



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.

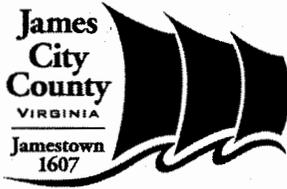
BMP NUMBER: JR048

DATE VERIFIED: September 28, 2012

QUALITY ASSURANCE TECHNICIAN: Leah Hardenbergh

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA



Stormwater Division

MEMORANDUM

Date: March 23, 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: JR048
PIN: 3630200001C
Owner Name (if known): GREENSPRINGS WEST
Legal Property Description: PARCEL 1 WILLIAMSBURG NATIONAL;
PREVIOUSLY SWM/BMP FACILITY P-1
GREENSPRINGS WEST
Site Address: ADJACENT TO 4023 SHADOW LANE

(For internal use only):

Box # 1

Agreements (in file as of scan date): Y **Book or Doc #:** 050007304 (050009304?)/060028906

Contents for Stormwater Management Facilities As-built Files

Each file is to contain:

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

COUNTY OF JAMES CITY, VIRGINIA

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 17 day of NOVEMBER, 2006,
between WILLIAMSBURG NATIONAL, LLC, and
all successors in interest, ("COVENANTOR(S),") owner(s) of the following property:

Parcel Identification Number: 3630200001C
Legal Description: PARCEL 1, WILLIAMSBURG NATIONAL
Project or Subdivision Name: GREENSPRINGS WEST, PHASE 1
Document No. 05009304
OR Deed Book _____, Page No. _____,
and the County of James City, Virginia ("COUNTY.")

WITNESSETH:

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

1. The COVENANTOR(S) shall provide maintenance for the drainage system including any runoff control facilities, conveyance systems and associated easements, hereinafter referred to as the "SYSTEM," located on and serving the above-described property to ensure that the SYSTEM is and remains in proper working condition in accordance with approved design standards, and with the law and applicable executive regulations. The SYSTEM shall not include any elements located within any Virginia Department of Transportation rights-of-way.
2. If necessary, the COVENANTOR(S) shall levy regular or special assessments against all present or subsequent owners of property served by the SYSTEM to ensure that the SYSTEM is properly maintained.
3. The COVENANTOR(S) shall provide and maintain perpetual access from public right-of-ways to the SYSTEM for the COUNTY, its agent and its contractor.
4. The COVENANTOR(S) shall grant the COUNTY, its agent and its contractor a right of entry to the SYSTEM for the purpose of inspecting, monitoring, operating, installing, constructing, reconstructing, maintaining or repairing the SYSTEM.
5. If, after reasonable notice by the COUNTY, the COVENANTOR(S) shall fail to maintain the SYSTEM in accordance with the approved design standards and with the law and applicable executive regulations, the COUNTY may perform all necessary repair or maintenance

Instrument # 060028906

Page 1 of 3

Revised 05/06

Recorded on Dec. 5, 2006

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.

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.

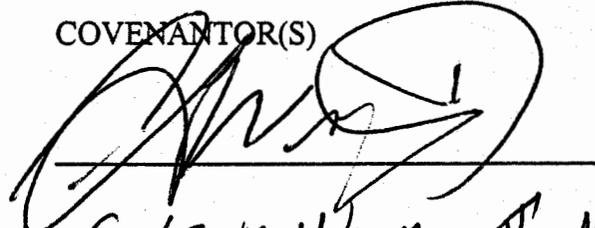
7. The COVENANTOR(s) shall promptly notify the COUNTY when the COVENANTOR(S) legally transfers any of the COVENANTOR(S)' responsibilities for the SYSTEM. The COVENANTOR(S)' shall supply the COUNTY with a copy of any document of transfer, executed by both parties.

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)



Print Name/Title

C. LEWIS WALTRIP, II, MGR

ATTEST:



COVENANTOR(S)

Print Name/Title

ATTEST:

COMMONWEALTH OF VIRGINIA

CITY/COUNTY OF James City

I hereby certify that on this 17 day of Nov, 2006, before the subscribed, a Notary Public for the Commonwealth of Virginia, personally appeared C. Lewis Waltrip, II and did acknowledge the foregoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 17 day of NOVEMBER, 2006.

[Signature]
Notary Public

My Commission expires: 9/30/07

Approved as to form:

[Signature]
Ass't. County Attorney

This Declaration of Covenants prepared by:

ROBERT OLVER
(Print Name)

SIR OF DEVEL
(Title)

213 WGRAM RD
(Address)

WMBG, VA 23186
(City) (State) (Zip)

220-0456
(Phone Number)

drainage1.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: Greensprings West, Phase I
Structure/BMP Name: Lake F Wet Pond (JR048)
Project Location: Centerville Rd at Manorgate Dr.
BMP Location: Manorgate Dr. at Longview Landing
County Plan No.: 46-1S - 18 - 1-1 99

Project Type: Residential Business Tax Map/Parcel No.: (46-1)(1-1)
 Commercial Office BMP ID Code (if known): JR048
 Institutional Industrial Zoning District:
 Public Roadway Land Use: R-4
 Other Site Area (sf or acres): 15.12

Brief Description of Stormwater Management/BMP Facility:
10 point wet pond design, with drainage area of post development of 154.9 acres.
Normal pool elevation of 56.00 with a storage capacity of 3,165,415 CF

Nearest Visible Landmark to SWM/BMP Facility: Greensprings West Lift Station

Nearest Vertical Ground Control (if known):
 JCC Geodetic Ground Control USGS Temporary Arbitrary Other
Station Number or Name: 315 and 315AZ
Datum or Reference Elevation:
Control Description:
Control Location from Subject Facility:

Section 2 - Stormwater Management / BMP Facility Construction Information:

PreConstruction Meeting Held for Construction of SWM/BMP Facility: Yes No Unknown
Approx. Construction Start Date for SWM/BMP Facility: June 1999
Facility Monitored by County Representative during Construction: Yes No Unknown
Name of Site Work Contractor Who Constructed Facility: C. Lewis Waltrip, II, Inc.
Name of Professional Firm Who Routinely Monitored Construction: ECS
Date of Completion for SWM/BMP Facility: August 1999
Date of Record Drawing/Construction Certification Submittal: January, 2001 / June 2003

(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: Jamestown, LLC
Mailing Address: 213 Ingram Rd
Williamsburg, Va 23188
Business Phone: 220-0856 Fax: 220-0916
Contact Person: Bob Oliver Title: Dir of Development

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 Rd, Ste 100
Williamsburg, Va 23185
Business Phone: 757-253-0040
Fax: 220-8994
Responsible Plan Preparer: Howard Price
Title: Project Manager
Plan Name: Greensprings West, Phase I
Firm's Project No. 8656-1
Plan Date: 2/26/99
Sheet No.'s Applicable to SWM/BMP Facility: 8 / 17 / / /

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

Name: C. Lewis Waltrip, II, Inc.
Mailing Address: PO Box 3522
Williamsburg, Va 23187
Business Phone: 253-1883
Fax: 253-0706
Contact Person: Wayne Reed
Site Foreman/Supervisor: Wayne Reed
Specialty Subcontractors & Purpose (for BMP Construction Only): _____

Section 4 - Professional Certifications:

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

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: Jamestown Mgmt Co, LLC
Mailing Address: 213 Ingram Rd
Williamsburg, Va 23188
Business Phone: 220-0856
Fax: 220-0916

Name: Robert M. Oliver
Title: Dir of Development
Signature: 
Date: 6/18/03

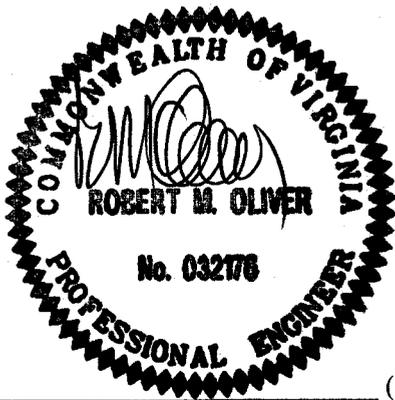
I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management / BMP facility. The facility appears to conform with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically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

Construction Certification

Firm Name: _____
Mailing Address: _____
Business Phone: _____
Fax: _____

Name: _____
Title: _____
Signature: _____
Date: _____

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

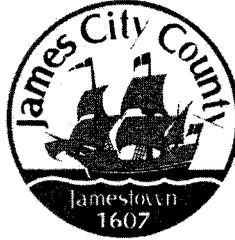


(Seal)

Virginia Registered Professional Engineer
or Certified Land Surveyor

(Seal)

Virginia Registered
Professional Engineer



**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: Greensprings West Phase I
 Structure/BMP Name: Wet Pond #1
 Project Location: Longview Landing
 BMP Location: Longview Landing
 County Plan No.: S-18-99

Project Type: Residential Business Tax Map/Parcel No.: 3630200001C
 Commercial Office BMP ID Code (if known): JR 048
 Institutional Industrial Zoning District: R4
 Public Roadway Land Use: _____
 Other _____ Site Area (sf or acres): 15.1 Acres

Brief Description of Stormwater Management/BMP Facility: THE WET POND IS LOCATED AT THE END OF MANOR GATE DRIVE AND ALONG LONGVIEW LANDING ROAD IN PHASE 1 OF GREENSPRINGS WEST. STORMWATER RUNOFF FROM THE SITE DRAINS PRIMARILY TO THE PROPOSED STORMWATER MANAGEMENT FACILITY WHICH IS DESIGNED TO HANDLE APPROXIMATELY 155 ACRES OF THE FUTURE SITE. THE REMAINDER OF THE PHASE I SITE DRAINS INTO AN EXISTING STORM SYSTEM WHICH EMPTIES INTO AN EXISTING BMP ON THE EAST SIDE.

Nearest Visible Landmark to SWM/BMP Facility: Greensprings West Phase I and Williamsburg National Golf Course

Nearest Vertical Ground Control (if known):
 JCC Geodetic Ground Control USGS Temporary Arbitrary Other
 Station Number or Name: 315
 Datum or Reference Elevation: 64.80
 Control Description: Concrete Monument
 Control Location from Subject Facility: Located approximately 900' south of the intersection of Centerville Road and Monticello Avenue.

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: July 2000
Facility Monitored by County Representative during Construction: Yes No Unknown
Name of Site Work Contractor Who Constructed Facility: Jamestown Contracting, LLC
Name of Professional Firm Who Routinely Monitored Construction: ECS
Date of Completion for SWM/BMP Facility: Oct 2000
Date of Record Drawing/Construction Certification Submittal: Feb 2007

(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: Jamestown, LLC
Mailing Address: 213 Ingram Road
Williamsburg, Virginia 23188
Business Phone: 757-220-0856 Fax: 220-0916
Contact Person: Bob Oliver Title: Dir of Development

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
Williamsburg, Va. 23188
Business Phone: 757-253-0040
Fax: 220-8994
Responsible Plan Preparer: G. Archer Marston, III
Title: Professional Engineer
Plan Name: Greensprings West Phase I
Firm's Project No. 8656-1
Plan Date: 2/26/99
Sheet No.'s Applicable to SWM/BMP Facility: 8 / 17 / _____ / _____ / _____

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

Name: Jamestown Contracting, LLC
Mailing Address: 213 Ingram Rd
Williamsburg, Virginia 23188
Business Phone: 220-0856
Fax: 220-0916
Contact Person: Bob Oliver
Site Foreman/Supervisor: Wayne Reed
Specialty Subcontractors & Purpose (for BMP Construction Only):

Section 4 – Professional Certifications:

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

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: AES Consulting Engineers
 Mailing Address: 5248 Olde Towne Road
Williamsburg, Va.
 Business Phone: 253-0040
 Fax: 220-8994

Name: G.T. Wilson, Jr.
 Title: Land Surveyor

Signature: *G.T. Wilson, Jr.*
 Date: 1/23/07

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

Construction Certification

Firm Name: ECS Mid-Atlantic, LLC
 Mailing Address: 108 Ingram Rd, suite 1
Williamsburg, VA 23185
 Business Phone: 229-6671
 Fax: 229-9978

Name: Michael J. Galli
 Title: principal Engineer

Signature: *Michael J. Galli*
 Date: 1/29/07

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



(Seal)

Virginia Registered Professional Engineer
 Or Certified Land Surveyor



(Seal)

Virginia Registered
 Professional Engineer

Record Drawing & Construction Certification
~~Interim Certification Review Checklist~~

NA

(Note: Consistent with plan review comments and/or Page 4 of the James City County Environmental Division, Stormwater Management/BMP Facilities, Record Drawing and Construction Certification, Standard Forms & Instructions, interim certification is required for BMP facilities which serve dual purpose as temporary sediment basins during construction and as permanent stormwater management / BMP facilities following construction. For these dual purpose facilities, construction certification is required once the temporary sediment basin phase of construction is complete. Interim certification is required for those dual purpose embankment-type facilities that are generally ten (10) feet or greater in dam height and may not be converted, modified or begin function as a permanent SWM / BMP structure for a period generally ranging from six (6) to eighteen (18) months or more from issuance of a Land-Disturbing permit for construction. Dam height as referenced above is generally defined as the vertical distance from the natural bed of the stream or waterway at the downstream toe of the embankment to the top of the embankment structure.)

Yes No

Record Drawings (Asbuilts):

- Top of dam elevation per plan. *D 61.65; AB 62*
- Finished contours or spot elevations reflect storage volume per plan. *YES*
- Riser arrangement, type, size and crest elevation per plan. *MODIFIED TO SET IN EMBANK AB ROUTING PROVIDED.*
- Barrel type, size and slope per plan. *60/24*
- NA* Temporary dewatering device/size shown.
- Asbuilt certification provided. *6/18/03*
- Standard forms (fully completed) provided. *3/11*

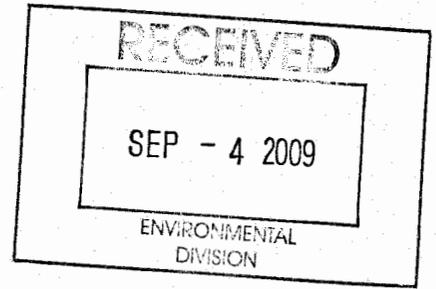
Construction Certification:

- Signed and sealed construction certification. *3/12/03*
- Optional - Field inspection, proctor and compaction test reports provided.

Construction (Field) Related:

Inspection Date/By: _____
 BMP Rating (1-5): _____

- Dam sideslopes per plan.
- Primary Structure - trash rack, riser and barrel in place per plan.
- Emergency spillway in place per plan.
- All flow control unobstructed of debris, sediment, vegetation and functional.
- Stabilization acceptable, especially top and side slopes of dam.
- No major seeps or dam slope erosion present.
- NA* Forebay(s) installed per plan.
- Outlet protection per plan.
- Low flow orifice installed, but temporarily blocked.
- Stormwater function appears acceptable.
- Structural integrity appears acceptable.

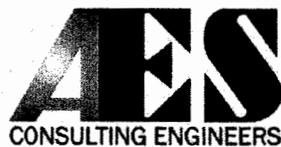


**Greensprings West
Phases IV-B and V**

**James City County Environmental
BMP Certification**

August 25, 2009

Prepared by:



AES Consulting Engineers

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



**James City County, Virginia
Environmental Division**

**Stormwater Management / BMP Facilities
Record Drawing and Construction Certification**

Standard Forms & Instructions

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*Issue Date
February 1, 2001*

Section 4 - Professional Certifications:

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

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: _____
Mailing Address: _____
Business Phone: _____
Fax: _____
Name: _____
Title: _____
Signature: _____
Date: _____

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

(Seal)
Virginia Registered Professional Engineer
or Certified Land Surveyor

Construction Certification

Firm Name: Engineering Consulting Services
Mailing Address: 108 Ingram Rd. Unit 1
Williamsburg, VA 23188
Business Phone: (757) 229-6677
Fax: (757) 229-9978
Name: Michael J. Galli
Title: Branch Manager
Signature: Michael J. Galli
Date: 3/21/03

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

(Seal)
Virginia Registered
Professional Engineer





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: Phase IV-B and V
Structure/BMP Name: 4B-1
Project Location: Greensprings West
BMP Location: Adjacent to St. James Park Road
County Plan No.: s _____ - 38 _____ - 04 _____

Project Type: Residential Business Tax Map/Parcel No.: _____
 Commercial Office BMP ID Code (if known): _____
 Institutional Industrial Zoning District: _____
 Public Roadway Land Use: _____
 Other _____ Site Area (sf or acres): _____

Brief Description of Stormwater Management/BMP Facility: This BMP is a JCC County Type A-3 facility.

Nearest Visible Landmark to SWM/BMP Facility: Intersection of Torrington trail and St. James Park Roads

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

Section 2 – Stormwater Management / BMP Facility Construction Information:

PreConstruction Meeting Held for Construction of SWM/BMP Facility: Yes No Unknown
Approx. Construction Start Date for SWM/BMP Facility: _____
Facility Monitored by County Representative during Construction: Yes No Unknown
Name of Site Work Contractor Who Constructed Facility: C. Lewis Waltrip
Name of Professional Firm Who Routinely Monitored Construction: _____
Date of Completion for SWM/BMP Facility: Approx. date of Completion 11-08-06
Date of Record Drawing/Construction Certification Submittal: April 2, 2008

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

Section 3 – Owner / Designer / Contractor Information:

Owner/Developer: *(Note: Site Owner or Applicant responsible for development of the project.)*
Name: Jamestown L.L.C.
Mailing Address: P.O. Box 3011
Williamsburg, Va. 23187
Business Phone: 757-253-1883 Fax: 757-220-0916
Contact Person: Mr. C. Lewis Waltrip II Title: _____

Design Professional: *(Note: Professional Engineer or Certified Land Surveyor responsible for the design and preparation of plans and specifications for the Stormwater Management / BMP facility.)*
Firm Name: AES Consulting Engineers
Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg, Va. 23188
Business Phone: 757-253-0040
Fax: 757-220-8994
Responsible Plan Preparer: James H. Bennett, P.E.
Title: Senior Project Manager
Plan Name: Greensprings West Phase IV-B nad V
Firm's Project No. 8656-13
Plan Date: 4/28/04
Sheet No.'s Applicable to SWM/BMP Facility: 16 / 21 / - / - / -

BMP Contractor: *(Note: Site Work Contractor directly responsible for construction of the Stormwater Management / BMP facility.)*
Name: Jamestown Development
Mailing Address: P.O. Box 3011
Williamsburg, Va. 23187
Business Phone: 757-253-1883
Fax: 757-220-0916
Contact Person: Mr. Robert Oliver, P.E.
Site Foreman/Supervisor: Mr. Robert Oliver, P.E.
Specialty Subcontractors & Purpose (for BMP Construction Only):

Section 4 – Professional Certifications:

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

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

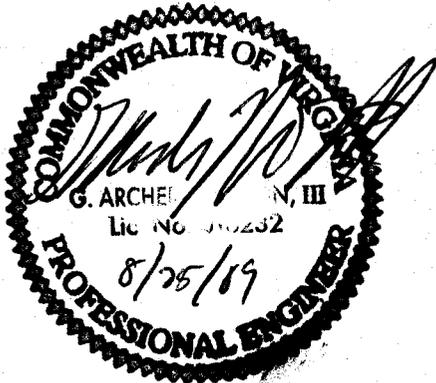
Record Drawing Certification

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

Name: Mr. G. Archer Marston, P.E.
Title: Vice President

Signature: *G. Archer Marston*
Date: 8/25/09

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



(Seal)

Virginia Registered Professional Engineer
Or Certified Land Surveyor

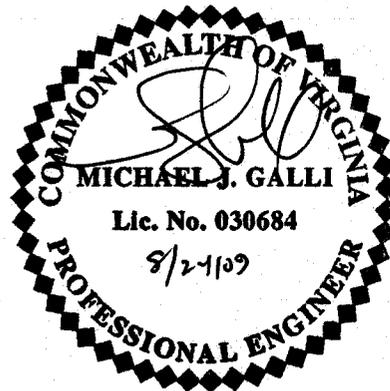
Construction Certification

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

Name: Michael J. Galli
Title: Principal Engineer

Signature: *Michael J. Galli*
Date: 8/24/09

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



(Seal)

Virginia Registered
Professional Engineer

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

- ❑ PreConstruction Meeting – Provides an opportunity to review SWM / BMP facility construction, maintenance and operation plans and address any questions regarding construction and/or monitoring of the structure. The design engineer, certifying professionals (if different), Owner/Applicant, Contractor and County representative(s) are encouraged to attend the preconstruction meeting. Advanced notice to the Environmental Division is requested. Usually, this requirement can be met simultaneously with Erosion and Sediment Control preconstruction meetings held for the project.
- ❑ A fully completed ***STORMWATER MANAGEMENT / BMP FACILITIES, RECORD DRAWING and CONSTRUCTION CERTIFICATION FORM and RECORD DRAWING CHECKLIST***. All applicable sections shall be completed in their entirety and certification statements signed and sealed by the registered professional responsible for individual record drawing and/or construction certification.
- ❑ The Record Drawing shall be prepared by a Registered Professional Engineer or Certified Land Surveyor for the drainage system of the project including any Best Management Practices.
- ❑ Construction Certification. Construction of Stormwater Management / BMP facilities which contain impoundments, embankments and related engineered appurtenances including subgrade preparation, compacted soils, structural fills, liners, geosynthetics, filters, seepage controls, cutoffs, toe drains, hydraulic flow control structures, etc. shall be visually observed and monitored by a Registered Professional Engineer or his/her authorized representative. The Engineer must certify that the structure, embankment and associated appurtenances were built in accordance with the approved design plan, specifications and stormwater management plan and standard accepted construction practice and shall submit a written certification and/or drawings to the Environmental Division as required. Soil and compaction test reports, concrete test reports, inspection reports, logs and other required construction material or installation documentation may be required by the Environmental Division to substantiate the certification, if specifically requested. The Engineer shall have the authority and responsibility to make minor changes to the approved plan, in coordination with the assigned County inspector, in order to compensate for unsafe or unusual conditions encountered during construction such as those related to bedrock, soils, groundwater, topography, etc. as long as changes do not adversely affect the integrity of the structure(s). Major changes to the approved design plan or structure must be reviewed and approved by the original design professional and the James City County Environmental Division.
- ❑ Record Drawing and Construction Certifications are required within **thirty (30) days** of the completion of Stormwater Management / BMP facility construction. Submittals must be reviewed and accepted by James City County Environmental Division prior to final inspection, acceptance and bond/surety release.

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

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

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

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

- ❑ Record Drawings shall provide, at a minimum, all information as shown within these requirements and the attached **RECORD DRAWING CHECKLIST** specific to the type of SWM/BMP facility being constructed. Other additional record data may be formally requested by the James City County Environmental Division. *(Note: Refer to the current edition of the James City County Guidelines for Design and Construction of Stormwater Management BMP's manual for a complete list of acceptable BMP's. Currently there are over 20 acceptable water quality type BMP's accepted by the County.)*
- ❑ Record Drawings shall consist of blue/black line prints and a reproducible (mylar, sepia, diazo, etc.) set of the approved stormwater management plan including applicable plan views, profiles, sections, details, maintenance plans, etc. as related to the subject SWM / BMP facility. The set shall indicate "**RECORD DRAWING**" in large text in the lower right hand corner of each sheet with record elevations, dimensions and data drawn in a clearly annotated format and/or boxed beside design values. Approved design plan values, dimensions and data shall not be removed or erased. Drawing sheet revision blocks shall be modified as required to indicate record drawing status. Elevations to the nearest 0.1' are sufficiently accurate except where higher accuracy is needed to show positive drainage. Certification statements as shown in Section 4 of the Record Drawing and Construction Certification Form, *or similar forms thereof*, and professional signatures and seals, with dates matching that of the record drawing status in the revision or title block, are also required on all associated record drawing plans, prints or reproducible.
- ❑ Submission Requirements. Initial and subsequent submissions for review shall consist of a minimum of one (1) blue/black line set for record drawings and one copy of the construction certification documents with appropriate transmittal. Under certain circumstances, it is understood that the record drawing and construction certification submissions may be performed by different professional firms. Therefore, record drawing submission may be in advance of construction certification or vice versa. Upon approval and prior to release of bond/surety, final submission shall include one (1) reproducible set of the record drawings, one (1) blue/black line set of the record drawings and one (1) copy of the construction certification. Also for current and/or future incorporation into the County BMP database and GIS system, it is requested that the record drawings also be submitted to the Environmental Division on a diskette or CD-ROM in an acceptable electronic file format such as *.dxf, *.dwg, etc. or in a standard scanned and readable format. The electronic file requirement can be discussed and coordinated with Environmental Division staff at the time of final submission.

STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

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

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

- XX 1. All constructed facilities meet approved design plans, unless otherwise shown. Record information or deviations from approved design plan shown in clearly annotated format and/or boxed beside design values.
- XX 2. Elevations to the nearest 0.1' unless higher accuracy is needed to show positive drainage.
- XX 3. All plan sheets labeled with "RECORD DRAWING" in large text in lower right hand corner (Approved County Plan Number and BMP ID Code can be included if known).
- XX 4. All plans sheet revision blocks modified to indicate date and record drawing status.
- XX 5. All plan sheets have certification statements and certifying professional's signature and seal.

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

- XX 1. All requirements of Section I (Methods and Presentation) apply to this section.
- XX 2. Plan Views: Show general location, arrangement and dimensions. Location and alignment shall generally match approved design plans.
- XX 3. Profile or elevations along top or berm of the facility. At a minimum, elevations are required at each end, at intervals not to exceed 50 feet and where low spots may be present. Top of embankment or berm elevations must be no less than design elevation plus any settlement allowances.
- XX 4. Top widths, berm widths and embankment side slopes.
- XX 5. Show length, width and depth of facility or grading, contours or spot elevations as required to verify permanent pool and design storage volumes were met or were reasonably close to the approved design. Evaluation of as-built grading, contours, spot elevations, or cross-sections, may be necessary by the professional to ensure approved design configurations, depths and volumes were closely maintained. If grading or elevations are significantly different from the approved plan, the Environmental Division shall be contacted immediately to determine whether the variation is acceptable or whether further evidence will be required. Facilities which do not closely resemble approved plan grades, elevations or configurations may require regrading by the Contractor; check volumetric computations; and/or a check hydraulic routing to ensure approved design water surface elevations, discharges or freeboard were closely maintained.
- XX 6. Cross-section of the embankment through the principal spillway or outlet barrel. Must extend at least 100 ft. downstream of the pipe outlet or to recorded site property line, whichever is closer. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the facility must reflect the required design storage volume(s) and/or design depth.
- XX 7. Profile or elevations along the entire centerline of the emergency spillway. Emergency spillway may be steeper, but no flatter or narrower than design.
- XX 8. Elevation of the principal spillway crest or outlet crest of the structure.

- XX 9. Primary control structure (riser) diameter or dimensions, height, type of material and base size. Indicate provisions for access that are present such as steps, ladders, etc.
- XX 10. Dimensions, locations and elevations of outlet orifices, weirs, slots and drains.
- XX 11. Type and size of anti-vortex and trash rack device. Height, diameter, dimensions, bar spacings (if applicable) and elevations relative to the principal spillway crest. Indicate if lockable hatch is present or not.
- XX 12. Type, location, size and number of anti-seep collars or documentation of other methods utilized for seepage control. **May need to obtain this information during construction.**
- XX 13. Top of impervious core embankment, core trench limits and elevation of cut-off trench bottom. **May need to obtain this information during construction.**
- XX 14. Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.
- XX 15. Outlet barrel diameter, length, slope, type and thickness class of material and type of flared end sections, headwall or endwall.
- XX 16. Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.
- 17. BMP interior and periphery landscaping zones conform with arrangements and requirements of the approved design plan.
- XX 18. Maintenance plan taken from approved design plan transposed onto record drawing set.
- N/A 19. Fencing location and type, if applicable to facility.
- XX 20. BMP vicinity properly cleaned of stockpiles and construction debris.
- XX 21. No visual signs of erosion or channel degradation immediately downstream of facility.
- XX 22. Any other information formally requested by the Environmental Division specific to the constructed SWM/BMP facility.

**STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST**

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

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.
- XX A5. Adequate fixed vertical sediment depth markers installed in the forebay(s) for future sediment monitoring purposes.
- N/A A6. Pond liner (if required) provided. Either clay liners, polyliners, bentonite liners or use of chemical soil additives based on requirements of the approved plan.
- XX A7. Minimum 6 percent slope safety bench extending a minimum of 15 feet outward from normal pool edge and/or an aquatic bench extending a minimum of 10 feet inward from the normal shoreline with a maximum depth of 12 inches below the normal pool elevation, if applicable, per the approved design plans. (Note: Safety benches may be waived if pond side slopes are no steeper than 4H:1V).
- XX A8. No trees are present within a zone 15 feet around the embankment toe and 25 feet from the principal spillway structure.
- XX A9. Wet permanent pool, typically 3 to 6 feet deep, is provided and maintains level within facility.
- N/A 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.
- XX A13. End walls above barrels (outlet pipe) greater than 48 inch in diameter are fenced to prevent a fall hazard.

STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

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

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

- N/A B1. Same requirements as Group A Wet Ponds.
- N/A B2. Minimum 2:1 length to width flow path provided across the facility.
- N/A B3. Micropool provided at or around outlet from BMP (generally 3 to 6 ft. deep).
- N/A B4. Wetland type landscaping provided in accordance with approved plan. Includes correct pondscaping zones, plant species, planting arrangements, wetland beds, etc. Wetland plants include 5 to 7 emergent wetland species. Individual plants at 18 inches on center in clumps.
- N/A B5. Adequate wetland buffer provided (Typically 25 ft. outward from maximum design water surface elevation and 15 ft. setback to structures).
- N/A B6. No more than one-half (1/2) of the wetland surface area is planted.
- N/A B7. Topsoil or wetland mulch provided to support vigorous growth of wetland plants.
- N/A B8. Planting zones staked or flagged in field and locations subsequently established by appropriate field surveying methods for record drawing presentation.

**STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST**

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

- V. **Group C – Infiltration Practices** (Includes C-1 Infiltration Trench; C-2 Infiltration Trench; C-3 Infiltration Basin; and C-4 Infiltration Basin)
- N/A C1. All requirements of Section II, Minimum Standards, apply to Group C facilities as applicable.
- N/A C2. Facility is not located on fill slopes or on natural ground in excess of six (6) percent.
- N/A C3. Pretreatment devices provided prior to entry into the infiltration facility. Acceptable pretreatment devices include sediment forebays, sediment basins, sediment traps, sump pits or inlets, grass channels, plunge pools or other acceptable measures.
- N/A C4. Three (3) or more of the following pretreatment devices provided to protect long term integrity of structure: grass channel; grass filter strip; bottom sand layer; upper filter fabric layer; use of washed bank run gravel aggregate.
- N/A C5. Sides of infiltration practice lined with filter fabric.
- N/A C6. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.
- N/A C7. Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.
- N/A C8. Minimum one hundred (100) foot separation horizontally from any known water supply well and minimum one hundred (100) foot separation upslope from any building.
- N/A C9. Minimum twenty-five (25) foot separation down gradient from any structure.
- N/A C10. Stormwater outfalls provided for overflow associated with larger design storms.
- N/A C11. No visual signs of erosion or channel degradation immediately downstream of facility.
- N/A C12. Facility does not currently cause any apparent surface or subsurface water problems to downgrade properties.
- N/A C13. Observation well provided.
- N/A C14. Adequate, direct access provided to the facility for future maintenance, operation and inspection.

STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

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

- VI. Group D – Filtering Systems** *Includes D-1 Bioretention Cells; D-2 Surface Sand Filters; D-3 Underground Sand Filters; D-4 Perimeter Sand Filters; D-5 Organic Filters; and D-6 Pocket Sand Filters)*
- N/A D1. All requirements of Section II, Minimum Standards, apply to Group D facilities.
- N/A D2. Sediment pretreatment devices provided.
- N/A D3. For D-1 BMPs (Bioretention Cells), pretreatment consisting of a grass filter strip below level spreader (deflector); a gravel diaphragm; and mulch and planting soil layers were provided.
- N/A D4. For D-1 BMPs (Bioretention Cells), plantings consist of native plant species; vegetation provided was based on zones of hydric tolerances; trees and understory of shrubs and herbaceous materials were provided; woody vegetation is absent from inflow locations; and trees are located around facility perimeter.
- N/A D5. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.
- N/A D6. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed.
- N/A D7. Filtering system is off-line from storm drainage conveyance system.
- N/A D8. Overflow outlet has adequate erosion protection.
- N/A D9. Deflector, diversion, flow splitter or regulator structure provided to divert the water quality volume to the filtering structure.
- N/A D10. Minimum four (4) inch perforated underdrain provided in a clean aggregate envelope layer beneath the facility.
- N/A D11. Minimum fifty (50) foot separation from any slope fifteen (15) percent or greater. Minimum one hundred (100) foot separation horizontally from any known water supply well. Minimum one hundred (100) foot separation upslope and twenty-five (25) foot separation downslope from any building.
- N/A D12. Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.
- N/A D13. No visual signs of erosion or channel degradation immediately downstream of facility.
- N/A D14. Adequate, direct access provided to the pretreatment area and/or filter bed for future maintenance.

**STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST**

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

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

- N/A E1. All requirements of Section II, Minimum Standards, apply to Group E facilities as applicable.
- N/A E2. Open channel system has constructed longitudinal slope of less than four (4) percent.
- N/A E3. No visual signs of erosion in the open channel system's soil and/or vegetative cover.
- N/A E4. Open channel side slopes are no steeper than 2H:1V at any location. Preferred channel sideslope is 3H:1V or flatter.
- N/A E5. No visual signs of ponding are present at any location in the open channel system, except at rock check dam locations for E-1 systems (Wet Swales).
- N/A E6. For E-2 BMPs (Dry Swales), an underdrain system was provided.
- N/A E7. Treated timber or rock check dams provided as pretreatment devices for the open channel system.
- N/A E8. Gravel diaphragm provided in areas where lateral sheet flow from impervious surfaces are directly connected to the open channel system.
- N/A E9. Grass cover/stabilization in the open channel system appears adaptable to the specific soils and hydric conditions for the site and along the channel system.
- N/A E10. Open channel system areas with grass covers higher than four (4) to six (6) inches were properly mowed.
- N/A E11. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.
- N/A E12. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed and no adverse affects to the function of the facility are anticipated.
- N/A E13. For E-3 BMPs (Biofilters), the bottom width is six (6) feet maximum at any location.
- N/A E14. For E-3 BMPs (Biofilters), sideslopes are 3H:1V maximum at any location.
- N/A E15. For E-3 BMPs (Biofilters), the constructed channel slope is less than or equal to three (3) percent at any location.
- N/A E16. For E-3 BMPs (Biofilters), the constructed grass channel is approximately equivalent to the constructed roadway length.

STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

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

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

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

**STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST**

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

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

- N/A G1. All requirements of Section II, Minimum Standards, apply to Group G facilities as applicable.
- N/A G2. Constructed impervious areas appear to conform with locations indicated on the approved plan and appear less than sixty (60) percent impervious in accordance with the requirements of the James City County Chesapeake Bay Preservation Ordinance.
- N/A G3. Dedicated open space areas are in undisturbed common areas, conservation easements or are protected by other enforceable instruments that ensures perpetual protection.
- N/A G4. Provisions included to clearly specify how the natural vegetated areas utilized as dedicated open space will be managed and field identified (marked).
- N/A G5. Adequate protection measures were implemented during construction to protect the defined dedicated open space areas.
- N/A G6. Dedicated open space areas were not disturbed during construction (ie. cleared, grubbed or graded).

STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

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

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

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

- N/A SD1. All requirements of Section II, Minimum Standards, apply to Storm Drainage Systems.
- N/A SD2. Horizontal location of all pipe and structures relative to the SWM/BMP facility.
- N/A SD3. Type, top elevation and invert elevation of all access type structures (inlets, manholes, etc.).
- N/A SD4. Material type, size or diameter, class, invert elevations, lengths and slopes for all pipe segments.
- N/A SD5. Class, length, width and depth of riprap and outlet protections or dimensions of special energy dissipation structures.

XII. Other Systems

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

- N/A O1. All requirements of Section II, Minimum Standards, apply to this section.
- N/A O2. Certification criteria to be determined on a case-by-case basis by the Environmental Division specific to the proposed SWM/BMP facility.

STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

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

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

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

LETTER OF TRANSMITTAL

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

ATTN: Mr. Bill Cain, P.E.

CO.: James City County Env. Div.

Address:

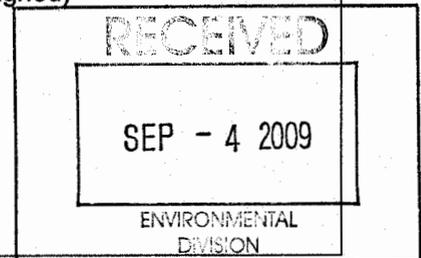
cc:

DATE 9-04-09	JOB NO. 8656-13
FROM: Rick Smith	
RE Greensprings West Phase IV-B & V BMP as-builts certification	

WE ARE SENDING YOU THE FOLLOWING ITEMS:

- Attached
 Under separate cover via
 Original(s) Print(s) Plan(s) Specification(s) Change Order
 Copy of letter(s) Other:

COPIES	DATE	No. of Pages	DESCRIPTION
2	4-08-08		BMP Certification Package (Sealed and signed)



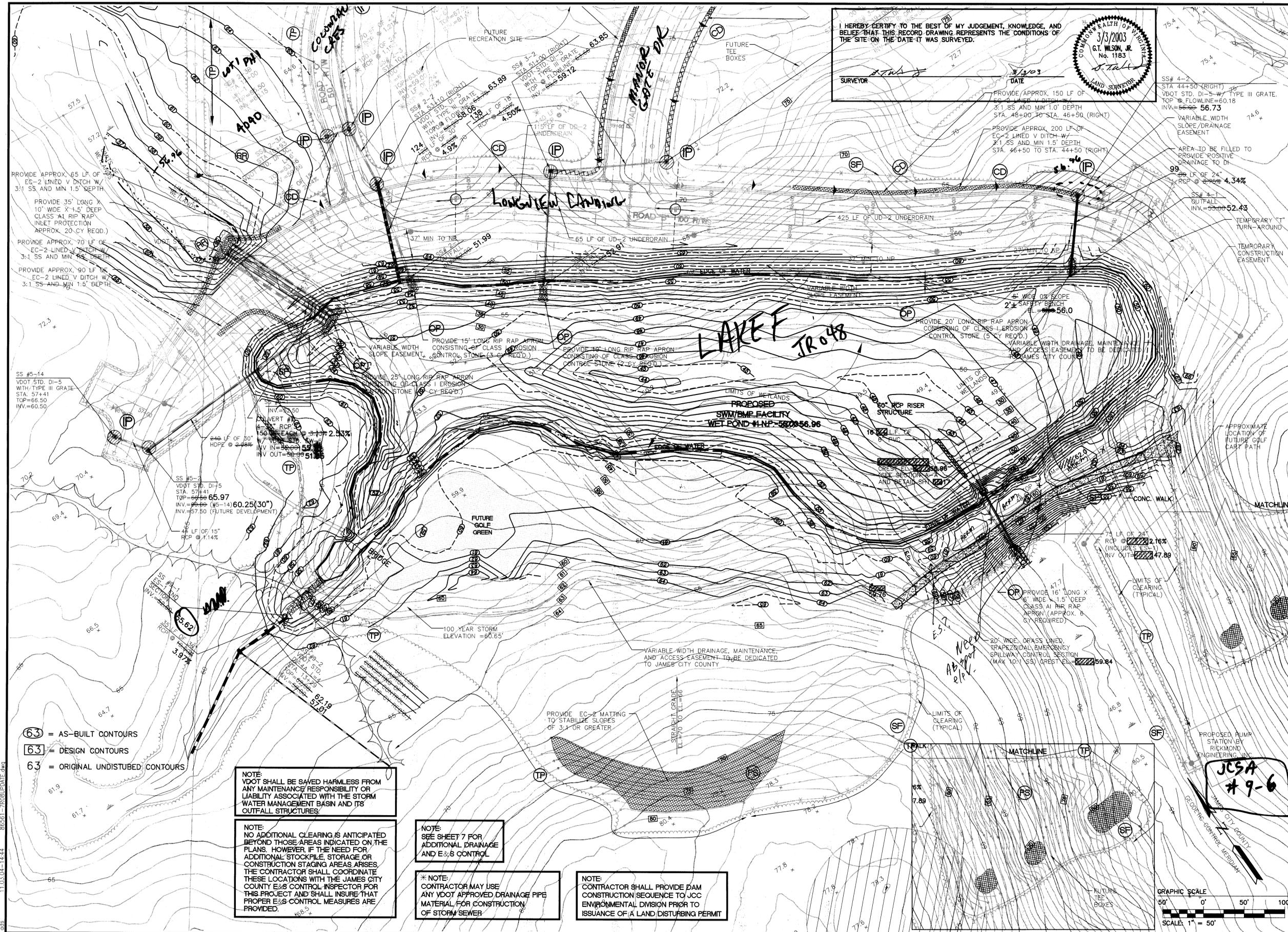
THESE ARE TRANSMITTED as checked below:

- For your approval For your signature For review and comment
 For your use As you requested As requested by:
 Other:

REMARKS:

Bill,
 This is the sealed and signed certification documents.
 Rick Smith

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



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.

SURVEYOR: *G.T. Wilson, Jr.* DATE: 3/3/03

COMMONWEALTH OF VIRGINIA
 3/3/2003
 G.T. WILSON, JR.
 No. 1183
 LAND SURVEYOR

PROVIDE APPROX. 65 LF OF EC-2 LINED V DITCH W/ 3:1 SS AND MIN 1.5' DEPTH

PROVIDE 35' LONG X 10" WIDE X 1.5' DEEP CLASS A1 RIP RAP INLET PROTECTION APPROX. 20 CY REQ'D.

PROVIDE APPROX. 70 LF OF EC-2 LINED V DITCH W/ 3:1 SS AND MIN 1.5' DEPTH

PROVIDE APPROX. 90 LF OF EC-2 LINED V DITCH W/ 3:1 SS AND MIN 1.5' DEPTH

PROVIDE APPROX. 150 LF OF EC-2 LINED V DITCH W/ 3:1 SS AND MIN 1.0' DEPTH STA. 45+00 TO STA. 46+50 (RIGHT)

PROVIDE APPROX. 200 LF OF EC-2 LINED V DITCH W/ 3:1 SS AND MIN 1.5' DEPTH STA. 46+50 TO STA. 44+50 (RIGHT)

VARIABLE WIDTH SLOPE/DRAINAGE EASEMENT

AREA TO BE FILLED TO PROVIDE POSITIVE DRAINAGE TO DITCH

99' LF OF 24" RCP @ 4.34% SLOPE

GUTFALL INV. = 52.43

TEMPORARY "T" TURN-AROUND

TEMPORARY CONSTRUCTION EASEMENT

SS #5-14
 VDOT STD. DI-5 WITH TYPE III GRATE STA. 57+41 TOP=66.50 INV.=60.50

SS #5-2
 VDOT STD. DI-5 STA. 57+41 TOP=66.50 INV.=60.50 (FUTURE DEVELOPMENT)

SS #5-14
 VDOT STD. DI-5 WITH TYPE III GRATE STA. 57+41 TOP=66.50 INV.=60.50

63 = AS-BUILT CONTOURS
 63 = DESIGN CONTOURS
 63 = ORIGINAL UNDISTURBED CONTOURS

NOTE: VDOT SHALL BE SAVED HARMLESS FROM ANY MAINTENANCE/RESPONSIBILITY OR LIABILITY ASSOCIATED WITH THE STORM WATER MANAGEMENT BASIN AND ITS OUTFALL STRUCTURES.

NOTE: NO ADDITIONAL CLEARING IS ANTICIPATED BEYOND THOSE AREAS INDICATED ON THE PLANS. HOWEVER, IF THE NEED FOR ADDITIONAL STOCKPILE, STORAGE OR CONSTRUCTION STAGING AREAS ARISES, THE CONTRACTOR SHALL COORDINATE THESE LOCATIONS WITH THE JAMES CITY COUNTY E&S CONTROL INSPECTOR FOR THIS PROJECT AND SHALL INSURE THAT PROPER E&S CONTROL MEASURES ARE PROVIDED.

NOTE: SEE SHEET 7 FOR ADDITIONAL DRAINAGE AND E&S CONTROL

* NOTE: CONTRACTOR MAY USE ANY VDOT APPROVED DRAINAGE PIPE MATERIAL FOR CONSTRUCTION OF STORM/SEWER

NOTE: CONTRACTOR SHALL PROVIDE DAM CONSTRUCTION SEQUENCE TO JCC ENVIRONMENTAL DIVISION PRIOR TO ISSUANCE OF A LAND DISTURBING PERMIT

NO.	DATE	REVISION / COMMENT / NOTE
1	5/1/99	REVISION PER JCC COMMENTS
2	5/2/99	REVISION PER JCC COMMENTS
3	6/15/99	REVISION PER JCC COMMENTS
4	6/15/99	REVISION PER JCC COMMENTS
5	7/20/01	UPDATE POND AS-BUILT
6	3/2/03	UPDATE POND AS-BUILT



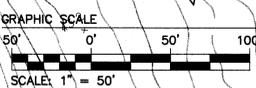
5248 Olde Towne Road, Suite 1
 Williamsburg, Virginia 23188
 (757) 253-0040
 Fax (757) 220-8994

CONSULTING ENGINEERS

DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN GREENSPRINGS WEST PHASE I

OWNER/DEVELOPER: JAMESTOWN LLC
 JAMES CITY COUNTY, VIRGINIA

Designed: HWP/CWG
 Scale: 1"=50'
 Drawn: KEG
 Date: 2/26/99
 Project No.: 8656-1
 Drawing No.: 8 OF 19



S-18-99; JR048 AS-BUILT DRAWING-1/10/01 SJT REVIEW SET

UPDATED 3/3/03

EROSION & SEDIMENT CONTROL NARRATIVE

PROJECT DESCRIPTION:

THE PROPOSED GREENSPRINGS WEST, PHASE I SITE CONSISTS OF 15.12 ACRES ON CENTERVILLE ROAD (ROUTE 614) ACROSS THE STREET FROM FRANCOIS BERKELEY IN JAMES CITY COUNTY, VIRGINIA.

EXISTING SITE CONDITIONS:

THE SITE IS HEAVILY WOODED. STORMWATER RUNOFF FROM THE SITE DRAINS PRIMARILY TO THE PROPOSED STORMWATER MANAGEMENT FACILITY WHICH IS DESIGNED TO HANDLE APPROXIMATELY 155 ACRES OF THE FUTURE SITE. THE REMAINDER OF THE PHASE I SITE DRAINS INTO AN EXISTING STORM SYSTEM WHICH EMPTIES INTO AN EXISTING BMP ON THE EAST SIDE.

SOILS:

THE SOIL CONSERVATION SERVICE HAS IDENTIFIED THIS SITE AS CONTAINING SOIL TYPES "5", "11C", "14B", "15D", "15E", "17", "19B", AND "29A".

CRITICAL AREAS:

TO PREVENT EROSION, A STORMWATER MANAGEMENT FACILITY, INLET PROTECTION, SEEDING AND MATING, AND CHECK DAMS HAVE BEEN PROVIDED.

EROSION AND SEDIMENT CONTROL MEASURES:

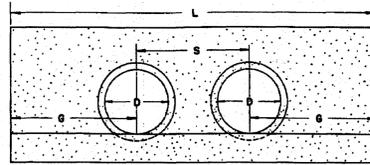
IN ADDITION TO THE MEASURES UTILIZED FOR THE CRITICAL AREAS OF THE SITE, SILT FENCE HAS BEEN PROVIDED TO PREVENT SILT-LADEN RUNOFF FROM REACHING ADJOINING AREAS. A CONSTRUCTION ENTRANCE HAS ALSO BEEN PROVIDED.

PERMANENT STABILIZATION:

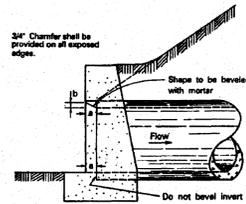
PERMANENT SEEDING WILL BE USED TO STABILIZE THE SITE AFTER CONSTRUCTION IS COMPLETE. A SCHEDULE HAS BEEN PROVIDED IN THE CONSTRUCTION PLAN SET.

STORMWATER RUNOFF CONSIDERATIONS:

STORMWATER RUNOFF FROM THE DEVELOPED SITE FOR THE 2-YEAR AND 10-YEAR STORM EVENTS WILL BE COLLECTED AND ATTENUATED IN THE PROPOSED STORMWATER MANAGEMENT POND. ABOVE THE N.P. ELEVATION 56.0, THE POND RELEASES TO THE NATURAL DRAINAGE PATTERN AT RATES LESS THAN THAT OF THE PRE-DEVELOPMENT RATES. THE 2-YEAR STORM RELEASES AT 37.00 CFS IN THE POST DEVELOPMENT CONDITION COMPARED TO 40.10 CFS IN THE PRE-DEVELOPMENT CONDITION. THE 10-YEAR STORM EVENT RELEASES AT 42.90 CFS IN THE POST DEVELOPMENT CONDITION COMPARED TO 110.30 CFS IN THE PRE-DEVELOPMENT CONDITION.



FRONT ELEVATION



SIDE ELEVATION

Note: On shallow fills, where endwalls are 1' or less below shoulder line, the top of the endwall shall be constructed parallel to the grade of the road.
This item may be precast or cast in place.
In no case shall top of endwall project above fill slope, ditch slope or shoulder.

This Sid to be used with straight crossings and skew angles to 15°. All cast in place concrete to be Class A3. For precast see Sheet 101.12.
Quantities given are for one endwall. All dimensions not given in table are same as those for single endwalls for same size of pipe.

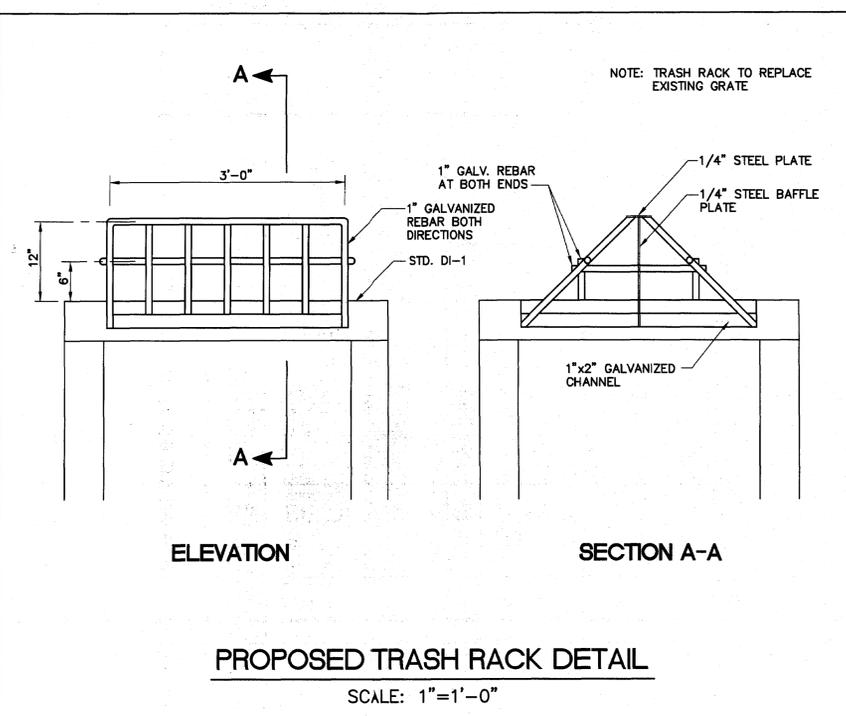
FOR CONCRETE PIPE								FOR CORRUGATED METAL PIPE							
Diameter Of Pipe	S	G	L	Cu. Yds. Concrete One Endwall	Increase Cu. Yds. For Each Additional Pipe	a	b	Diameter Of Pipe	S	G	L	Cu. Yds. Concrete One Endwall	Increase Cu. Yds. For Each Additional Pipe	a	b
12"	1'-0"	2'-0"	5'-0"	0.329	0.088	0'-2"	0'-1 1/4"	12"	1'-7"	2'-0"	5'-7"	0.344	0.087	0'-2"	0'-1 1/4"
15"	2'-3"	2'-6"	7'-3"	0.671	0.179	0'-2"	0'-1 1/4"	15"	1'-11"	2'-6"	6'-11"	0.696	0.175	0'-2"	0'-1 1/4"
18"	2'-8"	3'-0"	8'-6"	0.941	0.244	0'-2 1/2"	0'-1 1/2"	18"	2'-4"	3'-0"	6'-4"	0.980	0.241	0'-2 1/2"	0'-1 1/2"
21" or 24"	3'-6"	4'-0"	11'-6"	1.783	0.444	0'-3"	0'-2"	24"	3'-1"	4'-0"	11'-1"	1.840	0.442	0'-3"	0'-2"
27" or 30"	4'-4"	5'-0"	14'-4"	2.730	0.663	0'-4"	0'-2 1/2"	27" or 30"	3'-10"	5'-0"	13'-10"	2.868	0.670	0'-4"	0'-2 1/2"
33" or 36"	5'-2"	6'-0"	17'-2"	3.854	0.907	0'-4 1/2"	0'-3"	36"	4'-7"	6'-0"	16'-7"	4.076	0.931	0'-4 1/2"	0'-3"

Bevel edge is required on the headwall at the inlet end of the culvert (where the flow enters the culvert). Headwall at the outlet end of the culvert may be either square edge or bevel edge.

STANDARD ENDWALLS FOR MULTIPLE PIPE CULVERTS															
12"-36" PIPE															
VIRGINIA DEPARTMENT OF TRANSPORTATION															
SPECIFICATION REFERENCE															
105.04															
302															

EW-6

10111



PROPOSED TRASH RACK DETAIL

SCALE: 1"=1'-0"

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.

3/3/2003
G.T. WILSON, JR.
No. 1183
LAND SURVEYOR

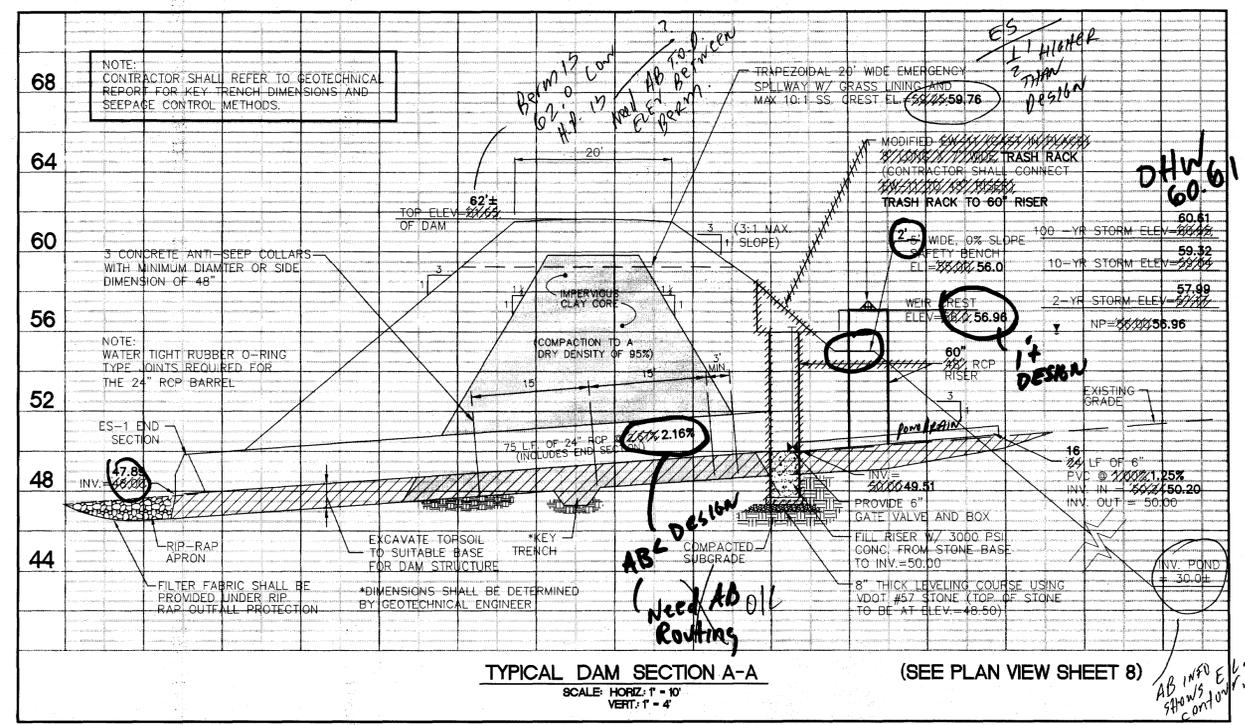
DATE: 3/3/03

DAM CONSTRUCTION NOTES

- A GEOTECHNICAL SUBSURFACE EXPLORATION AT THE PROPOSED DAM SITE HAS BEEN PERFORMED. THE GEOTECHNICAL REPORT SHALL BE SUBMITTED TO JAMES CITY COUNTY CODE COMPLIANCE AND THE CONTRACTOR. THE GEOTECHNICAL REPORT IS HEREBY MADE A PART OF THE DAM'S CONSTRUCTION SPECIFICATIONS. ADDITIONALLY, THE CONTRACTOR SHALL PROVIDE TESTING RESULTS FROM A PROFESSIONAL GEOTECHNICAL ENGINEER TO ENSURE PROPER MATERIALS AND DAM CONSTRUCTION METHODS ARE USED DURING CONSTRUCTION. IN ADDITION, AFTER CONSTRUCTION, THE PROFESSIONAL GEOTECHNICAL ENGINEER SHALL ALSO SUBMIT A LETTER TO JAMES CITY COUNTY CERTIFYING THAT THE DAM WAS BUILT IN ACCORDANCE WITH APPROVED PLANS, SPECIFICATIONS, AND GEOTECHNICAL REPORT.
- SITE PREPARATION: THE CONTRACTOR SHALL STRIP ALL AREAS OF THE PERMANENT CONSTRUCTION TO REMOVE ALL UNSUITABLE MATERIALS. THE UNSUITABLE MATERIALS TO BE REMOVED BY STRIPPING SHALL INCLUDE ALL TOPSOIL, DEBRIS AND VEGETABLE MATTER, INCLUDING STUMPS AND ROOTS, AND ALL OTHER MATERIALS WHICH MAY BE UNSUITABLE FOR USE IN THE PERMANENT CONSTRUCTION. THE EMBANKMENT SHALL BE KEYED INTO THE UNDISTURBED (EXISTING) SOIL STRATUM. EMBANKMENT SHOULD BE KEYED AS SPECIFIED BY THE GEOTECHNICAL ENGINEER. THE EMBANKMENT FOUNDATION AND ABUTMENTS SHALL BEAR ON FIRM AND STABLE EXISTING SUB GRADE WHICH HAS BEEN PREPARED SO AS TO REMOVE ALL ORGANIC, LOOSE, AND GENERALLY UNSUITABLE MATERIAL. ALL MATERIALS TO BE USED FOR BACK FILL OR COMPACTED FILL SHALL BE INSPECTED AND, IF NECESSARY, TESTED BY THE GEOTECHNICAL ENGINEER IN ACCORDANCE WITH ASTM D2487 PRIOR TO PLACEMENT TO DETERMINE IF THEY ARE SUITABLE FOR THE INTENDED USE. THE FILL MATERIAL SHALL BE TAKEN FROM APPROVED BORROW AREAS. IT SHALL BE CLEAN MINERAL SOIL, FREE OF ROOTS, WOOD VEGETATION, OVERSIZED STONES, ROCKS, OR OTHER OBJECTIONABLE MATERIAL. SOILS WHICH ARE APPROVAL FOR THE CONSTRUCTION OF THE IMPERVIOUS CLAY CORE, AS DEFINED BY THE UNIFIED SOIL CLASSIFICATION SYSTEM, ARE CH, INORGANIC CLAYS OF HIGH PLASTICITY; CL, INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY; GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS; SC, (WITH GEOTECHNICAL ENGINEERS APPROVAL) CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES. MATERIALS TO BE USED FOR THE CONSTRUCTION OF THE SHELL SHALL BE SELECT BACK FILL FREE OF STUMPS, ROOTS, ROCKS, TRASH, ETC. AND SHALL BE MORE PERVIOUS THAN THE IMPERVIOUS CLAY CORE. AREAS ON WHICH FILL IS TO BE PLACED SHALL BE SCARIFIED A MINIMUM DEPTH OF 4 INCHES PRIOR TO PLACEMENT OF FILL. THE FILL MATERIAL'S MOISTURE CONTENT SHALL BE +3 TO -2 PERCENTAGE POINTS OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D2216 (I.E. IN GENERAL THE FILL MATERIAL SHOULD CONTAIN SUFFICIENT MOISTURE SO THAT IT CAN BE FORMED INTO A BALL WITHOUT CRUMBLING. IF WATER CAN BE SQUEEZED OUT OF THE BALL, IT IS TOO WET FOR PROPER COMPACTION). FILL MATERIAL WILL BE PLACED IN 6 TO 8-INCH CONTINUOUS LAYERS OVER THE ENTIRE LENGTH OF THE FILL. FIRST LIFT ON SUB GRADE
- MAY BE PLACED AT A DEPTH UP TO 36 INCHES TO BRIDGE SUB GRADE WITH GREATER THAN OPTIMUM MOISTURE CONTENT. COMPACTION, AS NOTED ON PLAN, SHALL BE OBTAINED GENERALLY BY USING A SHEEPSFOOT COMPACTOR. FINISHED GRADES SHALL BE MERGED INTO THE EXISTING GRADES.
- CUTOFF TRENCH/KEY TRENCH: THE TRENCH SHALL BE EXCAVATED ALONG THE CENTERLINE OF THE DAM. THE WIDTH AND DEPTH SHALL BE AS DETERMINED BY THE GEOTECHNICAL ENGINEER. THE MIN. BOTTOM WIDTH SHALL BE WIDE ENOUGH TO PERMIT OPERATION OF COMPACTION EQUIPMENT. THE SIDE SLOPES SHALL BE NO STEEPER THAN 1:1. COMPACTION REQUIREMENTS SHALL BE THE SAME AS THOSE FOR THE EMBANKMENT. THE TRENCH SHALL BE KEPT DRAINED DURING THE BACKFILLING-COMPACTING OPERATIONS.
- SEEPAGE CONTROL: THE GEOTECHNICAL ENGINEER SHALL RECOMMEND A SEEPAGE CONTROL METHOD IN THE GEOTECHNICAL REPORT.
- PRINCIPAL SPILLWAY: THE BOTTOM OF THE SPILLWAY RISER FOUNDATION BASE EXCAVATION SHALL BE OBSERVED BY THE GEOTECHNICAL ENGINEER TO ENSURE THAT ALL UNSUITABLE AND LOOSE MATERIALS ARE REMOVED AND THAT ACCEPTABLE BEARING CONDITIONS EXIST IN THE FOUNDATION'S BASE. ALL JOINTS IN THE PRINCIPAL SPILLWAY STRUCTURE SHALL BE OF WATERTIGHT CONSTRUCTION. PERVIOUS MATERIALS SUCH AS SAND, GRAVEL OR CRUSHED STONE SHALL NOT BE USED AS BACK FILL AROUND THE BARREL. FILL MATERIAL SHALL BE PLACED AROUND THE PIPE IN 4-INCH LAYERS AND COMPACTED BY HAND TO THE SAME DENSITY AS THE EMBANKMENT. A MINIMUM OF TWO FEET OF FILL SHALL BE HAND-COMPACTED OVER THE BARREL BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT. VEGETATIVE STABILIZATION: FINAL VEGETATIVE COVER (STABILIZATION) SHALL CONSIST OF TOP SOILING, LIMING, FERTILIZING, SEEDING, AND MULCHING TO ASSURE A FIRM STAND OF GRASS AS SOON AS PRACTICAL. SEDIMENT BASINS AND OTHER TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED ONLY WHEN STABILIZATION IS COMPLETE. FINAL VEGETAL COVER SHALL BE PROVIDED IN ACCORDANCE WITH THE FOLLOWING:
TOPSOIL: AT LEAST 2" THICKNESS OBTAINED FROM STOCKPILES ON SITE, FREE OF LARGE DEBRIS.
LIME: 4,000#/ACRE (90#/1,000 S.F.)
SEED: KENTUCKY 31 TALL FESCUE 250#/ACRE (6#/1,000 S.F.)
FERTILIZER: 10/20/10 MIX, 1,000#/ACRE (25#/1,000 S.F.)
MULCH: STRAW OR HAY (LOCALLY OBTAINED) 4,000#/ACRE (90#/1,000 S.F.)

NOTE: CONTRACTOR SHALL PROVIDE DAM CONSTRUCTION SEQUENCE TO JCC ENVIRONMENTAL DIVISION PRIOR TO ISSUANCE OF A LAND DISTURBING PERMIT

INFORMATION SHOWN BELOW WAS COLLECTED ON 1/10/2001 AND PRIOR TO FILLING OF POND.



TYPICAL DAM SECTION A-A

(SEE PLAN VIEW SHEET 8)

SCALE: HORIZ: 1"=10'
VERT: 1"=4'

NO.	DATE	REVISION / COMMENT / NOTE
1	5/7/98	
2	12/27/98	REVISION PER JCC ENVIRONMENTAL COMMENTS
3	6/18/99	REVISION PER JCC ENVIRONMENTAL COMMENTS
4	1/10/01	REVISION PER JCC ENVIRONMENTAL COMMENTS
5	3/3/03	UPDATE POND AS-BUILT

SEAL OF THE BOARD OF PROFESSIONAL ENGINEERS AND SURVEYORS OF THE STATE OF VIRGINIA

G. ARCHER MARSH III
No. 00832
1/10/01
PROFESSIONAL ENGINEER

SEAL OF THE BOARD OF PROFESSIONAL ENGINEERS AND SURVEYORS OF THE STATE OF VIRGINIA

G.T. WILSON, JR.
No. 1183
3/3/2003
LAND SURVEYOR

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



NOTES AND DETAILS
GREENSPRINGS WEST
PHASE I

OWNER/DEVELOPER: JAMESTOWN LLC
JAMES CITY COUNTY, VIRGINIA

Designed: AES
Drawn: AES
Scale: NONE
Date: 2/26/99

Project No.: 8656-1
Drawing No.: 17 OF 19

Jamestown Management Co., LLC

213 Ingram Road
 Williamsburg, Virginia 23188
 (O) (757) 220-0856
 (F) (757) 220-0916

LETTER OF TRANSMITTAL

DATE: January 30, 2007	JOB NO.
ATTENTION: Scott Thompson ^{AS}	
RE: Greensprings West BMP	

JR048
5-18-99

To JCC

- WE ARE SENDING YOU
- | | |
|---|--|
| <input checked="" type="checkbox"/> Attached | <input type="checkbox"/> Under Separate cover via _____ the following items: |
| <input checked="" type="checkbox"/> Shop Drawings | <input checked="" type="checkbox"/> Prints |
| <input type="checkbox"/> Copy of Letter | <input type="checkbox"/> Change Order |
| | <input type="checkbox"/> Plans |
| | <input type="checkbox"/> Samples |
| | <input type="checkbox"/> Specifications |

COPIES	DATE	NO.	DESCRIPTION
1			Construction cert
1			As-built plans
1			Set Calculations
			Asbuilt Roofings
			Revised Asbuilt cert ↓ Const cert Asbuilt roofings for new viser.

THESE ARE TRANSMITTED as checked below:

- | | | |
|--|---|---|
| <input checked="" type="checkbox"/> For Approval | <input type="checkbox"/> Approved as submitted | <input type="checkbox"/> Resubmit _____ copies for approval |
| <input type="checkbox"/> For your use | <input type="checkbox"/> Approved as noted | <input type="checkbox"/> Submit _____ copies for distribution |
| <input type="checkbox"/> As requested | <input type="checkbox"/> Return for corrections | <input type="checkbox"/> Return _____ corrected prints |
| <input type="checkbox"/> For review and comment | <input type="checkbox"/> _____ | |
| <input type="checkbox"/> FOR BIDS DUE _____ | <input type="checkbox"/> PRINTS RETURNED AFTER LOAN TO US | |

REMARKS

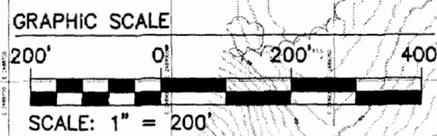
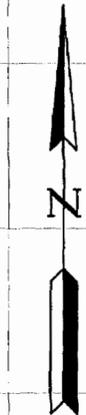
COPY TO _____

SIGNED: _____



Bob Oliver, P.E.

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



PRE-DEVELOPMENT DA.=153.3 AC.
POST-DEVELOPMENT DA.=154.8 AC.

3,550 L.F.
FLOW PATH
AVG. SLOPE=0.7%

CULVERT #1
4-36" RCP'S
DA=73.2 AC

POST-DEVELOPMENT
DRAINAGE AREA

PRE-DEVELOPMENT
DRAINAGE AREA

POST-DEVELOPMENT
DRAINAGE AREA

WET POND #1
NP=58.0

BRICK BAT ROAD

ROAD C

ROAD A

ROAD B

CENTERVILLE ROAD

FRANCIS BERKELEY

OLD CENTERVILLE RD



CONSULTING ENGINEERS

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

OVERALL DRAINAGE AREA MAP
GREENSPRINGS WEST
PHASE 1

Designed ACH	Drawn CJS
Scale 1"=200'	Date 2/19/99
Project No. 8656-01	
Drawing No. 1	

GREENSPRINGS WEST - PHASE I

OWNER/DEVELOPER: JAMESTOWN LLC

JAMES CITY COUNTY, VIRGINIA

JCC SP# 5-18-99



COUNTY OF JAMES CITY
FINAL SUBDIVISION

APPROVALS	DATE
Fire Dept. PP/MMM	5-15-99
Health Dept. VJ/MMM	5-10-99
VDOT BOB/MMM	8-4-99
Planning MWM	8-21-99
Env. Div. DC/MMM	8-16-99
J.C. DP/MMM	8-23-99
C. City	
Other	

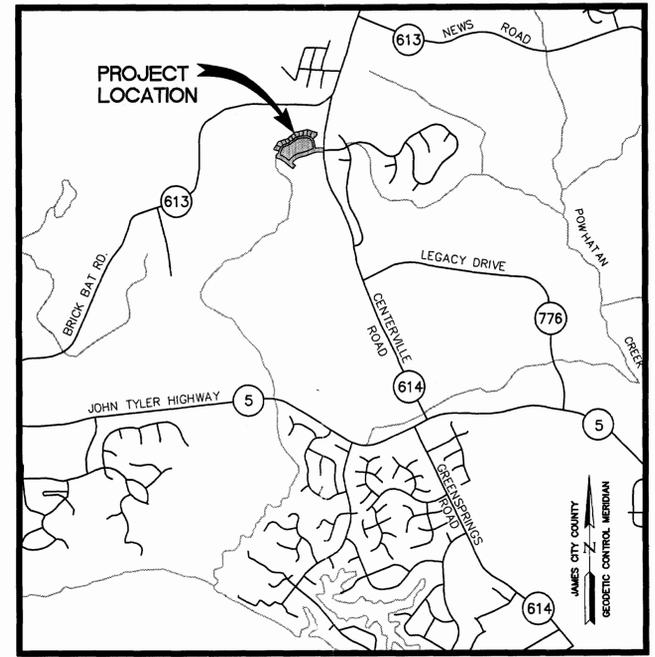
S-18-99

INDEX OF SHEETS

SHEET NUMBER	DESCRIPTION
COVER	COVER SHEET
2	PRELIMINARY PLAT
3	OVERALL UTILITY PLAN
4	ROAD AND UTILITY PLAN
5	ROAD AND UTILITY PLAN
6	DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
7	DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
8	ROAD AND UTILITY PROFILES
9	ROAD AND UTILITY PROFILES
10	ROAD AND UTILITY PROFILE
11	SANITARY SEWER PROFILES
12	TURN LANE
13	ENVIRONMENTAL INVENTORY
14	NOTES AND DETAILS
15	NOTES AND DETAILS
16	NOTES AND DETAILS
17	STANDARD SANITARY DETAILS
18	STANDARD WATER DETAILS

GENERAL NOTES

- THIS PROPERTY IS ZONED R-4, RESIDENTIAL PLANNED COMMUNITY.
- FOR THIS DEVELOPMENT, THERE ARE NO MINIMUM LOT WIDTHS OR AREA REQUIREMENTS.
- NO LESS THAN FORTY PERCENT (40%) OF THE GROSS AREAS OF AN OPEN SPACE DEVELOPMENT SHALL BE RESERVED AS AN OPEN SPACE, INCLUDING RECREATIONAL SPACE, WHICH SHALL BE MAINTAINED FOR THE BENEFIT OF THE RESIDENTS.
- ACCORDING TO FLOOD INSURANCE RATE MAP (F.I.R.M.) NUMBER 510201 0030 B, THE SITE IS RATED ZONE X, WHICH IS OUTSIDE THE 500 YEAR FLOOD PLAIN.
- CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING MISS UTILITY FOR EXISTING UTILITY LOCATIONS PRIOR TO COMMENCING CONSTRUCTION.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF CONSTRUCTION EFFORTS WITH THE VIRGINIA POWER COMPANY, BELL ATLANTIC TELEPHONE, APPROPRIATE CABLE COMPANY AND OTHERS THAT MAY BE REQUIRED.
- THE CONTRACTOR SHALL SATISFY HIMSELF AS TO ALL SITE CONDITIONS PRIOR TO CONSTRUCTION.
- THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS PRIOR TO COMMENCEMENT OF WORK TO INCLUDE, BUT NOT LIMITED TO, JAMES CITY COUNTY LAND DISTURBANCE AND VDOT CE-7. RESEARCH HAS SHOWN NO EVIDENCE OF ENVIRONMENTAL OR HEALTH HAZARDS ON THIS SITE.
- ALL LOTS WILL BE SERVED BY PUBLIC WATER AND SEWER FACILITIES.
- ALL UTILITIES WILL BE PLACED UNDERGROUND.
- A PRECONSTRUCTION CONFERENCE SHALL BE HELD ON-SITE BETWEEN THE COUNTY, THE PROJECT ENGINEERS AND THE CONTRACTOR PRIOR TO ISSUANCE OF A LAND DISTURBING PERMIT.
- NO BUILDING SHALL BE BUILT WITH IN 100 FEET OF THE PUMP STATION WET WELL.
- ALL SANITARY SEWER FACILITIES MUST HAVE A 5 FOOT MINIMUM HORIZONTAL SEPARATION DISTANCE BETWEEN IT AND ALL OTHER FIXED STRUCTURES, SUCH AS: DROP INLETS, FIRE HYDRANTS, LIGHT POLES, WATERLINE FACILITIES (GENERALLY DESIRE A MINIMUM OF 10 FEET PER STATE HEALTH DEPARTMENT REGULATIONS) AND STORM SEWER PIPES, ETC.
- ANY OLD WELLS THAT MAY BE ON SITE THAT WILL NOT BE USED SHALL BE PROPERLY ABANDONED ACCORDING TO STATE PRIVATE WELL REGULATIONS.
- THIS PROPERTY IS IN FIRM ZONE "X" AS SHOWN ON COMMUNITY PANEL 510201-0030B, 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.
- DEVELOPER: JAMESTOWN LLC
P.O. BOX 3011
WILLIAMSBURG, VA 23187
757-253-1883
IN CARE OF C. LEWIS WALTRIP, II



LOCATION MAP SCALE: 1"=2000'

DATE: FEBRUARY 26, 1999
REVISED MAY 20, 1999
PROJECT NO: 8656 - 1

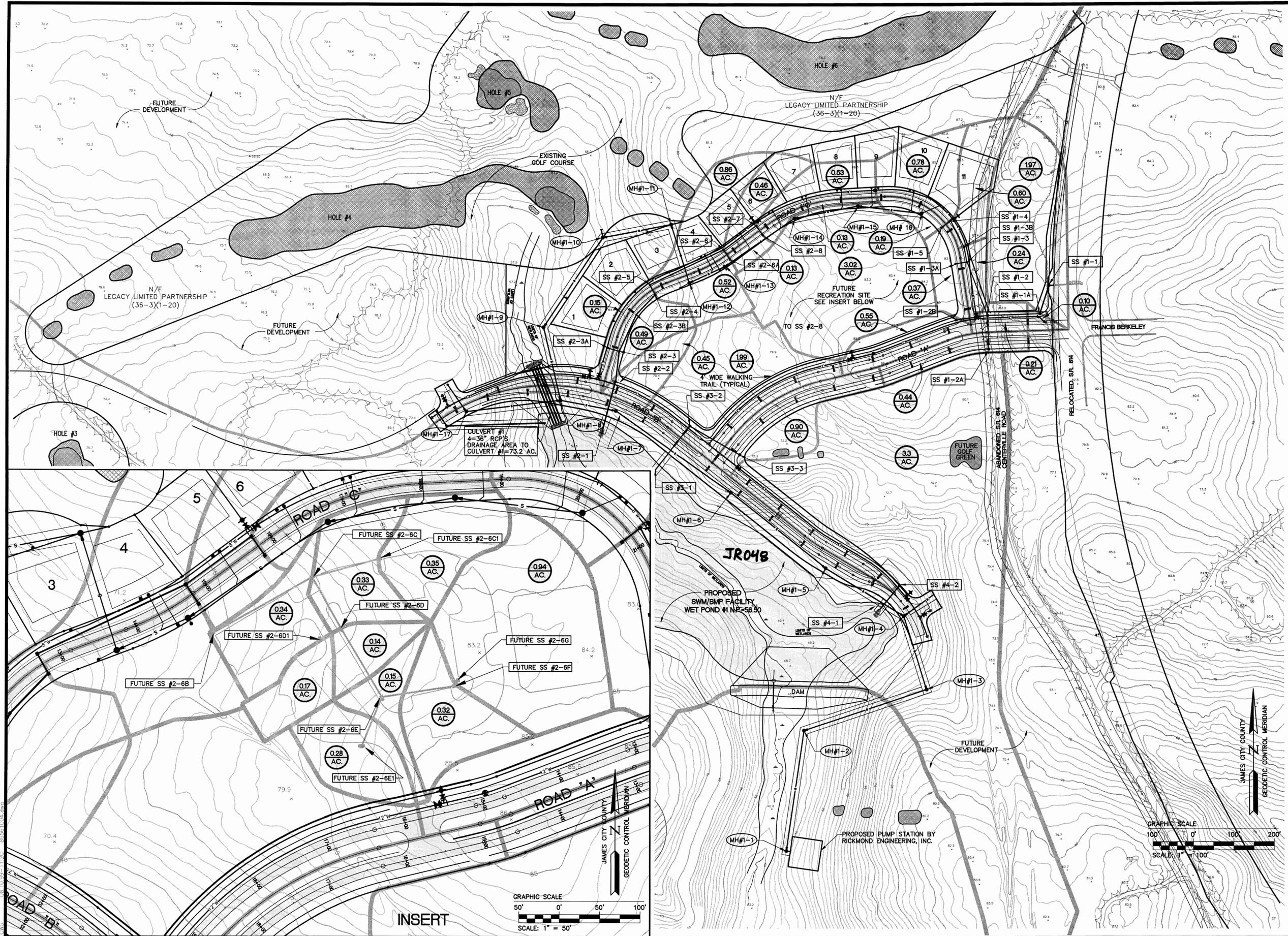


ES CONSULTING ENGINEERS
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
Fax (757) 220-8994

LEGEND

EXISTING		PROPOSED
— EX. W —	WATER	— W —
— EX. S —	SANITARY SEWER	— S —
— EX. FM —	STORM SEWER	— S.M. —
— EX. FM —	FORCE MAIN	— F.M. —
— O —	MANHOLE	— ● —
— □ —	CURB DROP INLET	— □ —
— □ —	YARD DROP INLET	— □ —
— ▽ —	FLARED END SECTION	— ▽ —
— V —	VALVE	— V —
— ⊕ —	FIRE HYDRANT ASSEMBLY	— ⊕ —
— ⊕ —	BLOW-OFF VALVE	— ⊕ —
— ⊕ —	AIR RELEASE ASSEMBLY	— ⊕ —
— ⊕ —	CLEAN OUT	— ⊕ —
— ⊕ —	WATER METER	— ⊕ —
— ⊕ —	STREETLIGHT	— ⊕ —
— — — — —	CENTERLINE/BASELINE	— — — — —
— — — — —	RIGHT OF WAY	— — — — —
— — — — —	PROPERTY LINE	— — — — —
— — — — —	□ DITCH/SWALE	— — — — —
— — — — —	CONCRETE LINED DITCH	— — — — —
— — — — —	EC-3 LINED DITCH	— — — — —
— — — — —	EXISTING TREELINE	— — — — —
— — — — —	LIMITS OF CLEARING	— — — — —
— — — — —	SILT FENCE	— — — — —
— — — — —	INLET PROTECTION	— — — — —
— — — — —	CHECK DAM	— — — — —
— — — — —	STRAW BALE BARRIER	— — — — —
— — — — —	RIP RAP	— — — — —
— — — — —	REVERSE ROLL TOP GUTTER	— — — — —
— — — — —	GROUND ELEVATION	— — — — —
— — — — —	PROPOSED TOP OF CURB ELEV.	— — — — —
— — — — —	GRADING LINE TIE-IN	— — — — —
— — — — —	EXISTING CONTOUR ELEV.	— — — — —
— — — — —	PROPOSED CONTOUR ELEV.	— — — — —
— — — — —	GRADING BY OTHERS	— — — — —

No.	DATE	REVISION / COMMENT / NOTE	BY
3	6/18/99	REVISION PER VDOT COMMENTS	HWP
2	5/20/99	REVISION PER JCC ENVIRONMENTAL COMMENTS	CAH
1	5/1/99	REVISION PER JCC COMMENTS	HWP



No.	DATE	REVISION / COMMENT / NOTE
4	8/10/99	REVISION PER PLANNING COMMENTS
3	8/19/99	REVISION PER VDOT COMMENTS
2	5/20/99	REVISION PER JCC ENVIRONMENTAL COMMENTS
1	5/7/99	REVISION PER JCC COMMENTS



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



OVERALL UTILITY PLAN
GREENSPRINGS WEST
PHASE 1
 OWNER/DEVELOPER: JAMESTOWN LLC
 JAMES CITY COUNTY, VIRGINIA

Designed HWP/CWG	Drawn KEG
Scale 1"=100'	Date 2/26/99
Project No. 8656-1	
Drawing No. 4 OF 19	

C:\WORK\8656\1\04.dwg

NOTE:
NO ADDITIONAL CLEARING IS ANTICIPATED BEYOND THOSE AREAS INDICATED ON THE PLANS. HOWEVER, IF THE NEED FOR ADDITIONAL STOCKPILE, STORAGE OR CONSTRUCTION STAGING AREAS ARISES, THE CONTRACTOR SHALL COORDINATE THESE LOCATIONS WITH THE JAMES CITY COUNTY E&S CONTROL INSPECTOR FOR THIS PROJECT AND SHALL INSURE THAT PROPER E&S CONTROL MEASURES ARE PROVIDED.

*** NOTE:**
CONTRACTOR MAY USE ANY VDOT APPROVED DRAINAGE PIPE MATERIAL FOR CONSTRUCTION OF STORM SEWER

CONSTRUCTION SEQUENCING

ENSURE THAT THE CONSTRUCTION ENTRANCE HAS BEEN INSTALLED FOR THE ENTIRE DEVELOPMENT.

INSTALL THE SEDIMENT BASIN FOR THE ENTIRE PROJECT. INSTALL THE SILT FENCE AROUND PROPOSED BMP.

CLEAR THE SITE AND REMOVE THE TOPSOIL.

ROUGH GRADE ROADS.

INSTALL ALL UNDERGROUND UTILITIES.

INSTALL THE PROPOSED STORM DRAINAGE SYSTEM. INSTALL INLET PROTECTION OF AN APPROVED TYPE FOR THE NEW DRAINAGE STRUCTURES.

INSTALL CURB AND THE BACKFILL BEHIND THE CURB, THEN GRADE BEHIND THE CURB.

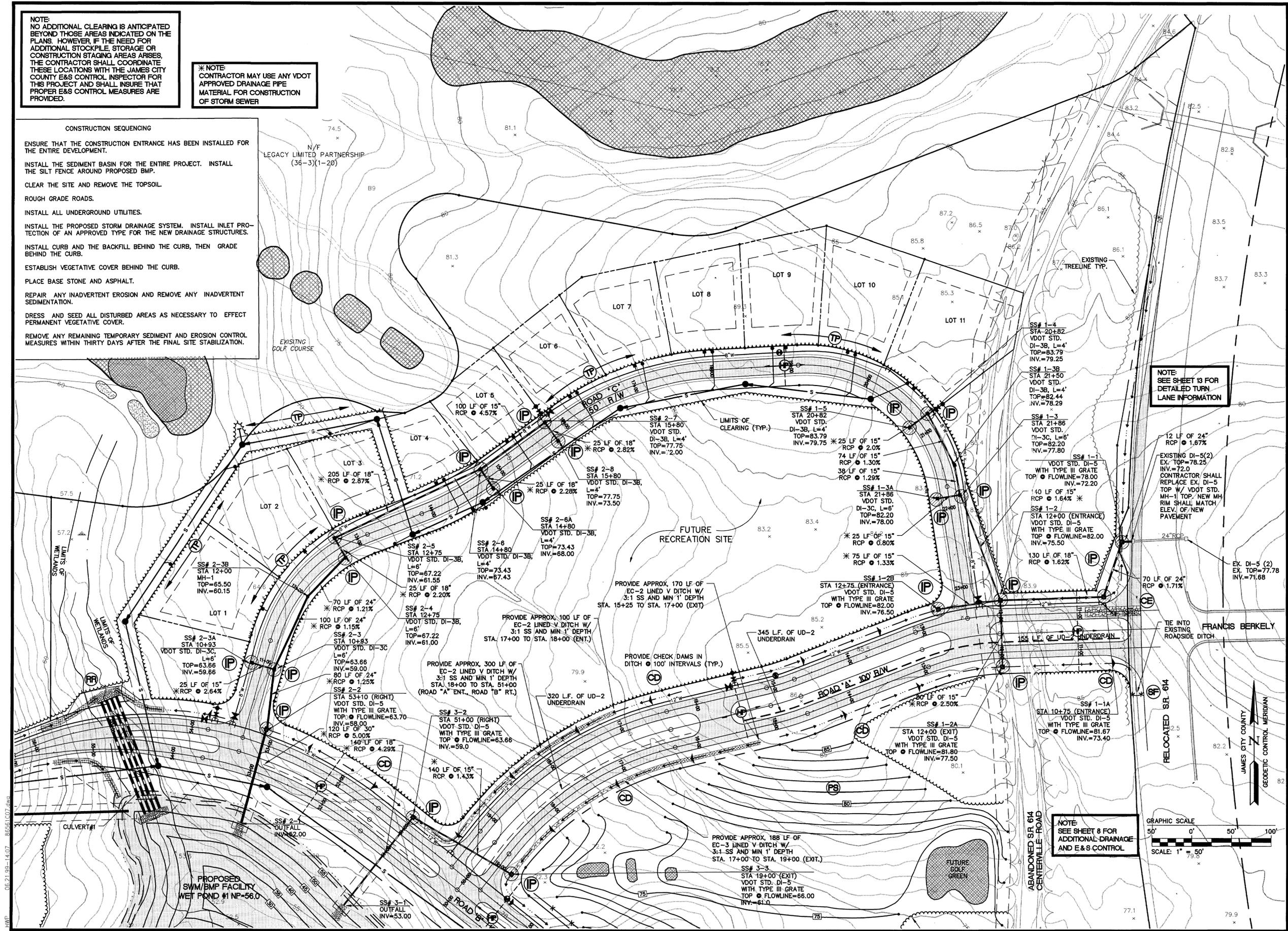
ESTABLISH VEGETATIVE COVER BEHIND THE CURB.

PLACE BASE STONE AND ASPHALT.

REPAIR ANY INADVERTENT EROSION AND REMOVE ANY INADVERTENT SEDIMENTATION.

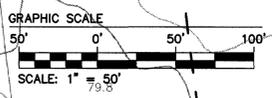
DRESS AND SEED ALL DISTURBED AREAS AS NECESSARY TO EFFECT PERMANENT VEGETATIVE COVER.

REMOVE ANY REMAINING TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES WITHIN THIRTY DAYS AFTER THE FINAL SITE STABILIZATION.



NOTE:
SEE SHEET 13 FOR DETAILED TURN LANE INFORMATION

NOTE:
SEE SHEET 8 FOR ADDITIONAL DRAINAGE AND E&S CONTROL



NO.	DATE	REVISION / COMMENT / NOTE
3	6/18/99	REVISION PER VDOT COMMENTS
2	5/20/99	REVISION PER ACC ENVIRONMENTAL COMMENTS
1	5/1/99	REVISION PER ACC COMMENTS



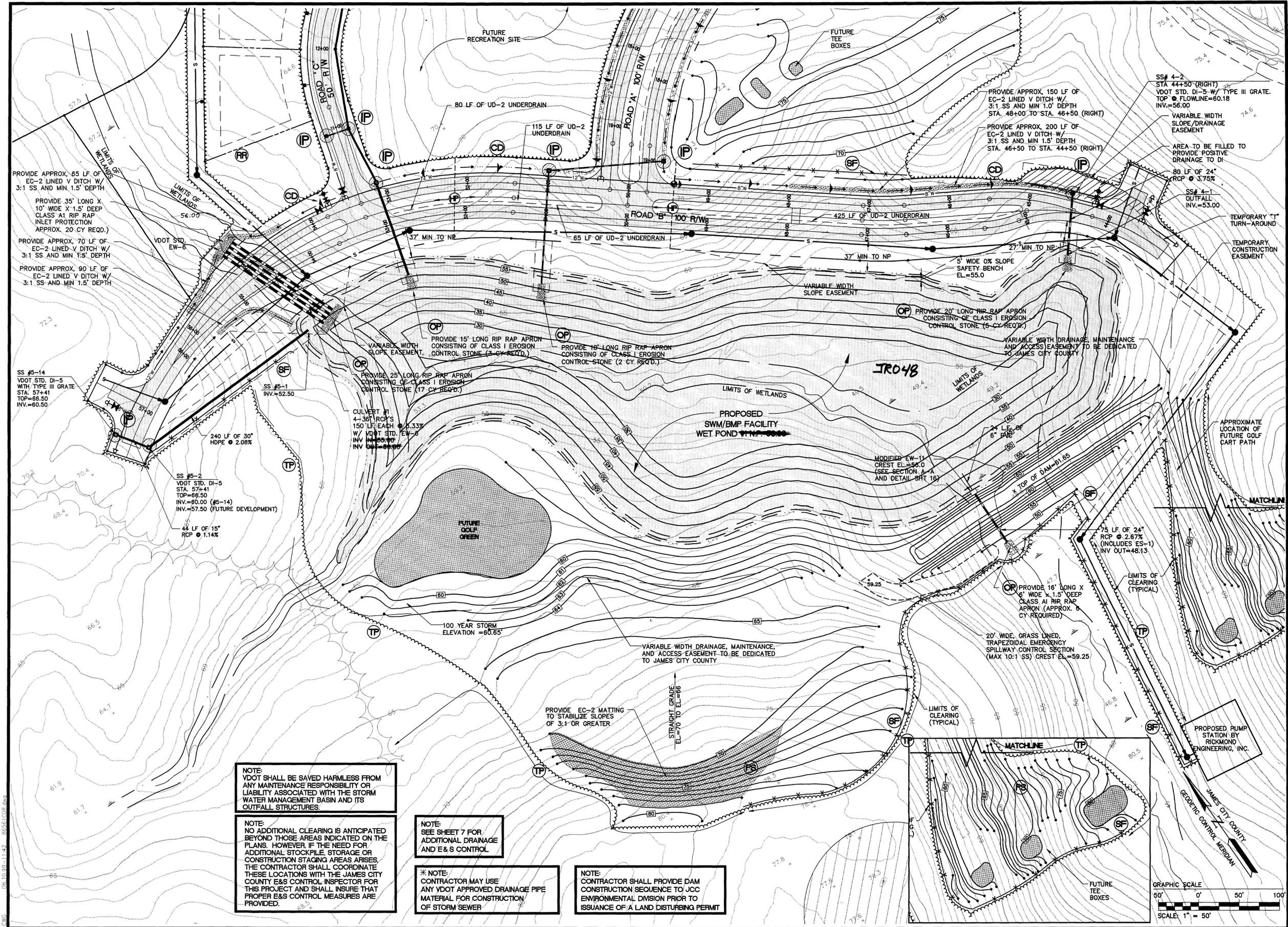
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Williamsburg, Virginia 23188
(757) 253-0040
Fax (757) 220-8994



DRAINAGE EROSION AND SEDIMENT CONTROL PLAN
GREENSPRINGS WEST PHASE I
OWNER/DEVELOPER: JAM'S TOWN LLC
JAMES CITY COUNTY, VIRGINIA

Designed	Drawn
HWP/CWG	KEG
Scale	Date
1"=50'	2/26/99
Project No.	
8656-1	
Drawing No.	
7 OF 19	

HWP 06.21.99-14.07 86561C07.dwg



NOTE:
VDOT SHALL BE SAVED HARMLESS FROM ANY MAINTENANCE RESPONSIBILITY OR LIABILITY ASSOCIATED WITH THE STORM WATER MANAGEMENT BASIN AND ITS OUTFALL STRUCTURES.

NOTE:
NO ADDITIONAL CLEARING IS ANTICIPATED BEYOND THOSE AREAS INDICATED ON THE PLANS. HOWEVER IF THE NEED FOR ADDITIONAL STOCKPILE, STORAGE OR CONSTRUCTION STAGING AREAS ARISES, THE CONTRACTOR SHALL COORDINATE THESE LOCATIONS WITH THE JAMES CITY COUNTY E&S CONTROL INSPECTOR FOR THIS PROJECT AND SHALL INSURE THAT PROPER E&S CONTROL MEASURES ARE PROVIDED.

NOTE:
SEE SHEET 7 FOR ADDITIONAL DRAINAGE AND E&S CONTROL

* NOTE:
CONTRACTOR MAY USE ANY VDOT APPROVED DRAINAGE PIPE MATERIAL FOR CONSTRUCTION OF STORM SEWER

NOTE:
CONTRACTOR SHALL PROVIDE DAM CONSTRUCTION SEQUENCE TO JCC ENVIRONMENTAL DIVISION PRIOR TO ISSUANCE OF A LAND DISTURBING PERMIT

NO.	DATE	REVISION / COMMENT / NOTE
1	5/01/99	HWP
2	5/20/99	REVISION PER JCC COMMENTS
3	6/18/99	REVISION PER VDOT COMMENTS
4	8/10/99	REVISION PER JCC COMMENTS



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



DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN GREENSPRINGS WEST PHASE I

OWNER/DEVELOPER: JAMESTOWN LLC
JAMES CITY COUNTY, VIRGINIA

Designed: HWP/CWG
Scale: 1"=50'
Drawn: KEG
Date: 2/26/99
Project No.: 8656-1
Drawing No.: 8 OF 19

CWC: 08.10.99=11.42 86561C08.dwg

EROSION & SEDIMENT CONTROL NARRATIVE

PROJECT DESCRIPTION:

THE PROPOSED GREENSPRINGS WEST, PHASE I SITE CONSISTS OF 15.12 ACRES ON CENTERVILLE ROAD (ROUTE 614) ACROSS THE STREET FROM FRANCIS BERKELEY IN JAMES CITY COUNTY, VIRGINIA.

EXISTING SITE CONDITIONS:

THE SITE IS HEAVILY WOODED. STORMWATER RUNOFF FROM THE SITE DRAINS PRIMARILY TO THE PROPOSED STORMWATER MANAGEMENT FACILITY WHICH IS DESIGNED TO HANDLE APPROXIMATELY 155 ACRES OF THE FUTURE SITE. THE REMAINDER OF THE PHASE I SITE DRAINS INTO AN EXISTING STORM SYSTEM WHICH EMPTIES INTO AN EXISTING BMP ON THE EAST SIDE.

SOILS:

THE SOIL CONSERVATION SERVICE HAS IDENTIFIED THIS SITE AS CONTAINING SOIL TYPES "5", "11C", "14B", "15D", "19E", "17", "19B", AND "29A".

CRITICAL AREAS:

TO PREVENT EROSION, A STORMWATER MANAGEMENT FACILITY, INLET PROTECTION, SEEDING AND MATING, AND CHECK DAMS HAVE BEEN PROVIDED.

EROSION AND SEDIMENT CONTROL MEASURES:

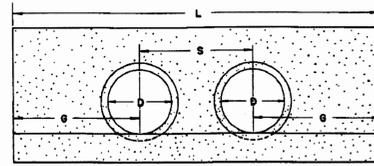
IN ADDITION TO THE MEASURES UTILIZED FOR THE CRITICAL AREAS OF THE SITE, SILT FENCE HAS BEEN PROVIDED TO PREVENT SILT-LADEN RUNOFF FROM REACHING ADJOINING AREAS. A CONSTRUCTION ENTRANCE HAS ALSO BEEN PROVIDED.

PERMANENT STABILIZATION:

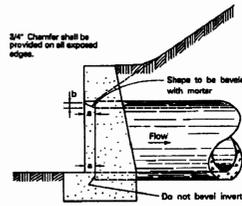
PERMANENT SEEDING WILL BE USED TO STABILIZE THE SITE AFTER CONSTRUCTION IS COMPLETE. A SCHEDULE HAS BEEN PROVIDED IN THE CONSTRUCTION PLAN SET.

STORMWATER RUNOFF CONSIDERATIONS:

STORMWATER RUNOFF FROM THE DEVELOPED SITE FOR THE 2-YEAR AND 10-YEAR STORM EVENTS WILL BE COLLECTED AND ATTENUATED IN THE PROPOSED STORMWATER MANAGEMENT POND. ABOVE THE N.P. ELEVATION 56.0, THE POND RELEASES TO THE NATURAL DRAINAGE PATTERN AT RATES LESS THAN THAT OF THE PRE-DEVELOPMENT RATES. THE 2-YEAR STORM RELEASES AT 37.00 CFS IN THE POST DEVELOPMENT CONDITION COMPARED TO 40.10 CFS IN THE PRE-DEVELOPMENT CONDITION. THE 10-YEAR STORM EVENT RELEASES AT 42.90 CFS IN THE POST DEVELOPMENT CONDITION COMPARED TO 110.30 CFS IN THE PRE-DEVELOPMENT CONDITION.



FRONT ELEVATION



SIDE ELEVATION

Note: On shallow fills, where endwalls are 1' or less below shoulder line, the top of the endwall shall be constructed parallel to the grade of the road.
This item may be precast or cast in place.
In no case shall top of endwall project above fill slope, ditch slope or shoulder.

This Skid to be used with straight crossings and skew angles to 15°. All cast in place concrete to be Class A3. For precast See Sheet 101.12.
Quantities given are for one endwall. All dimensions not given in table are same as those for single endwalls for same size of pipe.

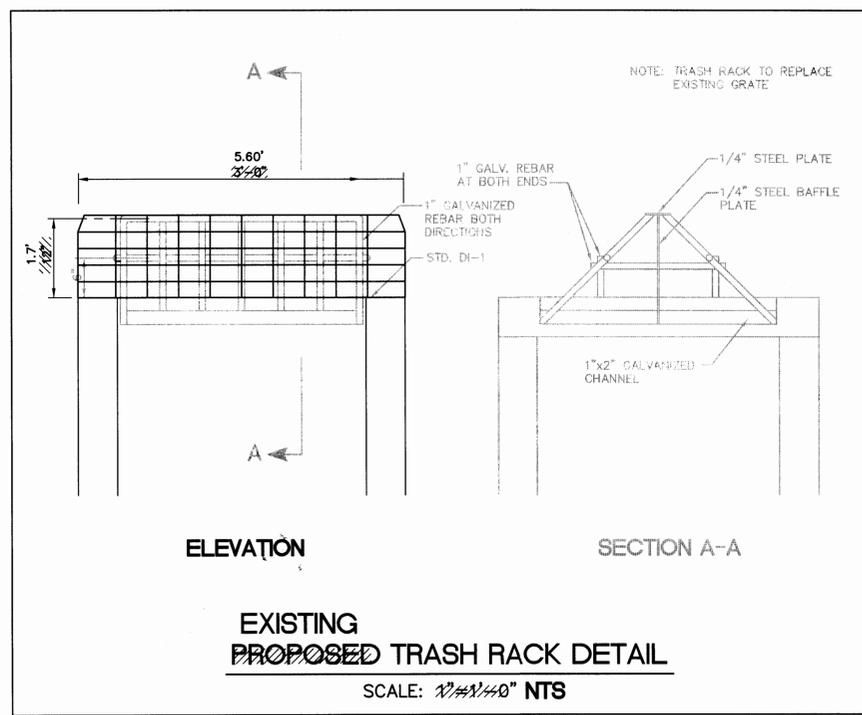
FOR CONCRETE PIPE								FOR CORRUGATED METAL PIPE															
Diameter Of Pipe	D	S	G	L	Ct. Yds. Concrete One Double Endwall	Increase Ct. Yds. For Each Additional Edge	a	b	Diameter Of Pipe	D	S	G	L	Ct. Yds. Concrete One Double Endwall	Increase Ct. Yds. For Each Additional Edge	a	b						
12"	1'-0"	2'-0"	5'-0"	0.329	0.088	0'-2"	0'-1 1/4"	12"	1'-7"	2'-0"	5'-7"	0.344	0.067	0'-2"	0'-1 1/4"	12"	1'-11"	2'-6"	6'-4"	0.696	0.175	0'-2"	0'-1 1/4"
15"	2'-3"	3'-0"	7'-3"	0.871	0.179	0'-2"	0'-1 1/4"	15"	2'-4"	3'-0"	8'-4"	0.980	0.241	0'-2 1/2"	0'-1 1/2"	15"	2'-4"	3'-0"	8'-4"	0.980	0.241	0'-2 1/2"	0'-1 1/2"
18"	2'-8"	3'-0"	8'-8"	0.941	0.244	0'-2 1/2"	0'-1 1/2"	18"	2'-4"	3'-0"	8'-4"	0.980	0.241	0'-2 1/2"	0'-1 1/2"	18"	2'-4"	3'-0"	8'-4"	0.980	0.241	0'-2 1/2"	0'-1 1/2"
21" or 24"	3'-6"	4'-0"	11'-6"	1.763	0.444	0'-3"	0'-2"	24"	3'-1"	4'-0"	11'-1"	1.840	0.442	0'-3"	0'-2"	24"	3'-1"	4'-0"	11'-1"	1.840	0.442	0'-3"	0'-2"
27" or 30"	4'-4"	5'-0"	14'-4"	2.730	0.663	0'-4"	0'-2 1/2"	27" or 30"	3'-10"	5'-0"	15'-10"	2.868	0.670	0'-4"	0'-2 1/2"	27" or 30"	3'-10"	5'-0"	15'-10"	2.868	0.670	0'-4"	0'-2 1/2"
33" or 36"	5'-2"	6'-0"	17'-2"	3.854	0.907	0'-4 1/2"	0'-3"	36"	4'-7"	6'-0"	18'-7"	4.076	0.931	0'-4 1/2"	0'-3"	36"	4'-7"	6'-0"	18'-7"	4.076	0.931	0'-4 1/2"	0'-3"

Bevel edge is required on the headwall at the inlet end of the culvert (where the flow enters the culvert).
Headwall at the outlet end of the culvert may be either square edge or bevel edge.

STANDARD ENDWALLS FOR MULTIPLE PIPE CULVERTS
12"-36" PIPE
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE
105.04
302

EW-6



ELEVATION

SECTION A-A

EXISTING PROPOSED TRASH RACK DETAIL

SCALE: 1/8"=1'-0" NTS

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.

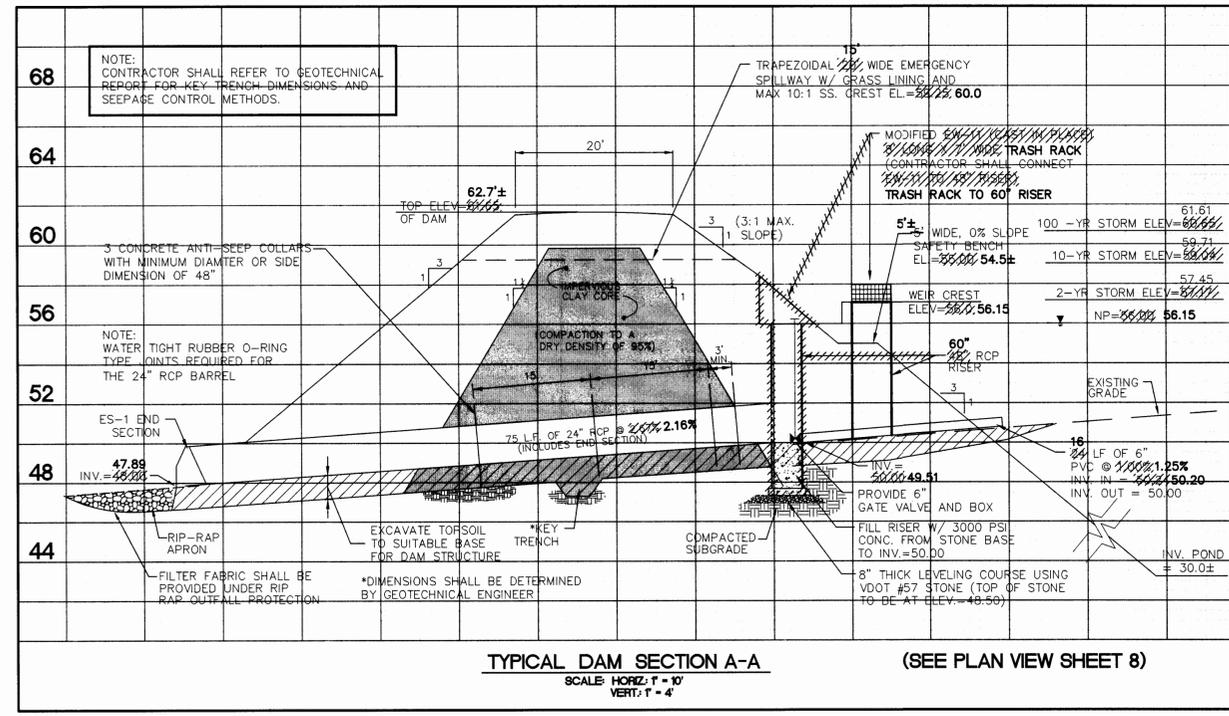
THOMAS C. SUBLETT
Lic. No. 1886
11/12/08
LAND SURVEYOR

SURVEYOR _____ DATE _____

DAM CONSTRUCTION NOTES

- A GEOTECHNICAL SUBSURFACE EXPLORATION AT THE PROPOSED DAM SITE HAS BEEN PERFORMED. THE GEOTECHNICAL REPORT SHALL BE SUBMITTED TO JAMES CITY COUNTY CODE COMPLIANCE AND THE CONTRACTOR. THE GEOTECHNICAL REPORT IS HEREBY MADE A PART OF THE DAM'S CONSTRUCTION SPECIFICATIONS. ADDITIONALLY, THE CONTRACTOR SHALL PROVIDE TESTING RESULTS FROM A PROFESSIONAL GEOTECHNICAL ENGINEER TO ENSURE PROPER MATERIALS AND DAM CONSTRUCTION METHODS ARE USED DURING CONSTRUCTION. IN ADDITION, AFTER CONSTRUCTION, THE PROFESSIONAL GEOTECHNICAL ENGINEER SHALL ALSO SUBMIT A LETTER TO JAMES CITY COUNTY CERTIFYING THAT THE DAM WAS BUILT IN ACCORDANCE WITH APPROVED PLANS, SPECIFICATIONS, AND GEOTECHNICAL REPORT.
- SITE PREPARATION:** THE CONTRACTOR SHALL STRIP ALL AREAS OF THE PERMANENT CONSTRUCTION TO REMOVE ALL UNSUITABLE MATERIALS. THE UNSUITABLE MATERIALS TO BE REMOVED BY STRIPPING SHALL INCLUDE ALL TOPSOIL, DEBRIS AND VEGETABLE MATTER, INCLUDING STUMPS AND ROOTS, AND ALL OTHER MATERIALS WHICH MAY BE UNSUITABLE FOR USE IN THE PERMANENT CONSTRUCTION.
- EMBANKMENT:** THE EXPOSED SUB GRADE SOILS SHALL BE CAREFULLY INSPECTED BY THE GEOTECHNICAL ENGINEER. ANY UNSUITABLE MATERIALS THUS EXPOSED SHALL BE REMOVED AND REPLACED WITH A WELL COMPACTED, SUITABLE MATERIAL. DENSITY TESTING, AT THE DISCRETION OF THE GEOTECHNICAL ENGINEER, SHALL BE PERFORMED AT THIS TIME.
THE EMBANKMENT SHALL BE KEVED INTO THE UNDISTURBED (EXISTING) SOIL STRATUM. EMBANKMENT SHOULD BE KEVED AS SPECIFIED BY THE GEOTECHNICAL ENGINEER.
THE EMBANKMENT FOUNDATION AND ABUTMENTS SHALL BEAR ON FIRM AND STABLE EXISTING SUB GRADE WHICH HAS BEEN PREPARED SO AS TO REMOVE ALL ORGANIC, LOOSE, AND GENERALLY UNSUITABLE MATERIAL.
ALL MATERIALS TO BE USED FOR BACK FILL OR COMPACTED FILL SHALL BE INSPECTED AND, IF NECESSARY, TESTED BY THE GEOTECHNICAL ENGINEER IN ACCORDANCE WITH ASTM D2487 PRIOR TO PLACEMENT TO DETERMINE IF THEY ARE SUITABLE FOR THE INTENDED USE.
THE FILL MATERIAL SHALL BE TAKEN FROM APPROVED BORROW AREAS. IT SHALL BE CLEAN MINERAL SOIL, FREE OF ROOTS, WOOD VEGETATION, OVERSIZED STONES, ROCKS, OR OTHER OBJECTIONABLE MATERIAL. SOILS WHICH ARE APPROVED FOR THE CONSTRUCTION OF THE IMPERVIOUS CLAY CORE, AS DEFINED BY THE UNIFIED SOIL CLASSIFICATION SYSTEM, ARE CH, INORGANIC CLAYS OF HIGH PLASTICITY; CL, INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY; GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS; SC, (WITH GEOTECHNICAL ENGINEERS APPROVAL) CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES. MATERIALS TO BE USED FOR THE CONSTRUCTION OF THE SHELL SHALL BE SELECT BACK FILL FREE OF STUMPS, ROOTS, ROCKS, TRASH, ETC. AND SHALL BE MORE PERVIOUS THAN THE IMPERVIOUS CLAY CORE. AREAS ON WHICH FILL IS TO BE PLACED SHALL BE SCARIFIED A MINIMUM DEPTH OF 4 INCHES PRIOR TO PLACEMENT OF FILL. THE FILL MATERIAL'S MOISTURE CONTENT SHALL BE +3 TO -2 PERCENTAGE POINTS OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D2216 (I.E. IN GENERAL THE FILL MATERIAL SHOULD CONTAIN SUFFICIENT MOISTURE SO THAT IT CAN BE FORMED INTO A BALL WITHOUT CRUMBLING. IF WATER CAN BE SQUEEZED OUT OF THE BALL, IT IS TOO WET FOR PROPER COMPACTION). FILL MATERIAL WILL BE PLACED IN 6 TO 8-INCH CONTINUOUS LAYERS OVER THE ENTIRE LENGTH OF THE FILL. FIRST LIFT ON SUB GRADE MAY BE PLACED AT A DEPTH UP TO 36 INCHES TO BRIDGE SUB GRADE WITH GREATER THAN OPTIMUM MOISTURE CONTENT. COMPACTION, AS NOTED ON PLAN, SHALL BE OBTAINED GENERALLY BY USING A SHEEPSFOOT COMPACTOR. FINISHED GRADES SHALL BE MERGED INTO THE EXISTING GRADES.
- CUTOFF TRENCH/KEY TRENCH:** THE TRENCH SHALL BE EXCAVATED ALONG THE CENTERLINE OF THE DAM. THE WIDTH AND DEPTH SHALL BE AS DETERMINED BY THE GEOTECHNICAL ENGINEER. THE MIN. BOTTOM WIDTH SHALL BE WIDE ENOUGH TO PERMIT OPERATION OF COMPACTION EQUIPMENT. THE SIDE SLOPES SHALL BE NO STEEPER THAN 1:1. COMPACTION REQUIREMENTS SHALL BE THE SAME AS THOSE FOR THE EMBANKMENT. THE TRENCH SHALL BE KEPT DRAINED DURING THE BACKFILLING-COMPACTION OPERATIONS.
- SEEPAGE CONTROL:** THE GEOTECHNICAL ENGINEER SHALL RECOMMEND A SEEPAGE CONTROL METHOD IN THE GEOTECHNICAL REPORT.
- PRINCIPAL SPILLWAY:** THE BOTTOM OF THE SPILLWAY RISER FOUNDATION BASE EXCAVATION SHALL BE OBSERVED BY THE GEOTECHNICAL ENGINEER TO ENSURE THAT ALL UNSUITABLE AND LOOSE MATERIALS ARE REMOVED AND THAT ACCEPTABLE BEARING CONDITIONS EXIST IN THE FOUNDATION'S BASE.
ALL JOINTS IN THE PRINCIPAL SPILLWAY STRUCTURE SHALL BE OF WATERTIGHT CONSTRUCTION. PERVIOUS MATERIALS SUCH AS SAND, GRAVEL OR CRUSHED STONE SHALL NOT BE USED AS BACK FILL AROUND THE BARREL. FILL MATERIAL SHALL BE PLACED AROUND THE PIPE IN 4-INCH LAYERS AND COMPACTED BY HAND TO THE SAME DENSITY AS THE EMBANKMENT. A MINIMUM OF TWO FEET OF FILL SHALL BE HAND-COMPACTED OVER THE BARREL BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT.
- VEGETATIVE STABILIZATION:** FINAL VEGETATIVE COVER (STABILIZATION) SHALL CONSIST OF TOP SOILING, LIMING, FERTILIZING, SEEDING, AND MULCHING TO ASSURE A FIRM STAND OF GRASS AS SOON AS PRACTICAL. SEDIMENT BASINS AND OTHER TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED ONLY WHEN STABILIZATION IS COMPLETE. FINAL VEGETAL COVER SHALL BE PROVIDED IN ACCORDANCE WITH THE FOLLOWING:
TOPSOIL: AT LEAST 2" THICKNESS OBTAINED FROM STOCKPILES ON SITE, FREE OF LARGE DEBRIS.
LIME: 4,000#/ACRE (90#/1,000 S.F.)
SEED: KENTUCKY 31 TALL FESCUE 250#/ACRE (6#/1,000 S.F.)
FERTILIZER: 10/20/10 MIX, 1,000#/ACRE (25#/1,000 S.F.)
MULCH: STRAW OR HAY (LOCALLY OBTAINED) 4,000#/ACRE (90#/1,000 S.F.)

NOTE:
CONTRACTOR SHALL PROVIDE DAM CONSTRUCTION SEQUENCE TO JCC ENVIRONMENTAL DIVISION PRIOR TO ISSUANCE OF A LAND DISTURBING PERMIT



TYPICAL DAM SECTION A-A (SEE PLAN VIEW SHEET 8)
SCALE: HORIZ: 1" = 10'
VERT: 1" = 4'

NO.	DATE	REVISION / COMMENT / NOTE
5	3/23/03	UPDATE POND AS-BUILT
4	1/10/01	POND AS-BUILT / ADDED DETAIL
3	6/18/99	REVISION PER VDOT COMMENTS
2	5/20/99	REVISION PER JCC ENVIRONMENTAL COMMENTS
1	5/7/99	REVISION PER JCC COMMENTS

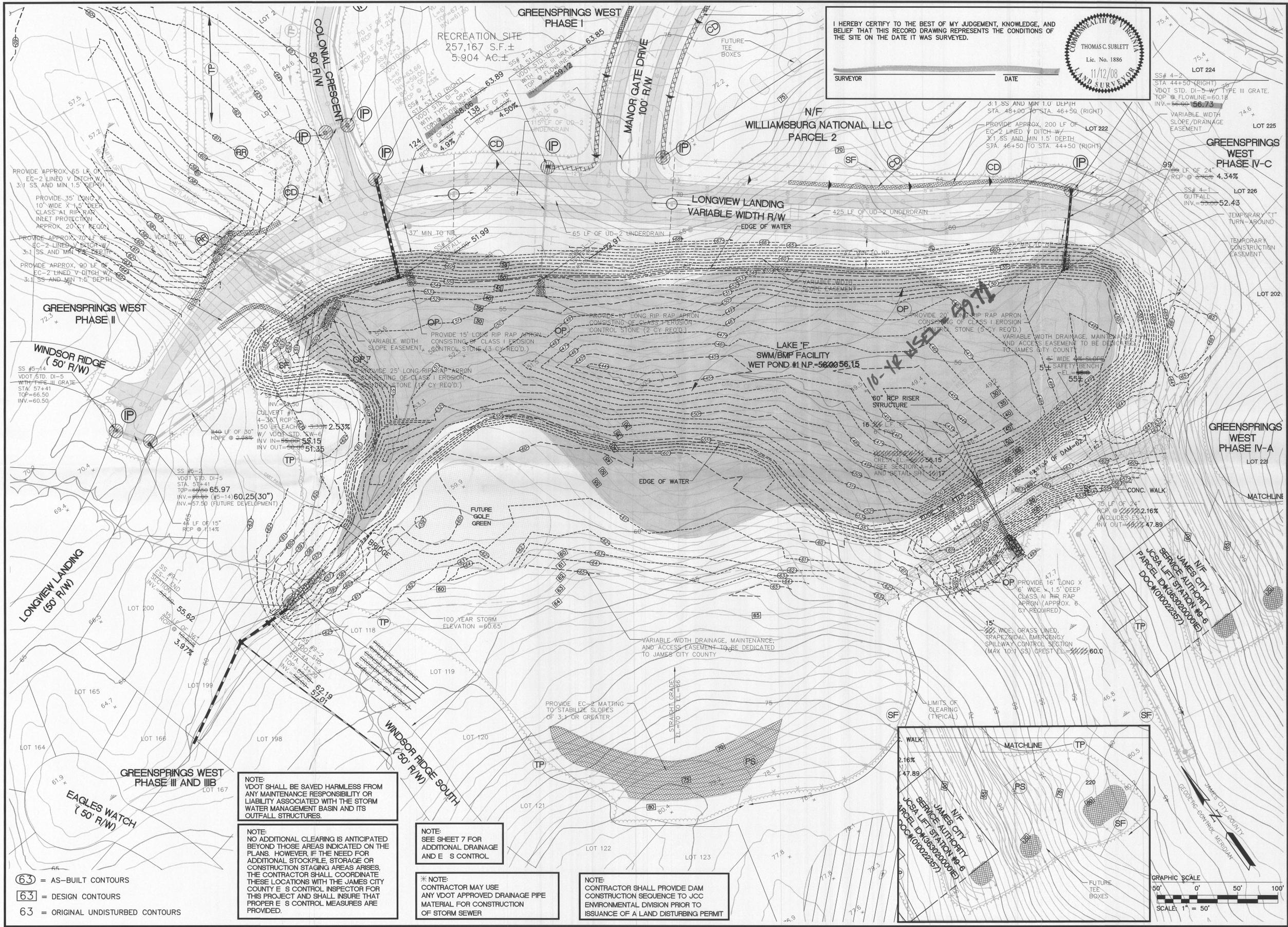


5248 Old Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
Fax (757) 220-8994



NOTES AND DETAILS GREENSPRINGS WEST PHASE I
OWNER/DEVELOPER: JAMESTOWN LLC
JAMES CITY COUNTY

Designed AES	Drawn AES
Scale NONE	Date 2/26/99
Project No. 8656-1	
Drawing No. 17 OF 19	



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.

SURVEYOR _____ DATE _____

THOMAS C. SUBLETT
Lic. No. 1886
11/12/08
LAND SURVEYOR

NO.	DATE	REVISION / COMMENT / NOTE
1	11/12/08	ISSUED FOR PERMIT
2	11/12/08	ISSUED FOR PERMIT
3	11/12/08	ISSUED FOR PERMIT
4	11/12/08	ISSUED FOR PERMIT
5	11/12/08	ISSUED FOR PERMIT
6	11/12/08	ISSUED FOR PERMIT



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



BMP AS-BUILT FOR LAKE 'F'
GREENSPRINGS WEST
PHASE I
OWNER/DEVELOPER: JAMESTOWN LLC
JAMES CITY COUNTY, VIRGINIA

Designed: HWP/CWG
Drawn: KEG
Scale: 1" = 50'
Date: 2/26/99
Project No.: 8656-1
Drawing No.: 8 OF 19

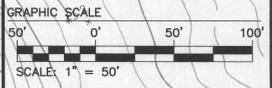
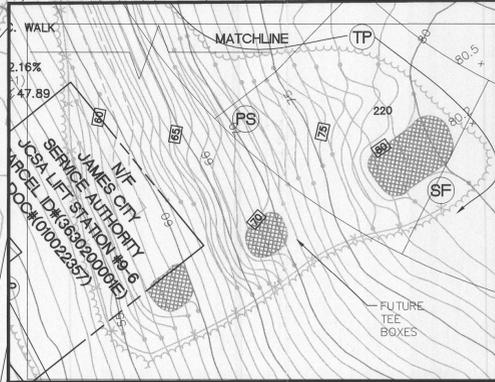
NOTE:
VDOT SHALL BE SAVED HARMLESS FROM ANY MAINTENANCE RESPONSIBILITY OR LIABILITY ASSOCIATED WITH THE STORM WATER MANAGEMENT BASIN AND ITS OUTFALL STRUCTURES.

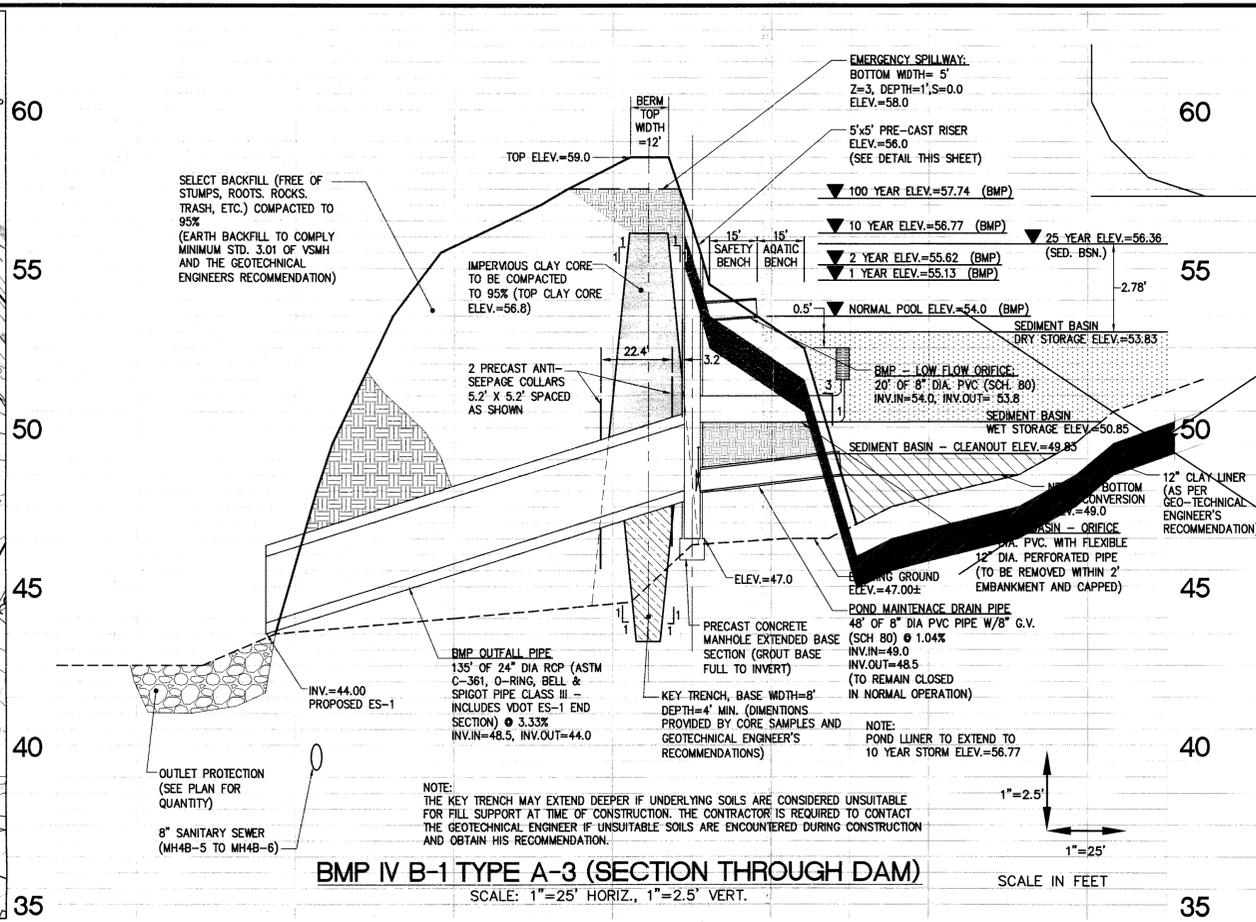
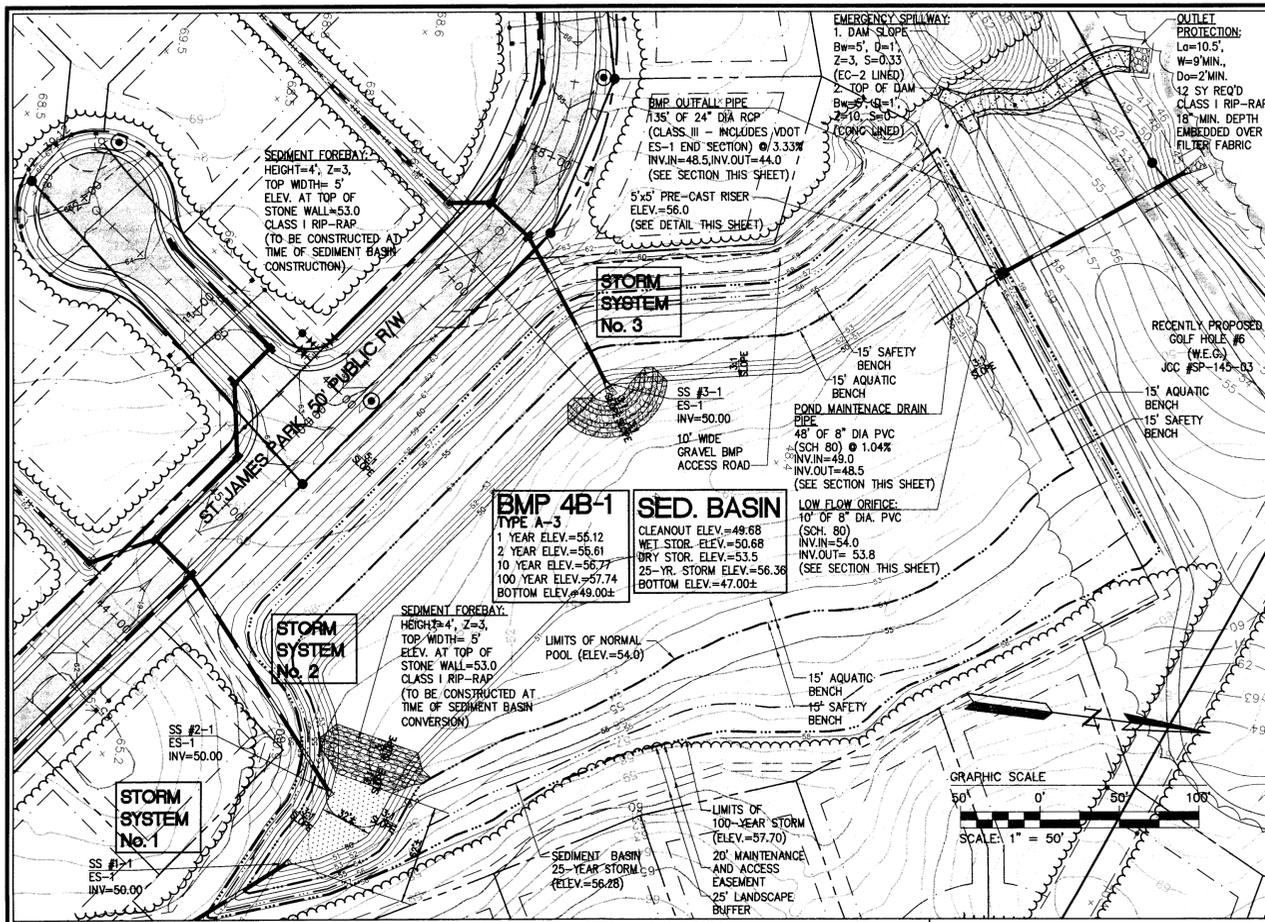
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NOTE:
SEE SHEET 7 FOR ADDITIONAL DRAINAGE AND E & S CONTROL

* NOTE:
CONTRACTOR MAY USE ANY VDOT APPROVED DRAINAGE PIPE MATERIAL FOR CONSTRUCTION OF STORM SEWER

NOTE:
CONTRACTOR SHALL PROVIDE DAM CONSTRUCTION SEQUENCE TO JCC ENVIRONMENTAL DIVISION PRIOR TO ISSUANCE OF A LAND DISTURBING PERMIT





NO.	DATE	REVISION / COMMENT / NOTE
1	8/24/04	REVISIONS PER COUNTY COMMENTS
2	11/5/04	REVISIONS PER COUNTY COMMENTS
3	1/31/05	REVISIONS PER COUNTY COMMENTS
4	3/29/05	REVISIONS PER COUNTY COMMENTS
5	6/15/05	REVISIONS PER COUNTY COMMENTS
6	7/29/06	REVISIONS PER COUNTY COMMENTS



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



DESIGNED	DRAWN
HWP/RDS	RDS
Scale	Date
1"=25'	4/28/04
Project No.	
8656-13	
Drawing No.	
21	

STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT INTO 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 UPO-SLOPE PARCELS, ADEQUATE PROTECTION SHOULD BE PROVIDED AND INSPECTIONS PERFORMED AT LEAST ONCE WEEKLY OF THESE NEWLY DISTURBED AREAS AS WELL AS INSPECTIONS FOR ACCUMULATED SEDIMENTS AT TWO BMP FACILITIES.

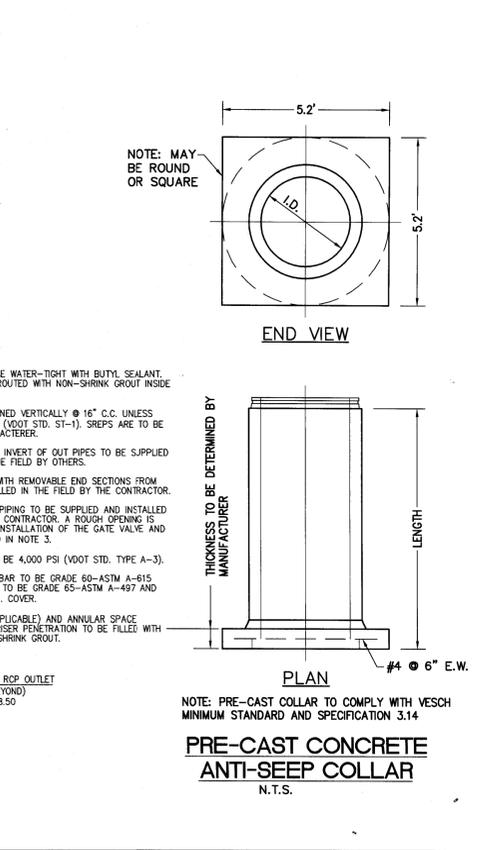
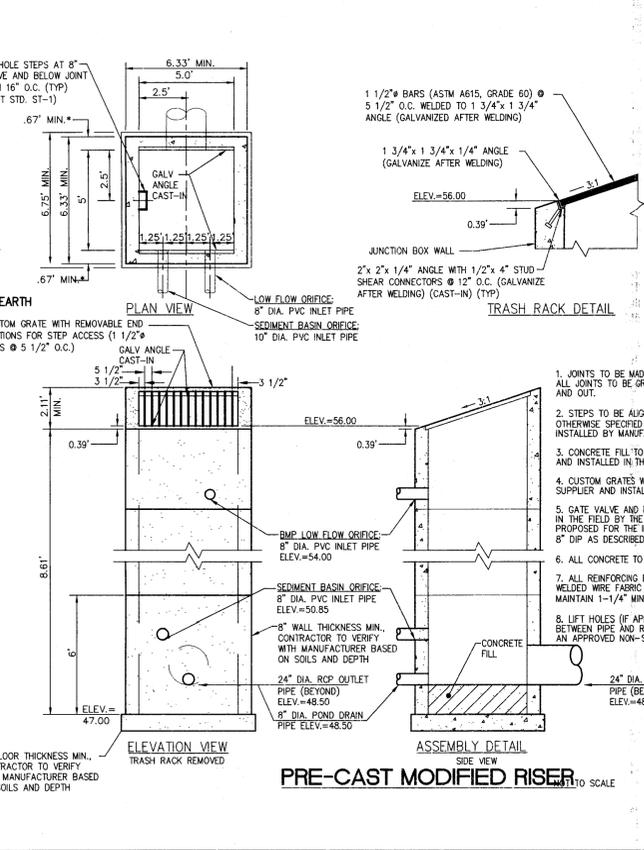
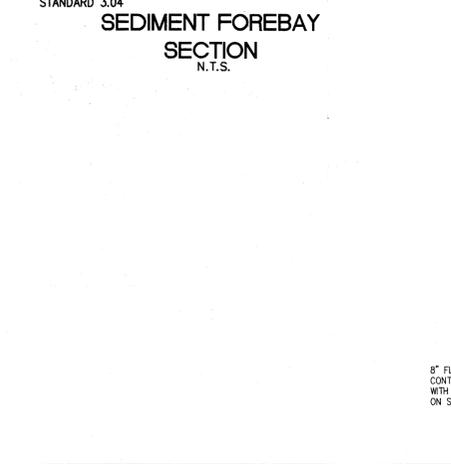
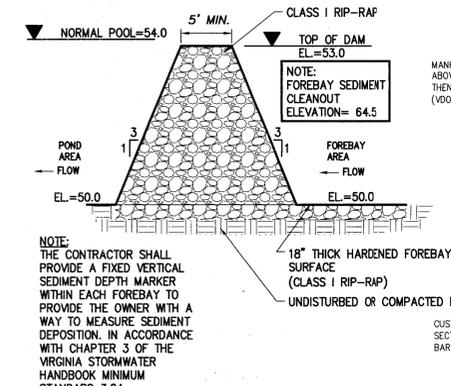
A DESIGNATED REPRESENTATIVE OF THE OWNER WILL INSPECT THE BMP STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING WORKING DAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF GAUGED RAINFALL WITHIN A 24-HOUR PERIOD. ONCE PER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

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

1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. SEDIMENT REMOVAL IS REQUIRED USING A RUBBER-WHEELED BACKHOE. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, THE RISER BOTTOM AND OUTLET PIPE SHALL BE CLEANED OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA. SEDIMENT SHALL NOT BE ALLOWED TO ACCUMULATE IN DEPTHS GREATER THAN 1-FOOT. NO SEDIMENT SHALL BE ALLOWED TO ACCUMULATE TO PREVENT THE PROPER FUNCTION OF ANY PIPE OR CULVERT.
2. PERFORM MAINTENANCE MOWING OF GRASSED AREAS AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ON ANY PART OF THE GRADED EMBANKMENT.
3. PERFORM SOIL SAMPLING ON STABILIZED BMP SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.
4. IN STABILIZED BMP AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACES, LIME, FERTILIZER AND SEED IN ACCORDANCE WITH RECOMMENDATIONS FOR NEW SEEDINGS, AS LISTED IN DAM CONSTRUCTION NOTES. IF VEGETATION COVERS MORE THAN 40% BUT LESS THAN 70% OF SOIL SURFACES, LIME FERTILIZER AND OVERSEED IN ACCORDANCE WITH CURRENT SEEDING RECOMMENDATIONS.
5. PERFORM QUARTERLY INSPECTIONS OF THE RELEASE STRUCTURES, RISER SECTION AND CREST OF SPILLWAY FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS TO MAINTAIN THE INTEGRITY OF THE STRUCTURE AND PROVIDE AN ATTRACTIVE APPEARANCE. DURING QUARTERLY INSPECTIONS, THE POND DRAIN VALVE, USUALLY LEFT IN THE "VALVE CLOSED" POSITION, SHALL BE INSPECTED AND OPERATED THROUGH TWO COMPLETE FULL-OPEN TO FULL-CLOSE TO FULL-OPEN CYCLES.
6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, ORIFICE/WEIR(S), OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE CONTINUED INTEGRITY OF THE STRUCTURE.
7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE FACILITY FOR SIGNS OF ANIMAL/RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.
8. RECORD KEEPING: THE LANDOWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE ACCURATE WRITTEN RECORDS OF INSPECTIONS PERFORMED ON THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.
9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.

GENERAL NOTES FOR CONSTRUCTION OF STORMWATER BASINS

1. THE CONTRACTOR SHALL PROVIDE ALL WORK AND MATERIALS NEEDED TO CONSTRUCT THE STORMWATER BASIN, STORMWATER MANAGEMENT PONDS, BEST MANAGEMENT PRACTICES, SEDIMENT BASINS AND SEDIMENT TRAPS. THE WORK SHALL INCLUDE ALL LABOR, MATERIALS, EQUIPMENT AND MATERIALS NEEDED FOR THE COMPLETION OF GRADING AND EARTHWORK ASSOCIATED WITH THE CONSTRUCTION.
2. THE CONTRACTOR SHALL CONSULT AND PROVIDE FOR THE SERVICES OF A GEOTECHNICAL ENGINEER. THE GEOTECHNICAL ENGINEER SHALL PROVIDE TEST RESULTS ON PLACED DAM MATERIALS, IDENTIFYING SOIL CLASSIFICATION, PERMEABILITY, PLASTICITY INDEX, AND COMPACTION. ALL TESTS SHALL BE IN CONFORMANCE WITH ASTM STANDARDS. THE COST OF THE SERVICES OF THE GEOTECHNICAL ENGINEER SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SATISFACTORY GEOTECHNICAL RESULTS ARE NEEDED PRIOR TO FINAL APPROVAL.
3. ALL INSPECTIONS REQUIRED FOR THE WORK SHALL BE PERFORMED BY A GEOTECHNICAL ENGINEER AT THE EXPENSE OF THE GENERAL CONTRACTOR.
4. ON-SITE EXCAVATED MATERIAL, IF DETERMINED SUITABLE FOR USE IN DAM CONSTRUCTION BY A GEOTECHNICAL ENGINEER, MAY BE USED FOR DAM CONSTRUCTION. SHOULD ADDITIONAL MATERIAL BE REQUIRED, THE CONTRACTOR SHALL IDENTIFY THE NEED FOR MATERIAL TO THE OWNER, AS ADDITIONAL BORROW MATERIAL MAY BE AVAILABLE ON THE PROPERTY. ALL EXCAVATED MATERIAL DETERMINED BY THE GEOTECHNICAL ENGINEER TO BE UNSUITABLE SHALL BE DISPOSED OF PROPERLY AT THE CONTRACTOR'S EXPENSE. ALL EXCAVATED MATERIAL NOT REQUIRED FOR BACKFILLING SHALL EITHER BE DEPOSITED ON SITE AND SPREAD BY THE CONTRACTOR, OR SHALL BE DEPOSITED IN AN AREA ON THE PROPERTY AS DIRECTED BY THE OWNER. THE CONTRACTOR SHALL PROVIDE PROPER STABILIZATION, AND EROSION AND SEDIMENT CONTROL MEASURES NEEDED TO CONTROL AS PER THE VESCH THIRD EDITION.
5. UNDERCUT FOR THE FOUNDATION OF THE DAM EMBANKMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. THE FOUNDATION SHALL BE BACKFILLED WITH SOILS CLASSIFIED AS SM, SC, OR CL UNDER THE UNIFIED SOIL CLASSIFICATION SYSTEM. SOILS SHALL HAVE A MINIMUM OF 15% BY WEIGHT FINES, HAVING A PLASTICITY INDEX OF 30% AND A PERMEABILITY OF 0.0004 IN./SEC. OR LESS. FILL SHALL BE COMPACTED IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO A DRY DENSITY OF 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). EXCAVATION FOR THE DAM KEY SHALL BE IN ACCORDANCE TO THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. HEIGHT, DEPTH, AND WIDTH OF THE KEY SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. THE KEY SHALL BE FORMED USING SOILS CLASSIFIED AS SC OR CL, WITH A PERMEABILITY OF 0.0004 IN./SEC. OR LESS.
6. THE DAM CORE SHALL BE AS CONSTRUCTED WITH NON-EXPANSIVE SC OR CL CLAYEY MATERIAL WITH PERMEABILITY OF 0.0004 IN./SEC. OR LESS. THE FILL OF THE CORE SHALL BE MADE IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). SIZE, SHAPE, WIDTH, DEPTH AND HEIGHT OF THE DAM CORE SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. TO COVER THE DAM CORE A SILTY FINE SAND OR CLAYEY SOIL (SM, SC, OR CL) SHALL BE PLACED. A VEGETATIVE COVER USING VDOT EC-2 EROSION CONTROL BLANKETS SHALL BE PLACED ON DAM SLOPES AND CREST TO PREVENT EROSION.
7. THE STORMWATER MANAGEMENT / BMP FACILITIES SHOWN ON THESE PLANS REQUIRE THE SUBMISSION, REVIEW AND APPROVAL OF RECORD DRAWING(S) AND CONSTRUCTION CERTIFICATION PRIOR TO RELEASE OF THE POSTED BOND / SURETY. THE GEOTECHNICAL ENGINEER IS TO ENSURE THAT HIS / HER INSPECTION OF THE SWM / BMP CONSTRUCTION ACTIVITY IS PERFORMED DURING AND FOLLOWING THE CONSTRUCTION OF THE SWM / BMP IN ACCORDANCE WITH THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION STORMWATER MANAGEMENT / BMP FACILITIES DESIGN GUIDELINES HANDBOOK, DATED AUGUST 30, 2000.
8. THE CONTRACTOR SHALL PROVIDE INTERIM CERTIFICATION OF TEMPORARY SEDIMENT BASIN IN ACCORDANCE WITH SECTION 5 OF THE JAMES CITY COUNTY BMP, EROSION AND SEDIMENT CONTROL AND STORM WATER MANAGEMENT DESIGN GUIDES.



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EROSION & SEDIMENT CONTROL NARRATIVE

PROJECT DESCRIPTION:

THE PROPOSED GREENSPRINGS WEST, PHASE I SITE CONSISTS OF 15.12 ACRES ON CENTERVILLE ROAD (ROUTE 614) ACROSS THE STREET FROM FRANCIS BERKELEY IN JAMES CITY COUNTY, VIRGINIA.

EXISTING SITE CONDITIONS:

THE SITE IS HEAVILY WOODED. STORMWATER RUNOFF FROM THE SITE DRAINS PRIMARILY TO THE PROPOSED STORMWATER MANAGEMENT FACILITY WHICH IS DESIGNED TO HANDLE APPROXIMATELY 155 ACRES OF THE FUTURE SITE. THE REMAINDER OF THE PHASE I SITE DRAINS INTO AN EXISTING STORM SYSTEM WHICH EMPTIES INTO AN EXISTING BMP ON THE EAST SIDE.

SOILS:

THE SOIL CONSERVATION SERVICE HAS IDENTIFIED THIS SITE AS CONTAINING SOIL TYPES "5", "11C", "14B", "150", "15E", "17", "19B", AND "29A".

CRITICAL AREAS:

TO PREVENT EROSION, A STORMWATER MANAGEMENT FACILITY, INLET PROTECTION, SEEDING AND MATING, AND CHECK DAMS HAVE BEEN PROVIDED.

EROSION AND SEDIMENT CONTROL MEASURES:

IN ADDITION TO THE MEASURES UTILIZED FOR THE CRITICAL AREAS OF THE SITE, SILT FENCE HAS BEEN PROVIDED TO PREVENT SILT-LADEN RUNOFF FROM REACHING ADJOINING AREAS. A CONSTRUCTION ENTRANCE HAS ALSO BEEN PROVIDED.

PERMANENT STABILIZATION:

PERMANENT SEEDING WILL BE USED TO STABILIZE THE SITE AFTER CONSTRUCTION IS COMPLETE. A SCHEDULE HAS BEEN PROVIDED IN THE CONSTRUCTION PLAN SET.

STORMWATER RUNOFF CONSIDERATIONS:

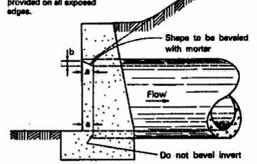
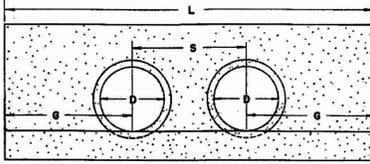
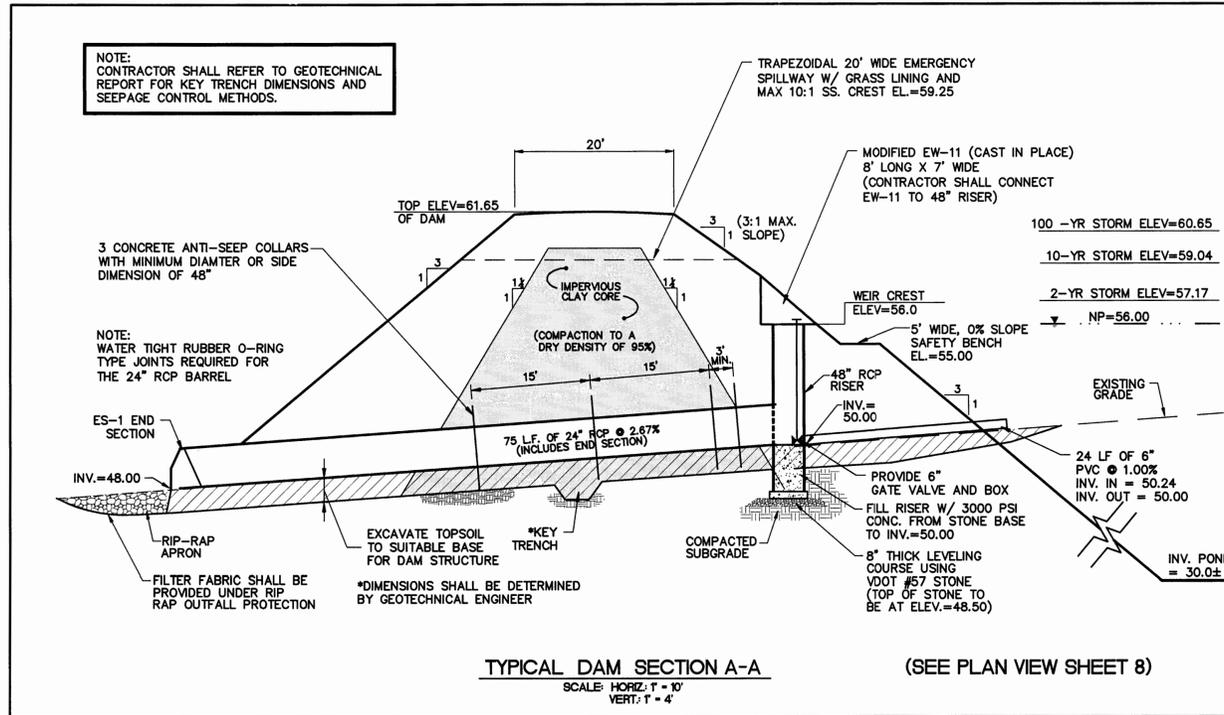
STORMWATER RUNOFF FROM THE DEVELOPED SITE FOR THE 2-YEAR AND 10-YEAR STORM EVENTS WILL BE COLLECTED AND ATTENUATED IN THE PROPOSED STORMWATER MANAGEMENT POND. ABOVE THE N.P. ELEVATION 56.0, THE POND RELEASES TO THE NATURAL DRAINAGE PATTERN AT RATES LESS THAN THAT OF THE PRE-DEVELOPMENT RATES. THE 2-YEAR STORM RELEASES AT 37.00 CFS IN THE POST DEVELOPMENT CONDITION COMPARED TO 40.10 CFS IN THE PRE-DEVELOPMENT CONDITION. THE 10-YEAR STORM EVENT RELEASES AT 42.90 CFS IN THE POST DEVELOPMENT CONDITION COMPARED TO 110.30 CFS IN THE PRE-DEVELOPMENT CONDITION.

DAM CONSTRUCTION NOTES

1. A GEOTECHNICAL SUBSURFACE EXPLORATION AT THE PROPOSED DAM SITE HAS BEEN PERFORMED. THE GEOTECHNICAL REPORT SHALL BE SUBMITTED TO JAMES CITY COUNTY CODE COMPLIANCE AND THE CONTRACTOR. THE GEOTECHNICAL REPORT IS HEREBY MADE A PART OF THE DAM'S CONSTRUCTION SPECIFICATIONS. ADDITIONALLY, THE CONTRACTOR SHALL PROVIDE TESTING RESULTS FROM A PROFESSIONAL GEOTECHNICAL ENGINEER TO ENSURE PROPER MATERIALS AND DAM CONSTRUCTION METHODS ARE USED DURING CONSTRUCTION. IN ADDITION, AFTER CONSTRUCTION, THE PROFESSIONAL GEOTECHNICAL ENGINEER SHALL ALSO SUBMIT A LETTER TO JAMES CITY COUNTY CERTIFYING THAT THE DAM WAS BUILT IN ACCORDANCE WITH APPROVED PLANS, SPECIFICATIONS, AND GEOTECHNICAL REPORT.
2. SITE PREPARATION: THE CONTRACTOR SHALL STRIP ALL AREAS OF THE PERMANENT CONSTRUCTION TO REMOVE ALL UNSUITABLE MATERIALS. THE UNSUITABLE MATERIALS TO BE REMOVED BY STRIPPING SHALL INCLUDE ALL TOPSOIL, DEBRIS AND VEGETABLE MATTER, INCLUDING STUMPS AND ROOTS, AND ALL OTHER MATERIALS WHICH MAY BE UNSUITABLE FOR USE IN THE PERMANENT CONSTRUCTION.
3. EMBANKMENT: THE EXPOSED SUB GRADE SOILS SHALL BE CAREFULLY INSPECTED BY THE GEOTECHNICAL ENGINEER. ANY UNSUITABLE MATERIALS THUS EXPOSED SHALL BE REMOVED AND REPLACED WITH A WELL COMPACTED, SUITABLE MATERIAL. DENSITY TESTING, AT THE DISCRETION OF THE GEOTECHNICAL ENGINEER, SHALL BE PERFORMED AT THIS TIME.
THE EMBANKMENT SHALL BE KEYPED INTO THE UNDISTURBED (EXISTING) SOIL STRATUM. EMBANKMENT SHOULD BE KEYPED AS SPECIFIED BY THE GEOTECHNICAL ENGINEER.
THE EMBANKMENT FOUNDATION AND ABUTMENTS SHALL BEAR ON FIRM AND STABLE EXISTING SUB GRADE WHICH HAS BEEN PREPARED SO AS TO REMOVE ALL ORGANIC, LOOSE, AND GENERALLY UNSUITABLE MATERIAL.
ALL MATERIALS TO BE USED FOR BACK FILL OR COMPACTED FILL SHALL BE INSPECTED AND, IF NECESSARY, TESTED BY THE GEOTECHNICAL ENGINEER IN ACCORDANCE WITH ASTM D2487 PRIOR TO PLACEMENT TO DETERMINE IF THEY ARE SUITABLE FOR THE INTENDED USE.
THE FILL MATERIAL SHALL BE TAKEN FROM APPROVED BORROW AREAS. IT SHALL BE CLEAN MINERAL SOIL, FREE OF ROOTS, WOOD VEGETATION, OVERSIZED STONES, ROCKS, OR OTHER OBJECTIONABLE MATERIAL. SOILS WHICH ARE APPROVAL FOR THE CONSTRUCTION OF THE IMPERVIOUS CLAY CORE, AS DEFINED BY THE UNIFIED SOIL CLASSIFICATION SYSTEM, ARE: CL, AREAS OF CLAYS OF HIGH PLASTICITY; CL, INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS; SC, (WITH GEOTECHNICAL ENGINEERS APPROVAL CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES. MATERIALS TO BE USED FOR THE CONSTRUCTION OF THE SHELL SHALL BE SELECT BACK FILL FREE OF STUMPS, ROOTS, ROCKS, TRASH, ETC. AND SHALL BE MORE PERVIOUS THAN THE IMPERVIOUS CLAY CORE. AREAS ON WHICH FILL IS TO BE PLACED SHALL BE SCARIFIED A MINIMUM DEPTH OF 4 INCHES PRIOR TO PLACEMENT OF FILL. THE FILL MATERIAL'S MOISTURE CONTENT SHALL BE +3 TO -2 PERCENTAGE POINTS OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D2216 (I.E. IN GENERAL THE FILL MATERIAL SHOULD CONTAIN SUFFICIENT MOISTURE SO THAT IT CAN BE FORMED INTO A BALL WITHOUT CRUMBLING. IF WATER CAN BE SQUEEZED OUT OF THE BALL, IT IS TOO WET FOR PROPER COMPACTION). FILL MATERIAL WILL BE PLACED IN 6 TO 8-INCH CONTINUOUS LAYERS OVER THE ENTIRE LENGTH OF THE FILL. FIRST LIFT ON SUB GRADE

- MAY BE PLACED AT A DEPTH UP TO 36 INCHES TO BRIDGE SUB GRADE WITH GREATER THAN OPTIMUM MOISTURE CONTENT. COMPACTION, AS NOTED ON PLAN, SHALL BE OBTAINED GENERALLY BY USING A SHEEPSFOOT COMPACTOR. FINISHED GRADES SHALL BE MERGED INTO THE EXISTING GRADES.
4. CUTOFF TRENCH/KEY TRENCH: THE TRENCH SHALL BE EXCAVATED ALONG THE CENTERLINE OF THE DAM. THE WIDTH AND DEPTH SHALL AS DETERMINED BY THE GEOTECHNICAL ENGINEER. THE MIN. BOTTOM WIDTH SHALL BE WIDE ENOUGH TO PERMIT OPERATION OF COMPACTION EQUIPMENT. THE SIDE SLOPES SHALL BE NO STEEPER THAN 1:1. COMPACTION REQUIREMENTS SHALL BE THE SAME AS THOSE FOR THE EMBANKMENT. THE TRENCH SHALL BE KEPT DRAINED DURING THE BACKFILLING-COMPACTION OPERATIONS.
 5. SEEPAGE CONTROL: THE GEOTECHNICAL ENGINEER SHALL RECOMMEND A SEEPAGE CONTROL METHOD IN THE GEOTECHNICAL REPORT.
 6. PRINCIPAL SPILLWAY: THE BOTTOM OF THE SPILLWAY RISER FOUNDATION BASE EXCAVATION SHALL BE OBSERVED BY THE GEOTECHNICAL ENGINEER TO ENSURE THAT ALL UNSUITABLE AND LOOSE MATERIALS ARE REMOVED AND THAT ACCEPTABLE BEARING CONDITIONS EXIST IN THE FOUNDATION'S BASE.
ALL JOINTS IN THE PRINCIPAL SPILLWAY STRUCTURE SHALL BE OF WATERTIGHT CONSTRUCTION. PERVIOUS MATERIALS SUCH AS SAND, GRAVEL OR CRUSHED STONE SHALL NOT BE USED AS BACK FILL AROUND THE BARREL. FILL MATERIAL SHALL BE PLACED AROUND THE PIPE IN 4-INCH LAYERS AND COMPACTED BY HAND TO THE SAME DENSITY AS THE EMBANKMENT. A MINIMUM OF TWO FEET OF FILL SHALL BE HAND-COMPACTED OVER THE BARREL BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT.
 7. VEGETATIVE STABILIZATION: FINAL VEGETATIVE COVER (STABILIZATION) SHALL CONSIST OF TOP SOILING, LIMING, FERTILIZING, SEEDING, AND MULCHING TO ASSURE A FIRM STAND OF GRASS AS SOON AS PRACTICAL. SEDIMENT BASINS AND OTHER TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED ONLY WHEN STABILIZATION IS COMPLETE. FINAL VEGETAL COVER SHALL BE PROVIDED IN ACCORDANCE WITH THE FOLLOWING:
TOPSOIL: AT LEAST 2" THICKNESS OBTAINED FROM STOCKPILES ON SITE, FREE OF LARGE DEBRIS.
LIME: 4,000#/ACRE (90#/1,000 S.F.)
SEED: KENTUCKY 31 TALL FESCUE 250#/ACRE (6#/1,000 S.F.)
FERTILIZER: 10/20/10 MIX, 1,000#/ACRE (25#/1,000 S.F.)
MULCH: STRAW OR HAY (LOCALLY OBTAINED) 4,000#/ACRE (90#/1,000 S.F.)

NOTE:
CONTRACTOR SHALL PROVIDE DAM CONSTRUCTION SEQUENCE TO JCC ENVIRONMENTAL DIVISION PRIOR TO ISSUANCE OF A LAND DISTURBING PERMIT



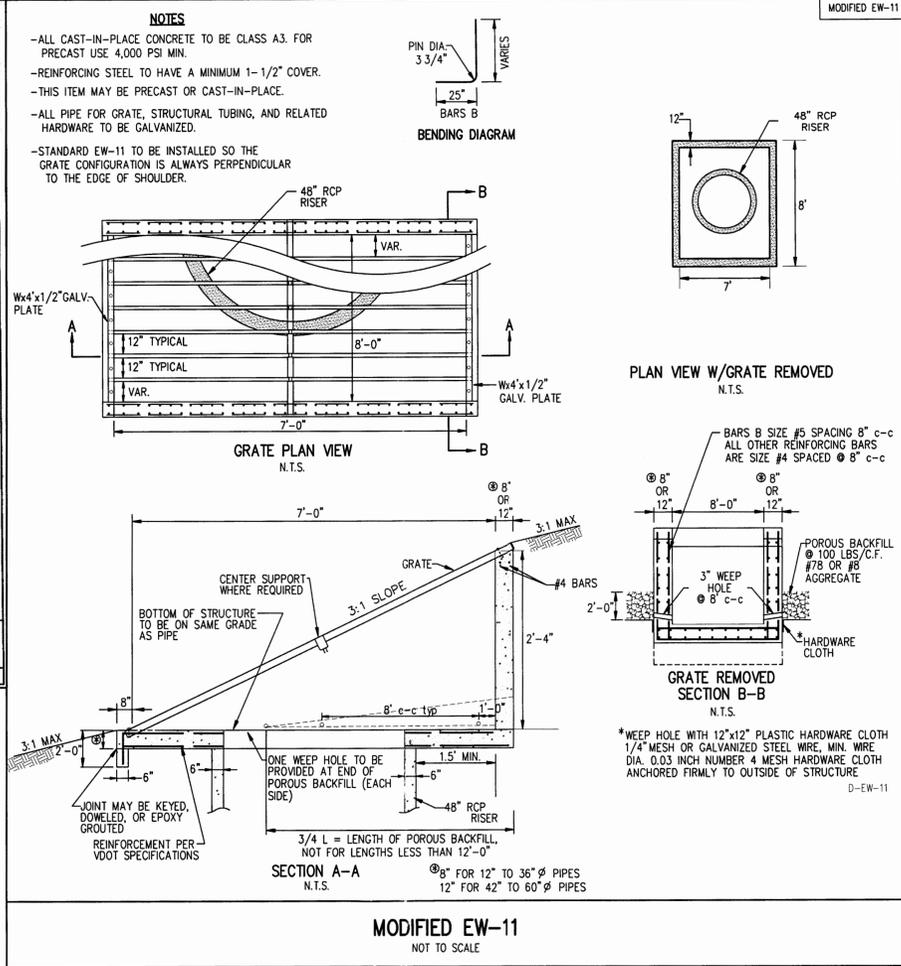
NOTE: On shallow fills, where endwalls are 1' or less below shoulder line, the top of the endwall shall be constructed parallel to the grade of the road.
This item may be precast or cast in place.
In no case shall top of endwall project above fill slope, ditch slope or shoulder.

This Std to be used with straight crossings and skew angles to 15°.
All cast in place Concrete to be Class A3. For precast See Sheet IO1.12.
Quantities given are for one endwall. All dimensions not given in table are same as those for single endwalls for same size of pipe.

Headwall to be beveled in all areas except where a conflict with invert or wingwalls occur.
a = 1.25' ± / foot diameter
b = 1" / foot diameter

FOR CONCRETE PIPE							FOR CORRUGATED METAL PIPE								
Diameter Or Pipe	S	G	L	Co. Yds. Concrete One Double Endwall	Increase Co. Yds. Per Each Additional Pipe	a	b	Diameter Or Pipe	S	G	L	Co. Yds. Concrete One Double Endwall	Increase Co. Yds. Per Each Additional Pipe	a	b
12"	1'-10"	2'-0"	5'-10"	0.329	0.008	0'-2"	0'-1 1/4"	12"	1'-7"	2'-0"	5'-7"	0.344	0.007	0'-2"	0'-1 1/4"
18"	2'-3"	2'-6"	7'-3"	0.671	0.179	0'-2"	0'-1 1/4"	18"	1'-11"	2'-6"	6'-11"	0.696	0.175	0'-2"	0'-1 1/4"
24"	2'-6"	3'-0"	8'-6"	0.941	0.244	0'-2 1/2"	0'-1 1/2"	24"	2'-4"	3'-0"	8'-4"	0.980	0.241	0'-2 1/2"	0'-1 1/2"
27" or 30"	3'-0"	4'-0"	11'-6"	1.763	0.444	0'-3"	0'-2"	27" or 30"	3'-11"	4'-0"	11'-11"	1.840	0.442	0'-3"	0'-2"
36" or 36"	3'-6"	4'-6"	17'-2"	3.854	0.907	0'-4 1/2"	0'-3"	36"	4'-7"	6'-0"	16'-7"	4.076	0.931	0'-4 1/2"	0'-3"

STANDARD ENDWALLS FOR MULTIPLE PIPE CULVERTS
12"-36" PIPE
VIRGINIA DEPARTMENT OF TRANSPORTATION
IO1.11



NO.	DATE	REVISION / COMMENT / NOTE
1	6/19/99	REVISION PER VDOT COMMENTS
2	6/20/99	REVISION PER JCC ENVIRONMENTAL COMMENTS
3	5/7/99	REVISION PER JCC COMMENTS
		REVISION / COMMENT / NOTE



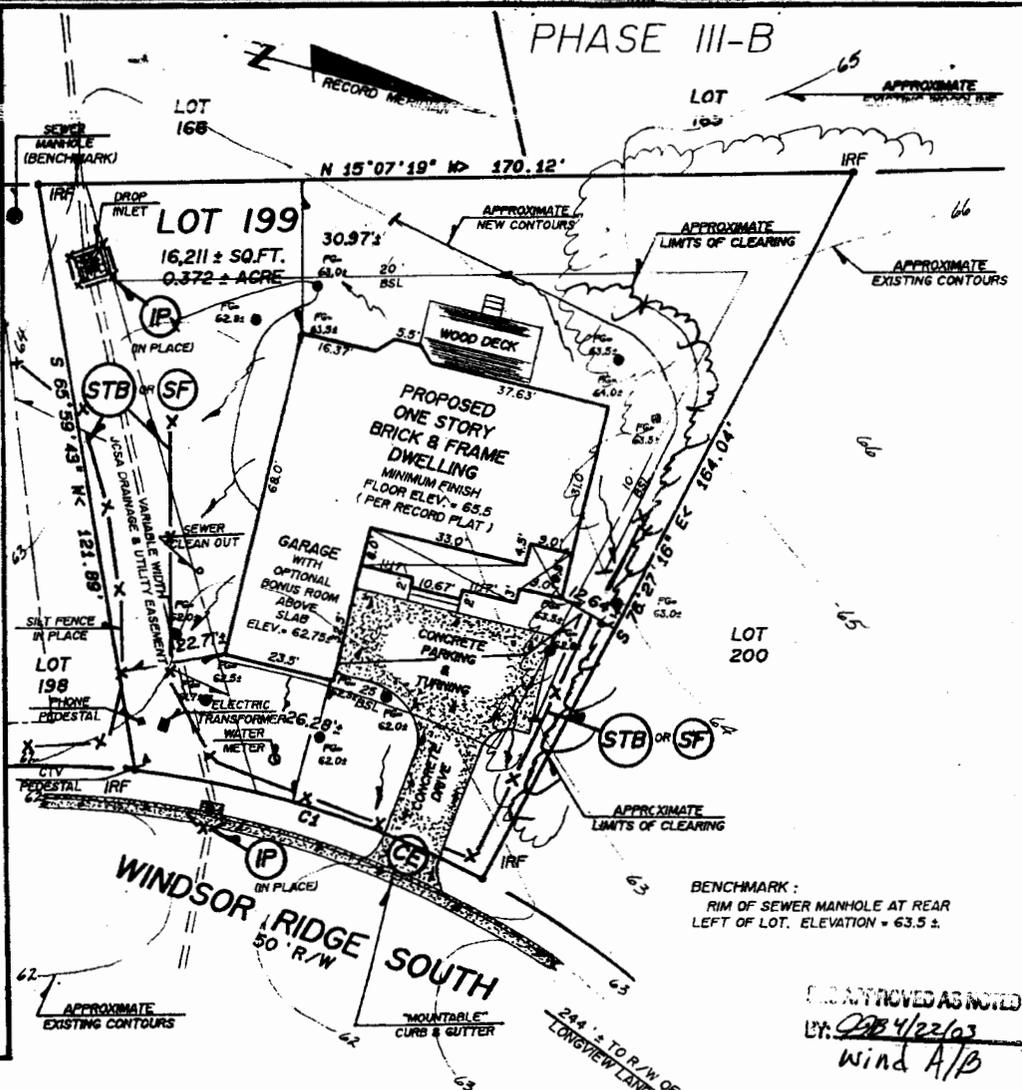
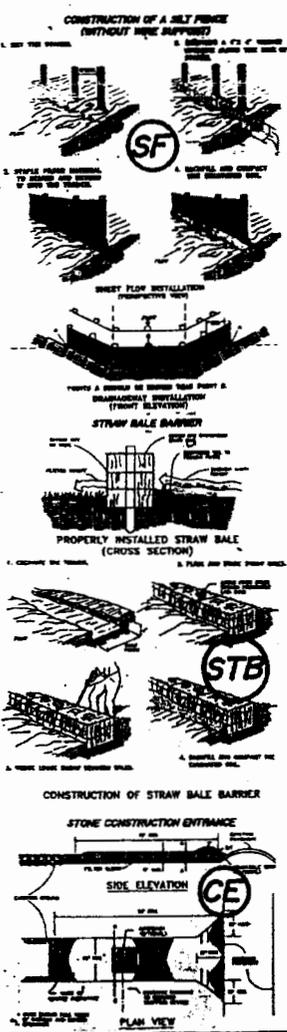
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
Fax (757) 220-8994



NOTES AND DETAILS
GREENSPRINGS WEST
PHASE I
OWNER/DEVELOPER: JAMESTOWN LLC
JAMES CITY COUNTY, VIRGINIA

Designed AES	Drawn AES
Scale NONE	Date 2/26/99
Project No. 8656-1	
Drawing No. 17 OF 19	

PHASE III-B



LEGEND:
 IRP = IRON PIPE FOUND
 IRF = IRON PIPE FOUND
 IRS = IRON ROD FOUND
 BSL = BLDG. SETBACK LINE
 TMAP = TAX MAP
 (S) = SOIL TEST HOLE (IF APPLICABLE)
 CMF = CONC. FOUND
 CMS = CONC. FOUND

ADDRESS:
 # 3204 WINDSOR RIDGE SOUTH

TMAP # =
 (36-3 X 02-00-199)

REFERENCE:
 PLAT BOOK 80, PAGE 67-70

NOTES:
 DRAINAGE AWAY FROM THE DWELLING IS TO BE 6" IN 10'. WHERE 10' IS NOT AVAILABLE, 6" FALL AWAY FROM THE DWELLING IS TO BE PROVIDED IN THE SPACE AVAILABLE.

TOPOGRAPHY SHOWN IS AS PROVIDED BY JAMES CITY COUNTY, CITY OF WILLIAMSBURG OR OTHERS. ACCURACY IS PLUS OR MINUS ONE CONTOUR AND WAS VISUALLY VERIFIED BY THIS SURVEYOR.

LOT IS MOSTLY CLEARED. THE REAR RIGHT IS LIGHTLY WOODED WITH SMALLER OAKS & POPLARS. MOST WILL BE SAVED. UNDERBRUSH CONSISTS OF DECIDUOUS SAPLINGS & SCRUB & A FEW SMALLER HOLLIES.

FLOOD CERTIFICATION:
 PROPERTY SHOWN HEREON APPEARS TO BE IN FLOOD HAZARD ZONE "X", (AREAS OUTSIDE THE 500 YEAR FLOOD PLAIN), AS SHOWN ON COMMUNITY PANEL # 510 201 00358 WHICH WAS PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY. SAID PANEL HAS AN EFFECTIVE DATE OF FEBRUARY 6, 1991.

EROSION CONTROL NOTES:
 PROVIDE STONE CONSTRUCTION ENTRANCE DURING CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR KEEPING WINDSOR RIDGE SOUTH FREE OF MUD AND DEBRIS ADJACENT TO PROPOSED DRIVEWAY AND LOT DURING CONSTRUCTION.

UPON REMOVAL OF ALL EROSION & SEDIMENT CONTROL ITEMS, ALL TRAPPED AND CONTAINED SEDIMENT IS TO BE REMOVED FROM LOT AND PROPERLY DISPOSED OF. ROADSIDE DITCHES AND, IF APPLICABLE, OUTFALL DITCHES ARE TO BE CLEANED OF SEDIMENT AND/OR CONSTRUCTION DEBRIS ON A REGULAR BASIS DURING CONSTRUCTION.

DEVELOPMENT PLAN

FOR
 LOT 199, PHASE III,
 GREENSPRINGS WEST
 LOCATED
 JAMES CITY COUNTY, VIRGINIA
 SCALE: 1" = 25' DATE: MAR. 20, 2003

PREPARED FOR
 GORDON BERRYMAN BUILDERS, INC.
 124 BERKELEY LANE
 WILLIAMSBURG, VIRGINIA
 23185
 (757) 253-0355
 JO #9250 - FB "F"

CLERK APPROVED AS NOTED
 BY: *DOB 4/22/03*
Wind A/B



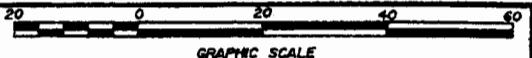
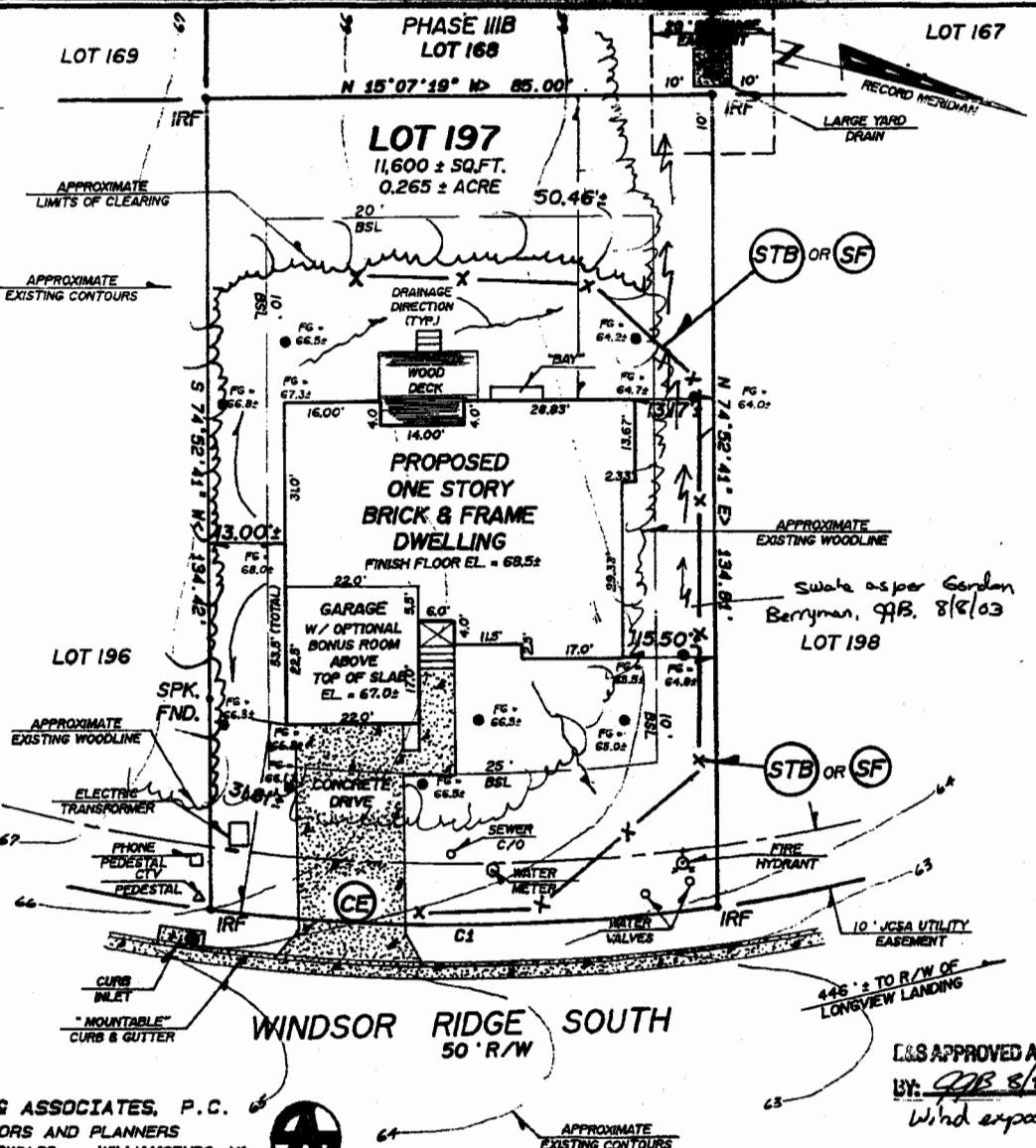
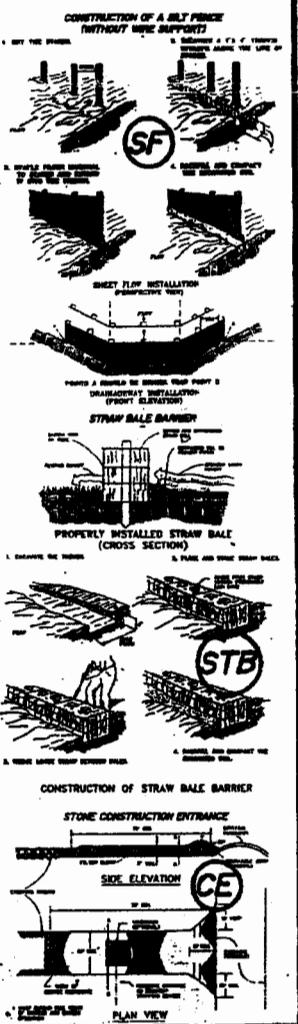
SPEARMAN & ASSOCIATES, P.C.
 SURVEYORS AND PLANNERS
 5682 A MOORETOWN RD. - WILLIAMSBURG, VA.
 (804) 253-9720



CURVE --- DATA --- TABLE

CURVE	ARC	DELTA	RADIUS	CHORD LENGTH	CHORD BEARING	TAN LENGTH
C1	76.76	21°27'15"	205.00	76.91	S 2°49'04" N	38.84

3204 Windsor Ridge S.
Tim Sammier



LEGEND:
 IRF - IRON PIPE FOUND
 IPE - IRON PIPE SET
 IRF - IRON ROD FOUND
 IRS - IRON ROD SET
 BSL - BLDG. SETBACK LINE
 TXMP - TAX MAP
 CH - CONCRETE FOUND
 CHS - CONC. FOUND SET

ADDRESS:
 # 3212 WINDSOR RIDGE SOUTH

TXMP #:
 (36-3)(02-00-197)

REFERENCE:
 PB 80, P. 67-70

NOTES:
 DRAINAGE AWAY FROM THE DWELLING IS TO BE 6" IN 10'. WHERE 10' IS NOT AVAILABLE, 6" FALL AWAY FROM THE DWELLING IS TO BE PROVIDED IN THE SPACE AVAILABLE.

TOPOGRAPHY SHOWN IS AS PROVIDED BY JAMES CITY COUNTY, CITY OF WILLIAMSBURG OR OTHERS. ACCURACY IS PLUS OR MINUS ONE CONTOUR AND WAS VISUALLY VERIFIED BY THIS SURVEYOR.

LOT IS LIGHTLY TO MODERATELY WOODED WITH MEDIUM TO LARGE OAKS. THERE ARE SOME SCATTERED SMALLER PINES, HICKORIES & POPLARS. UNDERBRUSH CONSISTS OF PINE & DECIDUOUS SAPLINGS & SCRUB & A FEW SMALLER HOLLYS.

FLOOD CERTIFICATION:
 PROPERTY SHOWN HEREON APPEARS TO BE IN FLOOD HAZARD ZONE "X", (AREAS OUTSIDE THE 500 YEAR FLOOD PLAIN), AS SHOWN ON COMMUNITY PANEL # 510 201 0035 B WHICH WAS PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY. SAID PANEL HAS AN EFFECTIVE DATE OF FEBRUARY 6, 1991.

EROSION CONTROL NOTES:
 PROVIDE STONE CONSTRUCTION ENTRANCE DURING CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR KEEPING WINDSOR RIDGE SOUTH FREE OF MUD AND DEBRIS ADJACENT TO PROPOSED DRIVEWAY AND LOT DURING CONSTRUCTION.
 UPON REMOVAL OF ALL EROSION & SEDIMENT CONTROL ITEMS, ALL TRAPPED AND CONTAINED SEDIMENT IS TO BE REMOVED FROM LOT AND PROPERLY DISPOSED OF. ROADSIDE DITCHES AND, IF APPLICABLE, OUTFALL DITCHES ARE TO BE CLEANED OF SEDIMENT AND/OR CONSTRUCTION DEBRIS ON A REGULAR BASIS DURING CONSTRUCTION.

DEVELOPMENT PLAN
 FOR
**LOT 197, PHASE III,
 GREENSPRINGS WEST**
 LOCATED

JAMES CITY COUNTY, VIRGINIA
 SCALE: 1" = 20' DATE: JUNE 14, 2003

PREPARED FOR
GORDON BERRYMAN BUILDERS, INC.
 124 BERKELEY LANE
 WILLIAMSBURG, VIRGINIA
 23185

(757) 253-0355
 JO # 9296 FB "F"

6/14/03
 ROGER D. SPEARMAN
 CHASE II
 LAND SURVEYOR

SPEARMAN & ASSOCIATES, P.C.
 SURVEYORS AND PLANNERS
 5682 A MOORETOWN RD. - WILLIAMSBURG, VA.
 (804) 253-8720



CURVE DATA TABLE

CURVE	ARC	DELTA	RADIUS	CHORD LENGTH	CHORD BEARING	TAN LENGTH
C1	85.25	15° 01' 42"	325.00	85.00	S 14° 51' 41" E	42.87



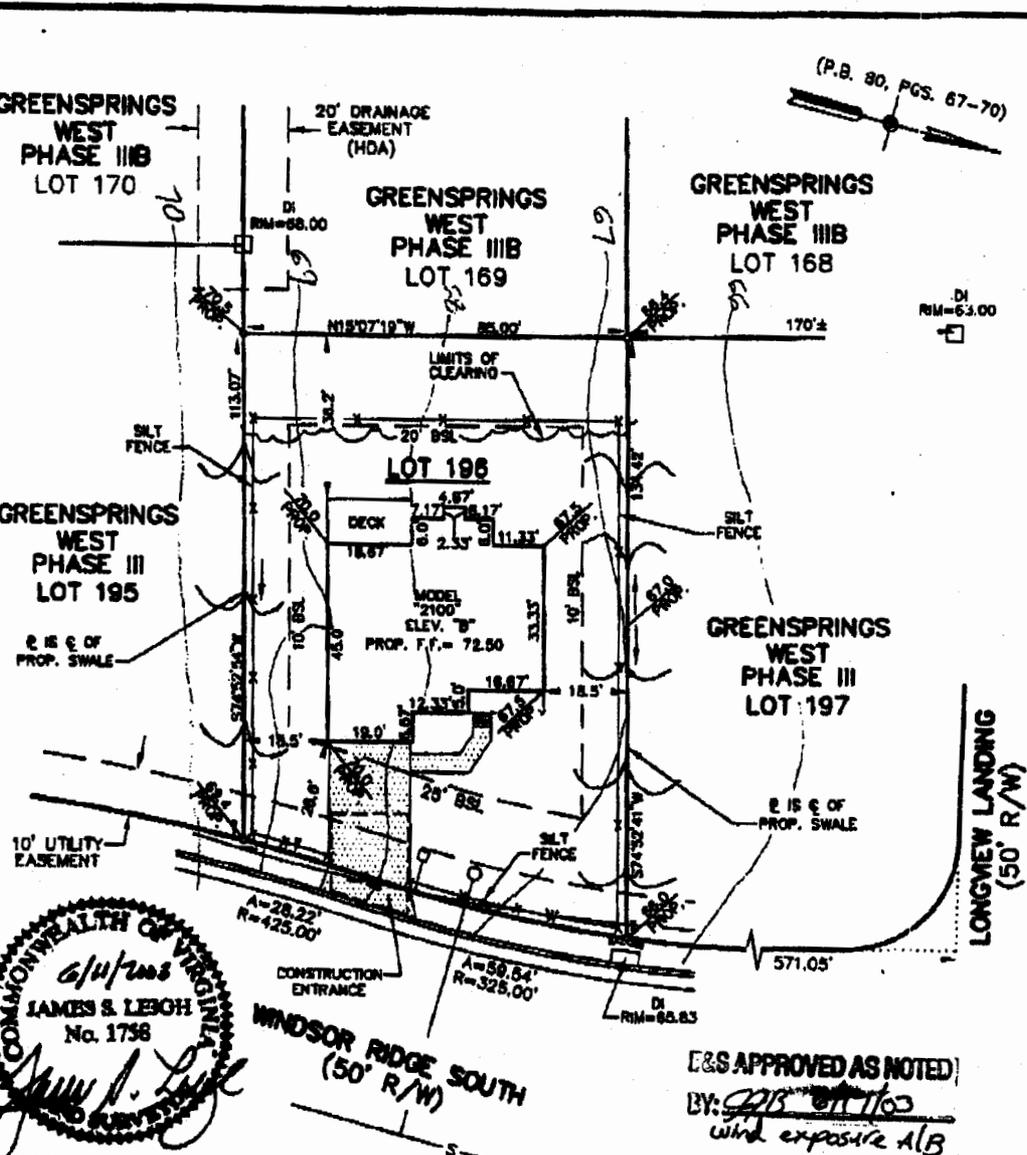
GREENSPRINGS WEST PHASE III B LOT 170

GREENSPRINGS WEST PHASE III B LOT 169

GREENSPRINGS WEST PHASE III B LOT 168

GREENSPRINGS WEST PHASE III LOT 195

GREENSPRINGS WEST PHASE III LOT 197



COMMONWEALTH OF VIRGINIA
6/11/2003
JAMES S. LEBOH
No. 1738
James S. Leboh

WINDSOR RIDGE SOUTH
(50' R/W)

[E&S APPROVED AS NOTED]
BY: *GRB* 6/11/03
wind exposure ALB

NOTE:
CONTOURS SHOWN WERE TAKEN FROM SITE DEVELOPMENT PLANS

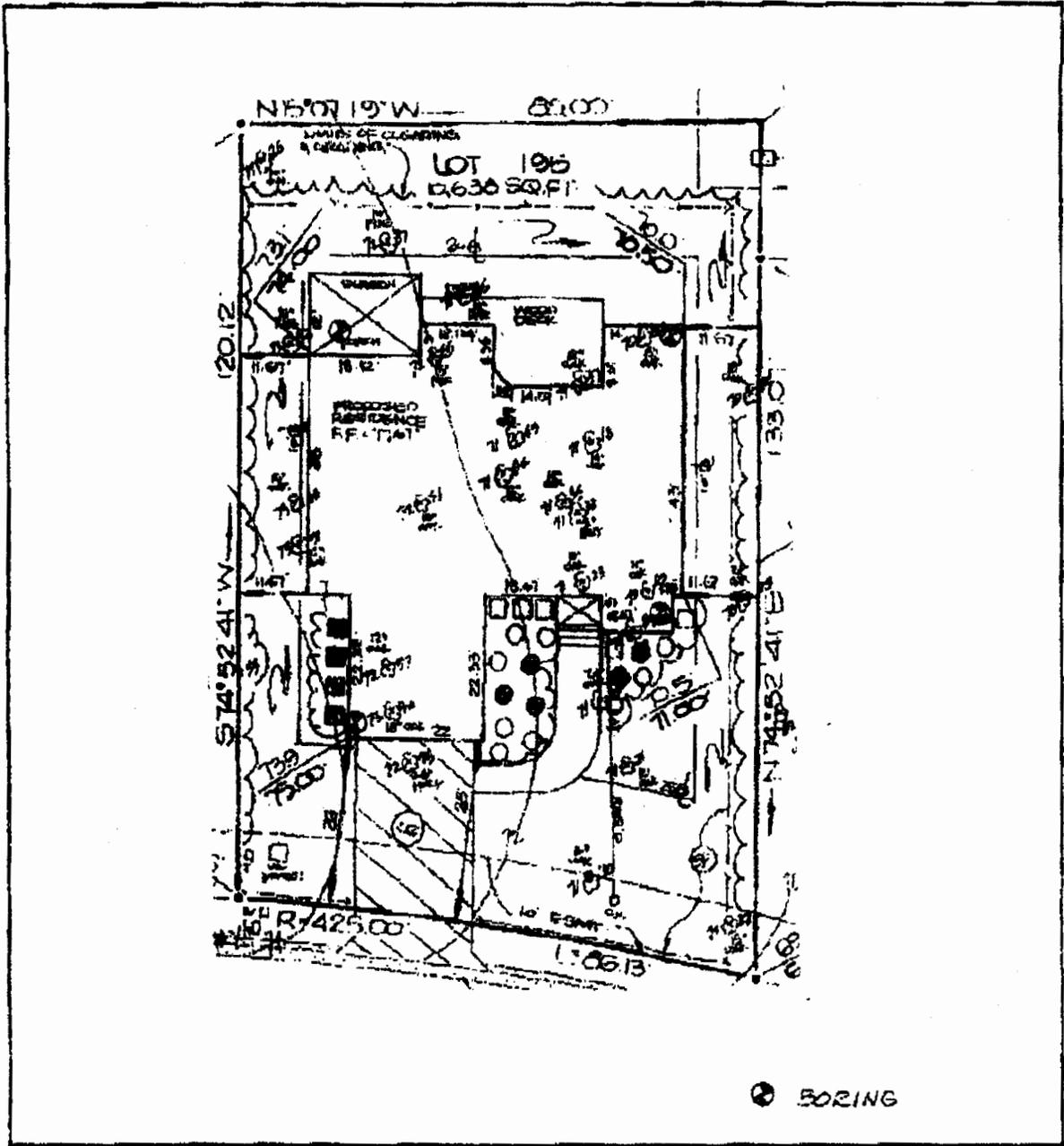
NOTE: THIS PROPERTY LIES IN ZONE X. (WHITE AREAS DETERMINED TO BE OUTSIDE 500-YEAR FLOOD PLAN), AS SHOWN ON FLOOD INSURANCE RATE MAP FOR JAMES CITY COUNTY, VIRGINIA, COMM. NO. 510201 00308, FEBRUARY 5, 1991.

ZONING: R4, RESIDENTIAL
BUILDING SETBACKS: FRONT = 25'
SIDE = 10'
REAR = 20'

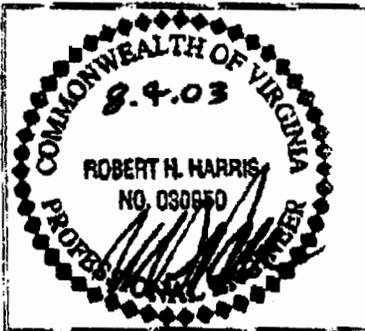
NOTE:
IT SHALL BE THE RESPONSIBILITY OF THE CLIENT/BUILDER TO VERIFY THAT THESE SITE PLAN DIMENSIONS ARE IN AGREEMENT WITH THE BUILDING PLANS PRIOR TO ANY CONSTRUCTION.

SITE PLAN
OF
LOT 196, PLAT OF SUBDIVISION AND BOUNDARY LINE ADJUSTMENT
GREENSPRINGS WEST, PHASE III
LOTS 118-126, 138-159 AND 180-201
FOR (P.B. 80, PGS. 67-70)

AFFINITY HOMES, INC.
BERKELEY DISTRICT - JAMES CITY COUNTY, VIRGINIA
SCALE: 1" = 30' JUNE 9, 2003
THE SIRINE GROUP, LTD.
SURVEYORS • ENGINEERS • PLANNERS
GLOUCESTER, VIRGINIA



⊙ BORING



Virginia Inspections & Engineering, Inc.

SOILS ANALYSIS FOUNDATION ENGINEERING CONCRETE INSPECTIONS

BORING LOCATIONS (Plat by Others)

Location: Lot 195 Greensprings West, 3220 Windsor Ridge South, James City

Client: Tom Joffe Builders, Inc.

Date: 4 August 2003

John Keller

Project No: 37243 SL

P.O. Box 2628 MIDLOTHIAN, VA 23113 (804) 379-5678



PROPOSED
SWM/BMP FACILITY
WET POND #1 N.P.=56.50

VARIABLE WIDTH
SLOPE EASEMENT

OP PROVIDE 20' LONG RIP RAP APRON
CONSISTING OF CLASS 1 EROSION
CONTROL STONE (5 CY REQ'D.)

VARIABLE WIDTH DRAINAGE, MAINTENANCE
AND ACCESS EASEMENT TO BE DEDICATED
TO JAMES CITY COUNTY

MODIFIED EW-11
CREST EL.=56.0
(SEE SECTION A-A
AND DETAIL SHT 16)

APPROXIMATE
LOCATION OF
FUTURE GOLF
CART PATH

MATCHLINE

75 LF OF 24"
RCP @ 2.67%
(INCLUDES ES-1)
INV OUT=48.13

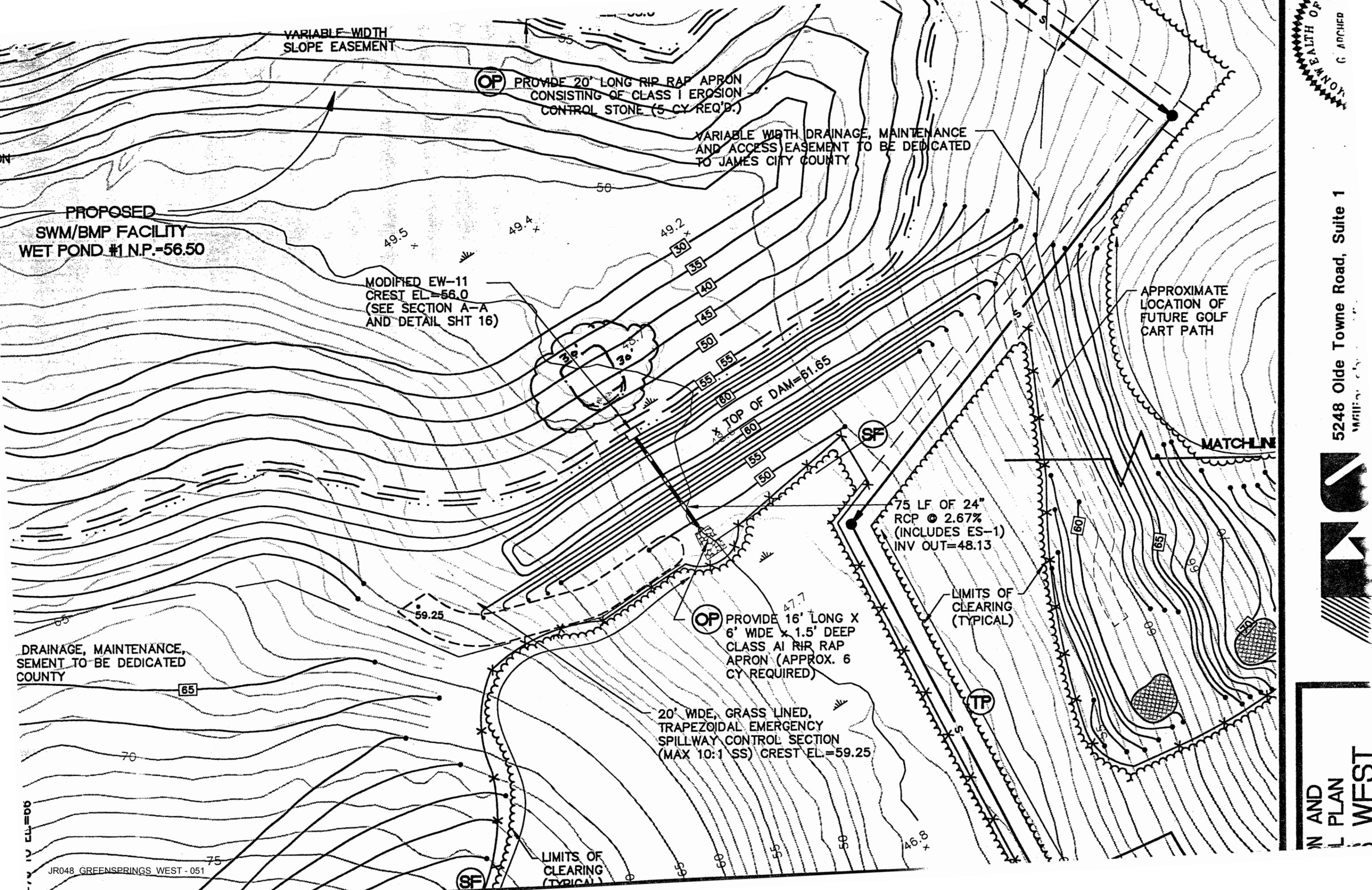
LIMITS OF
CLEARING
(TYPICAL)

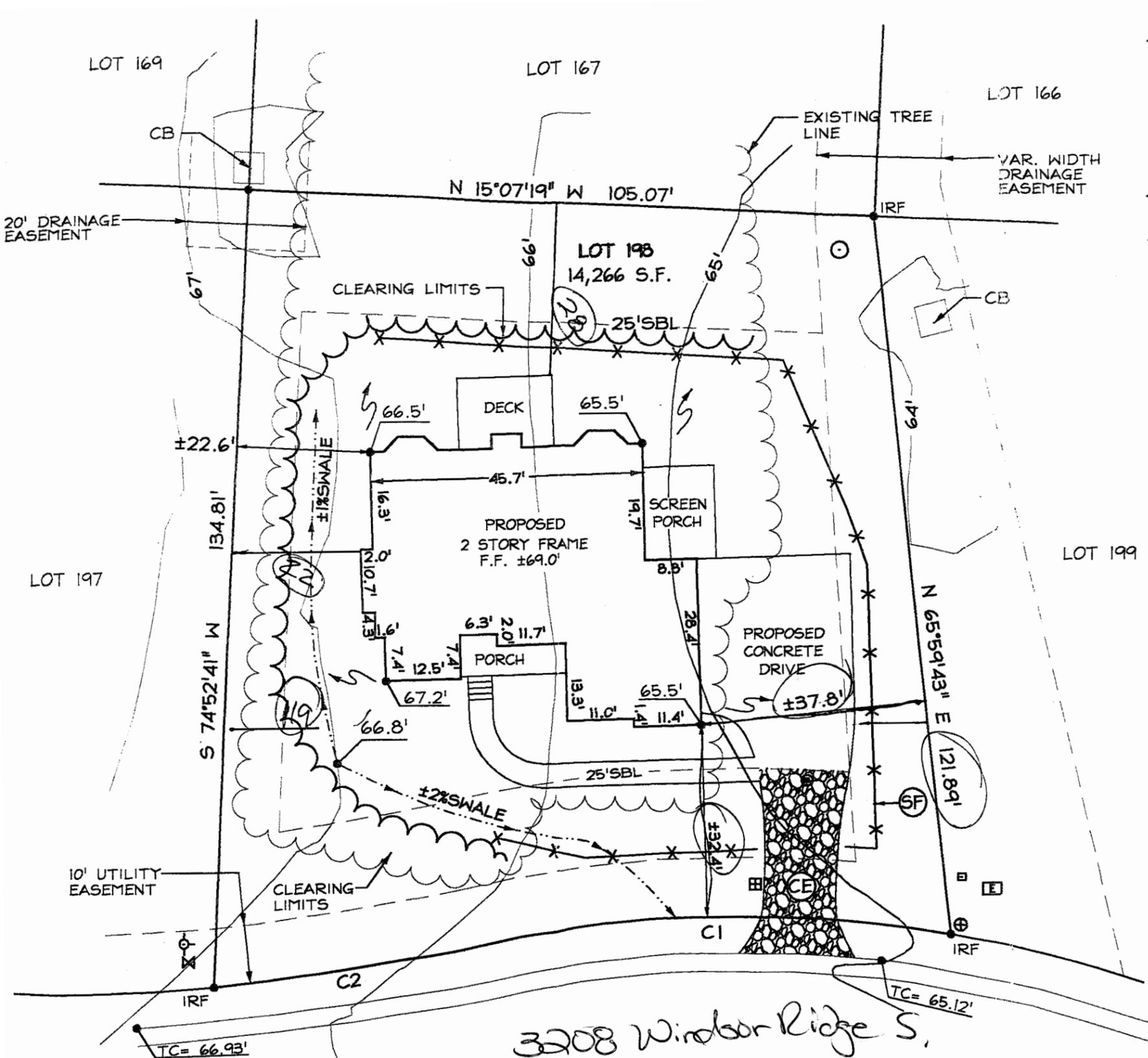
OP PROVIDE 16' LONG X
6' WIDE X 1.5' DEEP
CLASS A1 RIP RAP
APRON (APPROX. 6
CY REQUIRED)

20' WIDE, GRASS LINED,
TRAPEZOIDAL EMERGENCY
SPILLWAY CONTROL SECTION
(MAX 10:1 SS) CREST EL.=59.25

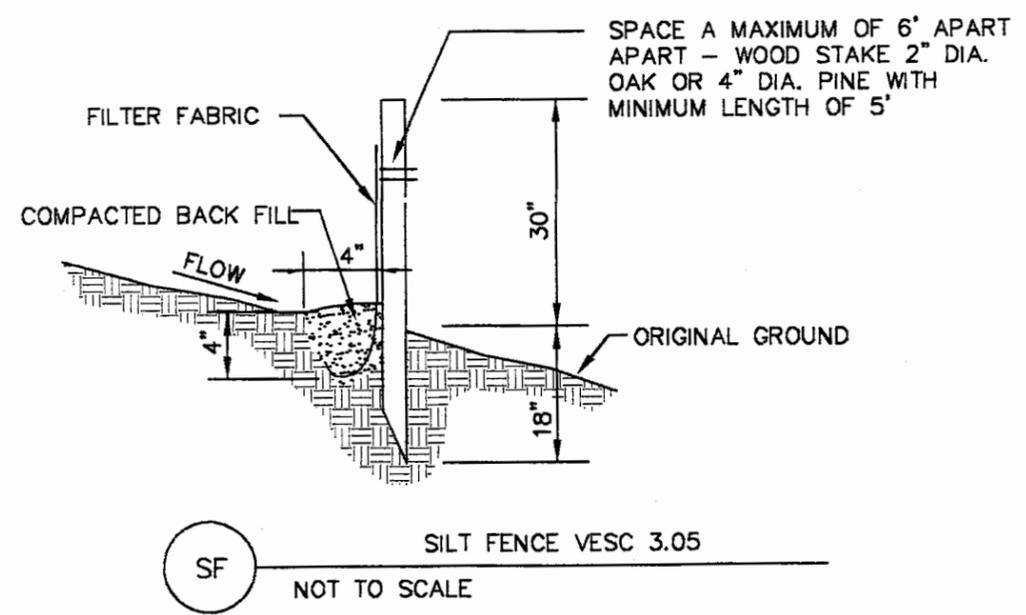
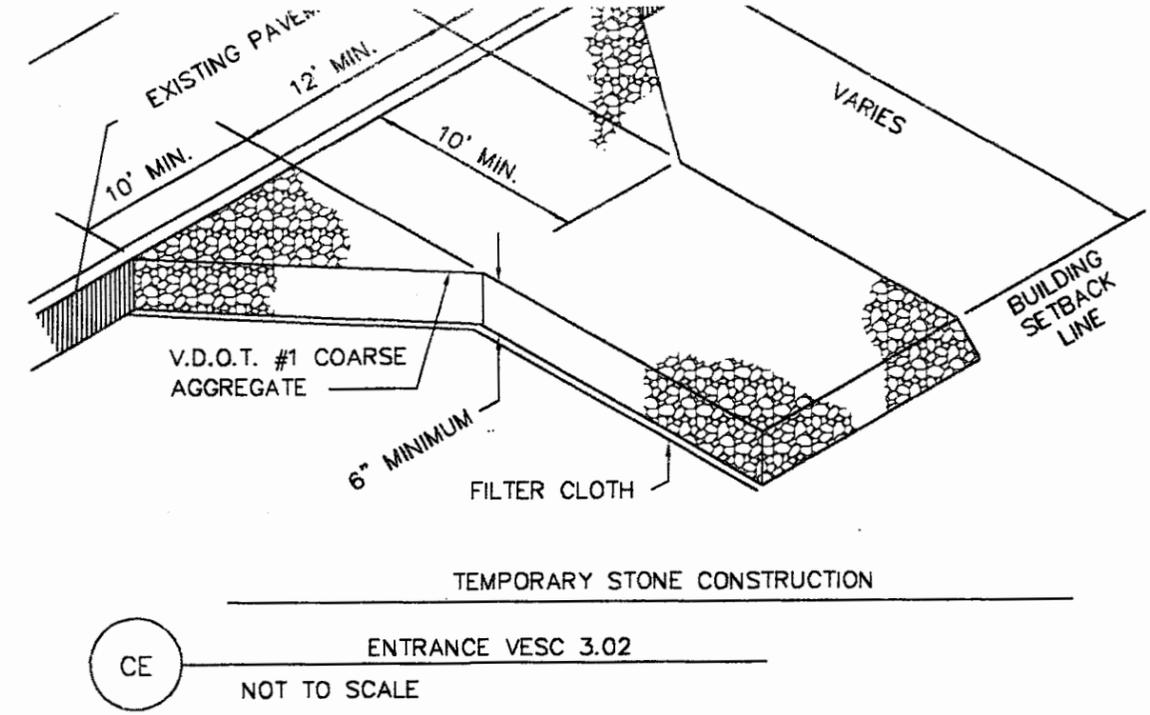
LIMITS OF
CLEARING
(TYPICAL)

DRAINAGE, MAINTENANCE,
SEMENT TO BE DEDICATED
COUNTY





3208 Windsor Ridge S,
WINDSOR RIDGE SOUTH
(50' R/W)
Lowman, David

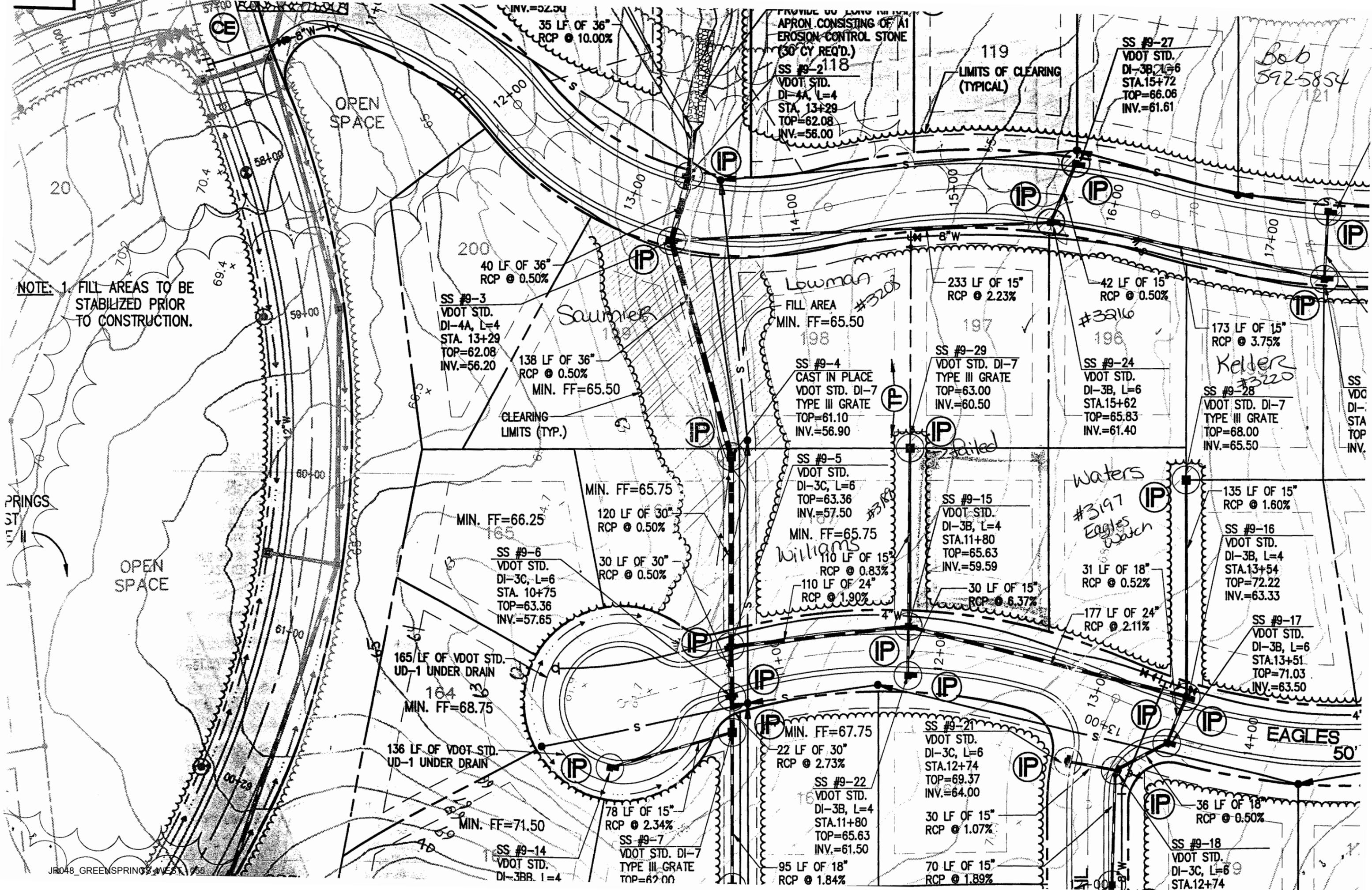


CURVE TABLE

NO	DELTA	CHORD	TANGENT	RADIUS	ARC	CHORD
----	-------	-------	---------	--------	-----	-------



NOTE: 1. FILL AREAS TO BE STABILIZED PRIOR TO CONSTRUCTION.



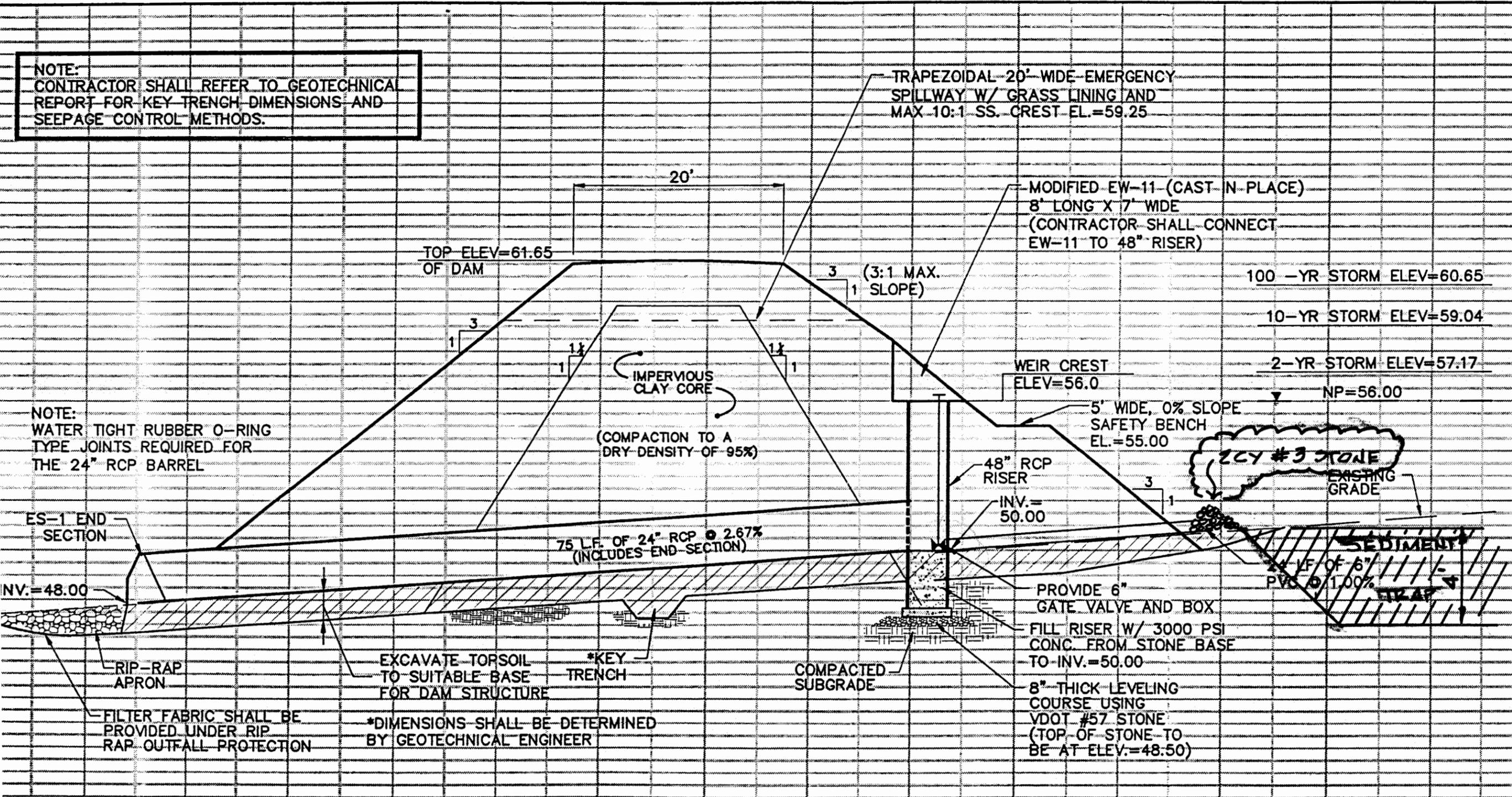
MODIFIED EW-11

NOT TO SCALE



NOTE:
CONTRACTOR SHALL REFER TO GEOTECHNICAL REPORT FOR KEY TRENCH DIMENSIONS AND SEEPAGE CONTROL METHODS.

NOTE:
WATER TIGHT RUBBER O-RING TYPE JOINTS REQUIRED FOR THE 24" RCP BARREL



TYPICAL DAM SECTION A-A

(SEE PLAN VIEW SHEET 8)

SCALE: HORIZ: 1" = 10'
VERT: 1" = 4'

Designed	AES
Scale	NONE
Project	

$\Delta = 05^{\circ} 29' 09''$
 $R = 5600.00'$
 $L = 536.17'$
 $T = 268.29'$
 $C = 535.96'$
 $CB = 1136^{\circ} 49' 30'' E$

N 1/4
DAVID M. MUIR

NOTE:
THE LAND DISTURBING PERMIT, WHEN ISSUED, WILL REQUIRE CONSTRUCTION OF THE DETENTION/SEDIMENT BASIN PRIOR TO ANY OTHER CONSTRUCTION ACTIVITIES ON THE REMAINDER OF THE PROJECT.

60 SECLIC EASEMENT OR VEGETATION TO PROTECT STRUCTURES TO BE

37.04
Ac.

4.81
Ac.

19.65
Ac.

2.66
Ac.

N 1/4
FRANCIS M. WHITE
46 11 13

SS# 2-3
DI-7
TOP = 711.20.81
INV. IN = 13.00 (24")
INV. IN = 711.30
INV. OUT = 13.00 (36")
12.58

EXIST.
SS# 2-9
DI-5
TOP = 711.18.41
INV. = 11.10 15.31

SS# 2-7
DI-5 17.21
TOP = 121.19
INV. = 14.00
13.81

0.85
Ac.

5.35
Ac.

• 66" METAL RISER
 TOP = 15.41
 PRIMARY SPILLWAY = 13.71
 • 12" CMP INTAKE RISER
 TOP = 10.85
 INV = 7.84
 (10 L.F. FORWARD OF 66" RISER)
 UTILITY BASEMENT TYPICAL

SS# 2-2
DI-7
TOP = 711.21.19
INV. = 11.00 11.44

110 L.F. OF 36" RCP @ 0.91%
200 L.F. OF 6" DEEP GRASS SWALE
SS# 3-1

21
95 L.F. OF 18" RCP @ 0.84%

38 L.F. OF 24" RCP @ 1.32%

0.47
Ac.

SS# 1-11
EXISTING DI-5

SS# 1-12
EXISTING DI-1

BEST MANAGEMENT PRACTICE (BMP) POND

ES-1 END SECTION
INV. = 10.00

20
125 L.F. OF 24" RCP @ 0.58%

SS# 2-6
DI-5
TOP = 1118.17.24
INV. IN = 14.50 (24")
INV. OUT = 14.19 (24")

SS# 1-10
EXISTING RI-5

0.81
Ac.

0.99
Ac.

THE WILKINSON ENVIRONMENTAL GROUP

DUAL RISER STRUCTURES SEE DETAIL SHEET NO. 9

ES-2 END SECTION
INV. = 12.00

19
100 L.F. OF 30" RCP @ 0.60% INCLUDING 1' ES-1 END SECTION

23
300 L.F. OF 18" RCP @ 0.84% TO DI-5
2" TYPE 2 CONC DITCH ON BOTH SIDES OF ROAD

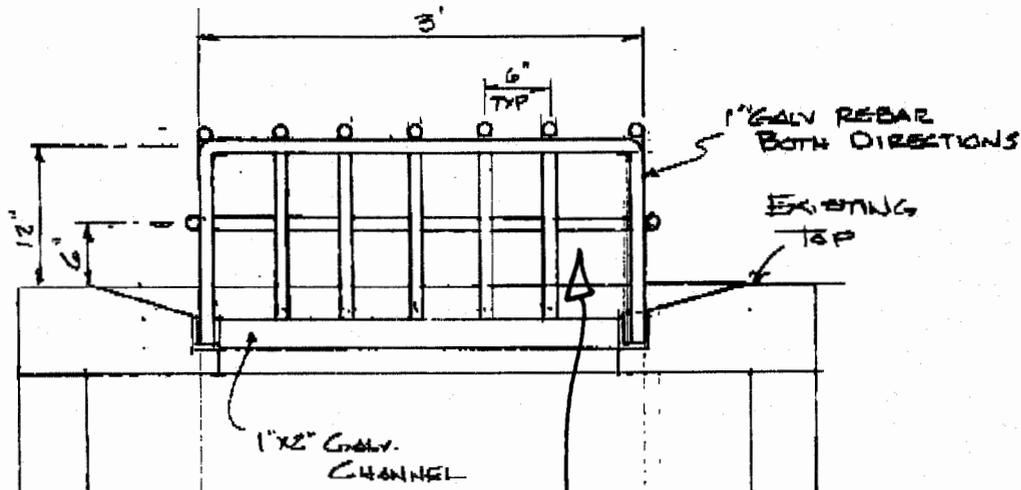
24
0.30
Ac.

SS# 1-9
EXIST. DI-5

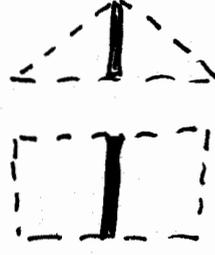
SS# 1-17
EXIST. ES-1 END SECTION

0.90
Ac.

FRANCIS ACCESS EASEMENT POND TO INCLUDE



1. NEEDS BAFFLE PLATE

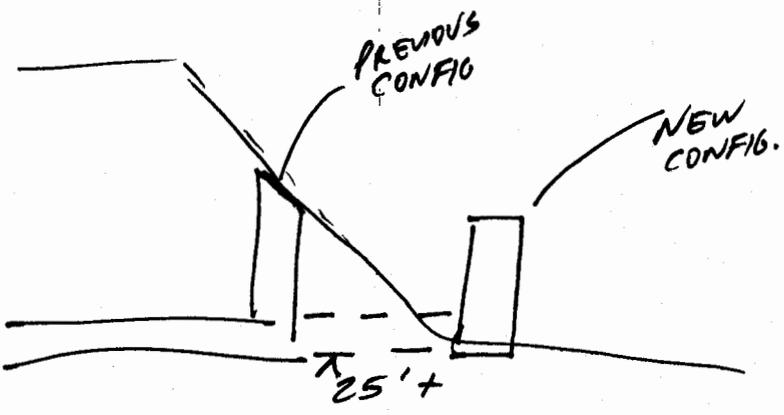


TRASH RACK TO REPLACE EXISTING D. I. GRATE

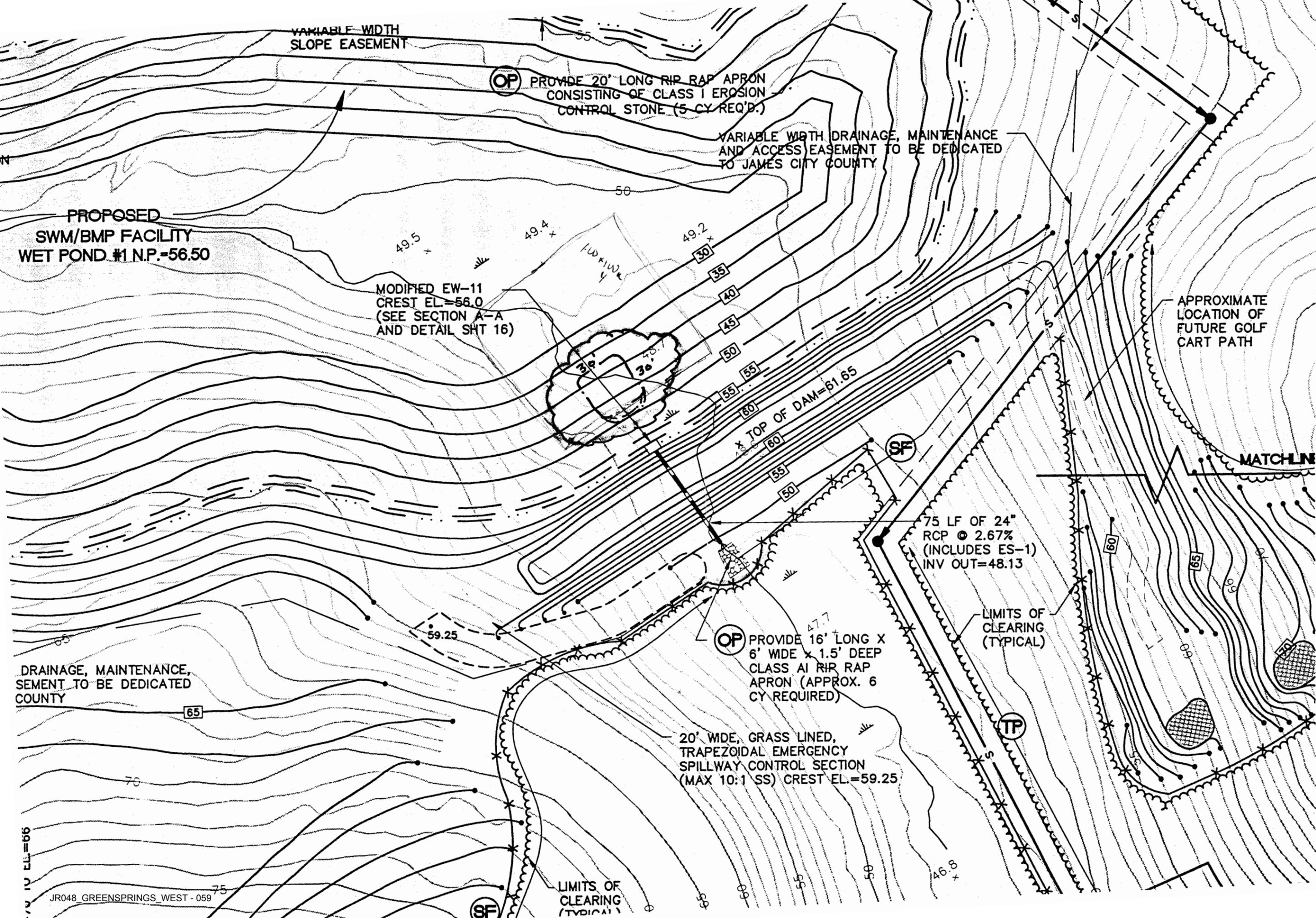
PROPOSED TRASH RACK GREENSPRINGS WEST 7-2500 3/4" = 1'

2. NEED CHECK HYDRAULIC ROUTING TO CONFIRM 2-, 10- AND 100-YEAR WSEL AND Freeboard to top of dam are maintained

3. Record Drawings Need to reflect riser, barrel? trash rack changes



07-28-00



Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.02

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	-----	12.96	22.89	-----	-----	62.11	73.26	-----	103.96	8656-13 GRSP-WEST PRE-DEV
3	SCS Runoff	-----	37.92	55.27	-----	-----	116.23	132.45	-----	175.80	8656-13 Grsp-West Post Dev.
5	Reservoir	3	1.492	1.900	-----	-----	10.63	15.29	-----	30.39	Routed BMP IV B-1
10	SCS Runoff	-----	56.66	74.31	-----	-----	131.69	146.51	-----	185.83	8656-13 Grsp-West Phase I E&S
12	Reservoir	10	3.876	4.461	-----	-----	5.933	8.545	-----	19.84	Sediment Basin IV B-1
20	Reservoir	3	2.199	7.871	-----	-----	34.63	35.96	-----	38.76	BMP IV B-1 As-Built
25	Reservoir	10	2.201	2.570	-----	-----	3.487	3.704	-----	16.47	Sediment Basin IV B-1

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.02

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	12.96	2	744	82,132	---	----	----	8656-13 GRSP-WEST PRE-DEV
3	SCS Runoff	37.92	2	734	166,071	---	----	----	8656-13 Grsp-West Post Dev.
5	Reservoir	1.492	2	1066	155,581	3	55.12	385,299	Routed BMP IV B-1
10	SCS Runoff	56.66	2	734	259,904	---	----	----	8656-13 Grsp-West Phase I E&S
12	Reservoir	3.876	2	850	255,444	10	53.45	238,134	Sediment Basin IV B-1
20	Reservoir	2.199	2	928	144,623	3	54.65	534,088	BMP IV B-1 As-Built
25	Reservoir	2.201	2	980	250,152	10	52.97	348,712	Sediment Basin IV B-1
BMP 4B-1 As-Built 12-20-06.gpw					Return Period: 1 Year			Wednesday, Apr 2, 2008	

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.02

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	22.89	2	742	133,075	---	----	----	8656-13 GRSP-WEST PRE-DEV
3	SCS Runoff	55.27	2	732	239,765	---	----	----	8656-13 Grsp-West Post Dev.
5	Reservoir	1.900	2	1094	227,536	3	55.61	441,901	Routed BMP IV B-1
10	SCS Runoff	74.31	2	734	344,500	---	----	----	8656-13 Grsp-West Phase I E&S
12	Reservoir	4.461	2	864	339,883	10	54.15	297,009	Sediment Basin IV B-1
20	Reservoir	7.871	2	784	218,165	3	54.86	558,642	BMP IV B-1 As-Built
25	Reservoir	2.570	2	1012	333,055	10	53.59	414,772	Sediment Basin IV B-1
BMP 4B-1 As-Built 12-20-06.gpw					Return Period: 2 Year			Wednesday, Apr 2, 2008	

Hydrograph Summary Report

Hydraflow Hydrographs by Intellisolve v9.02

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	62.11	2	742	336,036	---	----	----	8656-13 GRSP-WEST PRE-DEV
3	SCS Runoff	116.23	2	732	503,913	---	----	----	8656-13 Grsp-West Post Dev.
5	Reservoir	10.63	2	812	489,099	3	56.77	584,495	Routed BMP IV B-1
10	SCS Runoff	131.69	2	734	627,970	---	----	----	8656-13 Grsp-West Phase I E&S
12	Reservoir	5.933	2	928	622,760	10	56.05	502,044	Sediment Basin IV B-1
20	Reservoir	34.63	2	762	482,127	3	55.76	669,589	BMP IV B-1 As-Built
25	Reservoir	3.487	2	1118	607,897	10	55.56	644,050	Sediment Basin IV B-1
BMP 4B-1 As-Built 12-20-06.gpw					Return Period: 10 Year		Wednesday, Apr 2, 2008		

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.02

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	73.26	2	742	394,558	---	-----	-----	8656-13 GRSP-WEST PRE-DEV
3	SCS Runoff	132.45	2	732	575,886	---	-----	-----	8656-13 Grsp-West Post Dev.
5	Reservoir	15.29	2	790	560,945	3	57.03	618,966	Routed BMP IV B-1
10	SCS Runoff	146.51	2	734	702,594	---	-----	-----	8656-13 Grsp-West Phase I E&S
12	Reservoir	8.545	2	862	697,291	10	56.36	541,907	Sediment Basin IV B-1
20	Reservoir	35.96	2	762	554,065	3	56.07	707,568	BMP IV B-1 As-Built
25	Reservoir	3.704	2	1136	678,690	10	56.05	705,890	Sediment Basin IV B-1
BMP 4B-1 As-Built 12-20-06.gpw					Return Period: 25 Year		Wednesday, Apr 2, 2008		

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.02

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	103.96	2	740	557,326	---	----	----	8656-13 GRSP-WEST PRE-DEV
3	SCS Runoff	175.80	2	732	771,120	---	----	----	8656-13 Grsp-West Post Dev.
5	Reservoir	30.39	2	770	755,928	3	57.74	716,807	Routed BMP IV B-1
10	SCS Runoff	185.83	2	734	902,242	---	----	----	8656-13 Grsp-West Phase I E&S
12	Reservoir	19.84	2	794	896,830	10	57.09	635,404	Sediment Basin IV B-1
20	Reservoir	38.76	2	764	749,234	3	56.89	816,586	BMP IV B-1 As-Built
25	Reservoir	16.47	2	812	876,831	10	56.54	770,267	Sediment Basin IV B-1
BMP 4B-1 As-Built 12-20-06.gpw					Return Period: 100 Year		Wednesday, Apr 2, 2008		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

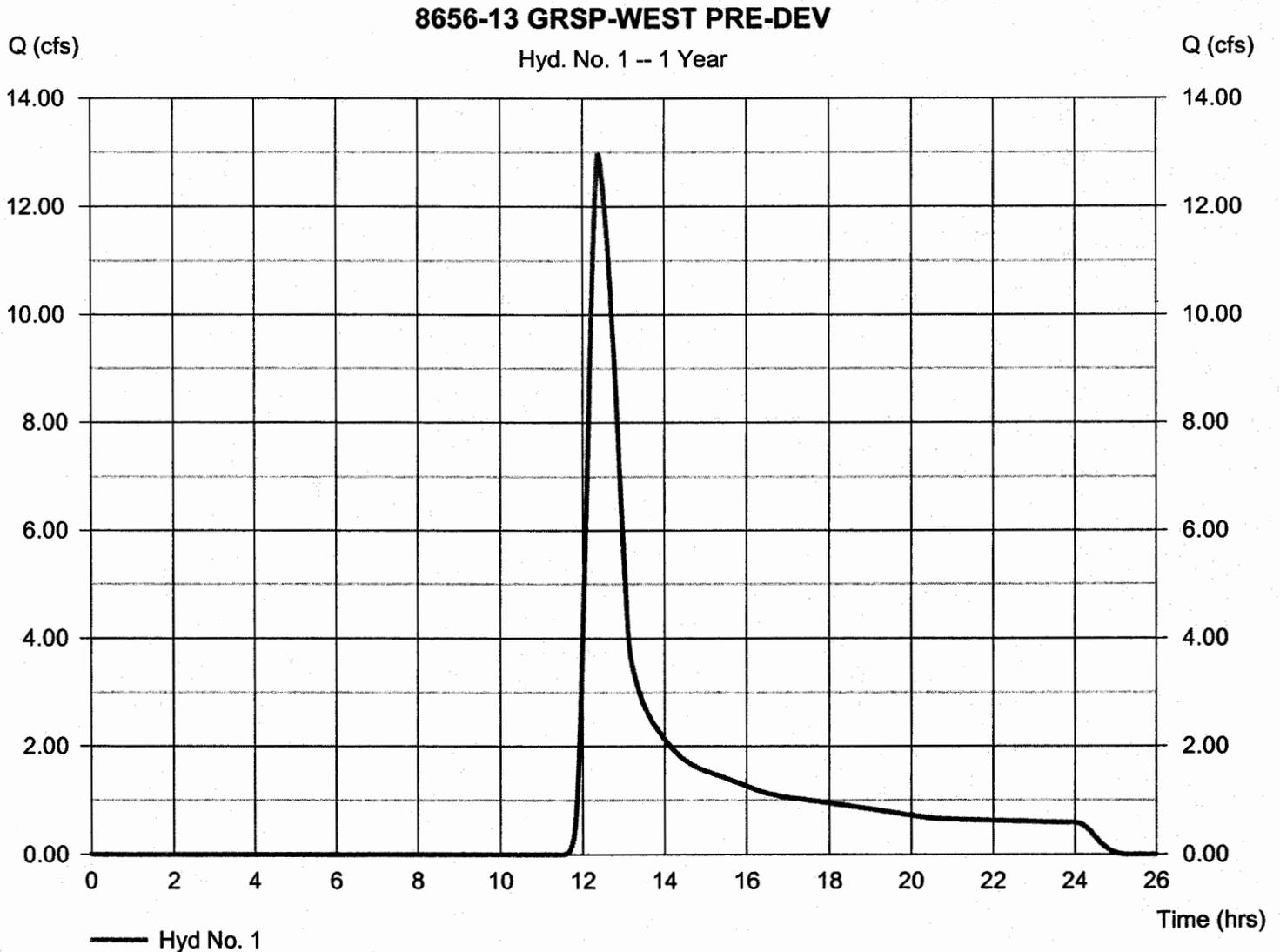
Wednesday, Apr 2, 2008

Hyd. No. 1

8656-13 GRSP-WEST PRE-DEV

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Time interval = 2 min
Drainage area = 33.000 ac
Basin Slope = 1.5 %
Tc method = USER
Total precip. = 2.80 in
Storm duration = 24 hrs

Peak discharge = 12.96 cfs
Time to peak = 744 min
Hyd. volume = 82,132 cuft
Curve number = 72
Hydraulic length = 1628 ft
Time of conc. (Tc) = 46.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

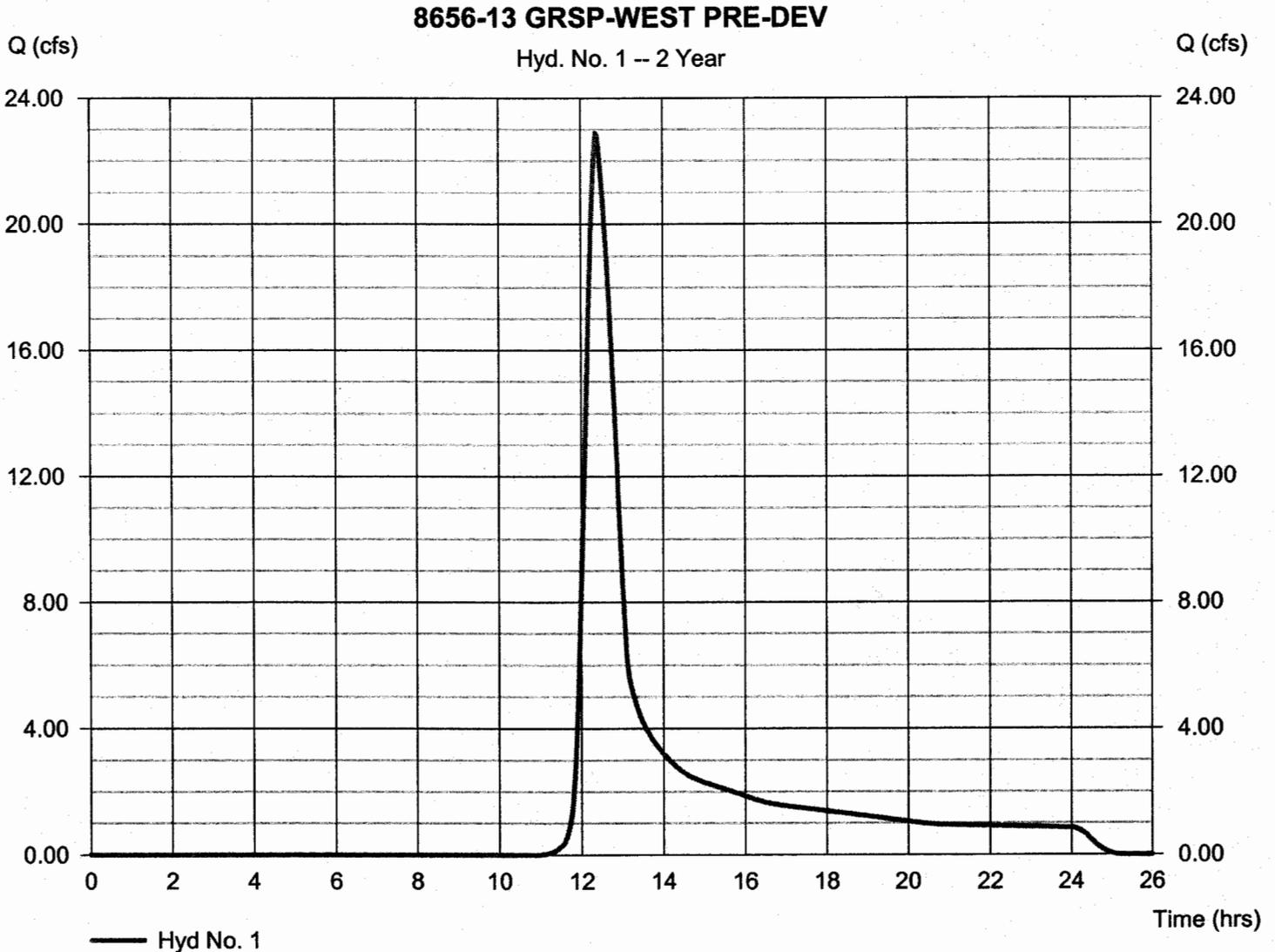
Wednesday, Apr 2, 2008

Hyd. No. 1

8656-13 GRSP-WEST PRE-DEV

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 2 min
Drainage area = 33.000 ac
Basin Slope = 1.5 %
Tc method = USER
Total precip. = 3.50 in
Storm duration = 24 hrs

Peak discharge = 22.89 cfs
Time to peak = 742 min
Hyd. volume = 133,075 cuft
Curve number = 72
Hydraulic length = 1628 ft
Time of conc. (Tc) = 46.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

Wednesday, Apr 2, 2008

Hyd. No. 1

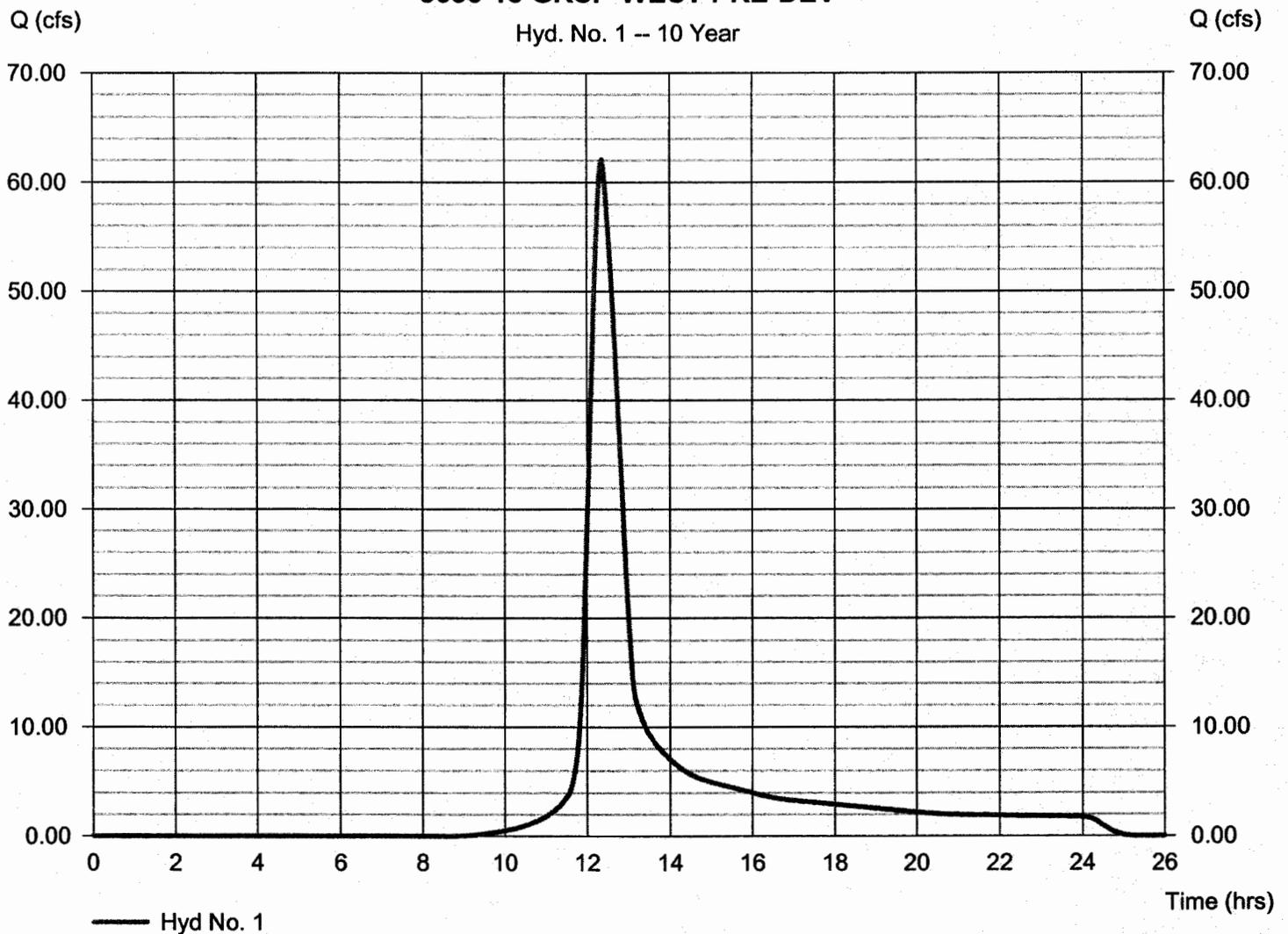
8656-13 GRSP-WEST PRE-DEV

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 33.000 ac
Basin Slope = 1.5 %
Tc method = USER
Total precip. = 5.80 in
Storm duration = 24 hrs

Peak discharge = 62.11 cfs
Time to peak = 742 min
Hyd. volume = 336,036 cuft
Curve number = 72
Hydraulic length = 1628 ft
Time of conc. (Tc) = 46.00 min
Distribution = Type II
Shape factor = 484

8656-13 GRSP-WEST PRE-DEV

Hyd. No. 1 -- 10 Year



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

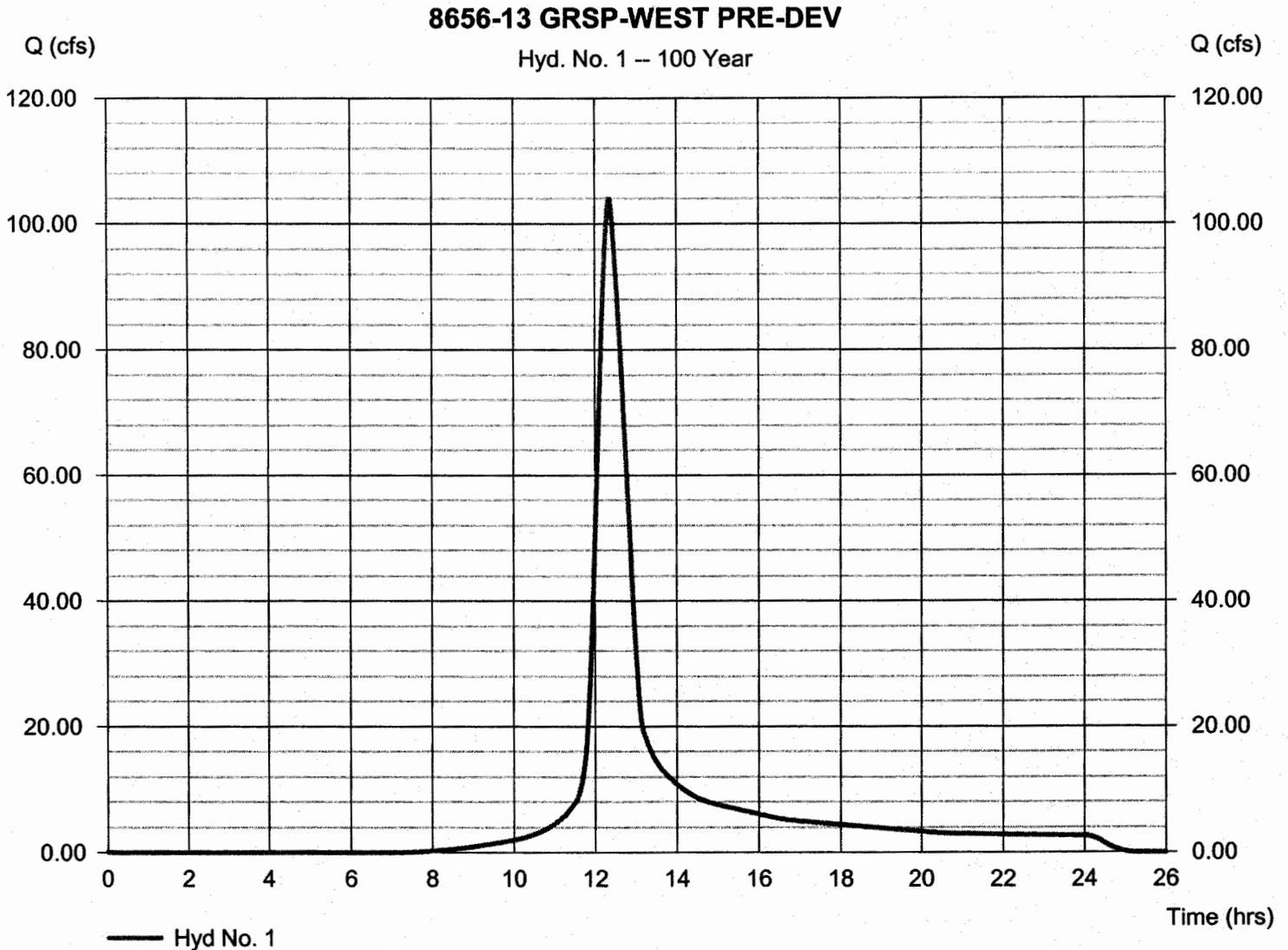
Wednesday, Apr 2, 2008

Hyd. No. 1

8656-13 GRSP-WEST PRE-DEV

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 33.000 ac
Basin Slope = 1.5 %
Tc method = USER
Total precip. = 8.00 in
Storm duration = 24 hrs

Peak discharge = 103.96 cfs
Time to peak = 740 min
Hyd. volume = 557,326 cuft
Curve number = 72
Hydraulic length = 1628 ft
Time of conc. (Tc) = 46.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

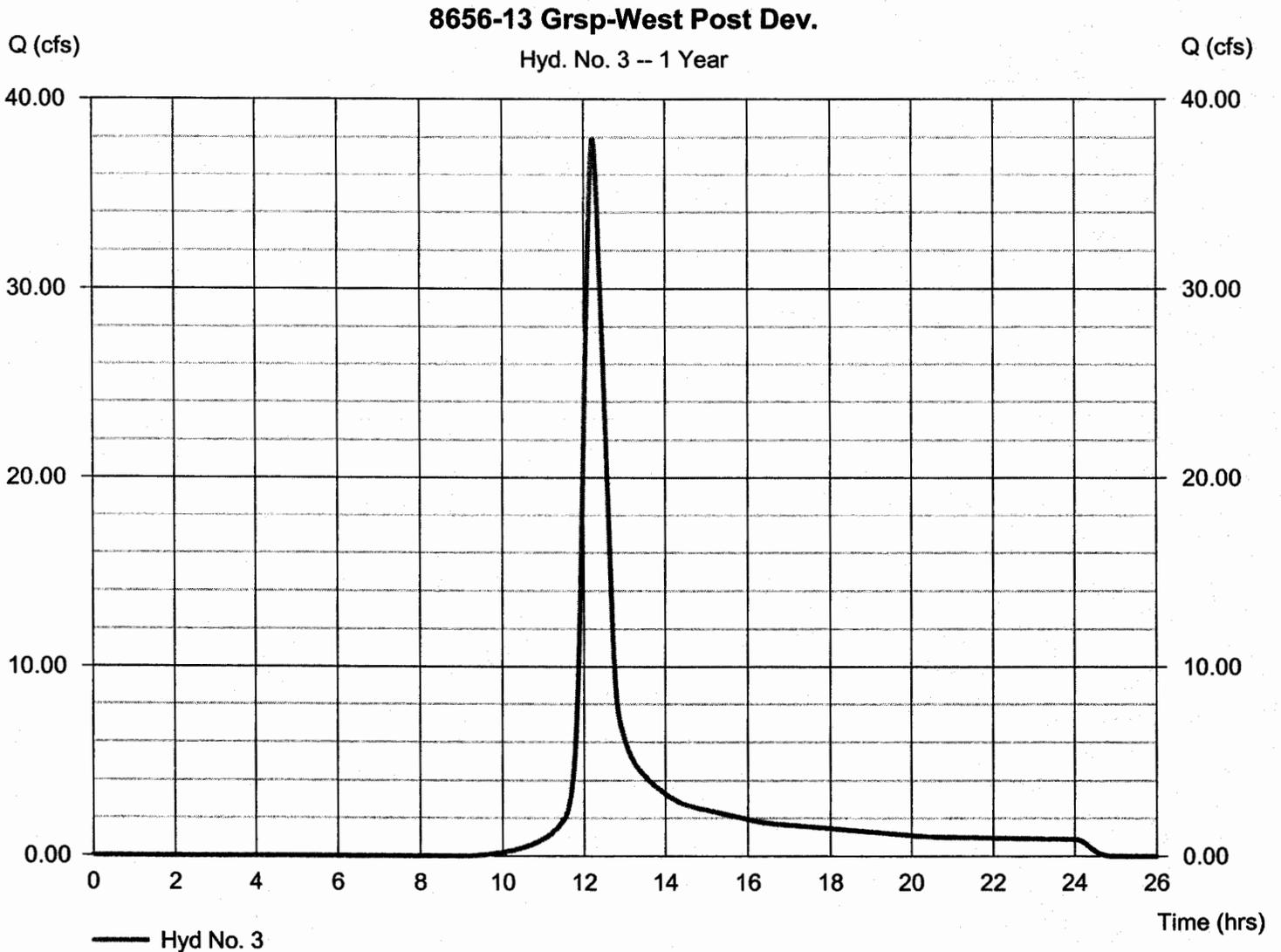
Wednesday, Apr 2, 2008

Hyd. No. 3

8656-13 Grsp-West Post Dev.

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Time interval = 2 min
Drainage area = 35.100 ac
Basin Slope = 3.0 %
Tc method = USER
Total precip. = 2.80 in
Storm duration = 24 hrs

Peak discharge = 37.92 cfs
Time to peak = 734 min
Hyd. volume = 166,071 cuft
Curve number = 83
Hydraulic length = 1628 ft
Time of conc. (Tc) = 31.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

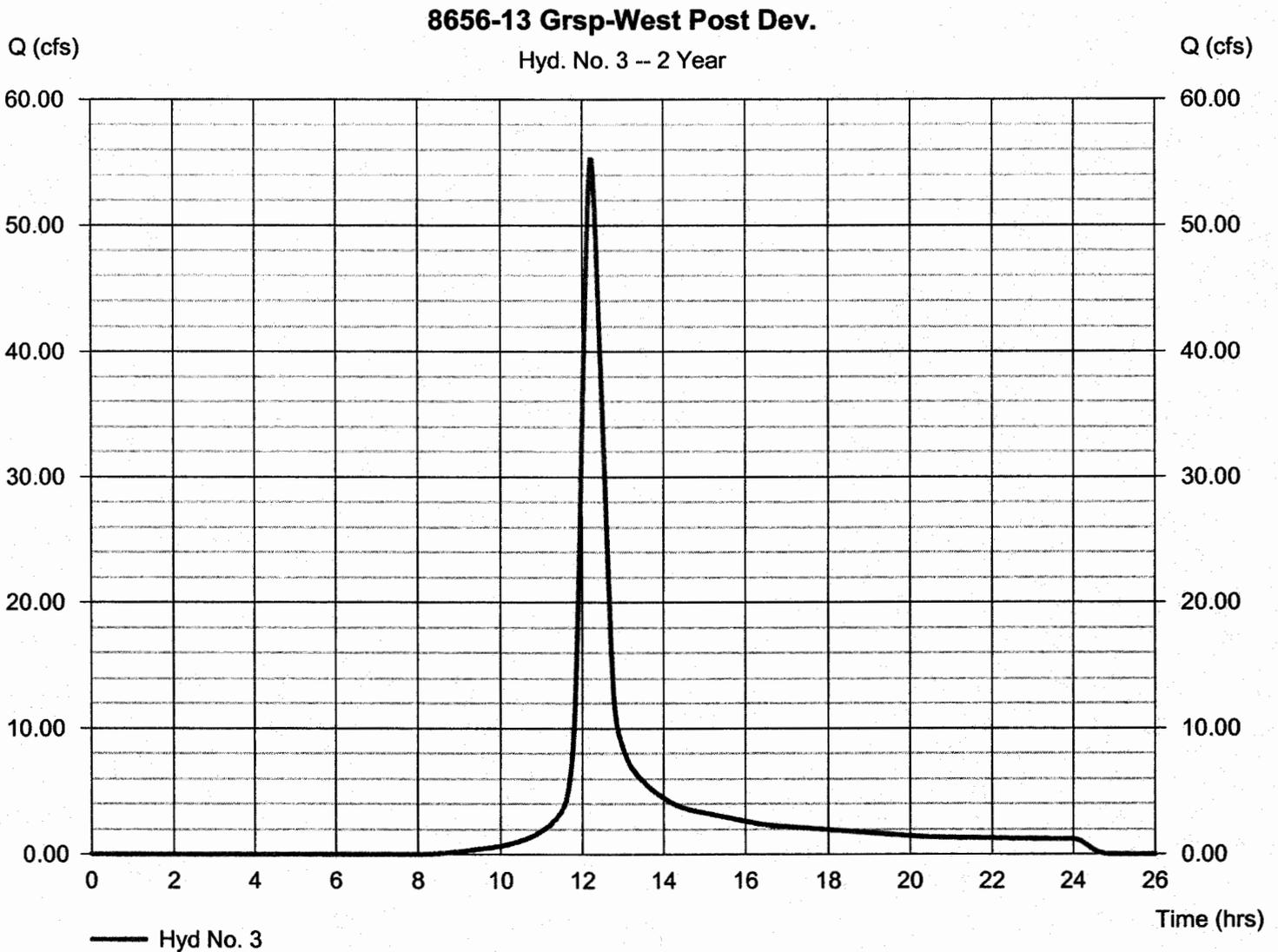
Wednesday, Apr 2, 2008

Hyd. No. 3

8656-13 Grsp-West Post Dev.

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 2 min
Drainage area = 35.100 ac
Basin Slope = 3.0 %
Tc method = USER
Total precip. = 3.50 in
Storm duration = 24 hrs

Peak discharge = 55.27 cfs
Time to peak = 732 min
Hyd. volume = 239,765 cuft
Curve number = 83
Hydraulic length = 1628 ft
Time of conc. (Tc) = 31.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intellisolve v9.02

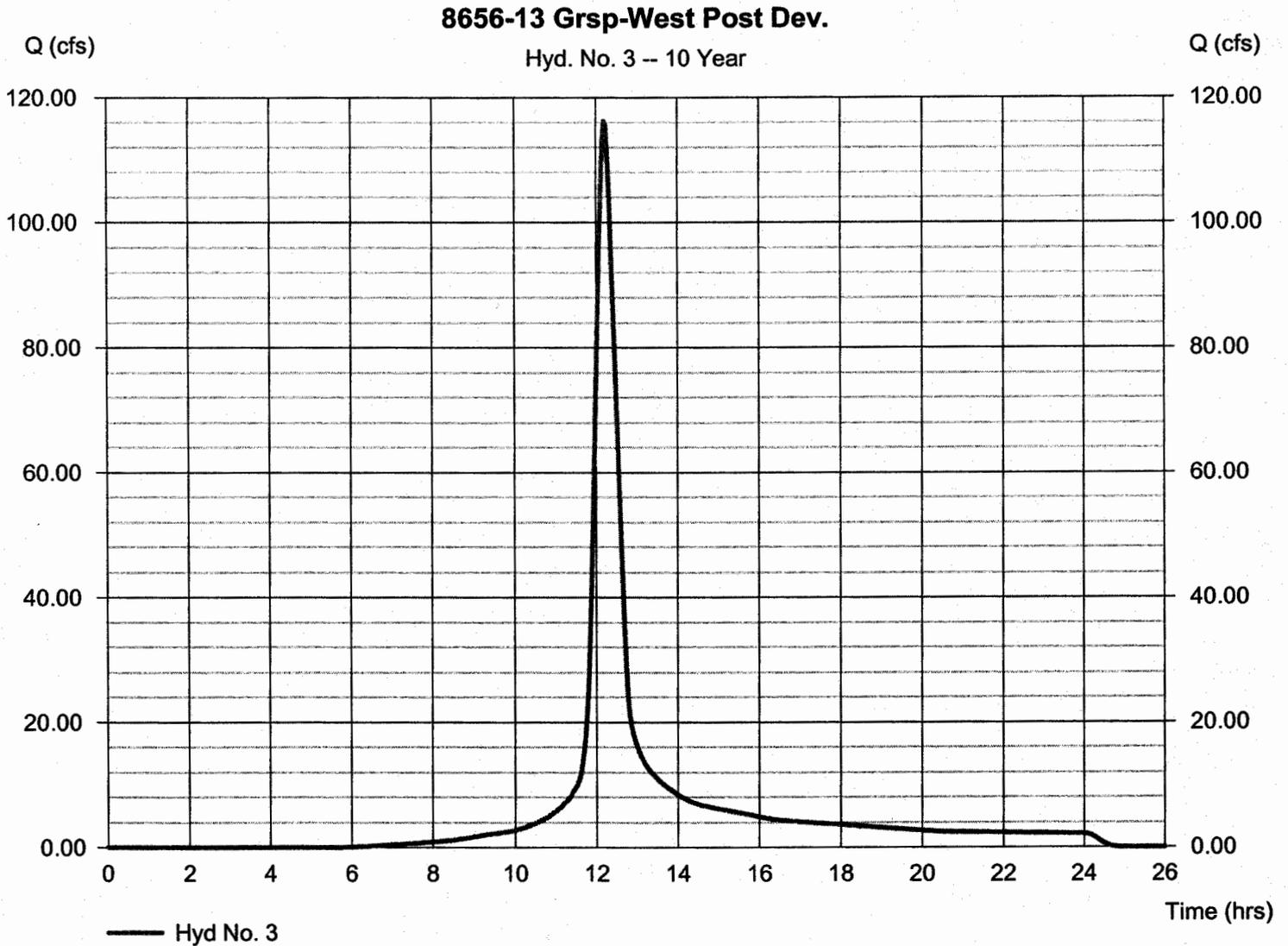
Wednesday, Apr 2, 2008

Hyd. No. 3

8656-13 Grsp-West Post Dev.

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 35.100 ac
Basin Slope = 3.0 %
Tc method = USER
Total precip. = 5.80 in
Storm duration = 24 hrs

Peak discharge = 116.23 cfs
Time to peak = 732 min
Hyd. volume = 503,913 cuft
Curve number = 83
Hydraulic length = 1628 ft
Time of conc. (Tc) = 31.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

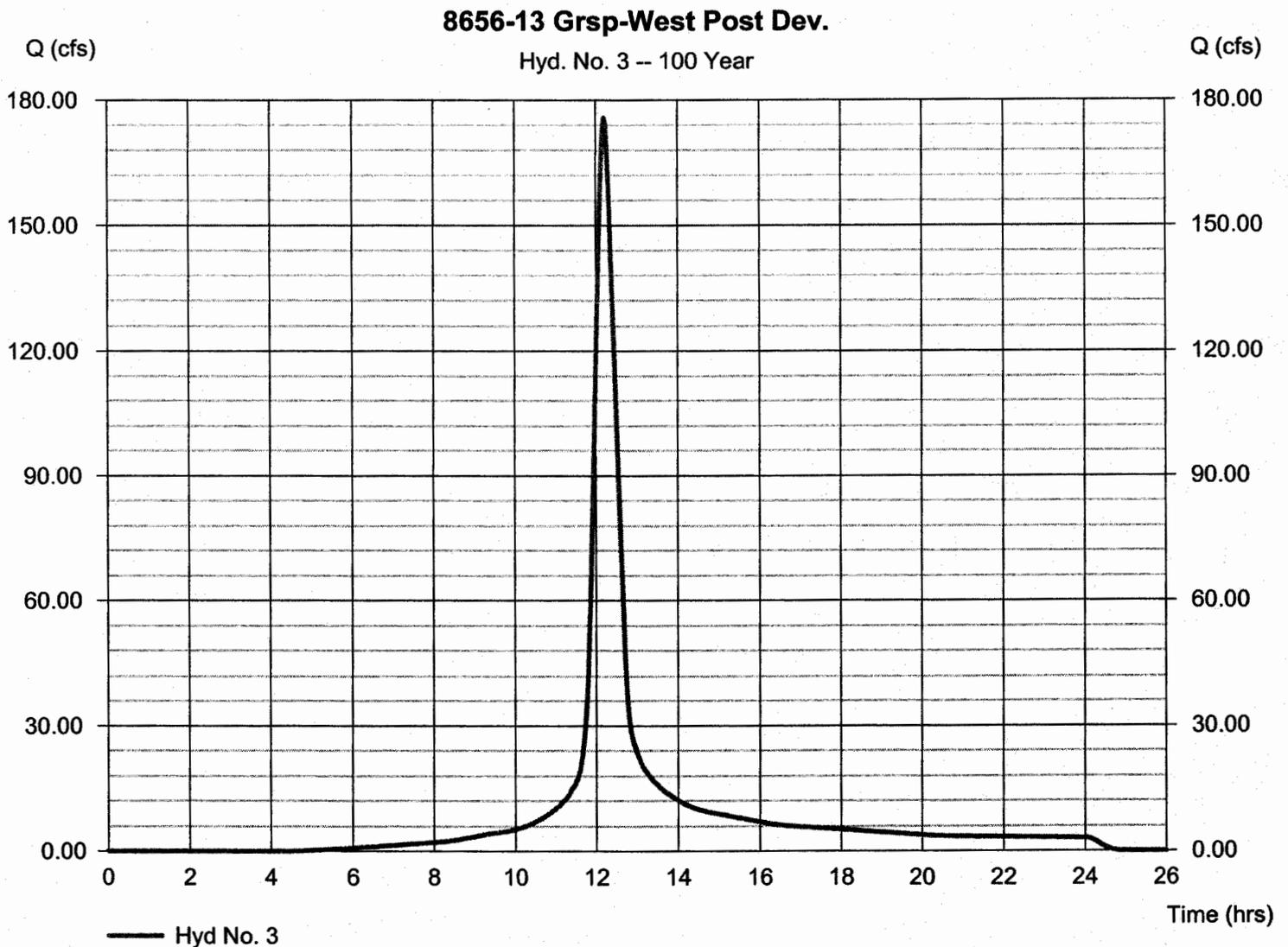
Wednesday, Apr 2, 2008

Hyd. No. 3

8656-13 Grsp-West Post Dev.

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 35.100 ac
Basin Slope = 3.0 %
Tc method = USER
Total precip. = 8.00 in
Storm duration = 24 hrs

Peak discharge = 175.80 cfs
Time to peak = 732 min
Hyd. volume = 771,120 cuft
Curve number = 83
Hydraulic length = 1628 ft
Time of conc. (Tc) = 31.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

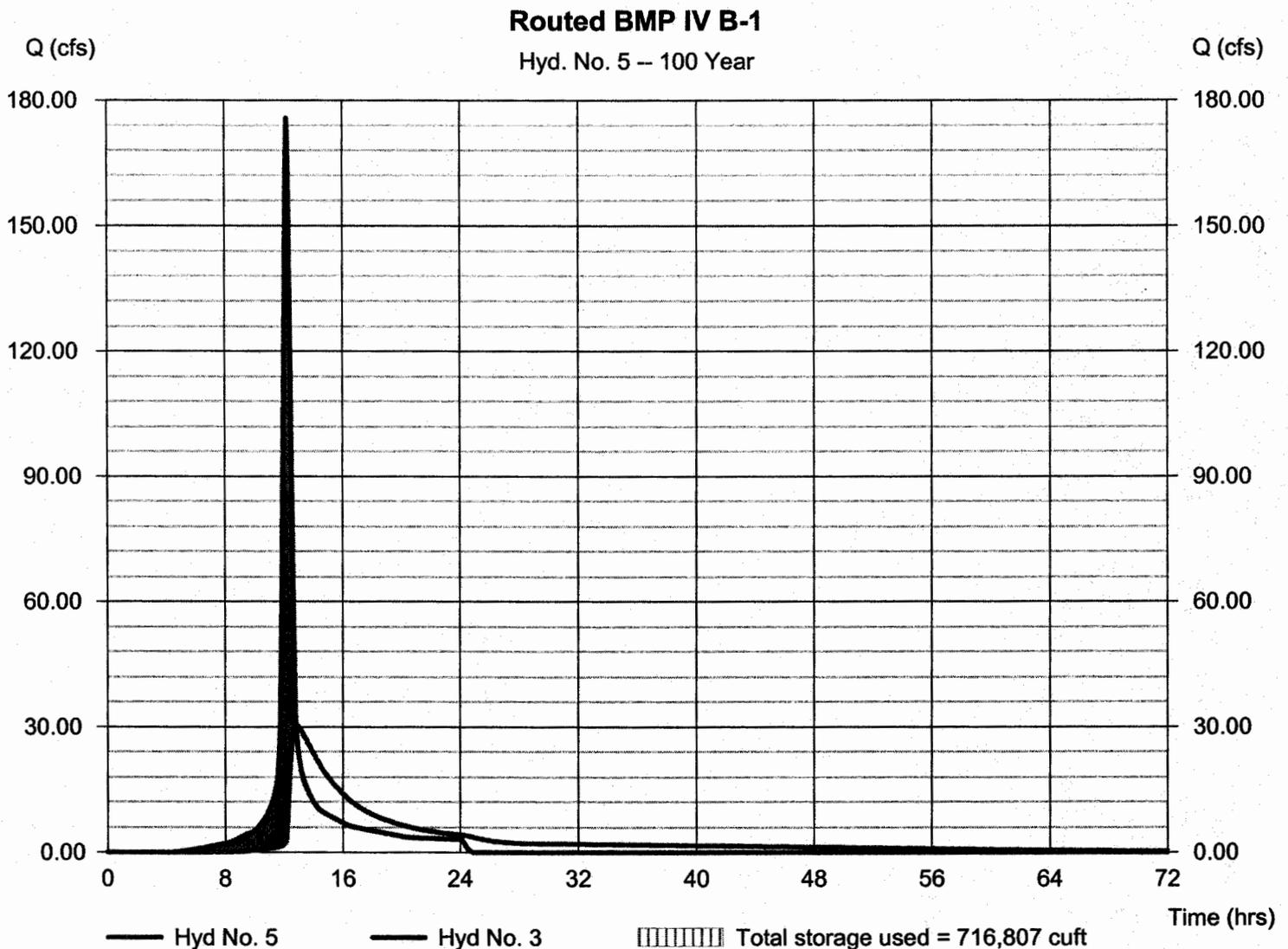
Wednesday, Apr 2, 2008

Hyd. No. 5

Routed BMP IV B-1

Hydrograph type	= Reservoir	Peak discharge	= 30.39 cfs
Storm frequency	= 100 yrs	Time to peak	= 770 min
Time interval	= 2 min	Hyd. volume	= 755,928 cuft
Inflow hyd. No.	= 3 - 8656-13 Grsp-West Post Dev.	Max. Elevation	= 57.74 ft
Reservoir name	= Wet Pond BMP IV B-1	Max. Storage	= 716,807 cuft

Storage Indication method used. Wet pond routing start elevation = 54.00 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

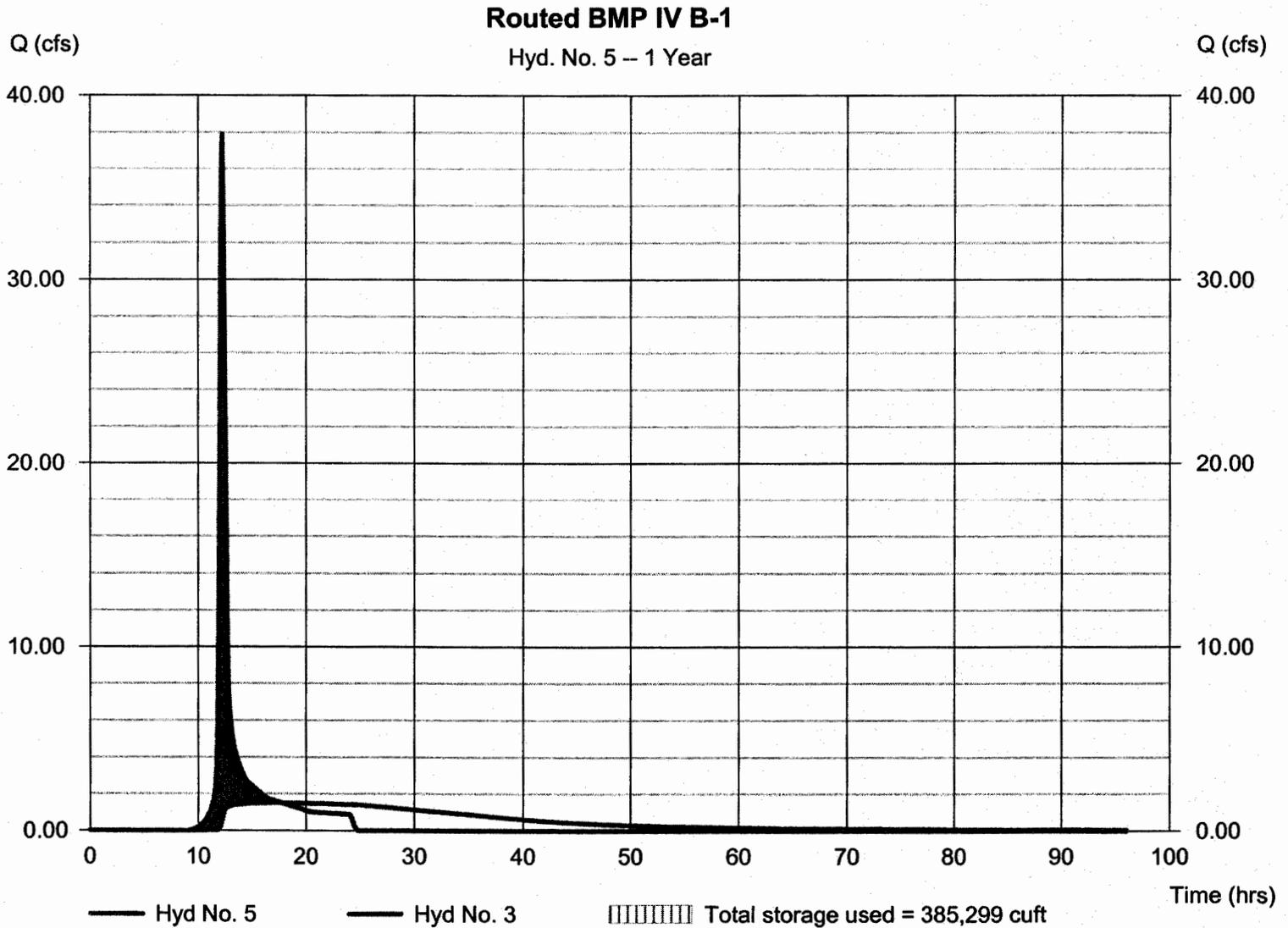
Wednesday, Apr 2, 2008

Hyd. No. 5

Routed BMP IV B-1

Hydrograph type	= Reservoir	Peak discharge	= 1.492 cfs
Storm frequency	= 1 yrs	Time to peak	= 1066 min
Time interval	= 2 min	Hyd. volume	= 155,581 cuft
Inflow hyd. No.	= 3 - 8656-13 Grsp-West Post Dev.	Max. Elevation	= 55.12 ft
Reservoir name	= Wet Pond BMP IV B-1	Max. Storage	= 385,299 cuft

Storage Indication method used. Wet pond routing start elevation = 54.00 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

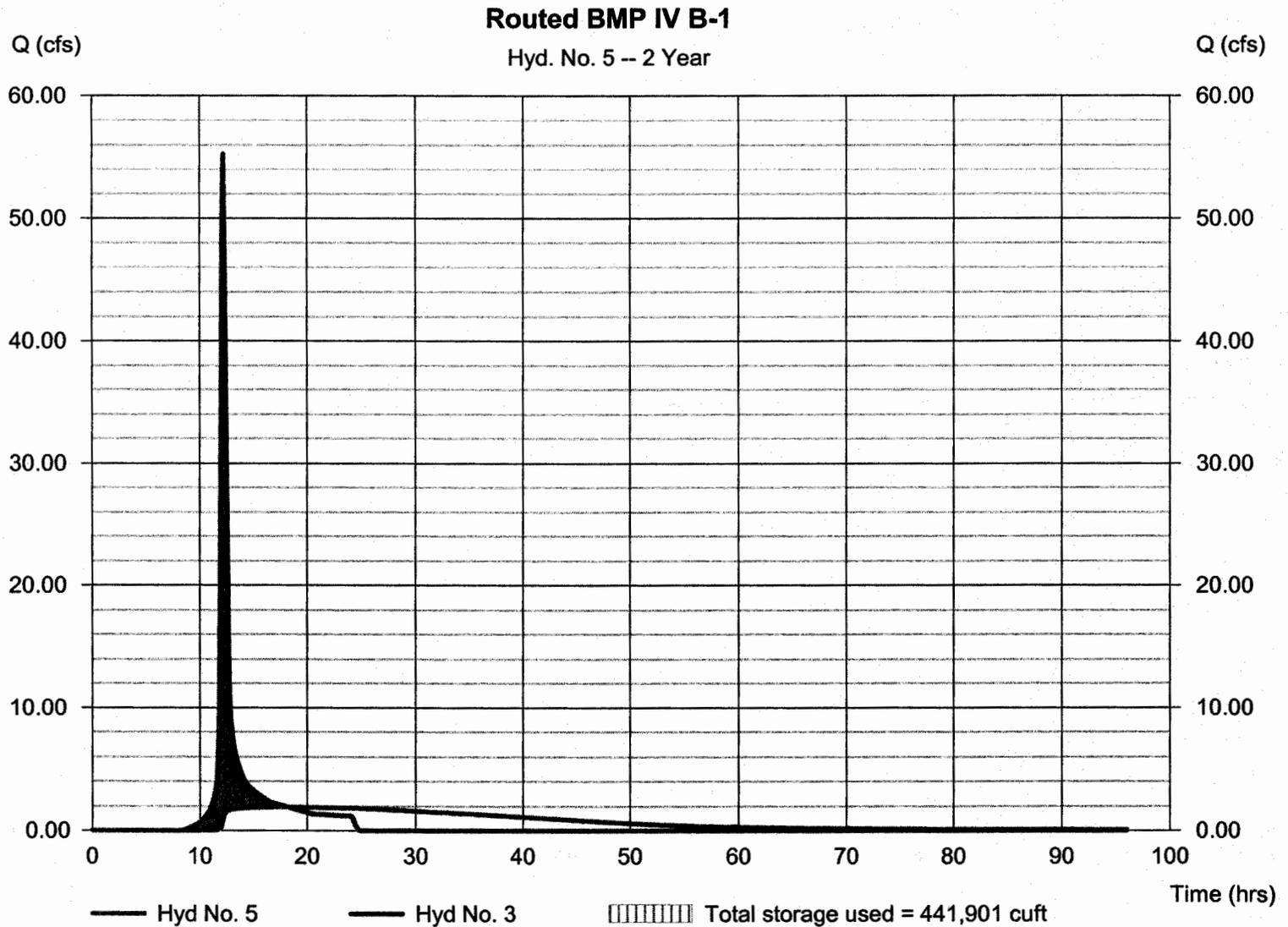
Wednesday, Apr 2, 2008

Hyd. No. 5

Routed BMP IV B-1

Hydrograph type	= Reservoir	Peak discharge	= 1.900 cfs
Storm frequency	= 2 yrs	Time to peak	= 1094 min
Time interval	= 2 min	Hyd. volume	= 227,536 cuft
Inflow hyd. No.	= 3 - 8656-13 Grsp-West Post Dev.	Max. Elevation	= 55.61 ft
Reservoir name	= Wet Pond BMP IV B-1	Max. Storage	= 441,901 cuft

Storage Indication method used. Wet pond routing start elevation = 54.00 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

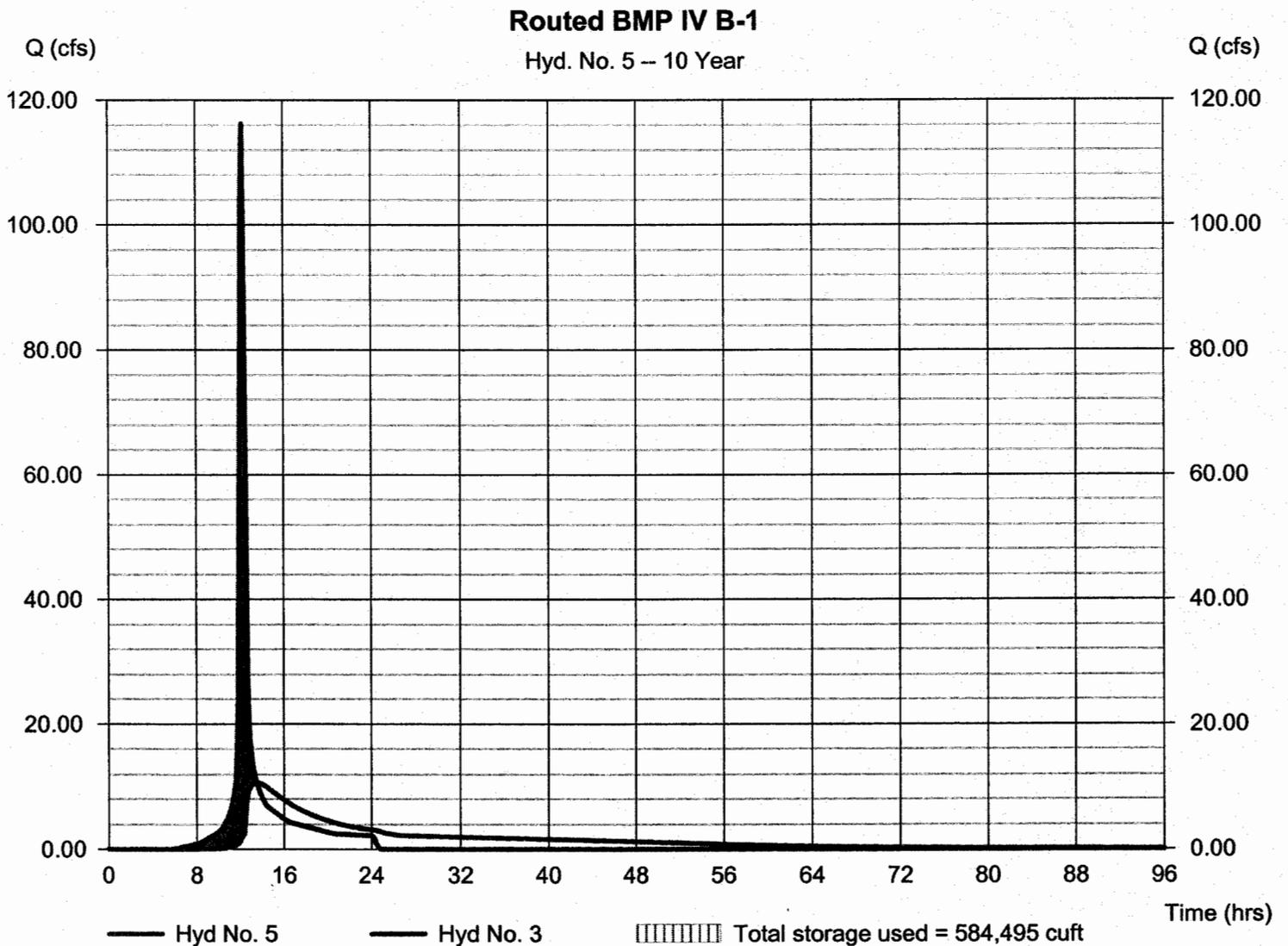
Wednesday, Apr 2, 2008

Hyd. No. 5

Routed BMP IV B-1

Hydrograph type	= Reservoir	Peak discharge	= 10.63 cfs
Storm frequency	= 10 yrs	Time to peak	= 812 min
Time interval	= 2 min	Hyd. volume	= 489,099 cuft
Inflow hyd. No.	= 3 - 8656-13 Grsp-West Post Dev.	Max. Elevation	= 56.77 ft
Reservoir name	= Wet Pond BMP IV B-1	Max. Storage	= 584,495 cuft

Storage Indication method used. Wet pond routing start elevation = 54.00 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

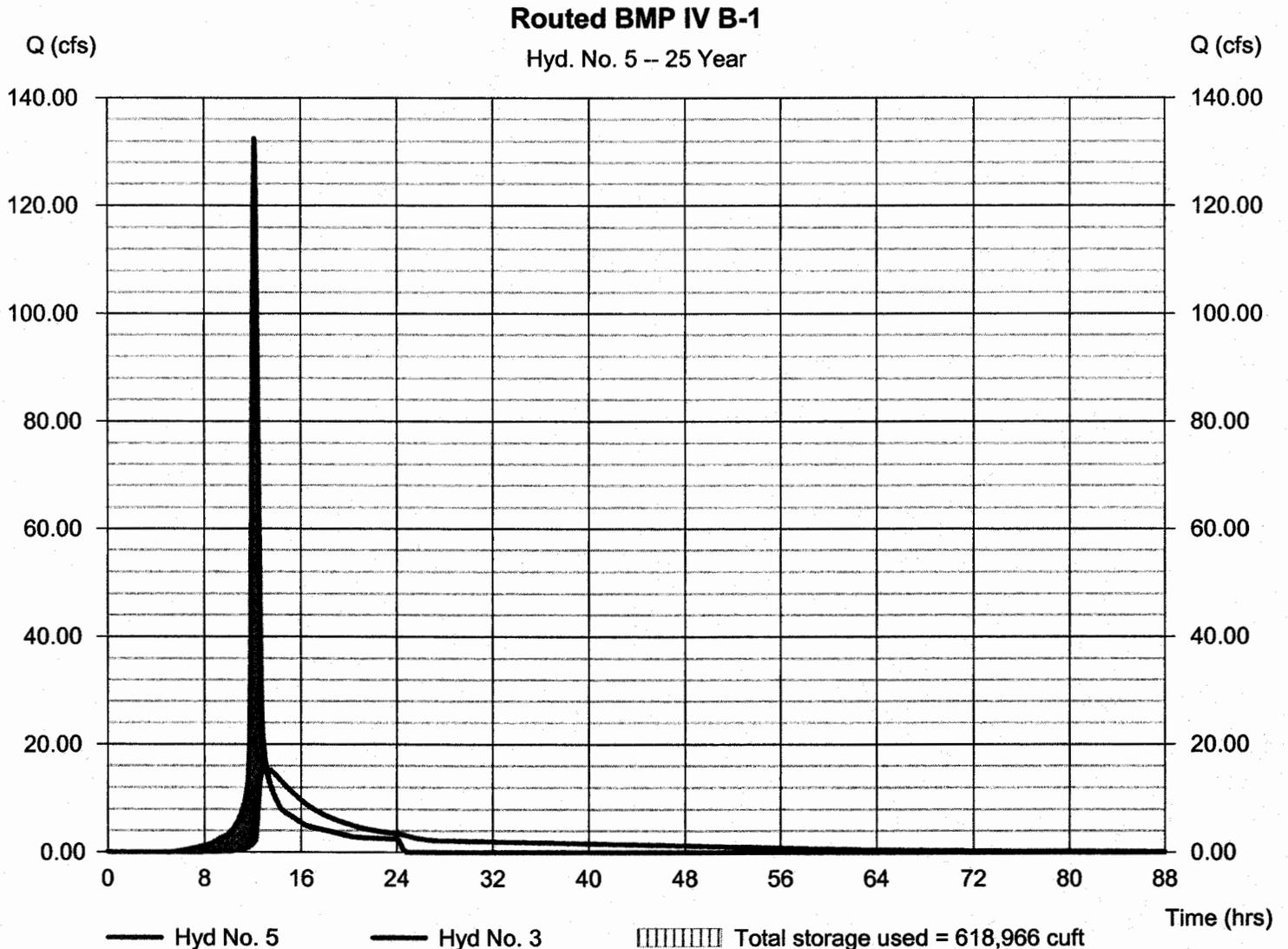
Wednesday, Apr 2, 2008

Hyd. No. 5

Routed BMP IV B-1

Hydrograph type	= Reservoir	Peak discharge	= 15.29 cfs
Storm frequency	= 25 yrs	Time to peak	= 790 min
Time interval	= 2 min	Hyd. volume	= 560,945 cuft
Inflow hyd. No.	= 3 - 8656-13 Grsp-West Post Dev.	Max. Elevation	= 57.03 ft
Reservoir name	= Wet Pond BMP IV B-1	Max. Storage	= 618,966 cuft

Storage Indication method used. Wet pond routing start elevation = 54.00 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

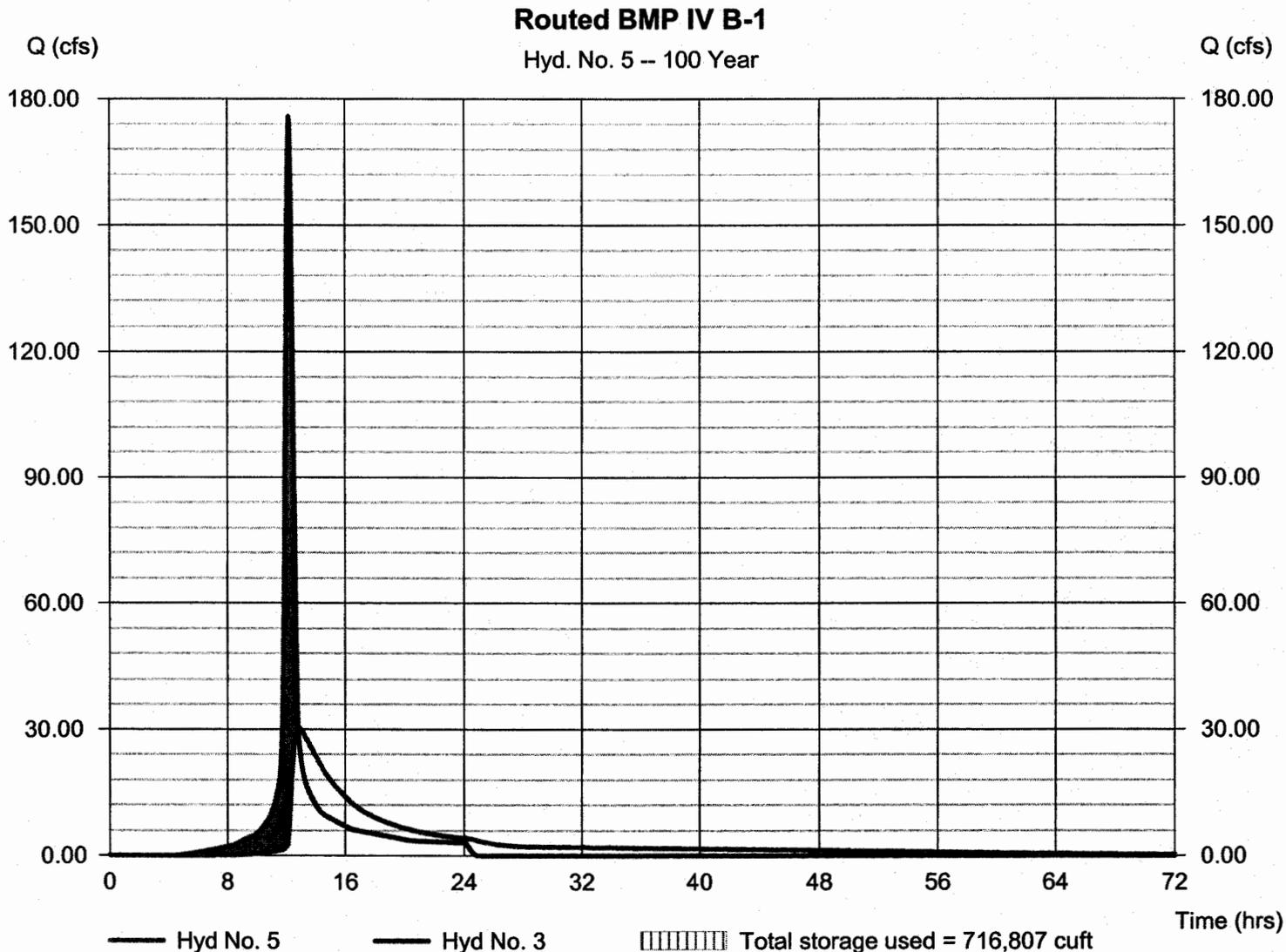
Wednesday, Apr 2, 2008

Hyd. No. 5

Routed BMP IV B-1

Hydrograph type	= Reservoir	Peak discharge	= 30.39 cfs
Storm frequency	= 100 yrs	Time to peak	= 770 min
Time interval	= 2 min	Hyd. volume	= 755,928 cuft
Inflow hyd. No.	= 3 - 8656-13 Grsp-West Post Dev.	Max. Elevation	= 57.74 ft
Reservoir name	= Wet Pond BMP IV B-1	Max. Storage	= 716,807 cuft

Storage Indication method used. Wet pond routing start elevation = 54.00 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

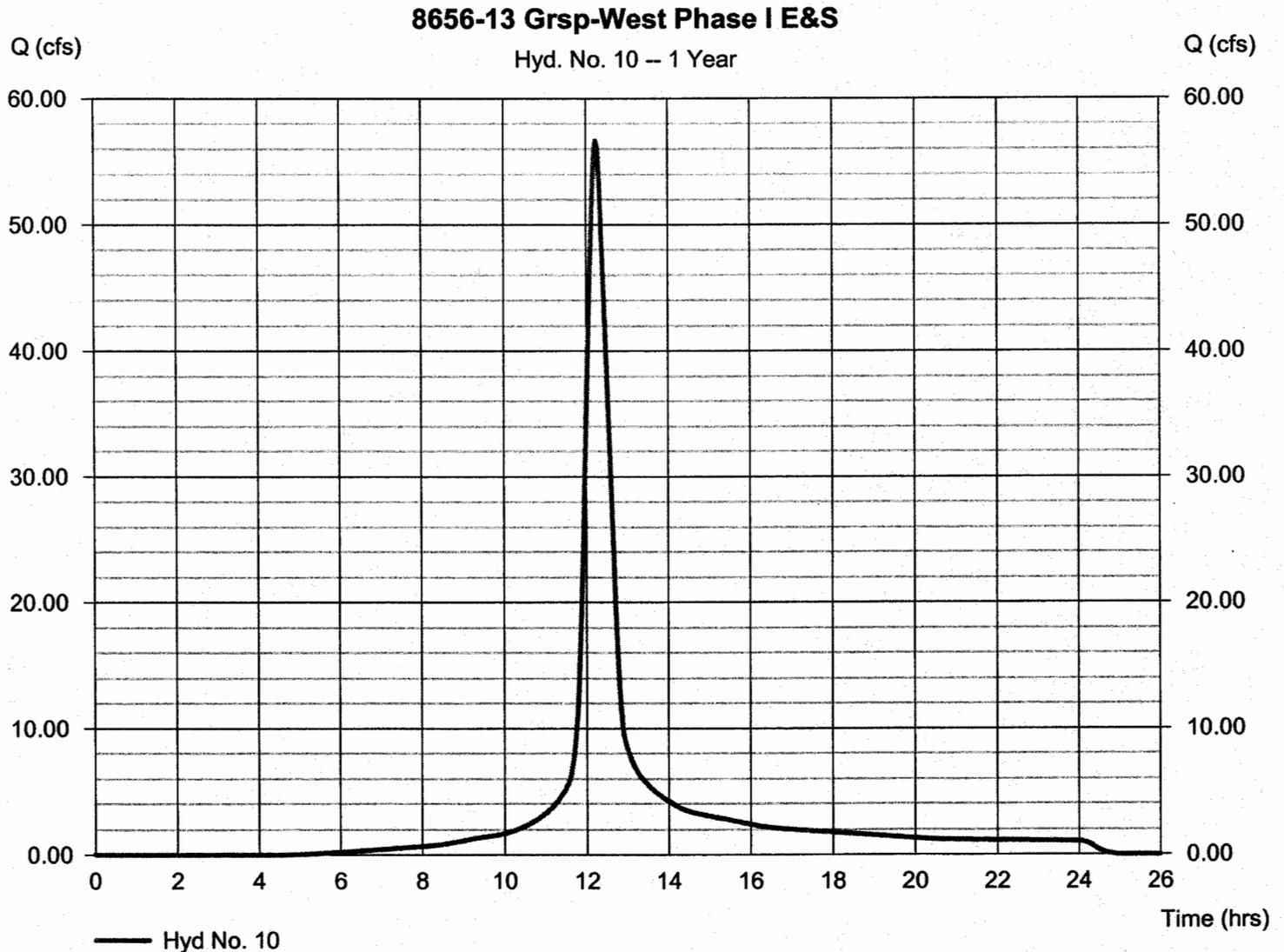
Wednesday, Apr 2, 2008

Hyd. No. 10

8656-13 Grsp-West Phase I E&S

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Time interval = 2 min
Drainage area = 35.100 ac
Basin Slope = 3.0 %
Tc method = USER
Total precip. = 2.80 in
Storm duration = 24 hrs

Peak discharge = 56.66 cfs
Time to peak = 734 min
Hyd. volume = 259,904 cuft
Curve number = 93
Hydraulic length = 1628 ft
Time of conc. (Tc) = 37.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

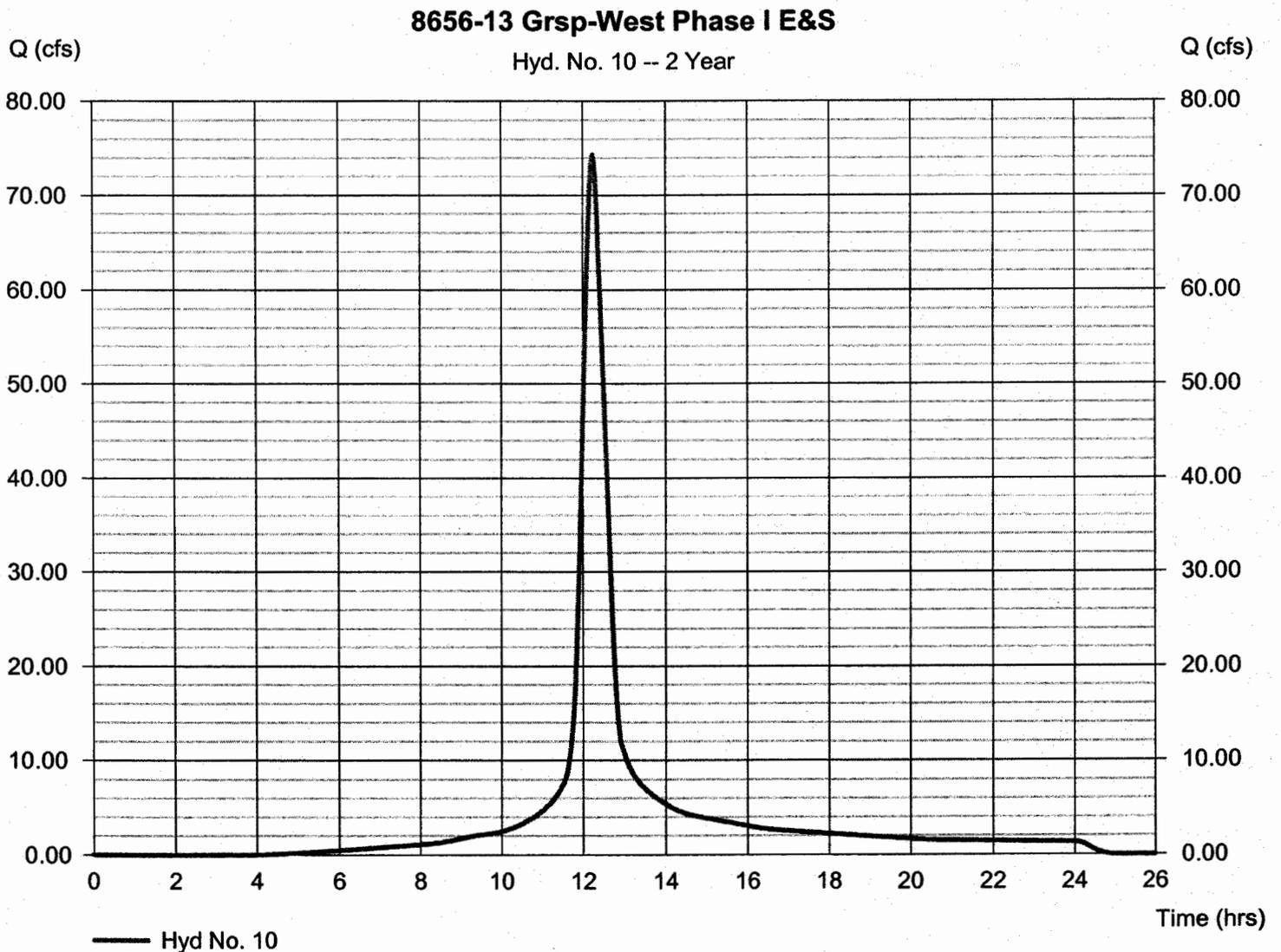
Wednesday, Apr 2, 2008

Hyd. No. 10

8656-13 Grsp-West Phase I E&S

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 2 min
Drainage area = 35.100 ac
Basin Slope = 3.0 %
Tc method = USER
Total precip. = 3.50 in
Storm duration = 24 hrs

Peak discharge = 74.31 cfs
Time to peak = 734 min
Hyd. volume = 344,500 cuft
Curve number = 93
Hydraulic length = 1628 ft
Time of conc. (Tc) = 37.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

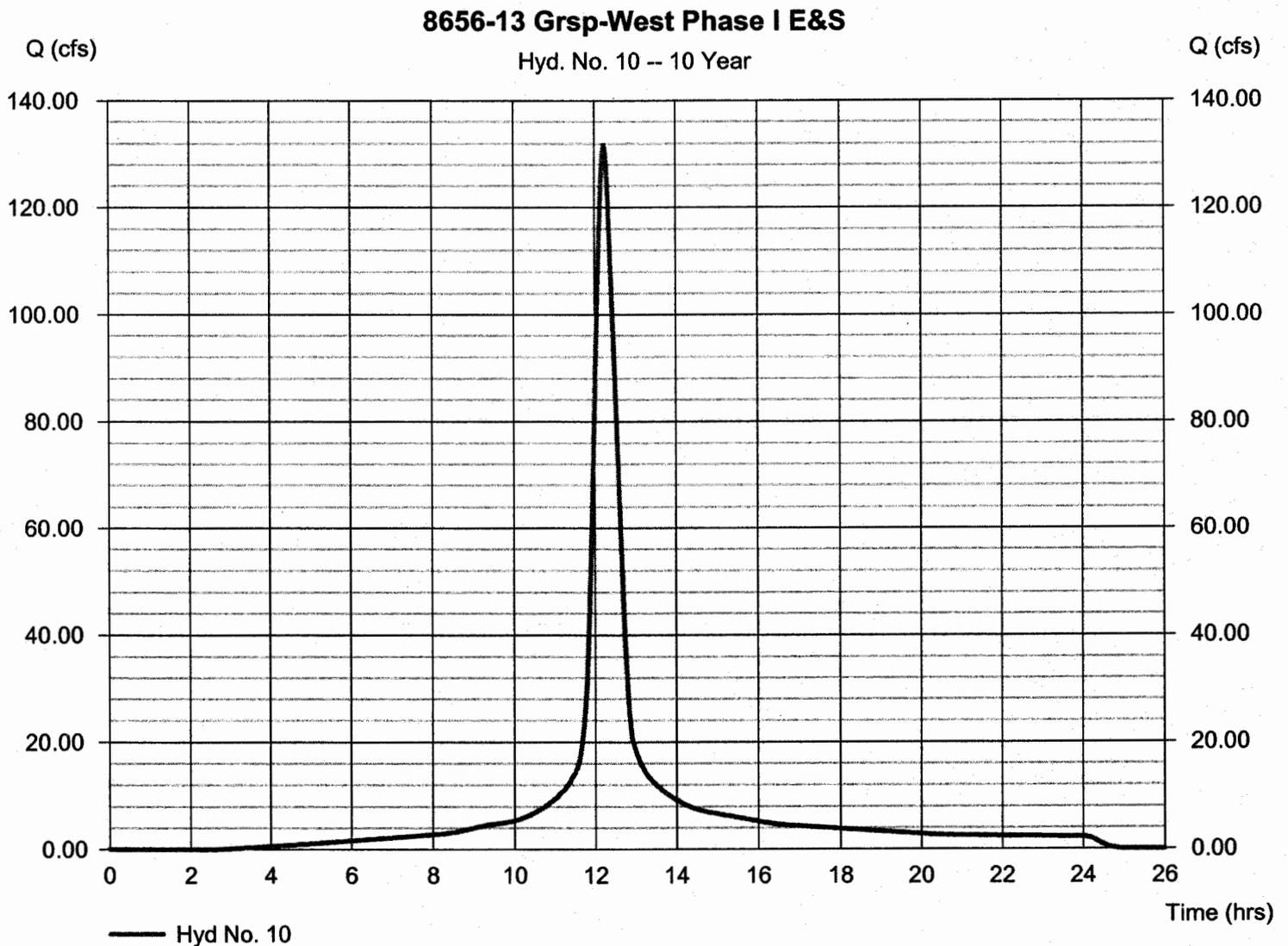
Wednesday, Apr 2, 2008

Hyd. No. 10

8656-13 Grsp-West Phase I E&S

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 35.100 ac
Basin Slope = 3.0 %
Tc method = USER
Total precip. = 5.80 in
Storm duration = 24 hrs

Peak discharge = 131.69 cfs
Time to peak = 734 min
Hyd. volume = 627,970 cuft
Curve number = 93
Hydraulic length = 1628 ft
Time of conc. (Tc) = 37.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

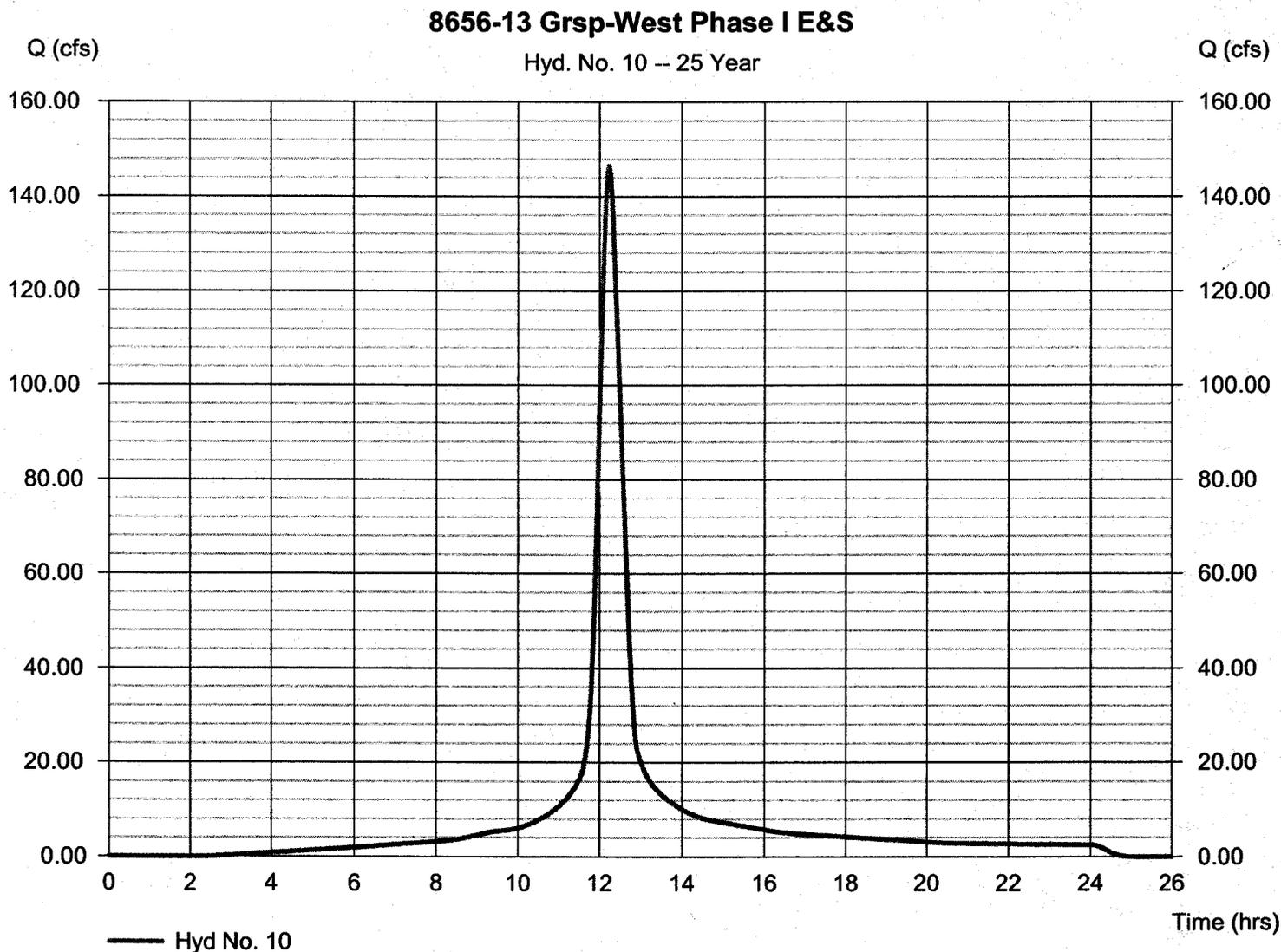
Wednesday, Apr 2, 2008

Hyd. No. 10

8656-13 Grsp-West Phase I E&S

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 2 min
Drainage area = 35.100 ac
Basin Slope = 3.0 %
Tc method = USER
Total precip. = 6.40 in
Storm duration = 24 hrs

Peak discharge = 146.51 cfs
Time to peak = 734 min
Hyd. volume = 702,594 cuft
Curve number = 93
Hydraulic length = 1628 ft
Time of conc. (Tc) = 37.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

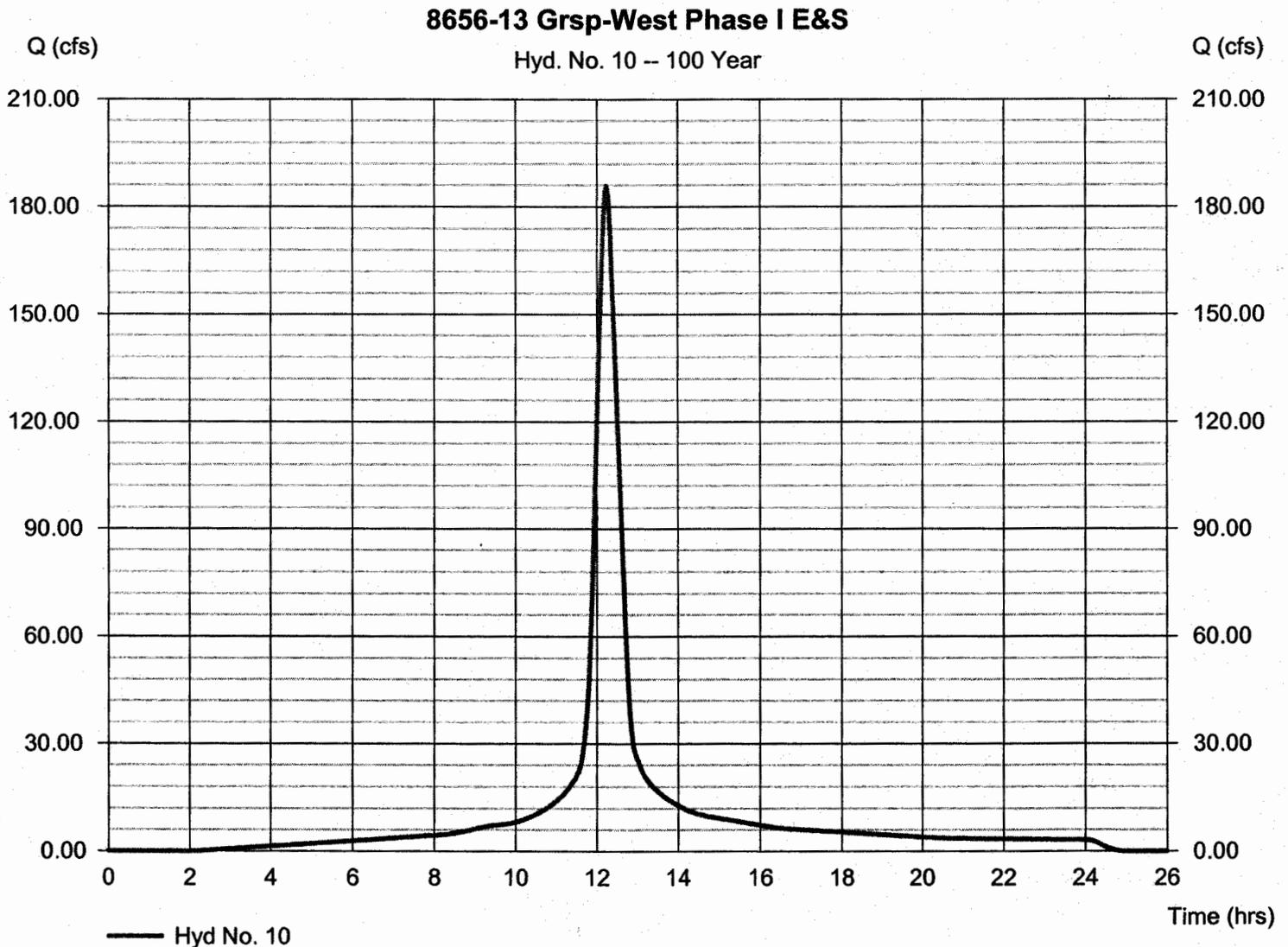
Wednesday, Apr 2, 2008

Hyd. No. 10

8656-13 Grsp-West Phase I E&S

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 35.100 ac
Basin Slope = 3.0 %
Tc method = USER
Total precip. = 8.00 in
Storm duration = 24 hrs

Peak discharge = 185.83 cfs
Time to peak = 734 min
Hyd. volume = 902,242 cuft
Curve number = 93
Hydraulic length = 1628 ft
Time of conc. (Tc) = 37.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

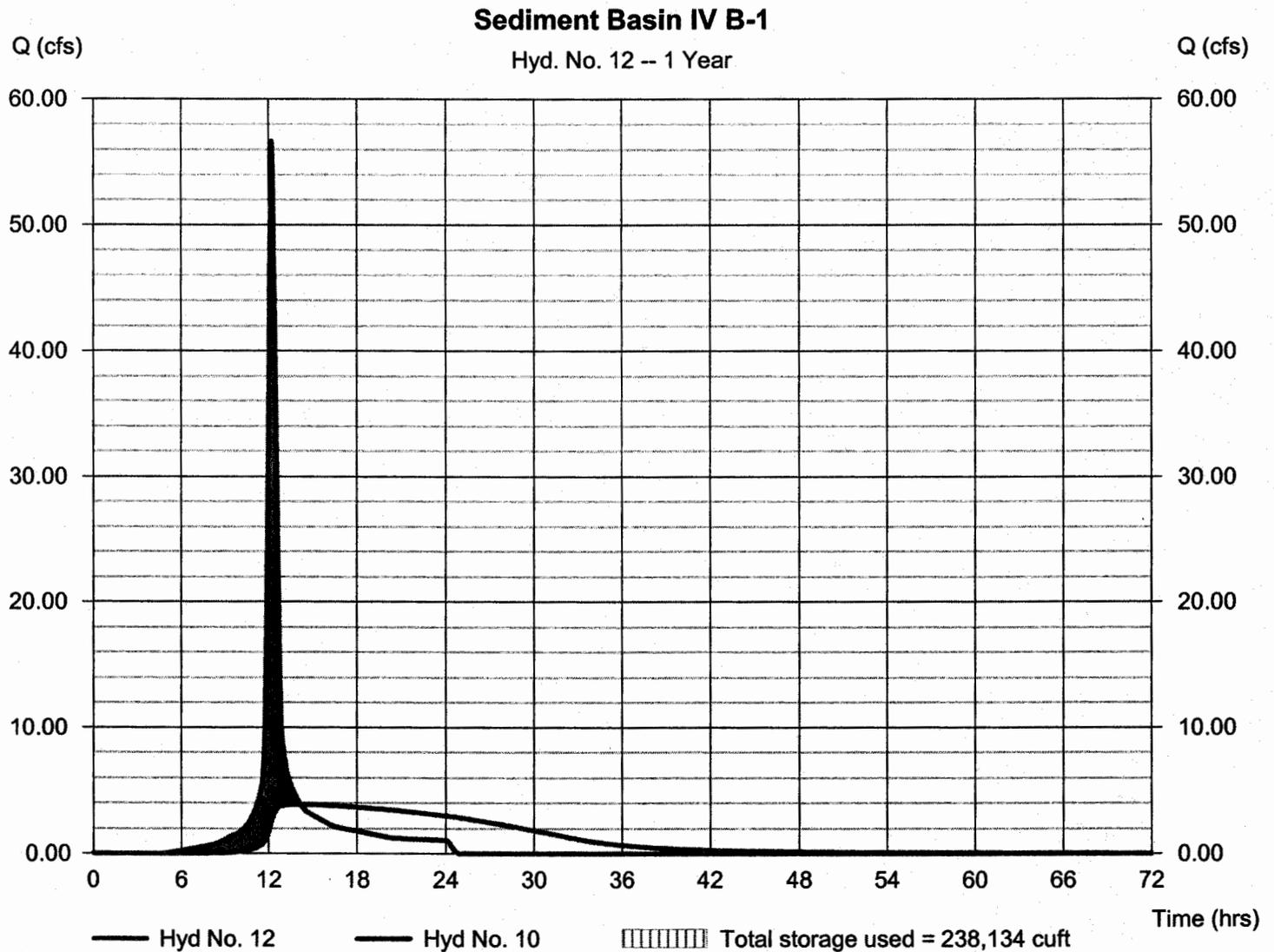
Wednesday, Apr 2, 2008

Hyd. No. 12

Sediment Basin IV B-1

Hydrograph type	= Reservoir	Peak discharge	= 3.876 cfs
Storm frequency	= 1 yrs	Time to peak	= 850 min
Time interval	= 2 min	Hyd. volume	= 255,444 cuft
Inflow hyd. No.	= 10 - 8656-13 Grsp-West Phase I E&S	Max. Elevation	= 53.45 ft
Reservoir name	= Sediment Basin IV B-1	Max. Storage	= 238,134 cuft

Storage Indication method used. Wet pond routing start elevation = 50.80 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

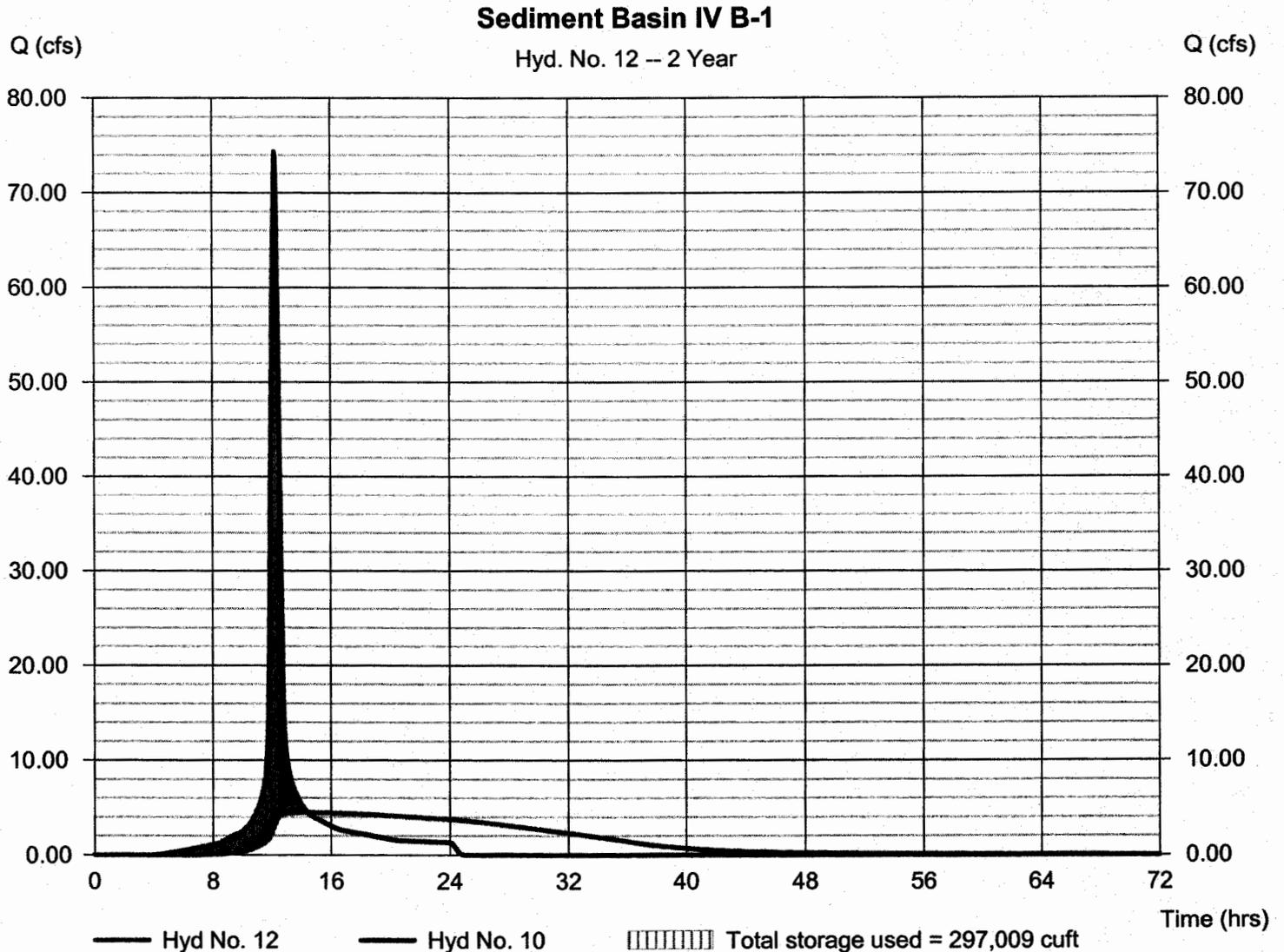
Wednesday, Apr 2, 2008

Hyd. No. 12

Sediment Basin IV B-1

Hydrograph type	= Reservoir	Peak discharge	= 4.461 cfs
Storm frequency	= 2 yrs	Time to peak	= 864 min
Time interval	= 2 min	Hyd. volume	= 339,883 cuft
Inflow hyd. No.	= 10 - 8656-13 Grsp-West Phase I E&S	Max. Elevation	= 54.15 ft
Reservoir name	= Sediment Basin IV B-1	Max. Storage	= 297,009 cuft

Storage Indication method used. Wet pond routing start elevation = 50.80 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

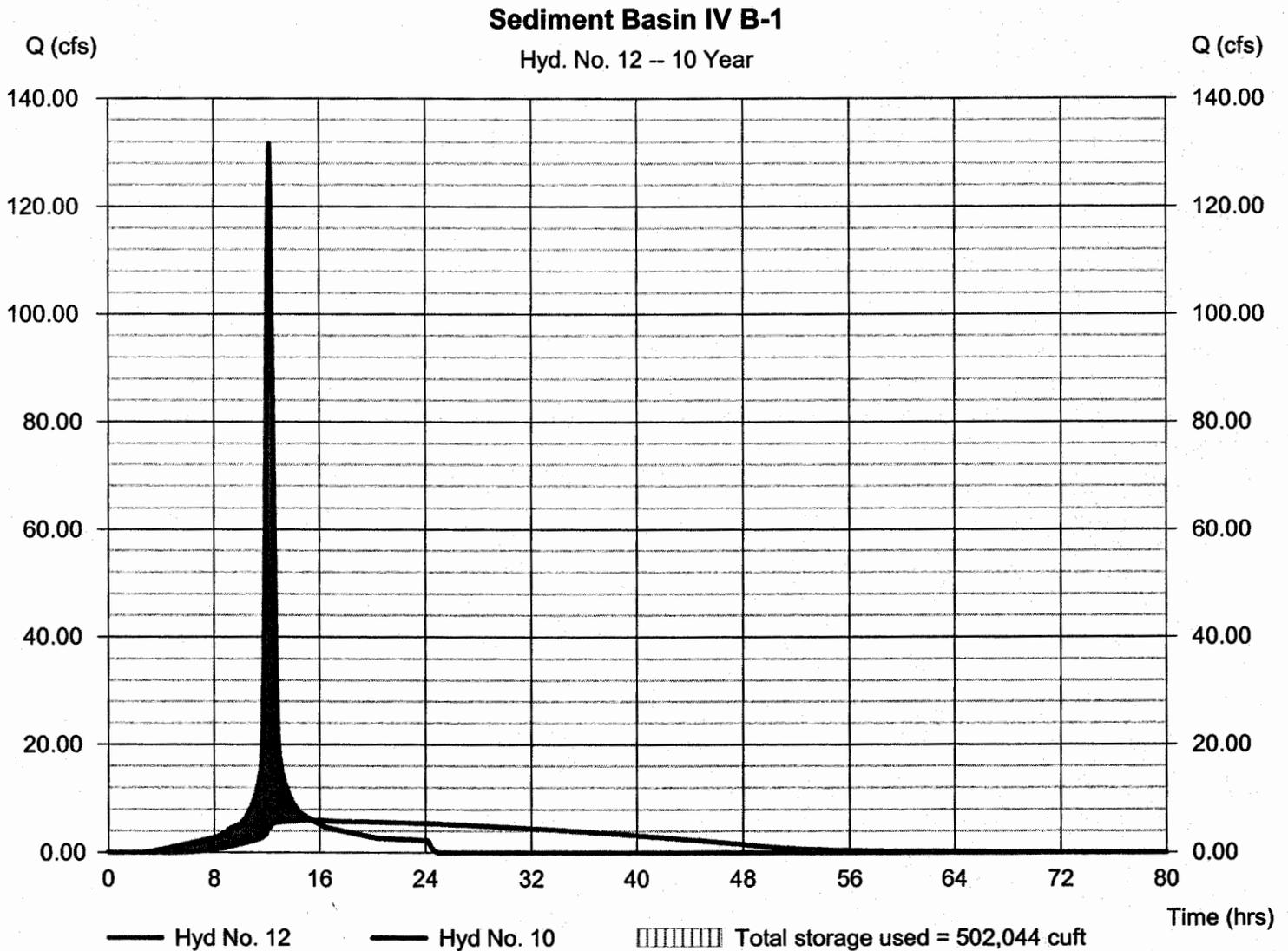
Wednesday, Apr 2, 2008

Hyd. No. 12

Sediment Basin IV B-1

Hydrograph type	= Reservoir	Peak discharge	= 5.933 cfs
Storm frequency	= 10 yrs	Time to peak	= 928 min
Time interval	= 2 min	Hyd. volume	= 622,760 cuft
Inflow hyd. No.	= 10 - 8656-13 Grsp-West Phase I E&S	Max. Elevation	= 56.05 ft
Reservoir name	= Sediment Basin IV B-1	Max. Storage	= 502,044 cuft

Storage Indication method used. Wet pond routing start elevation = 50.80 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

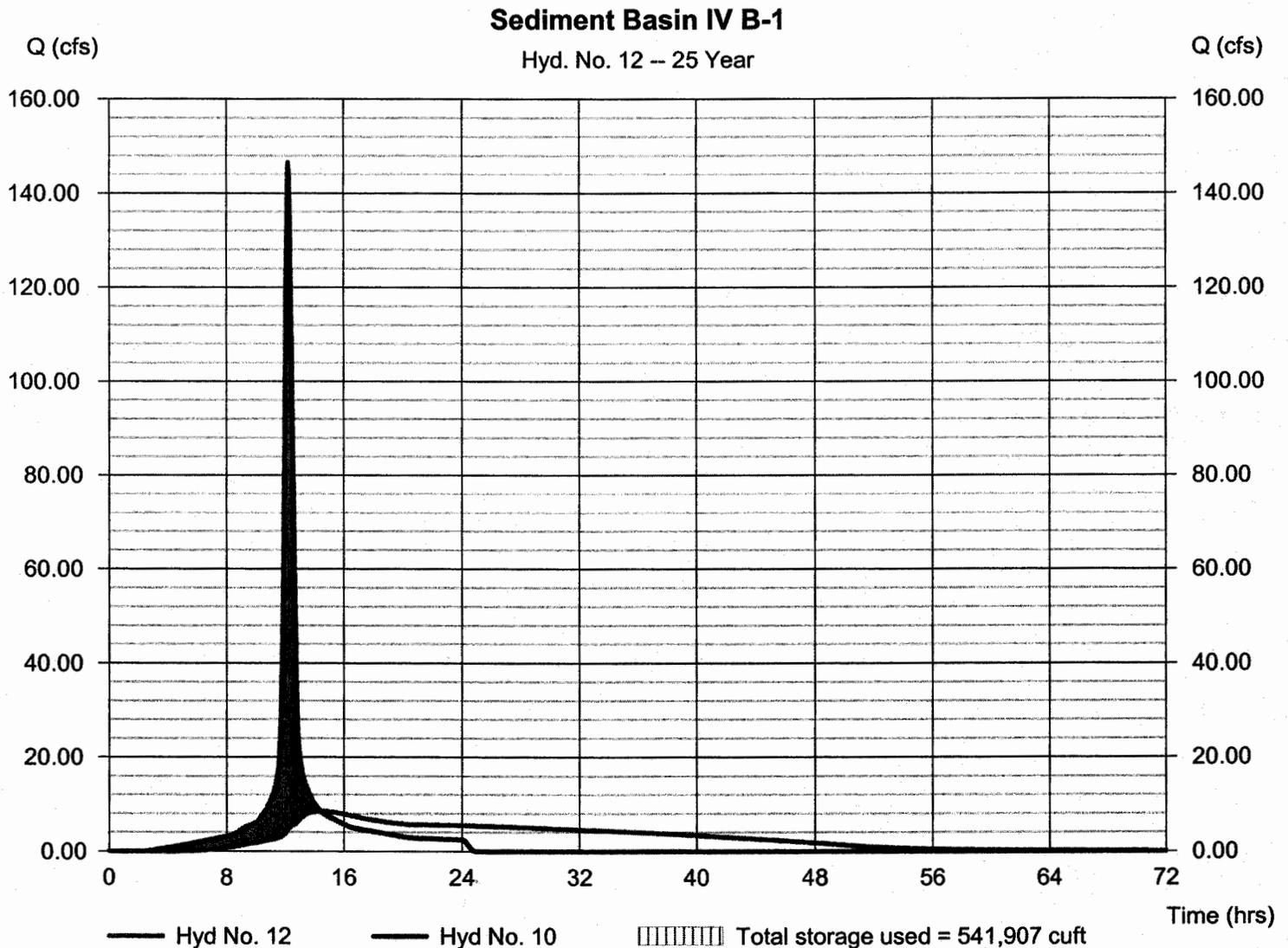
Wednesday, Apr 2, 2008

Hyd. No. 12

Sediment Basin IV B-1

Hydrograph type	= Reservoir	Peak discharge	= 8.545 cfs
Storm frequency	= 25 yrs	Time to peak	= 862 min
Time interval	= 2 min	Hyd. volume	= 697,291 cuft
Inflow hyd. No.	= 10 - 8656-13 Grsp-West Phase I E&S	Max. Elevation	= 56.36 ft
Reservoir name	= Sediment Basin IV B-1	Max. Storage	= 541,907 cuft

Storage Indication method used. Wet pond routing start elevation = 50.80 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

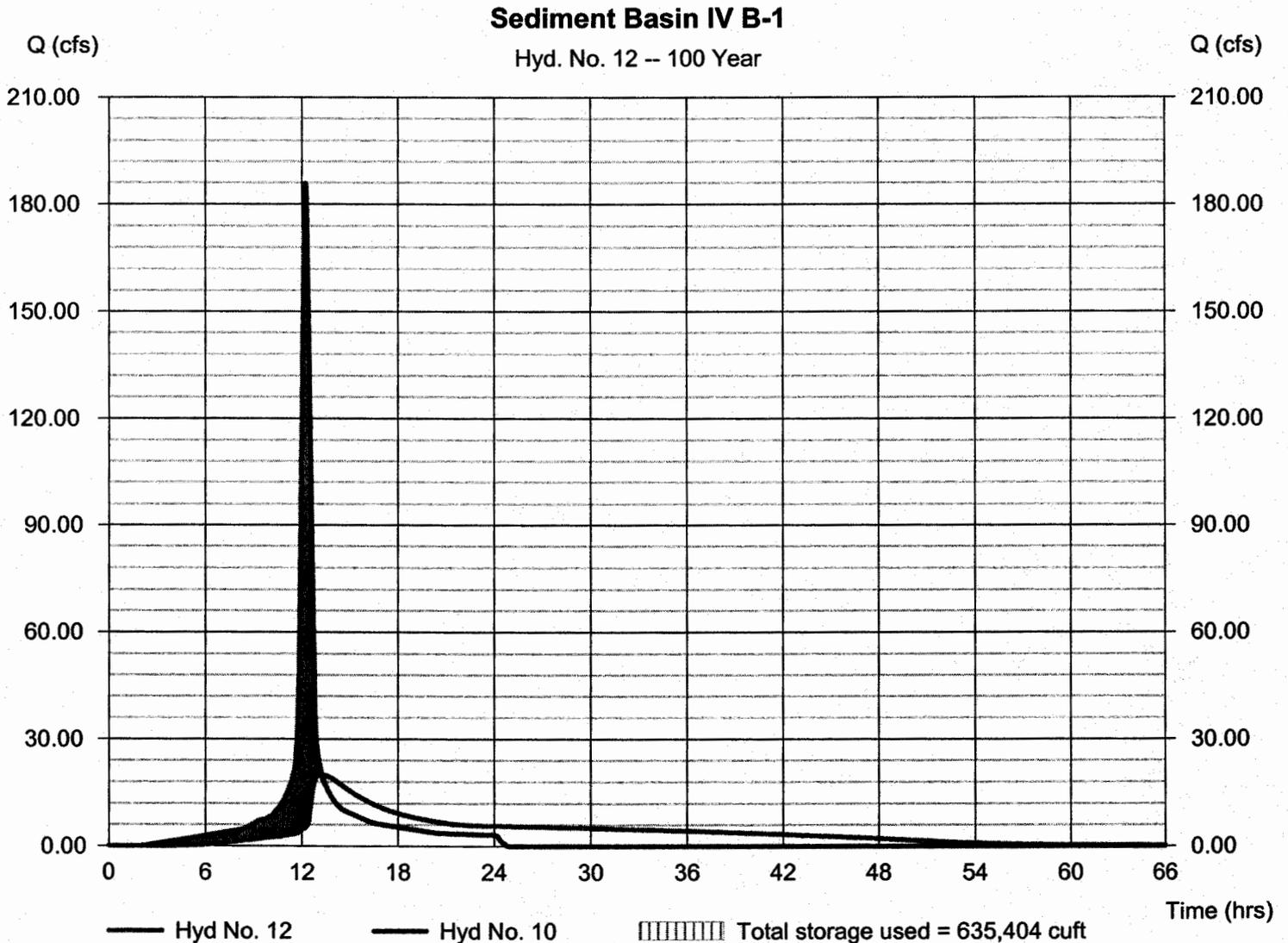
Wednesday, Apr 2, 2008

Hyd. No. 12

Sediment Basin IV B-1

Hydrograph type	= Reservoir	Peak discharge	= 19.84 cfs
Storm frequency	= 100 yrs	Time to peak	= 794 min
Time interval	= 2 min	Hyd. volume	= 896,830 cuft
Inflow hyd. No.	= 10 - 8656-13 Grsp-West Phase I E&S	Max. Elevation	= 57.09 ft
Reservoir name	= Sediment Basin IV B-1	Max. Storage	= 635,404 cuft

Storage Indication method used. Wet pond routing start elevation = 50.80 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

Wednesday, Apr 2, 2008

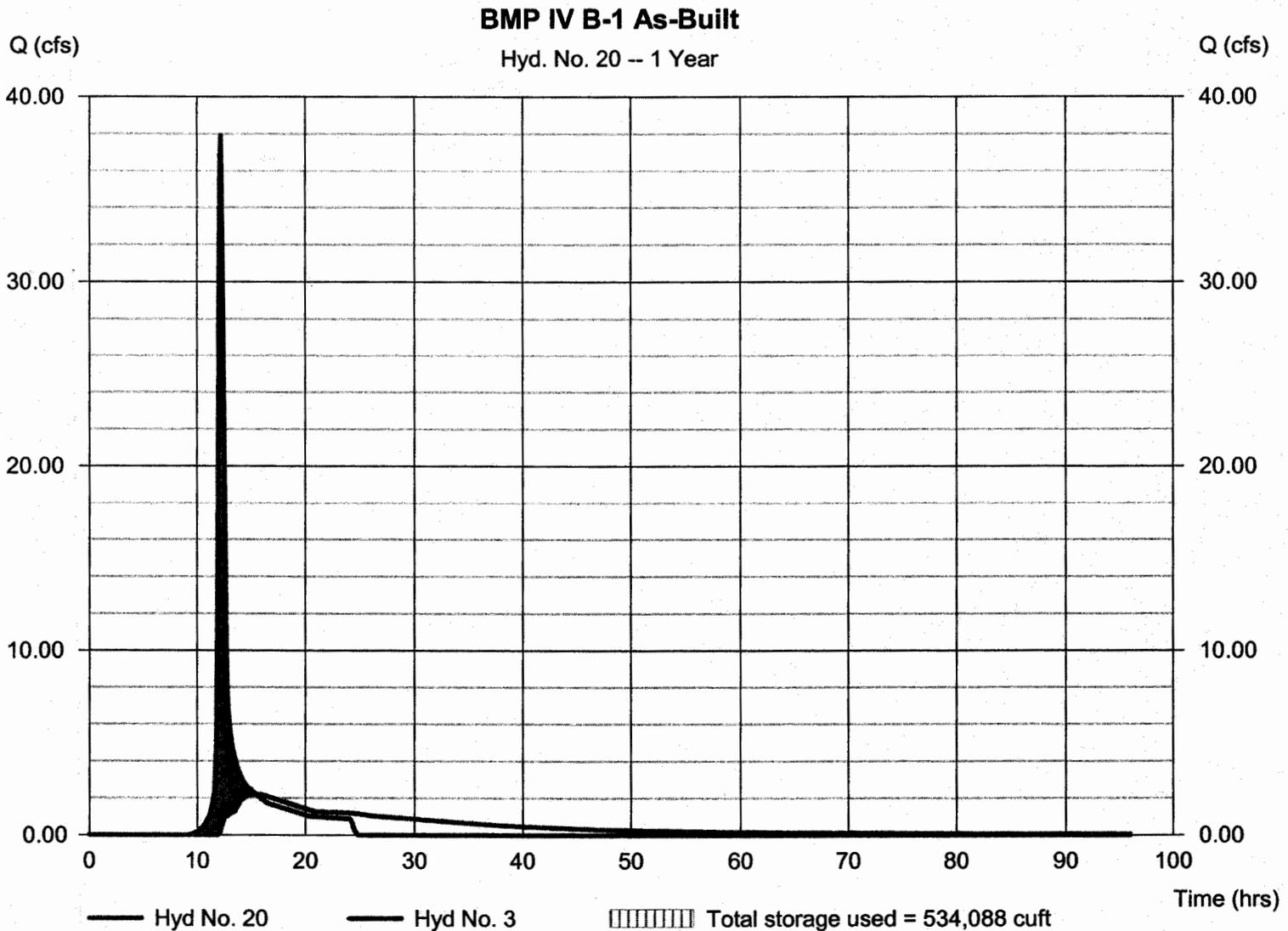
Hyd. No. 20

BMP IV B-1 As-Built

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Time interval = 2 min
Inflow hyd. No. = 3 - 8656-13 Grsp-West Post Dev.
Reservoir name = BMP IV B-1 As-Built

Peak discharge = 2.199 cfs
Time to peak = 928 min
Hyd. volume = 144,623 cuft
Max. Elevation = 54.65 ft
Max. Storage = 534,088 cuft

Storage Indication method used. Wet pond routing start elevation = 53.70 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

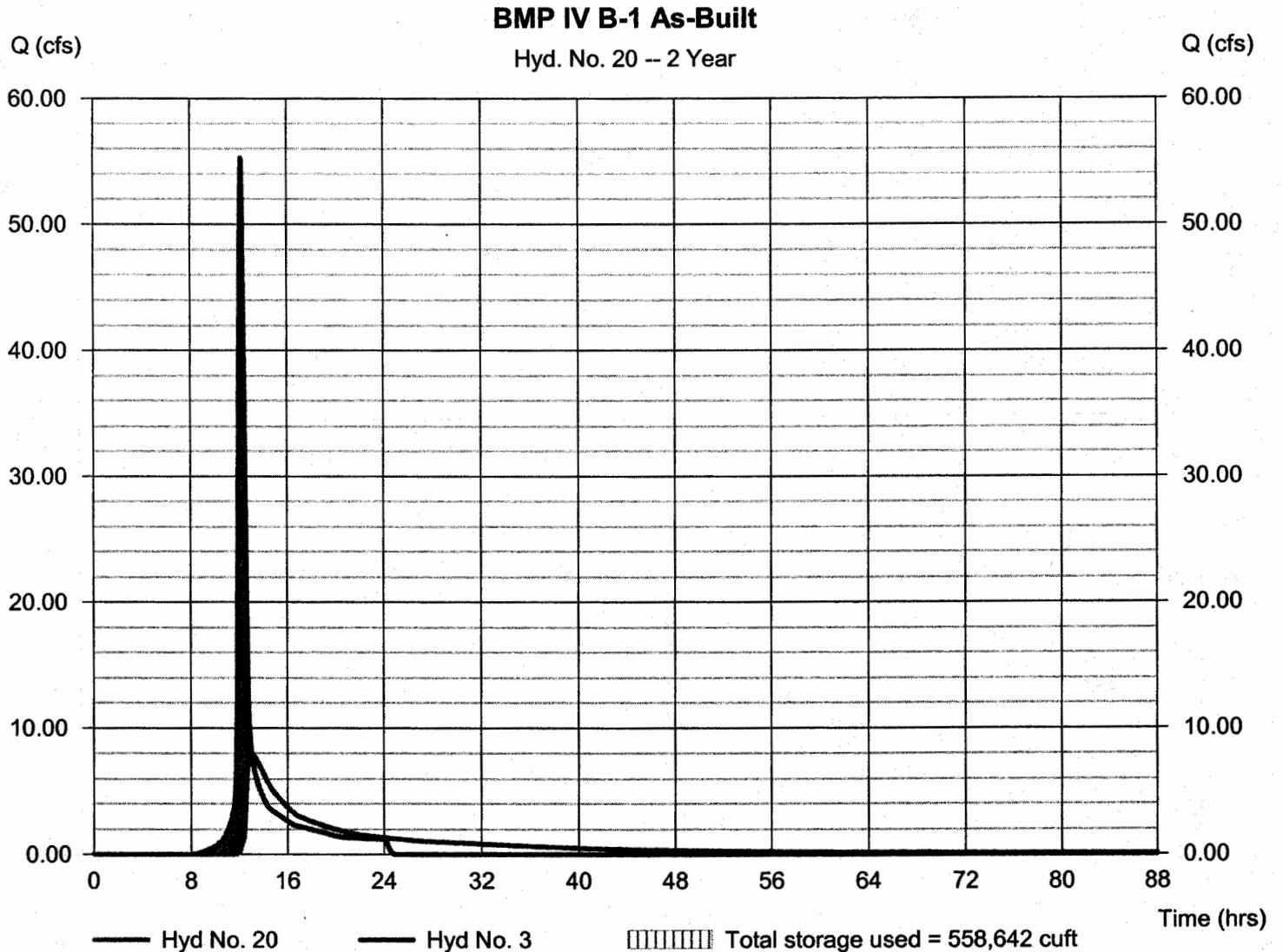
Wednesday, Apr 2, 2008

Hyd. No. 20

BMP IV B-1 As-Built

Hydrograph type	= Reservoir	Peak discharge	= 7.871 cfs
Storm frequency	= 2 yrs	Time to peak	= 784 min
Time interval	= 2 min	Hyd. volume	= 218,165 cuft
Inflow hyd. No.	= 3 - 8656-13 Grsp-West Post Dev.	Max. Elevation	= 54.86 ft
Reservoir name	= BMP IV B-1 As-Built	Max. Storage	= 558,642 cuft

Storage Indication method used. Wet pond routing start elevation = 53.70 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

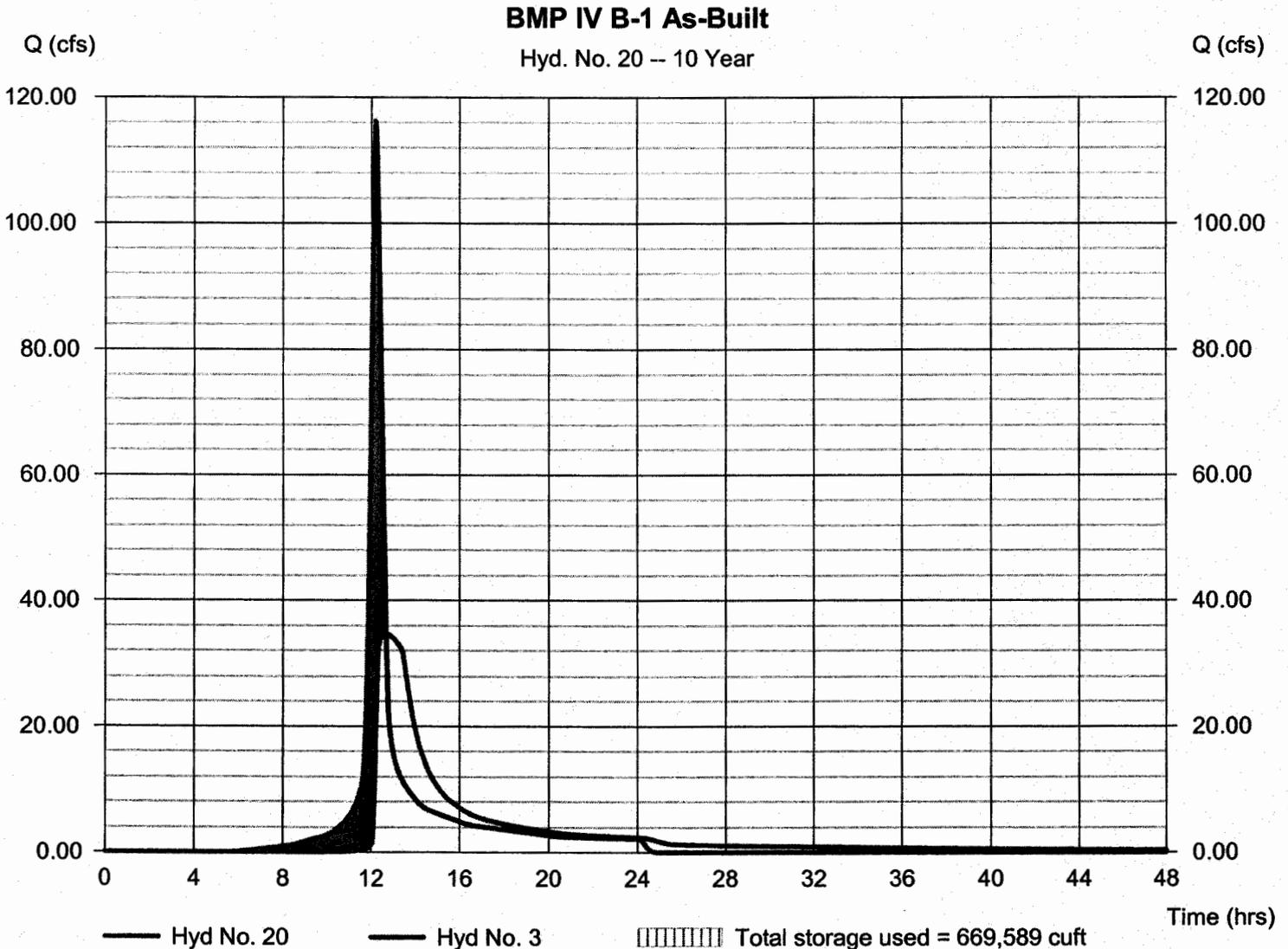
Wednesday, Apr 2, 2008

Hyd. No. 20

BMP IV B-1 As-Built

Hydrograph type	= Reservoir	Peak discharge	= 34.63 cfs
Storm frequency	= 10 yrs	Time to peak	= 762 min
Time interval	= 2 min	Hyd. volume	= 482,127 cuft
Inflow hyd. No.	= 3 - 8656-13 Grsp-West Post Dev.	Max. Elevation	= 55.77 ft
Reservoir name	= BMP IV B-1 As-Built	Max. Storage	= 669,589 cuft

Storage Indication method used. Wet pond routing start elevation = 53.70 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

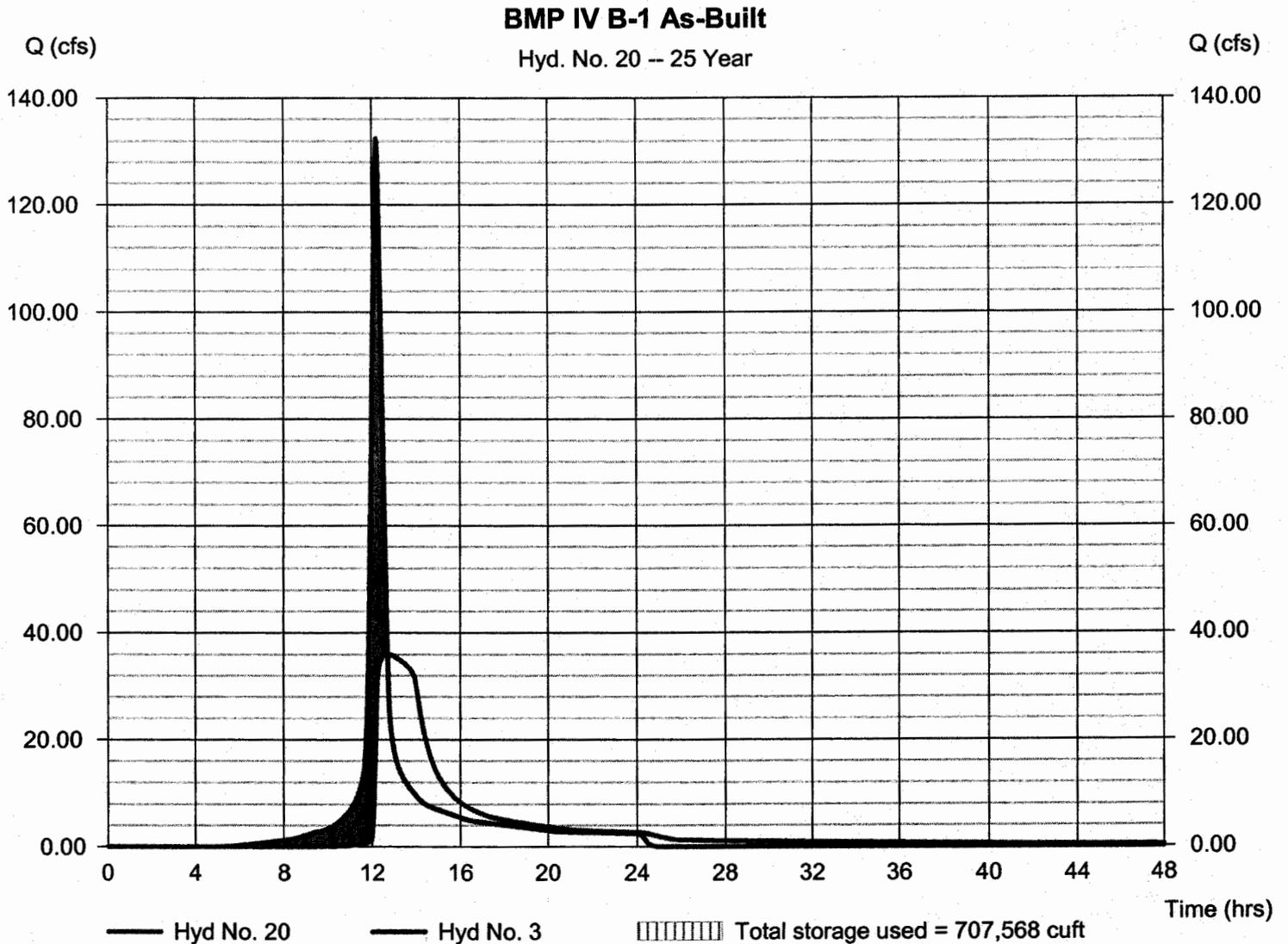
Wednesday, Apr 2, 2008

Hyd. No. 20

BMP IV B-1 As-Built

Hydrograph type	= Reservoir	Peak discharge	= 35.96 cfs
Storm frequency	= 25 yrs	Time to peak	= 762 min
Time interval	= 2 min	Hyd. volume	= 554,065 cuft
Inflow hyd. No.	= 3 - 8656-13 Grsp-West Post Dev.	Max. Elevation	= 56.07 ft
Reservoir name	= BMP IV B-1 As-Built	Max. Storage	= 707,568 cuft

Storage Indication method used. Wet pond routing start elevation = 53.70 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

Wednesday, Apr 2, 2008

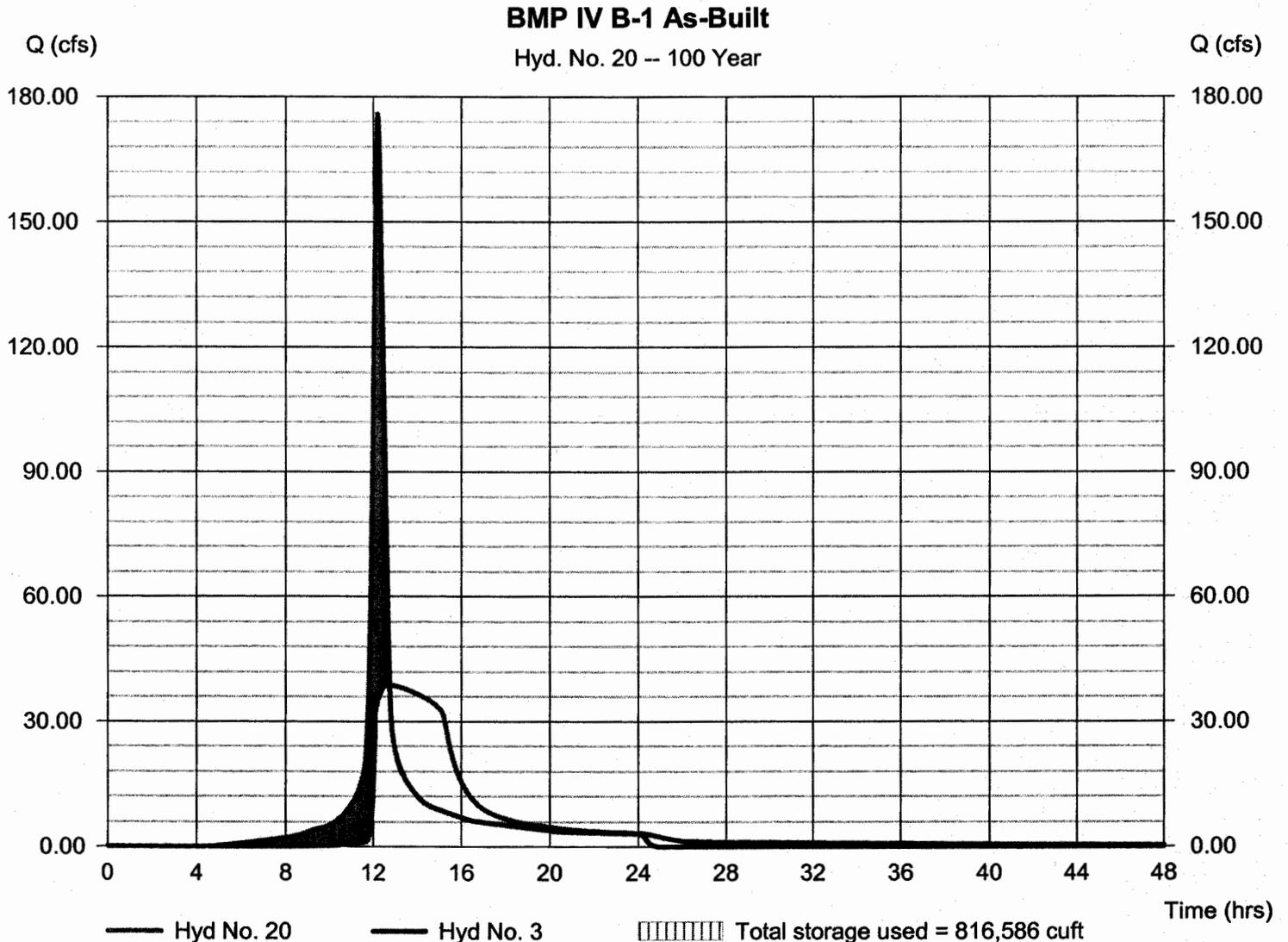
Hyd. No. 20

BMP IV B-1 As-Built

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyd. No. = 3 - 8656-13 Grsp-West Post Dev.
Reservoir name = BMP IV B-1 As-Built

Peak discharge = 38.76 cfs
Time to peak = 764 min
Hyd. volume = 749,234 cuft
Max. Elevation = 56.89 ft
Max. Storage = 816,586 cuft

Storage Indication method used. Wet pond routing start elevation = 53.70 ft.



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	-----	21.99	40.09	-----	-----	110.24	144.07	-----	215.21	2 YR PRE DEVELOPMENT
2	SCS Runoff	-----	21.99	40.09	-----	-----	110.24	144.07	-----	215.21	10 YR PRE- DEVELOPMENT
3	SCS Runoff	-----	58.04	88.71	-----	-----	189.64	234.79	-----	326.27	2 YR POST DEVELOPMENT
4	Reservoir	3	16.82	29.53	-----	-----	43.21	75.37	-----	152.14	2 YR POST ROUTED
5	SCS Runoff	-----	58.04	88.71	-----	-----	189.64	234.79	-----	326.27	10 YR POST DEVELOPMENT
6	Reservoir	5	16.82	29.53	-----	-----	43.21	75.37	-----	152.14	10 YR POST ROUTED
7	SCS Runoff	-----	58.04	88.71	-----	-----	189.64	234.79	-----	326.27	25 YR POST DEVELOPMENT
8	Reservoir	7	16.82	29.53	-----	-----	43.21	75.37	-----	152.14	25 YR POST ROUTED
9	SCS Runoff	-----	58.04	88.71	-----	-----	189.64	234.79	-----	326.27	100 YR POST DEVELOPMENT
10	Reservoir	9	16.82	29.53	-----	-----	43.21	75.37	-----	152.14	100 YR POST ROUTED
11	Reservoir	3	17.94	31.40	-----	-----	44.89	53.57	-----	94.69	2 YR ROUTED
12	Reservoir	5	17.94	31.40	-----	-----	44.89	53.57	-----	94.69	10 YR ROUTED
13	Reservoir	7	17.94	31.40	-----	-----	44.89	53.57	-----	94.69	25 YR ROUTED
14	Reservoir	9	17.94	31.40	-----	-----	44.89	53.57	-----	94.69	100 YR ROUTED

*DA = 154.80 AC.
 CN = 80
 TC = 104.85 min.*

~~AB Routing~~

*1 PRE
 2- PRE
 10- PRE
 100- PRE*

*21.99 cfs
 40.09 cfs
 110.24 cfs
 215.21 cfs*

*2- Routed
 10- Routed
 100- Routed*

*17.94 cfs @ 57.99
 31.40 cfs @ 59.32
 94.69 cfs @ 60.61
 DHN*

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 10 2007, 1:15 PM

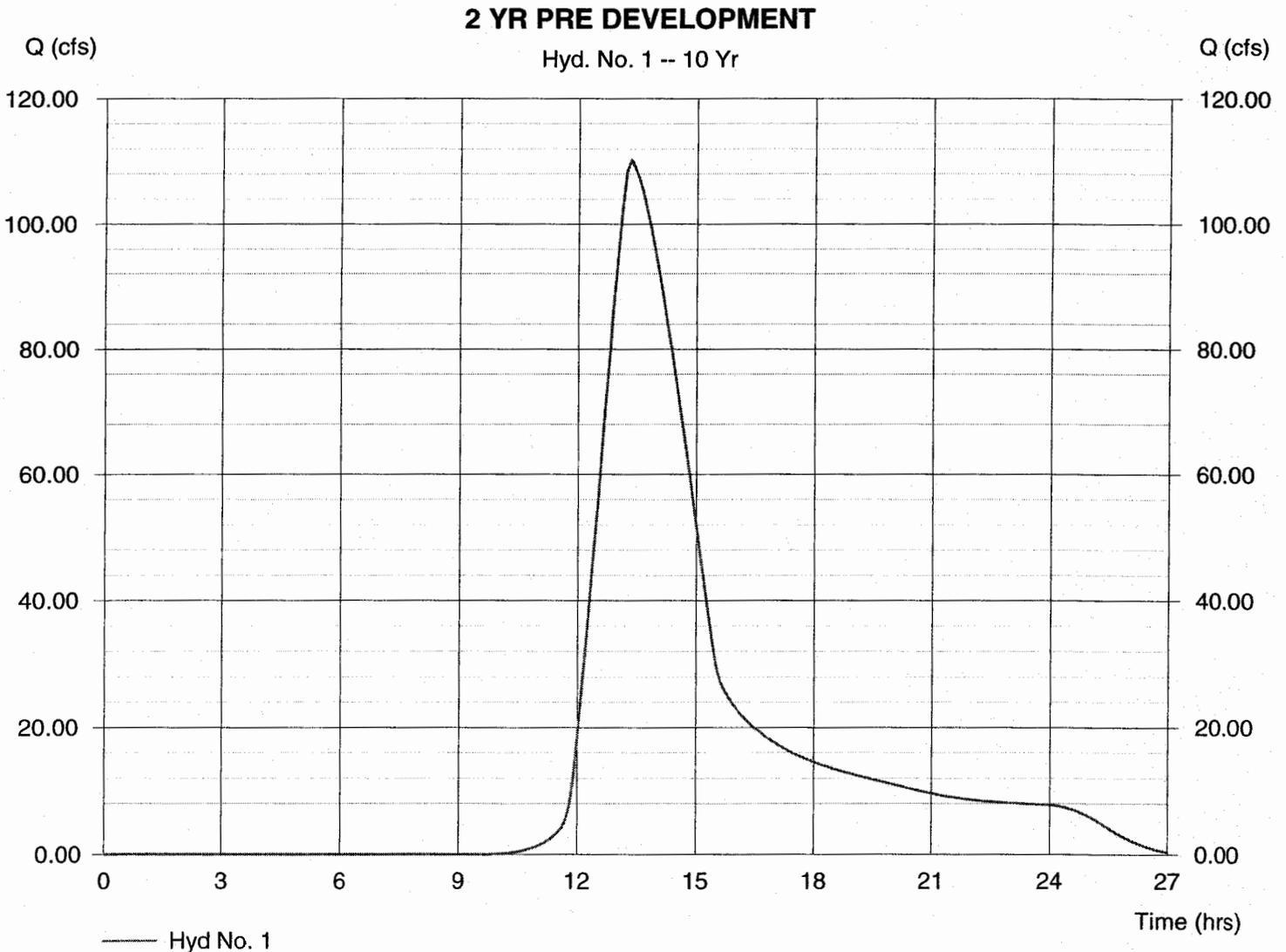
Hyd. No. 1

2 YR PRE DEVELOPMENT

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 153.30 ac
Basin Slope = 0.7 %
Tc method = LAG
Total precip. = 5.60 in
Storm duration = 24 hrs

Peak discharge = 110.24 cfs
Time interval = 6 min
Curve number = 70
Hydraulic length = 3550 ft
Time of conc. (Tc) = 139.9331 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 1,374,087 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 10 2007, 1:15 PM

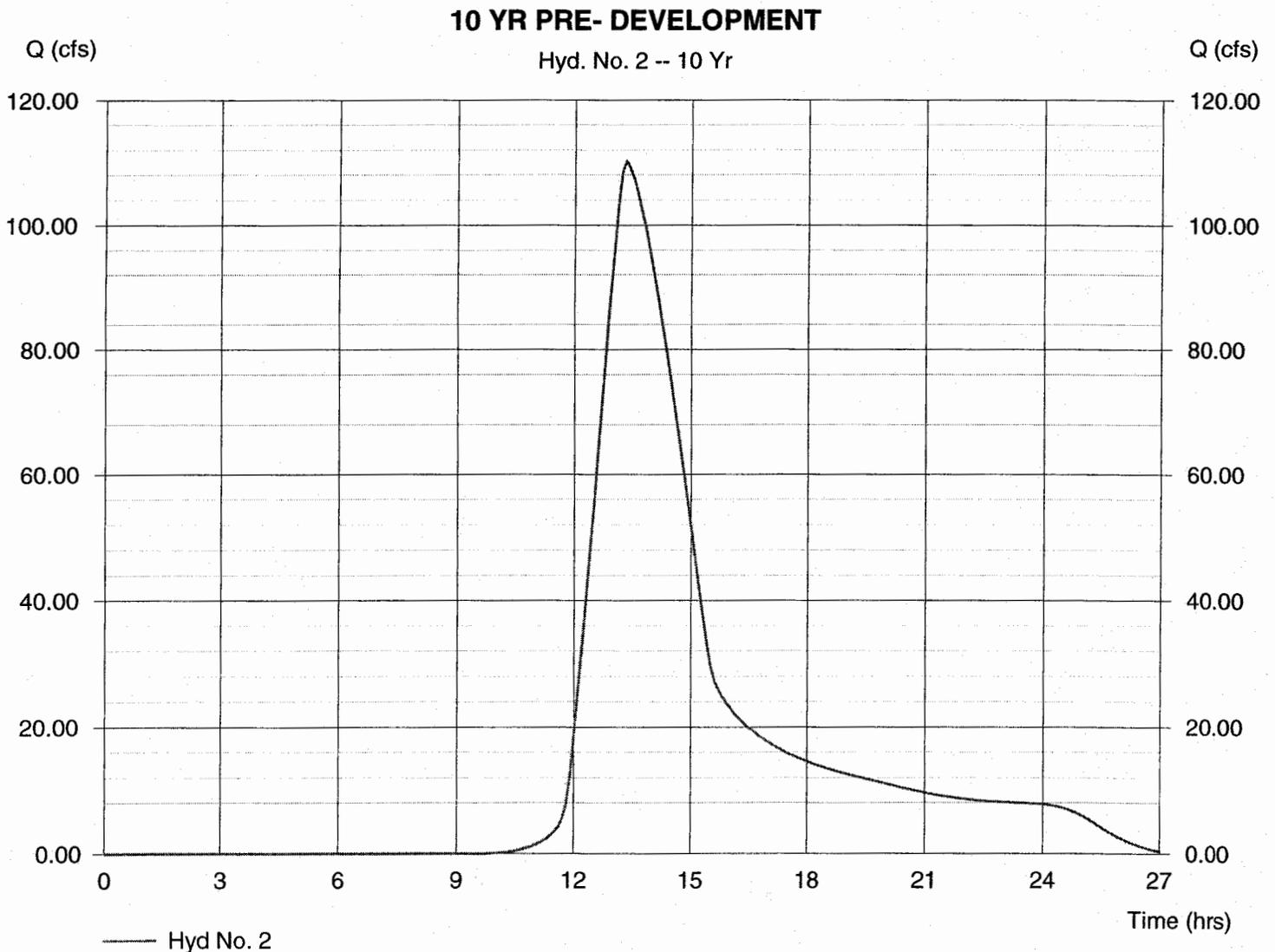
Hyd. No. 2

10 YR PRE- DEVELOPMENT

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 153.30 ac
Basin Slope = 0.7 %
Tc method = LAG
Total precip. = 5.60 in
Storm duration = 24 hrs

Peak discharge = 110.24 cfs
Time interval = 6 min
Curve number = 70
Hydraulic length = 3550 ft
Time of conc. (Tc) = 139.9331 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 1,374,087 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 10 2007, 1:16 PM

Hyd. No. 3

2 YR POST DEVELOPMENT

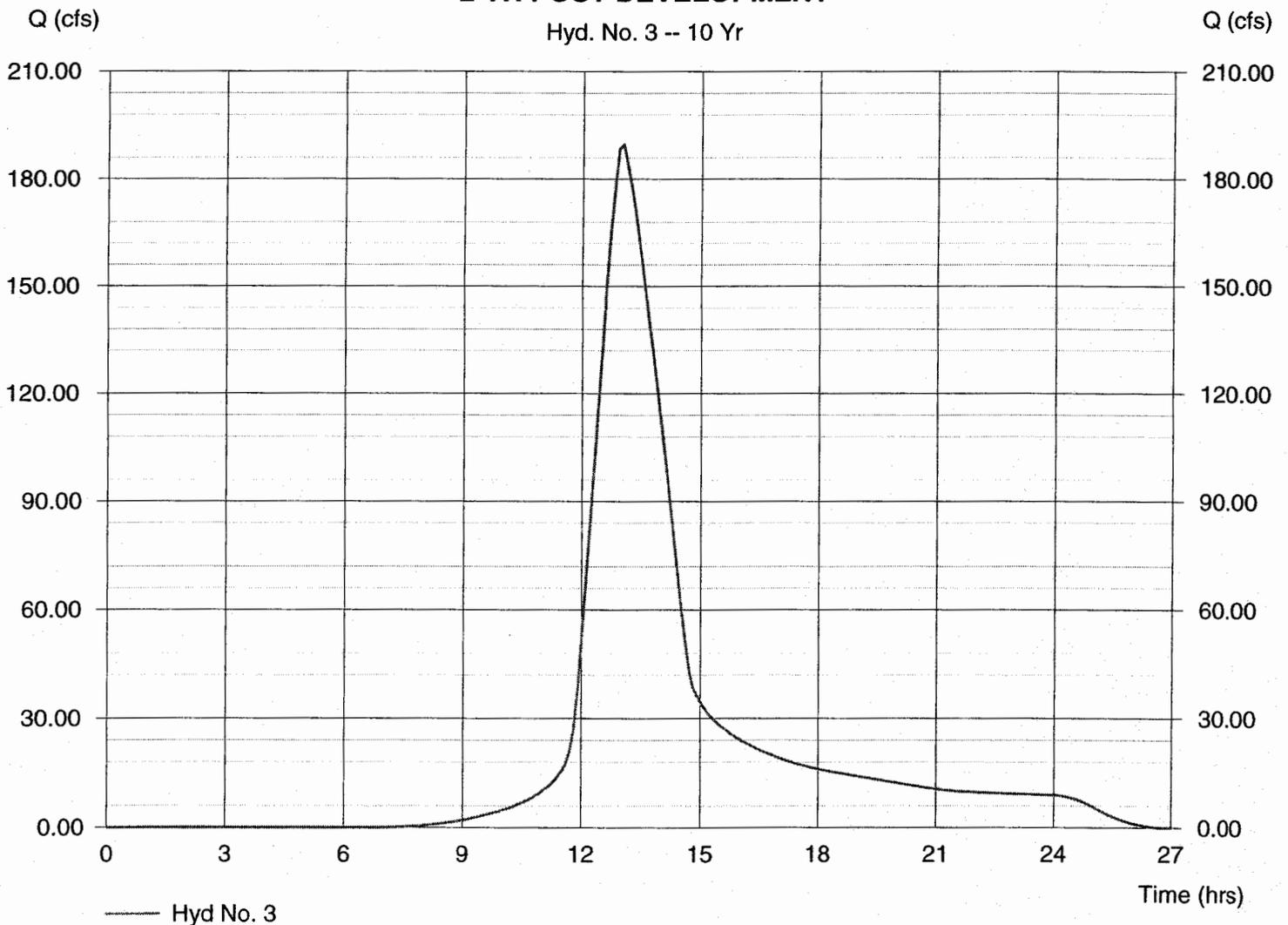
Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 154.80 ac
Basin Slope = 0.7 %
Tc method = LAG
Total precip. = 5.60 in
Storm duration = 24 hrs

Peak discharge = 189.64 cfs
Time interval = 6 min
Curve number = 80
Hydraulic length = 3550 ft
Time of conc. (Tc) = 104.8565 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 1,901,258 cuft

2 YR POST DEVELOPMENT

Hyd. No. 3 -- 10 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 10 2007, 1:17 PM

Hyd. No. 5

10 YR POST DEVELOPMENT

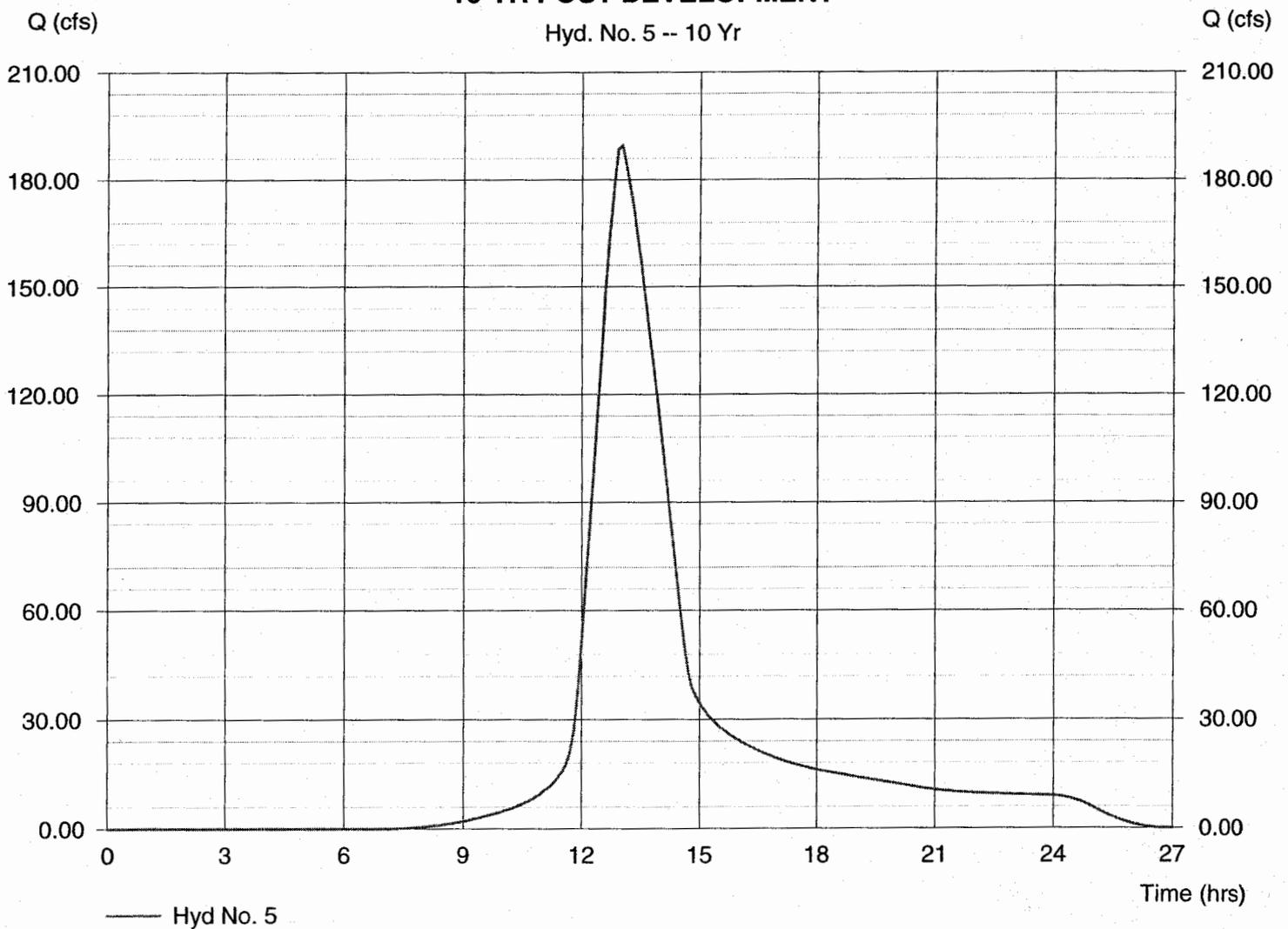
Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 154.80 ac
Basin Slope = 0.7 %
Tc method = LAG
Total precip. = 5.60 in
Storm duration = 24 hrs

Peak discharge = 189.64 cfs
Time interval = 6 min
Curve number = 80
Hydraulic length = 3550 ft
Time of conc. (Tc) = 104.8565 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 1,901,258 cuft

10 YR POST DEVELOPMENT

Hyd. No. 5 -- 10 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 10 2007, 1:34 PM

Hyd. No. 9

100 YR POST DEVELOPMENT

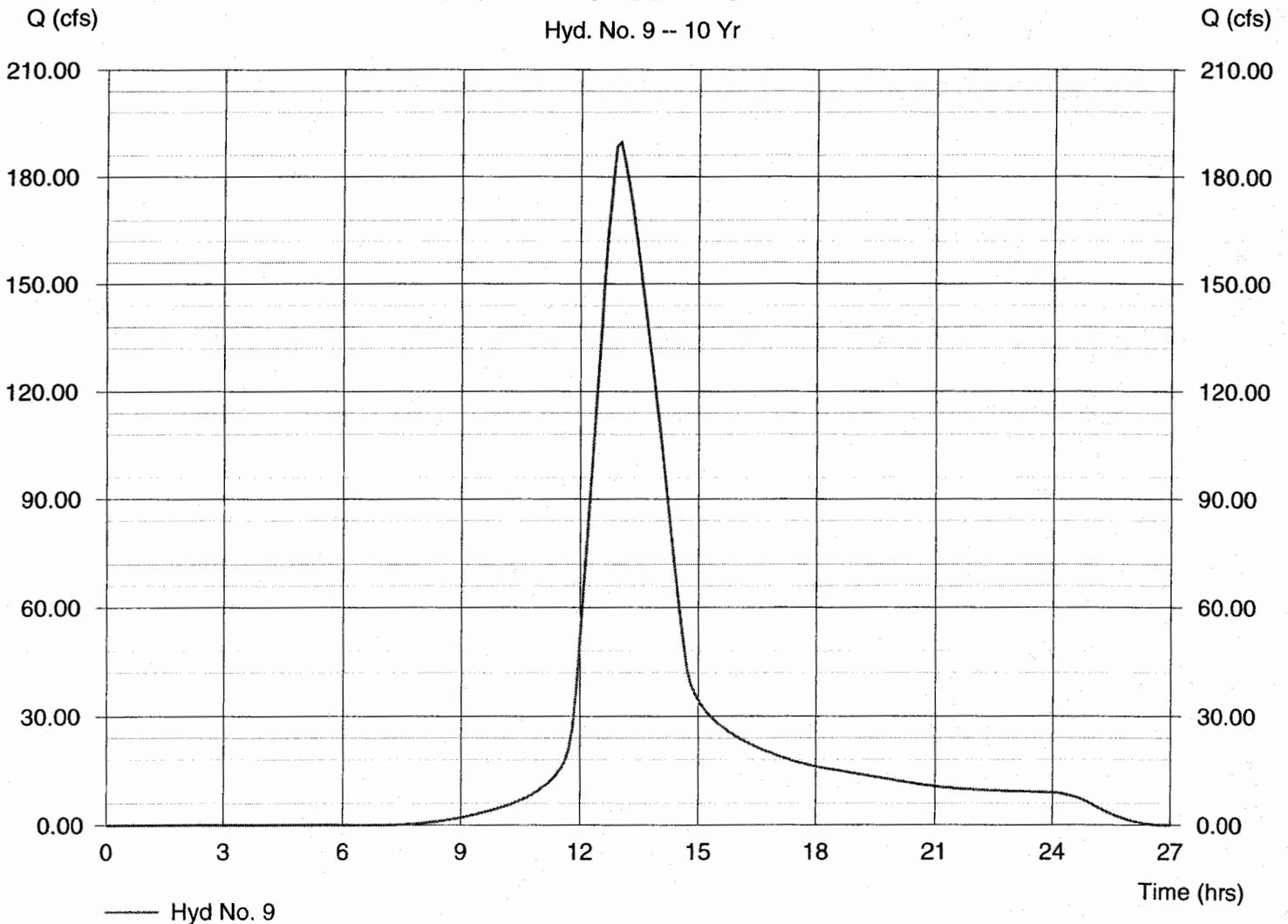
Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 154.80 ac
Basin Slope = 0.7 %
Tc method = LAG
Total precip. = 5.60 in
Storm duration = 24 hrs

Peak discharge = 189.64 cfs
Time interval = 6 min
Curve number = 80
Hydraulic length = 3550 ft
Time of conc. (Tc) = 104.8565 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 1,901,258 cuft

100 YR POST DEVELOPMENT

Hyd. No. 9 -- 10 Yr



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	40.09	6	798	555,970	---	-----	-----	2 YR PRE DEVELOPMENT
2	SCS Runoff	40.09	6	798	555,970	---	-----	-----	10 YR PRE- DEVELOPMENT
3	SCS Runoff	88.71	6	780	909,061	---	-----	-----	2 YR POST DEVELOPMENT
4	Reservoir	29.53	6	870	909,033	3	57.38	440,289	2 YR POST ROUTED
5	SCS Runoff	88.71	6	780	909,061	---	-----	-----	10 YR POST DEVELOPMENT
6	Reservoir	29.53	6	870	909,033	5	57.38	440,289	10 YR POST ROUTED
7	SCS Runoff	88.71	6	780	909,061	---	-----	-----	25 YR POST DEVELOPMENT
8	Reservoir	29.53	6	870	909,033	7	57.38	440,289	25 YR POST ROUTED
9	SCS Runoff	88.71	6	780	909,061	---	-----	-----	100 YR POST DEVELOPMENT
10	Reservoir	29.53	6	870	909,033	9	57.38	440,289	100 YR POST ROUTED
11	Reservoir	31.40	6	870	909,035	3	57.99	429,362	2 YR ROUTED
12	Reservoir	31.40	6	870	909,035	5	57.99	429,362	10 YR ROUTED
13	Reservoir	31.40	6	870	909,035	7	57.99	429,362	25 YR ROUTED
14	Reservoir	31.40	6	870	909,035	9	57.99	429,362	100 YR ROUTED

How can these all be the same for the 2-, 10-, 25-, 100-?
OK

8656-1.gpw

Return Period: 2 Year

Wednesday, Jan 10 2007, 1:23 PM

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 10 2007, 1:20 PM

Hyd. No. 11

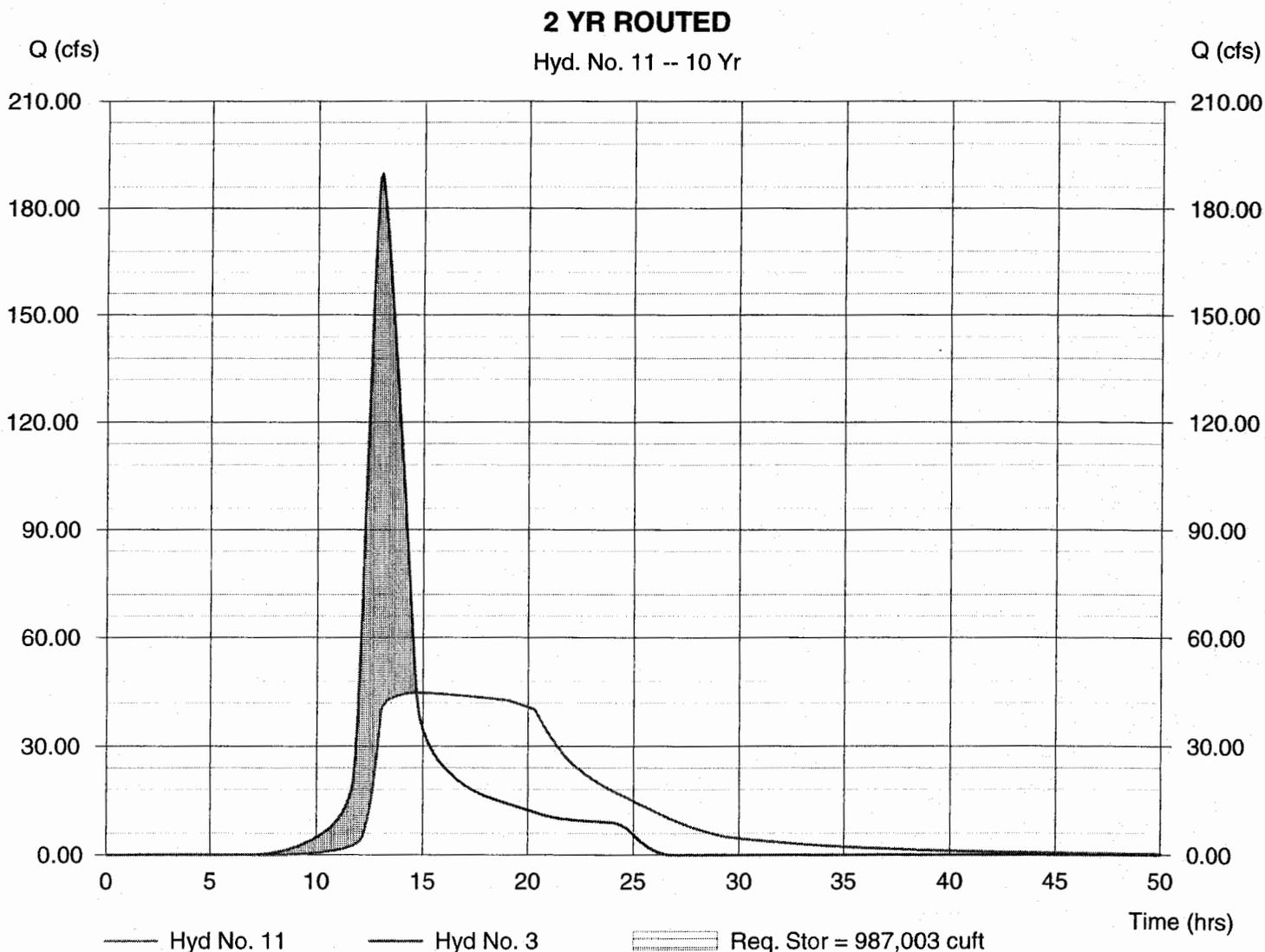
2 YR ROUTED

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 3
Reservoir name = ASBUILT WET POND

Peak discharge = 44.89 cfs
Time interval = 6 min
Max. Elevation = 59.32 ft
Max. Storage = 987,003 cuft

Storage Indication method used.

Hydrograph Volume = 1,901,233 cuft



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	110.24	6	798	1,374,087	----	-----	-----	2 YR PRE DEVELOPMENT
2	SCS Runoff	110.24	6	798	1,374,087	----	-----	-----	10 YR PRE- DEVELOPMENT
3	SCS Runoff	189.64	6	780	1,901,258	----	-----	-----	2 YR POST DEVELOPMENT
4	Reservoir	43.21	6	882	1,901,229	3	59.16	1,006,291	2 YR POST ROUTED
5	SCS Runoff	189.64	6	780	1,901,258	----	-----	-----	10 YR POST DEVELOPMENT
6	Reservoir	43.21	6	882	1,901,229	5	59.16	1,006,291	10 YR POST ROUTED
7	SCS Runoff	189.64	6	780	1,901,258	----	-----	-----	25 YR POST DEVELOPMENT
8	Reservoir	43.21	6	882	1,901,229	7	59.16	1,006,291	25 YR POST ROUTED
9	SCS Runoff	189.64	6	780	1,901,258	----	-----	-----	100 YR POST DEVELOPMENT
10	Reservoir	43.21	6	882	1,901,229	9	59.16	1,006,291	100 YR POST ROUTED
11	Reservoir	44.89	6	882	1,901,233	3	59.32	987,003	? 2 YR ROUTED
12	Reservoir	44.89	6	882	1,901,233	5	59.32	987,003	? 10 YR ROUTED
13	Reservoir	44.89	6	882	1,901,233	7	59.32	987,003	? 25 YR ROUTED
14	Reservoir	44.89	6	882	1,901,233	9	59.32	987,003	? 100 YR ROUTED

10-year

8656-1.gpw

Return Period: 10 Year

Wednesday, Jan 10 2007, 1:23 PM

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 10 2007, 1:20 PM

Hyd. No. 12

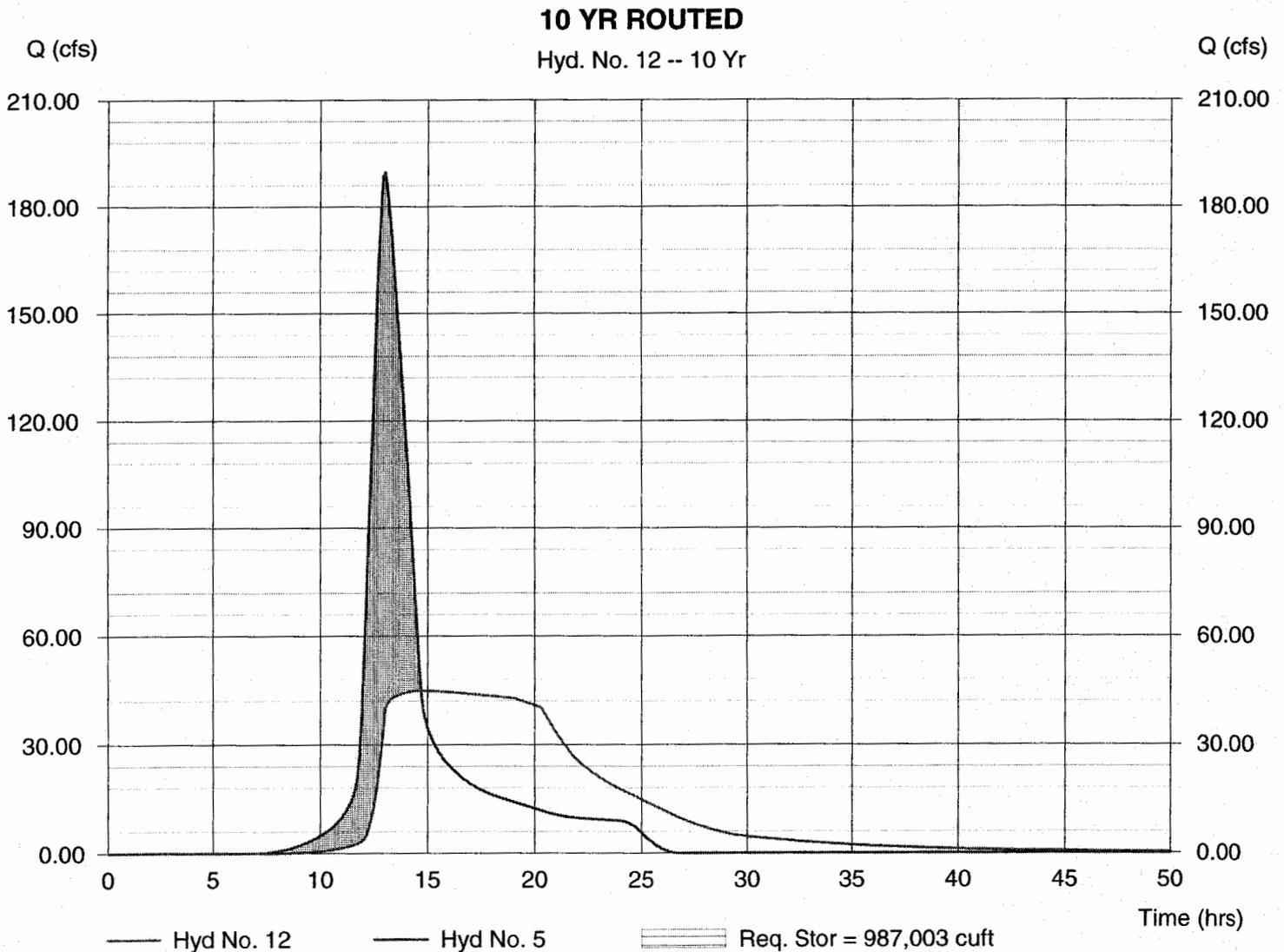
10 YR ROUTED

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 5
Reservoir name = ASBUILT WET POND

Peak discharge = 44.89 cfs
Time interval = 6 min
Max. Elevation = 59.32 ft
Max. Storage = 987,003 cuft

Storage Indication method used.

Hydrograph Volume = 1,901,233 cuft



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	215.21	6	798	2,604,881	---	-----	-----	2 YR PRE DEVELOPMENT	
2	SCS Runoff	215.21	6	798	2,604,881	---	-----	-----	10 YR PRE- DEVELOPMENT	
3	SCS Runoff	326.27	6	780	3,281,451	---	-----	-----	2 YR POST DEVELOPMENT	
4	Reservoir	152.14	6	852	3,281,421	3	60.70	1,552,553	2 YR POST ROUTED	
5	SCS Runoff	326.27	6	780	3,281,451	---	-----	-----	10 YR POST DEVELOPMENT	
6	Reservoir	152.14	6	852	3,281,421	5	60.70	1,552,553	10 YR POST ROUTED	
7	SCS Runoff	326.27	6	780	3,281,451	---	-----	-----	25 YR POST DEVELOPMENT	
8	Reservoir	152.14	6	852	3,281,421	7	60.70	1,552,553	25 YR POST ROUTED	
9	SCS Runoff	326.27	6	780	3,281,451	---	-----	-----	100 YR POST DEVELOPMENT	
10	Reservoir	152.14	6	852	3,281,421	9	60.70	1,552,553	100 YR POST ROUTED	
11	Reservoir	94.69	6	870	3,281,426	3	60.61	1,755,959	2 YR ROUTED	
12	Reservoir	94.69	6	870	3,281,426	5	60.61	1,755,959	10 YR ROUTED	
13	Reservoir	94.69	6	870	3,281,426	7	60.61	1,755,959	25 YR ROUTED	
14	Reservoir	94.69	6	870	3,281,426	9	60.61 <i>OH</i>	1,755,959	100 YR ROUTED	
8656-1.gpw					Return Period: 100 Year			Wednesday, Jan 10 2007, 1:23 PM		

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 10 2007, 1:20 PM

Hyd. No. 14

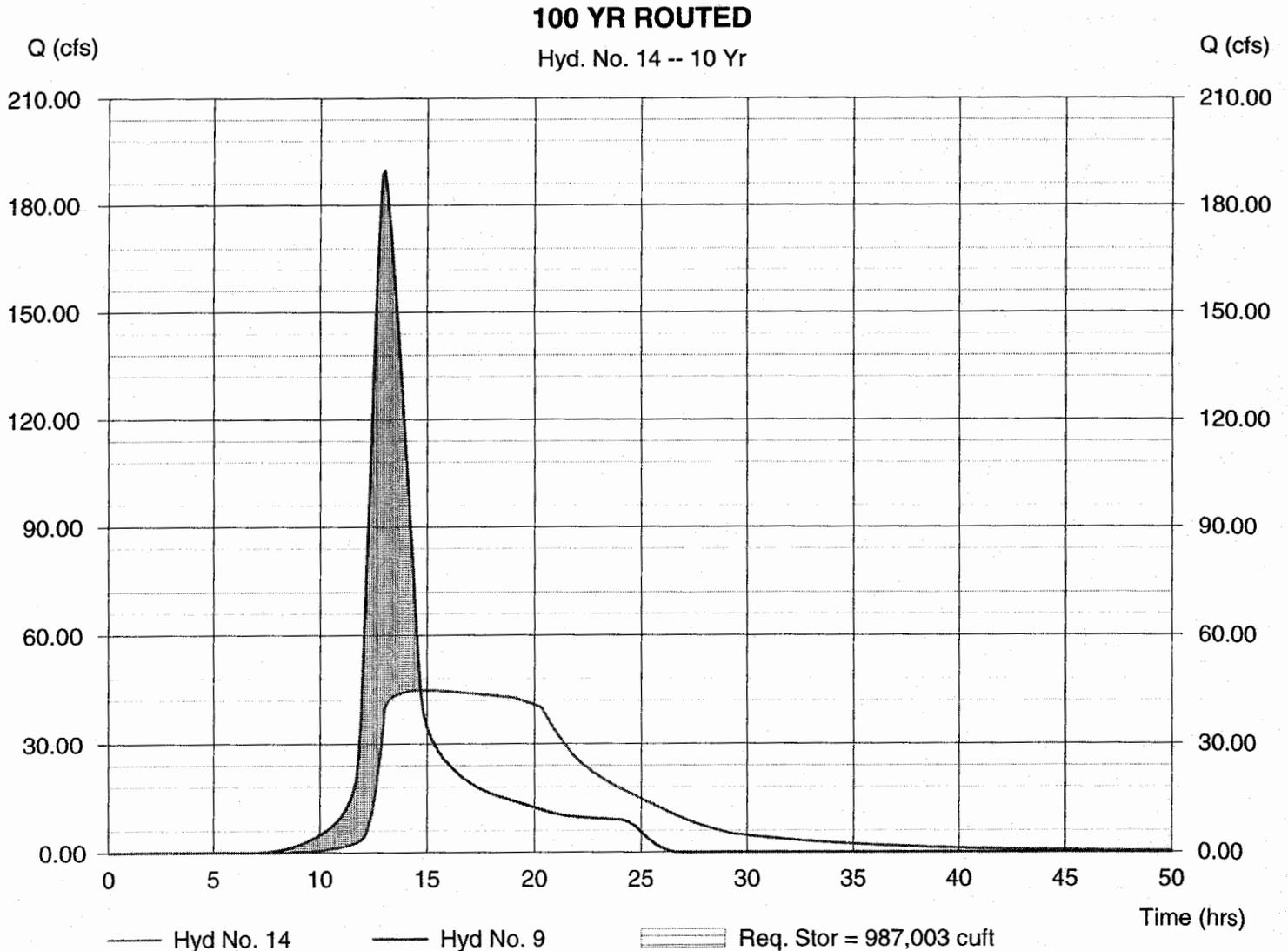
100 YR ROUTED

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 9
Reservoir name = ASBUILT WET POND

Peak discharge = 44.89 cfs
Time interval = 6 min
Max. Elevation = 59.32 ft
Max. Storage = 987,003 cuft

Storage Indication method used.

Hydrograph Volume = 1,901,233 cuft



Pond Report

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 10 2007, 1:36 PM

Pond No. 4 - ASBUILT WET POND

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	56.96 <i>N.P.</i>	257,683	0	0
3.04	60.00	378,676	967,266	967,266
5.04	62.00 <i>(10.0)</i>	420,000	798,676	1,765,942

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 24.00 ✓	0.00	0.00	0.00
Span (in)	= 24.00 ✓	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 49.51 ✓	0.00	0.00	0.00
Length (ft)	= 75.00 ✓	0.00	0.00	0.00
Slope (%)	= 2.16 ✓	0.00	0.00	0.00
N-Value	= .013 ✓	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00 ✓	20.00 ✓	0.00	0.00
Crest El. (ft)	= 56.96 ✓	59.76 ✓	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Riser	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Wet area) Tailwater Elev. = 0.00 ft

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	Civ D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	56.96	38.41	---	---	---	0.00	0.00	---	---	---	0.00
3.04	967,266	60.00	46.59	---	---	---	159.01	7.05	---	---	---	53.65
5.04	1,765,942	62.00	51.27	---	---	---	339.44	201.15	---	---	---	252.42

HYDROLOGIC REPORT FOR

GREENSPRINGS WEST PHASE ONE

SWM/BMP WET POND #1

AES JOB NUMBER 8656-1

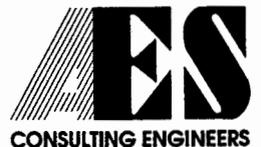
(JR048)

5-18-99

PREPARED BY

**AES CONSULTING ENGINEERS
5248 OLDE TOWNE ROAD, SUITE #1
WILLIAMSBURG, VIRGINIA 23188**

FEBRUARY 19, 1999





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

PROJECT GREENSPRINGS WEST PH. 1
 PROJECT NO. 8656-1
 SUBJECT SWM/BMP POND DESIGN
 SHEET NO. 1 OF 3
 CALCULATED BY CAH DATE 2/18/99

WET POND DESIGN

HYDROLOGIC/BMP CALCULATIONS

* FOR BMP, TRY FOR 10 POINT POND
 POST DEVELOPMENT DA = ~~154.8~~ AC.

IMPERVIOUS AREA = SF LOTS/ROADS → 98 AC @ 45%
 GOLF COURSE → 35 AC @ 25%
 REC CTR → 8 AC @ 50%
 OFFSITE → 14 AC @ 25%

$$\frac{60.35}{154.8} = 38.9 \approx \underline{\underline{39\%}} \leftarrow$$

60.35 IMP AC.

$$R_v = 0.05 + (0.009)(39\%) = 0.40$$

$$\text{VOLUME REQD} = 10 V_R = 10 \left(\frac{1}{2}''\right) \left(\frac{1}{2}''\right) (154.8 \text{ AC}) (43,560 \frac{\text{SF}}{\text{AC}}) (0.4)$$

$$= \underline{\underline{1,123,848 \text{ CF}}} \leftarrow$$

* FROM STAGE/STORAGE TABLE

NP EL = 56.0 → 3,165,415 CF ✓

* 10 PT. POND OK
 (DESIGN #7A)

* BMP IS IN ACCORDANCE WITH
 APPROVED GREENSPRINGS MASTER PLAN



5248 Olde Towne Road, Suite 1
 Williamsburg, Virginia 23188
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PROJECT GREENSPRINGS WEST PH
 PROJECT NO. 8656-1
 SUBJECT SUM/BMP POND DESIGN
 SHEET NO. 2 OF 3
 CALCULATED BY CAH DATE 2/18/96

WET POND DESIGN CONT

PRE-DEVELOPMENT

DA = 153.3 AC SOILS GROUP "C"
 CN = 70 WOODED 152 AC
 CN = 90 P/W 1.3 AC
CN = 70 ←

POST DEVELOPMENT

DA = 154.8 AC SOILS GROUP "C"
 14 AC ± OFFSITE → CN = 70
 35 AC ± GOLF COURSE → CN = 74
 98 AC ± SINGLE FAMILY → CN = 83
 8 AC ± REC. CTR. → CN = 88

COMPOSITE CN = 80 ←



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Williamsburg, Virginia 23188
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PROJECT GREENSPRINGS WEST PH. 1
PROJECT NO. 8656-1
SUBJECT SWM/BMP POND
SHEET NO. 3 OF 3
CALCULATED BY CAH DATE 2/18/99

TEMPORARY SEDIMENT BASIN

$$DA = 154.8 \text{ AC}$$

$$\text{TOTAL STORAGE REQUIRED} = 134 \text{ CY/AC}$$

$$154.8(134) = 20,744 \text{ CY} = \underline{\underline{560,066 \text{ CF}}} \leftarrow$$

$$\text{WET STORAGE} = 280,033 \text{ CF}$$

$$\text{DRY STORAGE} = 280,033 \text{ CF}$$

* ELEV. OF PRINCIPLE SPILLWAY = 56.0

* STORAGE PROVIDED AT PRINCIPLE SPILLWAY
IS 3,165,415 CF

$$\underline{\underline{3,165,415 \text{ CF}}} \gg 560,066 \text{ CF} \checkmark$$

∴ DEWATERING DEVICE NOT REQD

Reservoir Report

Reservoir No. 3 - TOTAL STORAGE 2

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	30.00	73,942	0	0
10.00	40.00	120,075	970,085	970,085
20.00	50.00	186,515	1,532,950	2,503,035
25.00	55.00	210,550	924,663	2,931,298
26.00	56.00	257,683	234,117	3,165,415
30.00	60.00	378,676	1,272,718	4,438,133

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= ----	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.0	0.0	0.0	0.0
Crest El. ft	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Eqn. Exp.	= 0.00	0.00	0.00	0.00
Multi-Stage	= No	No	No	No
Tailwater Elevation = 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	Discharge cfs
0.00	0	30.00	---	---	---	---	---	---	---	---	0.00
1.00	97,009	31.00	---	---	---	---	---	---	---	---	0.00
2.00	194,017	32.00	---	---	---	---	---	---	---	---	0.00
3.00	291,026	33.00	---	---	---	---	---	---	---	---	0.00
4.00	388,034	34.00	---	---	---	---	---	---	---	---	0.00
5.00	485,043	35.00	---	---	---	---	---	---	---	---	0.00
6.00	582,051	36.00	---	---	---	---	---	---	---	---	0.00
7.00	679,060	37.00	---	---	---	---	---	---	---	---	0.00
8.00	776,068	38.00	---	---	---	---	---	---	---	---	0.00
9.00	873,077	39.00	---	---	---	---	---	---	---	---	0.00
10.00	970,085	40.00	---	---	---	---	---	---	---	---	0.00

Continues on next page...

Reservoir Report

Reservoir No. 1 - WET POND

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	56.00	257,683	0	0
4.00	60.00	378,676	1,272,718	1,272,718
6.00	62.00	420,000	798,676	2,071,394

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 24.0	0.0	0.0	0.0
Span in	= 24.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 50.00	0.00	0.00	0.00
Length ft	= 75.0	0.0	0.0	0.0
Slope %	= 2.67	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= ----	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 6.0	20.0	0.0	0.0
Crest El. ft	= 56.00	59.25	0.00	0.00
Weir Coeff.	= 3.00	3.00	0.00	0.00
Eqn. Exp.	= 1.50	1.50	0.00	0.00
Multi-Stage	= Yes	No	No	No

Tailwater Elevation = 49.00 ft

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	Civ D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0	56.00	33.82	---	---	---	0.00	0.00	---	---	0.00
0.40	127,272	56.40	35.15	---	---	---	4.55	0.00	---	---	4.55
0.80	254,544	56.80	36.43	---	---	---	12.88	0.00	---	---	12.88
1.20	381,815	57.20	37.66	---	---	---	23.66	0.00	---	---	23.66
1.60	509,087	57.60	38.86	---	---	---	36.43	0.00	---	---	36.43
2.00	636,359	58.00	40.02	---	---	---	50.91	0.00	---	---	40.02
2.40	763,631	58.40	41.14	---	---	---	66.93	0.00	---	---	41.14
2.80	890,903	58.80	42.24	---	---	---	84.34	0.00	---	---	42.24
3.20	1,018,174	59.20	43.31	---	---	---	103.04	0.00	---	---	43.31
3.60	1,145,446	59.60	44.35	---	---	---	122.95	12.42	---	---	56.78
4.00	1,272,718	60.00	45.37	---	---	---	144.00	38.97	---	---	84.35

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Stage / Storage / Discharge Table

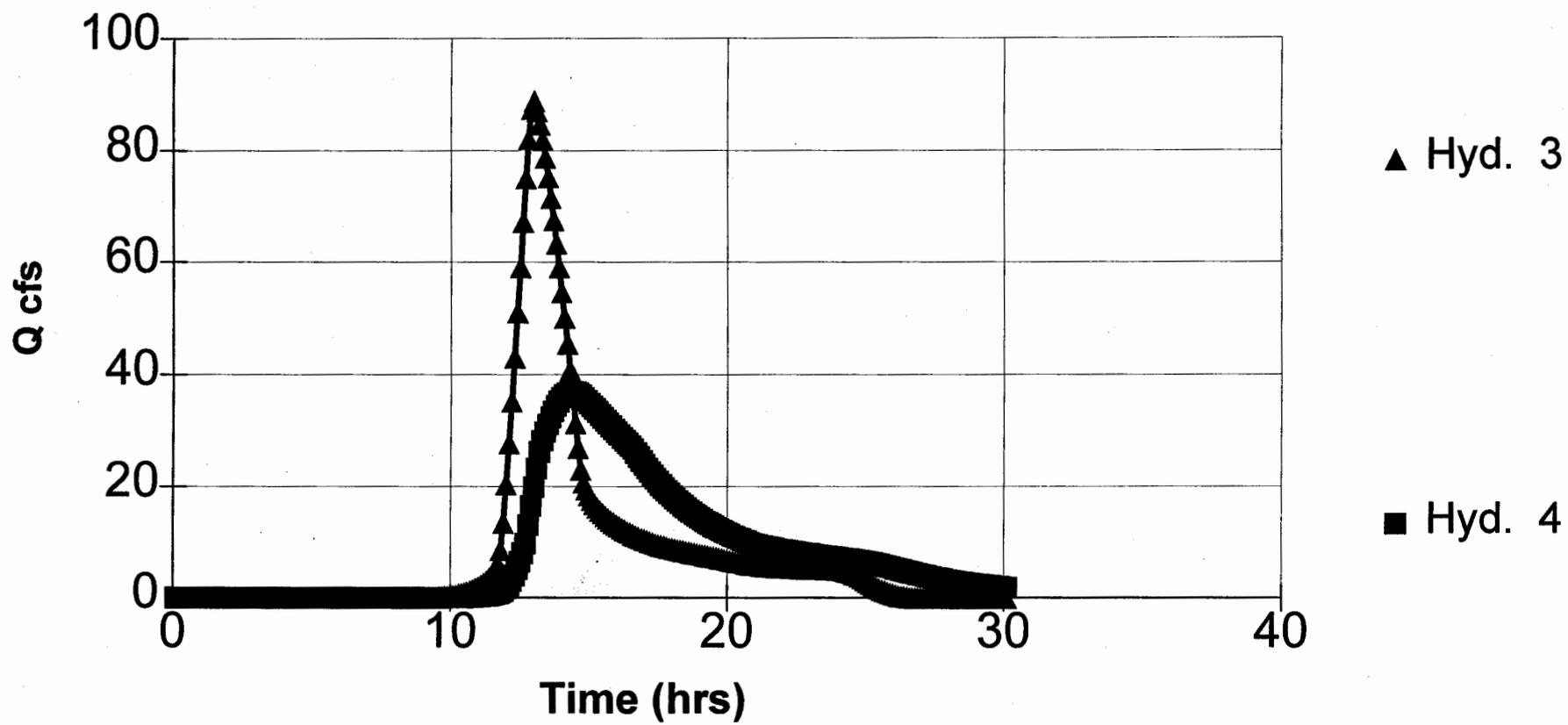
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
4.20	1,352,586	60.20	45.88	---	---	---	154.93	55.56	---	---	101.43
4.40	1,432,453	60.40	46.37	---	---	---	166.13	73.99	---	---	120.37
4.60	1,512,321	60.60	46.86	---	---	---	177.59	94.11	---	---	140.98
4.80	1,592,189	60.80	47.35	---	---	---	189.29	115.78	---	---	163.13
5.00	1,672,056	61.00	47.83	---	---	---	201.25	138.90	---	---	186.73
5.20	1,751,924	61.20	48.30	---	---	---	213.44	163.38	---	---	211.69
5.40	1,831,791	61.40	48.78	---	---	---	225.87	189.15	---	---	237.93
5.60	1,911,659	61.60	49.24	---	---	---	238.54	216.15	---	---	265.39
5.80	1,991,527	61.80	49.71	---	---	---	251.43	244.32	---	---	294.03
6.00	2,071,394	62.00	50.16	---	---	---	264.54	273.62	---	---	323.78

...End

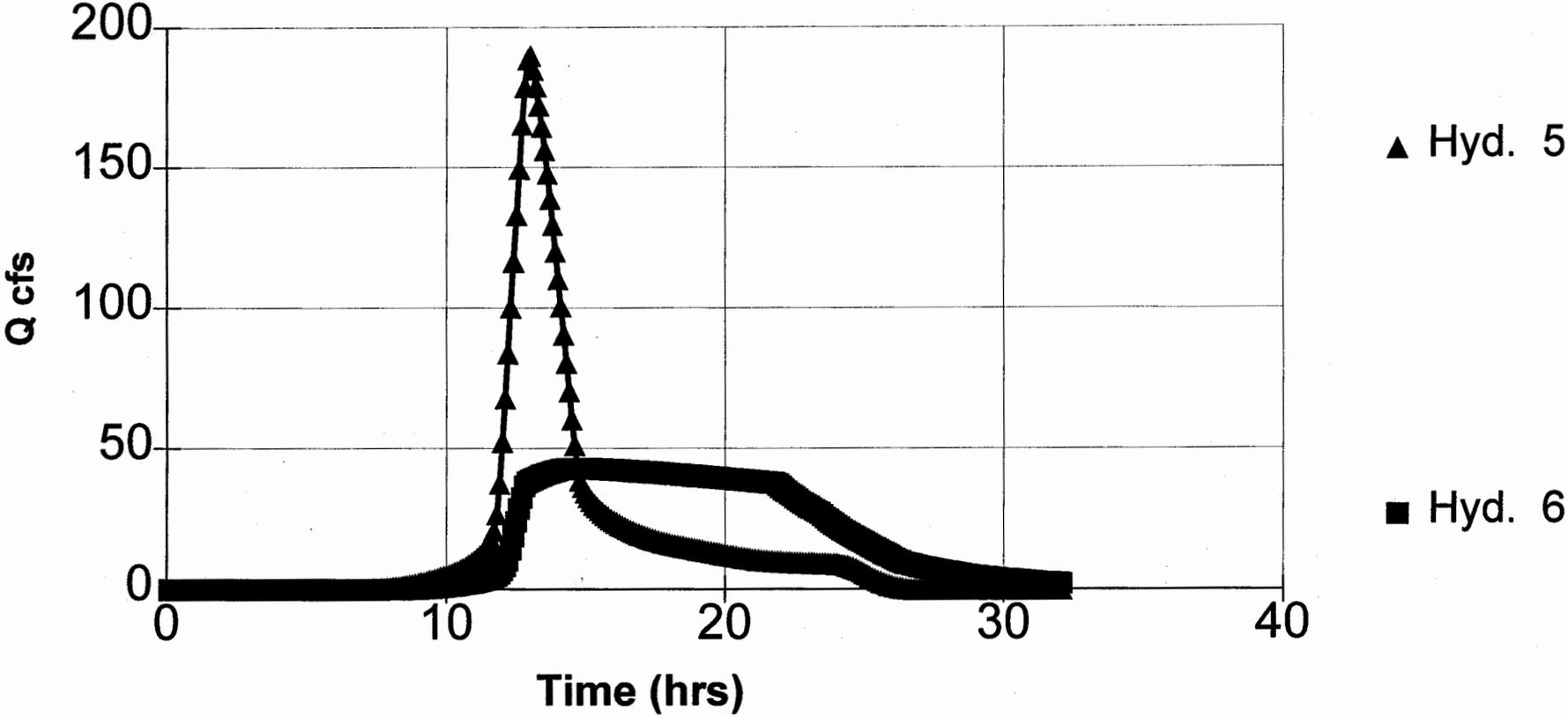
Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description	
1	SCS Runoff	40.1	6	798	555,978	2	---	---	---	2 YR PRE DEVELOPME	
2	SCS Runoff	110.3	6	798	1,374,089	10	---	---	---	10 YR PRE- DEVELOP	
3	SCS Runoff	88.7	6	780	909,063	2	---	---	---	2 YR POST DEVELOPM	
4	Reservoir	37.0	6	864	909,062	2	3	57.17	373,519	2 YR POST ROUTED	
5	SCS Runoff	189.7	6	780	1,901,258	10	---	---	---	10 YR POST DEVELOP	
6	Reservoir	42.9	6	882	1,901,255	10	5	59.04	968,463	10 YR POST ROUTED	
7	SCS Runoff	234.9	6	780	2,352,869	25	---	---	---	25 YR POST DEVELOP	
8	Reservoir	70.1	6	870	2,352,865	25	7	59.79	1,207,154	25 YR POST ROUTED	
9	SCS Runoff	326.4	6	780	3,281,453	100	---	---	---	100 YR POST DEVELO	
10	Reservoir	146.6	6	852	3,281,450	100	9	60.65	1,532,441	100 YR POST ROUTED	
Proj. file: 8656.GPW				IDF file: jcc.IDF				Run date: 02-18-1999			

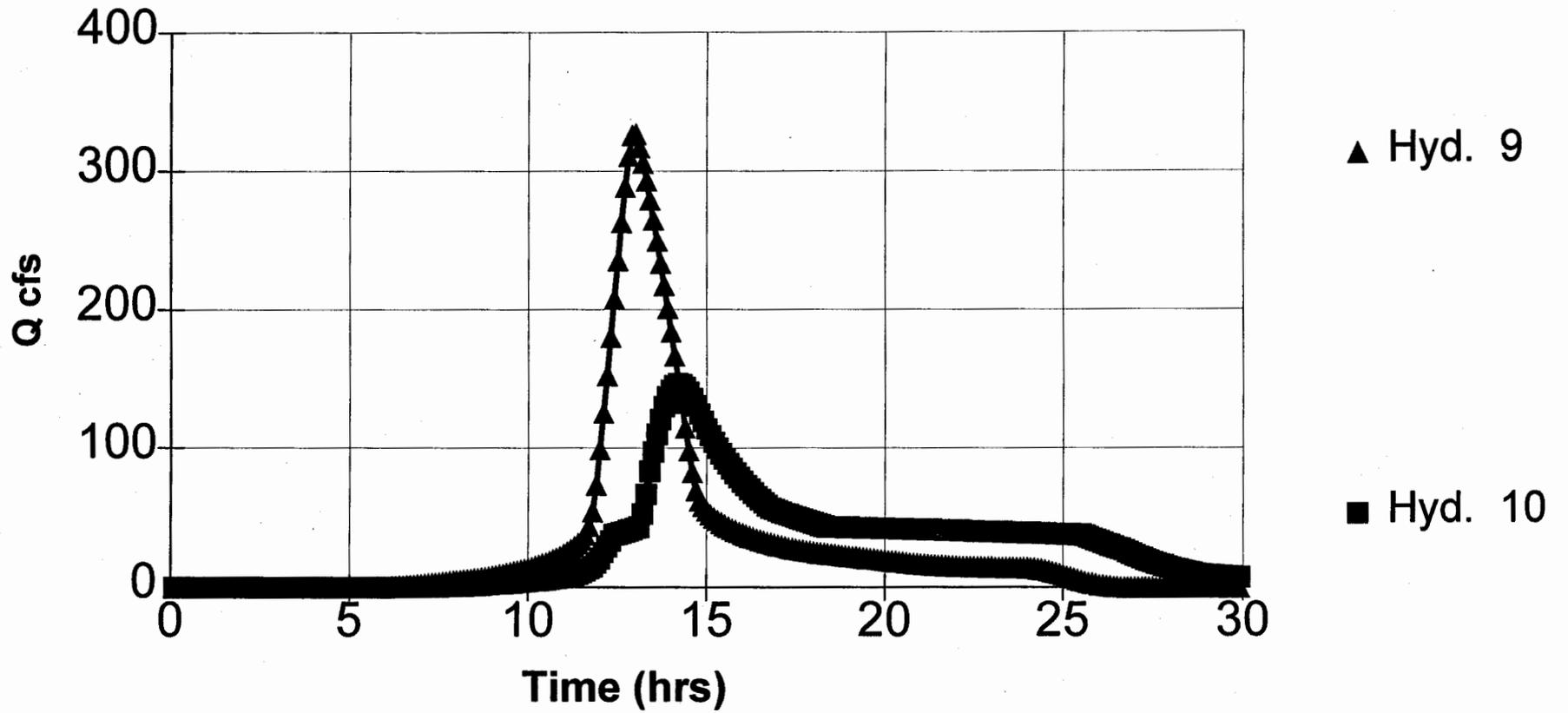
Hydrograph(s) 3 to 4



Hydrograph(s) 5 to 6



Hydrograph(s) 9 to 10



Hydrograph Report

Hyd. No. 1

2 YR PRE DEVELOPMENT

Hydrograph type	= SCS Runoff	Peak discharge	= 40.09 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Drainage area	= 153.30 ac	Curve number	= 70
Basin Slope	= 0.7 %	Hydraulic length	= 3550 ft
Tc method	= LAG	Time of conc. (Tc)	= 139.9 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 555,978 cuft

Hydrograph Discharge Table

| Time -- Outflow
(hrs cfs) |
|------------------------------|------------------------------|------------------------------|------------------------------|
| 11.80 0.79 | 15.00 22.07 | 18.20 6.78 | 21.40 4.48 |
| 11.90 2.19 | 15.10 20.39 | 18.30 6.68 | 21.50 4.43 |
| 12.00 4.39 | 15.20 18.67 | 18.40 6.59 | 21.60 4.39 |
| 12.10 6.77 | 15.30 16.94 | 18.50 6.50 | 21.70 4.35 |
| 12.20 9.31 | 15.40 15.25 | 18.60 6.42 | 21.80 4.31 |
| 12.30 11.99 | 15.50 13.72 | 18.70 6.34 | 21.90 4.27 |
| 12.40 14.79 | 15.60 12.69 | 18.80 6.26 | 22.00 4.24 |
| 12.50 17.69 | 15.70 12.12 | 18.90 6.18 | 22.10 4.20 |
| 12.60 20.68 | 15.80 11.63 | 19.00 6.10 | 22.20 4.18 |
| 12.70 23.74 | 15.90 11.20 | 19.10 6.03 | 22.30 4.15 |
| 12.80 26.87 | 16.00 10.82 | 19.20 5.95 | 22.40 4.12 |
| 12.90 30.05 | 16.10 10.49 | 19.30 5.88 | 22.50 4.10 |
| 13.00 33.23 | 16.20 10.18 | 19.40 5.81 | 22.60 4.08 |
| 13.10 36.28 | 16.30 9.89 | 19.50 5.74 | 22.70 4.06 |
| 13.20 38.87 | 16.40 9.63 | 19.60 5.67 | 22.80 4.04 |
| 13.30 40.09 << | 16.50 9.38 | 19.70 5.60 | 22.90 4.02 |
| 13.40 40.07 | 16.60 9.15 | 19.80 5.53 | 23.00 4.00 |
| 13.50 39.81 | 16.70 8.93 | 19.90 5.46 | 23.10 3.99 |
| 13.60 39.35 | 16.80 8.73 | 20.00 5.39 | 23.20 3.97 |
| 13.70 38.71 | 16.90 8.53 | 20.10 5.31 | 23.30 3.96 |
| 13.80 37.93 | 17.00 8.35 | 20.20 5.24 | 23.40 3.95 |
| 13.90 37.02 | 17.10 8.18 | 20.30 5.17 | 23.50 3.93 |
| 14.00 36.02 | 17.20 8.01 | 20.40 5.10 | 23.60 3.92 |
| 14.10 34.93 | 17.30 7.86 | 20.50 5.03 | 23.70 3.91 |
| 14.20 33.76 | 17.40 7.71 | 20.60 4.96 | 23.80 3.89 |
| 14.30 32.51 | 17.50 7.58 | 20.70 4.89 | 23.90 3.88 |
| 14.40 31.19 | 17.60 7.45 | 20.80 4.83 | 24.00 3.87 |
| 14.50 29.81 | 17.70 7.32 | 20.90 4.76 | 24.10 3.84 |
| 14.60 28.37 | 17.80 7.20 | 21.00 4.70 | 24.20 3.80 |
| 14.70 26.87 | 17.90 7.09 | 21.10 4.64 | 24.30 3.74 |
| 14.80 25.32 | 18.00 6.98 | 21.20 4.58 | 24.40 3.67 |
| 14.90 23.72 | 18.10 6.88 | 21.30 4.53 | 24.50 3.59 |

Continues on next page...

Hydrograph Discharge Table**Time -- Outflow
(hrs cfs)**

24.60	3.49
24.70	3.38
24.80	3.26
24.90	3.12
25.00	2.97
25.10	2.80
25.20	2.62
25.30	2.43
25.40	2.23
25.50	2.03
25.60	1.84
25.70	1.67
25.80	1.50
25.90	1.34
26.00	1.19
26.10	1.05
26.20	0.92
26.30	0.79
26.40	0.68
26.50	0.57
26.60	0.48

...End

Hydrograph Report

Hyd. No. 2

10 YR PRE- DEVELOPMENT

Hydrograph type	= SCS Runoff	Peak discharge	= 110.27 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 153.30 ac	Curve number	= 70
Basin Slope	= 0.7 %	Hydraulic length	= 3550 ft
Tc method	= LAG	Time of conc. (Tc)	= 139.9 min
Total precip.	= 5.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 1,374,089 cuft

Hydrograph Discharge Table

| Time -- Outflow
(hrs cfs) |
|------------------------------|------------------------------|------------------------------|------------------------------|
| 10.90 1.14 | 14.10 89.60 | 17.30 16.44 | 20.50 10.29 |
| 11.00 1.39 | 14.20 85.86 | 17.40 16.12 | 20.60 10.15 |
| 11.10 1.67 | 14.30 81.97 | 17.50 15.82 | 20.70 10.00 |
| 11.20 2.01 | 14.40 77.94 | 17.60 15.53 | 20.80 9.86 |
| 11.30 2.40 | 14.50 73.80 | 17.70 15.26 | 20.90 9.73 |
| 11.40 2.87 | 14.60 69.54 | 17.80 15.00 | 21.00 9.60 |
| 11.50 3.41 | 14.70 65.18 | 17.90 14.75 | 21.10 9.47 |
| 11.60 4.18 | 14.80 60.73 | 18.00 14.52 | 21.20 9.35 |
| 11.70 5.46 | 14.90 56.21 | 18.10 14.29 | 21.30 9.24 |
| 11.80 7.77 | 15.00 51.64 | 18.20 14.07 | 21.40 9.13 |
| 11.90 12.43 | 15.10 47.02 | 18.30 13.86 | 21.50 9.03 |
| 12.00 18.97 | 15.20 42.37 | 18.40 13.66 | 21.60 8.93 |
| 12.10 25.89 | 15.30 37.78 | 18.50 13.47 | 21.70 8.84 |
| 12.20 33.11 | 15.40 33.44 | 18.60 13.28 | 21.80 8.76 |
| 12.30 40.59 | 15.50 29.67 | 18.70 13.10 | 21.90 8.68 |
| 12.40 48.27 | 15.60 27.27 | 18.80 12.92 | 22.00 8.61 |
| 12.50 56.11 | 15.70 25.98 | 18.90 12.76 | 22.10 8.54 |
| 12.60 64.04 | 15.80 24.86 | 19.00 12.59 | 22.20 8.48 |
| 12.70 72.04 | 15.90 23.89 | 19.10 12.43 | 22.30 8.42 |
| 12.80 80.07 | 16.00 23.04 | 19.20 12.27 | 22.40 8.37 |
| 12.90 88.10 | 16.10 22.28 | 19.30 12.12 | 22.50 8.32 |
| 13.00 95.90 | 16.20 21.59 | 19.40 11.96 | 22.60 8.27 |
| 13.10 102.97 | 16.30 20.95 | 19.50 11.81 | 22.70 8.23 |
| 13.20 108.47 | 16.40 20.36 | 19.60 11.66 | 22.80 8.18 |
| 13.30 110.27 << | 16.50 19.81 | 19.70 11.51 | 22.90 8.15 |
| 13.40 109.09 | 16.60 19.29 | 19.80 11.35 | 23.00 8.11 |
| 13.50 107.37 | 16.70 18.81 | 19.90 11.20 | 23.10 8.07 |
| 13.60 105.19 | 16.80 18.35 | 20.00 11.05 | 23.20 8.04 |
| 13.70 102.61 | 16.90 17.92 | 20.10 10.90 | 23.30 8.01 |
| 13.80 99.69 | 17.00 17.52 | 20.20 10.74 | 23.40 7.98 |
| 13.90 96.53 | 17.10 17.14 | 20.30 10.59 | 23.50 7.95 |
| 14.00 93.16 | 17.20 16.78 | 20.40 10.44 | 23.60 7.92 |

Continues on next page...

Hydrograph Discharge Table**Time -- Outflow
(hrs cfs)**

23.70	7.89
23.80	7.86
23.90	7.83
24.00	7.80
24.10	7.75
24.20	7.66
24.30	7.55
24.40	7.40
24.50	7.23
24.60	7.04
24.70	6.81
24.80	6.56
24.90	6.28
25.00	5.98
25.10	5.64
25.20	5.28
25.30	4.89
25.40	4.48
25.50	4.09
25.60	3.71
25.70	3.35
25.80	3.01
25.90	2.69
26.00	2.39
26.10	2.11
26.20	1.84
26.30	1.59
26.40	1.36
26.50	1.15

...End

Hydrograph Report

Hyd. No. 3

2 YR POST DEVELOPMENT

Hydrograph type	= SCS Runoff	Peak discharge	= 88.74 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Drainage area	= 154.80 ac	Curve number	= 80
Basin Slope	= 0.7 %	Hydraulic length	= 3550 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.8 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 909,063 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)						
10.60	0.97	13.80	63.33	17.00	10.40	20.20	6.58
10.70	1.16	13.90	59.06	17.10	10.20	20.30	6.48
10.80	1.37	14.00	54.64	17.20	10.00	20.40	6.38
10.90	1.61	14.10	50.11	17.30	9.82	20.50	6.29
11.00	1.88	14.20	45.48	17.40	9.65	20.60	6.20
11.10	2.18	14.30	40.78	17.50	9.49	20.70	6.11
11.20	2.53	14.40	36.02	17.60	9.34	20.80	6.02
11.30	2.93	14.50	31.30	17.70	9.20	20.90	5.94
11.40	3.40	14.60	26.85	17.80	9.06	21.00	5.87
11.50	3.94	14.70	23.00	17.90	8.93	21.10	5.80
11.60	4.72	14.80	20.63	18.00	8.81	21.20	5.73
11.70	6.05	14.90	19.43	18.10	8.69	21.30	5.67
11.80	8.48	15.00	18.40	18.20	8.58	21.40	5.62
11.90	13.43	15.10	17.53	18.30	8.47	21.50	5.57
12.00	20.35	15.20	16.80	18.40	8.36	21.60	5.52
12.10	27.64	15.30	16.16	18.50	8.26	21.70	5.48
12.20	35.22	15.40	15.59	18.60	8.16	21.80	5.44
12.30	43.03	15.50	15.08	18.70	8.06	21.90	5.41
12.40	51.00	15.60	14.61	18.80	7.96	22.00	5.38
12.50	59.05	15.70	14.18	18.90	7.87	22.10	5.35
12.60	67.12	15.80	13.78	19.00	7.77	22.20	5.32
12.70	74.96	15.90	13.41	19.10	7.67	22.30	5.30
12.80	82.01	16.00	13.06	19.20	7.57	22.40	5.27
12.90	87.36	16.10	12.73	19.30	7.47	22.50	5.25
13.00	88.74 <<	16.20	12.42	19.40	7.38	22.60	5.23
13.10	86.96	16.30	12.13	19.50	7.28	22.70	5.21
13.20	84.64	16.40	11.84	19.60	7.18	22.80	5.19
13.30	81.85	16.50	11.58	19.70	7.08	22.90	5.17
13.40	78.66	16.60	11.32	19.80	6.98	23.00	5.16
13.50	75.15	16.70	11.07	19.90	6.88	23.10	5.14
13.60	71.40	16.80	10.84	20.00	6.78	23.20	5.12
13.70	67.45	16.90	10.61	20.10	6.68	23.30	5.10

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Hydrograph Discharge Table**Time -- Outflow
(hrs cfs)**

23.40	5.08
23.50	5.06
23.60	5.04
23.70	5.02
23.80	5.00
23.90	4.98
24.00	4.96
24.10	4.91
24.20	4.84
24.30	4.73
24.40	4.59
24.50	4.43
24.60	4.23
24.70	4.01
24.80	3.76
24.90	3.48
25.00	3.17
25.10	2.83
25.20	2.51
25.30	2.21
25.40	1.93
25.50	1.67
25.60	1.43
25.70	1.21
25.80	1.01

...End

Hydrograph Report

Hyd. No. 4

2 YR POST ROUTED

Hydrograph type = Reservoir
 Storm frequency = 2 yrs
 Inflow hyd. No. = 3
 Max. Elevation = 57.17 ft

Peak discharge = 36.96 cfs
 Time interval = 6 min
 Reservoir name = WET POND
 Max. Storage = 373,519 cuft

Storage Indication method used.

Total Volume = 909,062 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	Outflow cfs
11.30	2.93	56.02	33.88	---	---	---	0.40	---	---	---	0.40
11.40	3.40	56.02	33.89	---	---	---	0.48	---	---	---	0.48
11.50	3.94	56.02	33.90	---	---	---	0.56	---	---	---	0.56
11.60	4.72	56.03	33.91	---	---	---	0.66	---	---	---	0.66
11.70	6.05	56.03	33.93	---	---	---	0.79	---	---	---	0.79
11.80	8.48	56.04	33.95	---	---	---	0.96	---	---	---	0.96
11.90	13.43	56.05	33.99	---	---	---	1.23	---	---	---	1.23
12.00	20.35	56.07	34.05	---	---	---	1.64	---	---	---	1.64
12.10	27.64	56.09	34.13	---	---	---	2.24	---	---	---	2.24
12.20	35.22	56.13	34.24	---	---	---	3.01	---	---	---	3.01
12.30	43.03	56.17	34.37	---	---	---	3.97	---	---	---	3.97
12.40	51.00	56.21	34.53	---	---	---	5.12	---	---	---	5.12
12.50	59.05	56.27	34.72	---	---	---	6.45	---	---	---	6.45
12.60	67.12	56.33	34.93	---	---	---	7.95	---	---	---	7.95
12.70	74.96	56.40	35.16	---	---	---	9.71	---	---	---	9.71
12.80	82.01	56.48	35.40	---	---	---	13.02	---	---	---	13.02
12.90	87.36	56.56	35.66	---	---	---	16.47	---	---	---	16.47
13.00	88.74 <<	56.64	35.91	---	---	---	19.91	---	---	---	19.91
13.10	86.96	56.71	36.15	---	---	---	23.18	---	---	---	23.18
13.20	84.64	56.78	36.37	---	---	---	26.20	---	---	---	26.20
13.30	81.85	56.85	36.57	---	---	---	29.55	---	---	---	28.19
13.40	78.66	56.90	36.75	---	---	---	32.82	---	---	---	29.74
13.50	75.15	56.96	36.91	---	---	---	35.79	---	---	---	31.15
13.60	71.40	57.00	37.05	---	---	---	38.44	---	---	---	32.40
13.70	67.45	57.04	37.18	---	---	---	40.77	---	---	---	33.51
13.80	63.33	57.08	37.29	---	---	---	42.77	---	---	---	34.46
13.90	59.06	57.11	37.38	---	---	---	44.45	---	---	---	35.25
14.00	54.64	57.13	37.46	---	---	---	45.81	---	---	---	35.90
14.10	50.11	57.15	37.51	---	---	---	46.85	---	---	---	36.39
14.20	45.48	57.17	37.55	---	---	---	47.57	---	---	---	36.73
14.30	40.78	57.17	37.57	---	---	---	47.97	---	---	---	36.92
14.40	36.02	57.17 <<	37.58	---	---	---	48.06	---	---	---	36.96 <<
14.50	31.30	57.17	37.57	---	---	---	47.85	---	---	---	36.86
14.60	26.85	57.16	37.54	---	---	---	47.36	---	---	---	36.63
14.70	23.00	57.15	37.50	---	---	---	46.63	---	---	---	36.28
14.80	20.63	57.13	37.45	---	---	---	45.72	---	---	---	35.85

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	Outflow cfs
14.90	19.43	57.11	37.40	---	---	---	44.72	---	---	---	35.38
15.00	18.40	57.10	37.34	---	---	---	43.69	---	---	---	34.89
15.10	17.53	57.08	37.28	---	---	---	42.62	---	---	---	34.39
15.20	16.80	57.06	37.22	---	---	---	41.54	---	---	---	33.87
15.30	16.16	57.04	37.16	---	---	---	40.45	---	---	---	33.35
15.40	15.59	57.02	37.10	---	---	---	39.35	---	---	---	32.83
15.50	15.08	57.00	37.04	---	---	---	38.25	---	---	---	32.31
15.60	14.61	56.98	36.98	---	---	---	37.15	---	---	---	31.79
15.70	14.18	56.96	36.92	---	---	---	36.05	---	---	---	31.27
15.80	13.78	56.94	36.86	---	---	---	34.97	---	---	---	30.76
15.90	13.41	56.92	36.80	---	---	---	33.89	---	---	---	30.24
16.00	13.06	56.90	36.75	---	---	---	32.82	---	---	---	29.74
16.10	12.73	56.88	36.69	---	---	---	31.76	---	---	---	29.24
16.20	12.42	56.87	36.63	---	---	---	30.71	---	---	---	28.74
16.30	12.13	56.85	36.57	---	---	---	29.67	---	---	---	28.25
16.40	11.84	56.83	36.52	---	---	---	28.65	---	---	---	27.76
16.50	11.58	56.81	36.46	---	---	---	27.64	---	---	---	27.28
16.60	11.32	56.79	36.41	---	---	---	26.72	---	---	---	26.72
16.70	11.07	56.78	36.35	---	---	---	25.97	---	---	---	25.97
16.80	10.84	56.76	36.30	---	---	---	25.25	---	---	---	25.25
16.90	10.61	56.74	36.25	---	---	---	24.55	---	---	---	24.55
17.00	10.40	56.73	36.20	---	---	---	23.88	---	---	---	23.88
17.10	10.20	56.71	36.15	---	---	---	23.22	---	---	---	23.22
17.20	10.00	56.70	36.10	---	---	---	22.59	---	---	---	22.59
17.30	9.82	56.69	36.06	---	---	---	21.98	---	---	---	21.98
17.40	9.65	56.67	36.02	---	---	---	21.39	---	---	---	21.39
17.50	9.49	56.66	35.98	---	---	---	20.82	---	---	---	20.82
17.60	9.34	56.65	35.93	---	---	---	20.27	---	---	---	20.27
17.70	9.20	56.63	35.90	---	---	---	19.75	---	---	---	19.75
17.80	9.06	56.62	35.86	---	---	---	19.23	---	---	---	19.23
17.90	8.93	56.61	35.82	---	---	---	18.74	---	---	---	18.74
18.00	8.81	56.60	35.79	---	---	---	18.27	---	---	---	18.27
18.10	8.69	56.59	35.75	---	---	---	17.81	---	---	---	17.81
18.20	8.58	56.58	35.72	---	---	---	17.37	---	---	---	17.37
18.30	8.47	56.57	35.69	---	---	---	16.94	---	---	---	16.94
18.40	8.36	56.56	35.66	---	---	---	16.53	---	---	---	16.53
18.50	8.26	56.55	35.63	---	---	---	16.14	---	---	---	16.14
18.60	8.16	56.54	35.60	---	---	---	15.75	---	---	---	15.75
18.70	8.06	56.53	35.58	---	---	---	15.39	---	---	---	15.39
18.80	7.96	56.53	35.55	---	---	---	15.03	---	---	---	15.03
18.90	7.87	56.52	35.53	---	---	---	14.69	---	---	---	14.69
19.00	7.77	56.51	35.50	---	---	---	14.36	---	---	---	14.36
19.10	7.67	56.50	35.48	---	---	---	14.04	---	---	---	14.04
19.20	7.57	56.50	35.45	---	---	---	13.73	---	---	---	13.73
19.30	7.47	56.49	35.43	---	---	---	13.43	---	---	---	13.43
19.40	7.38	56.48	35.41	---	---	---	13.14	---	---	---	13.14
19.50	7.28	56.48	35.39	---	---	---	12.86	---	---	---	12.86
19.60	7.18	56.47	35.37	---	---	---	12.59	---	---	---	12.59
19.70	7.08	56.46	35.35	---	---	---	12.33	---	---	---	12.33

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	Outflow cfs
19.80	6.98	56.46	35.33	---	---	---	12.07	---	---	---	12.07
19.90	6.88	56.45	35.32	---	---	---	11.83	---	---	---	11.83
20.00	6.78	56.45	35.30	---	---	---	11.59	---	---	---	11.59
20.10	6.68	56.44	35.28	---	---	---	11.35	---	---	---	11.35
20.20	6.58	56.44	35.26	---	---	---	11.12	---	---	---	11.12
20.30	6.48	56.43	35.25	---	---	---	10.90	---	---	---	10.90
20.40	6.38	56.43	35.23	---	---	---	10.69	---	---	---	10.69
20.50	6.29	56.42	35.22	---	---	---	10.48	---	---	---	10.48
20.60	6.20	56.42	35.20	---	---	---	10.28	---	---	---	10.28
20.70	6.11	56.41	35.19	---	---	---	10.08	---	---	---	10.08
20.80	6.02	56.41	35.17	---	---	---	9.88	---	---	---	9.88
20.90	5.94	56.40	35.16	---	---	---	9.70	---	---	---	9.70
21.00	5.87	56.40	35.15	---	---	---	9.52	---	---	---	9.52
21.10	5.80	56.40	35.13	---	---	---	9.42	---	---	---	9.42
21.20	5.73	56.39	35.12	---	---	---	9.33	---	---	---	9.33
21.30	5.67	56.39	35.10	---	---	---	9.23	---	---	---	9.23
21.40	5.62	56.38	35.09	---	---	---	9.13	---	---	---	9.13
21.50	5.57	56.38	35.08	---	---	---	9.04	---	---	---	9.04
21.60	5.52	56.38	35.07	---	---	---	8.95	---	---	---	8.95
21.70	5.48	56.37	35.05	---	---	---	8.86	---	---	---	8.86
21.80	5.44	56.37	35.04	---	---	---	8.77	---	---	---	8.77
21.90	5.41	56.36	35.03	---	---	---	8.68	---	---	---	8.68
22.00	5.38	56.36	35.02	---	---	---	8.59	---	---	---	8.59
22.10	5.35	56.36	35.00	---	---	---	8.50	---	---	---	8.50
22.20	5.32	56.35	34.99	---	---	---	8.42	---	---	---	8.42
22.30	5.30	56.35	34.98	---	---	---	8.34	---	---	---	8.34
22.40	5.27	56.35	34.97	---	---	---	8.26	---	---	---	8.26
22.50	5.25	56.34	34.96	---	---	---	8.18	---	---	---	8.18
22.60	5.23	56.34	34.95	---	---	---	8.10	---	---	---	8.10
22.70	5.21	56.34	34.94	---	---	---	8.02	---	---	---	8.02
22.80	5.19	56.33	34.93	---	---	---	7.95	---	---	---	7.95
22.90	5.17	56.33	34.92	---	---	---	7.87	---	---	---	7.87
23.00	5.16	56.33	34.91	---	---	---	7.80	---	---	---	7.80
23.10	5.14	56.32	34.90	---	---	---	7.73	---	---	---	7.73
23.20	5.12	56.32	34.89	---	---	---	7.66	---	---	---	7.66
23.30	5.10	56.32	34.88	---	---	---	7.59	---	---	---	7.59
23.40	5.08	56.32	34.87	---	---	---	7.53	---	---	---	7.53
23.50	5.06	56.31	34.86	---	---	---	7.46	---	---	---	7.46
23.60	5.04	56.31	34.85	---	---	---	7.40	---	---	---	7.40
23.70	5.02	56.31	34.84	---	---	---	7.33	---	---	---	7.33
23.80	5.00	56.31	34.83	---	---	---	7.27	---	---	---	7.27
23.90	4.98	56.30	34.82	---	---	---	7.21	---	---	---	7.21
24.00	4.96	56.30	34.82	---	---	---	7.15	---	---	---	7.15
24.10	4.91	56.30	34.81	---	---	---	7.09	---	---	---	7.09
24.20	4.84	56.30	34.80	---	---	---	7.03	---	---	---	7.03
24.30	4.73	56.29	34.79	---	---	---	6.97	---	---	---	6.97
24.40	4.59	56.29	34.78	---	---	---	6.91	---	---	---	6.91
24.50	4.43	56.29	34.77	---	---	---	6.85	---	---	---	6.85
24.60	4.23	56.28	34.76	---	---	---	6.78	---	---	---	6.78

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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	Outflow cfs
24.70	4.01	56.28	34.75	----	----	----	6.71	----	----	----	6.71
24.80	3.76	56.28	34.74	----	----	----	6.64	----	----	----	6.64
24.90	3.48	56.28	34.73	----	----	----	6.56	----	----	----	6.56
25.00	3.17	56.27	34.72	----	----	----	6.47	----	----	----	6.47
25.10	2.83	56.27	34.71	----	----	----	6.38	----	----	----	6.38
25.20	2.51	56.26	34.69	----	----	----	6.28	----	----	----	6.28
25.30	2.21	56.26	34.68	----	----	----	6.17	----	----	----	6.17
25.40	1.93	56.25	34.66	----	----	----	6.07	----	----	----	6.07
25.50	1.67	56.25	34.65	----	----	----	5.95	----	----	----	5.95
25.60	1.43	56.24	34.63	----	----	----	5.83	----	----	----	5.83
25.70	1.21	56.24	34.62	----	----	----	5.71	----	----	----	5.71
25.80	1.01	56.23	34.60	----	----	----	5.59	----	----	----	5.59
25.90	0.82	56.23	34.58	----	----	----	5.47	----	----	----	5.47
26.00	0.66	56.22	34.56	----	----	----	5.34	----	----	----	5.34
26.10	0.51	56.22	34.55	----	----	----	5.22	----	----	----	5.22
26.20	0.38	56.21	34.53	----	----	----	5.09	----	----	----	5.09
26.30	0.27	56.21	34.51	----	----	----	4.96	----	----	----	4.96
26.40	0.18	56.20	34.49	----	----	----	4.84	----	----	----	4.84
26.50	0.11	56.20	34.48	----	----	----	4.71	----	----	----	4.71
26.60	0.05	56.19	34.46	----	----	----	4.59	----	----	----	4.59
26.70	0.02	56.19	34.44	----	----	----	4.47	----	----	----	4.47
26.80	0.00	56.18	34.43	----	----	----	4.35	----	----	----	4.35
26.90	0.00	56.18	34.41	----	----	----	4.23	----	----	----	4.23
27.00	0.00	56.17	34.39	----	----	----	4.12	----	----	----	4.12
27.10	0.00	56.17	34.38	----	----	----	4.01	----	----	----	4.01
27.20	0.00	56.16	34.36	----	----	----	3.90	----	----	----	3.90
27.30	0.00	56.16	34.35	----	----	----	3.80	----	----	----	3.80
27.40	0.00	56.16	34.33	----	----	----	3.70	----	----	----	3.70
27.50	0.00	56.15	34.32	----	----	----	3.60	----	----	----	3.60
27.60	0.00	56.15	34.31	----	----	----	3.50	----	----	----	3.50
27.70	0.00	56.14	34.29	----	----	----	3.41	----	----	----	3.41
27.80	0.00	56.14	34.28	----	----	----	3.32	----	----	----	3.32
27.90	0.00	56.14	34.27	----	----	----	3.23	----	----	----	3.23
28.00	0.00	56.13	34.26	----	----	----	3.15	----	----	----	3.15
28.10	0.00	56.13	34.25	----	----	----	3.06	----	----	----	3.06
28.20	0.00	56.13	34.24	----	----	----	2.98	----	----	----	2.98
28.30	0.00	56.12	34.22	----	----	----	2.90	----	----	----	2.90
28.40	0.00	56.12	34.21	----	----	----	2.82	----	----	----	2.82
28.50	0.00	56.12	34.20	----	----	----	2.75	----	----	----	2.75
28.60	0.00	56.11	34.19	----	----	----	2.68	----	----	----	2.68
28.70	0.00	56.11	34.18	----	----	----	2.61	----	----	----	2.61
28.80	0.00	56.11	34.17	----	----	----	2.54	----	----	----	2.54
28.90	0.00	56.10	34.16	----	----	----	2.47	----	----	----	2.47
29.00	0.00	56.10	34.15	----	----	----	2.40	----	----	----	2.40
29.10	0.00	56.10	34.15	----	----	----	2.34	----	----	----	2.34
29.20	0.00	56.10	34.14	----	----	----	2.28	----	----	----	2.28
29.30	0.00	56.09	34.13	----	----	----	2.22	----	----	----	2.22
29.40	0.00	56.09	34.12	----	----	----	2.16	----	----	----	2.16
29.50	0.00	56.09	34.11	----	----	----	2.10	----	----	----	2.10

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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	Outflow cfs
29.60	0.00	56.09	34.10	---	---	---	2.04	---	---	---	2.04
29.70	0.00	56.08	34.10	---	---	---	1.99	---	---	---	1.99
29.80	0.00	56.08	34.09	---	---	---	1.94	---	---	---	1.94
29.90	0.00	56.08	34.08	---	---	---	1.88	---	---	---	1.88
30.00	0.00	56.08	34.08	---	---	---	1.83	---	---	---	1.83
30.10	0.00	56.07	34.07	---	---	---	1.79	---	---	---	1.79
30.20	0.00	56.07	34.06	---	---	---	1.74	---	---	---	1.74
30.30	0.00	56.07	34.06	---	---	---	1.69	---	---	---	1.69
30.40	0.00	56.07	34.05	---	---	---	1.65	---	---	---	1.65
30.50	0.00	56.07	34.04	---	---	---	1.60	---	---	---	1.60
30.60	0.00	56.07	34.04	---	---	---	1.56	---	---	---	1.56
30.70	0.00	56.06	34.03	---	---	---	1.52	---	---	---	1.52
30.80	0.00	56.06	34.03	---	---	---	1.48	---	---	---	1.48
30.90	0.00	56.06	34.02	---	---	---	1.44	---	---	---	1.44
31.00	0.00	56.06	34.02	---	---	---	1.40	---	---	---	1.40
31.10	0.00	56.06	34.01	---	---	---	1.36	---	---	---	1.36
31.20	0.00	56.06	34.00	---	---	---	1.33	---	---	---	1.33
31.30	0.00	56.05	34.00	---	---	---	1.29	---	---	---	1.29
31.40	0.00	56.05	34.00	---	---	---	1.26	---	---	---	1.26
31.50	0.00	56.05	33.99	---	---	---	1.22	---	---	---	1.22
31.60	0.00	56.05	33.99	---	---	---	1.19	---	---	---	1.19
31.70	0.00	56.05	33.98	---	---	---	1.16	---	---	---	1.16
31.80	0.00	56.05	33.98	---	---	---	1.13	---	---	---	1.13
31.90	0.00	56.05	33.97	---	---	---	1.10	---	---	---	1.10
32.00	0.00	56.04	33.97	---	---	---	1.07	---	---	---	1.07
32.10	0.00	56.04	33.97	---	---	---	1.04	---	---	---	1.04
32.20	0.00	56.04	33.96	---	---	---	1.01	---	---	---	1.01
32.30	0.00	56.04	33.96	---	---	---	0.99	---	---	---	0.99
32.40	0.00	56.04	33.95	---	---	---	0.96	---	---	---	0.96
32.50	0.00	56.04	33.95	---	---	---	0.93	---	---	---	0.93
32.60	0.00	56.04	33.95	---	---	---	0.91	---	---	---	0.91
32.70	0.00	56.04	33.94	---	---	---	0.89	---	---	---	0.89
32.80	0.00	56.04	33.94	---	---	---	0.86	---	---	---	0.86
32.90	0.00	56.04	33.94	---	---	---	0.84	---	---	---	0.84
33.00	0.00	56.03	33.93	---	---	---	0.82	---	---	---	0.82
33.10	0.00	56.03	33.93	---	---	---	0.80	---	---	---	0.80
33.20	0.00	56.03	33.93	---	---	---	0.77	---	---	---	0.77
33.30	0.00	56.03	33.92	---	---	---	0.75	---	---	---	0.75
33.40	0.00	56.03	33.92	---	---	---	0.73	---	---	---	0.73
33.50	0.00	56.03	33.92	---	---	---	0.71	---	---	---	0.71
33.60	0.00	56.03	33.92	---	---	---	0.69	---	---	---	0.70
33.70	0.00	56.03	33.91	---	---	---	0.68	---	---	---	0.68
33.80	0.00	56.03	33.91	---	---	---	0.66	---	---	---	0.66
33.90	0.00	56.03	33.91	---	---	---	0.64	---	---	---	0.64
34.00	0.00	56.03	33.91	---	---	---	0.62	---	---	---	0.62
34.10	0.00	56.03	33.90	---	---	---	0.61	---	---	---	0.61
34.20	0.00	56.02	33.90	---	---	---	0.59	---	---	---	0.59
34.30	0.00	56.02	33.90	---	---	---	0.58	---	---	---	0.58
34.40	0.00	56.02	33.90	---	---	---	0.56	---	---	---	0.56

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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	Outflow cfs
34.50	0.00	56.02	33.90	----	----	----	0.55	----	----	----	0.55
34.60	0.00	56.02	33.89	----	----	----	0.53	----	----	----	0.53
34.70	0.00	56.02	33.89	----	----	----	0.52	----	----	----	0.52
34.80	0.00	56.02	33.89	----	----	----	0.50	----	----	----	0.50
34.90	0.00	56.02	33.89	----	----	----	0.49	----	----	----	0.49
35.00	0.00	56.02	33.89	----	----	----	0.48	----	----	----	0.48
35.10	0.00	56.02	33.88	----	----	----	0.46	----	----	----	0.46
35.20	0.00	56.02	33.88	----	----	----	0.45	----	----	----	0.45
35.30	0.00	56.02	33.88	----	----	----	0.44	----	----	----	0.44
35.40	0.00	56.02	33.88	----	----	----	0.43	----	----	----	0.43
35.50	0.00	56.02	33.88	----	----	----	0.42	----	----	----	0.42
35.60	0.00	56.02	33.88	----	----	----	0.41	----	----	----	0.41
35.70	0.00	56.02	33.88	----	----	----	0.39	----	----	----	0.39
35.80	0.00	56.02	33.87	----	----	----	0.38	----	----	----	0.38
35.90	0.00	56.02	33.87	----	----	----	0.37	----	----	----	0.37

...End

Hydrograph Report

Hyd. No. 5

10 YR POST DEVELOPMENT

Hydrograph type	= SCS Runoff	Peak discharge	= 189.73 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 154.80 ac	Curve number	= 80
Basin Slope	= 0.7 %	Hydraulic length	= 3550 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.8 min
Total precip.	= 5.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 1,901,258 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)						
9.00	2.08	12.20	83.82	15.40	29.03	18.60	14.91
9.10	2.31	12.30	100.11	15.50	28.04	18.70	14.72
9.20	2.55	12.40	116.58	15.60	27.14	18.80	14.54
9.30	2.80	12.50	133.07	15.70	26.32	18.90	14.36
9.40	3.06	12.60	149.47	15.80	25.56	19.00	14.17
9.50	3.34	12.70	165.12	15.90	24.85	19.10	13.99
9.60	3.62	12.80	178.74	16.00	24.19	19.20	13.81
9.70	3.92	12.90	188.41	16.10	23.56	19.30	13.62
9.80	4.23	13.00	189.73 <<	16.20	22.97	19.40	13.44
9.90	4.55	13.10	184.81	16.30	22.41	19.50	13.25
10.00	4.89	13.20	178.86	16.40	21.87	19.60	13.07
10.10	5.24	13.30	172.02	16.50	21.36	19.70	12.88
10.20	5.62	13.40	164.45	16.60	20.88	19.80	12.70
10.30	6.02	13.50	156.28	16.70	20.41	19.90	12.51
10.40	6.45	13.60	147.69	16.80	19.97	20.00	12.33
10.50	6.91	13.70	138.77	16.90	19.54	20.10	12.14
10.60	7.42	13.80	129.56	17.00	19.14	20.20	11.96
10.70	7.98	13.90	120.08	17.10	18.75	20.30	11.77
10.80	8.60	14.00	110.38	17.20	18.39	20.40	11.60
10.90	9.29	14.10	100.51	17.30	18.05	20.50	11.42
11.00	10.05	14.20	90.51	17.40	17.73	20.60	11.25
11.10	10.87	14.30	80.43	17.50	17.42	20.70	11.09
11.20	11.80	14.40	70.30	17.60	17.13	20.80	10.93
11.30	12.86	14.50	60.38	17.70	16.86	20.90	10.78
11.40	14.08	14.60	51.17	17.80	16.60	21.00	10.64
11.50	15.49	14.70	43.40	17.90	16.36	21.10	10.51
11.60	17.46	14.80	38.75	18.00	16.13	21.20	10.39
11.70	20.76	14.90	36.42	18.10	15.90	21.30	10.28
11.80	26.56	15.00	34.43	18.20	15.69	21.40	10.18
11.90	37.56	15.10	32.76	18.30	15.49	21.50	10.09
12.00	52.41	15.20	31.34	18.40	15.29	21.60	10.00
12.10	67.86	15.30	30.12	18.50	15.10	21.70	9.93

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Hydrograph Discharge Table**Time -- Outflow
(hrs cfs)**

21.80	9.86
21.90	9.79
22.00	9.73
22.10	9.68
22.20	9.63
22.30	9.58
22.40	9.54
22.50	9.50
22.60	9.46
22.70	9.42
22.80	9.38
22.90	9.35
23.00	9.31
23.10	9.27
23.20	9.24
23.30	9.20
23.40	9.17
23.50	9.13
23.60	9.09
23.70	9.06
23.80	9.02
23.90	8.98
24.00	8.95
24.10	8.86
24.20	8.72
24.30	8.52
24.40	8.27
24.50	7.97
24.60	7.62
24.70	7.22
24.80	6.76
24.90	6.26
25.00	5.70
25.10	5.10
25.20	4.52
25.30	3.98
25.40	3.48
25.50	3.01
25.60	2.58
25.70	2.18

...End

Hydrograph Report

Hyd. No. 6

10 YR POST ROUTED

Hydrograph type = Reservoir
 Storm frequency = 10 yrs
 Inflow hyd. No. = 5
 Max. Elevation = 59.04 ft

Peak discharge = 42.89 cfs
 Time interval = 6 min
 Reservoir name = WET POND
 Max. Storage = 968,463 cuft

Storage Indication method used.

Total Volume = 1,901,255 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	Outflow cfs
9.20	2.55	56.02	33.88	---	---	---	0.44	---	---	---	0.44
9.30	2.80	56.02	33.89	---	---	---	0.50	---	---	---	0.50
9.40	3.06	56.02	33.90	---	---	---	0.57	---	---	---	0.57
9.50	3.34	56.03	33.91	---	---	---	0.64	---	---	---	0.64
9.60	3.62	56.03	33.92	---	---	---	0.71	---	---	---	0.71
9.70	3.92	56.03	33.93	---	---	---	0.79	---	---	---	0.79
9.80	4.23	56.04	33.94	---	---	---	0.88	---	---	---	0.88
9.90	4.55	56.04	33.96	---	---	---	0.97	---	---	---	0.97
10.00	4.89	56.05	33.97	---	---	---	1.07	---	---	---	1.07
10.10	5.24	56.05	33.98	---	---	---	1.18	---	---	---	1.18
10.20	5.62	56.05	34.00	---	---	---	1.29	---	---	---	1.29
10.30	6.02	56.06	34.02	---	---	---	1.41	---	---	---	1.41
10.40	6.45	56.06	34.03	---	---	---	1.54	---	---	---	1.54
10.50	6.91	56.07	34.05	---	---	---	1.68	---	---	---	1.68
10.60	7.42	56.08	34.07	---	---	---	1.82	---	---	---	1.82
10.70	7.98	56.08	34.10	---	---	---	1.98	---	---	---	1.98
10.80	8.60	56.09	34.12	---	---	---	2.15	---	---	---	2.15
10.90	9.29	56.10	34.14	---	---	---	2.33	---	---	---	2.33
11.00	10.05	56.11	34.17	---	---	---	2.53	---	---	---	2.53
11.10	10.87	56.11	34.20	---	---	---	2.74	---	---	---	2.74
11.20	11.80	56.12	34.23	---	---	---	2.96	---	---	---	2.96
11.30	12.86	56.13	34.27	---	---	---	3.21	---	---	---	3.21
11.40	14.08	56.15	34.31	---	---	---	3.49	---	---	---	3.49
11.50	15.49	56.16	34.35	---	---	---	3.79	---	---	---	3.79
11.60	17.46	56.17	34.39	---	---	---	4.13	---	---	---	4.13
11.70	20.76	56.19	34.45	---	---	---	4.52	---	---	---	4.52
11.80	26.56	56.21	34.52	---	---	---	5.03	---	---	---	5.03
11.90	37.56	56.24	34.62	---	---	---	5.75	---	---	---	5.75
12.00	52.41	56.29	34.77	---	---	---	6.80	---	---	---	6.80
12.10	67.86	56.34	34.96	---	---	---	8.21	---	---	---	8.21
12.20	83.82	56.42	35.21	---	---	---	10.40	---	---	---	10.40
12.30	100.11	56.51	35.50	---	---	---	14.33	---	---	---	14.33
12.40	116.58	56.61	35.83	---	---	---	18.85	---	---	---	18.85
12.50	133.07	56.73	36.20	---	---	---	23.95	---	---	---	23.95
12.60	149.47	56.86	36.61	---	---	---	30.40	---	---	---	28.59
12.70	165.12	57.00	37.06	---	---	---	38.50	---	---	---	32.43

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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	Outflow cfs
12.80	178.74	57.16	37.54	---	---	---	47.27	---	---	---	36.59
12.90	188.41	57.33	38.04	---	---	---	57.91	---	---	---	38.04
13.00	189.73 <<	57.50	38.55	---	---	---	69.31	---	---	---	38.55
13.10	184.81	57.66	39.04	---	---	---	81.11	---	---	---	39.04
13.20	178.86	57.83	39.51	---	---	---	93.34	---	---	---	39.51
13.30	172.02	57.98	39.96	---	---	---	104.97	---	---	---	39.96
13.40	164.45	58.12	40.37	---	---	---	116.95	---	---	---	40.37
13.50	156.28	58.26	40.75	---	---	---	128.31	---	---	---	40.75
13.60	147.69	58.38	41.10	---	---	---	138.84	---	---	---	41.10
13.70	138.77	58.50	41.42	---	---	---	149.24	---	---	---	41.42
13.80	129.56	58.61	41.71	---	---	---	158.79	---	---	---	41.71
13.90	120.08	58.70	41.96	---	---	---	167.34	---	---	---	41.96
14.00	110.38	58.78	42.19	---	---	---	174.88	---	---	---	42.19
14.10	100.51	58.85	42.38	---	---	---	181.75	---	---	---	42.38
14.20	90.51	58.91	42.54	---	---	---	187.63	---	---	---	42.54
14.30	80.43	58.96	42.67	---	---	---	192.37	---	---	---	42.67
14.40	70.30	59.00	42.77	---	---	---	195.99	---	---	---	42.77
14.50	60.38	59.02	42.84	---	---	---	198.48	---	---	---	42.84
14.60	51.17	59.04	42.88	---	---	---	199.91	---	---	---	42.88
14.70	43.40	59.04 <<	42.89	---	---	---	200.40	---	---	---	42.89 <<
14.80	38.75	59.04	42.89	---	---	---	200.20	---	---	---	42.89
14.90	36.42	59.04	42.87	---	---	---	199.61	---	---	---	42.87
15.00	34.43	59.03	42.85	---	---	---	198.79	---	---	---	42.85
15.10	32.76	59.02	42.82	---	---	---	197.77	---	---	---	42.82
15.20	31.34	59.00	42.79	---	---	---	196.58	---	---	---	42.79
15.30	30.12	58.99	42.75	---	---	---	195.24	---	---	---	42.75
15.40	29.03	58.98	42.71	---	---	---	193.79	---	---	---	42.71
15.50	28.04	58.96	42.67	---	---	---	192.22	---	---	---	42.67
15.60	27.14	58.94	42.62	---	---	---	190.55	---	---	---	42.62
15.70	26.32	58.93	42.58	---	---	---	188.79	---	---	---	42.58
15.80	25.56	58.91	42.53	---	---	---	186.95	---	---	---	42.53
15.90	24.85	58.89	42.47	---	---	---	185.04	---	---	---	42.47
16.00	24.19	58.87	42.42	---	---	---	183.05	---	---	---	42.42
16.10	23.56	58.85	42.36	---	---	---	181.00	---	---	---	42.36
16.20	22.97	58.82	42.31	---	---	---	178.89	---	---	---	42.31
16.30	22.41	58.80	42.25	---	---	---	176.72	---	---	---	42.25
16.40	21.87	58.78	42.18	---	---	---	174.64	---	---	---	42.18
16.50	21.36	58.76	42.12	---	---	---	172.52	---	---	---	42.12
16.60	20.88	58.73	42.06	---	---	---	170.36	---	---	---	42.06
16.70	20.41	58.71	41.99	---	---	---	168.16	---	---	---	41.99
16.80	19.97	58.68	41.92	---	---	---	165.91	---	---	---	41.92
16.90	19.54	58.66	41.85	---	---	---	163.63	---	---	---	41.85
17.00	19.14	58.63	41.78	---	---	---	161.32	---	---	---	41.78
17.10	18.75	58.61	41.71	---	---	---	158.97	---	---	---	41.71
17.20	18.39	58.58	41.64	---	---	---	156.58	---	---	---	41.64
17.30	18.05	58.55	41.57	---	---	---	154.17	---	---	---	41.57
17.40	17.73	58.53	41.49	---	---	---	151.74	---	---	---	41.49
17.50	17.42	58.50	41.42	---	---	---	149.27	---	---	---	41.42
17.60	17.13	58.47	41.35	---	---	---	146.79	---	---	---	41.35

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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	Outflow cfs
17.70	16.86	58.45	41.27	----	----	----	144.28	----	----	----	41.27
17.80	16.60	58.42	41.19	----	----	----	141.76	----	----	----	41.19
17.90	16.36	58.39	41.12	----	----	----	139.28	----	----	----	41.12
18.00	16.13	58.36	41.04	----	----	----	136.93	----	----	----	41.04
18.10	15.90	58.33	40.96	----	----	----	134.56	----	----	----	40.96
18.20	15.69	58.31	40.88	----	----	----	132.18	----	----	----	40.88
18.30	15.49	58.28	40.80	----	----	----	129.79	----	----	----	40.80
18.40	15.29	58.25	40.72	----	----	----	127.38	----	----	----	40.72
18.50	15.10	58.22	40.63	----	----	----	124.96	----	----	----	40.63
18.60	14.91	58.19	40.55	----	----	----	122.54	----	----	----	40.55
18.70	14.72	58.16	40.47	----	----	----	120.10	----	----	----	40.47
18.80	14.54	58.13	40.39	----	----	----	117.65	----	----	----	40.39
18.90	14.36	58.10	40.31	----	----	----	115.20	----	----	----	40.31
19.00	14.17	58.07	40.22	----	----	----	112.73	----	----	----	40.22
19.10	13.99	58.04	40.14	----	----	----	110.26	----	----	----	40.14
19.20	13.81	58.01	40.06	----	----	----	107.77	----	----	----	40.06
19.30	13.62	57.98	39.97	----	----	----	105.40	----	----	----	39.97
19.40	13.44	57.95	39.89	----	----	----	103.14	----	----	----	39.89
19.50	13.25	57.92	39.80	----	----	----	100.87	----	----	----	39.80
19.60	13.07	57.89	39.71	----	----	----	98.59	----	----	----	39.71
19.70	12.88	57.86	39.62	----	----	----	96.30	----	----	----	39.62
19.80	12.70	57.83	39.54	----	----	----	94.00	----	----	----	39.54
19.90	12.51	57.80	39.45	----	----	----	91.70	----	----	----	39.45
20.00	12.33	57.77	39.36	----	----	----	89.38	----	----	----	39.36
20.10	12.14	57.74	39.27	----	----	----	87.06	----	----	----	39.27
20.20	11.96	57.71	39.18	----	----	----	84.73	----	----	----	39.18
20.30	11.77	57.68	39.09	----	----	----	82.39	----	----	----	39.09
20.40	11.60	57.65	39.00	----	----	----	80.05	----	----	----	39.00
20.50	11.42	57.62	38.91	----	----	----	77.69	----	----	----	38.91
20.60	11.25	57.59	38.82	----	----	----	75.44	----	----	----	38.82
20.70	11.09	57.56	38.73	----	----	----	73.35	----	----	----	38.73
20.80	10.93	57.53	38.63	----	----	----	71.26	----	----	----	38.63
20.90	10.78	57.49	38.54	----	----	----	69.17	----	----	----	38.54
21.00	10.64	57.46	38.44	----	----	----	67.07	----	----	----	38.44
21.10	10.51	57.43	38.35	----	----	----	64.96	----	----	----	38.35
21.20	10.39	57.40	38.26	----	----	----	62.86	----	----	----	38.26
21.30	10.28	57.37	38.16	----	----	----	60.75	----	----	----	38.16
21.40	10.18	57.34	38.07	----	----	----	58.64	----	----	----	38.07
21.50	10.09	57.30	37.97	----	----	----	56.53	----	----	----	37.97
21.60	10.00	57.27	37.88	----	----	----	54.43	----	----	----	37.88
21.70	9.93	57.24	37.79	----	----	----	52.32	----	----	----	37.79
21.80	9.86	57.21	37.69	----	----	----	50.21	----	----	----	37.69
21.90	9.79	57.18	37.60	----	----	----	48.35	----	----	----	37.10
22.00	9.73	57.15	37.50	----	----	----	46.63	----	----	----	36.28
22.10	9.68	57.12	37.41	----	----	----	44.96	----	----	----	35.49
22.20	9.63	57.09	37.32	----	----	----	43.33	----	----	----	34.72
22.30	9.58	57.06	37.23	----	----	----	41.75	----	----	----	33.97
22.40	9.54	57.03	37.15	----	----	----	40.22	----	----	----	33.24
22.50	9.50	57.01	37.07	----	----	----	38.72	----	----	----	32.54

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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	Outflow cfs
22.60	9.46	56.98	36.99	---	---	---	37.27	---	---	---	31.85
22.70	9.42	56.96	36.91	---	---	---	35.86	---	---	---	31.18
22.80	9.38	56.93	36.84	---	---	---	34.49	---	---	---	30.53
22.90	9.35	56.91	36.76	---	---	---	33.16	---	---	---	29.90
23.00	9.31	56.89	36.69	---	---	---	31.87	---	---	---	29.29
23.10	9.27	56.86	36.63	---	---	---	30.61	---	---	---	28.69
23.20	9.24	56.84	36.56	---	---	---	29.39	---	---	---	28.11
23.30	9.20	56.82	36.49	---	---	---	28.20	---	---	---	27.55
23.40	9.17	56.80	36.43	---	---	---	27.05	---	---	---	27.00
23.50	9.13	56.78	36.37	---	---	---	26.17	---	---	---	26.17
23.60	9.09	56.76	36.31	---	---	---	25.35	---	---	---	25.35
23.70	9.06	56.74	36.25	---	---	---	24.56	---	---	---	24.56
23.80	9.02	56.73	36.19	---	---	---	23.82	---	---	---	23.82
23.90	8.98	56.71	36.14	---	---	---	23.10	---	---	---	23.10
24.00	8.95	56.70	36.09	---	---	---	22.42	---	---	---	22.42
24.10	8.86	56.68	36.04	---	---	---	21.77	---	---	---	21.77
24.20	8.72	56.67	36.00	---	---	---	21.15	---	---	---	21.15
24.30	8.52	56.65	35.95	---	---	---	20.55	---	---	---	20.55
24.40	8.27	56.64	35.91	---	---	---	19.96	---	---	---	19.96
24.50	7.97	56.63	35.87	---	---	---	19.39	---	---	---	19.39
24.60	7.62	56.61	35.83	---	---	---	18.83	---	---	---	18.83
24.70	7.22	56.60	35.79	---	---	---	18.28	---	---	---	18.28
24.80	6.76	56.59	35.75	---	---	---	17.74	---	---	---	17.74
24.90	6.26	56.58	35.71	---	---	---	17.20	---	---	---	17.20
25.00	5.70	56.56	35.67	---	---	---	16.66	---	---	---	16.66
25.10	5.10	56.55	35.63	---	---	---	16.12	---	---	---	16.12
25.20	4.52	56.54	35.59	---	---	---	15.57	---	---	---	15.58
25.30	3.98	56.53	35.55	---	---	---	15.03	---	---	---	15.03
25.40	3.48	56.51	35.51	---	---	---	14.49	---	---	---	14.49
25.50	3.01	56.50	35.47	---	---	---	13.95	---	---	---	13.95
25.60	2.58	56.49	35.43	---	---	---	13.41	---	---	---	13.41
25.70	2.18	56.48	35.39	---	---	---	12.88	---	---	---	12.88
25.80	1.81	56.46	35.35	---	---	---	12.36	---	---	---	12.36
25.90	1.48	56.45	35.32	---	---	---	11.84	---	---	---	11.84
26.00	1.18	56.44	35.28	---	---	---	11.33	---	---	---	11.33
26.10	0.92	56.43	35.24	---	---	---	10.84	---	---	---	10.84
26.20	0.69	56.42	35.21	---	---	---	10.36	---	---	---	10.36
26.30	0.49	56.41	35.17	---	---	---	9.89	---	---	---	9.89
26.40	0.33	56.40	35.14	---	---	---	9.48	---	---	---	9.48
26.50	0.20	56.39	35.10	---	---	---	9.23	---	---	---	9.23
26.60	0.10	56.38	35.07	---	---	---	8.99	---	---	---	8.99
26.70	0.03	56.37	35.04	---	---	---	8.75	---	---	---	8.75
26.80	0.00	56.36	35.01	---	---	---	8.52	---	---	---	8.52
26.90	0.00	56.35	34.97	---	---	---	8.29	---	---	---	8.29
27.00	0.00	56.34	34.94	---	---	---	8.07	---	---	---	8.07
27.10	0.00	56.33	34.91	---	---	---	7.86	---	---	---	7.86
27.20	0.00	56.32	34.88	---	---	---	7.65	---	---	---	7.65
27.30	0.00	56.31	34.86	---	---	---	7.44	---	---	---	7.45
27.40	0.00	56.30	34.83	---	---	---	7.25	---	---	---	7.25

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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	Outflow cfs
27.50	0.00	56.30	34.80	---	---	---	7.05	---	---	---	7.05
27.60	0.00	56.29	34.78	---	---	---	6.87	---	---	---	6.87
27.70	0.00	56.28	34.75	---	---	---	6.68	---	---	---	6.68
27.80	0.00	56.27	34.73	---	---	---	6.51	---	---	---	6.51
27.90	0.00	56.27	34.70	---	---	---	6.33	---	---	---	6.33
28.00	0.00	56.26	34.68	---	---	---	6.16	---	---	---	6.16
28.10	0.00	56.25	34.66	---	---	---	6.00	---	---	---	6.00
28.20	0.00	56.25	34.63	---	---	---	5.84	---	---	---	5.84
28.30	0.00	56.24	34.61	---	---	---	5.69	---	---	---	5.69
28.40	0.00	56.23	34.59	---	---	---	5.53	---	---	---	5.53
28.50	0.00	56.23	34.57	---	---	---	5.39	---	---	---	5.39
28.60	0.00	56.22	34.55	---	---	---	5.24	---	---	---	5.24
28.70	0.00	56.21	34.53	---	---	---	5.10	---	---	---	5.10
28.80	0.00	56.21	34.51	---	---	---	4.97	---	---	---	4.97
28.90	0.00	56.20	34.49	---	---	---	4.84	---	---	---	4.84
29.00	0.00	56.20	34.48	---	---	---	4.71	---	---	---	4.71
29.10	0.00	56.19	34.46	---	---	---	4.58	---	---	---	4.58
29.20	0.00	56.19	34.44	---	---	---	4.46	---	---	---	4.46
29.30	0.00	56.18	34.42	---	---	---	4.34	---	---	---	4.34
29.40	0.00	56.18	34.41	---	---	---	4.23	---	---	---	4.23
29.50	0.00	56.17	34.39	---	---	---	4.11	---	---	---	4.11
29.60	0.00	56.17	34.38	---	---	---	4.00	---	---	---	4.00
29.70	0.00	56.16	34.36	---	---	---	3.90	---	---	---	3.90
29.80	0.00	56.16	34.35	---	---	---	3.79	---	---	---	3.79
29.90	0.00	56.15	34.33	---	---	---	3.69	---	---	---	3.69
30.00	0.00	56.15	34.32	---	---	---	3.59	---	---	---	3.59
30.10	0.00	56.15	34.31	---	---	---	3.50	---	---	---	3.50
30.20	0.00	56.14	34.29	---	---	---	3.41	---	---	---	3.41
30.30	0.00	56.14	34.28	---	---	---	3.32	---	---	---	3.32
30.40	0.00	56.14	34.27	---	---	---	3.23	---	---	---	3.23
30.50	0.00	56.13	34.26	---	---	---	3.14	---	---	---	3.14
30.60	0.00	56.13	34.25	---	---	---	3.06	---	---	---	3.06
30.70	0.00	56.12	34.23	---	---	---	2.98	---	---	---	2.98
30.80	0.00	56.12	34.22	---	---	---	2.90	---	---	---	2.90
30.90	0.00	56.12	34.21	---	---	---	2.82	---	---	---	2.82
31.00	0.00	56.12	34.20	---	---	---	2.75	---	---	---	2.75
31.10	0.00	56.11	34.19	---	---	---	2.67	---	---	---	2.67
31.20	0.00	56.11	34.18	---	---	---	2.60	---	---	---	2.60
31.30	0.00	56.11	34.17	---	---	---	2.53	---	---	---	2.53
31.40	0.00	56.10	34.16	---	---	---	2.46	---	---	---	2.46
31.50	0.00	56.10	34.15	---	---	---	2.40	---	---	---	2.40
31.60	0.00	56.10	34.15	---	---	---	2.34	---	---	---	2.34
31.70	0.00	56.10	34.14	---	---	---	2.27	---	---	---	2.27
31.80	0.00	56.09	34.13	---	---	---	2.21	---	---	---	2.21
31.90	0.00	56.09	34.12	---	---	---	2.15	---	---	---	2.15
32.00	0.00	56.09	34.11	---	---	---	2.10	---	---	---	2.10
32.10	0.00	56.09	34.10	---	---	---	2.04	---	---	---	2.04
32.20	0.00	56.08	34.10	---	---	---	1.99	---	---	---	1.99
32.30	0.00	56.08	34.09	---	---	---	1.93	---	---	---	1.93

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	Outflow cfs
32.40	0.00	56.08	34.08	---	---	---	1.88	---	---	---	1.88
32.50	0.00	56.08	34.08	---	---	---	1.83	---	---	---	1.83
32.60	0.00	56.07	34.07	---	---	---	1.78	---	---	---	1.78
32.70	0.00	56.07	34.06	---	---	---	1.74	---	---	---	1.74
32.80	0.00	56.07	34.06	---	---	---	1.69	---	---	---	1.69
32.90	0.00	56.07	34.05	---	---	---	1.64	---	---	---	1.64
33.00	0.00	56.07	34.04	---	---	---	1.60	---	---	---	1.60
33.10	0.00	56.07	34.04	---	---	---	1.56	---	---	---	1.56
33.20	0.00	56.06	34.03	---	---	---	1.52	---	---	---	1.52
33.30	0.00	56.06	34.03	---	---	---	1.48	---	---	---	1.48
33.40	0.00	56.06	34.02	---	---	---	1.44	---	---	---	1.44
33.50	0.00	56.06	34.01	---	---	---	1.40	---	---	---	1.40
33.60	0.00	56.06	34.01	---	---	---	1.36	---	---	---	1.36
33.70	0.00	56.06	34.00	---	---	---	1.33	---	---	---	1.33
33.80	0.00	56.05	34.00	---	---	---	1.29	---	---	---	1.29
33.90	0.00	56.05	33.99	---	---	---	1.26	---	---	---	1.26
34.00	0.00	56.05	33.99	---	---	---	1.22	---	---	---	1.22
34.10	0.00	56.05	33.99	---	---	---	1.19	---	---	---	1.19
34.20	0.00	56.05	33.98	---	---	---	1.16	---	---	---	1.16
34.30	0.00	56.05	33.98	---	---	---	1.13	---	---	---	1.13
34.40	0.00	56.05	33.97	---	---	---	1.10	---	---	---	1.10
34.50	0.00	56.04	33.97	---	---	---	1.07	---	---	---	1.07
34.60	0.00	56.04	33.96	---	---	---	1.04	---	---	---	1.04
34.70	0.00	56.04	33.96	---	---	---	1.01	---	---	---	1.01
34.80	0.00	56.04	33.96	---	---	---	0.99	---	---	---	0.99
34.90	0.00	56.04	33.95	---	---	---	0.96	---	---	---	0.96
35.00	0.00	56.04	33.95	---	---	---	0.93	---	---	---	0.93
35.10	0.00	56.04	33.95	---	---	---	0.91	---	---	---	0.91
35.20	0.00	56.04	33.94	---	---	---	0.88	---	---	---	0.88
35.30	0.00	56.04	33.94	---	---	---	0.86	---	---	---	0.86
35.40	0.00	56.04	33.94	---	---	---	0.84	---	---	---	0.84
35.50	0.00	56.03	33.93	---	---	---	0.82	---	---	---	0.82
35.60	0.00	56.03	33.93	---	---	---	0.79	---	---	---	0.79
35.70	0.00	56.03	33.93	---	---	---	0.77	---	---	---	0.77
35.80	0.00	56.03	33.92	---	---	---	0.75	---	---	---	0.75
35.90	0.00	56.03	33.92	---	---	---	0.73	---	---	---	0.73
36.00	0.00	56.03	33.92	---	---	---	0.71	---	---	---	0.71
36.10	0.00	56.03	33.92	---	---	---	0.69	---	---	---	0.69
36.20	0.00	56.03	33.91	---	---	---	0.68	---	---	---	0.68
36.30	0.00	56.03	33.91	---	---	---	0.66	---	---	---	0.66
36.40	0.00	56.03	33.91	---	---	---	0.64	---	---	---	0.64
36.50	0.00	56.03	33.91	---	---	---	0.62	---	---	---	0.62
36.60	0.00	56.03	33.90	---	---	---	0.61	---	---	---	0.61
36.70	0.00	56.02	33.90	---	---	---	0.59	---	---	---	0.59
36.80	0.00	56.02	33.90	---	---	---	0.57	---	---	---	0.57
36.90	0.00	56.02	33.90	---	---	---	0.56	---	---	---	0.56
37.00	0.00	56.02	33.90	---	---	---	0.54	---	---	---	0.54
37.10	0.00	56.02	33.89	---	---	---	0.53	---	---	---	0.53
37.20	0.00	56.02	33.89	---	---	---	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	Outflow cfs
37.30	0.00	56.02	33.89	----	----	----	0.50	----	----	----	0.50
37.40	0.00	56.02	33.89	----	----	----	0.49	----	----	----	0.49
37.50	0.00	56.02	33.89	----	----	----	0.48	----	----	----	0.48
37.60	0.00	56.02	33.88	----	----	----	0.46	----	----	----	0.46
37.70	0.00	56.02	33.88	----	----	----	0.45	----	----	----	0.45
37.80	0.00	56.02	33.88	----	----	----	0.44	----	----	----	0.44

...End

Hydrograph Report

Hyd. No. 7

25 YR POST DEVELOPMENT

Hydrograph type	= SCS Runoff	Peak discharge	= 234.90 cfs
Storm frequency	= 25 yrs	Time interval	= 6 min
Drainage area	= 154.80 ac	Curve number	= 80
Basin Slope	= 0.7 %	Hydraulic length	= 3550 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.8 min
Total precip.	= 6.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 2,352,869 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)						
8.40	2.42	11.60	23.87	14.80	46.52	18.00	19.25
8.50	2.63	11.70	28.09	14.90	43.70	18.10	18.99
8.60	2.86	11.80	35.43	15.00	41.31	18.20	18.73
8.70	3.09	11.90	49.16	15.10	39.29	18.30	18.48
8.80	3.34	12.00	67.54	15.20	37.57	18.40	18.25
8.90	3.61	12.10	86.63	15.30	36.10	18.50	18.02
9.00	3.89	12.20	106.30	15.40	34.79	18.60	17.79
9.10	4.20	12.30	126.34	15.50	33.59	18.70	17.57
9.20	4.52	12.40	146.55	15.60	32.51	18.80	17.35
9.30	4.85	12.50	166.75	15.70	31.52	18.90	17.13
9.40	5.21	12.60	186.80	15.80	30.60	19.00	16.91
9.50	5.57	12.70	205.84	15.90	29.75	19.10	16.69
9.60	5.95	12.80	222.27	16.00	28.95	19.20	16.47
9.70	6.35	12.90	233.73	16.10	28.19	19.30	16.24
9.80	6.76	13.00	234.90 <<	16.20	27.48	19.40	16.02
9.90	7.18	13.10	228.50	16.30	26.80	19.50	15.80
10.00	7.63	13.20	220.85	16.40	26.16	19.60	15.58
10.10	8.09	13.30	212.14	16.50	25.55	19.70	15.36
10.20	8.58	13.40	202.55	16.60	24.96	19.80	15.14
10.30	9.10	13.50	192.26	16.70	24.40	19.90	14.91
10.40	9.66	13.60	181.47	16.80	23.87	20.00	14.69
10.50	10.26	13.70	170.29	16.90	23.36	20.10	14.47
10.60	10.92	13.80	158.77	17.00	22.87	20.20	14.25
10.70	11.65	13.90	146.95	17.10	22.41	20.30	14.03
10.80	12.46	14.00	134.87	17.20	21.97	20.40	13.82
10.90	13.34	14.10	122.60	17.30	21.56	20.50	13.61
11.00	14.33	14.20	110.20	17.40	21.17	20.60	13.41
11.10	15.39	14.30	97.71	17.50	20.81	20.70	13.21
11.20	16.59	14.40	85.19	17.60	20.46	20.80	13.02
11.30	17.97	14.50	72.96	17.70	20.14	20.90	12.84
11.40	19.54	14.60	61.66	17.80	19.83	21.00	12.68
11.50	21.34	14.70	52.17	17.90	19.53	21.10	12.52

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Hydrograph Discharge Table**Time -- Outflow
(hrs cfs)**

21.20	12.38
21.30	12.25
21.40	12.13
21.50	12.02
21.60	11.91
21.70	11.82
21.80	11.73
21.90	11.66
22.00	11.59
22.10	11.52
22.20	11.46
22.30	11.40
22.40	11.35
22.50	11.30
22.60	11.26
22.70	11.21
22.80	11.17
22.90	11.12
23.00	11.08
23.10	11.04
23.20	10.99
23.30	10.95
23.40	10.91
23.50	10.86
23.60	10.82
23.70	10.78
23.80	10.73
23.90	10.69
24.00	10.64
24.10	10.54
24.20	10.37
24.30	10.13
24.40	9.84
24.50	9.48
24.60	9.07
24.70	8.59
24.80	8.05
24.90	7.44
25.00	6.78
25.10	6.06
25.20	5.38
25.30	4.74
25.40	4.14
25.50	3.58
25.60	3.07
25.70	2.59

...End

Hydrograph Report

Hyd. No. 8

25 YR POST ROUTED

Hydrograph type = Reservoir
 Storm frequency = 25 yrs
 Inflow hyd. No. = 7
 Max. Elevation = 59.79 ft

Peak discharge = 70.14 cfs
 Time interval = 6 min
 Reservoir name = WET POND
 Max. Storage = 1,207,154 cuft

Storage Indication method used.

Total Volume = 2,352,865 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	Outflow cfs
8.90	3.61	56.03	33.92	---	---	---	0.75	---	---	---	0.75
9.00	3.89	56.03	33.94	---	---	---	0.83	---	---	---	0.83
9.10	4.20	56.04	33.95	---	---	---	0.92	---	---	---	0.92
9.20	4.52	56.04	33.96	---	---	---	1.01	---	---	---	1.01
9.30	4.85	56.05	33.97	---	---	---	1.10	---	---	---	1.10
9.40	5.21	56.05	33.99	---	---	---	1.21	---	---	---	1.21
9.50	5.57	56.06	34.00	---	---	---	1.32	---	---	---	1.32
9.60	5.95	56.06	34.02	---	---	---	1.44	---	---	---	1.44
9.70	6.35	56.07	34.04	---	---	---	1.56	---	---	---	1.56
9.80	6.76	56.07	34.06	---	---	---	1.70	---	---	---	1.70
9.90	7.18	56.08	34.08	---	---	---	1.84	---	---	---	1.84
10.00	7.63	56.08	34.10	---	---	---	1.98	---	---	---	1.98
10.10	8.09	56.09	34.12	---	---	---	2.14	---	---	---	2.14
10.20	8.58	56.10	34.14	---	---	---	2.31	---	---	---	2.31
10.30	9.10	56.10	34.17	---	---	---	2.48	---	---	---	2.48
10.40	9.66	56.11	34.19	---	---	---	2.66	---	---	---	2.66
10.50	10.26	56.12	34.22	---	---	---	2.86	---	---	---	2.86
10.60	10.92	56.13	34.25	---	---	---	3.06	---	---	---	3.06
10.70	11.65	56.14	34.28	---	---	---	3.28	---	---	---	3.28
10.80	12.46	56.15	34.31	---	---	---	3.52	---	---	---	3.52
10.90	13.34	56.16	34.34	---	---	---	3.76	---	---	---	3.76
11.00	14.33	56.17	34.38	---	---	---	4.03	---	---	---	4.03
11.10	15.39	56.18	34.42	---	---	---	4.32	---	---	---	4.32
11.20	16.59	56.19	34.46	---	---	---	4.63	---	---	---	4.63
11.30	17.97	56.21	34.51	---	---	---	4.97	---	---	---	4.97
11.40	19.54	56.22	34.56	---	---	---	5.33	---	---	---	5.33
11.50	21.34	56.24	34.62	---	---	---	5.74	---	---	---	5.74
11.60	23.87	56.26	34.68	---	---	---	6.19	---	---	---	6.19
11.70	28.09	56.28	34.75	---	---	---	6.71	---	---	---	6.71
11.80	35.43	56.31	34.85	---	---	---	7.38	---	---	---	7.38
11.90	49.16	56.35	34.98	---	---	---	8.31	---	---	---	8.31
12.00	67.54	56.40	35.16	---	---	---	9.72	---	---	---	9.72
12.10	86.63	56.48	35.40	---	---	---	12.97	---	---	---	12.97
12.20	106.30	56.57	35.69	---	---	---	16.98	---	---	---	16.98
12.30	126.34	56.68	36.04	---	---	---	21.76	---	---	---	21.76
12.40	146.55	56.81	36.45	---	---	---	27.38	---	---	---	27.16

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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	Outflow cfs
12.50	166.75	56.95	36.89	---	---	---	35.52	---	---	---	31.02
12.60	186.80	57.11	37.40	---	---	---	44.69	---	---	---	35.36
12.70	205.84	57.29	37.94	---	---	---	55.87	---	---	---	37.94
12.80	222.27	57.49	38.54	---	---	---	69.16	---	---	---	38.54
12.90	233.73	57.71	39.17	---	---	---	84.42	---	---	---	39.17
13.00	234.90 <<	57.93	39.81	---	---	---	101.13	---	---	---	39.81
13.10	228.50	58.14	40.43	---	---	---	118.72	---	---	---	40.43
13.20	220.85	58.35	41.01	---	---	---	136.16	---	---	---	41.01
13.30	212.14	58.55	41.56	---	---	---	153.88	---	---	---	41.56
13.40	202.55	58.74	42.07	---	---	---	170.95	---	---	---	42.07
13.50	192.26	58.91	42.55	---	---	---	187.71	---	---	---	42.55
13.60	181.47	59.08	42.98	---	---	---	203.67	---	---	---	42.98
13.70	170.29	59.23	43.38	---	---	---	218.48	0.83	---	---	44.21
13.80	158.77	59.36	43.73	---	---	---	232.40	4.98	---	---	48.71
13.90	146.95	59.48	44.03	---	---	---	244.45	8.57	---	---	52.60
14.00	134.87	59.57	44.29	---	---	---	254.67	11.62	---	---	55.91
14.10	122.60	59.65	44.49	---	---	---	263.31	16.00	---	---	60.49
14.20	110.20	59.71	44.65	---	---	---	270.01	20.04	---	---	64.69
14.30	97.71	59.76	44.76	---	---	---	274.72	22.88	---	---	67.63
14.40	85.19	59.78	44.82	---	---	---	277.58	24.60	---	---	69.42
14.50	72.96	59.79 <<	44.85	---	---	---	278.74	25.30	---	---	70.14 <<
14.60	61.66	59.79	44.84	---	---	---	278.40	25.09	---	---	69.93
14.70	52.17	59.78	44.81	---	---	---	276.84	24.15	---	---	68.95
14.80	46.52	59.76	44.75	---	---	---	274.49	22.73	---	---	67.48
14.90	43.70	59.73	44.69	---	---	---	271.80	21.12	---	---	65.80
15.00	41.31	59.71	44.62	---	---	---	269.01	19.43	---	---	64.06
15.10	39.29	59.68	44.56	---	---	---	266.16	17.71	---	---	62.27
15.20	37.57	59.65	44.49	---	---	---	263.30	15.99	---	---	60.48
15.30	36.10	59.63	44.43	---	---	---	260.46	14.28	---	---	58.71
15.40	34.79	59.60	44.36	---	---	---	257.67	12.60	---	---	56.96
15.50	33.59	59.58	44.30	---	---	---	255.02	11.72	---	---	56.02
15.60	32.51	59.55	44.23	---	---	---	252.37	10.93	---	---	55.16
15.70	31.52	59.53	44.16	---	---	---	249.69	10.13	---	---	54.30
15.80	30.60	59.50	44.09	---	---	---	247.00	9.33	---	---	53.43
15.90	29.75	59.47	44.03	---	---	---	244.31	8.53	---	---	52.56
16.00	28.95	59.45	43.96	---	---	---	241.62	7.73	---	---	51.69
16.10	28.19	59.42	43.89	---	---	---	238.95	6.93	---	---	50.83
16.20	27.48	59.40	43.83	---	---	---	236.29	6.14	---	---	49.97
16.30	26.80	59.37	43.76	---	---	---	233.65	5.35	---	---	49.11
16.40	26.16	59.35	43.69	---	---	---	231.03	4.57	---	---	48.27
16.50	25.55	59.32	43.63	---	---	---	228.44	3.80	---	---	47.43
16.60	24.96	59.30	43.57	---	---	---	225.87	3.03	---	---	46.60
16.70	24.40	59.27	43.50	---	---	---	223.34	2.28	---	---	45.78
16.80	23.87	59.25	43.44	---	---	---	220.83	1.53	---	---	44.97
16.90	23.36	59.23	43.38	---	---	---	218.36	0.80	---	---	44.17
17.00	22.87	59.20	43.32	---	---	---	215.93	0.07	---	---	43.39
17.10	22.41	59.18	43.25	---	---	---	213.62	---	---	---	43.25
17.20	21.97	59.16	43.19	---	---	---	211.29	---	---	---	43.19
17.30	21.56	59.13	43.13	---	---	---	208.92	---	---	---	43.13

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	Outflow cfs
17.40	21.17	59.11	43.06	---	---	---	206.52	---	---	---	43.06
17.50	20.81	59.08	42.99	---	---	---	204.08	---	---	---	42.99
17.60	20.46	59.06	42.93	---	---	---	201.61	---	---	---	42.93
17.70	20.14	59.03	42.86	---	---	---	199.10	---	---	---	42.86
17.80	19.83	59.00	42.79	---	---	---	196.57	---	---	---	42.79
17.90	19.53	58.98	42.72	---	---	---	194.02	---	---	---	42.72
18.00	19.25	58.95	42.65	---	---	---	191.44	---	---	---	42.65
18.10	18.99	58.93	42.58	---	---	---	188.84	---	---	---	42.58
18.20	18.73	58.90	42.51	---	---	---	186.21	---	---	---	42.51
18.30	18.48	58.87	42.43	---	---	---	183.57	---	---	---	42.43
18.40	18.25	58.84	42.36	---	---	---	180.91	---	---	---	42.36
18.50	18.02	58.82	42.29	---	---	---	178.23	---	---	---	42.29
18.60	17.79	58.79	42.21	---	---	---	175.60	---	---	---	42.21
18.70	17.57	58.76	42.14	---	---	---	173.08	---	---	---	42.14
18.80	17.35	58.73	42.06	---	---	---	170.54	---	---	---	42.06
18.90	17.13	58.71	41.98	---	---	---	167.98	---	---	---	41.98
19.00	16.91	58.68	41.91	---	---	---	165.41	---	---	---	41.91
19.10	16.69	58.65	41.83	---	---	---	162.83	---	---	---	41.83
19.20	16.47	58.62	41.75	---	---	---	160.23	---	---	---	41.75
19.30	16.24	58.59	41.67	---	---	---	157.62	---	---	---	41.67
19.40	16.02	58.56	41.59	---	---	---	154.99	---	---	---	41.59
19.50	15.80	58.53	41.51	---	---	---	152.34	---	---	---	41.51
19.60	15.58	58.51	41.43	---	---	---	149.69	---	---	---	41.43
19.70	15.36	58.48	41.35	---	---	---	147.01	---	---	---	41.35
19.80	15.14	58.45	41.27	---	---	---	144.33	---	---	---	41.27
19.90	14.91	58.42	41.19	---	---	---	141.63	---	---	---	41.19
20.00	14.69	58.39	41.11	---	---	---	139.01	---	---	---	41.11
20.10	14.47	58.36	41.02	---	---	---	136.49	---	---	---	41.02
20.20	14.25	58.33	40.94	---	---	---	133.97	---	---	---	40.94
20.30	14.03	58.30	40.85	---	---	---	131.43	---	---	---	40.85
20.40	13.82	58.27	40.77	---	---	---	128.88	---	---	---	40.77
20.50	13.61	58.24	40.68	---	---	---	126.32	---	---	---	40.68
20.60	13.41	58.20	40.59	---	---	---	123.75	---	---	---	40.59
20.70	13.21	58.17	40.51	---	---	---	121.17	---	---	---	40.51
20.80	13.02	58.14	40.42	---	---	---	118.57	---	---	---	40.42
20.90	12.84	58.11	40.33	---	---	---	115.97	---	---	---	40.33
21.00	12.68	58.08	40.24	---	---	---	113.36	---	---	---	40.24
21.10	12.52	58.05	40.16	---	---	---	110.75	---	---	---	40.16
21.20	12.38	58.02	40.07	---	---	---	108.12	---	---	---	40.07
21.30	12.25	57.99	39.98	---	---	---	105.60	---	---	---	39.98
21.40	12.13	57.96	39.89	---	---	---	103.22	---	---	---	39.89
21.50	12.02	57.92	39.80	---	---	---	100.84	---	---	---	39.80
21.60	11.91	57.89	39.71	---	---	---	98.45	---	---	---	39.71
21.70	11.82	57.86	39.61	---	---	---	96.07	---	---	---	39.61
21.80	11.73	57.83	39.52	---	---	---	93.69	---	---	---	39.52
21.90	11.66	57.80	39.43	---	---	---	91.31	---	---	---	39.43
22.00	11.59	57.77	39.34	---	---	---	88.92	---	---	---	39.34
22.10	11.52	57.74	39.25	---	---	---	86.55	---	---	---	39.25
22.20	11.46	57.70	39.16	---	---	---	84.17	---	---	---	39.16

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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	Outflow cfs
22.30	11.40	57.67	39.07	---	---	---	81.80	---	---	---	39.07
22.40	11.35	57.64	38.98	---	---	---	79.42	---	---	---	38.98
22.50	11.30	57.61	38.89	---	---	---	77.06	---	---	---	38.89
22.60	11.26	57.58	38.79	---	---	---	74.88	---	---	---	38.79
22.70	11.21	57.55	38.70	---	---	---	72.80	---	---	---	38.70
22.80	11.17	57.52	38.61	---	---	---	70.72	---	---	---	38.61
22.90	11.12	57.49	38.52	---	---	---	68.65	---	---	---	38.52
23.00	11.08	57.46	38.42	---	---	---	66.58	---	---	---	38.42
23.10	11.04	57.42	38.33	---	---	---	64.52	---	---	---	38.33
23.20	10.99	57.39	38.24	---	---	---	62.45	---	---	---	38.24
23.30	10.95	57.36	38.15	---	---	---	60.40	---	---	---	38.15
23.40	10.91	57.33	38.05	---	---	---	58.34	---	---	---	38.05
23.50	10.86	57.30	37.96	---	---	---	56.29	---	---	---	37.96
23.60	10.82	57.27	37.87	---	---	---	54.24	---	---	---	37.87
23.70	10.78	57.24	37.78	---	---	---	52.20	---	---	---	37.78
23.80	10.73	57.21	37.69	---	---	---	50.16	---	---	---	37.69
23.90	10.69	57.18	37.60	---	---	---	48.36	---	---	---	37.10
24.00	10.64	57.15	37.51	---	---	---	46.70	---	---	---	36.32
24.10	10.54	57.12	37.42	---	---	---	45.08	---	---	---	35.55
24.20	10.37	57.09	37.33	---	---	---	43.50	---	---	---	34.80
24.30	10.13	57.07	37.25	---	---	---	41.96	---	---	---	34.07
24.40	9.84	57.04	37.16	---	---	---	40.44	---	---	---	33.35
24.50	9.48	57.01	37.08	---	---	---	38.95	---	---	---	32.65
24.60	9.07	56.99	37.00	---	---	---	37.48	---	---	---	31.95
24.70	8.59	56.96	36.92	---	---	---	36.03	---	---	---	31.26
24.80	8.05	56.94	36.84	---	---	---	34.59	---	---	---	30.58
24.90	7.44	56.91	36.76	---	---	---	33.15	---	---	---	29.89
25.00	6.78	56.88	36.69	---	---	---	31.72	---	---	---	29.22
25.10	6.06	56.86	36.61	---	---	---	30.28	---	---	---	28.54
25.20	5.38	56.83	36.53	---	---	---	28.85	---	---	---	27.86
25.30	4.74	56.81	36.45	---	---	---	27.41	---	---	---	27.18
25.40	4.14	56.78	36.37	---	---	---	26.21	---	---	---	26.21
25.50	3.58	56.76	36.29	---	---	---	25.14	---	---	---	25.14
25.60	3.07	56.73	36.21	---	---	---	24.09	---	---	---	24.09
25.70	2.59	56.71	36.14	---	---	---	23.07	---	---	---	23.07
25.80	2.16	56.69	36.07	---	---	---	22.07	---	---	---	22.07
25.90	1.76	56.67	36.00	---	---	---	21.10	---	---	---	21.10
26.00	1.41	56.64	35.93	---	---	---	20.16	---	---	---	20.16
26.10	1.09	56.62	35.86	---	---	---	19.25	---	---	---	19.25
26.20	0.82	56.60	35.80	---	---	---	18.37	---	---	---	18.37
26.30	0.58	56.58	35.73	---	---	---	17.52	---	---	---	17.52
26.40	0.39	56.56	35.67	---	---	---	16.70	---	---	---	16.70
26.50	0.23	56.55	35.62	---	---	---	15.91	---	---	---	15.91
26.60	0.12	56.53	35.56	---	---	---	15.16	---	---	---	15.16
26.70	0.04	56.51	35.51	---	---	---	14.43	---	---	---	14.43
26.80	0.00	56.50	35.46	---	---	---	13.74	---	---	---	13.74
26.90	0.00	56.48	35.41	---	---	---	13.08	---	---	---	13.08
27.00	0.00	56.47	35.36	---	---	---	12.45	---	---	---	12.45
27.10	0.00	56.45	35.32	---	---	---	11.85	---	---	---	11.85

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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	Outflow cfs
27.20	0.00	56.44	35.27	---	---	---	11.28	---	---	---	11.28
27.30	0.00	56.43	35.24	---	---	---	10.74	---	---	---	10.74
27.40	0.00	56.42	35.20	---	---	---	10.22	---	---	---	10.22
27.50	0.00	56.40	35.16	---	---	---	9.73	---	---	---	9.73
27.60	0.00	56.39	35.13	---	---	---	9.38	---	---	---	9.38
27.70	0.00	56.38	35.09	---	---	---	9.13	---	---	---	9.13
27.80	0.00	56.37	35.06	---	---	---	8.89	---	---	---	8.89
27.90	0.00	56.36	35.02	---	---	---	8.65	---	---	---	8.65
28.00	0.00	56.35	34.99	---	---	---	8.42	---	---	---	8.42
28.10	0.00	56.34	34.96	---	---	---	8.20	---	---	---	8.20
28.20	0.00	56.33	34.93	---	---	---	7.98	---	---	---	7.98
28.30	0.00	56.33	34.90	---	---	---	7.77	---	---	---	7.77
28.40	0.00	56.32	34.87	---	---	---	7.56	---	---	---	7.56
28.50	0.00	56.31	34.84	---	---	---	7.36	---	---	---	7.36
28.60	0.00	56.30	34.82	---	---	---	7.16	---	---	---	7.16
28.70	0.00	56.29	34.79	---	---	---	6.97	---	---	---	6.97
28.80	0.00	56.28	34.76	---	---	---	6.79	---	---	---	6.79
28.90	0.00	56.28	34.74	---	---	---	6.61	---	---	---	6.61
29.00	0.00	56.27	34.72	---	---	---	6.43	---	---	---	6.43
29.10	0.00	56.26	34.69	---	---	---	6.26	---	---	---	6.26
29.20	0.00	56.26	34.67	---	---	---	6.09	---	---	---	6.09
29.30	0.00	56.25	34.65	---	---	---	5.93	---	---	---	5.93
29.40	0.00	56.24	34.62	---	---	---	5.77	---	---	---	5.77
29.50	0.00	56.24	34.60	---	---	---	5.62	---	---	---	5.62
29.60	0.00	56.23	34.58	---	---	---	5.47	---	---	---	5.47
29.70	0.00	56.22	34.56	---	---	---	5.33	---	---	---	5.33
29.80	0.00	56.22	34.54	---	---	---	5.18	---	---	---	5.18
29.90	0.00	56.21	34.52	---	---	---	5.05	---	---	---	5.05
30.00	0.00	56.21	34.50	---	---	---	4.91	---	---	---	4.91
30.10	0.00	56.20	34.49	---	---	---	4.78	---	---	---	4.78
30.20	0.00	56.20	34.47	---	---	---	4.65	---	---	---	4.65
30.30	0.00	56.19	34.45	---	---	---	4.53	---	---	---	4.53
30.40	0.00	56.19	34.43	---	---	---	4.41	---	---	---	4.41
30.50	0.00	56.18	34.42	---	---	---	4.29	---	---	---	4.29
30.60	0.00	56.18	34.40	---	---	---	4.18	---	---	---	4.18
30.70	0.00	56.17	34.39	---	---	---	4.07	---	---	---	4.07
30.80	0.00	56.17	34.37	---	---	---	3.96	---	---	---	3.96
30.90	0.00	56.16	34.36	---	---	---	3.85	---	---	---	3.85
31.00	0.00	56.16	34.34	---	---	---	3.75	---	---	---	3.75
31.10	0.00	56.15	34.33	---	---	---	3.65	---	---	---	3.65
31.20	0.00	56.15	34.31	---	---	---	3.55	---	---	---	3.55
31.30	0.00	56.15	34.30	---	---	---	3.46	---	---	---	3.46
31.40	0.00	56.14	34.29	---	---	---	3.37	---	---	---	3.37
31.50	0.00	56.14	34.28	---	---	---	3.28	---	---	---	3.28
31.60	0.00	56.13	34.26	---	---	---	3.19	---	---	---	3.19
31.70	0.00	56.13	34.25	---	---	---	3.11	---	---	---	3.11
31.80	0.00	56.13	34.24	---	---	---	3.02	---	---	---	3.02
31.90	0.00	56.12	34.23	---	---	---	2.94	---	---	---	2.94
32.00	0.00	56.12	34.22	---	---	---	2.86	---	---	---	2.86

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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	Outflow cfs
32.10	0.00	56.12	34.21	----	----	----	2.79	----	----	----	2.79
32.20	0.00	56.11	34.20	----	----	----	2.71	----	----	----	2.71
32.30	0.00	56.11	34.19	----	----	----	2.64	----	----	----	2.64
32.40	0.00	56.11	34.18	----	----	----	2.57	----	----	----	2.57
32.50	0.00	56.11	34.17	----	----	----	2.50	----	----	----	2.50
32.60	0.00	56.10	34.16	----	----	----	2.44	----	----	----	2.44
32.70	0.00	56.10	34.15	----	----	----	2.37	----	----	----	2.37
32.80	0.00	56.10	34.14	----	----	----	2.31	----	----	----	2.31
32.90	0.00	56.09	34.13	----	----	----	2.25	----	----	----	2.25
33.00	0.00	56.09	34.12	----	----	----	2.19	----	----	----	2.19
33.10	0.00	56.09	34.12	----	----	----	2.13	----	----	----	2.13
33.20	0.00	56.09	34.11	----	----	----	2.07	----	----	----	2.07
33.30	0.00	56.08	34.10	----	----	----	2.02	----	----	----	2.02
33.40	0.00	56.08	34.09	----	----	----	1.96	----	----	----	1.96
33.50	0.00	56.08	34.09	----	----	----	1.91	----	----	----	1.91
33.60	0.00	56.08	34.08	----	----	----	1.86	----	----	----	1.86
33.70	0.00	56.08	34.07	----	----	----	1.81	----	----	----	1.81
33.80	0.00	56.07	34.07	----	----	----	1.76	----	----	----	1.76
33.90	0.00	56.07	34.06	----	----	----	1.72	----	----	----	1.72
34.00	0.00	56.07	34.05	----	----	----	1.67	----	----	----	1.67
34.10	0.00	56.07	34.05	----	----	----	1.63	----	----	----	1.63
34.20	0.00	56.07	34.04	----	----	----	1.58	----	----	----	1.58
34.30	0.00	56.06	34.03	----	----	----	1.54	----	----	----	1.54
34.40	0.00	56.06	34.03	----	----	----	1.50	----	----	----	1.50
34.50	0.00	56.06	34.02	----	----	----	1.46	----	----	----	1.46
34.60	0.00	56.06	34.02	----	----	----	1.42	----	----	----	1.42
34.70	0.00	56.06	34.01	----	----	----	1.38	----	----	----	1.38
34.80	0.00	56.06	34.01	----	----	----	1.35	----	----	----	1.35
34.90	0.00	56.05	34.00	----	----	----	1.31	----	----	----	1.31
35.00	0.00	56.05	34.00	----	----	----	1.28	----	----	----	1.28
35.10	0.00	56.05	33.99	----	----	----	1.24	----	----	----	1.24
35.20	0.00	56.05	33.99	----	----	----	1.21	----	----	----	1.21
35.30	0.00	56.05	33.98	----	----	----	1.18	----	----	----	1.18
35.40	0.00	56.05	33.98	----	----	----	1.15	----	----	----	1.15
35.50	0.00	56.05	33.98	----	----	----	1.11	----	----	----	1.11
35.60	0.00	56.05	33.97	----	----	----	1.08	----	----	----	1.08
35.70	0.00	56.04	33.97	----	----	----	1.06	----	----	----	1.06
35.80	0.00	56.04	33.96	----	----	----	1.03	----	----	----	1.03
35.90	0.00	56.04	33.96	----	----	----	1.00	----	----	----	1.00
36.00	0.00	56.04	33.96	----	----	----	0.97	----	----	----	0.97
36.10	0.00	56.04	33.95	----	----	----	0.95	----	----	----	0.95
36.20	0.00	56.04	33.95	----	----	----	0.92	----	----	----	0.92
36.30	0.00	56.04	33.95	----	----	----	0.90	----	----	----	0.90
36.40	0.00	56.04	33.94	----	----	----	0.87	----	----	----	0.87
36.50	0.00	56.04	33.94	----	----	----	0.85	----	----	----	0.85
36.60	0.00	56.03	33.94	----	----	----	0.83	----	----	----	0.83
36.70	0.00	56.03	33.93	----	----	----	0.81	----	----	----	0.81
36.80	0.00	56.03	33.93	----	----	----	0.79	----	----	----	0.79
36.90	0.00	56.03	33.93	----	----	----	0.76	----	----	----	0.76

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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	Outflow cfs
37.00	0.00	56.03	33.92	----	----	----	0.74	----	----	----	0.74
37.10	0.00	56.03	33.92	----	----	----	0.72	----	----	----	0.72
37.20	0.00	56.03	33.92	----	----	----	0.70	----	----	----	0.70

...End

Hydrograph Report

Hyd. No. 9

100 YR POST DEVELOPMENT

Hydrograph type	= SCS Runoff	Peak discharge	= 326.43 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 154.80 ac	Curve number	= 80
Basin Slope	= 0.7 %	Hydraulic length	= 3550 ft
Tc method	= LAG	Time of conc. (Tc)	= 104.8 min
Total precip.	= 8.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 3,281,453 cuft

Hydrograph Discharge Table

| Time -- Outflow
(hrs cfs) |
|------------------------------|------------------------------|------------------------------|------------------------------|
| 7.50 3.38 | 10.70 19.81 | 13.90 200.98 | 17.10 29.67 |
| 7.60 3.65 | 10.80 21.00 | 14.00 184.07 | 17.20 29.09 |
| 7.70 3.92 | 10.90 22.31 | 14.10 166.93 | 17.30 28.54 |
| 7.80 4.19 | 11.00 23.75 | 14.20 149.66 | 17.40 28.03 |
| 7.90 4.47 | 11.10 25.32 | 14.30 132.31 | 17.50 27.54 |
| 8.00 4.75 | 11.20 27.08 | 14.40 114.95 | 17.60 27.08 |
| 8.10 5.03 | 11.30 29.09 | 14.50 98.07 | 17.70 26.64 |
| 8.20 5.33 | 11.40 31.39 | 14.60 82.54 | 17.80 26.23 |
| 8.30 5.62 | 11.50 34.01 | 14.70 69.61 | 17.90 25.83 |
| 8.40 5.93 | 11.60 37.70 | 14.80 61.99 | 18.00 25.46 |
| 8.50 6.26 | 11.70 43.81 | 14.90 58.20 | 18.10 25.10 |
| 8.60 6.60 | 11.80 54.30 | 15.00 54.98 | 18.20 24.76 |
| 8.70 6.95 | 11.90 73.56 | 15.10 52.27 | 18.30 24.44 |
| 8.80 7.33 | 12.00 99.09 | 15.20 49.97 | 18.40 24.12 |
| 8.90 7.74 | 12.10 125.50 | 15.30 47.99 | 18.50 23.81 |
| 9.00 8.17 | 12.20 152.65 | 15.40 46.23 | 18.60 23.51 |
| 9.10 8.64 | 12.30 180.22 | 15.50 44.63 | 18.70 23.21 |
| 9.20 9.13 | 12.40 207.95 | 15.60 43.18 | 18.80 22.92 |
| 9.30 9.65 | 12.50 235.59 | 15.70 41.85 | 18.90 22.63 |
| 9.40 10.19 | 12.60 262.93 | 15.80 40.62 | 19.00 22.33 |
| 9.50 10.75 | 12.70 288.74 | 15.90 39.48 | 19.10 22.04 |
| 9.60 11.33 | 12.80 310.73 | 16.00 38.41 | 19.20 21.75 |
| 9.70 11.93 | 12.90 325.69 | 16.10 37.40 | 19.30 21.45 |
| 9.80 12.54 | 13.00 326.43 << | 16.20 36.44 | 19.40 21.16 |
| 9.90 13.18 | 13.10 316.93 | 16.30 35.54 | 19.50 20.86 |
| 10.00 13.85 | 13.20 305.78 | 16.40 34.68 | 19.60 20.57 |
| 10.10 14.54 | 13.30 293.22 | 16.50 33.86 | 19.70 20.28 |
| 10.20 15.26 | 13.40 279.50 | 16.60 33.08 | 19.80 19.98 |
| 10.30 16.03 | 13.50 264.86 | 16.70 32.34 | 19.90 19.69 |
| 10.40 16.86 | 13.60 249.57 | 16.80 31.62 | 20.00 19.39 |
| 10.50 17.75 | 13.70 233.78 | 16.90 30.94 | 20.10 19.10 |
| 10.60 18.73 | 13.80 217.57 | 17.00 30.29 | 20.20 18.80 |

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Hydrograph Discharge Table

Time -- Outflow (hrs cfs)	Time -- Outflow (hrs cfs)
20.30 18.51	25.20 7.08
20.40 18.23	25.30 6.24
20.50 17.95	25.40 5.45
20.60 17.68	25.50 4.72
20.70 17.42	25.60 4.04
20.80 17.18	25.70 3.41
20.90 16.94	
21.00 16.72	
21.10 16.51	...End
21.20 16.32	
21.30 16.15	
21.40 15.99	
21.50 15.84	
21.60 15.70	
21.70 15.58	
21.80 15.47	
21.90 15.36	
22.00 15.27	
22.10 15.18	
22.20 15.10	
22.30 15.03	
22.40 14.96	
22.50 14.89	
22.60 14.83	
22.70 14.77	
22.80 14.71	
22.90 14.65	
23.00 14.59	
23.10 14.54	
23.20 14.48	
23.30 14.42	
23.40 14.36	
23.50 14.30	
23.60 14.24	
23.70 14.19	
23.80 14.13	
23.90 14.07	
24.00 14.01	
24.10 13.87	
24.20 13.65	
24.30 13.34	
24.40 12.95	
24.50 12.48	
24.60 11.93	
24.70 11.30	
24.80 10.59	
24.90 9.80	
25.00 8.92	
25.10 7.97	

Hydrograph Report

Hyd. No. 10

100 YR POST ROUTED

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 9
Max. Elevation = 60.65 ft

Peak discharge = 146.56 cfs
Time interval = 6 min
Reservoir name = WET POND
Max. Storage = 1,532,441 cuft

Storage Indication method used.

Total Volume = 3,281,450 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	Outflow cfs
8.40	5.93	56.06	34.03	----	----	----	1.50	----	----	----	1.50
8.50	6.26	56.07	34.05	----	----	----	1.62	----	----	----	1.62
8.60	6.60	56.07	34.06	----	----	----	1.75	----	----	----	1.75
8.70	6.95	56.08	34.08	----	----	----	1.88	----	----	----	1.88
8.80	7.33	56.08	34.10	----	----	----	2.02	----	----	----	2.02
8.90	7.74	56.09	34.12	----	----	----	2.17	----	----	----	2.17
9.00	8.17	56.10	34.14	----	----	----	2.32	----	----	----	2.32
9.10	8.64	56.10	34.17	----	----	----	2.48	----	----	----	2.48
9.20	9.13	56.11	34.19	----	----	----	2.65	----	----	----	2.65
9.30	9.65	56.12	34.21	----	----	----	2.83	----	----	----	2.83
9.40	10.19	56.13	34.24	----	----	----	3.02	----	----	----	3.02
9.50	10.75	56.14	34.27	----	----	----	3.22	----	----	----	3.22
9.60	11.33	56.14	34.30	----	----	----	3.43	----	----	----	3.43
9.70	11.93	56.15	34.33	----	----	----	3.65	----	----	----	3.65
9.80	12.54	56.16	34.36	----	----	----	3.87	----	----	----	3.87
9.90	13.18	56.17	34.39	----	----	----	4.11	----	----	----	4.11
10.00	13.85	56.18	34.43	----	----	----	4.36	----	----	----	4.36
10.10	14.54	56.19	34.46	----	----	----	4.62	----	----	----	4.62
10.20	15.26	56.21	34.50	----	----	----	4.90	----	----	----	4.90
10.30	16.03	56.22	34.54	----	----	----	5.18	----	----	----	5.18
10.40	16.86	56.23	34.58	----	----	----	5.48	----	----	----	5.48
10.50	17.75	56.24	34.63	----	----	----	5.80	----	----	----	5.80
10.60	18.73	56.26	34.67	----	----	----	6.13	----	----	----	6.13
10.70	19.81	56.27	34.72	----	----	----	6.48	----	----	----	6.48
10.80	21.00	56.29	34.77	----	----	----	6.85	----	----	----	6.85
10.90	22.31	56.30	34.83	----	----	----	7.24	----	----	----	7.24
11.00	23.75	56.32	34.89	----	----	----	7.66	----	----	----	7.66
11.10	25.32	56.34	34.95	----	----	----	8.11	----	----	----	8.11
11.20	27.08	56.36	35.02	----	----	----	8.59	----	----	----	8.59
11.30	29.09	56.38	35.09	----	----	----	9.11	----	----	----	9.11
11.40	31.39	56.41	35.17	----	----	----	9.79	----	----	----	9.79
11.50	34.01	56.43	35.25	----	----	----	10.89	----	----	----	10.89
11.60	37.70	56.46	35.33	----	----	----	12.09	----	----	----	12.09
11.70	43.81	56.49	35.44	----	----	----	13.47	----	----	----	13.47
11.80	54.30	56.53	35.56	----	----	----	15.18	----	----	----	15.18
11.90	73.56	56.58	35.73	----	----	----	17.53	----	----	----	17.53

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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	Outflow cfs
12.00	99.09	56.66	35.98	---	---	---	20.84	---	---	---	20.84
12.10	125.50	56.76	36.30	---	---	---	25.24	---	---	---	25.24
12.20	152.65	56.89	36.69	---	---	---	31.87	---	---	---	29.29
12.30	180.22	57.04	37.17	---	---	---	40.49	---	---	---	33.38
12.40	207.95	57.22	37.72	---	---	---	50.81	---	---	---	37.72
12.50	235.59	57.43	38.34	---	---	---	64.71	---	---	---	38.34
12.60	262.93	57.67	39.05	---	---	---	81.21	---	---	---	39.05
12.70	288.74	57.93	39.82	---	---	---	101.48	---	---	---	39.82
12.80	310.73	58.23	40.65	---	---	---	125.55	---	---	---	40.65
12.90	325.69	58.54	41.53	---	---	---	152.85	---	---	---	41.53
13.00	326.43 <<	58.86	42.41	---	---	---	182.55	---	---	---	42.41
13.10	316.93	59.18	43.25	---	---	---	213.43	---	---	---	43.25
13.20	305.78	59.47	44.03	---	---	---	244.35	8.54	---	---	52.57
13.30	293.22	59.75	44.73	---	---	---	273.49	22.13	---	---	66.86
13.40	279.50	59.99	45.34	---	---	---	299.82	38.00	---	---	83.33
13.50	264.86	60.15	45.76	---	---	---	318.86	51.59	---	---	97.35
13.60	249.57	60.29	46.10	---	---	---	334.95	63.91	---	---	110.01
13.70	233.78	60.40	46.38	---	---	---	348.30	74.44	---	---	120.82
13.80	217.57	60.49	46.60	---	---	---	359.13	83.53	---	---	130.13
13.90	200.98	60.56	46.77	---	---	---	367.31	90.39	---	---	137.16
14.00	184.07	60.61	46.89	---	---	---	373.05	95.26	---	---	142.15
14.10	166.93	60.64	46.96	---	---	---	376.56	98.37	---	---	145.32
14.20	149.66	60.65 <<	46.98	---	---	---	377.92	99.57	---	---	146.56 <<
14.30	132.31	60.65	46.97	---	---	---	377.33	99.05	---	---	146.03
14.40	114.95	60.63	46.93	---	---	---	374.98	96.97	---	---	143.90
14.50	98.07	60.59	46.85	---	---	---	371.06	93.53	---	---	140.38
14.60	82.54	60.55	46.74	---	---	---	365.88	89.19	---	---	135.94
14.70	69.61	60.50	46.62	---	---	---	359.70	84.01	---	---	130.62
14.80	61.99	60.44	46.48	---	---	---	353.01	78.39	---	---	124.87
14.90	58.20	60.39	46.34	---	---	---	346.34	72.87	---	---	119.22
15.00	54.98	60.33	46.21	---	---	---	340.00	67.88	---	---	114.09
15.10	52.27	60.28	46.08	---	---	---	333.87	63.06	---	---	109.14
15.20	49.97	60.23	45.95	---	---	---	327.99	58.44	---	---	104.39
15.30	47.99	60.18	45.83	---	---	---	322.41	54.17	---	---	100.00
15.40	46.23	60.14	45.72	---	---	---	317.16	50.36	---	---	96.08
15.50	44.63	60.09	45.61	---	---	---	312.13	46.72	---	---	92.32
15.60	43.18	60.05	45.50	---	---	---	307.32	43.23	---	---	88.73
15.70	41.85	60.01	45.40	---	---	---	302.73	39.90	---	---	85.31
15.80	40.62	59.97	45.29	---	---	---	297.71	36.72	---	---	82.01
15.90	39.48	59.92	45.17	---	---	---	292.67	33.69	---	---	78.86
16.00	38.41	59.88	45.06	---	---	---	287.88	30.80	---	---	75.86
16.10	37.40	59.84	44.96	---	---	---	283.33	28.06	---	---	73.02
16.20	36.44	59.80	44.86	---	---	---	279.00	25.45	---	---	70.31
16.30	35.54	59.76	44.76	---	---	---	274.88	22.97	---	---	67.73
16.40	34.68	59.72	44.67	---	---	---	270.97	20.61	---	---	65.28
16.50	33.86	59.69	44.58	---	---	---	267.25	18.37	---	---	62.96
16.60	33.08	59.66	44.50	---	---	---	263.71	16.24	---	---	60.74
16.70	32.34	59.63	44.42	---	---	---	260.35	14.22	---	---	58.64
16.80	31.62	59.60	44.35	---	---	---	257.16	12.36	---	---	56.71

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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	Outflow cfs
16.90	30.94	59.57	44.28	----	----	----	254.22	11.48	----	----	55.76
17.00	30.29	59.54	44.20	----	----	----	251.31	10.62	----	----	54.82
17.10	29.67	59.51	44.13	----	----	----	248.43	9.76	----	----	53.89
17.20	29.09	59.49	44.06	----	----	----	245.60	8.91	----	----	52.97
17.30	28.54	59.46	43.99	----	----	----	242.80	8.08	----	----	52.07
17.40	28.03	59.43	43.92	----	----	----	240.05	7.26	----	----	51.18
17.50	27.54	59.41	43.85	----	----	----	237.34	6.45	----	----	50.31
17.60	27.08	59.38	43.79	----	----	----	234.68	5.66	----	----	49.45
17.70	26.64	59.36	43.72	----	----	----	232.07	4.88	----	----	48.60
17.80	26.23	59.33	43.66	----	----	----	229.51	4.12	----	----	47.77
17.90	25.83	59.31	43.59	----	----	----	226.99	3.37	----	----	46.96
18.00	25.46	59.28	43.53	----	----	----	224.52	2.63	----	----	46.16
18.10	25.10	59.26	43.47	----	----	----	222.11	1.91	----	----	45.38
18.20	24.76	59.24	43.41	----	----	----	219.74	1.21	----	----	44.62
18.30	24.44	59.22	43.35	----	----	----	217.43	0.52	----	----	43.87
18.40	24.12	59.19	43.30	----	----	----	215.18	----	----	----	43.30
18.50	23.81	59.17	43.24	----	----	----	213.04	----	----	----	43.24
18.60	23.51	59.15	43.18	----	----	----	210.88	----	----	----	43.18
18.70	23.21	59.13	43.12	----	----	----	208.69	----	----	----	43.12
18.80	22.92	59.11	43.06	----	----	----	206.47	----	----	----	43.06
18.90	22.63	59.08	43.00	----	----	----	204.23	----	----	----	43.00
19.00	22.33	59.06	42.94	----	----	----	201.96	----	----	----	42.94
19.10	22.04	59.04	42.87	----	----	----	199.66	----	----	----	42.87
19.20	21.75	59.01	42.81	----	----	----	197.35	----	----	----	42.81
19.30	21.45	58.99	42.75	----	----	----	195.00	----	----	----	42.75
19.40	21.16	58.96	42.68	----	----	----	192.63	----	----	----	42.68
19.50	20.86	58.94	42.62	----	----	----	190.23	----	----	----	42.62
19.60	20.57	58.92	42.55	----	----	----	187.81	----	----	----	42.55
19.70	20.28	58.89	42.48	----	----	----	185.36	----	----	----	42.48
19.80	19.98	58.86	42.41	----	----	----	182.89	----	----	----	42.41
19.90	19.69	58.84	42.35	----	----	----	180.40	----	----	----	42.35
20.00	19.39	58.81	42.28	----	----	----	177.87	----	----	----	42.28
20.10	19.10	58.79	42.21	----	----	----	175.41	----	----	----	42.21
20.20	18.80	58.76	42.14	----	----	----	173.02	----	----	----	42.14
20.30	18.51	58.73	42.06	----	----	----	170.60	----	----	----	42.06
20.40	18.23	58.71	41.99	----	----	----	168.16	----	----	----	41.99
20.50	17.95	58.68	41.91	----	----	----	165.70	----	----	----	41.91
20.60	17.68	58.65	41.84	----	----	----	163.22	----	----	----	41.84
20.70	17.42	58.63	41.76	----	----	----	160.72	----	----	----	41.76
20.80	17.18	58.60	41.69	----	----	----	158.20	----	----	----	41.69
20.90	16.94	58.57	41.61	----	----	----	155.67	----	----	----	41.61
21.00	16.72	58.54	41.54	----	----	----	153.12	----	----	----	41.54
21.10	16.51	58.51	41.46	----	----	----	150.55	----	----	----	41.46
21.20	16.32	58.49	41.38	----	----	----	147.98	----	----	----	41.38
21.30	16.15	58.46	41.30	----	----	----	145.39	----	----	----	41.30
21.40	15.99	58.43	41.23	----	----	----	142.79	----	----	----	41.23
21.50	15.84	58.40	41.15	----	----	----	140.18	----	----	----	41.15
21.60	15.70	58.37	41.07	----	----	----	137.78	----	----	----	41.07
21.70	15.58	58.34	40.98	----	----	----	135.37	----	----	----	40.98

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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	Outflow cfs
21.80	15.47	58.31	40.90	---	---	---	132.96	---	---	---	40.90
21.90	15.36	58.29	40.82	---	---	---	130.55	---	---	---	40.82
22.00	15.27	58.26	40.74	---	---	---	128.13	---	---	---	40.74
22.10	15.18	58.23	40.66	---	---	---	125.72	---	---	---	40.66
22.20	15.10	58.20	40.58	---	---	---	123.30	---	---	---	40.58
22.30	15.03	58.17	40.50	---	---	---	120.88	---	---	---	40.50
22.40	14.96	58.14	40.42	---	---	---	118.47	---	---	---	40.42
22.50	14.89	58.11	40.34	---	---	---	116.06	---	---	---	40.34
22.60	14.83	58.08	40.25	---	---	---	113.64	---	---	---	40.25
22.70	14.77	58.06	40.17	---	---	---	111.23	---	---	---	40.17
22.80	14.71	58.03	40.09	---	---	---	108.83	---	---	---	40.09
22.90	14.65	58.00	40.01	---	---	---	106.44	---	---	---	40.01
23.00	14.59	57.97	39.93	---	---	---	104.26	---	---	---	39.93
23.10	14.54	57.94	39.84	---	---	---	102.09	---	---	---	39.84
23.20	14.48	57.91	39.76	---	---	---	99.92	---	---	---	39.76
23.30	14.42	57.88	39.68	---	---	---	97.75	---	---	---	39.68
23.40	14.36	57.86	39.60	---	---	---	95.59	---	---	---	39.60
23.50	14.30	57.83	39.51	---	---	---	93.43	---	---	---	39.51
23.60	14.24	57.80	39.43	---	---	---	91.27	---	---	---	39.43
23.70	14.19	57.77	39.35	---	---	---	89.11	---	---	---	39.35
23.80	14.13	57.74	39.27	---	---	---	86.95	---	---	---	39.27
23.90	14.07	57.71	39.18	---	---	---	84.80	---	---	---	39.18
24.00	14.01	57.68	39.10	---	---	---	82.64	---	---	---	39.10
24.10	13.87	57.66	39.02	---	---	---	80.49	---	---	---	39.02
24.20	13.65	57.63	38.94	---	---	---	78.33	---	---	---	38.94
24.30	13.34	57.60	38.85	---	---	---	76.16	---	---	---	38.85
24.40	12.95	57.57	38.77	---	---	---	74.22	---	---	---	38.77
24.50	12.48	57.54	38.68	---	---	---	72.26	---	---	---	38.68
24.60	11.93	57.51	38.59	---	---	---	70.26	---	---	---	38.59
24.70	11.30	57.48	38.50	---	---	---	68.22	---	---	---	38.50
24.80	10.59	57.45	38.40	---	---	---	66.14	---	---	---	38.40
24.90	9.80	57.42	38.31	---	---	---	64.01	---	---	---	38.31
25.00	8.92	57.38	38.21	---	---	---	61.83	---	---	---	38.21
25.10	7.97	57.35	38.11	---	---	---	59.58	---	---	---	38.11
25.20	7.08	57.32	38.01	---	---	---	57.27	---	---	---	38.01
25.30	6.24	57.28	37.90	---	---	---	54.91	---	---	---	37.90
25.40	5.45	57.24	37.79	---	---	---	52.49	---	---	---	37.79
25.50	4.72	57.21	37.68	---	---	---	50.02	---	---	---	37.68
25.60	4.04	57.17	37.57	---	---	---	47.84	---	---	---	36.86
25.70	3.41	57.13	37.45	---	---	---	45.76	---	---	---	35.87
25.80	2.84	57.10	37.34	---	---	---	43.70	---	---	---	34.90
25.90	2.32	57.06	37.23	---	---	---	41.67	---	---	---	33.93
26.00	1.85	57.03	37.12	---	---	---	39.66	---	---	---	32.98
26.10	1.44	56.99	37.01	---	---	---	37.69	---	---	---	32.05
26.20	1.08	56.96	36.91	---	---	---	35.76	---	---	---	31.13
26.30	0.77	56.92	36.80	---	---	---	33.86	---	---	---	30.23
26.40	0.51	56.89	36.70	---	---	---	32.00	---	---	---	29.35
26.50	0.31	56.86	36.60	---	---	---	30.18	---	---	---	28.49
26.60	0.15	56.83	36.50	---	---	---	28.40	---	---	---	27.64

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	Outflow cfs
26.70	0.05	56.79	36.41	----	----	----	26.74	----	----	----	26.74
26.80	0.00	56.77	36.31	----	----	----	25.45	----	----	----	25.45
26.90	0.00	56.74	36.22	----	----	----	24.23	----	----	----	24.23
27.00	0.00	56.71	36.14	----	----	----	23.06	----	----	----	23.06
27.10	0.00	56.69	36.06	----	----	----	21.95	----	----	----	21.95
27.20	0.00	56.66	35.98	----	----	----	20.90	----	----	----	20.90
27.30	0.00	56.64	35.91	----	----	----	19.89	----	----	----	19.89
27.40	0.00	56.62	35.84	----	----	----	18.93	----	----	----	18.93
27.50	0.00	56.59	35.77	----	----	----	18.02	----	----	----	18.02
27.60	0.00	56.57	35.71	----	----	----	17.15	----	----	----	17.15
27.70	0.00	56.56	35.65	----	----	----	16.33	----	----	----	16.33
27.80	0.00	56.54	35.59	----	----	----	15.54	----	----	----	15.54
27.90	0.00	56.52	35.53	----	----	----	14.80	----	----	----	14.80
28.00	0.00	56.50	35.48	----	----	----	14.08	----	----	----	14.08
28.10	0.00	56.49	35.43	----	----	----	13.41	----	----	----	13.41
28.20	0.00	56.47	35.38	----	----	----	12.76	----	----	----	12.76
28.30	0.00	56.46	35.34	----	----	----	12.15	----	----	----	12.15
28.40	0.00	56.45	35.30	----	----	----	11.56	----	----	----	11.56
28.50	0.00	56.43	35.26	----	----	----	11.01	----	----	----	11.01
28.60	0.00	56.42	35.22	----	----	----	10.48	----	----	----	10.48
28.70	0.00	56.41	35.18	----	----	----	9.97	----	----	----	9.97
28.80	0.00	56.40	35.14	----	----	----	9.51	----	----	----	9.51
28.90	0.00	56.39	35.11	----	----	----	9.26	----	----	----	9.26
29.00	0.00	56.38	35.07	----	----	----	9.01	----	----	----	9.01
29.10	0.00	56.37	35.04	----	----	----	8.77	----	----	----	8.77
29.20	0.00	56.36	35.01	----	----	----	8.54	----	----	----	8.54
29.30	0.00	56.35	34.98	----	----	----	8.31	----	----	----	8.31
29.40	0.00	56.34	34.95	----	----	----	8.09	----	----	----	8.09
29.50	0.00	56.33	34.92	----	----	----	7.87	----	----	----	7.87
29.60	0.00	56.32	34.89	----	----	----	7.67	----	----	----	7.67
29.70	0.00	56.31	34.86	----	----	----	7.46	----	----	----	7.46
29.80	0.00	56.30	34.83	----	----	----	7.26	----	----	----	7.26
29.90	0.00	56.30	34.80	----	----	----	7.07	----	----	----	7.07
30.00	0.00	56.29	34.78	----	----	----	6.88	----	----	----	6.88
30.10	0.00	56.28	34.75	----	----	----	6.70	----	----	----	6.70
30.20	0.00	56.27	34.73	----	----	----	6.52	----	----	----	6.52
30.30	0.00	56.27	34.70	----	----	----	6.35	----	----	----	6.35
30.40	0.00	56.26	34.68	----	----	----	6.18	----	----	----	6.18
30.50	0.00	56.25	34.66	----	----	----	6.01	----	----	----	6.01
30.60	0.00	56.25	34.63	----	----	----	5.85	----	----	----	5.85
30.70	0.00	56.24	34.61	----	----	----	5.70	----	----	----	5.70
30.80	0.00	56.23	34.59	----	----	----	5.55	----	----	----	5.55
30.90	0.00	56.23	34.57	----	----	----	5.40	----	----	----	5.40
31.00	0.00	56.22	34.55	----	----	----	5.26	----	----	----	5.25
31.10	0.00	56.21	34.53	----	----	----	5.12	----	----	----	5.12
31.20	0.00	56.21	34.51	----	----	----	4.98	----	----	----	4.98
31.30	0.00	56.20	34.49	----	----	----	4.85	----	----	----	4.85
31.40	0.00	56.20	34.48	----	----	----	4.72	----	----	----	4.72
31.50	0.00	56.19	34.46	----	----	----	4.59	----	----	----	4.59

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	Outflow cfs
31.60	0.00	56.19	34.44	---	---	---	4.47	---	---	---	4.47
31.70	0.00	56.18	34.43	---	---	---	4.35	---	---	---	4.35
31.80	0.00	56.18	34.41	---	---	---	4.24	---	---	---	4.24
31.90	0.00	56.17	34.39	---	---	---	4.12	---	---	---	4.12
32.00	0.00	56.17	34.38	---	---	---	4.01	---	---	---	4.01
32.10	0.00	56.16	34.36	---	---	---	3.91	---	---	---	3.91
32.20	0.00	56.16	34.35	---	---	---	3.80	---	---	---	3.80
32.30	0.00	56.16	34.34	---	---	---	3.70	---	---	---	3.70
32.40	0.00	56.15	34.32	---	---	---	3.60	---	---	---	3.60
32.50	0.00	56.15	34.31	---	---	---	3.51	---	---	---	3.51
32.60	0.00	56.14	34.30	---	---	---	3.41	---	---	---	3.41
32.70	0.00	56.14	34.28	---	---	---	3.32	---	---	---	3.32
32.80	0.00	56.14	34.27	---	---	---	3.23	---	---	---	3.23
32.90	0.00	56.13	34.26	---	---	---	3.15	---	---	---	3.15
33.00	0.00	56.13	34.25	---	---	---	3.06	---	---	---	3.06
33.10	0.00	56.13	34.24	---	---	---	2.98	---	---	---	2.98
33.20	0.00	56.12	34.22	---	---	---	2.90	---	---	---	2.90
33.30	0.00	56.12	34.21	---	---	---	2.83	---	---	---	2.83
33.40	0.00	56.12	34.20	---	---	---	2.75	---	---	---	2.75
33.50	0.00	56.11	34.19	---	---	---	2.68	---	---	---	2.68
33.60	0.00	56.11	34.18	---	---	---	2.61	---	---	---	2.61
33.70	0.00	56.11	34.17	---	---	---	2.54	---	---	---	2.54
33.80	0.00	56.10	34.16	---	---	---	2.47	---	---	---	2.47
33.90	0.00	56.10	34.15	---	---	---	2.40	---	---	---	2.40
34.00	0.00	56.10	34.15	---	---	---	2.34	---	---	---	2.34
34.10	0.00	56.10	34.14	---	---	---	2.28	---	---	---	2.28
34.20	0.00	56.09	34.13	---	---	---	2.22	---	---	---	2.22
34.30	0.00	56.09	34.12	---	---	---	2.16	---	---	---	2.16
34.40	0.00	56.09	34.11	---	---	---	2.10	---	---	---	2.10
34.50	0.00	56.09	34.10	---	---	---	2.04	---	---	---	2.05
34.60	0.00	56.08	34.10	---	---	---	1.99	---	---	---	1.99
34.70	0.00	56.08	34.09	---	---	---	1.94	---	---	---	1.94
34.80	0.00	56.08	34.08	---	---	---	1.89	---	---	---	1.89
34.90	0.00	56.08	34.08	---	---	---	1.84	---	---	---	1.84
35.00	0.00	56.07	34.07	---	---	---	1.79	---	---	---	1.79
35.10	0.00	56.07	34.06	---	---	---	1.74	---	---	---	1.74
35.20	0.00	56.07	34.06	---	---	---	1.69	---	---	---	1.69
35.30	0.00	56.07	34.05	---	---	---	1.65	---	---	---	1.65
35.40	0.00	56.07	34.04	---	---	---	1.60	---	---	---	1.60
35.50	0.00	56.07	34.04	---	---	---	1.56	---	---	---	1.56
35.60	0.00	56.06	34.03	---	---	---	1.52	---	---	---	1.52
35.70	0.00	56.06	34.03	---	---	---	1.48	---	---	---	1.48

...End

Reservoir Report

Reservoir No. 2 - WET POND

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	56.00	257,683	0	0
4.00	60.00	378,676	1,272,718	1,272,718
6.00	62.00	420,000	798,676	2,071,394

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 24.0	0.0	0.0	0.0
Span in	= 24.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 50.00	0.00	0.00	0.00
Length ft	= 75.0	0.0	0.0	0.0
Slope %	= 2.67	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= ---	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 12.6	20.0	0.0	0.0
Crest El. ft	= 56.00	59.25	0.00	0.00
Weir Coeff.	= 3.00	3.00	0.00	0.00
Eqn. Exp.	= 1.50	1.50	0.00	0.00
Multi-Stage	= Yes	No	No	No

Tailwater Elevation = 49.00 ft

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

Stage / Storage / Discharge Table

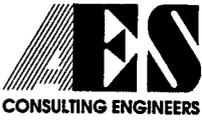
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0	56.00	33.82	---	---	---	0.00	0.00	---	---	0.00
0.40	127,272	56.40	35.15	---	---	---	9.53	0.00	---	---	9.53
0.80	254,544	56.80	36.43	---	---	---	26.96	0.00	---	---	26.96
1.20	381,815	57.20	37.66	---	---	---	49.53	0.00	---	---	37.66
1.60	509,087	57.60	38.86	---	---	---	76.26	0.00	---	---	38.86
2.00	636,359	58.00	40.02	---	---	---	106.58	0.00	---	---	40.02
2.40	763,631	58.40	41.14	---	---	---	140.10	0.00	---	---	41.14
2.80	890,903	58.80	42.24	---	---	---	176.54	0.00	---	---	42.24
3.20	1,018,174	59.20	43.31	---	---	---	215.69	0.00	---	---	43.31
3.60	1,145,446	59.60	44.35	---	---	---	257.38	12.42	---	---	56.78
4.00	1,272,718	60.00	45.37	---	---	---	301.44	38.97	---	---	84.35

Continues on next page...

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	Discharge cfs
4.20	1,352,586	60.20	45.88	---	---	---	324.33	55.56	---	---	101.43
4.40	1,432,453	60.40	46.37	---	---	---	347.77	73.99	---	---	120.37
4.60	1,512,321	60.60	46.86	---	---	---	371.75	94.11	---	---	140.98
4.80	1,592,189	60.80	47.35	---	---	---	396.25	115.78	---	---	163.13
5.00	1,672,056	61.00	47.83	---	---	---	421.28	138.90	---	---	186.73
5.20	1,751,924	61.20	48.30	---	---	---	446.80	163.38	---	---	211.69
5.40	1,831,791	61.40	48.78	---	---	---	472.83	189.15	---	---	237.93
5.60	1,911,659	61.60	49.24	---	---	---	499.34	216.15	---	---	265.39
5.80	1,991,527	61.80	49.71	---	---	---	526.32	244.32	---	---	294.03
6.00	2,071,394	62.00	50.16	---	---	---	553.78	273.62	---	---	323.78

...End



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

PROJECT GREENSPRINGS WEST - PH III
 PROJECT NO. 8656-A
 SUBJECT DRAINAGE DESIGN
 SHEET NO. 1 OF 1
 CALCULATED BY AWA DATE 10/27/99

$0.1'' = 363 \text{ CF/AC}$
 $363 \times 14.35 = 5209 \text{ CF OK}$

FOLDBAY AT OUTFALL - SYSTEM 9 Pre 16.6 AC.

DISTURBED D.A. = (5.5 AC) DISTURBED AREA \ll Post ~~14.35~~ 14.35 AC.

$67 \text{ cu yds/AC} \rightarrow (67)(5.5) = (368.5 \text{ CY})(27 \text{ CF/CY})$

$0.1'' / 14.35 \text{ AC}$
 $= 51,227 \text{ CF}$

OK $= 9949.5 \text{ CF}$

PROVIDE 85' LONG \times 30' WIDE \times 4' DEEP FOLDBAY
 $10200 \text{ CF} > 9949.5 \text{ CF}$

NOTE: THIS IS TO SUPPLEMENT THE EXISTING BUT NON-FUNCTIONING BASIN WHICH WAS DESIGNED TO FUNCTION AS A DISTRIBUTION BASIN FOR THIS DRAINAGE AREA.

$9945.9 / 1015 = 5.47 \text{ AC} = 3870$
 14.35

$5.5 \text{ AC} = 9949.5 \text{ CF}$

$0.1'' \times 14.35 \text{ AC} \times 10 = 1.43 \text{ AC} \times 1'' = 0.012 \text{ AC-FT} = 522.75 \text{ CF}$

SEDIMENT TRAP @ OUTFALL - SYSTEM 10

D.A. = 2.0 AC

Pre = 3.4 AC.
 Post = 1.66 + 0.41 = 2.57 AC.

$67 \text{ cu yds/AC} \rightarrow (67)(2) = 134 \text{ cu yds} = 3618 \text{ CF}$

PROVIDE 50' LONG \times 25' WIDE AVG \times 3' DEEP TRAP

$3750 \text{ CF} > 3618 \text{ CF}$

1.66 AC based on E drainage areas.
 Missing 1 AC \pm downslope of road
 to sed. trap.

GREENSPRINGS WEST
 PHASE III
 S-103-99

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	35.0	0.54	14.35	0.60	0.32	5.86	5.0	13.7	4.7	27.38	210.9	3.87	36	10.00	56.00	52.50	59.10	59.04	61.53	60.00	9-2 TO 9-1
2	1	40.0	0.65	13.81	0.50	0.32	5.54	5.0	13.5	4.7	26.01	47.16	3.68	36	0.50	56.20	56.00	59.19	59.13	61.53	61.53	9-3 TO 9-2
3	2	138.0	2.00	11.76	0.30	0.60	4.62	10.0	12.8	4.8	22.23	47.50	3.27	36	0.51	56.90	56.20	59.52	59.40	61.10	61.53	9-4 TO 9-3
4	3	120.0	0.20	9.76	0.60	0.12	4.02	5.0	12.2	4.9	19.74	47.16	3.36	36	0.50	57.50	56.90	59.60	59.55	63.36	61.10	9-5 TO 9-4
5	4	30.0	0.26	4.88	0.45	0.12	1.99	5.0	10.4	5.2	10.44	47.16	1.85	36	0.50	57.65	57.50	59.82	59.81	63.36	63.36	9-6 TO 9-5
6	5	22.0	0.40	4.62	0.30	0.12	1.88	10.0	10.3	5.3	9.88	67.73	2.68	30	2.73	58.25	57.65	59.76	59.83	62.00	63.36	9-7 TO 9-6
7	6	95.0	0.44	3.75	0.30	0.13	1.57	10.0	10.0	5.3	8.36	14.25	5.36	18	1.84	60.00	58.25	61.10	59.89	65.50	62.00	9-8 TO 9-7
8	7	120.0	0.44	3.31	0.40	0.18	1.44	5.0	7.3	6.1	8.70	13.17	5.95	18	1.57	62.83	60.00	63.96	61.19	69.18	65.50	9-9 TO 9-8
9	8	43.0	0.75	2.87	0.40	0.30	1.26	5.0	7.1	6.1	7.70	7.51	4.54	18	0.51	63.05	62.83	64.41	64.22	69.05	69.18	9-10 TO 9-9
10	9	92.0	0.60	1.99	0.50	0.30	0.86	5.0	6.0	6.5	5.58	7.43	3.17	18	0.50	63.51	63.05	64.98	64.73	68.44	69.05	9-11 TO 9-10
11	10	98.0	0.69	0.69	0.40	0.28	0.28	5.0	5.0	7.0	1.93	4.57	1.58	15	0.50	64.00	63.51	65.22	65.14	69.00	68.44	9-12 TO 9-11
12	10	42.0	0.70	0.70	0.40	0.28	0.28	5.0	5.0	7.0	1.96	4.57	1.60	15	0.50	63.72	63.51	65.17	65.14	68.44	68.44	9-13 TO 9-11
13	6	78.0	0.47	0.47	0.40	0.19	0.19	5.0	5.0	7.0	1.31	9.87	2.15	15	2.24	60.00	58.25	60.46	59.89	69.74	62.00	9-14 TO 9-7
14	4	110.0	0.10	4.68	0.60	0.06	1.91	5.0	11.8	5.0	9.52	31.18	4.22	24	1.90	59.59	57.50	60.68	59.81	65.63	63.36	9-15 TO 9-5
15	14	177.0	0.47	3.58	0.60	0.28	1.51	5.0	11.0	5.1	7.75	32.88	3.99	24	2.11	63.33	59.59	64.32	61.14	72.22	65.63	9-16 TO 9-15
16	15	31.0	0.93	2.24	0.40	0.37	0.97	5.0	6.1	6.5	6.31	7.54	3.82	18	0.52	63.50	63.34	64.79	64.71	71.03	72.22	9-17 TO 9-16
17	16	36.0	0.20	1.31	0.60	0.12	0.60	5.0	5.8	6.6	3.95	7.43	2.33	18	0.50	63.68	63.50	65.00	64.96	69.37	71.03	9-18 TO 9-17
18	17	70.0	0.29	0.94	0.40	0.12	0.38	5.0	5.4	6.8	2.55	8.87	3.06	15	1.89	65.00	63.68	65.64	65.08	70.50	69.37	9-19 TO 9-18
19	18	77.0	0.65	0.65	0.40	0.26	0.26	5.0	5.0	7.0	1.82	10.41	3.13	15	2.60	67.00	65.00	67.54	65.68	72.10	70.50	9-20 TO 9-19
20	17	30.0	0.17	0.17	0.60	0.10	0.10	5.0	5.0	7.0	0.71	6.67	0.61	15	1.07	64.00	63.68	65.08	65.08	69.37	69.37	9-21 TO 9-18
21	14	30.0	0.37	0.37	0.40	0.15	0.15	5.0	5.0	7.0	1.04	16.29	1.91	15	6.37	61.50	59.59	61.91	61.14	65.63	65.63	9-22 TO 9-15

OK
52.5

All
OK

All
OK

OK

OK

61.50

MATCHES
102
YR IN
POND

Project File: 865649.stm I-D-F File: jcc.IDF Total number of lines: 28 Run Date: 10-27-1999

NOTES: Intensity = 17.05 / (Tc + 1.50) ^ 0.48; Return period = 10 Yrs. ; Initial tailwater elevation = 59.04 (ft) **SYSTEM 9**

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim.Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
22	9	210.0	0.13	0.13	0.80	0.10	0.10	5.0	5.0	7.0	0.73	9.91	1.64	15	2.36	68.00	63.05	68.34	64.73	73.92	69.05	9-23 TO 9-10
23	2	233.0	0.47	1.40	0.40	0.19	0.59	5.0	6.5	6.3	3.72	9.65	3.85	15	2.23	61.40	56.20	62.17	59.40	65.83	61.53	9-24 TO 9-3
24	23	173.0	0.44	0.65	0.40	0.18	0.26	5.0	5.4	6.8	1.76	12.50	2.57	15	3.75	67.88	61.40	68.41	62.46	74.60	65.83	9-25 TO 9-24
25	24	42.0	0.21	0.21	0.40	0.08	0.08	5.0	5.0	7.0	0.59	13.07	1.65	15	4.10	69.60	67.88	69.91	68.61	74.60	74.60	9-26 TO 9-25
26	23	40.0	0.28	0.28	0.50	0.14	0.14	5.0	5.0	7.0	0.98	4.57	0.98	15	0.50	61.60	61.40	62.47	62.46	66.06	65.83	9-27 TO 9-24
27	15	135.0	0.87	0.87	0.30	0.26	0.26	10.0	10.0	5.3	1.39	8.17	2.21	15	1.60	65.50	63.34	65.97	64.71	68.00	72.22	9-28 TO 9-16
28	14	110.0	0.63	0.63	0.30	0.19	0.19	10.0	10.0	5.3	1.01	5.87	1.16	15	0.83	60.50	59.59	61.17	61.14	63.00	65.63	9-29 TO 9-15

ALL
OK

OK

OK

SYSTEM 9 OK
 - VELOCITIES OK
 - H&L OK
 - TW ELEV POWDIO OK
 - I'S OK
 - DA'S OK.
 8/1
 12-6-99

Project File: 865649.stm I-D-F File: jcc.IDF Total number of lines: 28 Run Date: 10-27-1999

NOTES: Intensity = 17.05 / (Tc + 1.50) ^ 0.48; Return period = 10 Yrs. ; Initial tailwater elevation = 59.04 (ft)

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim, Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	182.0	0.20	1.66	0.80	0.16	0.84	5.0	6.7	6.3	5.28	14.56	6.12	18	1.92	69.50	66.00	70.38	66.64	75.28	67.50	10-2 TO 10-1
2	1	43.0	0.57	1.46	0.50	0.28	0.68	5.0	6.5	6.3	4.32	7.51	4.09	18	0.51	69.72	69.50	70.53	70.43	75.28	75.28	10-3 TO 10-2
3	2	106.0	0.18	0.89	0.30	0.05	0.40	5.0	5.9	6.6	2.62	4.57	2.82	15	0.50	70.25	69.72	71.01	70.84	75.92	75.28	10-4 TO 10-3
4	3	100.0	0.56	0.71	0.40	0.22	0.34	5.0	5.4	6.8	2.34	4.57	3.29	15	0.50	70.75	70.25	71.37	71.09	77.68	75.92	10-5 TO 10-4
5	4	43.0	0.15	0.15	0.80	0.12	0.12	5.0	5.0	7.0	0.84	11.01	1.87	15	2.91	72.00	70.75	72.37	71.60	77.68	77.68	10-6 TO 10-5

OK

OK OK

OK CHANNEL DEPTH

SYSTEM #10 OK

Project File: 8656410.stm I-D-F File: jcc.IDF Total number of lines: 5 Run Date: 10-26-1999

NOTES: Intensity = 17.05 / (Tc + 1.50) ^ 0.48; Return period = 10 Yrs. ; Initial tailwater elevation = 66.64 (ft)

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim, Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	175.0	0.29	3.99	0.80	0.23	1.61	5.0	15.8	4.4	7.07	48.36	3.57	24	4.57	63.50	55.50	64.44	57.44	74.01	57.50	11-2 TO 11-1
2	1	42.0	0.10	3.70	0.80	0.08	1.38	5.0	15.6	4.4	6.07	7.43	4.65	18	0.50	66.79	66.58	67.82	67.62	74.01	74.01	11-3 TO 11-2
3	2	10.0	0.80	2.32	0.30	0.24	0.70	10.0	15.6	4.4	3.07	4.57	2.50	15	0.50	66.84	66.79	68.19	68.16	72.50	74.01	11-4 TO 11-3
4	3	94.0	1.52	1.52	0.30	0.46	0.46	15.0	15.0	4.5	2.05	9.79	2.70	15	2.30	69.00	66.84	69.57	68.20	73.50	72.50	11-5 TO 11-4
5	2	85.0	0.26	0.71	0.40	0.10	0.37	5.0	7.4	6.0	2.26	4.59	1.96	15	0.51	67.22	66.79	68.25	68.16	75.84	74.01	11-6 TO 11-3
6	2	75.0	0.57	0.57	0.40	0.23	0.23	5.0	5.0	7.0	1.59	11.28	4.82	15	3.05	71.00	68.71	71.51	69.04	75.30	74.01	11-7 TO 11-3
7	5	132.0	0.00	0.45	0.10	0.00	0.27	0.0	6.4	6.4	1.72	4.57	2.32	15	0.50	67.88	67.22	68.46	68.28	79.50	75.84	11-8 TO 11-6
8	7	268.0	0.45	0.45	0.60	0.27	0.27	5.0	5.0	7.0	1.89	4.57	3.14	15	0.50	69.22	67.88	69.77	68.58	75.71	79.50	11-9 TO 11-8

Low??

Plans show 15 inch.
18 inch used in calcs.

SYSTEM #11
All ok except
11-3 to 11-2 (18")
was shown as
15" on plan
sheet 10

MA TILLS 10-YEAR
USE IN POND

Project File: 8656411.stm

I-D-F File: jcc.IDF

Total number of lines: 8

Run Date: 10-26-1999

NOTES: Intensity = 17.05 / (Tc + 1.50) ^ 0.48; Return period = 10 Yrs. ; Initial tailwater elevation = 57.44 (ft)



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

PROJECT GREENSPRINGS WEST PHASE 3
 PROJECT NO. 8656-4
 SUBJECT Spread Calc's
 SHEET NO. 1 OF 3
 DATE OCT 12, 1999
 BY CWG

STORM WATER INLET COMPUTATIONS

INLET			Station	Drainage Area (Ac)	C	CA	Σ CA	I in/hr	Q-Inter (CFS)	Q Carry-Over (CFS)	Q1 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	L1 (ft) 15 P Effect L	L/Lt d (ft)	E (#16) h (ft)	Q Int CFS d/h	Q Carryover Spread	Remark
Number	Type	Length																												
WINDSOR RIDGE SOUTH LEFT																														
SS 9-26	DI-3B	4	17+40L	0.21	0.4	0.084	0.084	4	0.336		0.336	0.08	0.02	1.1	2	1.818	0.08	4	1	0.015	2	3.44	0.143	0.163	6.556	0.61	0.816	0.274	0.062	SYSTEM 9
SS 9-27	DI-3B	6	15+75L	0.28	0.5	0.14	0.14	4	0.56	0.062	0.622	0.023	0.02	2.9	2	0.69	0.08	4	0.987	0.015	2	3.44	0.143	0.161	5.882	1	1	0.622	0	
SS 9-2	DI-3C	6	13+35L	0.36	0.5	0.18	0.18	4	0.72	0	0.72	0.001	0.02	8.3	Flow Approaching From Down Station															
				0.18	0.8	0.144	0.144	4	0.576		1.296	0.001	0.02		2	0.08									9.8	0.134	0.27	0.496	6.7	
HP																														
SS 10-6	DI-3B	4	21+50L	0.15	0.8	0.12	0.12	4	0.48		0.48	0.013	0.02	3	2	0.667	0.08	4	0.984	0.015	2	3.44	0.143	0.161	4.452	0.898	0.984	0.472	0.008	SYSTEM 10
SS 10-2	DI-3A	2.5	23+60L	0.1	0.8	0.08	0.08	4	0.32	0.008	0.328	0.001	0.02	5.7	Flow Approaching From Down Station															
				0.1	0.8	0.08	0.08	4	0.32		0.648	0.001	0.02		2	0.08									6.1	0.12	0.27	0.444	6	
HP																														
SS 11-2	DI-3C	6	28+00L	0.12	0.8	0.096	0.096	4	0.384		0.384	0.001	0.02	6.3	Flow Approaching From Down Station															
				0.17	0.8	0.136	0.136	4	0.544		0.928	0.001	0.02		2	0.08									9.8	0.118	0.27	0.437	5.9	
HP																														
SS 9-23	DI-3B	4	33+25L	0.13	0.8	0.104	0.104	4	0.416		0.416	0.032	0.02	1.7	2	1.176	0.08	4	1	0.015	2	3.44	0.143	0.163	5.448	0.734	0.908	0.378	0.038	SYSTEM 9
SS 9-10	DI-3B	6	35+50L	0.75	0.4	0.3	0.3	4	1.2	0.038	1.238	0.023	0.02	5	2	0.4	0.08	4	0.875	0.015	2	3.44	0.143	0.145	8.307	0.722	0.9	1.115	0.123	
			36+50L	0.3	0.5	0.15	0.15	4	0.6	0.123	0.723	0.001	0.02		2	0.08									9.6	0.136	0.27	0.504	6.8	
SS 9-11	DI-3C	6		0.3	0.5	0.15	0.15	4	0.6	0.002	0.602	0.001	0.02	7.7	Flow Approaching From Up Station															
SS 9-12	DI-3B	6	37+50L	0.69	0.4	0.276	0.276	4	1.104		1.104	0.008	0.02	6.4	2	0.313	0.08	4	0.74	0.015	2	3.44	0.143	0.126	6.204	0.967	0.998	1.102	0.002	

OK JH



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PROJECT GREENSPRINGS WEST PHASE 3
 PROJECT NO. 8656-4
 SUBJECT Spread Calc's
 SHEET NO. 2 OF 3
 DATE OCT 12, 1999
 BY CWG

STORM WATER INLET COMPUTATIONS

INLET				Drainage Area (Ac)	C	CA	Σ CA	I in/hr	Q-Inter (CFS)	Q Carry-Over (CFS)	Q1 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	Lx (#15) Effect L	Lx/Ld	d (ft)	E (#16) h (ft)	Q Int CFS d/h	Q Carryover Spread	Remark
Number	Type	Length	Station																												
WINDSOR RIDGE SOUTH RIGHT																															
SS 9-25	DI-3B	4	17+40R	0.44	0.4	0.176	0.176	4	0.704	0.704	0.08	0.021	1.8	2	1.111	0.08	3.846	1	0.015	2	3.421	0.143	0.163	8.945	0.447	0.656	0.462	0.242	SYSTEM 9		
SS 9-24	DI-3B	6	15+75R	0.47	0.4	0.188	0.188	4	0.752	0.242	0.994	0.023	0.021	4.3	2	0.465	0.08	3.846	0.91	0.015	2	3.421	0.143	0.151	7.472	0.803	0.946	0.941	0.053		
SS 9-3	DI-3C	6	13+35	0.28	0.5	0.14	0.14	4	0.56	0.053	0.813	0.001	0.02	7.7	Flow Approaching From Down Station																
				0.37	0.5	0.185	0.185	4	0.74		1.353	0.001	0.02	8.4	Flow Approaching From Up Station																
HP																															
SS 10-5	DI-3B	4	21+50R	0.56	0.4	0.224	0.224	4	0.896	0.896	0.013	0.02	4.9	2	0.408	0.08	4	0.875	0.015	2	3.44	0.143	0.145	6.151	0.65	0.849	0.761	0.135	SYSTEM 10		
SS 10-4	DI-3B	4		0.18	0.5	0.09	0.09	4	0.36	0.135	0.495	0.013	0.02	3.1	2	0.645	0.08	4	0.982	0.015	2	3.44	0.143	0.161	4.517	0.886	0.98	0.485	0.01		
SS 10-3	DI-3C	6	23+60R	0.18	0.5	0.09	0.09	4	0.36	0.01	0.37	0.001	0.02	6.2	Flow Approaching From Down Station																
				0.39	0.5	0.195	0.195	4	0.78		1.15	0.001	0.02	8.6	Flow Approaching From Up Station																
HP																															
SS 11-6	DI-3B	4	27+25R	0.26	0.4	0.104	0.104	4	0.416	0.416	0.053	0.02	1.5	2	1.333	0.08	4	1	0.015	2	3.44	0.143	0.163	6.338	0.631	0.834	0.347	0.069	SYSTEM 11		
SS 11-3	DI-3A	2.5	25+00R	0.05	0.4	0.02	0.02	4	0.08	0.069	0.149	0.001	0.02	3.7	Flow Approaching From Down Station																
				0.05	0.4	0.02	0.02	4	0.08	0.235	0.464	0.001	0.02	5.6	Flow Approaching From Up Station																
SS 11-7	DI-3B	4	25+75R	0.57	0.4	0.228	0.228	4	0.912	0.912	0.03	0.02	3.4	2	0.588	0.08	4	0.97	0.015	2	3.44	0.143	0.159	7.551	0.53	0.743	0.877	0.235			
HP																															
SS 9-9	DI-3B	4	35+50R	0.44	0.4	0.176	0.176	4	0.704	0.704	0.023	0.02	3.3	2	0.606	0.08	4	0.977	0.015	2	3.44	0.143	0.16	6.189	0.646	0.846	0.596	0.108	SYSTEM 9		
SS 9-13	DI-3C	6	35+50R	0.22	0.5	0.11	0.11	4	0.44	0.108	0.548	0.001	0.02	7.4	Flow Approaching From Down Station																
				0.48	0.4	0.192	0.192	4	0.768		1.316	0.001	0.02	8.5	Flow Approaching From Up Station																

STORM WATER INLET COMPUTATIONS

Form LD 204
Rev 6-85

$$E = 1 - (1 - \frac{1}{L})^{1.8}$$

$$A = 0.015$$

ALLOWABLE SPREAD
"D" = 6'
"E" = 7'
"F" = 9'

RTE "D", "E", "F"

PROJ 8656-2 (GREENSPRINGS WEST PHASE II)

DATE 3/24/99

GLADE	INLET			STATION	DRAINAGE AREA (AC)	C	CA	CA	I	IN/HR	Q INCR (CFS)	Q CARRY-OVER (CFS)	Q _T GUTTER FLOW	S GUTTER SLOPE (FT/FT)	SX CROSS SLOPE (FT/FT)	T (SPREAD)	H (FT)	W/T	SW (FT/FT)	SW/SX	Eo (#10)	a	Sw-a/(12W)	Se (FT/FT) = Sx + SwEo	L (FT) 15	P EFFEC	LENGTH FT L/LT	d (FT)	E (#16)	h (FT)	Q _i INTERCEPTED CFS	d/h	Q _b CARRY-OVER CFS	T SPREAD @ SAG FT d/st	REMARKS	SHEET OF					
	NUMBER	TYPE	LENGTH (FT)																																		1	2	3	4	5
				RD "F"																																					
GLADE	13	3B	6	12+15L	0.89	0.40	0.36		4	1.42		1.42	.0127	.0208	6.3	Z	.32	.0833	4	1.00	3.5	.1458	.14	7.58	.79	.94	1.84	Q _b = 0.08	55'x5'-13												
SUMP	12	3C	6	11+63L	0.21	0.40	.08		4	0.34	0.08	0.42	.001		6.5'																										
	12	3C	6	11+62L	0.33	0.40	.13		4	0.53		0.53	.001		7.0'																										
				TOTAL								0.95	.001						.0833					9.6	0.13	0.27	0.48	6.25'x7'	55'x5'-12												
SUMP	11	3A	2.5	11+63K	0.16	0.40	.06		4	0.26		0.26	.001		4.8'																										
	11	3A	2.5	11+62K	0.19	0.40	.08		4	0.30		0.30	.001		5.5'																										
				TOTAL								0.56	.001						.0833					6.1	0.14	0.27	0.52	6.70'x7'	55'x5'-11												
				RD "E"																																					
GLADE	10	3B	4	51+70K	0.21	0.40	.08		4	0.34		0.34	.010		2.3	Z	0.87	.0833	4	1.0	3.5	.1458	.17	3.45	1.16	1.00	0.34	Q _b = 0.00	59'x5'-10												
SUMP	19	3C	6	49+76L	0.13	0.70	.09		4	0.36		0.36	.001																												
	19	3C	6	49+75L	0.14	0.70	.10		4	0.39		0.39	.001																												
				TOTAL								0.75	.001						.0833					7.6	0.12	0.27	0.44	5.77'x9'	59'x5'-19												
				RD "D"																																					
GLADE	18	3B	4	16+20K	0.49	0.40	.20		4	0.78		0.78	.0105		4.8	Z	0.42	.0833	4	0.90	3.5	.1458	.15	5.30	.75	.92	.72	Q _b = 0.06	53'x5'-18												
GLADE	17	3B	4	17+20K	0.58	0.40	.23		4	0.93	0.06	0.99	.0105		5.5	Z	0.36	.0833	4	0.85	3.5	.1458	.15	6.04	.66	.86	.85	Q _b = 0.14	55'x5'-17												

STORM WATER INLET COMPUTATIONS

Form LD 204
Rev 6-85

ALLOWABLE SPREAD

5' x 6' = 7'
5' = 9' 59+62 Down
= 7' 59+62 UP

$n = 1 - (1 - \frac{4}{K})^{1.8}$
 $n = 0.015$

GRADE
SUMP

DATE 3/24/99

RTE "E" "F" & "G"

PROJ 8656-2 (GREENSPRINGS WEST - PHASE II)

INLET NUMBER	TYPE	LENGTH (FT)	STATION	DRAINAGE AREA (AC)	C	CA	CA	I IN/HR	Q INCR (CFS)	Q CARRY-OVER (CFS)	Q _T 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)	a	Sw=a/(12W)	Se (FT/FT) = Sx + SwEo	LT (FT) 15 P EFFEC LENGTH FT	L/LT	d (FT)	E (#16)	h (FT)	Q _i INTERCEPTED CFS	d/h	Q _b CARRY-OVER CFS	T SPREAD @ SAG FT	SHEET OF	REMARKS
			RD "F"																														
GRADE	24	3B	4	17+15 L	0.38	0.40	.15	4	0.61		0.61	.0238	.0208	2.8	2	.71	.0833	4	.99	3.5	.1458	.17	5.82	.69	.88	0.54		Q _b = 0.08		55" 6-24			
GRADE	26	3B	6	20+05 L	0.89	0.40	.36	4	1.42		1.42	.0133	.0208	6.3	2	.32	.0833	4	.80	3.5	.1458	.14	7.78	.77	.93	1.32		Q _b = 0.10		55" 6-25			
SUMP	20	3C	6	18+61 L	0.25	0.40	.10	4	0.40	0.10	0.50	.001		7.0																			
	20	3C	6	18+60 L	0.18	0.40	.07	4	0.29	0.08	0.37	.001		6.0																			
			TOTAL																														
			9.6 .13 0.27 .48 6.25' < 7' 55" 6-20																														
GRADE	23	3B	6	17+20 K	0.54	0.40	.22	4	0.86		0.86	.0238	.0208	3.8	2	.53	.0833	4	.96	3.5	.1458	.16	6.83	.87	.98	.84		Q _b = 0.02		55" 6-23			
GRADE	25	3B	4	20+05 R	0.16	0.70	.11	4	0.45		0.45	.0133	.0208	2.9	2	.69	.0833	4	.99	3.5	.1458	.17	4.29	.93	.99	.45		Q _b IS NEG.		55" 6-25			
SUMP	19	3A	2.5	18+60 K	0.16	0.40	.06	4	0.26	0.02	0.28	.001		5.2																			
	19	3A	2.5	18+61 L	0.70	0.70	.07	4	0.28		0.28	.001		5.2																			
			TOTAL																														
			6.1 .14 0.27 .52 6.73' < 7' 55" 6-19																														
GRADE	10	3B	4	24+21 L	0.69	0.40	.28	4	1.10		1.10	.0071	.0208	6.6	2	.30	.0833	4	.77	3.5	.1458	.13	5.90	.68	.87	.96		Q _b = 0.14		55" 6-10			
GRADE	9	3B	6	22+00 L	0.54	0.40	.22	4	0.86	0.14	1.00	.0071	.0208	6.4	2	.31	.0833	4	.78	3.5	.1458	.13	5.63	1.07	1.00	1.00		Q _b = 0.00		55" 6-9			
			RD "G"																														
GRADE	8	3B	6	13+40 K	0.37	0.70	.26	4	1.04		1.04	.0208	.0208	4.6	2	.43	.0833	4	.90	3.5	.1458	.15	7.34	.82	.95	.99		Q _b = 0.05		55" 6-8			
GRADE	6	3B	4	11+30 K	0.13	0.70	.09	4	0.36	.05	0.41	.0158	.0208	2.5	2	.80	.0833	4	.99	3.5	.1458	.17	4.35	.92	.99	.41		Q _b IS NEG.		55" 6-6			
SUMP	5	3A	2.5	10+61 K	0.14	0.40	.06	4	0.22		0.22	.001		4.4																			
	5	3A	2.5	10+60 L	0.19	0.40	.08	4	0.30	0.12	0.42	.001		6.6																			
			TOTAL																														
			6.1 .145 0.27 .54 6.97' < 7' 55" 6-5																														
GRADE	13	3B	4	61+00 L	0.50	0.40	.20	4	0.80		0.80	.0175	.0208	4.2	2	.48	.0833	4	.74	3.5	.1458	.16	6.11	.66	.85	.68		Q _b = 0.12		55" 6-13			

Form LD 204
Rev 6-85

STORM WATER INLET COMPUTATIONS

$C = 1 - (1 - \frac{1}{2})^{1.8}$
 $n = 0.015$

ALLOWABLE SPREAD
"6" = 7'
"4" = 9' 59+62 DOWN
7' 59+62 UP

RTE "5" AND "6"

PROJ 8656-2 (GREENSPRINGS WEST - PHASE II)

gutter
sump

DATE 3/24/99

INLET	NUMBER	TYPE	LENGTH (FT)	STATION	DRAINAGE AREA (AC)	C	CA	I	Q INCR (CFS)	Q CARRY-OVER (CFS)	Q _T 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)	a	SW=a/(12W)	Se (FT/FT) = Sx + SwEo	L _T (FT) 15	P EFFEC LENGTH FT	L/L _T	d (FT)	E (#16)	h (FT)	Q _i INTERCEPTED CFS	d/h	Q _b CARRY-OVER CFS	T SPREAD @ SAG FT	REMARKS	SHEET OF		
																																			5	5
				RD "6"																																
GRAB	15	3B	4	58+25	0.36	0.70	.25	4	1.01		1.01	.0086	.0208	6.0	2	.33	.0833	4	.81	3.5	.1458	.14	5.88	.68	.87	.88	0.0	0.13						55#6-15		
				RD "6"																																
SUMP	16	3C	6	10+60 L	0.11	0.70	.08	4	0.31	0.13	0.44	.001		6.5																						
	16	3C	6	10+61 L	0.22	0.40	.09	4	0.35		0.35	.001		5.9																						
				TOTAL							0.79	.001					.0833						9.6	.12	.027	0.44	5.77	< 7'						55#6-16		
GRAB	14	3B	6	58+95K	1.08	0.40	.43	4	1.73		1.73	.0086	.0208	7.6	2	.26	.0833	4	.70	3.5	.1458	.12	7.93	.76	.92	1.59	0.0	0.14						55#6-14		
GRAB	12	3B	4	60+75K	0.26	0.70	.18	4	0.73		0.73	.0175	.0208	4.0	2	.50	.0833	4	.94	3.5	.1458	.16	5.88	.68	.87	0.64	0.0	0.09						55#6-12		
SUMP	4	3C	6	59+84K	0.06	0.70	.04	4	0.17	0.09	0.26	.001		5.0																						
	4	3C	6	59+83K	0.10	0.70	.07	4	0.28	0.14	0.42	.001		6.5																						
				TOTAL							0.68	.001					.0833						9.6	.12	.027	0.44	5.77	< 7'							55#6-4	

STORM WATER INLET COMPUTATIONS

Form LD 204
Rev 6-85

$$E = 1 - (1 - \frac{4}{L})^{1.8}$$

$$n = 0.015$$

ALLOWABLE SPREAD

7" = 7'
8" = 7' 67+64 DOWN
6" = 6' 67+64 UP

RTE E AND F

PROJ 8656-2 (GREENSPRINGS WEST PHASE II)

DATE 3/24/99

GLADG
sump

INLET	NUMBER	TYPE	LENGTH (FT)	STATION	DRAINAGE AREA (AC)	C	CA	E CA	I IN/HR	Q INCR (CFS)	Q CARRY-OVER (CFS)	Q _T 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)	a	Sw-a/(12W)	Se (FT/FT) = Sx + SwEo	L _T (FT) 15 P EFFEC LENGTH FT L/LT	d (FT)	E (#16)	h (FT)	Q _i INTERCEPTED CFS	d/h	Q _b CARRY-OVER CFS	T SPREAD @ SAG FT	SHEET OF	REMARKS					
																																		4	5			
				<u>RD "E"</u>																																		
SUMP	6	3A	2.5	67+01 L	0.16	0.70	.11		4	0.45		0.45	.001																									
	6	3A	2.5	67+02 L	0.04	0.70	.03		4	0.11		0.11	.001																									
				TOTAL									0.56	.001											6.1	0.14	0.27	0.52			6.7' < 7'			SS #7-6				
GLADG	10	3B	6	68+50 K	0.50	0.70	.35		4	1.40		1.40	.0209	.0208	5.5	2	.36	.0833	4	.85	3.5	.1458	.14	8.58	.70	.88	1.24			0.016			SS #7-10					
SUMP	5	3C	6	67+02 K	0.10	0.70	.07		4	0.28	0.16	0.44	.001																									
	5	3C	6	67+01 K	0.17	0.70	.12		4	0.48		0.48	.001																									
				TOTAL									0.92	.001											9.6	.13	0.27	0.48			6.25' < 7'			SS #7-5				
GLADG	13	3B	6	70+00 L	0.70	0.40	.28		4	1.12		1.12	.0209	.0208	4.7	2	.43	.0833	4	.90	3.5	.1458	.15	7.59	.79	.94	1.05			0.07			SS #7-13					
GLADG	9	3B	4	68+50 L	0.40	0.40	.16		4	0.64	0.07	0.71	.0209	.0208	3.4	2	.59	.0833	4	.78	3.5	.1458	.16	5.99	.67	.86	0.61			0.10			SS #7-9					
				<u>RD "F"</u>																																		
GLADG	12	3B	6	30+15 L	0.95	0.40	.38		4	1.52		1.52	.0191	.0208	6.0	2	.33	.0833	4	.81	3.5	.1458	.14	8.86	.68	.87	1.32			0.20			SS #7-12					
SUMP	8	3A	2.5	30+64 L	0.06	0.40	.02		4	0.10	0.20	0.30	.001																									
	8	3A	2.5	30+65 L	0.09	0.40	.04		4	0.14	0.10	0.24	.001																									
				TOTAL									0.54	.001											6.1	.14	0.27	0.52			6.7' < 7'			SS #7-8				
SUMP	7	3A	2.5	30+64 K	0.20	0.70	.14		4	0.56		0.56	.001																									
	7	3A	2.5	30+65 K	0.02	0.70	.01		4	0.06		0.06	.001																									
				TOTAL									0.62	.001											6.1	.145	0.27	0.54			6.97' < 7'			SS #7-7				



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

PROJECT GREENSPRINGS WEST PHASE 2
 PROJECT NO. 8656-2

SHEET NO. 1
 DATE MAR 24, 1999
 BY HWP

DESIGNER USED AN
 "n" VALUE OF 0.04 (+/-)
 BELOW

ROADSIDE DITCH DESIGN COMPUTATIONS

INLET				From Station	To Station	Side	Area (ac)	C	Tc (min)	1-2 in/hr	1-10 in/hr	S Ditch Slope (ft/ft)	Q-2 (CFS)	Q-2 Carryover (CFS)	Q-2 Cumula. (CFS)	Act Vel-2 (FPS)	Allow Vel-2 (FPS)	Lining Type	Q-10 (CFS)	Q-10 Carryover	Q-10 Cumula. (CFS)	Act Vel-10 (FPS)	Depth of Flow 10 (in.)	Remark
Number	Type	Length	Station																					
SS*5-2	D1-5		57+41	58+04	57+41	L	0.05	0.70	5	5.7	7.0	.01	.20	-	.20	1.92	2.5	GLASS	0.0406 .25	-	.25	.95	3.5	1.0' DEEP "V" DITCH
SS*5-14	D1-5		57+41	58+04	57+41	R	.55	0.40	10	4.5	6.0	.01	.99	-	.99	1.40	2.5	GLASS	0.0417 1.32	-	1.32	1.50	6.6	"
SS*5-4	D1-5		60+53	58+04	60+53	L	.18	0.70	5	5.7	7.0	.018	.72	-	.72	1.60	2.5	GLASS	0.04 .88	-	.88	1.70	5.0	"
SS*5-4	D1-5		60+53	62+55	60+53	L	.14	0.70	5	5.7	7.0	.017	.56	-	.56	1.50	2.5	GLASS	0.04 .69	-	.69	1.60	4.7	"
SS*5-15	D1-5		60+53	58+04	60+53	R	1.38	0.30	15	4.0	5.2	.018	1.66	-	1.66	2.0	2.5	GLASS	0.04 2.15	-	2.15	2.1	7.0	1.5' DEEP "V" DITCH
SS*5-15	D1-5		60+53	64+30	60+53	R	1.68	0.30	15	4.0	5.2	.017	2.02	-	2.02	2.1	2.5	GLASS	0.04 2.62	-	2.62	2.3	7.5	"
SS*5-5	D1-5		62+55	64+75	62+55	L	0.76	0.40	10	4.5	6.0	.017	1.37	-	1.37	1.9	2.5	GLASS	0.04 1.82	-	1.82	2.0	6.6	1.0' DEEP "V" DITCH
SS*5-6	D1-5		64+75	67+00	64+75	L	0.44	0.40	10	4.5	6.0	.017	.79	-	.79	1.6	2.5	GLASS	0.04 1.06	-	1.06	1.8	5.6	"
SS*5-16	D1-5		64+75	68+93	64+75	R	1.67	0.25	15	4.0	5.2	.017	1.67	-	1.67	1.9	2.5	GLASS	0.04 2.17	-	2.17	2.2	7.0	1.5' DEEP "V" DITCH
SS*5-7	D1-5		67+00	68+93	67+00	L	0.27	0.40	10	4.5	6.0	.017	.49	-	.49	1.4	2.5	GLASS	0.04 .65	-	.65	1.5	4.6	1.0' DEEP "V" DITCH
SS*5-8	D1-5		70+00	68+93	70+00	L	0.25	0.70	5	5.7	7.0	.02	1.00	-	1.00	1.8	2.5	GLASS	0.04 1.23	-	1.23	1.9	5.6	"
SS*5-9	D1-5		70+00	66+93	70+00	R	0.54	0.25	10	4.5	6.0	.02	.61	-	.61	1.6	2.5	GLASS	0.04 .81	-	.81	1.7	4.8	"

USE EC-2 LINING
 BASED ON BH CALC
 FOR BARE EARTH

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (In)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	240.0	0.05	15.47	0.70	0.04	5.90	5.0	34.2	3.1	18.34	51.30	7.90	30	2.08	57.50	52.50	58.93	53.54	66.50	0.00	SS#5-1 TO SS
2	1	165.0	0.08	14.87	0.70	0.06	5.65	5.0	33.8	3.1	17.65	18.69	6.13	24	0.91	59.00	57.50	60.59	59.46	65.92	66.50	SS#5-2 TO SS
3	2	160.0	0.24	14.79	0.70	0.17	5.59	5.0	33.3	3.1	17.59	15.50	5.60	24	0.63	60.00	59.00	62.29	61.00	63.89	65.92	SS#5-3 TO SS
4	3	210.0	0.76	11.49	0.40	0.30	4.35	10.0	32.6	3.2	13.82	21.81	5.35	24	1.24	62.60	60.00	63.92	62.78	66.63	63.89	SS#5-4 TO SS
5	4	220.0	0.44	10.73	0.40	0.18	4.05	10.0	32.0	3.2	12.97	20.47	5.48	24	1.09	65.00	62.60	66.28	64.19	70.25	66.63	SS#5-5 TO SS
6	5	225.0	0.27	7.55	0.40	0.11	2.86	10.0	31.3	3.2	9.26	8.03	5.24	18	0.78	66.75	65.00	69.19	66.86	73.95	70.25	SS#5-6 TO SS
7	6	290.0	0.25	7.28	0.70	0.17	2.75	5.0	30.3	3.3	9.03	8.02	5.11	18	0.78	69.00	66.75	72.24	69.38	75.00	73.95	SS#5-7 TO SS
8	7	44.0	0.54	2.53	0.40	0.22	1.12	10.0	12.3	4.9	5.46	4.22	4.45	15	0.57	69.25	69.00	73.06	72.64	75.00	75.00	SS#5-8 TO SS
9	8	145.0	0.21	1.99	0.40	0.08	0.90	5.0	11.6	5.0	4.51	5.40	3.68	15	0.93	70.60	69.25	74.05	73.11	79.08	75.00	SS#5-9 TO SS
10	9	160.0	0.35	1.78	0.70	0.24	0.82	5.0	10.9	5.2	4.21	5.24	3.43	15	0.88	72.00	70.60	75.19	74.28	76.30	79.08	SS#5-10 TO S
11	10	30.0	0.54	1.43	0.40	0.22	0.57	5.0	10.6	5.2	2.97	5.11	2.42	15	0.83	72.25	72.00	75.55	75.46	76.30	76.30	SS#5-11 TO S
12	11	60.0	0.89	0.89	0.40	0.36	0.36	10.0	10.0	5.3	1.90	5.11	1.55	15	0.83	72.75	72.25	75.75	75.68	76.75	76.30	SS#5-12 TO S
13	1	44.0	0.55	0.55	0.40	0.22	0.22	10.0	10.0	5.3	1.17	5.97	3.38	15	1.14	63.50	63.00	63.93	63.38	66.50	66.50	SS#5-2 TO SS
14	3	44.0	3.06	3.06	0.35	1.07	1.07	15.0	15.0	4.5	4.81	11.88	2.72	18	1.70	60.75	60.00	62.90	62.78	63.90	63.89	SS#5-4 TO SS
15	5	44.0	1.67	2.74	0.35	0.58	1.01	15.0	15.0	4.5	4.55	10.33	4.40	15	3.41	66.50	65.00	67.35	66.86	70.25	70.25	SS#5-6 TO SS
16	15	140.0	0.58	1.07	0.40	0.23	0.43	10.0	10.0	5.3	2.28	4.73	2.99	15	0.71	67.50	66.50	68.10	67.53	71.65	70.25	SS#5-16 TO S
17	16	100.0	0.49	0.49	0.40	0.20	0.20	5.0	5.0	7.0	1.37	7.40	2.50	15	1.75	69.25	67.50	69.72	68.27	73.25	71.65	SS#5-17 TO S
18	7	65.0	0.27	4.50	0.70	0.19	1.46	5.0	30.1	3.3	4.81	14.73	4.57	15	6.92	73.50	69.00	74.38	72.64	77.75	75.00	SS#5-8 TO SS
19	18	20.0	4.23	4.23	0.30	1.27	1.27	30.0	30.0	3.3	4.19	8.85	4.30	15	2.50	74.00	73.50	74.82	74.59	77.00	77.75	SS#5-19 TO S

Project File: 86562-5.stm

I-D-F File: jcc.IDF

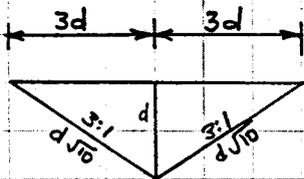
Total number of lines: 19

Run Date: 06-09-1999

NOTES: Intensity = 17.05 / (Tc + 1.50) ^ 0.48; Return period = 10 Yrs. ; Initial tailwater elevation = 53.54 (ft)

DITCH CHECK FOR BARE EARTH CONDITIONS: (2 YEAR STORM)

(ASSUME 3:1 SIDESLOPES)



$A = 3d^2$
 $P = 6.324d$

$R_H = \frac{3d^2}{6.324d} = 0.474d$

$(3d^2) \cdot (0.474d)^{2/3} = \frac{Q \cdot N}{1.486 \cdot S^{1/2}}$

$d \text{ (ft)} = \left[\frac{Q \cdot N^{0.04}}{2.710 \cdot S^{1/2}} \right]^{3/8} \quad V \left(\frac{\text{ft}}{\text{SEC}} \right) = \frac{Q}{3d^2}$

b/h
BUCHART
HORN, INC.
BASCO
ASSOCIATES
 ENGINEERS, ARCHITECTS AND PLANNERS

STRUCTURE #	Q ₂	n	SLOPE	d ₂	ACTUAL V ₂	REMARKS
SS # 5-2	0.20	0.03	0.01	0.24	1.16	BARE EARTH OKAY
SS # 5-14	0.99	0.03	0.01	0.44	1.73	OK
SS # 5-4	0.72	0.03	0.018	0.35	1.99	OK
	0.56	0.03	0.017	0.32	1.83	OK
SS # 5-15	1.66	0.03	0.018	0.47	2.46	PROVIDE EC-2 LINING
	2.02	0.03	0.017	0.52	2.53	PROVIDE EC-2 LINING
SS # 5-5	1.37	0.03	0.017	0.45	2.29	OK
SS # 5-6	0.79	0.03	0.017	0.36	2.00	OK
SS # 5-16	1.67	0.03	0.017	0.48	2.41	OK
SS # 5-7	0.49	0.03	0.017	0.30	1.77	OK
SS # 5-8	1.00	0.03	0.02	0.38	2.25	OK
SS # 5-9	0.61	0.03	0.02	0.32	1.99	OK

Project GREENSPRINGS WEST

Plan Sheet No. 15 Designer HWP

Sheet 1 of 1

N4. 2 8656-2 CULVERT #4 BLICK BAT 20

Rev. Date 6/8/97 Date _____

HYDROLOGICAL DATA:

D.A. : 3.75 AC.

$T_2 = 10$ MIN

$I_2 = 4.5$ IN/HR

$I_0 = 6.0$ IN/HR

2.0 3.5

AHW Controls

STATION: _____

100 yr. Flood plain _____ elev. _____

Design AHW depth _____ elev. _____

Structures _____ elev. _____

freq. T Welev. _____

Shoulder elev. _____

_____ elev. _____

Skew _____° Cover _____'

Inv. El. _____

So = _____

Inv. El. _____

Orig. Gr. Elev. _____

L = _____

Orig. Gr. Elev. _____

DISCHARGES USED

Q 2 : 5.91 CFS

Q 10 : 7.88 CFS

Q _____ : _____ CFS

Q _____ : _____ CFS

Q _____ : _____ CFS

RISK ASSESSMENT

ADT _____

Detours Available _____, Length _____

Overtopping Stage _____

Flood Plain Management _____

Criteria and Significant Impact _____

CULVERT TYPE & SIZE	Q	Q/B	HEADWATER COMPUTATIONS									CONT. HW. ELEV.	OUTLET VELOCITY		End Treat.	COMMENTS
			INLET CONT.		OUTLET CONTROL								C.M.	Smooth		
			HW/D	HW	Ke	dc	$\frac{dc^2}{2}$	ho	H	LSo	HW					
12" RCP	5.91		2.2	2.25		0.9	0.95	0.95	2.50	.44	3.01				NOT ADEQUATE	
15" RCP	5.91		1.3	1.63		0.9	1.08	1.08	0.80	.44	1.44				INLET CONTROLS	
				TOO HIGH.												
18" RCP	5.91		0.90	1.35		0.9	1.20	1.20	0.20	.44	0.96				INLET CONTROLS	
	7.88		1.10	1.65		0.9	1.20	1.20	0.60	.44	1.36				" "	

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

SUMMARY & RECOMMENDATIONS:



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

PROJECT GREENSPRINGS WEST - PH. II

PROJECT NO. 8656-2

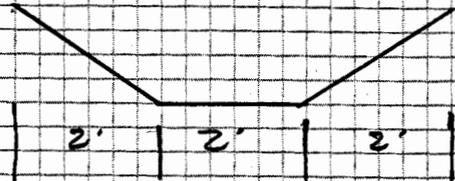
SUBJECT ADJOURY DITCH CALL'S

SHEET NO. 1 OF 1

CALCULATED BY KVA DATE 6/8/99

BLICK BAY ROAD (S.A. 613)

EXISTING OUTFALL



1.5'

PAGE 2-82

$n = 0.03$

SLOPE = 0.005 FT/FT

$$Q_2 = 5.91 \text{ CFS}$$

$$Q_{10} = 7.88 \text{ CFS}$$

$$\underline{V_2 = 2.20 \text{ FPS}}$$

$$\underline{V_{10} = 2.45 \text{ FPS}}$$

$$D_{10} = 0.90' = \underline{10.8''}$$

GRASS LINED OUTFALL IS ADEQUATE.

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	240.0	0.05	15.47	0.70	0.04	5.90	5.0	34.2	3.1	18.35	51.30	7.91	30	2.08	57.50	52.50	58.93	53.54	66.50	0.00	SS#5-1 TO SS
2	1	165.0	0.08	14.87	0.70	0.06	5.65	5.0	33.7	3.1	17.66	18.69	6.12	24	0.91	59.00	57.50	60.59	59.46	65.92 ³	66.50	SS#5-2 TO SS
3	2	160.0	0.24	14.79	0.70	0.17	5.59	5.0	33.3	3.1	17.60	15.50	5.60	24	0.83	60.00	59.00	62.29	61.00 ^b	63.89	65.92 ³	SS#5-3 TO SS
4	3	210.0	0.76	11.49	0.40	0.30	4.35	10.0	32.6	3.2	13.83	21.81	5.35	24	1.24	62.60	60.00	63.92	62.78	66.63	63.89	SS#5-4 TO SS
5	4	220.0	0.44	10.73	0.40	0.18	4.05	10.0	31.9	3.2	12.98	20.47	5.48	24	1.09	65.00	62.60	66.28	64.19	70.25	66.63	SS#5-5 TO SS
6	5	225.0	0.27	7.55	0.40	0.11	2.86	10.0	31.2	3.2	9.26	8.03	5.24	18	0.78	66.75	65.00	69.19	66.86	73.95	70.25	SS#5-6 TO SS
7	6	290.0	0.25	7.28	0.70	0.17	2.75	5.0	30.3	3.3	9.04	8.02	5.12	18	0.78	69.00	66.75	72.25	69.39	75.50	73.95	SS#5-7 TO SS
8	7	44.0	0.54	2.53	0.40	0.22	1.12	10.0	12.3	4.9	5.46	4.22	4.45	15	0.57	69.25	69.00	73.07	72.65	75.50	75.50	SS#5-8 TO SS
9	8	145.0	0.21	1.99	0.40	0.08	0.90	5.0	11.6	5.0	4.51	5.40	3.68	15	0.93	70.60	69.25	74.06	73.12	79.08	75.50	SS#5-9 TO SS
10	9	160.0	0.35	1.78	0.70	0.24	0.82	5.0	10.9	5.2	4.21	5.24	3.43	15	0.88	72.00	70.60	75.20	74.29	76.30	79.08	SS#5-10 TO S
11	10	30.0	0.54	1.43	0.40	0.22	0.57	5.0	10.6	5.2	2.97	5.11	2.42	15	0.83	72.25	72.00	75.56	75.47	76.30	76.30	SS#5-11 TO S
12	11	60.0	0.89	0.89	0.40	0.36	0.36	10.0	10.0	5.3	1.90	5.11	1.55	15	0.83	72.75	72.25	75.76	75.69	76.75	76.30	SS#5-12 TO S
13	1	44.0	0.55	0.55	0.40	0.22	0.22	10.0	10.0	5.3	1.17	5.97	3.38	15	1.14	63.50	63.00	63.93	63.38	66.50	66.50	SS#5-2 TO SS
14	3	44.0	3.06	3.06	0.35	1.07	1.07	15.0	15.0	4.5	4.81	11.88	2.72	18	1.70	60.75	60.00	62.90	62.78	63.90	63.89	SS#5-4 TO SS
15	5	44.0	1.67	2.74	0.35	0.58	1.01	15.0	15.0	4.5	4.55	10.33	4.40	15	3.41	66.50	65.00	67.35	66.86	70.25	70.25	SS#5-6 TO SS
16	15	140.0	0.58	1.07	0.40	0.23	0.43	10.0	10.0	5.3	2.28	4.73	2.99	15	0.71	67.50	66.50	68.10	67.53	71.65	70.25	SS#5-16 TO S
17	16	100.0	0.49	0.49	0.40	0.20	0.20	5.0	5.0	7.0	1.37	7.40	2.50	15	1.75	69.25	67.50	69.72	68.27	73.25	71.65	SS#5-17 TO S
18	7	65.0	0.27	4.50	0.70	0.19	1.46	5.0	30.1	3.3	4.81	6.94	5.65	15	1.54	73.50	72.50	74.38	73.27	77.75	75.50	SS#5-8 TO SS
19	18	20.0	4.23	4.23	0.30	1.27	1.27	30.0	30.0	3.3	4.19	8.85	4.30	15	2.50	74.00	73.50	74.82	74.59	77.00	77.75	SS#5-19 TO S

Project File: 86562-5.stm

I-D-F File: jcc.IDF

Total number of lines: 19

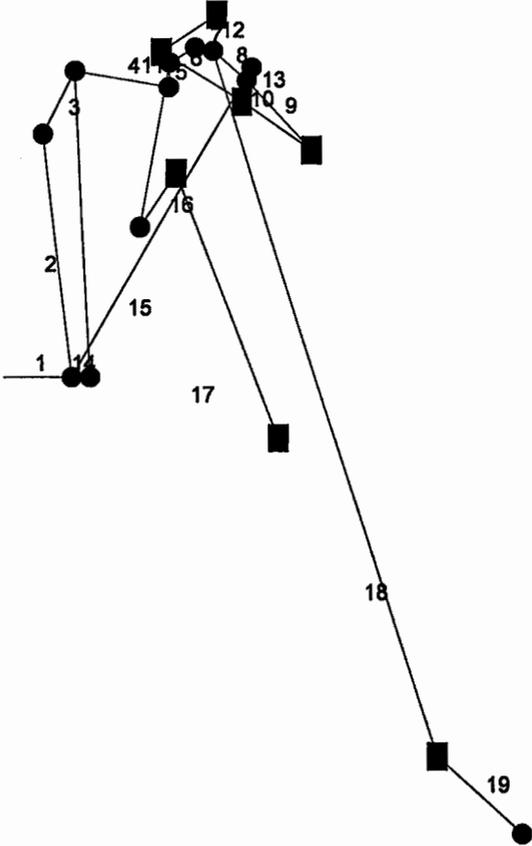
Run Date: 03-24-1999

NOTES: Intensity = 17.05 / (Tc + 1.50) ^ 0.48; Return period = 10 Yrs. ; Initial tailwater elevation = 53.54 (ft)

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	SS#5-1 TO SS#5-2	18.35	30 c	240.0	52.50	57.50	2.083	53.54	58.93	0.53	End
2	SS#5-2 TO SS#5-3	17.66	24 c	165.0	57.50	59.00	0.909	59.46	60.59	0.30	1
3	SS#5-3 TO SS#5-4	17.60	24 c	160.0	59.00	60.00	0.625	61.00*	62.29*	0.49	2
4	SS#5-4 TO SS#5-5	13.83	24 c	210.0	60.00	62.60	1.238	62.78	63.92	0.28	3
5	SS#5-5 TO SS#5-6	12.98	24 c	220.0	62.60	65.00	1.091	64.19	66.28	0.59	4
6	SS#5-6 TO SS#5-7	9.26	18 c	225.0	65.00	66.75	0.778	66.86*	69.19*	0.19	5
7	SS#5-7 TO SS#5-8	9.04	18 c	290.0	66.75	69.00	0.776	69.39*	72.25*	0.41	6
8	SS#5-8 TO SS#5-9	5.46	15 c	44.0	69.00	69.25	0.568	72.65*	73.07*	0.05	7
9	SS#5-9 TO SS#5-10	4.51	15 c	145.0	69.25	70.60	0.931	73.12*	74.06*	0.23	8
10	SS#5-10 TO SS#5-11	4.21	15 c	160.0	70.60	72.00	0.875	74.29*	75.20*	0.27	9
11	SS#5-11 TO SS#5-12	2.97	15 c	30.0	72.00	72.25	0.833	75.47*	75.56*	0.14	10
12	SS#5-12 TO SS#5-13	1.90	15 c	60.0	72.25	72.75	0.833	75.69*	75.76*	0.04	11
13	SS#5-2 TO SS#5-14	1.17	15 c	44.0	63.00	63.50	1.136	63.38	63.93	0.15	1
14	SS#5-4 TO SS#5-15	4.81	18 c	44.0	60.00	60.75	1.705	62.78*	62.90*	0.12	3
15	SS#5-6 TO SS#5-16	4.55	15 c	44.0	65.00	66.50	3.409	66.86	67.35	0.18	5
16	SS#5-16 TO SS#5-17	2.28	15 c	140.0	66.50	67.50	0.714	67.53	68.10	0.16	15
17	SS#5-17 TO SS#5-18	1.37	15 c	100.0	67.50	69.25	1.750	68.27	69.72	0.17	16
18	SS#5-8 TO SS#5-19	4.81	15 c	65.0	72.50	73.50	1.538	73.27	74.38	0.21	7
19	SS#5-19 TO SS#5-20	4.19	15 c	20.0	73.50	74.00	2.500	74.59	74.82	0.38	18
Project File: 86562-5.stm			I-D-F File: jcc.IDF			Total No. Lines: 19			Run Date: 03-24-1999		
NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.											

Hydraflow Plan View



Project file: 86562-5.stm

IDF file: jcc.IDF

No. Lines: 19

03-24-1999

Hydraflow DOT Report

Line No.	To Line	Length (ft)	Incr Area (ac)	Total Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	Inlet Time (min)	Tc Syst (min)	Rain (I) (in/hr)	Total Runoff (cfs)	Addnl Q (cfs)	Total Flow (cfs)	Capac. Full (cfs)	Veloc (ft/s)	Pipe Size (in)	Pipe Slope (%)	Inv Elev Up (ft)	Inv Elev Dn (ft)	HGL Elev Up (ft)	HGL Elev Dn (ft)	Gr/Rim El (ft)	Gr/Rim El (ft)	Line ID
1	End	540	6.45	37.22	0.22	1.42	11.96	20	64.4	2.3	27.78	0	27.78	44.84	6.47	36	0.6	61.72	58.47	63.4	60.31	66.25	66.25	0 SS#6-1 TO SS#6-2
2	1	84	0	30.77	0	0	10.54	0	64.2	2.3	24.52	0	24.52	34.25	6.82	30	0.93	62.5	61.72	64.16	63.51	67.5	66.25	SS#6-2 TO SS#6-3
3	2	107	0.16	30.77	0.7	0.11	10.54	5	63.8	2.3	24.58	0	24.58	24.3	5.35	30	0.47	63	62.5	65.18	64.74	69.65	67.5	SS#6-3 TO SS#6-4
4	3	78	0.34	28.41	0.4	0.14	9.36	5	63.5	2.3	21.88	0	21.88	28.46	4.46	30	0.64	63.5	63	66.16	65.86	69.65	69.65	SS#6-4 TO SS#6-5
5	4	70	0.13	27.74	0.7	0.09	9	5	63.3	2.3	21.07	0	21.07	30.04	4.29	30	0.71	64	63.5	66.87	66.62	70.38	69.65	SS#6-5 TO SS#6-6
6	5	60	2.46	7.63	0.35	0.86	2.68	20	32.1	3.2	8.59	0	8.59	20.35	5.47	18	5	67	64	68.12	67.3	71.5	70.38	SS#6-6 TO SS#6-7
7	6	140	0.37	5.17	0.7	0.26	1.82	5	31.6	3.2	5.88	0	5.88	12.16	4.3	18	1.79	69.5	67	70.43	68.38	73.7	71.5	SS#6-7 TO SS#6-8
8	7	60	0.54	4.8	0.4	0.22	1.56	15	31.3	3.2	5.06	0	5.06	7.04	4.84	15	1.58	70.45	69.5	71.35	70.63	74.64	73.7	SS#6-8 TO SS#6-9
9	8	154	0.69	4.26	0.4	0.28	1.35	15	30.6	3.3	4.4	0	4.4	5.04	3.67	15	0.81	71.75	70.5	72.89	72.02	75.9	74.64	SS#6-9 TO SS#6-10
10	9	145	3.57	3.57	0.3	1.07	1.07	30	30	3.3	3.53	0	3.53	8.38	3.73	15	2.24	75	71.75	75.75	73.22	78	75.9	SS#6-10 TO SS#6-11
11	3	94	0.26	0.76	0.7	0.18	0.38	5	10.3	5.3	2.01	0	2.01	11.18	2.67	15	3.99	66.75	63	67.32	65.86	70.85	69.65	SS#6-4 TO SS#6-12
12	11	45	0.5	0.5	0.4	0.2	0.2	10	10	5.3	1.07	0	1.07	5.9	2.15	15	1.11	67.25	66.75	67.66	67.55	71.2	70.85	SS#6-12 TO SS#6-13
13	3	140	1.08	1.44	0.4	0.43	0.68	15	15	4.5	3.07	0	3.07	8.85	3.42	15	2.5	66.5	63	67.2	65.86	70.78	69.65	SS#6-4 TO SS#6-14
14	13	40	0.36	0.36	0.7	0.25	0.25	5	5	7	1.76	0	1.76	6.26	2.41	15	1.25	67	66.5	67.57	67.57	70.95	70.78	SS#6-14 TO SS#6-15
15	4	30	0.33	0.33	0.7	0.23	0.23	5	5	7	1.62	0	1.62	6.85	1.48	15	1.5	65.7	65.25	66.64	66.62	69.65	69.65	SS#6-5 TO SS#6-16
16	5	80	2.3	19.98	0.35	0.8	6.22	15	63	2.3	14.6	0	14.6	13.86	4.65	24	0.5	64.4	64	67.74	67.3	70	70	SS#6-6 TO SS#6-17
17	16	226	2.86	17.68	0.35	1	5.42	15	62.1	2.4	12.8	0	12.8	13.68	4.07	24	0.49	65.5	64.4	68.76	67.79	70	70	SS#6-17 TO SS#6-18
18	17	214	0.26	14.82	0.7	0.18	4.42	5	61	2.4	10.52	0	10.52	11.6	3.35	24	0.35	66.25	65.5	69.59	68.98	71.03	71.03	SS#6-18 TO SS#6-19
19	18	30	0.43	12.59	0.7	0.3	3.4	5	60.9	2.4	8.1	0	8.1	8.31	4.59	18	0.83	66.5	66.25	70.09	69.86	71.03	71.03	SS#6-19 TO SS#6-20
20	19	144	0.58	12.16	0.35	0.2	3.1	10	60.3	2.4	7.42	0	7.42	9.29	4.2	18	1.04	68	66.5	71.21	70.26	73.5	71.03	SS#6-20 TO SS#6-21
21	20	75	11.58	11.58	0.25	2.89	2.89	60	60	2.4	6.95	0	6.95	9.1	3.93	18	1	68.75	68	71.92	71.49	71.5	71.5	SS#6-21 TO SS#6-22
22	18	142	0.54	0.92	0.4	0.22	0.37	10	10.9	5.1	1.89	0	1.89	6.21	1.54	15	1.23	68	66.25	70.02	69.86	72.45	71.03	SS#6-19 TO SS#6-23
23	22	35	0.38	0.38	0.4	0.15	0.15	10	10	5.3	0.81	0	0.81	6.69	0.66	15	1.43	68.5	68	70.08	70.07	72.45	72.45	SS#6-23 TO SS#6-24
24	18	148	0.16	1.05	0.7	0.11	0.47	5	15.4	4.4	2.08	0	2.08	5.14	1.69	15	0.84	67.5	66.25	70.06	69.86	72.1	71.03	SS#6-19 TO SS#6-25
25	24	34	0.89	0.89	0.4	0.36	0.36	15	15	4.5	1.6	0	1.6	6.79	1.3	15	1.47	68	67.5	70.15	70.13	72.1	72.1	SS#6-25 TO SS#6-26

Notes:
 Project file: SDFSDG.stm
 I-D-F file: jcc.IDF
 Total number of lines: 25
 Run date: 03-24-1999

Intensity = 17.0482 / (Tc + 1.5) ^ .4759791 (in/hr)
 Return period = 10 Yrs.

HGL EXCEEDS
 RIM ELEVATION
 NEED TO RE-ANALYZE

22(5-18)

HYDROLOGICAL DATA:

D.A. = 0.10 AC. $T_c = 5$ MIN $I_2 = 5.7$ IN/HK $I_0 = 7.0$ IN/HK

$C = 0.40$

$Q_2 = 0.23$ CFS

$Q_{10} = 0.28$ CFS

AHW Controls STATION: _____

100yr. Flood plain _____ elev. _____

Design AHW depth _____ elev. _____

Structures _____ elev. _____

DISCHARGES USED

$Q_2 = 0.23$ CFS

$Q_{10} = 0.28$ CFS

$Q_{100} =$ _____ CFS

$Q_{1000} =$ _____ CFS

$Q_{10000} =$ _____ CFS

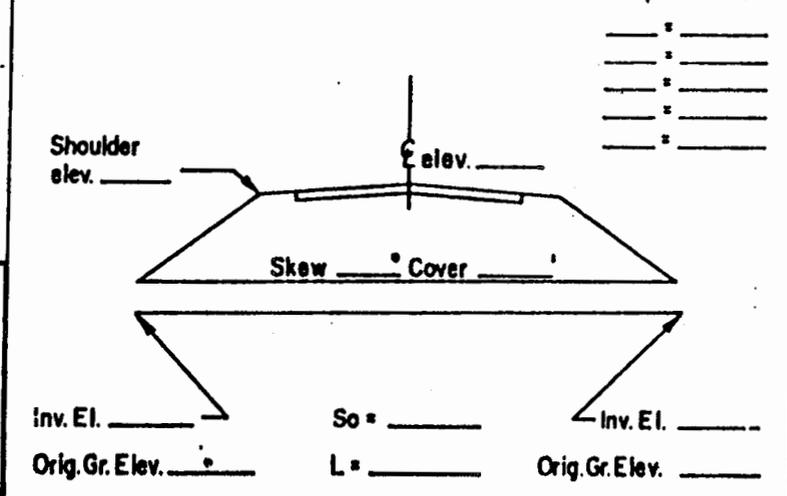
RISK ASSESSMENT ADT _____

Detours Available _____, Length _____

Overtopping Stage _____

Flood Plain Management _____

Criteria and Significant Impact _____



CULVERT TYPE & SIZE	Q	Q/B	HEADWATER COMPUTATIONS									CONT. HW. ELEV.	OUTLET VELOCITY		End Treat.	COMMENTS
			INLET CONT.			OUTLET CONTROL							C.M.	Smooth		
			HW/D	HW	K_e	dc	$\frac{dc \cdot D}{2}$	h_o	H	LSo	HW					
15" RCP	0.28		-	-		0.20	0.73	0.73	-	0.15	0.58					

SUMMARY & RECOMMENDATIONS:

Design Flood Exceed. Prob. _____ Elev. _____

Overtop Flood Exceed. Prob. _____ Elev. _____

Base Flood 1% Exceed. Prob. _____ Elev. _____

(Rev 1/85)

22(5-18)

HYDROLOGICAL DATA:

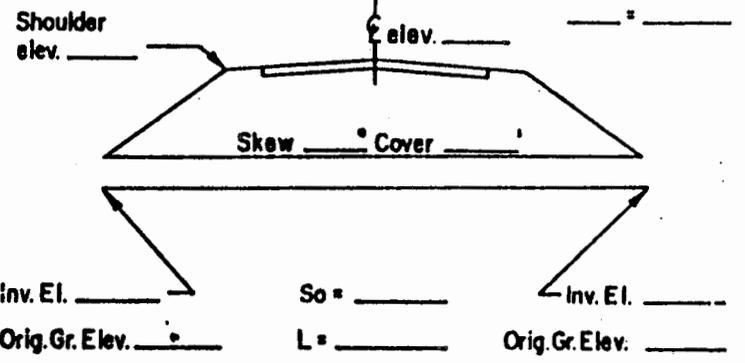
DA = <u>0.15</u> AC.	<u>TC = 5.41 in</u>	<u>I₂ = 5.7 in/hr</u>
<u>C.F.O. = 90</u>		<u>I₁₀ = 7.0 in/hr</u>

AHW Controls

STATION: _____

100yr. Flood plain _____ elev. _____
 Design AHW depth _____ elev. _____
 Structures _____ elev. _____

freq. T Welev.



DISCHARGES USED

Q <u>2</u> = <u>0.34</u> CFS
Q <u>10</u> = <u>0.42</u> CFS
Q _____ = _____ CFS
Q _____ = _____ CFS
Q _____ = _____ CFS

RISK ASSESSMENT

ADT _____
 Detours Available _____ Length _____
 Overtopping Stage _____
 Flood Plain Management _____
 Criteria and Significant Impact _____

HEADWATER COMPUTATIONS

CULVERT TYPE & SIZE	Q	Q/B	HEADWATER COMPUTATIONS								CONT. HW. ELEV.	OUTLET VELOCITY		End Treat.	COMMENTS
			INLET CONT.		OUTLET CONTROL							C.M.	Smooth		
			HW/D	HW	K _e	dc	$\frac{dc \cdot D}{2}$	h _o	H	LS _o					
<u>15" RCP</u>	<u>0.42</u>		-	-		<u>0.20</u>	<u>0.75</u>	<u>0.75</u>	-	<u>0.15</u>	<u>0.58</u>				

SUMMARY & RECOMMENDATIONS:

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

(Rev. 1/85)

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	130.0	0.00	25.51	0.00	0.00	6.81	0.0	48.3	2.7	18.09	45.64	5.83	30	1.24	60.71	59.10	62.13	60.72	64.50	0.00	SS#7-1 TO SS
2	1	335.0	0.00	6.63	0.00	0.00	2.66	0.0	47.1	2.7	7.14	14.10	4.81	18	1.80	66.75	60.71	67.77	62.74	77.50	64.50	SS#7-2 TO SS
3	2	105.0	0.00	6.63	0.00	0.00	2.66	0.0	46.7	2.7	7.16	10.25	4.90	18	0.95	67.75	66.75	68.77	68.13	78.80	77.50	SS#7-3 TO SS
4	3	182.0	0.27	6.63	0.70	0.19	2.66	5.0	46.1	2.7	7.21	8.92	4.87	18	0.96	69.50	67.75	70.52	69.18	74.75	78.80	SS#7-4 TO SS
5	4	34.0	0.19	6.36	0.70	0.13	2.47	5.0	46.0	2.7	6.70	6.79	5.46	15	1.47	70.00	69.50	71.50	71.01	74.75	74.75	SS#7-5 TO SS
6	5	52.0	0.22	5.23	0.70	0.15	1.96	5.0	45.8	2.7	5.33	5.49	4.35	15	0.96	70.50	70.00	72.55	72.08	75.00	74.75	SS#7-6 TO SS
7	6	34.0	0.15	5.01	0.40	0.06	1.81	5.0	45.7	2.7	4.92	6.79	4.01	15	1.47	71.00	70.50	73.02	72.76	75.00	75.00	SS#7-7 TO SS
8	7	77.0	0.40	3.91	0.40	0.16	1.37	10.0	45.3	2.7	3.74	7.81	3.06	15	1.95	72.50	71.00	73.72	73.40	77.10	75.00	SS#7-8 TO SS
9	8	158.0	0.70	0.70	0.40	0.28	0.28	10.0	10.0	5.3	1.49	7.23	2.29	15	1.67	75.14	72.50	75.63	73.94	80.25	77.10	SS#7-9 TO SS
10	8	30.0	0.50	0.50	0.70	0.35	0.35	5.0	5.0	7.0	2.45	7.23	2.19	15	1.67	73.00	72.50	73.97	73.94	77.10	77.10	SS#7-9 TO SS
11	5	22.0	0.94	0.94	0.40	0.38	0.38	10.0	10.0	5.3	2.00	14.61	2.67	15	6.82	71.50	70.00	72.07	72.08	74.50	74.75	SS#7-6 TO SS
12	7	50.0	0.95	0.95	0.40	0.38	0.38	10.0	10.0	5.3	2.03	6.85	1.65	15	1.50	71.75	71.00	73.46	73.40	75.85	75.00	SS#7-8 TO SS
13	8	20.0	2.31	2.31	0.25	0.58	0.58	45.0	45.0	2.7	1.58	6.26	1.30	15	1.25	72.75	72.50	73.95	73.94	77.00	77.10	SS#7-9 TO SS
14	1	35.0	6.53	18.88	0.22	1.44	4.15	30.0	32.9	3.2	13.15	45.46	3.61	30	1.23	61.14	60.71	62.68	62.74	64.45	64.50	SS#7-2 TO SS
15	14	225.0	0.33	0.99	0.22	0.07	0.22	5.0	5.7	6.7	1.45	11.35	2.25	15	3.09	68.09	61.14	68.57	62.91	71.39	64.45	SS#7-15 TO S
16	15	100.0	0.66	0.66	0.22	0.15	0.15	5.0	5.0	7.0	1.02	9.66	2.44	15	2.24	70.33	68.09	70.73	68.65	72.13	71.39	SS#7-16 TO S
17	14	370.0	3.32	11.36	0.22	0.73	2.50	20.0	31.7	3.2	8.05	15.13	5.22	18	2.08	68.82	61.14	69.90	62.91	74.60	64.45	SS#7-17 TO S
18	17	530.0	4.68	8.04	0.22	1.03	1.77	30.0	30.0	3.3	5.84	6.43	5.24	15	0.99	74.08	68.82	75.05	70.31	77.58	74.60	SS#7-18 TO S
19	18	195.0	3.36	3.36	0.22	0.74	0.74	20.0	20.0	4.0	2.93	7.15	3.34	15	1.23	76.47	74.08	77.15	75.28	78.92	77.58	SS#7-19 TO S

Project File: 86562-7.stm

I-D-F File: jcc.IDF

Total number of lines: 19

Run Date: 03-24-1999

NOTES: Intensity = 17.05 / (Tc + 1.50) ^ 0.48; Return period = 10 Yrs. ; Initial tailwater elevation = 60.72 (ft)

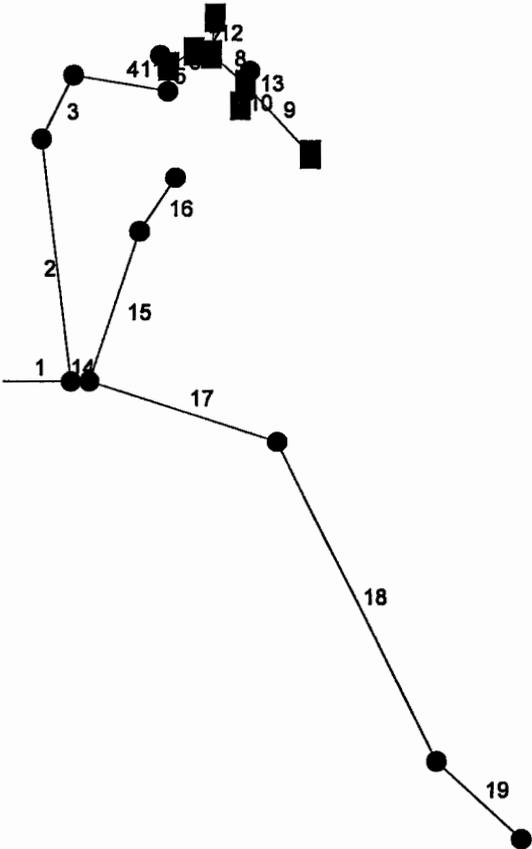
Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	SS#7-1 TO SS#7-2	18.09	30 c	130.0	59.10	60.71	1.238	60.72	62.13	0.61	End
2	SS#7-2 TO SS#7-3	7.14	18 c	335.0	60.71	66.75	1.803	62.74	67.77	0.36	1
3	SS#7-3 TO SS#7-4	7.16	18 c	105.0	66.75	67.75	0.952	68.13	68.77	0.41	2
4	SS#7-4 TO SS#7-5	7.21	18 c	182.0	67.75	69.50	0.962	69.18	70.52	0.49	3
5	SS#7-5 TO SS#7-6	6.70	15 c	34.0	69.50	70.00	1.471	71.01*	71.50*	0.58	4
6	SS#7-6 TO SS#7-7	5.33	15 c	52.0	70.00	70.50	0.962	72.08*	72.55*	0.21	5
7	SS#7-7 TO SS#7-8	4.92	15 c	34.0	70.50	71.00	1.471	72.76*	73.02*	0.38	6
8	SS#7-8 TO SS#7-9	3.74	15 c	77.0	71.00	72.50	1.948	73.40	73.72	0.22	7
9	SS#7-9 TO SS#7-13	1.49	15 c	158.0	72.50	75.14	1.671	73.94	75.63	0.18	8
10	SS#7-9 TO SS#7-10	2.45	15 c	30.0	72.50	73.00	1.667	73.94	73.97	0.09	8
11	SS#7-6 TO SS#7-11	2.00	15 c	22.0	70.00	71.50	6.818	72.08	72.07	0.21	5
12	SS#7-8 TO SS#7-12	2.03	15 c	50.0	71.00	71.75	1.500	73.40*	73.46*	0.04	7
13	SS#7-9 TO SS#7-14	1.58	15 c	20.0	72.50	72.75	1.250	73.94	73.95	0.03	8
14	SS#7-2 TO SS#7-15	13.15	30 c	35.0	60.71	61.14	1.229	62.74	62.68	0.23	1
15	SS#7-15 TO SS#7-16	1.45	15 c	225.0	61.14	68.09	3.089	62.91	68.57	0.08	14
16	SS#7-16 TO SS#7-17	1.02	15 c	100.0	68.09	70.33	2.240	68.65	70.73	0.14	15
17	SS#7-17 TO SS#7-18	8.05	18 c	370.0	61.14	68.82	2.076	62.91	69.90	0.40	14
18	SS#7-18 TO SS#7-19	5.84	15 c	530.0	68.82	74.08	0.992	70.31	75.05	0.23	17
19	SS#7-19 TO SS#7-20	2.93	15 c	195.0	74.08	76.47	1.226	75.28	77.15	0.28	18

Project File: 86562-7.stm I-D-F File: jcc.IDF Total No. Lines: 19 Run Date: 03-24-1999

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.

Hydraflow Plan View



Project file: 86562-7.stm	IDF file: jcc.IDF	No. Lines: 19	03-24-1999
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Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	70.0 ✓	0.35 ✓	0.98	0.70	0.24	0.62	5.0	5.9	6.6	4.07	6.69	5.25	15 ✓	1.43	78.50 ✓	77.50 ✓	79.31 *	78.21 *	82.50 ✓	0.00	SS#8-1 TO SS
2	1	120.0 ✓	0.23 ✓	0.63	0.40	0.09	0.37	5.0	5.2	6.9	2.56	5.11	3.08	15 ✓	0.83	79.50 ✓	78.50 ✓	80.14 *	79.71 *	83.95 ✓	82.50 ✓	SS#8-2 TO SS
3	2	34.0 ✓	0.40 ✓	0.40	0.70	0.28	0.28	5.0	5.0	7.0	1.96	6.79	2.75	15 ✓	1.47 ✓	80.00 ✓	79.50 ✓	80.56 *	80.52 *	83.95 ✓	83.95 ✓	SS#8-3 TO SS
Project File: 86562-8.stm								I-D-F File: jcc.IDF						Total number of lines: 3				Run Date: 03-18-1999				
NOTES: Intensity = 17.05 / (Tc + 1.50) ^ 0.48; Return period = 10 Yrs. ; Initial tailwater elevation = 78.21 (ft)																						

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	SS#8-1 TO SS#8-2	4.07	15 c	70.0	77.50	78.50	1.429	78.21	79.31	0.40	End
2	SS#8-2 TO SS#8-3	2.56	15 c	120.0	78.50	79.50	0.833	79.71	80.14	0.38	1
3	SS#8-3 TO SS#8-4	1.96	15 c	34.0	79.50	80.00	1.471	80.52	80.56	0.21	2
Project File: 86562-8.stm			I-D-F File: jcc.IDF			Total No. Lines: 3			Run Date: 03-18-1999		
NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.											



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PROJECT GREENSPRINGS WEST PHASE 2
 PROJECT NO. 8656-2

SHEET NO. 1
 DATE MAR 24, 1999
 BY HWP

ROADSIDE DITCH DESIGN COMPUTATIONS

n=0.050 (Grass)

INLET				From Station	To Station	Side	Area (ac)	C	Tc (min)	I-2 in/hr	I-10 in/hr	S Ditch Slope (ft/ft)	Q-2 (CFS)	Carryover (CFS)	Q-2 Cumula. (CFS)	Act Vel-2 (FPS)	Allow Vel-2 (FPS)	Lining Type	Q-10 (CFS)	Q-10 Carryover	Q-10 Cumula. (CFS)	Act Vel-10 (FPS)	Depth of Flow10 (in.)	Remark
Number	Type	Length	Station																					
SS#5-2	D1-5		57+41	58+04	57+41	L	0.05	0.70	5	5.7	7.0	.01	.20	-	.20	.92	2.5	GRASS	.25	-	.25	.95	3.5	1.0' DEEP "V" DITCH
SS#5-14	D1-5		57+41	58+04	57+41	R	.55	0.40	10	4.5	6.0	.01	.99	-	.99	1.40	2.5	GRASS	1.32	-	1.32	1.50	6.6	"
SS#5-4	D1-5		60+53	58+04	60+53	L	.18	0.70	5	5.7	7.0	.018	.72	-	.72	1.60	2.5	GRASS	.88	-	.88	1.70	5.0	"
SS#5-4	D1-5		60+53	62+55	60+53	L	.14	0.70	5	5.7	7.0	.017	.56	-	.56	1.50	2.5	GRASS	.69	-	.69	1.60	4.7	"
SS#5-15	D1-5		60+53	58+04	60+53	R	1.38	0.30	15	4.0	5.2	.018	1.66	-	1.66	2.0	2.5	GRASS	2.15	-	2.15	2.1	7.0	1.5' DEEP "V" DITCH
SS#5-15	D1-5		60+53	64+30	60+53	R	1.68	0.30	15	4.0	5.2	.017	2.02	-	2.02	2.1	2.5	GRASS	2.62	-	2.62	2.3	7.5	"
SS#5-5	D1-5		62+55	64+75	62+55	L	0.76	0.40	10	4.5	6.0	.017	1.37	-	1.37	1.9	2.5	GRASS	1.82	-	1.82	2.0	6.6	1.0' DEEP "V" DITCH
SS#5-6	D1-5		64+75	67+00	64+75	L	0.44	0.40	10	4.5	6.0	.017	.79	-	.79	1.6	2.5	GRASS	1.06	-	1.06	1.8	5.6	"
SS#5-16	D1-5		64+75	68+93	64+75	R	1.67	0.25	15	4.0	5.2	.017	1.67	-	1.67	1.9	2.5	GRASS	2.17	-	2.17	2.2	7.0	1.5' DEEP "V" DITCH
SS#5-7	D1-5		67+00	68+93	67+00	L	0.27	0.40	10	4.5	6.0	.017	.49	-	.49	1.4	2.5	GRASS	.65	-	.65	1.5	4.6	1.0' DEEP "V" DITCH
SS#5-8	D1-5		70+00	68+93	70+00	L	0.25	0.70	5	5.7	7.0	.02	1.00	-	1.00	1.8	2.5	GRASS	1.23	-	1.23	1.9	5.6	"
SS#5-9	D1-5		70+00	68+93	70+00	R	0.54	0.25	10	4.5	6.0	.02	.61	-	.61	1.6	2.5	GRASS	.81	-	.81	1.7	4.8	"
OUTFALL	-			SS#6-19	SS#6-18	-	2.86	0.30	15	4.0	5.1	.005	3.43	-	3.43	0.80	2.5	GRASS	4.38	-	4.38	0.90	5.2	1.0' DEEP "V" DITCH



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PROJECT GREENSPRINGS WEST Phase II
PROJECT NO. 8656-2
SUBJECT SEDIMENT TRAP - ROAD
SHEET NO. 1 OF 1
CALCULATED BY CWG DATE 4-26-99

TOTAL DRAINAGE AREA

0.98 AC

$$\text{Required Wet Volume} = 67 \text{ cft/AC} \times 0.98 \text{ AC} = 65.66 \text{ cy}$$

$$\text{Required Dry Volume} = 67 \text{ cft/AC} \times 0.98 \text{ AC} = 65.66 \text{ cy}$$

Provide 18' x 50' x 4' TRAP

$$\text{Volume} = 133 \text{ CUBIC YARDS}$$

$$\text{Bottom Elevation} = 75.50'$$

$$\text{Base of Stone Outlet} = 77.50'$$

$$\text{Crest of Stone Outlet} = 79.50'$$

SEE DETAIL

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.02

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	-----	-----	40.09	-----	-----	110.24	-----	-----	215.21	PRE- DEVELOPMENT
2	SCS Runoff	-----	-----	88.71	-----	-----	189.64	-----	-----	326.27	POST DEVELOPMENT
3	Reservoir	2	-----	39.39	-----	-----	45.72	-----	-----	152.49	Post Routed As-Bult

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.02

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	40.09	6	798	555,970	---	----	----	PRE- DEVELOPMENT
2	SCS Runoff	88.71	6	780	909,061	---	----	----	POST DEVELOPMENT
3	Reservoir	39.39	6	858	909,020	2	57.45	1,784,587	Post Routed As-Bult
8656-1 Lake F - As-Built Dec 10 2008.gpw						Return Period: 2 Year		Tuesday, Jan 27, 2009	
JR048_GREENSPRINGS_WEST - 191									

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.02

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description	
1	SCS Runoff	110.24	6	798	1,374,087	---	---	---	PRE- DEVELOPMENT	
2	SCS Runoff	189.64	6	780	1,901,258	---	---	---	POST DEVELOPMENT	
3	Reservoir	45.72	6	882	1,901,216	2	59.71	2,382,740	Post Routed As-Built	
8656-1 Lake F - As-Built Dec 10 2008.gpw					Return Period: 10 Year			Tuesday, Jan 27, 2009		

Hydrograph Summary Report

Hydraflow Hydrographs by Intellisolve v9.02

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	215.21	6	798	2,604,881	---	---	---	PRE- DEVELOPMENT
2	SCS Runoff	326.27	6	780	3,281,451	---	---	---	POST DEVELOPMENT
3	Reservoir	152.49	6	852	3,281,412	2	61.61	2,932,420	Post Routed As-Built

Pond Report

Hydraflow Hydrographs by Intellisolve v9.02

Tuesday, Jan 27, 2009

Pond No. 5 - As-Built May 5 2008

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 44.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	44.00	888	0	0
1.00	45.00	5,718	2,953	2,953
2.00	46.00	34,089	17,921	20,874
3.00	47.00	54,525	43,905	64,778
4.00	48.00	77,555	65,696	130,475
5.00	49.00	99,762	88,417	218,892
6.00	50.00	128,119	113,634	332,525
7.00	51.00	122,548	125,311	457,836
8.00	52.00	178,287	149,534	607,371
9.00	53.00	192,735	185,446	792,816
10.00	54.00	206,597	199,606	992,422
11.00	55.00	220,310	213,396	1,205,818
12.00	56.00	233,149	226,676	1,432,494
13.00	57.00	244,636	238,846	1,671,340
14.00	58.00	259,588	252,050	1,923,390
15.00	59.00	268,579	264,044	2,187,434
16.00	60.00	280,829	274,654	2,462,088
17.00	61.00	293,302	287,014	2,749,102
18.00	62.00	305,942	299,570	3,048,672
19.00	63.00	318,776	312,305	3,360,977

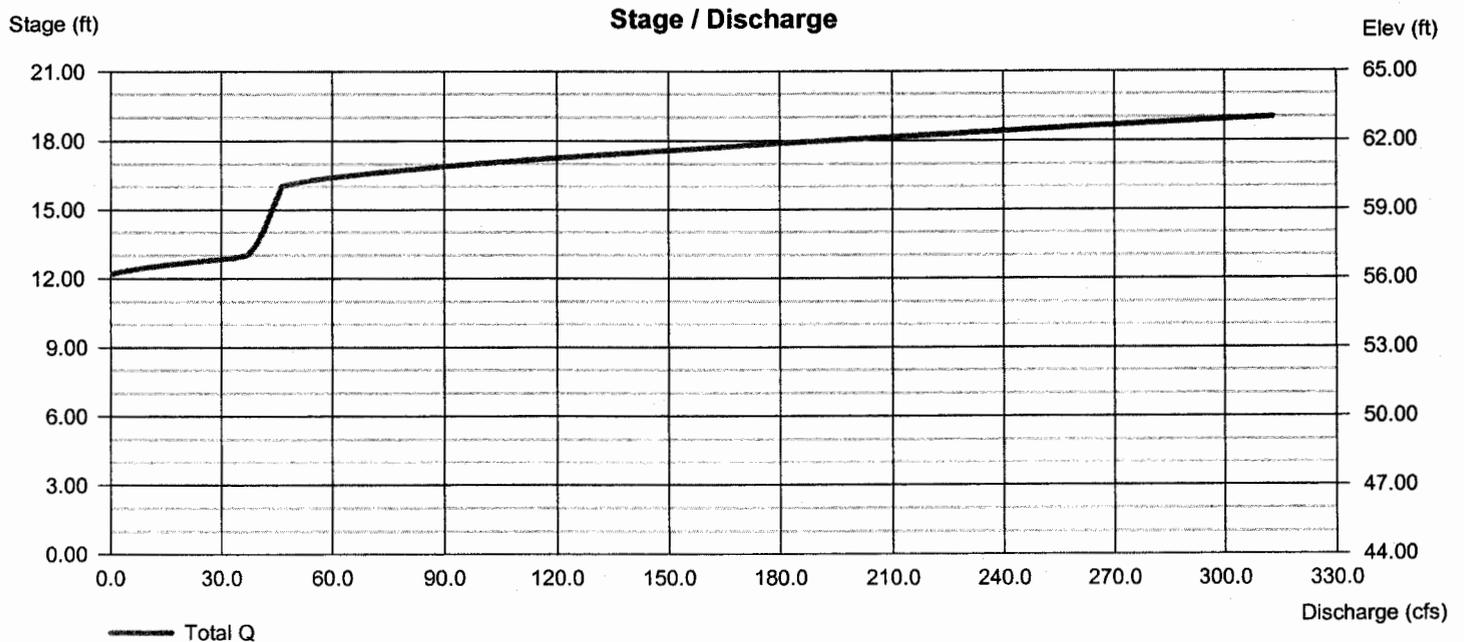
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 49.51	0.00	0.00	0.00
Length (ft)	= 75.00	0.00	0.00	0.00
Slope (%)	= 2.16	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.71	15.00	0.00	0.00
Crest El. (ft)	= 56.15	60.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	Ciplti	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet and outlet control. Weir risers are checked for orifice conditions.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.02

Tuesday, Jan 27, 2009

Pond No. 5 - As-Built May 5 2008

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 44.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	44.00	888	0	0
1.00	45.00	5,718	2,953	2,953
2.00	46.00	34,089	17,921	20,874
3.00	47.00	54,525	43,905	64,778
4.00	48.00	77,555	65,696	130,475
5.00	49.00	99,762	88,417	218,892
6.00	50.00	128,119	113,634	332,525
7.00	51.00	122,548	125,311	457,836
8.00	52.00	178,287	149,534	607,371
9.00	53.00	192,735	185,446	792,816
10.00	54.00	206,597	199,606	992,422
11.00	55.00	220,310	213,396	1,205,818
12.00	56.00	233,149	226,676	1,432,494
13.00	57.00	244,636	238,846	1,671,340
14.00	58.00	259,588	252,050	1,923,390
15.00	59.00	268,579	264,044	2,187,434
16.00	60.00	280,829	274,654	2,462,088
17.00	61.00	293,302	287,014	2,749,102
18.00	62.00	305,942	299,570	3,048,672
19.00	63.00	318,776	312,305	3,360,977

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 49.51	0.00	0.00	0.00
Length (ft)	= 75.00	0.00	0.00	0.00
Slope (%)	= 2.16	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.71	15.00	0.00	0.00
Crest El. (ft)	= 56.15	60.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	Ciplti	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet and outlet control. Weir risers are checked for orifice conditions.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	44.00	---	---	---	---	0.00	0.00	---	---	---	---	0.00
1.00	2,953	45.00	---	---	---	---	0.00	0.00	---	---	---	---	0.00
2.00	20,874	46.00	---	---	---	---	0.00	0.00	---	---	---	---	0.00
3.00	64,778	47.00	---	---	---	---	0.00	0.00	---	---	---	---	0.00
4.00	130,475	48.00	---	---	---	---	0.00	0.00	---	---	---	---	0.00
5.00	218,892	49.00	---	---	---	---	0.00	0.00	---	---	---	---	0.00
6.00	332,525	50.00	---	---	---	---	0.00	0.00	---	---	---	---	0.00
7.00	457,836	51.00	---	---	---	---	0.00	0.00	---	---	---	---	0.00
8.00	607,371	52.00	---	---	---	---	0.00	0.00	---	---	---	---	0.00
9.00	792,816	53.00	---	---	---	---	0.00	0.00	---	---	---	---	0.00
10.00	992,422	54.00	---	---	---	---	0.00	0.00	---	---	---	---	0.00
11.00	1,205,818	55.00	---	---	---	---	0.00	0.00	---	---	---	---	0.00
12.00	1,432,494	56.00	---	---	---	---	0.00	0.00	---	---	---	---	0.00
13.00	1,671,340	57.00	36.94	---	---	---	36.94	0.00	---	---	---	---	36.94
14.00	1,923,390	58.00	41.22	---	---	---	41.21	0.00	---	---	---	---	41.21
15.00	2,187,434	59.00	43.94	---	---	---	43.94	0.00	---	---	---	---	43.94
16.00	2,462,088	60.00	46.46	---	---	---	46.43	0.00	---	---	---	---	46.43
17.00	2,749,102	61.00	48.85	---	---	---	48.85	49.95	---	---	---	---	98.80
18.00	3,048,672	62.00	51.13	---	---	---	51.13	141.28	---	---	---	---	192.41
19.00	3,360,977	63.00	53.32	---	---	---	53.29	259.55	---	---	---	---	312.84

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

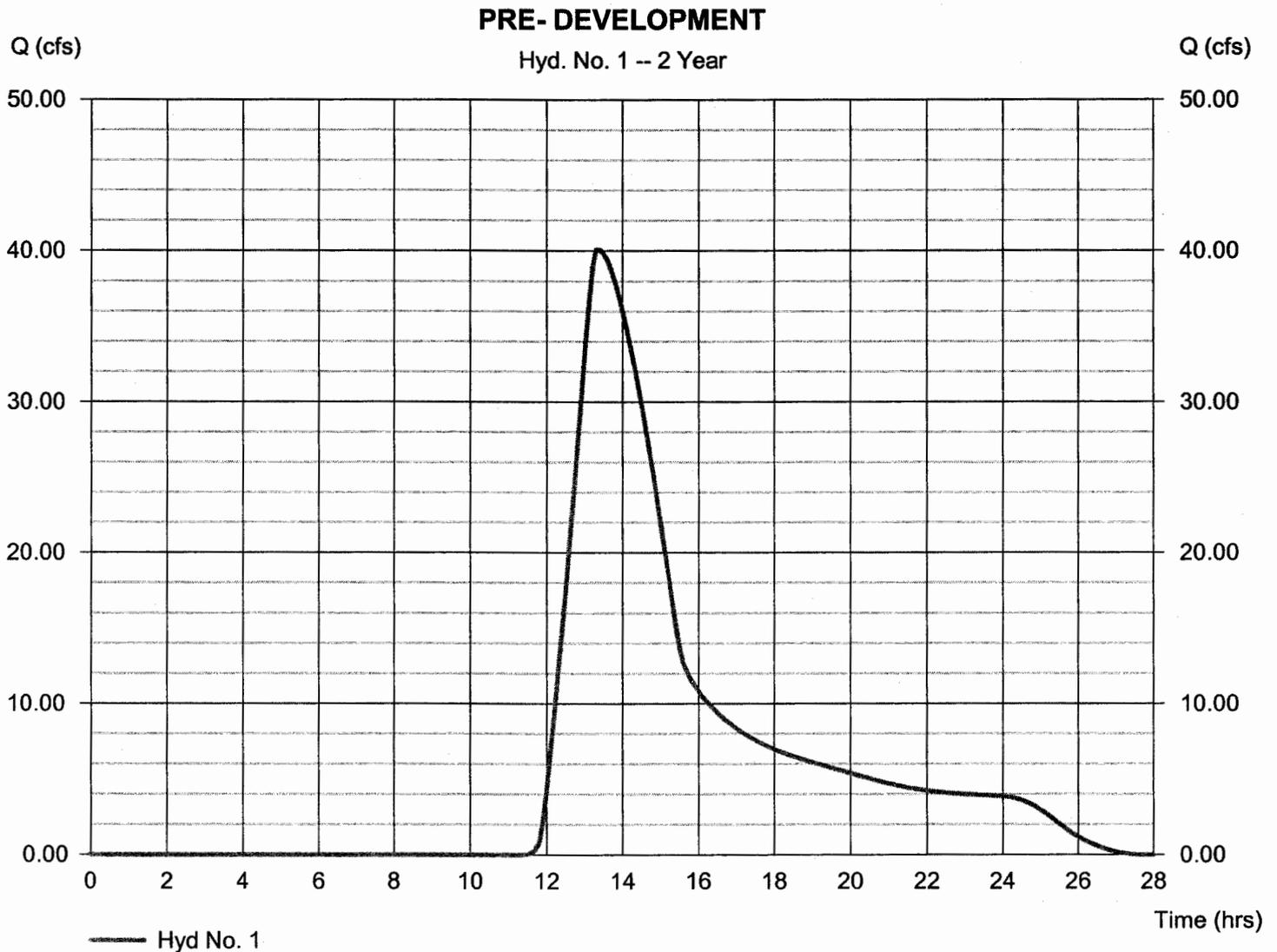
Tuesday, Jan 27, 2009

Hyd. No. 1

PRE- DEVELOPMENT

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 6 min
Drainage area = 153.300 ac
Basin Slope = 0.7 %
Tc method = LAG
Total precip. = 3.50 in
Storm duration = 24 hrs

Peak discharge = 40.09 cfs
Time to peak = 798 min
Hyd. volume = 555,970 cuft
Curve number = 70
Hydraulic length = 3550 ft
Time of conc. (Tc) = 139.93 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intellisolve v9.02

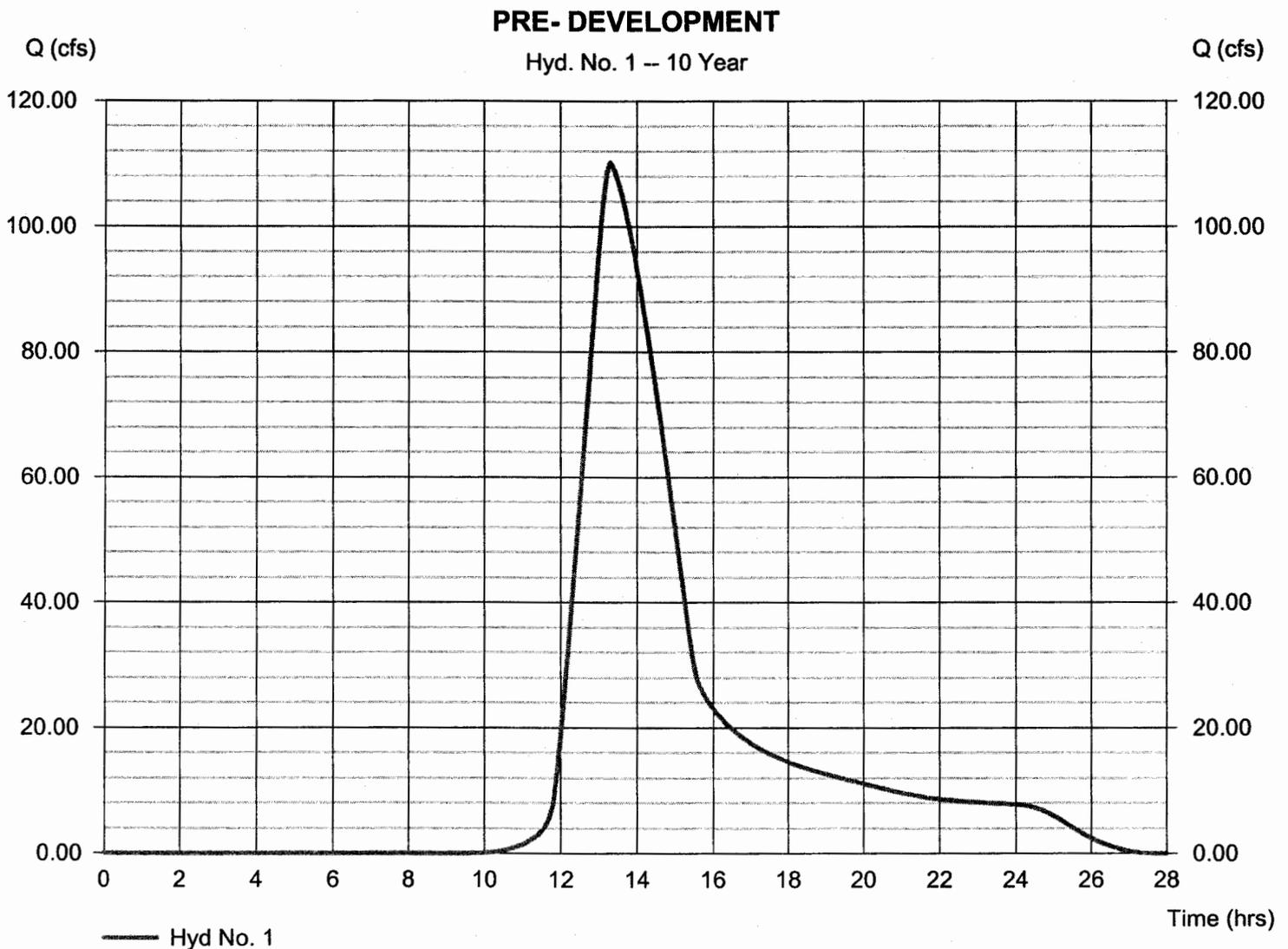
Tuesday, Jan 27, 2009

Hyd. No. 1

PRE- DEVELOPMENT

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 6 min
Drainage area = 153.300 ac
Basin Slope = 0.7 %
Tc method = LAG
Total precip. = 5.60 in
Storm duration = 24 hrs

Peak discharge = 110.24 cfs
Time to peak = 798 min
Hyd. volume = 1,374,087 cuft
Curve number = 70
Hydraulic length = 3550 ft
Time of conc. (Tc) = 139.93 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

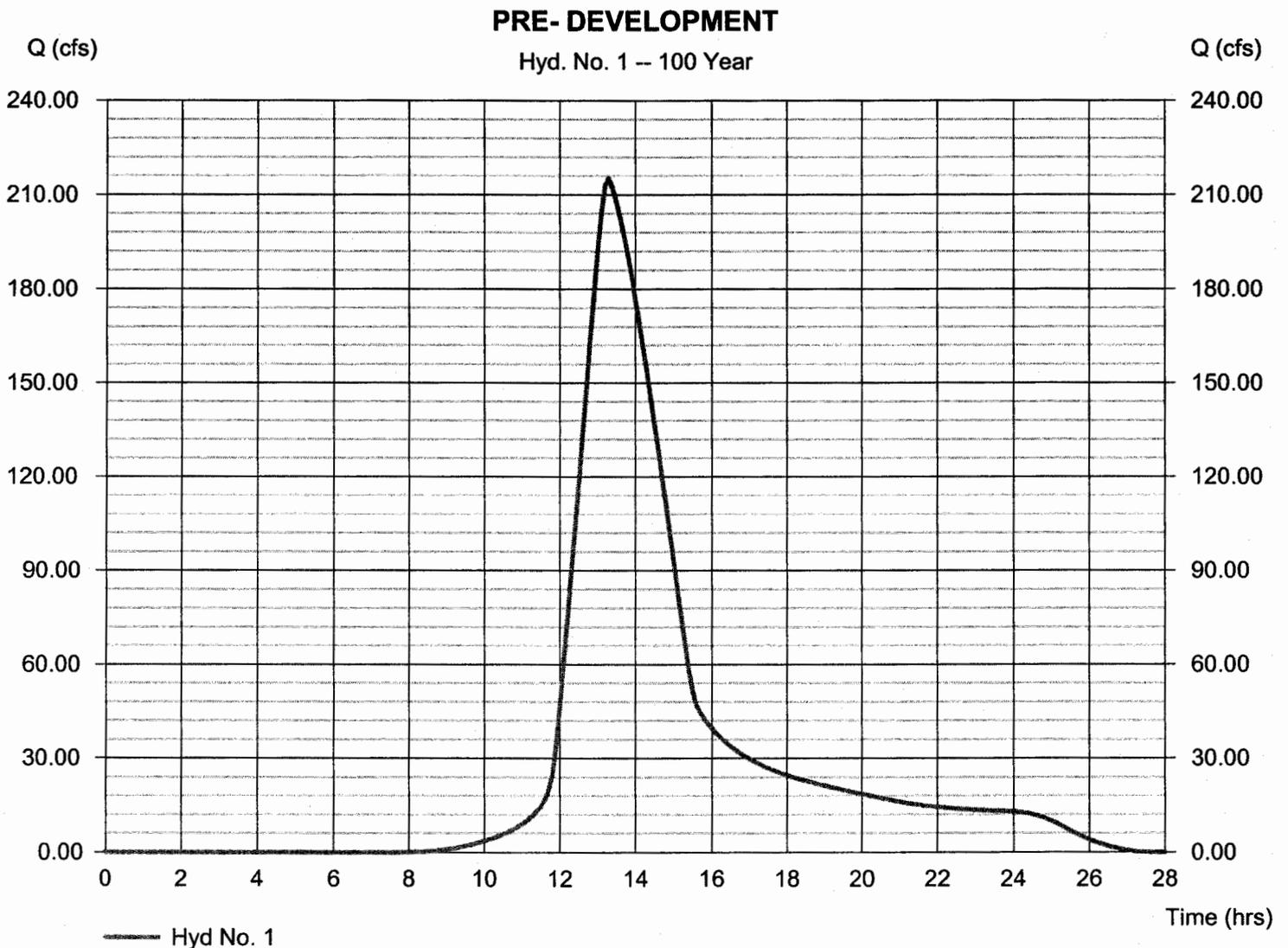
Tuesday, Jan 27, 2009

Hyd. No. 1

PRE- DEVELOPMENT

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 6 min
Drainage area = 153.300 ac
Basin Slope = 0.7 %
Tc method = LAG
Total precip. = 8.30 in
Storm duration = 24 hrs

Peak discharge = 215.21 cfs
Time to peak = 798 min
Hyd. volume = 2,604,881 cuft
Curve number = 70
Hydraulic length = 3550 ft
Time of conc. (Tc) = 139.93 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

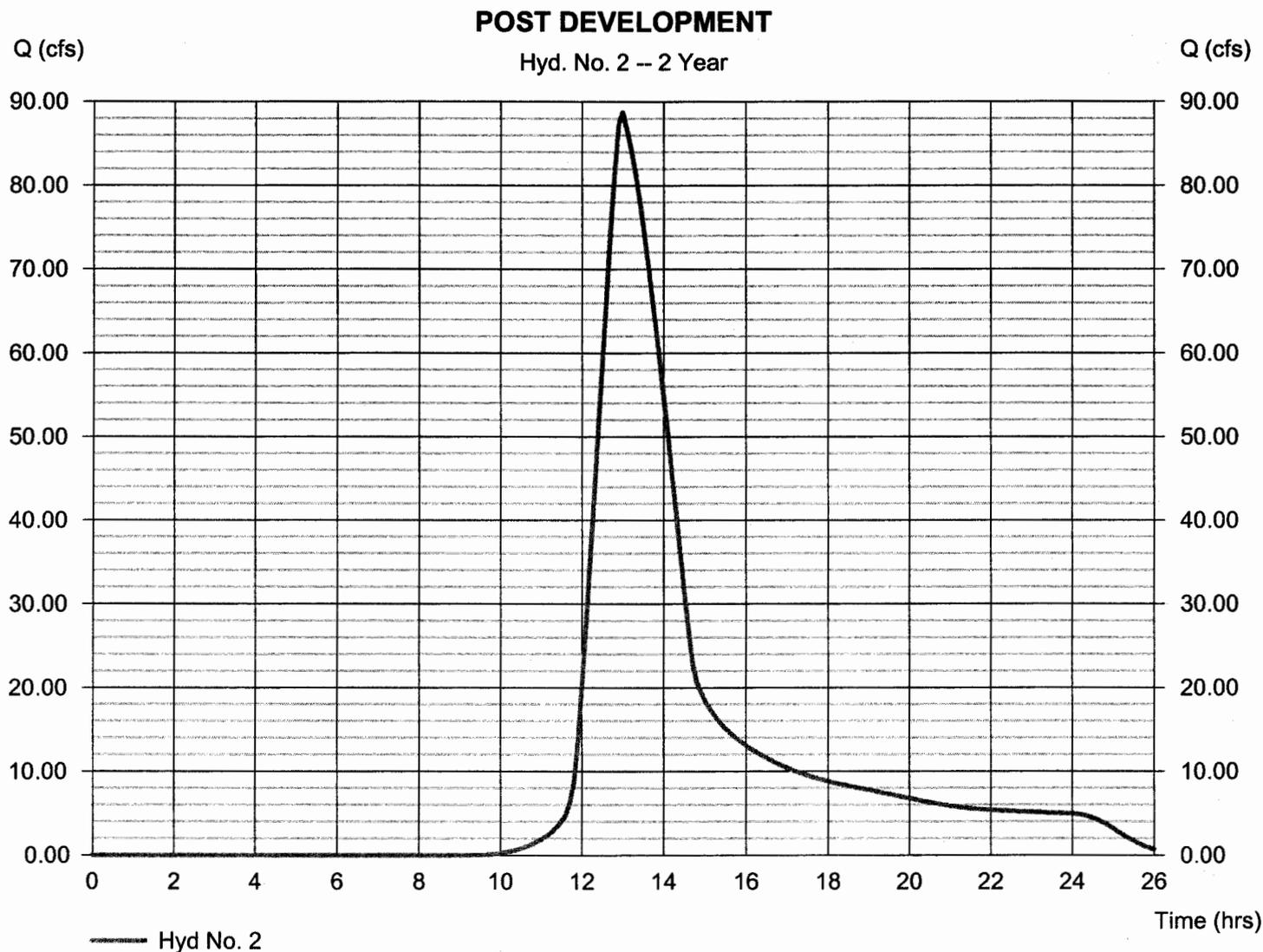
Tuesday, Jan 27, 2009

Hyd. No. 2

POST DEVELOPMENT

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 6 min
Drainage area = 154.800 ac
Basin Slope = 0.7 %
Tc method = LAG
Total precip. = 3.50 in
Storm duration = 24 hrs

Peak discharge = 88.71 cfs
Time to peak = 780 min
Hyd. volume = 909,061 cuft
Curve number = 80
Hydraulic length = 3550 ft
Time of conc. (Tc) = 104.86 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

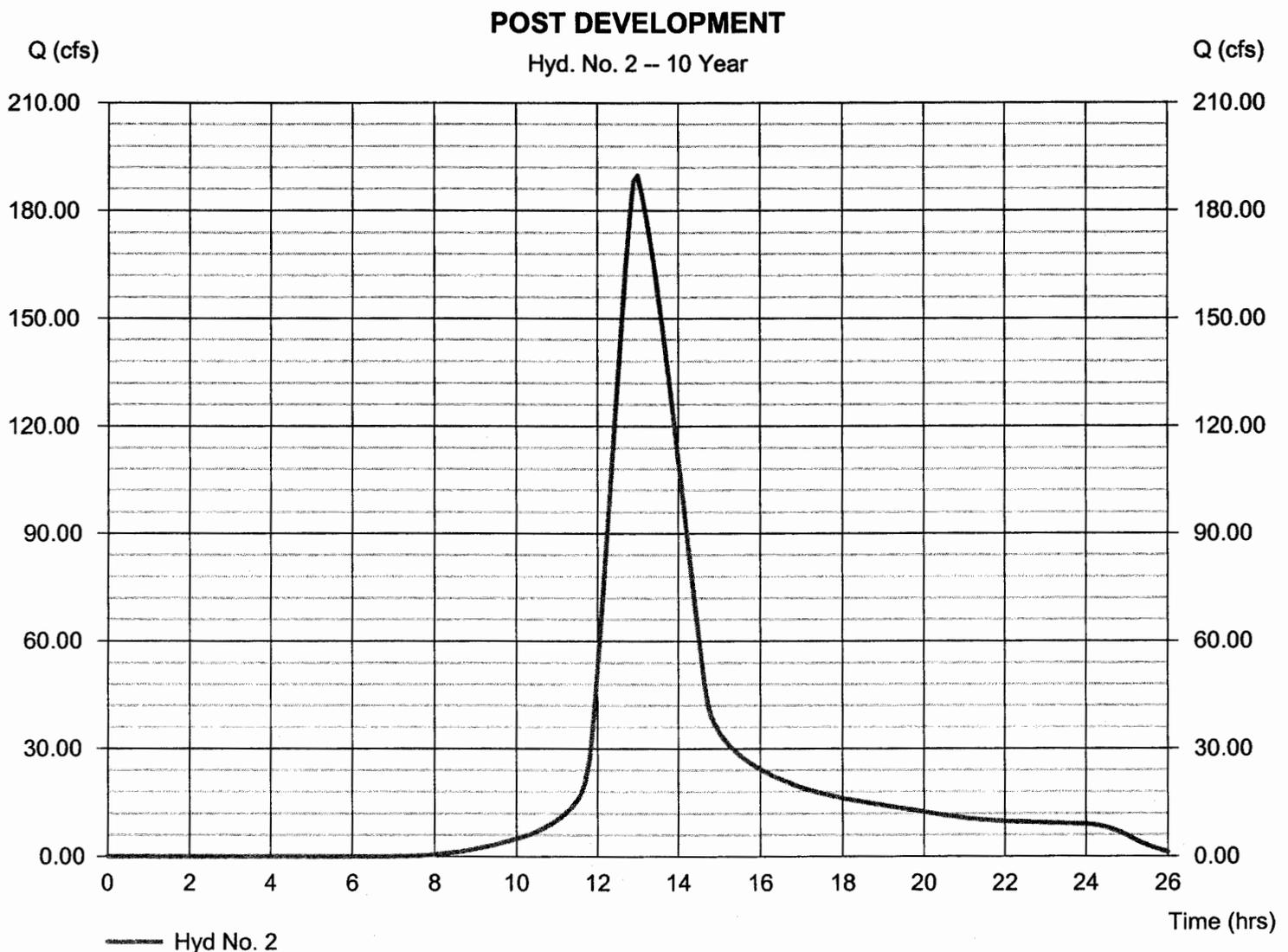
Tuesday, Jan 27, 2009

Hyd. No. 2

POST DEVELOPMENT

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 6 min
Drainage area = 154.800 ac
Basin Slope = 0.7 %
Tc method = LAG
Total precip. = 5.60 in
Storm duration = 24 hrs

Peak discharge = 189.64 cfs
Time to peak = 780 min
Hyd. volume = 1,901,258 cuft
Curve number = 80
Hydraulic length = 3550 ft
Time of conc. (Tc) = 104.86 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

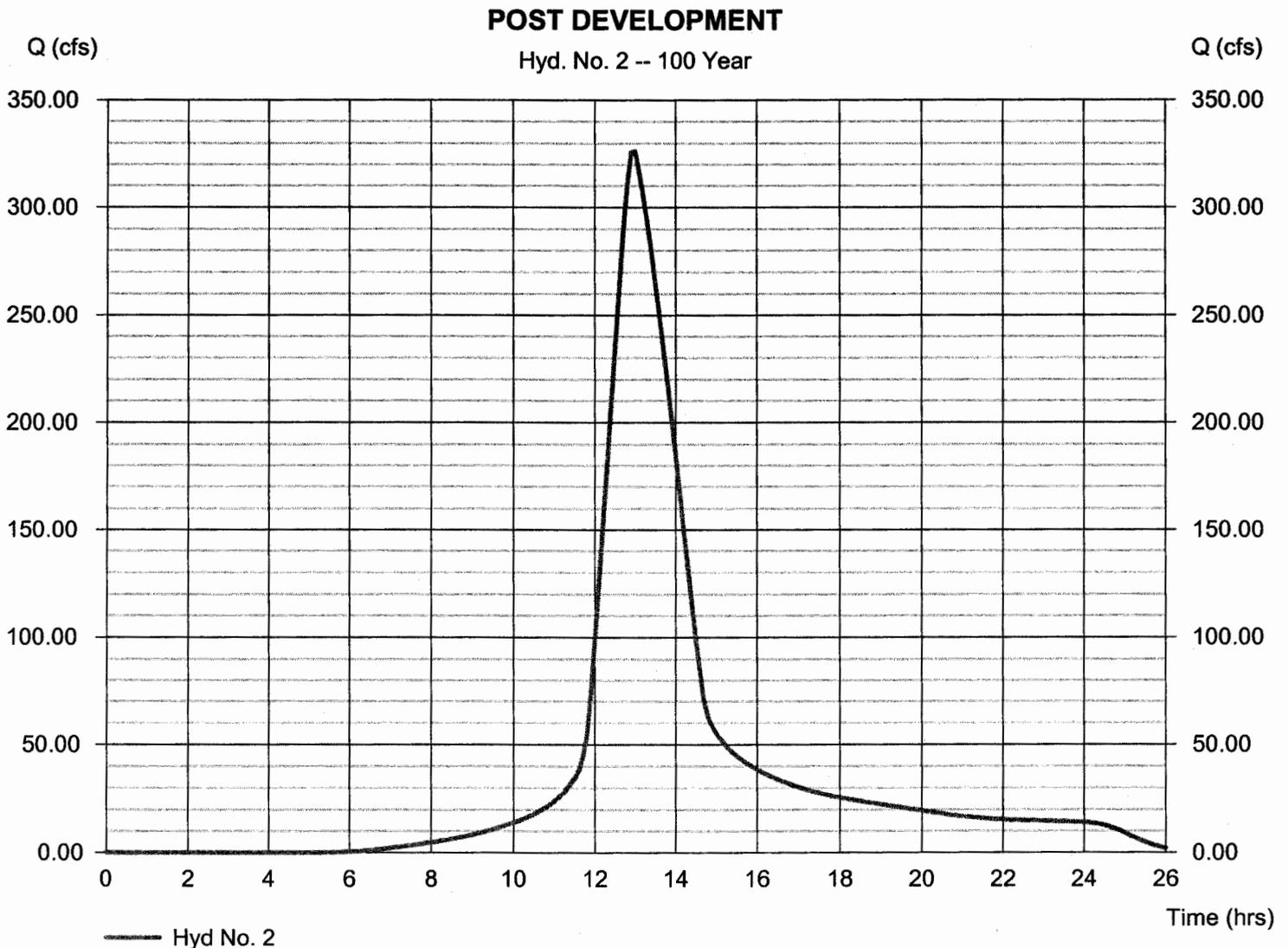
Tuesday, Jan 27, 2009

Hyd. No. 2

POST DEVELOPMENT

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 6 min
Drainage area = 154.800 ac
Basin Slope = 0.7 %
Tc method = LAG
Total precip. = 8.30 in
Storm duration = 24 hrs

Peak discharge = 326.27 cfs
Time to peak = 780 min
Hyd. volume = 3,281,451 cuft
Curve number = 80
Hydraulic length = 3550 ft
Time of conc. (Tc) = 104.86 min
Distribution = Type II
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

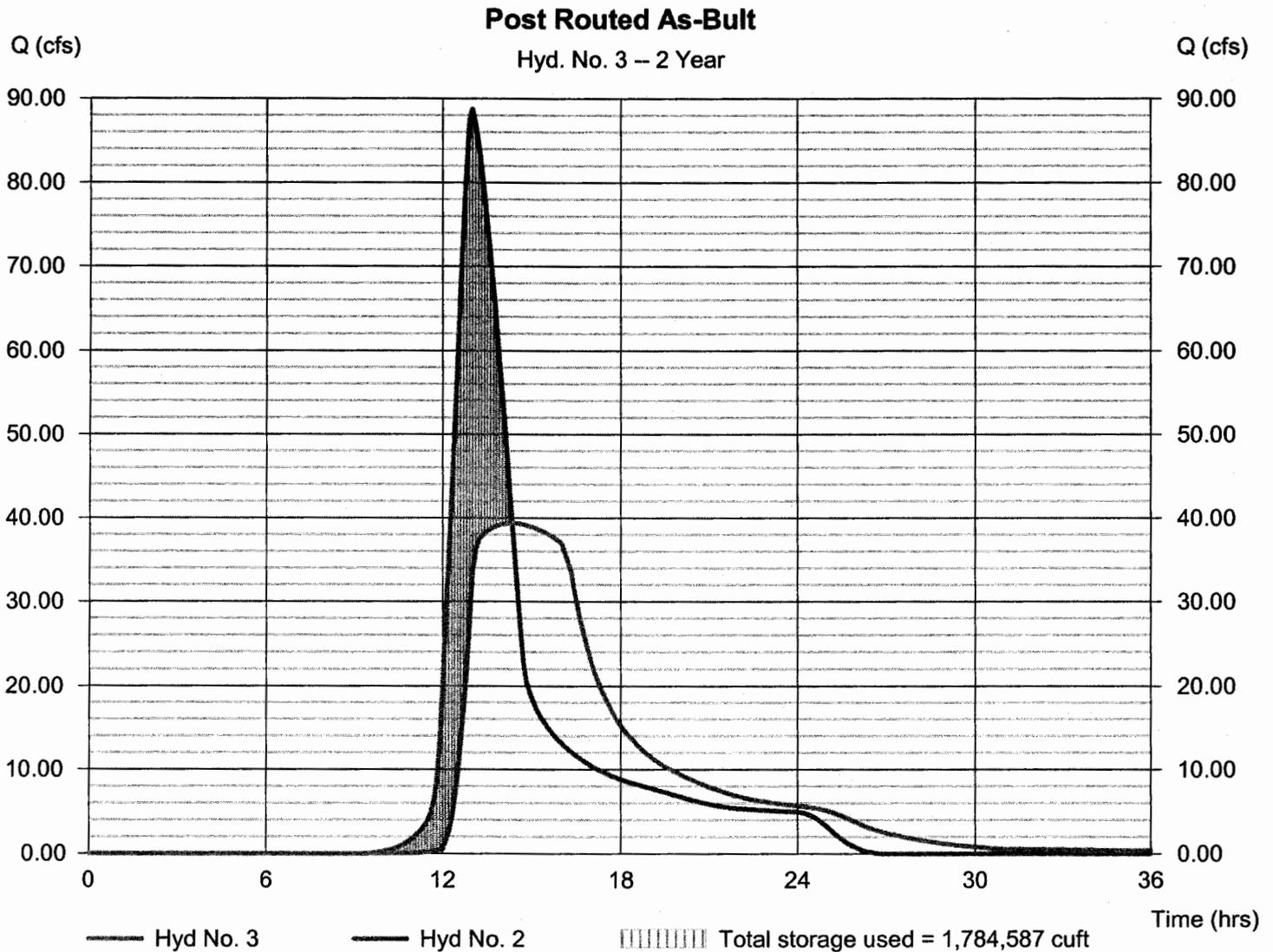
Tuesday, Jan 27, 2009

Hyd. No. 3

Post Routed As-Built

Hydrograph type	= Reservoir	Peak discharge	= 39.39 cfs
Storm frequency	= 2 yrs	Time to peak	= 858 min
Time interval	= 6 min	Hyd. volume	= 909,020 cuft
Inflow hyd. No.	= 2 - POST DEVELOPMENT	Max. Elevation	= 57.45 ft
Reservoir name	= As-Built May 5 2008	Max. Storage	= 1,784,587 cuft

Storage Indication method used. Wet pond routing start elevation = 56.10 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

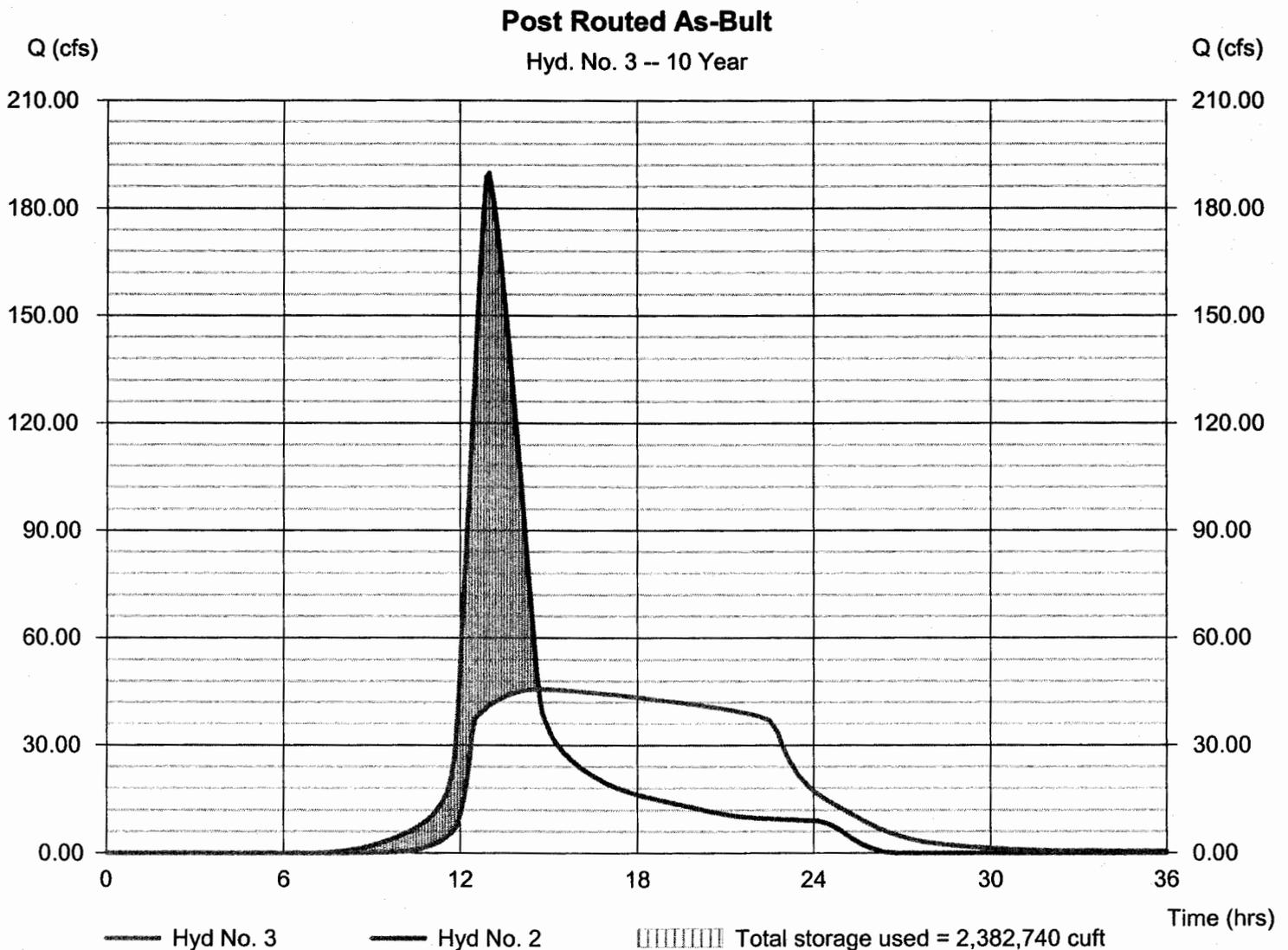
Tuesday, Jan 27, 2009

Hyd. No. 3

Post Routed As-Built

Hydrograph type	= Reservoir	Peak discharge	= 45.72 cfs
Storm frequency	= 10 yrs	Time to peak	= 882 min
Time interval	= 6 min	Hyd. volume	= 1,901,216 cuft
Inflow hyd. No.	= 2 - POST DEVELOPMENT	Max. Elevation	= 59.71 ft
Reservoir name	= As-Built May 5 2008	Max. Storage	= 2,382,740 cuft

Storage Indication method used. Wet pond routing start elevation = 56.10 ft.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.02

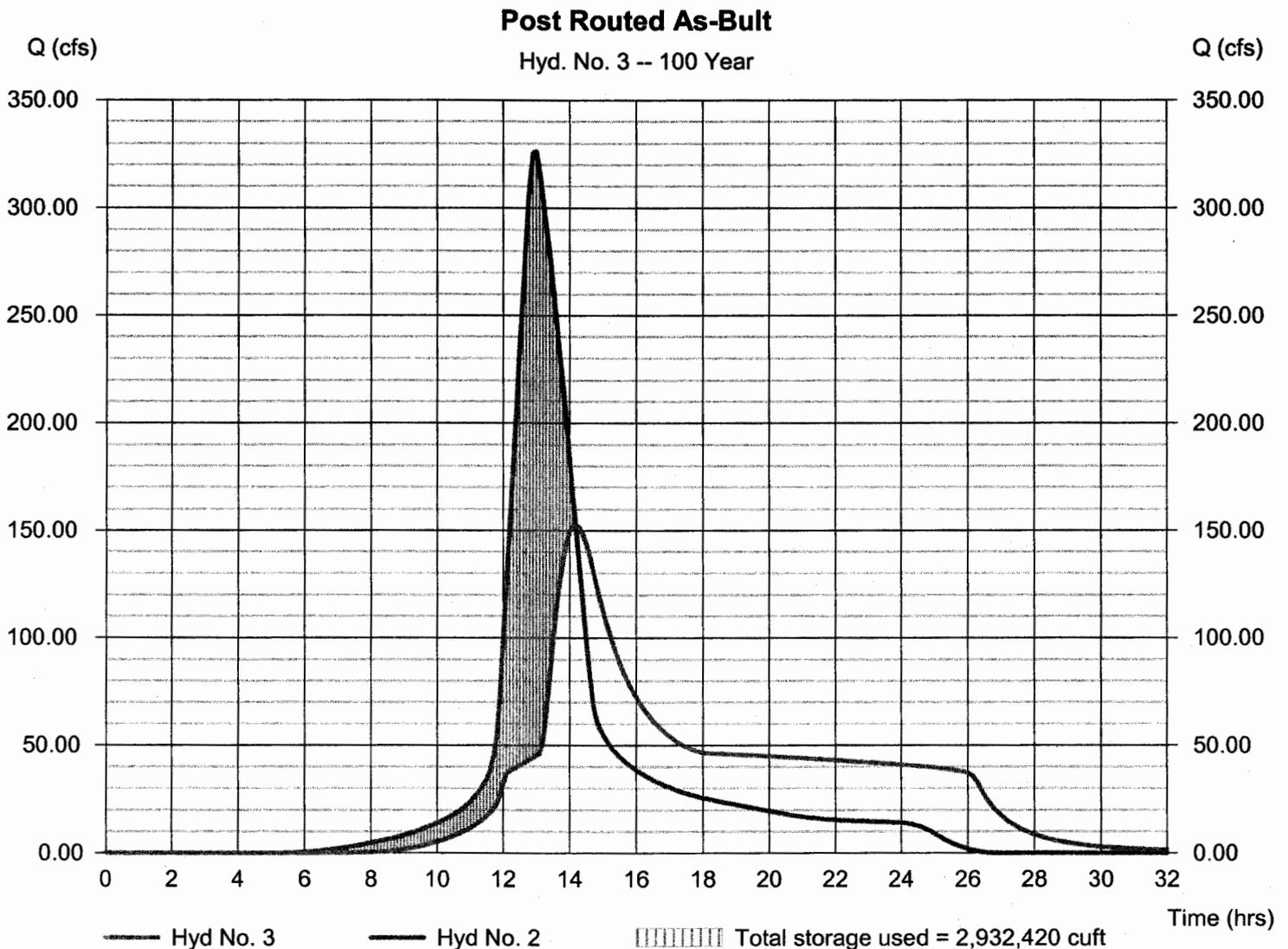
Tuesday, Jan 27, 2009

Hyd. No. 3

Post Routed As-Built

Hydrograph type	= Reservoir	Peak discharge	= 152.49 cfs
Storm frequency	= 100 yrs	Time to peak	= 852 min
Time interval	= 6 min	Hyd. volume	= 3,281,412 cuft
Inflow hyd. No.	= 2 - POST DEVELOPMENT	Max. Elevation	= 61.61 ft
Reservoir name	= As-Built May 5 2008	Max. Storage	= 2,932,420 cuft

Storage Indication method used. Wet pond routing start elevation = 56.10 ft.





5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
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PROJECT GREENSPRINGS WEST - PH II
PROJECT NO. 8656-1
SUBJECT CHANNEL ADJUSTMENT
SHEET NO. 1 OF 1
CALCULATED BY HNP DATE 4/30/99

OUTFALL CHANNEL

60' BOTTOM w/ 3:1 SS @ 0.67%

Q_2 POST = 37.00 CFS

USING 20' BOTTOM CHART

$V_2 = 2.6$ FPS WHICH IS MORE THAN REQUIRED

TO HANDLE 2 YEAR STORM.

Greensprings Plantation- Summary Table for 10-Point BMP Plan
4/26/93

8656
HWP

BMPs Coincide With Those Shown on SWMP for Greenspring Plantation

ADJUSTED FOR ANALYSIS I, II, & III

Total site area= 1402 acres

BMP/DA	Total Area (ac)	% of site	Open Space (ac)	BMP Points		
				Structural	Open Space	Total
Lake C	91	6.27%	9	11	1.0	12.0
Lake F	155 119	11% 8%	15 6	11	0.5 1.0	11.5 12.0
Lake G	64	5%	5	11	0.8	11.8
Lake E	79	6%	2	10	0.3	10.3
Lake H	22	2%	0	9	0.0	9.0
Lake A	31	2%	4	9	1.3	10.3
Wetpond 1	22	2%	2	9	1.0	10.0
Drypond 1	246	18%	56	9	2.3	11.3
Drypond 2	124	9%	28	9	2.3	11.3
Drypond 4	47	3%	3	9	0.6	9.6
Drypond 5	16	1%	2	6	1.3	7.3
Drypond 6	32	2%	6	9	1.9	10.9
Subtotal	929 892	66% 64%	132 123	9.7 9.6	1.4	11.0 11.1
Default*	473 510	34% 36%	384 393	0.0	8.1 7.7	7.7 8.1
TOTAL	1402	100%	516	6.4 6.7	3.7	9.8 10.1

*Area not treated by a structure in conceptual stormwater management plan

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project GREENSPRINGS WEST - PH. I & II

Basin # 1 Location END OF ENTRANCE RD "A"
ADJACENT TO RD "B"

Total area draining to basin: 154.8 acres.

Basin Volume Design

Wet Storage:

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

$$67 \text{ cu. yds.} \times \underline{154.8} \text{ acres} = \underline{10,372} \text{ cu. yds.}$$

2. Available basin volume = 815 cu. yds. at elevation 50.00. (From storage - elevation curve)

3. Excavate 9557 cu. yds. to obtain required volume*.

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

4. Available volume before cleanout required.

$$33 \text{ cu. yds.} \times \underline{154.8} \text{ acres} = \underline{5108} \text{ cu. yds.}$$

5. Elevation corresponding to cleanout level = 49.00.

(From Storage - Elevation Curve)

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

Dry Storage:

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

$$67 \text{ cu. yds.} \times \underline{154.8} \text{ acres} = \underline{10,372} \text{ cu. yds.}$$

8. Total available basin volume at crest of riser* = $\frac{117,238}{56.00}$ cu. yds. at elevation 56.00. (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 = _____ in. (diameter of dewatering orifice plus 2 inches).

Preliminary Design Elevations

11. Crest of Riser = 56.00
- Top of Dam = 61.05
- Design High Water = 60.65
- Upstream Toe of Dam = 48.50

Basin Shape

12. $\frac{\text{Length of Flow}}{\text{Effective Width}} = \frac{L}{We} = \frac{820}{314} = 2.61$

If > 2 , baffles are not required ✓

If < 2 , baffles are required _____

Runoff

13. $Q_2 = \underline{37.00}$ cfs (From Chapter 5)
14. $Q_{25} = \underline{70.10}$ cfs (From Chapter 5)

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2 = \underline{37.00}$ cfs. (riser and barrel)

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

16. With emergency spillway:

$$\text{Assumed available head (h)} = \underline{3.25} \text{ ft. (Using } Q_2\text{)}$$

$$h = \text{Crest of Emergency Spillway Elevation} - \text{Crest of Riser Elevation}$$

Without emergency spillway:

$$\text{Assumed available head (h)} = \underline{\quad} \text{ ft. (Using } Q_{25}\text{)}$$

$$h = \text{Design High Water Elevation} - \text{Crest of Riser Elevation}$$

17. Riser diameter (D_r) = 48 in. Actual head (h) = 0.90 ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = 75 ft.

$$\text{Head (H) on barrel through embankment} = \underline{9.17} \text{ ft.}$$

(From Plate 3.14-7).

19. Barrel diameter = 24 in.

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

20. Trash rack and anti-vortex device

$$\text{Diameter} = \underline{\quad} \text{ inches. } \text{LSW-11 MODIFIED}$$

$$\text{Height} = \underline{\quad} \text{ inches.}$$

(From Table 3.14-D).

Emergency Spillway Design

21. Required spillway capacity $Q_e = Q_{25} - Q_p = \underline{33.10}$ cfs.

22. Bottom width (b) = 20 ft.; the slope of the exit channel (s) = .05 ft./foot; and the minimum length of the exit channel (x) = 220 ft.

(From Table 3.14-C).

Anti-Seep Collar Design

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 = 61.65
 Design High Water = 60.65
 Emergency Spillway Crest = 59.25
 Principal Spillway Crest = 56.00
 Dewatering Orifice Invert = 50.00
 Cleanout Elevation = 49.00
 Elevation of Upstream Toe of Dam
 or Excavated Bottom of "Wet Storage
 Area" (if excavation was performed) = 48.00

HYDROLOGIC REPORT FOR

GREENSPRINGS WEST PHASE ONE

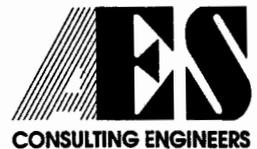
CULVERT #1

AES JOB NUMBER 8656-1

PREPARED BY

**AES CONSULTING ENGINEERS
5248 OLDE TOWNE ROAD, SUITE #1
WILLIAMSBURG, VIRGINIA 23188**

FEBRUARY 19, 1999



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description	
1	SCS Runoff	140.3	6	762	1,107,801	25	—	—	—	25 YR POST DEVELOP	
2	Reservoir	129.9	6	774	973,926	25	1	60.71	192,654	25 YR POST ROUTED	
3	SCS Runoff	194.8	6	756	1,545,006	100	—	—	—	100YR POST DEVELOP	
4	Reservoir	175.1	6	774	1,411,131	100	3	61.46	238,486	100YR POST ROUTED	
Proj. file: CULVERT #1.GPW				IDF file: jcc.IDF				Run date: 02-25-1999			

Reservoir Report

Reservoir No. 1 - CULVERT #1

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	55.00	3,500	0	0
5.00	60.00	56,000	148,750	148,750
7.00	62.00	67,200	123,200	271,950

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 36.0	0.0	0.0	0.0
Span in	= 36.0	0.0	0.0	0.0
No. Barrels	= 4	0	0	0
Invert El. ft	= 55.00	0.00	0.00	0.00
Length ft	= 150.0	0.0	0.0	0.0
Slope %	= 3.33	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= ----	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.0	0.0	0.0	0.0
Crest El. ft	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Eqn. Exp.	= 0.00	0.00	0.00	0.00
Multi-Stage	= No	No	No	No

Tailwater Elevation = 59.80 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	Discharge cfs
0.00	0	55.00	0.00	---	---	---	---	---	---	---	0.00
0.50	14,875	55.50	0.00	---	---	---	---	---	---	---	0.00
1.00	29,750	56.00	0.00	---	---	---	---	---	---	---	0.00
1.50	44,625	56.50	0.00	---	---	---	---	---	---	---	0.00
2.00	59,500	57.00	0.00	---	---	---	---	---	---	---	0.00
2.50	74,375	57.50	0.00	---	---	---	---	---	---	---	0.00
3.00	89,250	58.00	0.00	---	---	---	---	---	---	---	0.00
3.50	104,125	58.50	0.00	---	---	---	---	---	---	---	0.00
4.00	119,000	59.00	0.00	---	---	---	---	---	---	---	0.00
4.50	133,875	59.50	0.00	---	---	---	---	---	---	---	0.00
5.00	148,750	60.00	60.88	---	---	---	---	---	---	---	60.88

Continues on next page...

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	Discharge cfs
5.20	161,070	60.20	86.09	---	---	---	---	---	---	---	86.09
5.40	173,390	60.40	105.44	---	---	---	---	---	---	---	105.44
5.60	185,710	60.60	121.75	---	---	---	---	---	---	---	121.75
5.80	198,030	60.80	136.12	---	---	---	---	---	---	---	136.12
6.00	210,350	61.00	149.12	---	---	---	---	---	---	---	149.12
6.20	222,670	61.20	161.06	---	---	---	---	---	---	---	161.06
6.40	234,990	61.40	172.18	---	---	---	---	---	---	---	172.18
6.60	247,310	61.60	182.63	---	---	---	---	---	---	---	182.63
6.80	259,630	61.80	192.51	---	---	---	---	---	---	---	192.51
7.00	271,950	62.00	201.90	---	---	---	---	---	---	---	201.90

...End

Hydrograph Report

Hyd. No. 1

25 YR POST DEVELOPMENT

Hydrograph type	= SCS Runoff	Peak discharge	= 140.30 cfs
Storm frequency	= 25 yrs	Time interval	= 6 min
Drainage area	= 73.20 ac	Curve number	= 80
Basin Slope	= 0.7 %	Hydraulic length	= 2500 ft
Tc method	= LAG	Time of conc. (Tc)	= 79.2 min
Total precip.	= 6.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 1,107,801 cuft

Hydrograph Discharge Table

| Time -- Outflow
(hrs cfs) |
|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 8.40 1.49 | 11.60 14.68 | 14.80 17.22 | 18.00 8.62 |
| 8.50 1.60 | 11.70 17.93 | 14.90 16.59 | 18.10 8.51 |
| 8.60 1.72 | 11.80 23.90 | 15.00 16.03 | 18.20 8.41 |
| 8.70 1.85 | 11.90 35.55 | 15.10 15.52 | 18.30 8.31 |
| 8.80 1.99 | 12.00 51.27 | 15.20 15.06 | 18.40 8.20 |
| 8.90 2.14 | 12.10 67.48 | 15.30 14.64 | 18.50 8.10 |
| 9.00 2.31 | 12.20 84.01 | 15.40 14.26 | 18.60 8.00 |
| 9.10 2.48 | 12.30 100.70 | 15.50 13.90 | 18.70 7.89 |
| 9.20 2.67 | 12.40 116.71 | 15.60 13.57 | 18.80 7.79 |
| 9.30 2.86 | 12.50 130.52 | 15.70 13.25 | 18.90 7.68 |
| 9.40 3.06 | 12.60 139.98 | 15.80 12.95 | 19.00 7.58 |
| 9.50 3.27 | 12.70 140.30 << | 15.90 12.66 | 19.10 7.48 |
| 9.60 3.47 | 12.80 133.94 | 16.00 12.37 | 19.20 7.37 |
| 9.70 3.68 | 12.90 126.55 | 16.10 12.08 | 19.30 7.27 |
| 9.80 3.90 | 13.00 118.30 | 16.20 11.80 | 19.40 7.16 |
| 9.90 4.12 | 13.10 109.34 | 16.30 11.52 | 19.50 7.06 |
| 10.00 4.35 | 13.20 99.83 | 16.40 11.25 | 19.60 6.95 |
| 10.10 4.59 | 13.30 89.97 | 16.50 10.99 | 19.70 6.85 |
| 10.20 4.86 | 13.40 79.88 | 16.60 10.74 | 19.80 6.74 |
| 10.30 5.15 | 13.50 69.60 | 16.70 10.51 | 19.90 6.64 |
| 10.40 5.47 | 13.60 59.19 | 16.80 10.29 | 20.00 6.53 |
| 10.50 5.83 | 13.70 48.96 | 16.90 10.09 | 20.10 6.43 |
| 10.60 6.22 | 13.80 39.49 | 17.00 9.90 | 20.20 6.33 |
| 10.70 6.66 | 13.90 31.58 | 17.10 9.73 | 20.30 6.23 |
| 10.80 7.15 | 14.00 27.07 | 17.20 9.58 | 20.40 6.13 |
| 10.90 7.71 | 14.10 25.03 | 17.30 9.43 | 20.50 6.03 |
| 11.00 8.32 | 14.20 23.31 | 17.40 9.29 | 20.60 5.95 |
| 11.10 8.99 | 14.30 21.88 | 17.50 9.17 | 20.70 5.87 |
| 11.20 9.76 | 14.40 20.68 | 17.60 9.05 | 20.80 5.79 |
| 11.30 10.65 | 14.50 19.65 | 17.70 8.93 | 20.90 5.73 |
| 11.40 11.68 | 14.60 18.75 | 17.80 8.82 | 21.00 5.67 |
| 11.50 12.88 | 14.70 17.94 | 17.90 8.72 | 21.10 5.62 |

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Hydrograph Discharge Table**Time -- Outflow
(hrs cfs)**

21.20	5.57
21.30	5.53
21.40	5.50
21.50	5.47
21.60	5.44
21.70	5.41
21.80	5.39
21.90	5.37
22.00	5.35
22.10	5.33
22.20	5.31
22.30	5.29
22.40	5.27
22.50	5.24
22.60	5.22
22.70	5.20
22.80	5.18
22.90	5.16
23.00	5.14
23.10	5.12
23.20	5.10
23.30	5.08
23.40	5.06
23.50	5.04
23.60	5.02
23.70	5.00
23.80	4.98
23.90	4.96
24.00	4.94
24.10	4.86
24.20	4.73
24.30	4.54
24.40	4.29
24.50	3.99
24.60	3.64
24.70	3.23
24.80	2.76
24.90	2.33
25.00	1.94
25.10	1.59

...End

Hydrograph Report

Hyd. No. 2

25 YR POST ROUTED

Hydrograph type = Reservoir
 Storm frequency = 25 yrs
 Inflow hyd. No. = 1
 Max. Elevation = 60.71 ft

Peak discharge = 129.85 cfs
 Time interval = 6 min
 Reservoir name = CULVERT #1
 Max. Storage = 192,654 cuft

Storage Indication method used.

Total Volume = 973,926 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	Outflow cfs
12.20	84.01	59.89	47.18	---	---	---	---	---	---	---	47.18
12.30	100.70	60.12	76.51	---	---	---	---	---	---	---	76.51
12.40	116.71	60.27	92.44	---	---	---	---	---	---	---	92.44
12.50	130.52	60.41	106.09	---	---	---	---	---	---	---	106.09
12.60	139.98	60.55	117.31	---	---	---	---	---	---	---	117.31
12.70	140.30 <<	60.65	125.67	---	---	---	---	---	---	---	125.67
12.80	133.94	60.71	129.64	---	---	---	---	---	---	---	129.64
12.90	126.55	60.71 <<	129.85	---	---	---	---	---	---	---	129.85 <<
13.00	118.30	60.68	127.28	---	---	---	---	---	---	---	127.28
13.10	109.34	60.61	122.61	---	---	---	---	---	---	---	122.61
13.20	99.83	60.53	115.76	---	---	---	---	---	---	---	115.76
13.30	89.97	60.43	107.73	---	---	---	---	---	---	---	107.73
13.40	79.88	60.32	98.01	---	---	---	---	---	---	---	98.01
13.50	69.60	60.22	87.75	---	---	---	---	---	---	---	87.75
13.60	59.19	60.12	75.54	---	---	---	---	---	---	---	75.54
13.70	48.96	60.02	63.99	---	---	---	---	---	---	---	63.99
13.80	39.49	59.90	49.01	---	---	---	---	---	---	---	49.01
13.90	31.58	59.81	37.58	---	---	---	---	---	---	---	37.58
14.00	27.07	59.75	30.58	---	---	---	---	---	---	---	30.58
14.10	25.03	59.72	26.73	---	---	---	---	---	---	---	26.73
14.20	23.31	59.70	24.56	---	---	---	---	---	---	---	24.56
14.30	21.88	59.69	22.89	---	---	---	---	---	---	---	22.89
14.40	20.68	59.68	21.52	---	---	---	---	---	---	---	21.52
14.50	19.65	59.67	20.37	---	---	---	---	---	---	---	20.37
14.60	18.75	59.66	19.38	---	---	---	---	---	---	---	19.38
14.70	17.94	59.65	18.50	---	---	---	---	---	---	---	18.50
14.80	17.22	59.65	17.72	---	---	---	---	---	---	---	17.72
14.90	16.59	59.64	17.03	---	---	---	---	---	---	---	17.03
15.00	16.03	59.63	16.42	---	---	---	---	---	---	---	16.42
15.10	15.52	59.63	15.87	---	---	---	---	---	---	---	15.87
15.20	15.06	59.63	15.38	---	---	---	---	---	---	---	15.38
15.30	14.64	59.62	14.93	---	---	---	---	---	---	---	14.93
15.40	14.26	59.62	14.52	---	---	---	---	---	---	---	14.52
15.50	13.90	59.62	14.15	---	---	---	---	---	---	---	14.15
15.60	13.57	59.61	13.80	---	---	---	---	---	---	---	13.80
15.70	13.25	59.61	13.47	---	---	---	---	---	---	---	13.47

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	Outflow cfs
15.80	12.95	59.61	13.16	---	---	---	---	---	---	---	13.16
15.90	12.66	59.61	12.86	---	---	---	---	---	---	---	12.86
16.00	12.37	59.60	12.57	---	---	---	---	---	---	---	12.57
16.10	12.08	59.60	12.28	---	---	---	---	---	---	---	12.28
16.20	11.80	59.60	11.99	---	---	---	---	---	---	---	11.99
16.30	11.52	59.60	11.71	---	---	---	---	---	---	---	11.71
16.40	11.25	59.59	11.44	---	---	---	---	---	---	---	11.44
16.50	10.99	59.59	11.17	---	---	---	---	---	---	---	11.17
16.60	10.74	59.59	10.91	---	---	---	---	---	---	---	10.91
16.70	10.51	59.59	10.67	---	---	---	---	---	---	---	10.67
16.80	10.29	59.59	10.44	---	---	---	---	---	---	---	10.44
16.90	10.09	59.58	10.23	---	---	---	---	---	---	---	10.23
17.00	9.90	59.58	10.03	---	---	---	---	---	---	---	10.03
17.10	9.73	59.58	9.85	---	---	---	---	---	---	---	9.85
17.20	9.58	59.58	9.68	---	---	---	---	---	---	---	9.68
17.30	9.43	59.58	9.53	---	---	---	---	---	---	---	9.53
17.40	9.29	59.58	9.39	---	---	---	---	---	---	---	9.39
17.50	9.17	59.58	9.25	---	---	---	---	---	---	---	9.25
17.60	9.05	59.57	9.13	---	---	---	---	---	---	---	9.13
17.70	8.93	59.57	9.01	---	---	---	---	---	---	---	9.01
17.80	8.82	59.57	8.90	---	---	---	---	---	---	---	8.90
17.90	8.72	59.57	8.79	---	---	---	---	---	---	---	8.79
18.00	8.62	59.57	8.69	---	---	---	---	---	---	---	8.69
18.10	8.51	59.57	8.58	---	---	---	---	---	---	---	8.58
18.20	8.41	59.57	8.48	---	---	---	---	---	---	---	8.48
18.30	8.31	59.57	8.38	---	---	---	---	---	---	---	8.38
18.40	8.20	59.57	8.27	---	---	---	---	---	---	---	8.27
18.50	8.10	59.57	8.17	---	---	---	---	---	---	---	8.17
18.60	8.00	59.57	8.07	---	---	---	---	---	---	---	8.07
18.70	7.89	59.57	7.96	---	---	---	---	---	---	---	7.96
18.80	7.79	59.56	7.86	---	---	---	---	---	---	---	7.86
18.90	7.68	59.56	7.75	---	---	---	---	---	---	---	7.75
19.00	7.58	59.56	7.65	---	---	---	---	---	---	---	7.65
19.10	7.48	59.56	7.55	---	---	---	---	---	---	---	7.55
19.20	7.37	59.56	7.44	---	---	---	---	---	---	---	7.44
19.30	7.27	59.56	7.34	---	---	---	---	---	---	---	7.34
19.40	7.16	59.56	7.23	---	---	---	---	---	---	---	7.23
19.50	7.06	59.56	7.13	---	---	---	---	---	---	---	7.13
19.60	6.95	59.56	7.02	---	---	---	---	---	---	---	7.02
19.70	6.85	59.56	6.92	---	---	---	---	---	---	---	6.92
19.80	6.74	59.56	6.81	---	---	---	---	---	---	---	6.81
19.90	6.64	59.56	6.71	---	---	---	---	---	---	---	6.71
20.00	6.53	59.55	6.60	---	---	---	---	---	---	---	6.60
20.10	6.43	59.55	6.50	---	---	---	---	---	---	---	6.50
20.20	6.33	59.55	6.40	---	---	---	---	---	---	---	6.40
20.30	6.23	59.55	6.29	---	---	---	---	---	---	---	6.29
20.40	6.13	59.55	6.19	---	---	---	---	---	---	---	6.19
20.50	6.03	59.55	6.10	---	---	---	---	---	---	---	6.10
20.60	5.95	59.55	6.01	---	---	---	---	---	---	---	6.01

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	Outflow cfs
20.70	5.87	59.55	5.92	---	---	---	---	---	---	---	5.92
20.80	5.79	59.55	5.84	---	---	---	---	---	---	---	5.84
20.90	5.73	59.55	5.77	---	---	---	---	---	---	---	5.77
21.00	5.67	59.55	5.71	---	---	---	---	---	---	---	5.71
21.10	5.62	59.55	5.66	---	---	---	---	---	---	---	5.65
21.20	5.57	59.55	5.61	---	---	---	---	---	---	---	5.61
21.30	5.53	59.55	5.56	---	---	---	---	---	---	---	5.56
21.40	5.50	59.55	5.52	---	---	---	---	---	---	---	5.52
21.50	5.47	59.55	5.49	---	---	---	---	---	---	---	5.49
21.60	5.44	59.54	5.46	---	---	---	---	---	---	---	5.46
21.70	5.41	59.54	5.43	---	---	---	---	---	---	---	5.43
21.80	5.39	59.54	5.41	---	---	---	---	---	---	---	5.41
21.90	5.37	59.54	5.38	---	---	---	---	---	---	---	5.38
22.00	5.35	59.54	5.36	---	---	---	---	---	---	---	5.36
22.10	5.33	59.54	5.34	---	---	---	---	---	---	---	5.34
22.20	5.31	59.54	5.32	---	---	---	---	---	---	---	5.32
22.30	5.29	59.54	5.30	---	---	---	---	---	---	---	5.30
22.40	5.27	59.54	5.28	---	---	---	---	---	---	---	5.28
22.50	5.24	59.54	5.26	---	---	---	---	---	---	---	5.26
22.60	5.22	59.54	5.24	---	---	---	---	---	---	---	5.24
22.70	5.20	59.54	5.22	---	---	---	---	---	---	---	5.22
22.80	5.18	59.54	5.20	---	---	---	---	---	---	---	5.20
22.90	5.16	59.54	5.18	---	---	---	---	---	---	---	5.18
23.00	5.14	59.54	5.16	---	---	---	---	---	---	---	5.16
23.10	5.12	59.54	5.14	---	---	---	---	---	---	---	5.14
23.20	5.10	59.54	5.11	---	---	---	---	---	---	---	5.11
23.30	5.08	59.54	5.09	---	---	---	---	---	---	---	5.09
23.40	5.06	59.54	5.07	---	---	---	---	---	---	---	5.07
23.50	5.04	59.54	5.05	---	---	---	---	---	---	---	5.05
23.60	5.02	59.54	5.03	---	---	---	---	---	---	---	5.03
23.70	5.00	59.54	5.01	---	---	---	---	---	---	---	5.01
23.80	4.98	59.54	4.99	---	---	---	---	---	---	---	4.99
23.90	4.96	59.54	4.97	---	---	---	---	---	---	---	4.97
24.00	4.94	59.54	4.95	---	---	---	---	---	---	---	4.95
24.10	4.86	59.54	4.91	---	---	---	---	---	---	---	4.91
24.20	4.73	59.54	4.81	---	---	---	---	---	---	---	4.81
24.30	4.54	59.54	4.66	---	---	---	---	---	---	---	4.66
24.40	4.29	59.54	4.45	---	---	---	---	---	---	---	4.45
24.50	3.99	59.53	4.19	---	---	---	---	---	---	---	4.19
24.60	3.64	59.53	3.87	---	---	---	---	---	---	---	3.87
24.70	3.23	59.53	3.50	---	---	---	---	---	---	---	3.50
24.80	2.76	59.53	3.07	---	---	---	---	---	---	---	3.07
24.90	2.33	59.52	2.63	---	---	---	---	---	---	---	2.63
25.00	1.94	59.52	2.21	---	---	---	---	---	---	---	2.21
25.10	1.59	59.52	1.83	---	---	---	---	---	---	---	1.83
25.20	1.27	59.51	1.49	---	---	---	---	---	---	---	1.49

...End

Hydrograph Report

Hyd. No. 3

100YR POST DEVELOPMENT

Hydrograph type	= SCS Runoff	Peak discharge	= 194.81 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 73.20 ac	Curve number	= 80
Basin Slope	= 0.7 %	Hydraulic length	= 2500 ft
Tc method	= LAG	Time of conc. (Tc)	= 79.2 min
Total precip.	= 8.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 1,545,006 cuft

Hydrograph Discharge Table

| Time -- Outflow
(hrs cfs) |
|------------------------------|------------------------------|------------------------------|------------------------------|
| 7.50 2.05 | 10.70 11.06 | 13.90 42.22 | 17.10 12.88 |
| 7.60 2.18 | 10.80 11.78 | 14.00 36.12 | 17.20 12.67 |
| 7.70 2.31 | 10.90 12.60 | 14.10 33.37 | 17.30 12.47 |
| 7.80 2.45 | 11.00 13.51 | 14.20 31.07 | 17.40 12.29 |
| 7.90 2.58 | 11.10 14.48 | 14.30 29.14 | 17.50 12.12 |
| 8.00 2.72 | 11.20 15.61 | 14.40 27.53 | 17.60 11.96 |
| 8.10 2.86 | 11.30 16.91 | 14.50 26.15 | 17.70 11.81 |
| 8.20 3.00 | 11.40 18.42 | 14.60 24.94 | 17.80 11.67 |
| 8.30 3.15 | 11.50 20.16 | 14.70 23.86 | 17.90 11.53 |
| 8.40 3.31 | 11.60 22.76 | 14.80 22.90 | 18.00 11.39 |
| 8.50 3.48 | 11.70 27.46 | 14.90 22.05 | 18.10 11.25 |
| 8.60 3.66 | 11.80 35.98 | 15.00 21.29 | 18.20 11.11 |
| 8.70 3.86 | 11.90 52.30 | 15.10 20.61 | 18.30 10.98 |
| 8.80 4.08 | 12.00 74.07 | 15.20 20.00 | 18.40 10.84 |
| 8.90 4.31 | 12.10 96.43 | 15.30 19.44 | 18.50 10.70 |
| 9.00 4.57 | 12.20 119.16 | 15.40 18.92 | 18.60 10.56 |
| 9.10 4.84 | 12.30 142.04 | 15.50 18.45 | 18.70 10.42 |
| 9.20 5.13 | 12.40 163.84 | 15.60 18.00 | 18.80 10.29 |
| 9.30 5.43 | 12.50 182.41 | 15.70 17.58 | 18.90 10.15 |
| 9.40 5.74 | 12.60 194.81 << | 15.80 17.17 | 19.00 10.01 |
| 9.50 6.05 | 12.70 194.60 | 15.90 16.78 | 19.10 9.87 |
| 9.60 6.37 | 12.80 185.36 | 16.00 16.40 | 19.20 9.73 |
| 9.70 6.68 | 12.90 174.76 | 16.10 16.02 | 19.30 9.59 |
| 9.80 7.00 | 13.00 163.01 | 16.20 15.64 | 19.40 9.45 |
| 9.90 7.33 | 13.10 150.33 | 16.30 15.27 | 19.50 9.32 |
| 10.00 7.66 | 13.20 136.94 | 16.40 14.91 | 19.60 9.18 |
| 10.10 8.02 | 13.30 123.11 | 16.50 14.56 | 19.70 9.04 |
| 10.20 8.40 | 13.40 109.00 | 16.60 14.23 | 19.80 8.90 |
| 10.30 8.83 | 13.50 94.67 | 16.70 13.91 | 19.90 8.76 |
| 10.40 9.30 | 13.60 80.20 | 16.80 13.62 | 20.00 8.62 |
| 10.50 9.83 | 13.70 66.05 | 16.90 13.36 | 20.10 8.48 |
| 10.60 10.41 | 13.80 53.01 | 17.00 13.11 | 20.20 8.34 |

Continues on next page...

Hydrograph Discharge Table

Time -- Outflow (hrs cfs)	Time -- Outflow (hrs cfs)
20.30 8.21	
20.40 8.08	
20.50 7.96	...End
20.60 7.84	
20.70 7.74	
20.80 7.64	
20.90 7.55	
21.00 7.48	
21.10 7.41	
21.20 7.35	
21.30 7.29	
21.40 7.25	
21.50 7.20	
21.60 7.17	
21.70 7.13	
21.80 7.10	
21.90 7.07	
22.00 7.04	
22.10 7.02	
22.20 6.99	
22.30 6.96	
22.40 6.94	
22.50 6.91	
22.60 6.88	
22.70 6.85	
22.80 6.83	
22.90 6.80	
23.00 6.77	
23.10 6.74	
23.20 6.72	
23.30 6.69	
23.40 6.66	
23.50 6.63	
23.60 6.61	
23.70 6.58	
23.80 6.55	
23.90 6.52	
24.00 6.50	
24.10 6.39	
24.20 6.22	
24.30 5.97	
24.40 5.65	
24.50 5.25	
24.60 4.78	
24.70 4.24	
24.80 3.63	
24.90 3.07	
25.00 2.55	
25.10 2.09	

Hydrograph Report

Hyd. No. 4

100YR POST ROUTED

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Inflow hyd. No. = 3
 Max. Elevation = 61.46 ft

Peak discharge = 175.15 cfs
 Time interval = 6 min
 Reservoir name = CULVERT #1
 Max. Storage = 238,486 cuft

Storage Indication method used.

Total Volume = 1,411,131 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	Outflow cfs
11.80	35.98	59.61	13.29	---	---	---	---	---	---	---	13.29
11.90	52.30	59.82	39.46	---	---	---	---	---	---	---	39.46
12.00	74.07	59.99	59.58	---	---	---	---	---	---	---	59.58
12.10	96.43	60.10	73.87	---	---	---	---	---	---	---	73.87
12.20	119.16	60.25	91.04	---	---	---	---	---	---	---	91.04
12.30	142.04	60.43	108.09	---	---	---	---	---	---	---	108.09
12.40	163.84	60.65	125.00	---	---	---	---	---	---	---	125.00
12.50	182.41	60.88	141.25	---	---	---	---	---	---	---	141.25
12.60	194.81 <<	61.11	155.87	---	---	---	---	---	---	---	155.87
12.70	194.60	61.31	167.03	---	---	---	---	---	---	---	167.03
12.80	185.36	61.42	173.38	---	---	---	---	---	---	---	173.38
12.90	174.76	61.46 <<	175.15	---	---	---	---	---	---	---	175.15 <<
13.00	163.01	61.42	173.49	---	---	---	---	---	---	---	173.49
13.10	150.33	61.34	168.86	---	---	---	---	---	---	---	168.86
13.20	136.94	61.21	161.81	---	---	---	---	---	---	---	161.81
13.30	123.11	61.06	152.41	---	---	---	---	---	---	---	152.41
13.40	109.00	60.88	141.05	---	---	---	---	---	---	---	141.05
13.50	94.67	60.69	127.87	---	---	---	---	---	---	---	127.87
13.60	80.20	60.49	112.98	---	---	---	---	---	---	---	112.98
13.70	66.05	60.31	96.50	---	---	---	---	---	---	---	96.50
13.80	53.01	60.14	78.90	---	---	---	---	---	---	---	78.90
13.90	42.22	60.01	62.06	---	---	---	---	---	---	---	62.06
14.00	36.12	59.86	43.32	---	---	---	---	---	---	---	43.32
14.10	33.37	59.80	36.05	---	---	---	---	---	---	---	36.05
14.20	31.07	59.77	32.80	---	---	---	---	---	---	---	32.80
14.30	29.14	59.75	30.52	---	---	---	---	---	---	---	30.52
14.40	27.53	59.74	28.67	---	---	---	---	---	---	---	28.67
14.50	26.15	59.72	27.12	---	---	---	---	---	---	---	27.12
14.60	24.94	59.71	25.79	---	---	---	---	---	---	---	25.79
14.70	23.86	59.70	24.61	---	---	---	---	---	---	---	24.61
14.80	22.90	59.69	23.56	---	---	---	---	---	---	---	23.56
14.90	22.05	59.69	22.64	---	---	---	---	---	---	---	22.64
15.00	21.29	59.68	21.82	---	---	---	---	---	---	---	21.82
15.10	20.61	59.67	21.08	---	---	---	---	---	---	---	21.08
15.20	20.00	59.67	20.42	---	---	---	---	---	---	---	20.42
15.30	19.44	59.66	19.83	---	---	---	---	---	---	---	19.83

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	Outflow cfs
15.40	18.92	59.66	19.28	---	---	---	---	---	---	---	19.28
15.50	18.45	59.65	18.78	---	---	---	---	---	---	---	18.78
15.60	18.00	59.65	18.31	---	---	---	---	---	---	---	18.31
15.70	17.58	59.65	17.87	---	---	---	---	---	---	---	17.87
15.80	17.17	59.64	17.45	---	---	---	---	---	---	---	17.45
15.90	16.78	59.64	17.05	---	---	---	---	---	---	---	17.05
16.00	16.40	59.64	16.66	---	---	---	---	---	---	---	16.66
16.10	16.02	59.63	16.27	---	---	---	---	---	---	---	16.27
16.20	15.64	59.63	15.89	---	---	---	---	---	---	---	15.89
16.30	15.27	59.63	15.52	---	---	---	---	---	---	---	15.52
16.40	14.91	59.62	15.15	---	---	---	---	---	---	---	15.15
16.50	14.56	59.62	14.80	---	---	---	---	---	---	---	14.80
16.60	14.23	59.62	14.45	---	---	---	---	---	---	---	14.45
16.70	13.91	59.62	14.13	---	---	---	---	---	---	---	14.13
16.80	13.62	59.61	13.82	---	---	---	---	---	---	---	13.82
16.90	13.36	59.61	13.54	---	---	---	---	---	---	---	13.54
17.00	13.11	59.61	13.28	---	---	---	---	---	---	---	13.28
17.10	12.88	59.61	13.04	---	---	---	---	---	---	---	13.04
17.20	12.67	59.61	12.81	---	---	---	---	---	---	---	12.81
17.30	12.47	59.60	12.61	---	---	---	---	---	---	---	12.61
17.40	12.29	59.60	12.42	---	---	---	---	---	---	---	12.42
17.50	12.12	59.60	12.24	---	---	---	---	---	---	---	12.24
17.60	11.96	59.60	12.07	---	---	---	---	---	---	---	12.07
17.70	11.81	59.60	11.92	---	---	---	---	---	---	---	11.92
17.80	11.67	59.60	11.77	---	---	---	---	---	---	---	11.77
17.90	11.53	59.60	11.62	---	---	---	---	---	---	---	11.62
18.00	11.39	59.59	11.48	---	---	---	---	---	---	---	11.48
18.10	11.25	59.59	11.34	---	---	---	---	---	---	---	11.34
18.20	11.11	59.59	11.21	---	---	---	---	---	---	---	11.21
18.30	10.98	59.59	11.07	---	---	---	---	---	---	---	11.07
18.40	10.84	59.59	10.93	---	---	---	---	---	---	---	10.93
18.50	10.70	59.59	10.79	---	---	---	---	---	---	---	10.79
18.60	10.56	59.59	10.66	---	---	---	---	---	---	---	10.66
18.70	10.42	59.59	10.52	---	---	---	---	---	---	---	10.52
18.80	10.29	59.59	10.38	---	---	---	---	---	---	---	10.38
18.90	10.15	59.58	10.24	---	---	---	---	---	---	---	10.24
19.00	10.01	59.58	10.10	---	---	---	---	---	---	---	10.10
19.10	9.87	59.58	9.96	---	---	---	---	---	---	---	9.96
19.20	9.73	59.58	9.83	---	---	---	---	---	---	---	9.83
19.30	9.59	59.58	9.69	---	---	---	---	---	---	---	9.69
19.40	9.45	59.58	9.55	---	---	---	---	---	---	---	9.55
19.50	9.32	59.58	9.41	---	---	---	---	---	---	---	9.41
19.60	9.18	59.58	9.27	---	---	---	---	---	---	---	9.27
19.70	9.04	59.58	9.13	---	---	---	---	---	---	---	9.13
19.80	8.90	59.57	8.99	---	---	---	---	---	---	---	8.99
19.90	8.76	59.57	8.85	---	---	---	---	---	---	---	8.85
20.00	8.62	59.57	8.71	---	---	---	---	---	---	---	8.71
20.10	8.48	59.57	8.58	---	---	---	---	---	---	---	8.58
20.20	8.34	59.57	8.44	---	---	---	---	---	---	---	8.44

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	Outflow cfs
20.30	8.21	59.57	8.30	---	---	---	---	---	---	---	8.30
20.40	8.08	59.57	8.17	---	---	---	---	---	---	---	8.17
20.50	7.96	59.57	8.04	---	---	---	---	---	---	---	8.04
20.60	7.84	59.57	7.92	---	---	---	---	---	---	---	7.92
20.70	7.74	59.56	7.81	---	---	---	---	---	---	---	7.81
20.80	7.64	59.56	7.71	---	---	---	---	---	---	---	7.71
20.90	7.55	59.56	7.61	---	---	---	---	---	---	---	7.61
21.00	7.48	59.56	7.53	---	---	---	---	---	---	---	7.53
21.10	7.41	59.56	7.46	---	---	---	---	---	---	---	7.46
21.20	7.35	59.56	7.39	---	---	---	---	---	---	---	7.39
21.30	7.29	59.56	7.33	---	---	---	---	---	---	---	7.33
21.40	7.25	59.56	7.28	---	---	---	---	---	---	---	7.28
21.50	7.20	59.56	7.23	---	---	---	---	---	---	---	7.23
21.60	7.17	59.56	7.19	---	---	---	---	---	---	---	7.19
21.70	7.13	59.56	7.16	---	---	---	---	---	---	---	7.16
21.80	7.10	59.56	7.12	---	---	---	---	---	---	---	7.12
21.90	7.07	59.56	7.09	---	---	---	---	---	---	---	7.09
22.00	7.04	59.56	7.06	---	---	---	---	---	---	---	7.06
22.10	7.02	59.56	7.04	---	---	---	---	---	---	---	7.04
22.20	6.99	59.56	7.01	---	---	---	---	---	---	---	7.01
22.30	6.96	59.56	6.98	---	---	---	---	---	---	---	6.98
22.40	6.94	59.56	6.95	---	---	---	---	---	---	---	6.95
22.50	6.91	59.56	6.93	---	---	---	---	---	---	---	6.93
22.60	6.88	59.56	6.90	---	---	---	---	---	---	---	6.90
22.70	6.85	59.56	6.87	---	---	---	---	---	---	---	6.87
22.80	6.83	59.56	6.84	---	---	---	---	---	---	---	6.84
22.90	6.80	59.56	6.82	---	---	---	---	---	---	---	6.82
23.00	6.77	59.56	6.79	---	---	---	---	---	---	---	6.79
23.10	6.74	59.56	6.76	---	---	---	---	---	---	---	6.76
23.20	6.72	59.56	6.73	---	---	---	---	---	---	---	6.73
23.30	6.69	59.56	6.71	---	---	---	---	---	---	---	6.71
23.40	6.66	59.55	6.68	---	---	---	---	---	---	---	6.68
23.50	6.63	59.55	6.65	---	---	---	---	---	---	---	6.65
23.60	6.61	59.55	6.62	---	---	---	---	---	---	---	6.62
23.70	6.58	59.55	6.60	---	---	---	---	---	---	---	6.60
23.80	6.55	59.55	6.57	---	---	---	---	---	---	---	6.57
23.90	6.52	59.55	6.54	---	---	---	---	---	---	---	6.54
24.00	6.50	59.55	6.51	---	---	---	---	---	---	---	6.51
24.10	6.39	59.55	6.46	---	---	---	---	---	---	---	6.46
24.20	6.22	59.55	6.33	---	---	---	---	---	---	---	6.33
24.30	5.97	59.55	6.13	---	---	---	---	---	---	---	6.13
24.40	5.65	59.55	5.86	---	---	---	---	---	---	---	5.86
24.50	5.25	59.55	5.51	---	---	---	---	---	---	---	5.51
24.60	4.78	59.54	5.09	---	---	---	---	---	---	---	5.09
24.70	4.24	59.54	4.60	---	---	---	---	---	---	---	4.60
24.80	3.63	59.53	4.04	---	---	---	---	---	---	---	4.04
24.90	3.07	59.53	3.46	---	---	---	---	---	---	---	3.46
25.00	2.55	59.52	2.91	---	---	---	---	---	---	---	2.91
25.10	2.09	59.52	2.41	---	---	---	---	---	---	---	2.41

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	Outflow cfs
25.20	1.67	59.52	1.96	---	---	---	---	---	---	---	1.96

...End

ED

HYDRAULIC REPORT FOR

GREENSPRINGS WEST PHASE ONE

STORMWATER CONVEYANCE SYSTEM

AES JOB NUMBER 8656-1

PREPARED BY

AES CONSULTING ENGINEERS
5248 OLDE TOWNE ROAD, SUITE #1
WILLIAMSBURG, VIRGINIA 23188

FEBRUARY 19, 1999



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

PROJECT GREENSPRINGS WEST PHASE 1
 PROJECT NO. 8656-1

SHEET NO. 1
 DATE Feb 25, 1999
 BY CAH

ROADSIDE DITCH DESIGN COMPUTATIONS

INLET				From Station	To Station	Side	Area (ac)	C	Tc (min)	I-2 In/hr	I-10 In/hr	S Ditch Slope (ft/ft)	Q-2 (CFS)	Carryover (CFS)	Q-2 Cumula. (CFS)	Act Vel-2 (FPS)	Allow Vel-2 (FPS)	Lining Type	Q-10 (CFS)	Q-10 Carryover	Q-10 Cumula. (CFS)	Act Vel-10 (FPS)	Depth of Flow10 (in.)	Remark
Number	Type	Length	Station																					
SS#3-3	DI-5		19+00 OUT	14+75 OUT	17+00 OUT	L	0.25	0.7	7	5	6.5	0.049	0.875		0.875	2.3	3.5	PROVIDE EC-2, 6" DEEP	1.138		1.138	2.8	4.5	ROAD "A", MIN. 1' DEEP
SS#3-3	DI-5		19+00 OUT	17+00 OUT	19+00 OUT	L	0.65	0.5	10	4	5.5	0.049	1.3	0.938	2.238	3.4	3.5	PROVIDE EC-3, 6" DEEP	1.788	1.14	2.926	3.5	6.5	ROAD "A", MIN. 1' DEEP
SS#3-2	DI-5		51+00 RIGHT	16+00 RD. A	18+00 RD. A	R	0.29	0.6	7	5	6.5	0.051	0.87		0.87	2.4	3.5	PROVIDE EC-2, 6" DEEP	1.131		1.131	2.6	5.5	ROAD "A", MIN. 1' DEEP
SS#3-2	DI-5		51+00 RIGHT	18+00 RD. A	51+00 RIGHT	R	0.55	0.6	10	4	5.5	0.051	1.32	0.87	2.19	3.4	3.5	PROVIDE EC-3, 6" DEEP	1.815	1.13	2.946	3.5	6.5	ROAD "A" and "B", MIN. 1' DEEP
SS#3-2	DI-5		51+00 RIGHT	52+00 RIGHT	51+00 RIGHT	R	0.8	0.5	10	4	5.5	0.02	1.6		1.6	2.1	3.5	GRASS	2.2		2.2	2.3	7	ROAD "B", MIN. 1' DEEP
SS#3-1	DI-5		53+00 RIGHT	52+00 RIGHT	53+00 RIGHT	R	0.42	0.4	10	4	5.5	0.02	0.672		0.672	1.6	3.5	GRASS	0.924		0.924	1.8	5	ROAD "B", MIN. 1' DEEP
SS#1-2A	DI-5		12+00 OUT	14+75 OUT	12+00 OUT	L	0.3	0.75	7	5	6.5	0.01	1.125		1.125	1.5	3.5	GRASS	1.463		1.463	1.6	6.75	ROAD "A", MIN. 1' DEEP
SS#1-2B	DI-5		12+75 IN	15+75 IN	12+75 IN	R	0.73	0.5	10	4	5.5	0.008	1.46		1.46	1.4	3.5	GRASS	2.008		2.008	1.5	7.25	ROAD "A", MIN. 1' DEEP
SS#4-1	DI-5		44+50 RIGHT	48+00 RIGHT	46+50 RIGHT	R	1.6	0.4	15	3.5	4.5	0.023	2.24		2.24	2.3	3.5	PROVIDE EC-2, 6" DEEP	2.88		2.88	2.5	7.5	ROAD "B", MIN. 1' DEEP
SS#4-1	DI-5		44+50 RIGHT	46+50 RIGHT	44+50 RIGHT	R	3.9	0.4	15	3.5	4.5	0.01	5.46	2.24	7.7	2.4	3.5	PROVIDE EC-2, 6" DEEP	7.02	2.88	9.9	2.6	14	ROAD "B", MIN. 1.5' DEEP



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PROJECT GREENSPRINGS WEST PHASE 1
 PROJECT NO. 8565-1
 SUBJECT ROAD "C"
 SHEET NO. 1
 DATE FEBRUARY 25, 1999
 BY CAH

STORM WATER INLET COMPUTATIONS

INLET			Station	Drainage Area (Ac)	C	CA	Σ CA	I in/hr	Q-Inter (CFS)	Q-Carry-Over (CFS)	Q1 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	L1 (ft) 15 P	L/L1 d	E(#16) h	Q Int CFS d/h	Q Carryover Spread	Remark	
Number	Type	Length																													
SS#2-7	3B	4	15+80L	0.53	0.4	0.212	0.212	4	0.848	0	0.848	0.044	0.02	3	2	0.667	0.08	4	0.99	0.015	2	3.44	0.143	0.162	8.099	0.494	0.706	0.599	0.249	OK<MAX. SPREAD 7'	
SS#2-6	3B	4	14+80L	0.46	0.4	0.184	0.184	4	0.736	0.249	0.985	0.044	0.02	3.3	2	0.606	0.08	4	0.98	0.015	2	3.44	0.143	0.16	8.67	0.461	0.672	0.661	0.323	OK<MAX. SPREAD 7'	
SS#2-5	3B	6	12+75L	0.86	0.4	0.344	0.344	4	1.376	0.323	1.699	0.025	0.02	5.4	2	0.37	0.08	4	0.86	0.015	2	3.44	0.143	0.143	9.907	0.606	0.813	1.381	0.318	OK<MAX. SPREAD 7'	
SS#2-3A	3C	6	10+93R	0.075	0.75	0.056	0.056	4	0.225		0.225	0.001	0.02	4.5	Flow Approaching From Down Station																
SS#2-3A	3C	6	10+93R								0.768	0.001	0.02	2																	
SS#2-3A	3C	6	10+93R	0.075	0.75	0.056	0.056	4	0.225	0.318	0.543	0.001	0.02	7	Flow Approaching From Up Station																
SS #2-8	3B	4	15+80R	0.19	0.5	0.095	0.095	4	0.38		0.38	0.044	0.02	1	2	2	0.08	4	1	0.015	2	3.44	0.143	0.163	5.751	0.696	0.882	0.335	0.045	OK<MAX. SPREAD 7'	
SS #2-6A	3B	4	14+80R	0.13	0.4	0.052	0.052	4	0.208	0.045	0.253	0.044	0.02	1.3	2	1.538	0.08	4	1	0.015	2	3.44	0.143	0.163	4.845	0.826	0.957	0.242	0.011	OK<MAX. SPREAD 7'	
SS#2-4	3B	6	12+75R	0.52	0.4	0.208	0.208	4	0.832	0.011	0.843	0.025	0.02	3.8	2	0.526	0.08	4	0.96	0.015	2	3.44	0.143	0.158	6.97	0.861	0.971	0.819	0.024	OK<MAX. SPREAD 7'	
SS#2-3	3C	6	10+93R	0.22	0.4	0.088	0.088	4	0.352		0.352	0.001	0.02	5.9	Flow Approaching From Down Station																
SS#2-3	3C	6	10+93R								0.808	0.001	0.02	2																	
SS#2-3	3C	6	10+93R	0.27	0.4	0.108	0.108	4	0.432	0.024	0.456	0.001	0.02	6.8	Flow Approaching From Up Station																
SS#1-5	3B	4	20+82R	0.19	0.4	0.076	0.076	4	0.304	0	0.304	0.025	0.02	1.6	2	1.25	0.08	4	1	0.015	2	3.44	0.143	0.163	4.445	0.9	0.984	0.299	0.005	OK<MAX. SPREAD 7'	
SS#1-4	3B	4	20+82L	0.78	0.3	0.234	0.234	4	0.936	0	0.936	0.025	0.02	4.1	2	0.488	0.08	4	0.95	0.015	2	3.44	0.143	0.156	7.323	0.546	0.759	0.71	0.226	OK<MAX. SPREAD 7'	
SS#1-3B	3B	4	20+50L	0.6	0.3	0.18	0.18	4	0.72	0.226	0.946	0.025	0.02	4.2	2	0.476	0.08	4	0.95	0.015	2	3.44	0.143	0.156	7.355	0.544	0.757	0.716	0.23	OK<MAX. SPREAD 7'	
SS#1-3	3C	6	21+86L	0.06	0.4	0.024	0.024	4	0.096		0.096	0.001	0.02	1.9	Flow Approaching From Down Station																
SS#1-3	3C	6	21+86L								0.614	0.001	0.02	2																	
SS#1-3	3C	6	21+86L	0.18	0.4	0.072	0.072	4	0.288	0.23	0.518	0.001	0.02	7	Flow Approaching From Up Station																
SS#1-3A	3C	6	21+86R	0.14	0.4	0.056	0.056	4	0.224		0.224	0.001	0.02	4.4	Flow Approaching From Down Station																
SS#1-3A	3C	6	21+86R								0.597	0.001	0.02	2																	
SS#1-3A	3C	6	21+86R	0.23	0.4	0.092	0.092	4	0.368	0.005	0.373	0.001	0.02	6	Flow Approaching From Up Station																

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (I) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	65.0	0.00	5.49	0.00	0.00	2.10	0.0	20.1	4.7	9.94	15.87	3.27	24	0.49	72.00	71.68	73.78	73.68	78.25	77.78	EX DI-5 (2)
2	1	12.0	1.97	5.49	0.30	0.59	2.10	20.0	20.0	4.8	9.95	29.20	3.42	24	1.67	72.20	72.00	73.85	73.87	78.00	78.25	SS#1-1 TO EX
3	2	70.0	0.10	3.52	0.50	0.05	1.50	5.0	13.6	5.6	8.48	29.61	3.95	24	1.71	73.40	72.20	74.43	74.15	81.67	78.00	SS#1-1A TO S
4	3	130.0	0.21	3.42	0.50	0.10	1.45	5.0	13.2	5.7	8.30	13.35	5.34	18	1.62	75.50	73.40	76.60	75.06	82.00	81.67	SS#1-2 TO SS
5	4	80.0	0.44	0.44	0.60	0.26	0.26	7.0	7.0	7.2	1.91	10.21	2.60	15	2.50	77.50	75.50	78.05	77.43	81.80	82.00	SS#1-2A TO S
6	4	75.0	0.55	0.55	0.50	0.28	0.28	10.0	10.0	6.4	1.75	7.46	1.57	15	1.33	76.50	75.50	77.48	77.43	82.00	82.00	SS#1-2B TO S
7	4	140.0	0.24	2.22	0.40	0.10	0.81	5.0	12.7	5.8	4.70	8.28	4.50	15	1.64	77.80	75.50	78.67	77.43	82.29	82.00	SS#1-3 TO SS
8	7	25.0	0.37	0.37	0.40	0.15	0.15	10.0	10.0	6.4	0.94	5.78	0.78	15	0.80	78.00	77.80	79.19	79.19	82.29	82.29	SS#1-3A TO S
9	7	38.0	0.60	1.61	0.40	0.24	0.57	10.0	12.5	5.8	3.31	7.33	3.01	15	1.29	78.29	77.80	79.24	79.19	82.44	82.29	SS#1-3 SS#1-
10	9	74.0	0.78	1.01	0.30	0.23	0.33	12.0	12.0	5.9	1.93	8.39	2.62	15	1.69	79.25	78.00	79.81	79.32	83.79	82.44	SS#1-4 TO SS
11	10	25.0	0.23	0.23	0.40	0.09	0.09	7.0	7.0	7.2	0.66	9.13	1.62	15	2.00	79.75	79.25	80.08	80.12	83.79	83.79	SS#1-5 TO SS

5.49 → total = 9.94

4.83 @ 0.4 - design Q = 14.04 cfs

Q_{cap} = 15 cfs OK

Project File: 86561-1.stm I-D-F File: JCC.IDF Total number of lines: 11 Run Date: 05-04-1999

NOTES: Intensity = 34.51 / (Tc + 6.10) ^ 0.61; Return period = 10 Yrs. ; Initial tailwater elevation = 73.68 (ft)

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	120.0	0.45	6.80	0.35	0.16	3.49	5.0	17.8	5.0	17.49	91.71	4.88	30	5.00	58.00	52.00	59.40	59.00	63.70	54.25	SS#2-2 TO SS
2	1	80.0	0.49	6.35	0.40	0.20	3.33	7.0	17.6	5.0	16.79	25.29	6.39	24	1.25	59.00	58.00	60.45	59.70	63.66	63.70	SS#2-3 TO SS
3	2	25.0	0.15	0.15	0.75	0.11	0.11	5.0	5.0	8.0	0.90	10.49	0.73	15	2.64	59.66	59.00	61.56	61.55	63.66	63.66	SS#2-3A TO S
4	2	165.0	0.52	5.71	0.40	0.21	3.03	10.0	17.1	5.1	15.42	24.90	5.76	24	1.21	61.00	59.00	62.39	61.55	67.22	63.66	SS#2-4 TO SS
5	4	25.0	0.86	5.19	0.40	0.34	2.82	10.0	17.1	5.1	14.38	15.58	8.14	18	2.20	61.55	61.00	63.71	63.24	67.22	67.22	SS#2-5 TO SS
6	5	205.0	0.46	4.33	0.40	0.18	2.47	7.0	16.6	5.2	12.78	17.78	7.44	18	2.87	67.43	61.55	68.78	65.25	73.43	67.22	SS#2-6 TO SS
7	6	30.0	0.13	3.15	0.60	0.08	1.98	10.0	16.5	5.2	10.27	14.47	5.81	18	1.90	68.00	67.43	70.43	70.14	73.43	73.43	SS#2-6A TO S
8	7	38.0	0.34	3.02	0.65	0.22	1.90	7.0	16.4	5.2	9.89	12.05	5.60	18	1.32	68.50	68.00	71.03	70.69	75.85	73.43	SS#2-6B TO S
9	8	140.0	0.33	2.68	0.65	0.21	1.68	7.0	16.1	5.2	8.82	9.45	7.19	15	2.14	71.50	68.50	74.37	71.76	78.50	75.85	SS#2-6C TO S
10	9	88.0	0.35	0.35	0.65	0.23	0.23	10.0	10.0	6.4	1.45	14.60	2.25	15	5.11	76.00	71.50	76.48	75.58	81.10	78.50	SS#2-6C1 TO
11	9	70.0	0.14	2.00	0.50	0.07	1.24	10.0	15.9	5.3	6.55	9.45	5.33	15	2.14	73.00	71.50	76.30	75.58	80.00	78.50	SS#2-6D TO S
12	11	26.0	0.17	0.17	0.85	0.14	0.14	5.0	5.0	8.0	1.15	17.91	0.94	15	7.69	75.00	73.00	76.97	76.96	80.00	80.00	SS#2-6D1 TO
13	11	100.0	0.15	1.69	0.80	0.12	1.03	7.0	15.5	5.3	5.47	7.91	4.46	15	1.50	74.50	73.00	77.68	76.96	80.30	80.00	SS#2-6E TO S
14	13	64.0	0.28	0.28	0.60	0.17	0.17	10.0	10.0	6.4	1.07	9.89	0.87	15	2.34	76.00	74.50	78.08	78.06	80.30	80.30	SS#2-6E1 TO
15	13	90.0	0.32	1.26	0.40	0.13	0.74	15.0	15.0	5.4	3.99	6.81	3.25	15	1.11	75.50	74.50	78.41	78.06	80.00	80.30	SS#2-6F TO S
16	15	8.0	0.94	0.94	0.65	0.61	0.61	15.0	15.0	5.4	3.30	16.14	2.69	15	6.25	76.00	75.50	78.63	78.61	80.20	80.00	SS#2-6G TO S
17	6	100.0	0.53	0.72	0.40	0.21	0.31	7.0	7.0	7.2	2.22	13.80	2.82	15	4.57	72.00	67.43	72.60	70.14	77.75	73.43	SS#2-7 TO SS
18	17	25.0	0.19	0.19	0.50	0.09	0.09	5.0	5.0	8.0	0.76	15.82	1.74	15	6.00	73.50	72.00	73.85	72.94	77.75	77.75	SS#2-8 TO SS

Project File: 86561-2.stm

I-D-F File: JCC.IDF

Total number of lines: 18

Run Date: 04-27-1999

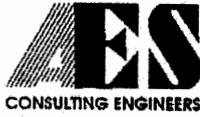
NOTES: Intensity = 34.51 / (Tc + 6.10) ^ 0.61; Return period = 10 Yrs. ; Initial tailwater elevation = 59.00 (ft)

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	140.0	1.61	2.51	0.50	0.81	1.48	10.0	10.0	6.4	9.43	21.74	5.85	18	4.29	59.00	53.00	60.17	59.00	54.25	63.66	SS#3-2 TO SS
2	1	140.0	0.90	0.90	0.75	0.67	0.67	7.0	7.0	7.2	4.88	7.72	4.60	15	1.43	61.00	59.00	61.89	61.12	63.66	66.00	SS#3-3 TO SS
Project File: 86561-3.stm								I-D-F File: JCC.IDF						Total number of lines: 2				Run Date: 02-25-1999				
NOTES: Intensity = 34.51 / (Tc + 6.10) ^ 0.61; Return period = 10 Yrs. ; Initial tailwater elevation = 59.00 (ft)																						

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	80.0	10.00	10.00	0.40	4.00	4.00	15.0	15.0	5.4	21.62	43.80	6.88	24	3.75	56.00	53.00	59.73	59.00	54.25	60.18	SS#4-2 TO SS
Project File: 86561-4.stm						I-D-F File: JCC.IDF						Total number of lines: 1				Run Date: 02-25-1999						
NOTES: Intensity = $34.51 / (Tc + 6.10)^{0.61}$; Return period = 10 Yrs. ; Initial tailwater elevation = 59.00 (ft)																						



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PROJECT GREENSPRINGS WEST PH 1
PROJECT NO. 8656-1
SUBJECT POND DESIGN
SHEET NO. _____ OF _____
CALCULATED BY CAH DATE 5/20/99

BOUYANCY CALCULATIONS FOR 48" RCP

WEIGHT OF WATER DISPLACED BY RISER

$$W_{H_2O} = (62.4 \text{ LBS/CF}) (\pi) (2^2) (6 \text{ FT}) = \underline{4,702 \text{ LBS}} \leftarrow$$

* ASSUME WORST CASE OF FULL HEIGHT
DISPLACING WATER

WEIGHT OF STRUCTURE $150 - 62.4 = 87.6 \text{ LBS/CF}$

* RISER (48" RCP) = 905 LBS/FT $(6 \times 87.6) \times 6 = 3153 \text{ LBS}$
FOR 6' RISER, WEIGHT = 5,430 LBS

* EW-11

8' LONG x 7' WIDE x 2' HIGH x 8" THICK

BOTTOM = 37.5 CF

BACK = 9.4 CF

SIDES = 9.4 CF

TOTAL = 56.3 CF AT $87.6 \times 56.3 = 4932 \text{ LBS}$
150 LBS/CF = 8,445 LBS

* CONC IN BOTTOM OF RISER

$(1.5 \text{ FT}) (\overset{87.6}{150 \text{ LBS/CF}}) (\pi) (2^2) = \underline{2,826 \text{ LBS}}$ 1651

STRUCTURE WEIGHT = $16,701 \overset{9736}{\text{LBS}}$ > 4,702 LBS ✓
∞ STRUCTURE WILL NOT FLOAT.

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	120.0	0.45	6.80	0.35	0.16	3.49	5.0	17.9	5.0	17.47	91.71	4.88	30	5.00	58.00	52.00	59.40	59.00	63.70	54.25	#2-2 - #2-1
2	1	80.0	0.49	6.35	0.40	0.20	3.33	7.0	17.7	5.0	16.77	25.29	6.39	24	1.25	59.00	58.00	60.45	59.69	63.66	63.70	#2-3 - #2-2
3	2	25.0	0.15	0.15	0.75	0.11	0.11	5.0	5.0	8.0	0.90	10.49	0.73	15	2.64	59.66	59.00	61.56	61.55	63.66	63.66	#2-3A - #2-3
4	2	100.0	0.00	5.71	0.00	0.00	3.03	0.0	17.3	5.1	15.35	24.25	5.03	24	1.15	60.15	59.00	61.94	61.55	65.50	63.66	SS#2-3B TO S
5	4	70.0	0.52	5.71	0.40	0.21	3.03	10.0	17.1	5.1	15.43	24.92	5.77	24	1.21	61.00	60.15	62.39	62.13	67.22	65.50	#2-4 - #2-3B
6	5	25.0	0.86	5.19	0.40	0.34	2.82	10.0	17.1	5.1	14.39	15.58	8.14	18	2.20	61.55	61.00	63.71	63.24	67.22	67.22	#2-5 - #2-4
7	6	205.0	0.46	4.33	0.40	0.18	2.47	7.0	16.6	5.2	12.79	17.78	7.44	18	2.87	67.43	61.55	68.78	65.26	73.43	67.22	#2-6 - #2-5
8	7	25.0	0.13	3.15	0.60	0.08	1.98	10.0	16.5	5.2	10.27	15.86	5.81	18	2.28	68.00	67.43	70.38	70.14	73.43	73.43	#2-6A - #2-6
9	8	38.0	0.34	3.02	0.65	0.22	1.90	7.0	16.4	5.2	9.89	12.05	5.60	18	1.32	68.50	68.00	70.98	70.64	75.85	73.43	#2-6B - #2-6
10	9	140.0	0.33	2.68	0.65	0.21	1.68	7.0	16.1	5.2	8.82	9.45	7.19	15	2.14	71.50	68.50	74.32	71.71	78.50	75.85	#2-6C - #2-6
11	10	88.0	0.35	0.35	0.65	0.23	0.23	10.0	10.0	6.4	1.45	14.60	2.25	15	5.11	76.00	71.50	76.48	75.53	81.10	78.50	#2-6C1 - #2-
12	10	70.0	0.14	2.00	0.50	0.07	1.24	10.0	15.9	5.3	6.55	9.45	5.33	15	2.14	73.00	71.50	76.25	75.53	80.00	78.50	#2-6D - #2-6
13	12	26.0	0.17	0.17	0.85	0.14	0.14	5.0	5.0	8.0	1.15	17.91	0.94	15	7.69	75.00	73.00	76.92	76.91	80.00	80.00	#2-6D1 - #2-
14	12	100.0	0.15	1.69	0.80	0.12	1.03	7.0	15.5	5.3	5.47	7.91	4.46	15	1.50	74.50	73.00	77.63	76.91	80.30	80.00	#2-6E - #2-6
15	14	64.0	0.28	0.28	0.60	0.17	0.17	10.0	10.0	6.4	1.07	9.89	0.87	15	2.34	76.00	74.50	78.04	78.02	80.30	80.30	#2-6E1 - #2-
16	14	90.0	0.32	1.26	0.40	0.13	0.74	15.0	15.0	5.4	3.99	6.81	3.25	15	1.11	75.50	74.50	78.36	78.02	80.00	80.30	#2-6F - #2-6
17	16	8.0	0.94	0.94	0.65	0.61	0.61	15.0	15.0	5.4	3.30	16.14	2.69	15	6.25	76.00	75.50	78.59	78.57	80.20	80.00	#2-6G - #2-6
18	7	100.0	0.53	0.72	0.40	0.21	0.31	7.0	7.0	7.2	2.22	13.80	2.82	15	4.57	72.00	67.43	72.60	70.14	77.75	73.43	#2-7 - #2-6
19	18	25.0	0.19	0.19	0.50	0.09	0.09	5.0	5.0	8.0	0.76	15.82	1.74	15	6.00	73.50	72.00	73.85	72.94	77.75	77.75	#2-8 - #2-7

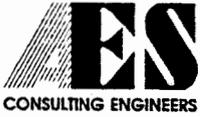
Project File: 86561-2.stm

I-D-F File: JCC.IDF

Total number of lines: 19

Run Date: 06-20-1999

NOTES: Intensity = 34.51 / (Tc + 6.10) ^ 0.61; Return period = 10 Yrs. ; Initial tailwater elevation = 59.00 (ft)



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PROJECT G.S. WEST - AM. I
PROJECT NO. 8656-1
SUBJECT INLET CALCULATION (SS # 4-2)
SHEET NO. 1 OF 1
CALCULATED BY HWP DATE 6/18/99

(SS # 4-2) DZ-5

P&R CONVERSATION WITH OTIS WILLIAMS (V.DOT)

D.A. = 3.3 AC C = 0.25 T_c = 15 MIN I₂ = 4.0 IN/HR

I₁₀ = 5.1 IN/HR

Q₂ = 3.83 CFS

Q₁₀ = 4.21 CFS

V₂ = 1.50 FPS

V₁₀ = 1.60 FPS

D₁₀ = 3.6"

Reservoir Report

Reservoir No. 4 - ASBUILT WET POND

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	56.96	257,683	0	0
3.04	60.00	378,676	1,272,718	1,272,718
5.04	62.00	420,000	1,597,352	2,870,070

was 56
was 59.25

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 24.0	0.0	0.0	0.0
Span in	= 24.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 49.51	0.00	0.00	0.00
Length ft	= 75.0	0.0	0.0	0.0
Slope %	= 2.16	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= ---	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.0	20.0	0.0	0.0
Crest El. ft	= <u>56.96</u>	<u>59.76</u>	0.00	0.00
Weir Coeff.	= 3.00	3.00	0.00	0.00
Eqn. Exp.	= 1.50	1.50	0.00	0.00
Multi-Stage	= Yes	No	No	No

Tailwater Elevation = 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	Discharge cfs
0.00	0	56.96	38.41	---	---	---	0.00	0.00	---	---	0.00
3.04	1,272,718	60.00	46.59	---	---	---	159.01	7.05	---	---	53.65
5.04	2,870,070	62.00	51.27	---	---	---	339.44	201.15	---	---	252.42

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description	
1	SCS Runoff	40.1	6	798	555,978	2	---	---	---	2 YR PRE DEVELOPME	
2	SCS Runoff	110.3	6	798	1,374,089	10	---	---	---	10 YR PRE- DEVELOP	
3	SCS Runoff	88.7	6	780	909,063	2	---	---	---	2 YR POST DEVELOPM	
4	Reservoir	29.5	6	870	909,062	2	3	57.38	440,319	2 YR POST ROUTED	
5	SCS Runoff	189.7	6	780	1,901,258	10	---	---	---	10 YR POST DEVELOP	
6	Reservoir	43.2	6	882	1,901,253	10	5	59.16	1,006,402	10 YR POST ROUTED	
7	SCS Runoff	234.9	6	780	2,352,869	25	---	---	---	25 YR POST DEVELOP	
8	Reservoir	75.4	6	870	2,352,865	25	7	59.87	1,231,371	25 YR POST ROUTED	
9	SCS Runoff	326.4	6	780	3,281,453	100	---	---	---	100 YR POST DEVELO	
10	Reservoir	152.2	6	852	3,281,443	100	9	60.70	1,552,747	100 YR POST ROUTED	
11	Reservoir	31.4	6	870	909,062	2	3	57.99	429,394	2 YR ROUTED	
12	Reservoir	44.9	6	882	1,901,254	10	5	59.32	987,125	10 YR ROUTED	
13	Reservoir	53.6	6	882	2,352,865	25	7	60.00	1,271,656	25 YR ROUTED	
14	Reservoir	94.7	6	870	3,281,447	100	9	60.61	1,756,159	100 YR ROUTED	
<p><u>ORIGINAL DESIGN</u></p> <p>2 - 37 cfs @ EL 57.17</p> <p>10 - 42.9 cfs @ EL 59.04</p> <p>100 - 146.6 cfs @ EL 60.65</p>											
Proj. file: 8656-1.gpw					IDF file: jcc.IDF			Run date: 01-03-2001			

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	65.0	0.00	5.45	0.00	0.00	2.08	0.0	20.1	4.7	9.86	15.87	3.24	24	0.49	72.00	71.68	73.78	73.68	77.78	78.25	DI(2)-DI(1)
2	1	12.0	1.97	5.45	0.30	0.59	2.08	20.0	20.0	4.8	9.88	29.20	3.40	24	1.67	72.20	72.00	73.85	73.87	78.25	78.00	DI(2)-DI(1)
3	2	70.0	0.10	3.48	0.50	0.05	1.49	5.0	13.6	5.6	8.38	29.61	3.93	24	1.71	73.40	72.20	74.43	74.15	78.00	81.67	#1-1A - #1-1
4	3	130.0	0.21	3.38	0.50	0.10	1.44	5.0	13.2	5.7	8.21	13.35	5.30	18	1.62	75.50	73.40	76.59	75.05	81.67	82.00	#1-2 - #1-1A
5	4	80.0	0.44	0.44	0.60	0.26	0.26	7.0	7.0	7.2	1.91	10.21	2.60	15	2.50	77.50	75.50	78.05	77.42	82.00	81.80	#1-2A - #1-2
6	4	75.0	0.55	0.55	0.50	0.28	0.28	10.0	10.0	6.4	1.75	7.46	1.58	15	1.33	76.50	75.50	77.46	77.42	82.00	82.00	#1-2B - #1-2
7	4	140.0	0.24	2.18	0.40	0.10	0.79	5.0	12.7	5.8	4.61	8.28	4.44	15	1.64	77.80	75.50	78.66	77.42	82.00	82.20	#1-3 - #1-2
8	7	25.0	0.37	0.37	0.40	0.15	0.15	10.0	10.0	6.4	0.94	5.78	0.78	15	0.80	78.00	77.80	79.17	79.17	82.20	82.20	#1-3A - #1-3
9	7	38.0	0.60	1.57	0.40	0.24	0.55	10.0	12.5	5.8	3.21	7.33	2.96	15	1.29	78.29	77.80	79.21	79.17	82.20	82.44	#1-3B - #1-
10	9	74.0	0.78	0.97	0.30	0.23	0.31	12.0	12.0	5.9	1.84	7.35	2.67	15	1.30	79.25	78.29	79.79	79.30	82.44	83.79	#1-4 - #1-3B
11	10	25.0	0.19	0.19	0.40	0.08	0.08	7.0	7.0	7.2	0.55	9.13	1.43	15	2.00	79.75	79.25	80.07	80.09	83.79	83.79	#1-5 - #1-4

Project File: 86561-1.stm

I-D-F File: JCC.IDF

Total number of lines: 11

Run Date: 05-20-1999

NOTES: Intensity = 34.51 / (Tc + 6.10) ^ 0.61; Return period = 10 Yrs. ; Initial tailwater elevation = 73.68 (ft)

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	120.0	0.45	6.80	0.35	0.16	3.49	5.0	17.8	5.0	17.49	91.71	4.88	30	5.00	58.00	52.00	59.40	59.00	54.25	63.70	#2-2 - #2-1
2	1	80.0	0.49	6.35	0.40	0.20	3.33	7.0	17.6	5.0	16.79	25.29	6.39	24	1.25	59.00	58.00	60.45	59.70	63.70	63.66	#2-3 - #2-2
3	2	25.0	0.15	0.15	0.75	0.11	0.11	5.0	5.0	8.0	0.90	10.49	0.73	15	2.64	59.66	59.00	61.56	61.55	63.66	63.66	#2-3A - #2-3
4	2	165.0	0.52	5.71	0.40	0.21	3.03	10.0	17.1	5.1	15.43	24.90	5.76	24	1.21	61.00	59.00	62.39	61.55	63.66	67.22	#2-4 - #2-3
5	4	25.0	0.86	5.19	0.40	0.34	2.82	10.0	17.1	5.1	14.39	15.58	8.14	18	2.20	61.55	61.00	63.71	63.24	67.22	67.22	#2-5 - #2-4
6	5	205.0	0.46	4.33	0.40	0.18	2.47	7.0	16.6	5.2	12.79	17.78	7.44	18	2.87	67.43	61.55	68.78	65.26	67.22	73.43	#2-6 - #2-5
7	6	25.0	0.13	3.15	0.60	0.08	1.98	10.0	16.5	5.2	10.27	15.86	5.81	18	2.28	68.00	67.43	70.38	70.14	73.43	73.43	#2-6A - #2-6
8	7	38.0	0.34	3.02	0.65	0.22	1.90	7.0	16.4	5.2	9.89	12.05	5.60	18	1.32	68.50	68.00	70.98	70.64	73.43	75.85	#2-6B - #2-6
9	8	140.0	0.33	2.68	0.65	0.21	1.68	7.0	16.1	5.2	8.82	9.45	7.19	15	2.14	71.50	68.50	74.32	71.71	75.85	78.50	#2-6C - #2-6
10	9	88.0	0.35	0.35	0.65	0.23	0.23	10.0	10.0	6.4	1.45	14.60	2.25	15	5.11	76.00	71.50	76.48	75.53	78.50	81.10	#2-6C1 - #2-
11	9	70.0	0.14	2.00	0.50	0.07	1.24	10.0	15.9	5.3	6.55	9.45	5.33	15	2.14	73.00	71.50	76.25	75.53	78.50	80.00	#2-6D - #2-6
12	11	26.0	0.17	0.17	0.85	0.14	0.14	5.0	5.0	8.0	1.15	17.91	0.94	15	7.69	75.00	73.00	76.92	76.91	80.00	80.00	#2-6D1 - #2-
13	11	100.0	0.15	1.69	0.80	0.12	1.03	7.0	15.5	5.3	5.47	7.91	4.46	15	1.50	74.50	73.00	77.63	76.91	80.00	80.30	#2-6E - #2-6
14	13	64.0	0.28	0.28	0.60	0.17	0.17	10.0	10.0	6.4	1.07	9.89	0.87	15	2.34	76.00	74.50	78.04	78.02	80.30	80.30	#2-6E1 - #2-
15	13	90.0	0.32	1.26	0.40	0.13	0.74	15.0	15.0	5.4	3.99	6.81	3.25	15	1.11	75.50	74.50	78.36	78.02	80.30	80.00	#2-6F - #2-6
16	15	8.0	0.94	0.94	0.65	0.61	0.61	15.0	15.0	5.4	3.30	16.14	2.69	15	6.25	76.00	75.50	78.59	78.57	80.00	80.20	#2-6G - #2-6
17	6	100.0	0.53	0.72	0.40	0.21	0.31	7.0	7.0	7.2	2.22	13.80	2.82	15	4.57	72.00	67.43	72.60	70.14	73.43	77.75	#2-7 - #2-6
18	17	25.0	0.19	0.19	0.50	0.09	0.09	5.0	5.0	8.0	0.76	15.82	1.74	15	6.00	73.50	72.00	73.85	72.94	77.75	77.75	#2-8 - #2-7

Project File: 86561-2.stm I-D-F File: JCC.IDF Total number of lines: 18 Run Date: 05-20-1999

NOTES: Intensity = 34.51 / (Tc + 6.10) ^ 0.61; Return period = 10 Yrs. ; Initial tailwater elevation = 59.00 (ft)



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PROJECT GREENSPRINGS WEST PH 1

PROJECT NO. 8656-1

SUBJECT POND DESIGN

SHEET NO. _____ OF _____

CALCULATED BY CAH DATE 5/20/99

BOUYANCY CALCULATIONS FOR 48" RCP

WEIGHT OF WATER DISPLACED BY RISER

$$W_{H_2O} = (62.4 \text{ LBS/CF}) (\pi) (2^2) (6 \text{ FT}) = \underline{4,702 \text{ LBS}} \leftarrow$$

* ASSUME WORST CASE OF FULL HEIGHT DISPLACING WATER

WEIGHT OF STRUCTURE

* RISER (48" RCP) = 905 LBS/FT

FOR 6' RISER, WEIGHT = 5,430 LBS

* EW-11

8' LONG x 7' WIDE x 2' HIGH x 8" THICK

BOTTOM = 37.5 CF

BACK = 9.4 CF

SIDES = 9.4 CF

TOTAL = 56.3 CF AT 150 LBS/CF = 8,445 LBS

* CONC IN BOTTOM OF RISER

$$(1.5 \text{ FT}) (150 \text{ LBS/CF}) (\pi) (2^2) = \underline{2,826 \text{ LBS}}$$

STRUCTURE WEIGHT = 16,701 LBS > 4,702 LBS ✓

∞ STRUCTURE WILL NOT FLOAT.

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	65.0	0.00	5.45	0.00	0.00	2.08	0.0	20.1	4.7	9.86	15.87	3.24	24	0.49	72.00	71.68	73.78	73.68	77.78	78.25	DI(2)-DI(1)
2	1	12.0	1.97	5.45	0.30	0.59	2.08	20.0	20.0	4.8	9.88	29.20	3.40	24	1.67	72.20	72.00	73.85	73.87	78.25	78.00	DI(2)-DI(1)
3	2	70.0	0.10	3.48	0.50	0.05	1.49	5.0	13.6	5.6	8.38	29.61	3.93	24	1.71	73.40	72.20	74.43	74.15	78.00	81.67	#1-1A - #1-1
4	3	130.0	0.21	3.38	0.50	0.10	1.44	5.0	13.2	5.7	8.21	13.35	5.30	18	1.62	75.50	73.40	76.59	75.05	81.67	82.00	#1-2 - #1-1A
5	4	80.0	0.44	0.44	0.60	0.26	0.26	7.0	7.0	7.2	1.91	10.21	2.60	15	2.50	77.50	75.50	78.05	77.42	82.00	81.80	#1-2A - #1-2
6	4	75.0	0.55	0.55	0.50	0.28	0.28	10.0	10.0	6.4	1.75	7.46	1.58	15	1.33	76.50	75.50	77.46	77.42	82.00	82.00	#1-2B - #1-2
7	4	140.0	0.24	2.18	0.40	0.10	0.79	5.0	12.7	5.8	4.61	8.28	4.44	15	1.64	77.80	75.50	78.66	77.42	82.00	82.20	#1-3 - #1-2
8	7	25.0	0.37	0.37	0.40	0.15	0.15	10.0	10.0	6.4	0.94	5.78	0.78	15	0.80	78.00	77.80	79.17	79.17	82.20	82.20	#1-3A - #1-3
9	7	38.0	0.60	1.57	0.40	0.24	0.55	10.0	12.5	5.8	3.21	7.33	2.96	15	1.29	78.29	77.80	79.21	79.17	82.20	82.44	#1-3B - #1-
10	9	74.0	0.78	0.97	0.30	0.23	0.31	12.0	12.0	5.9	1.84	7.35	2.67	15	1.30	79.25	78.29	79.79	79.30	82.44	83.79	#1-4 - #1-3B
11	10	25.0	0.19	0.19	0.40	0.08	0.08	7.0	7.0	7.2	0.55	9.13	1.43	15	2.00	79.75	79.25	80.07	80.09	83.79	83.79	#1-5 - #1-4

Project File: 86561-1.stm I-D-F File: JCC.IDF Total number of lines: 11 Run Date: 05-20-1999

NOTES: Intensity = 34.51 / (Tc + 6.10) ^ 0.61; Return period = 10 Yrs. ; Initial tailwater elevation = 73.68 (ft)

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	120.0	0.45	6.80	0.35	0.16	3.49	5.0	17.8	5.0	17.49	91.71	4.88	30	5.00	58.00	52.00	59.40	59.00	54.25	63.70	#2-2 - #2-1
2	1	80.0	0.49	6.35	0.40	0.20	3.33	7.0	17.6	5.0	16.79	25.29	6.39	24	1.25	59.00	58.00	60.45	59.70	63.70	63.66	#2-3 - #2-2
3	2	25.0	0.15	0.15	0.75	0.11	0.11	5.0	5.0	8.0	0.90	10.49	0.73	15	2.64	59.66	59.00	61.56	61.55	63.66	63.66	#2-3A - #2-3
4	2	165.0	0.52	5.71	0.40	0.21	3.03	10.0	17.1	5.1	15.43	24.90	5.76	24	1.21	61.00	59.00	62.39	61.55	63.66	67.22	#2-4 - #2-3
5	4	25.0	0.86	5.19	0.40	0.34	2.82	10.0	17.1	5.1	14.39	15.58	8.14	18	2.20	61.55	61.00	63.71	63.24	67.22	67.22	#2-5 - #2-4
6	5	205.0	0.46	4.33	0.40	0.18	2.47	7.0	16.6	5.2	12.79	17.78	7.44	18	2.87	67.43	61.55	68.78	65.26	67.22	73.43	#2-6 - #2-5
7	6	25.0	0.13	3.15	0.60	0.08	1.98	10.0	16.5	5.2	10.27	15.86	5.81	18	2.28	68.00	67.43	70.38	70.14	73.43	73.43	#2-6A - #2-6
8	7	38.0	0.34	3.02	0.65	0.22	1.90	7.0	16.4	5.2	9.89	12.05	5.60	18	1.32	68.50	68.00	70.98	70.64	73.43	75.85	#2-6B - #2-6
9	8	140.0	0.33	2.68	0.65	0.21	1.68	7.0	16.1	5.2	8.82	9.45	7.19	15	2.14	71.50	68.50	74.32	71.71	75.85	78.50	#2-6C - #2-6
10	9	88.0	0.35	0.35	0.65	0.23	0.23	10.0	10.0	6.4	1.45	14.60	2.25	15	5.11	76.00	71.50	76.48	75.53	78.50	81.10	#2-6C1 - #2-
11	9	70.0	0.14	2.00	0.50	0.07	1.24	10.0	15.9	5.3	6.55	9.45	5.33	15	2.14	73.00	71.50	76.25	75.53	78.50	80.00	#2-6D - #2-6
12	11	26.0	0.17	0.17	0.85	0.14	0.14	5.0	5.0	8.0	1.15	17.91	0.94	15	7.69	75.00	73.00	76.92	76.91	80.00	80.00	#2-6D1 - #2-
13	11	100.0	0.15	1.69	0.80	0.12	1.03	7.0	15.5	5.3	5.47	7.91	4.46	15	1.50	74.50	73.00	77.63	76.91	80.00	80.30	#2-6E - #2-6
14	13	64.0	0.28	0.28	0.60	0.17	0.17	10.0	10.0	6.4	1.07	9.89	0.87	15	2.34	76.00	74.50	78.04	78.02	80.30	80.30	#2-6E1 - #2-
15	13	90.0	0.32	1.26	0.40	0.13	0.74	15.0	15.0	5.4	3.99	6.81	3.25	15	1.11	75.50	74.50	78.36	78.02	80.30	80.00	#2-6F - #2-6
16	15	8.0	0.94	0.94	0.65	0.61	0.61	15.0	15.0	5.4	3.30	16.14	2.69	15	6.25	76.00	75.50	78.59	78.57	80.00	80.20	#2-6G - #2-6
17	6	100.0	0.53	0.72	0.40	0.21	0.31	7.0	7.0	7.2	2.22	13.80	2.82	15	4.57	72.00	67.43	72.60	70.14	73.43	77.75	#2-7 - #2-6
18	17	25.0	0.19	0.19	0.50	0.09	0.09	5.0	5.0	8.0	0.76	15.82	1.74	15	6.00	73.50	72.00	73.85	72.94	77.75	77.75	#2-8 - #2-7

Project File: 86561-2.stm I-D-F File: JCC.IDF Total number of lines: 18 Run Date: 05-20-1999

NOTES: Intensity = 34.51 / (Tc + 6.10) ^ 0.61; Return period = 10 Yrs. ; Initial tailwater elevation = 59.00 (ft)



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

PROJECT GREENSPRINGS WEST PH 1

PROJECT NO. 8656-1

SUBJECT POND DESIGN

SHEET NO. _____ OF _____

CALCULATED BY CAH DATE 5/20/99

BOUYANCY CALCULATIONS FOR 48" RCP

WEIGHT OF WATER DISPLACED BY RISER

$$W_{H_2O} = (62.4 \text{ LBS/CF}) (\pi) (2^2) (6 \text{ FT}) = \underline{4,702 \text{ LBS}} \leftarrow$$

* ASSUME WORST CASE OF FULL HEIGHT
DISPLACING WATER

WEIGHT OF STRUCTURE

* RISER (48" RCP) = 905 LBS/FT

FOR 6' RISER, WEIGHT = 5,430 LBS

* EW-11

8' LONG x 7' WIDE x 2' HIGH x 8" THICK

BOTTOM = 37.5 CF

BACK = 9.4 CF

SIDES = 9.4 CF

TOTAL = 56.3 CF AT 150 LBS/CF = 8,445 LBS

* CONC IN BOTTOM OF RISER

$$(1.5 \text{ FT}) (150 \text{ LBS/CF}) (\pi) (2^2) = \underline{2,826 \text{ LBS}}$$

STRUCTURE WEIGHT = 16,701 LBS > 4,702 LBS ✓

∞ STRUCTURE WILL NOT FLOAT.

AES CONSULTING ENGINEERS

Engineering, Surveying and Planning

5248 Olde Towne Road, Suite 1
WILLIAMSBURG, VIRGINIA 23188

LETTER OF TRANSMITTAL

(757) 253-0040
FAX (757) 220-8994

TO JCC ENVIRONMENTAL DIV.

DATE <u>5/20/99</u>	JOB NO. <u>8656-1</u>
ATTENTION <u>DARRYL COOK</u>	
RE: <u>GREENSPRINGS PHASE I</u>	

WE ARE SENDING YOU Attached Under separate cover via _____ the following

- Shop drawings Prints Plans Samples Specifications
 Copy of letter Change order _____



COPIES	DATE	NO.	DESCRIPTION
<u>2</u>			<u>REVISED PLANS</u>
<u>2</u>			<u>REVISED DRAINAGE CALCS.</u>
<u>2</u>			<u>BOUYANCY CALCS.</u>

THESE ARE TRANSMITTED as checked below:

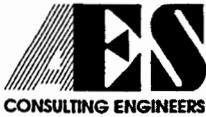
- For approval Approved as submitted Resubmit _____ copies for approval
 For your use Approved as noted Submit _____ copies for distribution
 As requested Returned for corrections Return _____ corrected prints
 For review and comment _____
 FOR BIDS DUE _____ PRINTS RETURNED AFTER LOAN TO US

REMARKS

COPY TO _____

SIGNED: C. Andrew Hill

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



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

PROJECT GREENSPRINGS WEST - PH III
 PROJECT NO. 8656-4
 SUBJECT DRAINAGE - DITCH CALL
 SHEET NO. 1 OF 1
 CALCULATED BY HWP DATE 2/2/00
 RCV. 2/22/00

DITCH FROM LOTS 173 TO 176 AND 191 TO 184

$D.A. = 1.52 \text{ AC}$ $C = 0.40$ $T_p = 10 \text{ MIN}$

$I_2 = 4.5 \text{ IN/HR}$ $I_{10} = 6.0 \text{ IN/HR}$

$Q_2 = CA = (0.40)(4.5)(1.52) = 2.74 \text{ CFS}$ $V_2 = 1.0 \text{ FPS OK}$

$Q_{10} = (0.40)(6.0)(1.52) = 3.65 \text{ CFS}$ $V_{10} = 1.1 \text{ FPS OK}$

$D_{10} = 4.1''$

PROVIDED 387 LF OF GRASS V-DITCH W/3:1 SS

DEPTH = 6", @ 1.03%

OUTFALL AT SYSTEM 10

$Q_2 = 4.39 \text{ CFS}$ ✓

$n_1 = 0.02$ ✓	$n_4 = 0.00$ ✓
$n_2 = 0.00$ ✓	$n_5 = 0.04$ ✓
$n_3 = 0.00$ ✓	$n_6 = 0.00$
TOTAL $n = 0.06$	

CHANNEL → 8' BOTTOM W/2:1 SS @ 7.00%

PER CHART ON PAGE 262 $V_2 = 4.0 \text{ FPS}$ ADEQUATE ✓

OUTFALL AT SYSTEM 11

$Q_2 = 6.00 \text{ CFS}$ ✓

$n_1 = 0.02$	$n_4 = 0.01$
$n_2 = 0.00$	$n_5 = 0.03$
$n_3 = 0.00$	$n_6 = 0.00$
TOTAL $n = 0.06$	

CHANNEL → 12' BOTTOM W/5:1 SS @ 5.00%

PER CHART ON PAGE 264 $V_2 = 3.35 \text{ FPS}$ ADEQUATE ✓

Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (I) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	182.0	0.20	1.66	0.80	0.16	0.84	5.0	6.8	5.2	4.39	14.56	5.22	18	1.92	69.50	66.00	70.30	66.66	75.28	67.50	10-2 TO 10-1
2	1	43.0	0.57	1.46	0.50	0.28	0.68	5.0	6.6	5.2	3.58	7.51	3.85	18	0.51	69.72	69.50	70.45	70.35	75.28	75.28	10-3 TO 10-2
3	2	106.0	0.18	0.89	0.30	0.05	0.40	5.0	5.9	5.4	2.15	4.57	2.73	15	0.50	70.25	69.72	70.89	70.72	75.92	75.28	10-4 TO 10-3
4	3	100.0	0.56	0.71	0.40	0.22	0.34	5.0	5.4	5.5	1.91	4.57	3.13	15	0.50	70.75	70.25	71.30	70.97	77.68	75.92	10-5 TO 10-4
5	4	43.0	0.15	0.15	0.80	0.12	0.12	5.0	5.0	5.6	0.68	11.01	1.75	15	2.91	72.00	70.75	72.33	71.51	77.68	77.68	10-6 TO 10-5
Project File: 8656410.stm								I-D-F File: New JCC.IDF						Total number of lines: 5				Run Date: 02-23-2000				
NOTES: Intensity = $93.68 / (Tc + 14.60)^{0.94}$; Return period = 2 Yrs; Initial tailwater elevation = 66.66 (ft)																						

System 10: $Q_2 = 4.39$ EFS

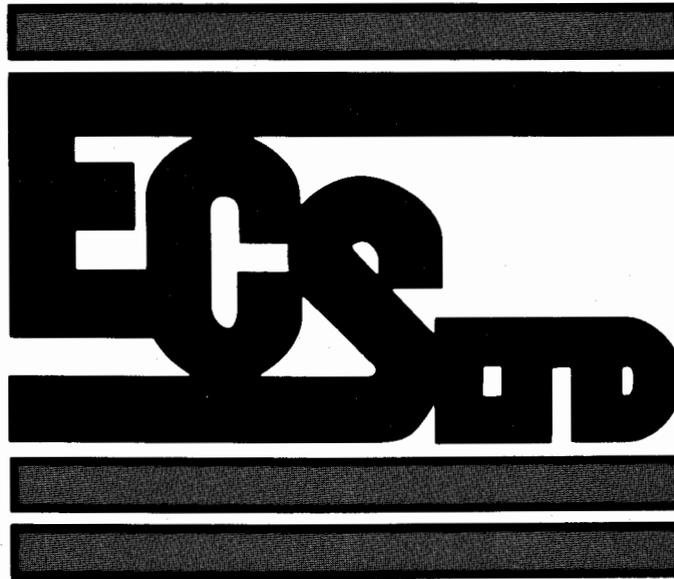
Hydraflow Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	100.0	0.29	3.99	0.80	0.23	1.61	5.0	15.9	3.7	6.00	35.76	5.61	24	2.50	63.50	61.00	64.37	61.66	74.01	57.50	11-2 TO 11-1
2	1	42.0	0.10	3.70	0.80	0.08	1.38	5.0	15.7	3.7	5.16	7.43	4.54	18	0.50	66.79	66.58	67.71	67.50	74.01	74.01	11-3 TO 11-2
3	2	10.0	0.80	2.32	0.30	0.24	0.70	10.0	15.6	3.8	2.61	4.57	2.14	15	0.50	66.84	66.79	68.04	68.03	72.50	74.01	11-4 TO 11-3
4	3	94.0	1.52	1.52	0.30	0.46	0.46	15.0	15.0	3.8	1.75	9.79	2.48	15	2.30	69.00	66.84	69.53	68.05	73.50	72.50	11-5 TO 11-4
5	2	85.0	0.26	0.71	0.40	0.10	0.37	5.0	7.4	5.1	1.89	4.59	1.81	15	0.51	67.22	66.79	68.09	68.03	75.84	74.01	11-6 TO 11-3
6	2	75.0	0.57	0.57	0.40	0.23	0.23	5.0	5.0	5.6	1.29	11.28	4.62	15	3.05	71.00	68.71	71.45	69.00	75.30	74.01	11-7 TO 11-3
7	5	132.0	0.00	0.45	0.10	0.00	0.27	0.0	6.5	5.3	1.42	4.57	2.39	15	0.50	67.88	67.22	68.36	68.12	79.50	75.84	11-8 TO 11-6
8	7	268.0	0.45	0.45	0.60	0.27	0.27	5.0	5.0	5.6	1.53	4.57	2.94	15	0.50	69.22	67.88	69.71	68.50	75.71	79.50	11-9 TO 11-8

SYSTEM 11:
Q₂ = 6.00 CFS

Project File: 8656411.stm I-D-F File: New JCC.IDF Total number of lines: 8 Run Date: 02-23-2000

NOTES: Intensity = 93.68 / (Tc + 14.60) ^ 0.94; Return period = 2 Yrs; Initial tailwater elevation = 61.66 (ft)



REPORT OF
SUBSURFACE EXPLORATION
AND GEOTECHNICAL ENGINEERING ANALYSIS

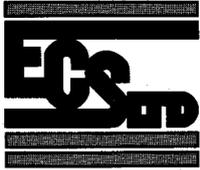
Greensprings West – Phase I/II (Dam Study)
Centerville Road
James City County, Virginia

ECS Project No. R4723

FOR

Mr. Lynn Evans
C. Lewis Waltrip II, Inc.
P.O. Box 418
Williamsburg, Virginia 23187

May 18, 1999



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

May 18, 1999

Mr. Lynn Evans
C. Lewis Waltrip II, Inc.
P.O. Box 418
Williamsburg, Virginia 23187

ECS Project No. R4723

Reference: Greensprings West – Phase I/II (Dam Study)
Centerville Road
James City County, Virginia

Dear Mr. Evans:

As requested, ECS performed soil test borings on September 11, 1998, for the proposed dam referenced above. In general, three borings (B-1, B-2 and B-3) were performed to depths of 30 feet along the centerline of the proposed dam, and two borings (B-4 and B-5) were performed to depths of 15 feet within the impoundment area. The borings were performed with an ATV mounted drill rig which utilized continuous flight, hollow stem augers to advance the boreholes. Laboratory testing, for classification purposes, was performed on representative soils samples obtained from the borings. The approximate boring locations are indicated on the diagram included in Appendix I, and the boring logs are included in Appendix II.

It is expected that the soil test borings and the recommendations provided herein will satisfy the requirements of the "Typical Dam Section A-A" and "Dam Construction Notes" prepared by AES. A copy of the dam cross-section and construction notes are included in Appendix III.

Design Recommendations:

In general, it is our recommendation that the key trench extend to an approximate depth of 6 feet below existing surface grade, or approximate elevation 44 feet, throughout the centermost section of the dam (vicinity of Boring B-2). The purpose of this deep embedment will be to penetrate the near surface organic material, and very loose soil conditions. We anticipate that the key trench may be stepped up along the east and west shoulders, however, a minimum 3-foot embedment depth should be maintained. The key trench should be a minimum 6-feet wide at the base.

2119-D North Hamilton Street, Richmond Virginia 23230 • (804) 353-6333 • Fax (804) 353-9478

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It is also recommended that the 24" RCP out-fall barrel be constructed with a minimum of three (3) concrete anti-seep collars. The collars (either round or square) may be pre-cast or cast-in-place, and should be constructed with a minimum diameter or side dimension of 48-inches (as appropriate). We recommend that the collars be evenly spaced within the core of the dam, with a minimum 3-foot set-back from the outer edge of the core.

With regard to the construction of the key, core and shell of the dam, the following fill types and compaction criteria are recommended:

Key and Core Fill: Soil Material classified as SM, SC, ML, or CL which contains at least 40% by weight Silt or Clay, has a compacted permeability of 10^{-4} cm/sec or less, and is free of organics and rock larger than 4 inches in diameter. Fill should have a maximum Liquid Limit of 50 and maximum plasticity index of 30.

Embankment Cover Fill: Soil material classified as SM, SC, ML, or CL free of organics and rock greater than 4 inches in diameter.

All soil type fill for the dam key, core, and embankment should be placed and compacted to a dry density of at least 95% of that soil's Standard Proctor maximum dry density (ASTM D 698). The compaction should be accomplished by placing the fill in 6- to 12-inch loose lifts and mechanically compacting each lift to the required density prior to placement of subsequent lifts. At least a 5-ton sheepsfoot roller should be employed to attain compaction of cohesive key and core materials. Hand-operated equipment should be employed around and immediately above pipes and foundations. We recommend that the soils for the dam key and core be compacted at moisture contents at the optimum moisture content or up to 3% above optimum moisture content for the material used for best compaction results. The soils comprising the dam cover should be compacted at moisture contents within +/- 3% of the optimum moisture content for that soil type. Where backfilling with soil is not possible in deeper excavations, lean concrete or flowable fill having a minimum 28-day compressive strength of 200 psi should be employed. It should be noted that if adequate compaction of the foundation base soils is not attained, excessive settlement of the embankment could occur, affecting the stability of the dam.

The surface of each compacted lift of the key and core fill should be scarified by backdragging to a depth of 2 inches prior to placement of the next lift. This step should prevent development of horizontal seepage planes. If the cleats of the sheepsfoot roller leaves uniform impressions of at least 1.5 inches in depth, then backdragging is not considered necessary. Embankment fill should be placed in horizontal lifts against shoulder slopes no steeper than 1 vertical to 4 horizontal. Where greater slopes exist they should be benched to receive fill. Bench heights should be limited to 4 feet. The natural shoulders of the ravines should be cleared of all vegetation, root matter, or other organic or otherwise unstable material prior to embankment fill placement.

Dam embankments should be protected from erosion due to wave action and surface runoff. While design of such protection is beyond the scope of this study, we recommend that upstream erosion control consist of concrete members or rip rap placed over filter fabric. This protection should extend to an elevation just above the 100-year flood elevation. On the downstream side, slope protection could probably best be attained by seeding with heavy grass or similar deep-rooted vegetation. If construction occurs during a period not conducive to rapid vegetative growth, a temporary synthetic stabilization matting could be used to cover the slope. Trees should not be planted on the dam embankment.

Routine maintenance should be provided for the dam. This should include annual inspections for removal of bushes and trees, filling of animal burrows, inspection for surface erosion or vertical cracks in the embankment, etc. The toe drain and stilling basin should be inspected for erosion and loss of rip rap, seepage beyond the toe drain, or increased flow or movement of fines through the drains.

Construction Considerations:

All topsoil and organic materials should be removed from below the dam and to a distance of at least 5 feet beyond the design toe of the embankment. It is recommended that provisions for dewatering be made, then the full width and length of the embankment be undercut to the required grade and dimensions so as to remove excessively soft or organic soils. Upon review by the geotechnical engineer, the excavation can be backfilled utilizing approved Core Fill material. The contractor should be prepared to provide the methods necessary to attain adequate dewatering and excavation stability. Dewatering during construction will be difficult, particularly if work is performed at any time other than the drier summer months. Surface grade stream flows are relatively low and temporary retention of surficial flows might be attained by temporary berms and dams upstream of the work area. For excavation below grade to remove and replace organic or excessively porous deposits and construct the key, dewatering could be more complicated. It is anticipated that staged excavation supported by dewatering pumps of substantial capacity will be required to accomplish the undercuts.

The soil test borings and laboratory test results indicate potentially erratic subsurface soil conditions. Typically, the subsurface soils consist of variable deposits of Silty and Clayey, fine to coarse Sands (SM and SC), with interbedded and isolated layers of Clayey SILTS (MH and ML) and Silty CLAYS (CL). In this regard, it is recommended that field personnel with ECS be present on-site during critical key trench excavation and backfilling operations so as to verify key trench embedment depth, confirm suitable key trench bearing material, and to monitor placement and compaction of the clay core. Undercutting below the center of the dam will be most critical, and the geotechnical engineer should be allowed to direct this effort.

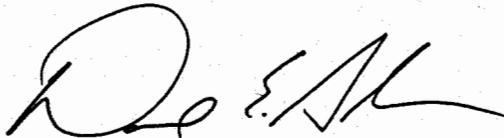
It is noted that the borings performed within the impoundment area, Borings B-4 and B-5, encountered primarily granular soils (sands). This material *does not* meet the specifications for the impervious clay core material, but is considered suitable for use as shell material. At this time it is anticipated that material for the clay core will need to be imported from an off-site source. Samples of core and shell fill material should be submitted to ECS and/or the geotechnical engineer for analysis and approval prior to placement.

Closing:

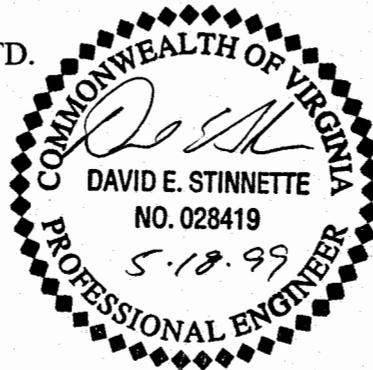
ECS, Ltd. has appreciated the opportunity to be of service to you on this project. Please feel free to call us should you have questions or need further assistance.

Respectfully,

ENGINEERING CONSULTING SERVICES, LTD.



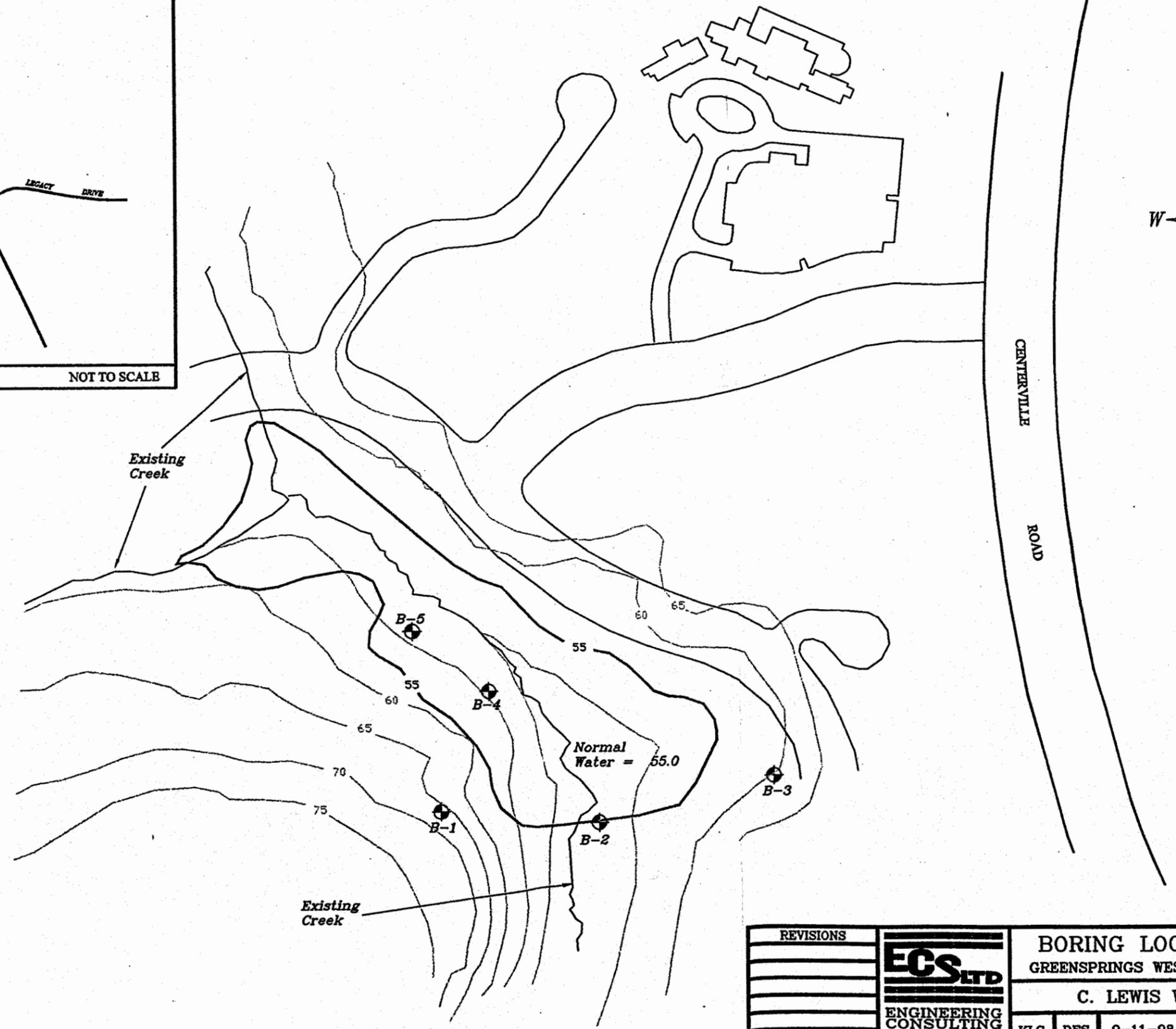
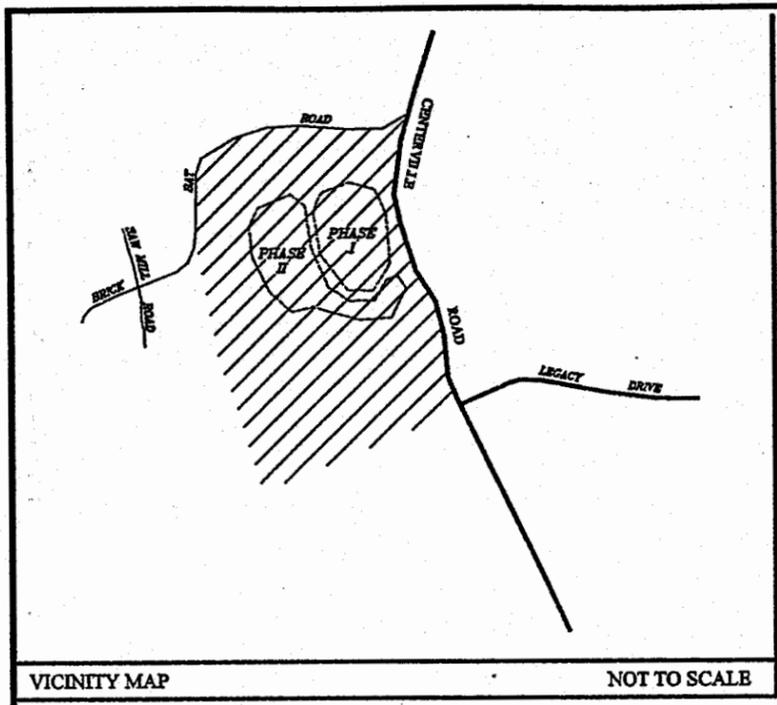
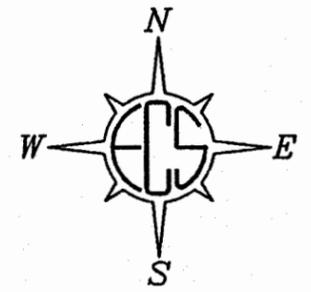
David E. Stinnette, P.E.
Engineering Services Manager



Copies: (1) C. Lewis Waltrip II, Inc.
(4) AES (for distribution to James City County as required)

Appendix: I. Boring Location Diagram
II. Boring Logs
III. Dam Cross-Section and Construction Notes
IV. Summary of Laboratory Test Results

GEOTECH/LTRS/R4723LTR



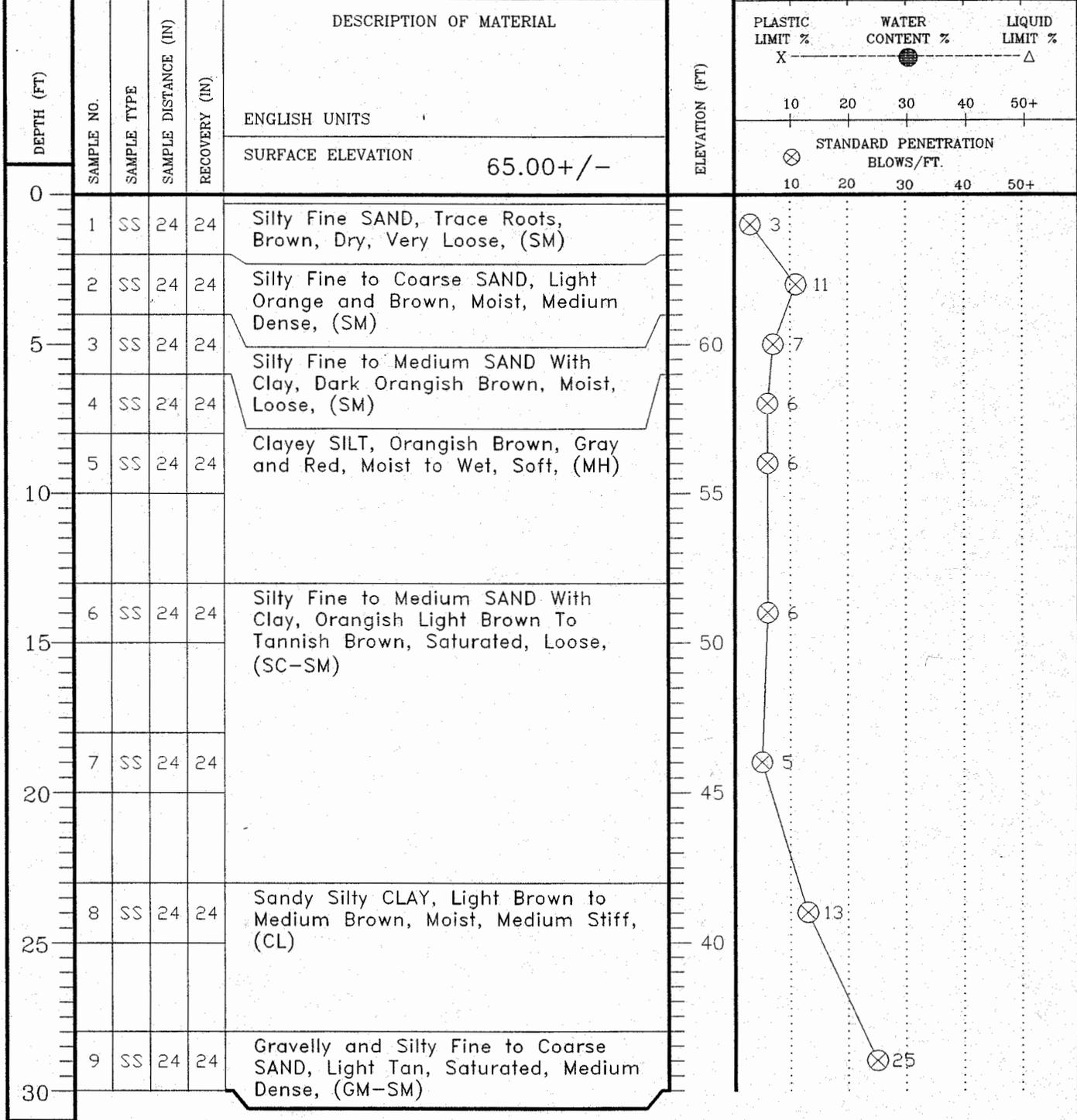
CENTERVILLE ROAD

⊕ - Approximate Boring Location

REVISIONS			BORING LOCATION DIAGRAM			
			GREENSPRINGS WEST-PHASE I (DAM STUDY)			
		C. LEWIS WALTRIP II, INC.				
KLG	DES	9-11-98	1"=200'	R4723	1 OF 1	

CLIENT C. LEWIS WALTRIP II, INC.	JOB # R4723	BORING # B-1	SHEET 1 OF 1	ECS LTD
PROJECT NAME GREENSPRINGS WEST-PH I (DAM STUDY)		ARCHITECT-ENGINEER		

SITE LOCATION
JAMES CITY COUNTY, VIRGINIA

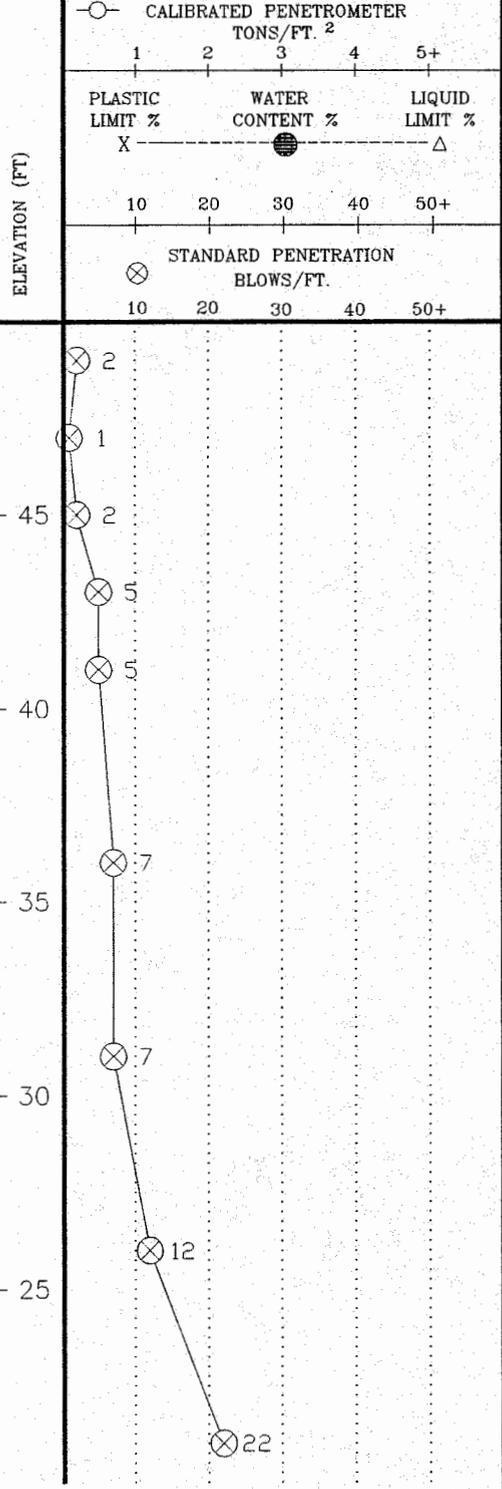


THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL				
WL	13.0'	WS OR (WD)	BORING STARTED 9-11-98	TOPSOIL DEPTH: 4"
WL	BCR	ACR	BORING COMPLETED 9-11-98	CAVE IN DEPTH (C) N/A
WL			RIG FISHBURNE FOREMAN RR	DRILLING METHOD HOLLOW STEM AUGER

CLIENT C. LEWIS WALTRIP II, INC.	JOB # R4723	BORING # B-2	SHEET 1 OF 1	ECS LTD
PROJECT NAME GREENSPRINGS WEST-PH I (DAM STUDY)		ARCHITECT-ENGINEER		

SITE LOCATION
JAMES CITY COUNTY, VIRGINIA

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL
					ENGLISH UNITS
					SURFACE ELEVATION 50.00+/-
0	1	SS	24	24	Silty Fine to Medium SAND, Trace Roots, Black to Dark Brown, Wet to Saturated, Very Loose, (SM)
	2	SS	24	24	
5	3	SS	24	24	
	4	SS	24	24	
10	5	SS	24	24	Silty Fine to Medium SAND, Light Gray and Medium Gray, Wet, Loose, (SM)
15	6	SS	24	24	Silty Fine SAND, Orangish Brown, Wet, Loose, (SM)
20	7	SS	24	24	Fine Sandy Clayey SILT, Orangish Light Brown, Moist, Medium Stiff, (ML)
25	8	SS	24	24	
30	9	SS	24	24	Silty Fine to Coarse SAND With Gravel and Rock Fragments, Light Brown and Tan, Wet, Medium Dense, (SM)



END OF BORING @ 30.0'

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

WL 1.5' +/-	WS OR WD	BORING STARTED 9-11-98	TOPSOIL DEPTH: 12"
WL BCR	ACR	BORING COMPLETED 9-11-98	CAVE IN DEPTH @ N/A
WL		RIG FISHBURNE FOREMAN RR	DRILLING METHOD HOLLOW STEM AUGER

CLIENT C. LEWIS WALTRIP II, INC.	JOB # R4723	BORING # B-3	SHEET 1 OF 1	
PROJECT NAME GREENSPRINGS WEST-PH I (DAM STUDY)	ARCHITECT-ENGINEER			

SITE LOCATION
JAMES CITY COUNTY, VIRGINIA

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	CALIBRATED PENETROMETER TONS/FT. ²													
							1	2	3	4	5+									
						PLASTIC LIMIT %			WATER CONTENT %			LIQUID LIMIT %								
						X			●			△								
						10			20			30			40			50+		
						STANDARD PENETRATION BLOWS/FT.														
						⊗														
						10			20			30			40			50+		
0					ENGLISH UNITS															
					SURFACE ELEVATION	60.00+/-														
0	1	SS	24	24	Silty Fine to Medium SAND, Light Brown, Moist, Very Loose, (SM)	58.0														
1	2	SS	24	24	Silty Fine to Medium SAND With Gravel, Light Brown, Moist, Loose, (SM)	56.5														
5	3	SS	24	24	Silty Clayey Fine to Medium SAND, Orangish Brown and Tan, Moist to Wet, Loose, (SC-SM)	55.0														
4	4	SS	24	24		54.0														
5	5	SS	24	24		53.0														
10						50.0														
15	6	SS	24	24		46.0														
20	7	SS	24	24	Silty Clayey Fine SAND, Tan With Brown Streaks, Wet, Loose, (SM)	41.0														
25	8	SS	24	24	Fine Sandy Silty CLAY, Orangish Brown, Moist, Medium Stiff, (CL-CH)	36.0														
30	9	SS	24	24	Gravelly and Silty Fine to Coarse SAND, Brown and Tan, Wet to Saturated, Medium Dense, (GM-SM)	32.0														

END OF BORING @ 30.0'

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL					
WL	12.0' +/-	WS OR	BORING STARTED	9-11-98	TOPSOIL DEPTH: 3"
WL	BCR	ACR	BORING COMPLETED	9-11-98	CAVE IN DEPTH @ N/A
WL			RIG FISHBURNE FOREMAN RR		DRILLING METHOD HOLLOW STEM AUGER

CLIENT C. LEWIS WALTRIP II, INC.	JOB # R4723	BORING # B-4	SHEET 1 OF 1	
PROJECT NAME GREENSPRINGS WEST-PH I (DAM STUDY)	ARCHITECT-ENGINEER			

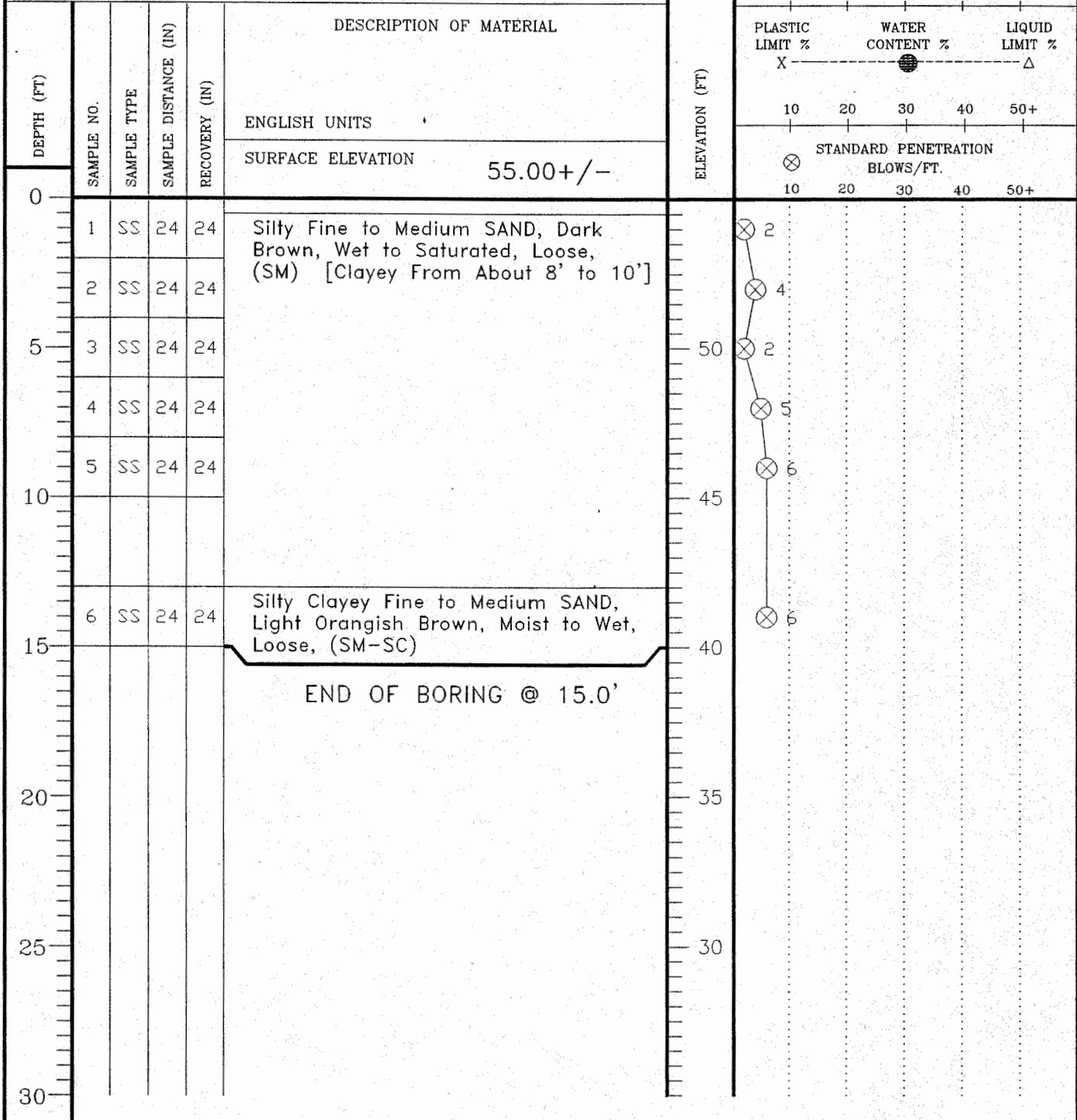
SITE LOCATION
JAMES CITY COUNTY, VIRGINIA

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	○ CALIBRATED PENETROMETER TONS/FT. ² 1 2 3 4 5+ PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X ----- ● ----- Δ 10 20 30 40 50+ ⊗ STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+
					ENGLISH UNITS		
					SURFACE ELEVATION 55.00+/-		
0	1	SS	24	24	Silty Fine to Medium SAND, Trace Roots, Dark Brown, Moist to Wet, Very Loose to Loose, (SM)	49.5	⊗ 1
	2	SS	24	24		48.5	⊗ 3
5	3	SS	24	24		47.5	⊗ 2
	4	SS	24	24		46.5	⊗ 6
	5	SS	24	24		45.5	⊗ 6
15	6	SS	24	24	Fine Sandy Silty CLAY, Trace Fine Gravel, Orange With Red Streaks, Wet to Saturated, Soft, (CL-CH)	41.5	⊗ 5
END OF BORING @ 15.0'							

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL					
WL	6.0+/-	WS OR	BORING STARTED	9-11-98	TOPSOIL DEPTH: 4"
WL	BCR	ACR	BORING COMPLETED	9-11-98	CAVE IN DEPTH @ N/A
WL	RIG FISHBURNE FOREMAN RR			DRILLING METHOD HOLLOW STEM AUGER	

CLIENT C. LEWIS WALTRIP II, INC.	JOB # R4723	BORING # B-5	SHEET 1 OF 1	ECS LTD
PROJECT NAME GREENSPRINGS WEST-PH I (DAM STUDY)	ARCHITECT-ENGINEER			

SITE LOCATION
JAMES CITY COUNTY, VIRGINIA



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

WL 5.0+/-	WS OR	BORING STARTED	9-11-98	TOPSOIL DEPTH: 6"
WL BCR	ACR	BORING COMPLETED	9-11-98	CAVE IN DEPTH @ N/A
WL		RIG FISHBURNE FOREMAN RR		DRILLING METHOD HOLLOW STEM AUGER

DAM CONSTRUCTION NOTES

1. A GEOTECHNICAL SUBSURFACE EXPLORATION AT THE PROPOSED DAM SITE HAS BEEN PERFORMED. THE GEOTECHNICAL REPORT SHALL BE SUBMITTED TO JAMES CITY COUNTY CODE COMPLIANCE AND THE CONTRACTOR. THE GEOTECHNICAL REPORT IS HEREBY MADE A PART OF THE DAM'S CONSTRUCTION SPECIFICATIONS. ADDITIONALLY, THE CONTRACTOR SHALL PROVIDE TESTING RESULTS FROM A PROFESSIONAL GEOTECHNICAL ENGINEER TO ENSURE PROPER MATERIALS AND DAM CONSTRUCTION METHODS ARE USED DURING CONSTRUCTION. IN ADDITION, AFTER CONSTRUCTION, THE PROFESSIONAL GEOTECHNICAL ENGINEER SHALL ALSO SUBMIT A LETTER TO JAMES CITY COUNTY CERTIFYING THAT THE DAM WAS BUILT IN ACCORDANCE WITH APPROVED PLANS, SPECIFICATIONS, AND GEOTECHNICAL REPORT.

2. SITE PREPARATION:

THE CONTRACTOR SHALL STRIP ALL AREAS OF THE PERMANENT CONSTRUCTION TO REMOVE ALL UNSUITABLE MATERIALS. THE UNSUITABLE MATERIALS TO BE REMOVED BY STRIPPING SHALL INCLUDE ALL TOPSOIL, DEBRIS AND VEGETABLE MATTER, INCLUDING STUMPS AND ROOTS, AND ALL OTHER MATERIALS WHICH MAY BE UNSUITABLE FOR USE IN THE PERMANENT CONSTRUCTION.

3. EMBANKMENT: THE EXPOSED SUB GRADE SOILS SHALL BE CAREFULLY INSPECTED BY THE GEOTECHNICAL ENGINEER. ANY UNSUITABLE MATERIALS THUS EXPOSED SHALL BE REMOVED AND REPLACED WITH A WELL COMPACTED, SUITABLE MATERIAL. DENSITY TESTING, AT THE DISCRETION OF THE GEOTECHNICAL ENGINEER, SHALL BE PERFORMED AT THIS TIME.

THE EMBANKMENT SHALL BE KEYED INTO THE UNDISTURBED (EXISTING) SOIL STRATUM. EMBANKMENT SHOULD BE KEYED AS SPECIFIED BY THE GEOTECHNICAL ENGINEER. THE EMBANKMENT FOUNDATION AND ABUTMENTS SHALL BEAR ON FIRM AND STABLE EXISTING SUB GRADE WHICH HAS BEEN PREPARED SO AS TO REMOVE ALL ORGANIC, LOOSE, AND GENERALLY UNSUITABLE MATERIAL.

ALL MATERIALS TO BE USED FOR BACK FILL OR COMPACTED FILL SHALL BE INSPECTED AND, IF NECESSARY, TESTED BY THE GEOTECHNICAL ENGINEER IN ACCORDANCE WITH ASTM D2487 PRIOR TO PLACEMENT TO DETERMINE IF THEY ARE SUITABLE FOR THE INTENDED USE.

THE FILL MATERIAL SHALL BE TAKEN FROM APPROVED BORROW AREAS. IT SHALL BE CLEAN MINERAL SOIL, FREE OF ROOTS, WOOD VEGETATION, OVERSIZED STONES, ROCKS, OR OTHER OBJECTIONABLE MATERIAL. SOILS WHICH ARE APPROVED FOR THE CONSTRUCTION OF THE IMPERVIOUS CLAY CORE, AS DEFINED BY THE UNIFIED SOIL CLASSIFICATION SYSTEM, ARE CH, INORGANIC CLAYS OF HIGH PLASTICITY; CL, INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELY CLAYS, SANDY CLAYS, SILTY CLAYS; SC, (WITH GEOTECHNICAL ENGINEERS APPROVAL CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES. MATERIALS TO BE USED FOR THE CONSTRUCTION OF THE SHELL SHALL BE SELECT BACK FILL FREE OF STUMPS, ROOTS, ROCKS, TRASH, ETC. AND SHALL BE MORE PERVIOUS THAN THE IMPERVIOUS CLAY CORE. AREAS ON WHICH FILL IS TO BE PLACED SHALL BE SCARIFIED A MINIMUM DEPTH OF 4 INCHES PRIOR TO PLACEMENT OF FILL. THE FILL MATERIAL'S MOISTURE CONTENT SHALL BE +3 TO -2 PERCENTAGE POINTS OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D2218 (I.E. IN GENERAL THE FILL MATERIAL SHOULD CONTAIN SUFFICIENT MOISTURE SO THAT IT CAN BE FORMED INTO A BALL WITHOUT CRUMBLING. IF WATER CAN BE SQUEEZED OUT OF THE BALL, IT IS TOO WET FOR PROPER COMPACTION). FILL MATERIAL WILL BE PLACED IN 8 TO 8-INCH CONTINUOUS LAYERS OVER THE ENTIRE LENGTH OF THE FILL. FIRST LIFT ON SUB GRADE

MAY BE PLACED AT A DEPTH UP TO 36 INCHES TO BRIDGE SUB GRADE WITH GREATER THAN OPTIMUM MOISTURE CONTENT. COMPACTION, AS NOTED ON PLAN, SHALL BE OBTAINED GENERALLY BY USING A SHEEPSFOOT COMPACTOR. FINISHED GRADES SHALL BE MERGED INTO THE EXISTING GRADES.

4. CUTOFF TRENCH/KEY TRENCH: THE TRENCH SHALL BE EXCAVATED ALONG THE CENTERLINE OF THE DAM. THE WIDTH AND DEPTH SHALL BE AS DETERMINED BY THE GEOTECHNICAL ENGINEER. THE MIN. BOTTOM WIDTH SHALL BE WIDE ENOUGH TO PERMIT OPERATION OF COMPACTION EQUIPMENT. THE SIDE SLOPES SHALL BE NO STEEPER THAN 1:1. COMPACTION REQUIREMENTS SHALL BE THE SAME AS THOSE FOR THE EMBANKMENT. THE TRENCH SHALL BE KEPT DRAINED DURING THE BACKFILLING-COMPACTING OPERATIONS.
5. SEEPAGE CONTROL: THE GEOTECHNICAL ENGINEER SHALL RECOMMEND A SEEPAGE CONTROL METHOD IN THE GEOTECHNICAL REPORT.
6. PRINCIPAL SPILLWAY: THE BOTTOM OF THE SPILLWAY RISER FOUNDATION BASE EXCAVATION SHALL BE OBSERVED BY THE GEOTECHNICAL ENGINEER TO ENSURE THAT ALL UNSUITABLE AND LOOSE MATERIALS ARE REMOVED AND THAT ACCEPTABLE BEARING CONDITIONS EXIST IN THE FOUNDATION'S BASE.

ALL JOINTS IN THE PRINCIPAL SPILLWAY STRUCTURE SHALL BE OF WATERTIGHT CONSTRUCTION. PERVIOUS MATERIALS SUCH AS SAND, GRAVEL OR CRUSHED STONE SHALL NOT BE USED AS BACK FILL AROUND THE BARREL. FILL MATERIAL SHALL BE PLACED AROUND THE PIPE IN 4-INCH LAYERS AND COMPACTED BY HAND TO THE SAME DENSITY AS THE EMBANKMENT. A MINIMUM OF TWO FEET OF FILL SHALL BE HAND-COMPACTED OVER THE BARREL BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT.

7. VEGETATIVE STABILIZATION: FINAL VEGETATIVE COVER (STABILIZATION) SHALL CONSIST OF TOP SOILING, LIMING, FERTILIZING, SEEDING, AND MULCHING TO ASSURE A FIRM STAND OF GRASS AS SOON AS PRACTICAL. SEDIMENT BASINS AND OTHER TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED ONLY WHEN STABILIZATION IS COMPLETE. FINAL VEGETAL COVER SHALL BE PROVIDED IN ACCORDANCE WITH THE FOLLOWING:

TOPSOIL: AT LEAST 2" THICKNESS OBTAINED FROM STOCKPILES ON SITE, FREE OF LARGE DEBRIS.

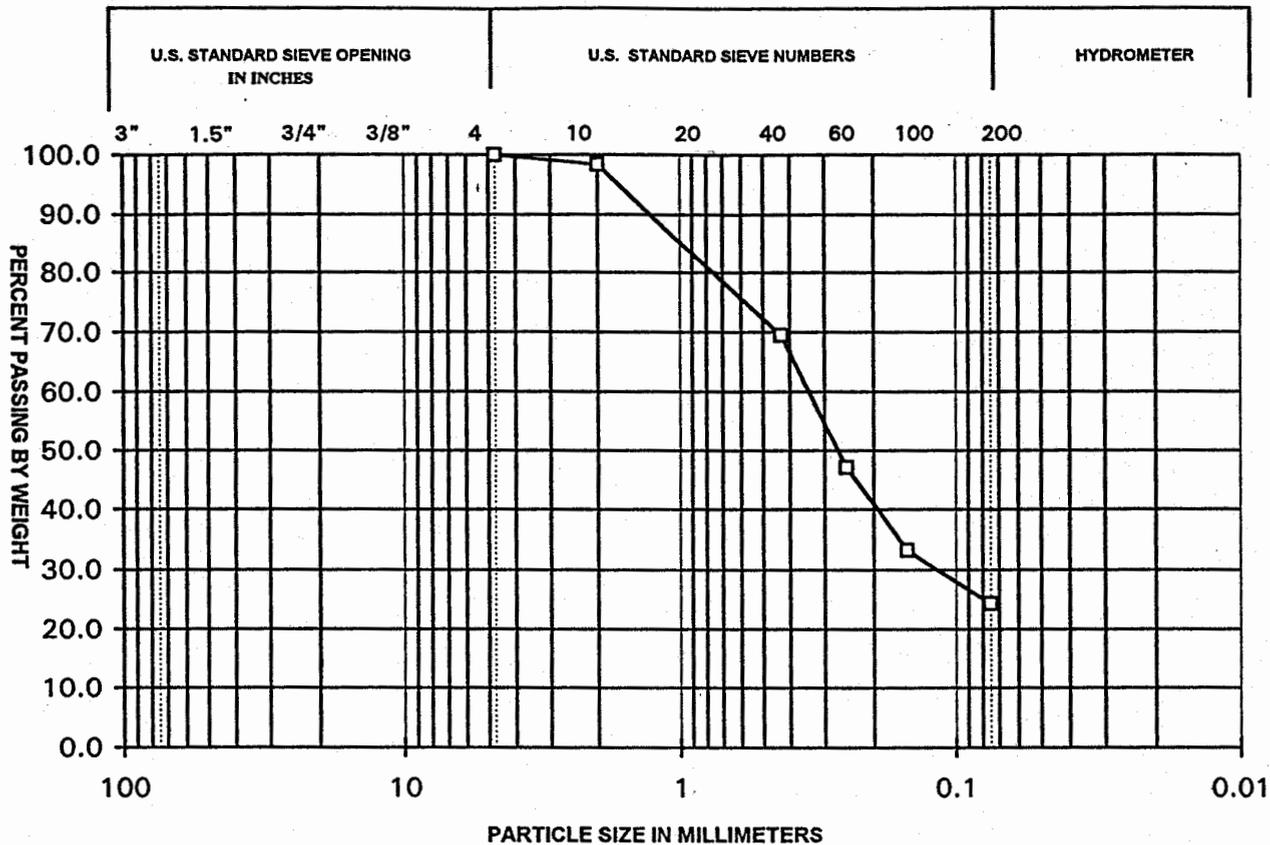
LIME: 4,000#/ACRE (90#/1,000 S.F.)

SEED: KENTUCKY 31 TALL FESCUE 250#/ACRE (6#/1,000 S.F.)

FERTILIZER: 10/20/10 MIX, 1,000#/ACRE (25#/1,000 S.F.)

MULCH: STRAW OR HAY (LOCALLY OBTAINED) 4,000#/ACRE (90#/1,000 S.F.)

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Boring/ Sample No.	Depth (feet)	Symbol	LL	PI	Description
B-2 / S-5	8.0 - 10.0	□	*	*	Gray, Silty SAND (SM)
/		■			
/		△			
/		▲			

Project: Greensprings West - Phase I / II (Dam Study)

Project No.: R4723

Date: 10/1/98

Engineering Consulting Services, Ltd

Richmond, Virginia

Particle Size Distribution Curves

AES CONSULTING ENGINEERS

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

LETTER OF TRANSMITTAL

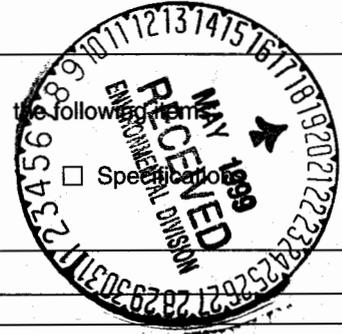
(757) 253-0040
 FAX (757) 220-8994

TO JCC ENVIRONMENTAL DIVISION

DATE <u>5/19/99</u>	JOB NO. <u>8656-1</u>
ATTENTION <u>DARRYL COOK</u>	
RE: <u>GREENSPRINGS WEST, PHASE I</u>	

WE ARE SENDING YOU Attached Under separate cover via _____

- Shop drawings
 Prints
 Plans
 Samples
 Copy of letter
 Change order
 REPORT



COPIES	DATE	NO.	DESCRIPTION
<u>2</u>			<u>GEO TECHNICAL REPORT</u>

THESE ARE TRANSMITTED as checked below:

- For approval
 Approved as submitted
 Resubmit _____ copies for approval
 For your use
 Approved as noted
 Submit _____ copies for distribution
 As requested
 Returned for corrections
 Return _____ corrected prints
 For review and comment

 FOR BIDS DUE _____
 PRINTS RETURNED AFTER LOAN TO US

REMARKS

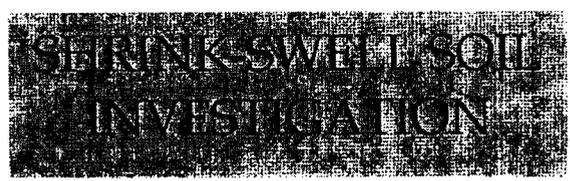
C. Andrew Hill

COPY TO _____

SIGNED: _____



Engineering Consulting Services, Ltd.
 108 Ingram Road - Unit 1
 Williamsburg, VA 23188
 Phone: (757) 229-6677
 Fax: (757) 229-9978



CLIENT: Mr. Gordon Berryman
 Gordon Berryman Builders
 124 Berkeley Lane
 Williamsburg, VA 23185

DATE: November 25, 2003

NAME: Greensprings West, Phase IIIB

PROJECT #: 07:6541

LOT ID: SUBDIVISION: GREENSPRINGS WEST, PHASE IIIB
 LOT: LOT 168, 3193 EAGLES WATCH
 COUNTY, STATE: JAMES CITY COUNTY, VIRGINIA
 ADC MAP/PAGE/GRID: GHR/87/K-7

CONSTRUCTION: One to two-story wood-frame residence with a first floor constructed either over a crawl space or slab-on-grade. Foundation loading not expected to exceed 3 kips per linear foot for walls or 10 kips for columns.

CHARACTERISTICS: BASED ON SITE VISIT BY: JS ON: 11/19/03
 (e.g. Building Development / Vegetation / Drainage / Etc.)

The site was relatively level and open.

CONDITIONS: [BASED ON HAND AUGER BORINGS]

• Fill Encountered: Yes No Groundwater Encountered: Yes No

• Laboratory Test Results:

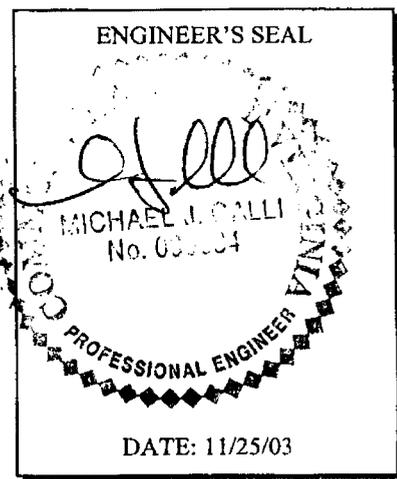
Soil Sample	Depth (feet)	Moisture Content (%)	Atterberg Limits (LL/PL)	Compaction (% Passing #200 Sieve)	USCS Symbol
HA-1	24-48	13.6	30/15/15	57.5	CL

• SCS-USDA Soil Series: EMPORIA Shrink Swell Potential: LOW TO MODERATE

RECOMMENDATIONS: [See Attachment "Additional Design and Construction Notes"]

- Bearing Capacity ----- 2000 psf
 [Based on BOCA 1996, Table 1804.3]
- Minimum Footing Width ----- 18 inches
- Minimum Footing Embedment Depth ----- 24 inches
- Minimum Footing Thickness ----- 10 inches
- Steel Reinforcement ----- Two No 4 bars continuous throughout.

Additional Notes - Footings should be extended through all fill soils (if encountered) to suitable, firm Natural soils.

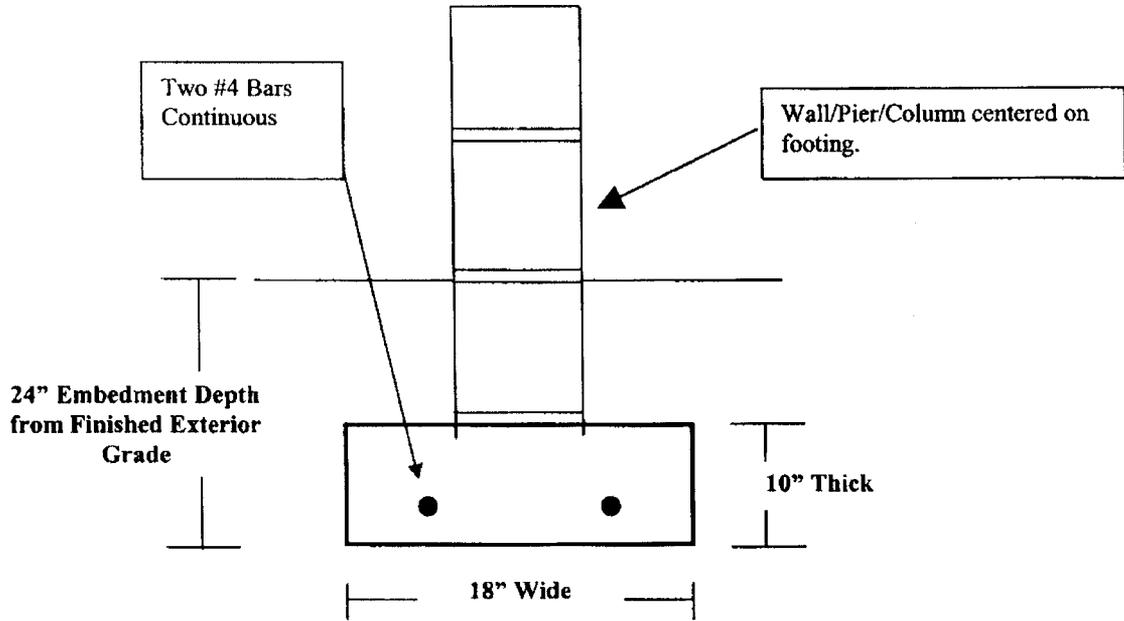




SUBDIVISION: GREENSPRINGS WEST, PHASE IIIB
 LOT: LOT 168, 3193 EAGLES WATCH
 COUNTY, STATE: JAMES CITY COUNTY, VIRGINIA
 ADC MAP/PAGE/GRID: GHR/87/K-7

ECS PROJECT # 07: 6541

NOT TO SCALE



NOTES:
 DETAIL SHOWS TYPICAL WALL FOOTING CROSS SECTION WITH THE MINIMUM RECOMMENDED DIMENSIONS. TWO CONTINUOUS #4 REINFORCING BARS SHALL BE PROVIDED THROUGHOUT ALL WALL FOOTINGS.

ALL REINFORCING STEEL SHALL BE SECURED IN PLACE AND LAPPED A MINIMUM OF 20-INCHES WHERE SPLICED. PROVIDE A MINIMUM OF 3-INCHES OF CLEARANCE FROM THE SIDES AND BOTTOM OF THE EXCAVATION.

FOOTINGS SHOULD BE EXTENDED THROUGH ALL FILL SOILS (IF ENCOUNTERED) TO SUITABLE, FIRM NATURAL SOILS.

ENGINEER'S SEAL

Michael J. Galli

MICHAEL J. GALLI
 No. 030024

PROFESSIONAL ENGINEER

DATE: 11/25/03



ECS PROJECT # 07: 6541

SUBDIVISION: GREENSPRINGS WEST, PHASE IIIB
LOT: LOT 168, 3193 EAGLES WATCH
COUNTY, STATE: JAMES CITY COUNTY, VIRGINIA
ADC MAP/PAGE/GRID: GHR/87/K-7

0-2	Topsoil
2-24	Gray and Brown, Moist, Fine to Medium Sandy CLAY (CL)
24-72	Gray and Brown, Moist, Fine to Medium Sandy CLAY (CL)
	GROUNDWATER NOT ENCOUNTERED
	END OF BORING AT 72 INCHES

0-2	Topsoil
2-72	Brown, Moist, Fine to Medium Sandy CLAY (CL)
	GROUNDWATER NOT ENCOUNTERED
	END OF BORING AT 72 INCHES

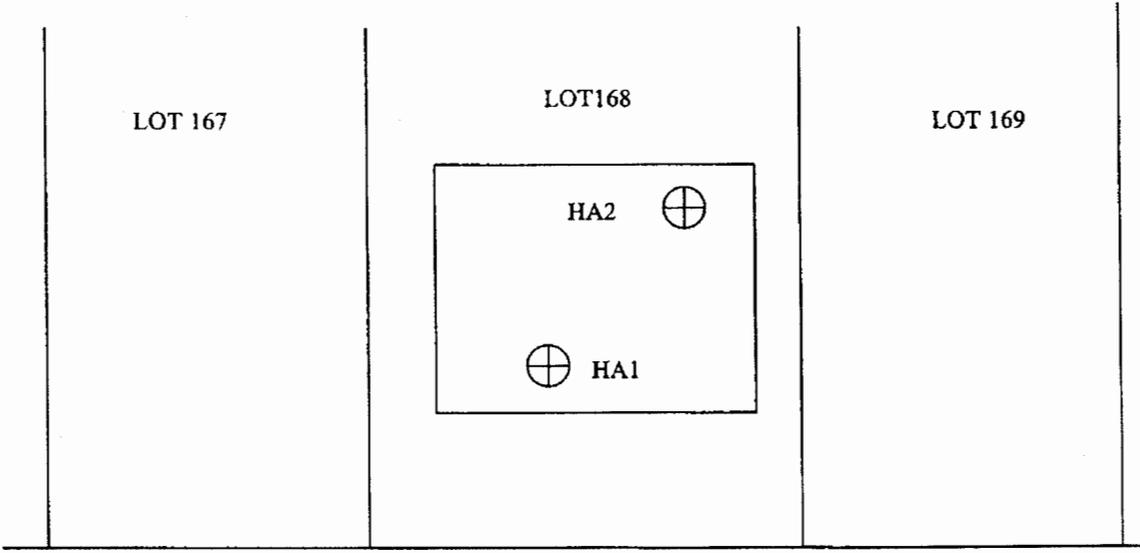
**Note: Soils were classified in general accordance with ASTM D-2488
(Description and Identification of Soils - Visual/Manual Procedures)**



ECS PROJECT #: 07: 6541

SUBDIVISION: GREENSPRINGS WEST, PHASE IIIB
LOT: LOT 168, 3193 EAGLES WATCH
COUNTY, STATE: JAMES CITY COUNTY, VIRGINIA
ADC MAP/PAGE/GRID: GHR/87/K-7

NOT TO SCALE



EAGLES WATCH

 = Approximate hand auger boring location

ATTACHMENT FOR ADDITIONAL DESIGN AND CONSTRUCTION NOTES [ECS SHRINK-SWELL SOIL INVESTIGATION]

EXPLORATION PROCEDURES

This exploration was accomplished by performing shallow hand auger borings within the approximate limits of the proposed building construction. Visual classification was performed, and available Soil Survey data from the Soil Conservation Service publications was reviewed.

The soil deposits encountered in the borings were classified in the field in general accordance with ASTM D-2488 (Description and Identification of Soils - Visual/Manual Procedures). Representative samples of soils encountered were collected from the borings and returned to our Williamsburg laboratory for moisture content, sieve analyses, and Atterberg Limits (plasticity) testing, as appropriate.

FOUNDATION DESIGN

The net allowable soil pressure referenced in the cover report is based on our experience with soils in the project area as well as the "Presumptive Bearing Values of Foundation Materials" as outlined in Table 1804.3 of the 1996 BOCA National Building Code. Therefore, it is considered essential that all footing excavations and subgrade areas be observed by a qualified inspector for conformance with the Virginia Uniform Statewide Building Code and to assure that the recommendations made herein are consistent with the conditions encountered during construction.

The minimum recommended foundation excavation and footing embedment depths are based on laboratory test results, field observations, and anticipated shrink-swell conditions. These depths may be increased at the time of construction if uncontrolled fill, unsuitable soils or unidentified moderate or high potential shrink-swell soils are encountered. If shrink-swell soils are present, it is recommended that the minimum foundation excavation and footing embedment depth be increased to effectively penetrate the zone of seasonal moisture change and break the continuity between the soils exterior of the home and those below the first level floor (slab-on-grade or crawl space). This depth should be specified by the geotechnical engineer. In this regard, the minimum depth is intended to minimize soil activity (shrink-swell) as a result of extreme moisture fluctuations and will also satisfy frost protection and bearing capacity considerations. Footings should be lowered and stepped as necessary to maintain minimum excavation and embedment depths and achieve stable bearing. Footings located on/or near slopes will need to be stepped as necessary to maintain the required embedment depth and to prevent foundation failure due to soil creep.

CONSTRUCTION CONSIDERATIONS

Please note, we generally encountered loose density near surface soils. Some of these soils may not be considered suitable for direct bearing support and should be removed beneath new foundations. The depth and extent of unsuitable soils should be evaluated at the time of construction.

In general, all footing excavations should extend through all uncontrolled fill, soft or otherwise unsuitable material so as to expose firm, natural soils. Where soft or unsuitable materials are encountered below the minimum excavation depths, they should be removed. Footings may be placed at this undercut elevation or bottom of footing grades may be raised, as directed by the geotechnical engineer, to the minimum footing embedment depth by backfilling with No. 57 Stone or flowable fill, except as noted. Flowable fill must have a minimum 28 day compressive strength of 200 psi. A qualified inspector should be called on to observe all footing excavations for conformance with the Virginia Uniform Statewide Building Code prior to placement of stone, flowable fill, and/or concrete to ascertain that firm bearing soils have been exposed.

If perched groundwater is encountered during foundation excavation, sumps should be excavated perpendicular to the proposed foundation wall such that water drains from the foundation into the lowest point of the excavation. If excessive moisture accumulations occur, especially during wet seasonal conditions, the footings could be over-excavated about 6 to 12 inches (depending on severity at time of construction) and a drainage layer placed to allow for water runoff and discharge while concrete is placed. Water can then be discharged outside the construction limits with the use of submersible pumps. To help drain wet conditions (if appropriate); the main interior pier line could be supported by a strip footing poured monolithically with the exterior wall footing.

Care should be exercised to prevent water from ponding above or within the bearing soils. A slight swale should be constructed uphill of the homesite (if appropriate) to intercept surface runoff and divert it away from the foundations. Any natural drainage should be diverted away from the foundations. The final site grading for the lot should allow for strong positive drainage away from the foundation. We recommend a fall of at least 6 inches be provided for the first 10 feet outward from the foundation walls. For lots with moderate to high shrink-swell potential, gutters are recommended. We recommend gutter effluent be discharged at a point at least 5 feet outward from the foundation walls.

LIMITATIONS

It should be noted that this study was limited in scope to two (2) hand auger borings and classification type laboratory testing only. The borings were generally extended to a maximum depth of 72 inches or hand auger refusal. The recommendations contained herein were based on the data obtained from the hand auger borings, which indicate subsurface conditions at these specific locations at the time of the exploration. Soil conditions may vary between borings. Subsurface conditions below the depths explored, which could affect building foundations and settlements were not investigated.

Furthermore, it is sometimes difficult to characterize soil content and consistency using hand auger borings alone. Therefore, as a critical part of a complete soil evaluation, all footing excavations should be observed by a qualified inspector for conformance with the Virginia Uniform Statewide Building Code and to ascertain that soil conditions encountered by our exploration are consistent with conditions encountered during construction. If during the course of construction variations appear evident, the geotechnical engineer should be informed so that the conditions can be addressed.



DEVELOPMENT MANAGEMENT

101-E MOUNTS BAY ROAD, P.O. BOX 8784, WILLIAMSBURG, VIRGINIA 23187-8784
(757) 253-6671 Fax: (757) 253-6850 E-MAIL: devtman@james-city.va.us

CODE COMPLIANCE
(757) 253-6626
codecomp@james-city.va.us

ENVIRONMENTAL DIVISION
(757) 253-6670
environ@james-city.va.us

PLANNING
(757) 253-6685
planning@james-city.va.us

COUNTY ENGINEER
(757) 253-6678
INTEGRATED PEST MANAGEMENT
(757) 253-2620

Date: August 1, 2000

To: Jamestown LLC
213 Ingram Road
Williamsburg, VA 23188
Attn: Lynn Evans

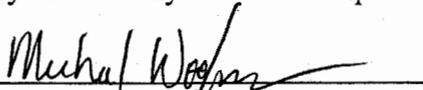
Re: Greensprings West, Phase 1 trash rack detail

The following comments pertain to the primary control structure and trash rack detail modifications that was submitted to our office for review on July 25th for the Greensprings West wet pond.

The pond riser has been reconfigured and moved waterward from the interior of the embankment out into the lake closer to the upstream embankment toe of slope. The riser structure now has different forces acting upon it during drawdown. In addition, the validity of the pond's hydraulic routing and designed 2-, 10-, and 100-year water surface elevations and 100-year design high water freeboard to the top of dam are in question due to the riser top changes and extension of the outlet barrel. The following information is required for our review so that we can make an informed decision about the proposed trash rack modifications.

1. A vertical baffle plate will be required within the trash rack to prevent anti-vortex and swirling conditions since the riser is now out into the normal pool area. The plate shall be at least $\frac{1}{4}$ inch, galvanized steel, and welded to the trash rack bar. Rebar and baffle shall be painted a dull gray or rust color to blend with a natural setting.
2. Record drawings for the facility will require details and configurations specific to the riser, barrel and trash rack.
3. A pond check routing of the 2-, 10-, and 100-year as-built water surface elevations with the new riser/outlet barrel configuration will be required prior to the record drawing phase and release of the bond posted for the facility. The earlier our office receives this information the better, because the pond is being used as a sediment basin for the duration of the buildout of the project prior to conversion to a permanent BMP facility.

If you have any concerns or questions regarding these issues, please call me at 253-6670.


Michael Woolson
Environmental Division Inspector

File
Greensprings West Phase I

Scott Thomas

From: Scott Thomas
Sent: Friday, July 28, 2000 3:03 PM
To: Mike Woolson
Subject: Greensprings West Phase I Wet Pond

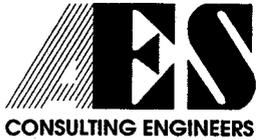
These are my comments pertaining to the primary control structure modifications as outlined via fax dated July 25th (Lynn Evans) for the Greensprings West Phase I wet pond.

Since it appears that the pond riser has been reconfigured (moved) waterward from interior to the embankment closer to the upstream pond toe/water pool, the riser structure will have different forces acting upon it during drawdown. In addition, the validity of the pond's hydraulic routing and design (2-, 10- and 100-year) design water surface elevations and 100-year design high water freeboard to top of dam are in question due to riser top changes and extension of the outlet barrel at least 25 feet. The following is required.

1. A vertical baffle plate will be required within the trash rack to prevent anti-vortex and swirling conditions since the riser is now out in the water pool area. The plate shall be at least 1/4 inch galvanized steel and welded to the trash rack bar. Rebar and baffle shall be painted a dull gray or rust color to blend with a natural setting.
2. Record drawings for the facility will require details and configurations specific to riser, barrel and trash rack modifications.
3. A pond check hydraulic routing with the new riser/outlet barrel configuration will be required prior to the record drawing phase and release of the bond posted for the facility. The earlier we see this the better, especially if the pond will be in service as a sediment basin for an extended period prior to conversion to a permanent BMP.

I put the fax back in your mailbox with this email attached. Please relay this to the responsible person. If you need me to take any other action (letter, phone call, etc.) let me know.

Scott



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

January 12, 2001



Mr. Michael Woolson
James City County
Environmental Division Inspector
101-E Mounts Bay Road
P. O. Box 8784
Williamsburg, Virginia 23187-8784

RE: Greensprings West Phase I
AES Project No. 8656-1
Wet Pond

Dear Mike:

To facilitate your review of the subject project, we are responding to your comments dated August 1, 2000:

Environmental Division

- 1) The modified trash rack is shown and detailed.
- 2) The record drawings specific to the riser, barrel, and trash rack are provided.
- 3) Routing for the 2-, 10-, and 100-year storms are provided through the as-built structure. The facility will still function properly.

Should you have further questions or need any additional information, please contact me at (757) 253-0040.

Sincerely,

AES Consulting Engineers

A handwritten signature in cursive script, appearing to read 'Howard W. Price'.

Howard W. Price
Project Manager

November 30,2004

Mr. Bob Oliver
Jamestown Management LLC
213 Ingram Road
Williamsburg, VA 23188

Subject: 3204 Windsor Ridge South
Williamsburg, VA 23185
Greensprings West

Dear Mr. Oliver,

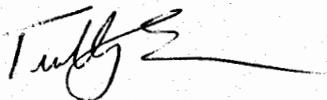
This letter is in regards to my property located in Greensprings West. As I understand it, your company has and still is responsible for all development and drainage for the Greensprings West. The reason for the letter is after six months of verbally trying to get resolution to our drainage issues through Jamestown Management LLC, I have grown extremely frustrated with the lack of completion. I have personally spoken to you on at least three occasions and received verbal commitment that the problem would be resolved immediately. In addition, per Molly Roggero at JCC Environmental Department, you also committed to her verbally to have this problem resolved immediately.

Mr. Oliver, with all due respect, it's time for Jamestown LLC to fulfill it's obligation and complete the project onsite. In addition, I expect restitution to help me replace landscaping (trees & bushes) that have died as well as the loss of soil & mulch due to the faulty drainage system put in by Jamestown Management LLC. I will be happy to provide you with a bill from my landscaping firm after plants, soil, and mulch are replaced.

Mr. Oliver, I do not want to take this any further than this letter, but if this situation is not rectified by 10 December 2004, I will have to take alternative measures against Jamestown Management LLC. I am only asking you to complete what you verbally committed too. After the drainage has been completed, I will contact my landscaping firm who will then provide a quote for what it will take to replace the materials that have been loss due to the drainage issues.

I appreciate your immediate attention to this matter.

Sincerely,
Tim Saumier
757-870-5196



cc: Molly Roggero (101E Mounts Bay Road, Williamsburg, VA 23188)

Tina Cooke

From: ddrexler@unitedproperty.org on behalf of David Drexler [ddrexler@unitedproperty.org]
Sent: Friday, January 16, 2009 10:49 AM
To: Tina Cooke
Subject: Greensprings West

Hi Tina,

I am the Association Manager for Greensprings West. As we approach the gathering of information for the transition from Jamestown LLC to a New Board of Directors for Greensprings West could you please provide me with the following documents. First I would like the Maintenance Agreement for phase 1. Second, I would like the filtration agreement and third the letter concerning BMP for pond 1. Also if you have access to any other agreements concerning the wetlands located in the common areas of Greensprings West I would greatly appreciate a copy of the letters or agreements.

If you can not provide these too me please send me the contact information of the person who can.

I am going to be out of the office from 11 AM today but will return on Monday at 9 AM. My office number is 757-345-5383 ext 485.

Thank you for your help and consideration.

David M. Drexler
Association Manager
Greensprings West

David Drexler
Association Manager
United Property Associates
103 Bulifants Blvd. Suite A
Williamsburg, VA 23188
(757) 345-5383

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If the reader is not the named recipient, you are hereby notified that you have received this document in error. If you have received this transmission in error, please contact sender and delete all copies. Thank you.

<http://www.unitedproperty.org>

*Supplied
information
on 1/21/09
(Jee)*



DEVELOPMENT MANAGEMENT

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(757) 253-6671

E-MAIL: devtman@james-city.va.us
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ENVIRON@JAMES-CITY.VA.US

PLANNING
(757) 253-6685
PLANNING@JAMES-CITY.VA.US

COUNTY ENGINEER
(757) 253-6678

MOSQUITO CONTROL
(757) 259-4116

April 23, 2007

Mr. Bob Oliver
Jamestown, LLC
213 Ingram Road
Williamsburg, VA 23188

Re: Greensprings West Phase 1
Lake F Wet Pond #1
County Plan No. S-18-99
County BMP ID Code: JR 048

Dear Mr. Oliver:

The Environmental Divisions has received a record drawing (asbuilt) and construction certification as submitted on January 30, 2007 for the stormwater management facility for the above referenced project. The record drawing provides as-built information for a wet pond situated in the southern end of the site.

Based on our review of the project and a concurrent field inspection as performed on April 12th 2007, the following items must be addressed prior to release of the developer's surety instrument for the stormwater management/BMP facility at the site and to proceed with closing out the project:

Record Drawing:

1. Label the facility as "Lake F" on the record drawing, consistent with master plan designations.
2. Label all roadways and lot numbers and subdivision sections on the record drawing.
3. Label the pump station below the Lake F dam as JCSA Lift Station # 9-6.
4. Additional asbuilt spot elevations are needed between the landscaping berms along top of dam. Although asbuilt top of dam elevation is shown at El. 62 on the cross-section on record drawing Sheet 2, contour and plan information on Sheet 1 shows that top of dam elevations may be lower than El. 62.
5. The riser for the BMP is situated in the southern end of the wet pond is a 60-inch diameter riser. Riser crest controls normal pool. The asbuilt elevation of the crest of the riser is 0.96 feet higher than that approved in the design plan which results in a normal (permanent) pool elevation higher than the approved plan. This is not in conformance with the approved plan.

6. The approved plan required a 5 ft. safety bench along the upstream face of the dam fill embankment. Field observations and the record drawing confirm that a narrower bench was used. This is not in conformance with the approved plan.
7. Pond bottom elevations on the approved plan (Elev. 30) do not correspond with the asbuilt contours show on the record drawing (Elev. 43/44). This is not in conformance with design water quality volume per the approved plan.

Note: To our knowledge, the only variance granted to the configuration of the stormwater basin was to pull the principal spillway control structure from within the dam embankment lakeward and change the top unit from a EW-11 top unit to a flat top unit out in the lake with a triangular shaped trash rack/anti-vortex plate. No revised plans were ever submitted or approved to change the pond (bottom) grading plan, narrow the safety bench or to change normal pool elevation of the basin. Review of our records show no approval letter granted to make these changes. It is noted; however, that based on water quality computations for the BMP that there was 2.8 times the water quality provided at El. 56 (3.1 million cubic feet) than that required (1.1 million cubic feet). The approved plan was for a pond bottom at El. 30 and a normal pool at El. 56. A transmittal by the project engineer dated January 12 2001 was provided to show that the reconfigured riser structure would work and meet specified discharge parameters for the pond, mainly outflow discharges, freeboard and water surface elevations. The reservoir report in the asbuilt routing did show a normal pool at El. 56.96. This was hidden in the asbuilt routing package and cannot be construed as approval of a major change to an approved plan. There was no subsequent revision or amendment to the approved design or stormwater management plan.

Construction - Related Items:

8. Remove debris from recently cut trees from and along the dam fill embankment.
9. Repair erosion and bare soil areas on all interior graded pond slopes around the entire pond perimeter.
10. Channel erosion accompanied by evident seepage and ground water present on the emergency spillway should be backfilled with compacted material, reseeded and mulched or matted for stabilization.
11. The approved plan indicates a trapezoidal channel for the emergency spillway. The spillway is parabolic, it is one half (1/2) foot higher than designed, has no defined channel, with standing water in the cart path.
12. Repair and stabilize bare soil and erosion areas present along the emergency spillway due to installation of the irrigation system.
13. Clear and remove all obstructions from around, inside and within 10 feet of the principal flow control (riser) structure. This includes: algae, sticks, construction debris, boards, vegetation, etc.
14. The approved plan called for a trash rack structure; however, none was found in the field. Provide a trash rack structure per the approved plan.
15. During the field inspection the outlet protection and the condition of the five storm drain inflow pipes into the basin were not visible due to the pond elevation (ie. submerged). Storm drainage structure SS # 9-1 (36-inch pipe) was $\frac{3}{4}$ full of water with 1' - 2' of sediment in the pipe at the

outfall. The riprap channel downstream of outfall SS # 9-1 was not visible and needs to be cleaned after pond normal pool elevation issues are resolved. Please note that storm drainage structures SS # 9-4 and SS # 9-3 located on Lots 198 and 199 in Greensprings West Phase 3 of this project hold water and we have several documented occasions concerning flooded properties during rain events due to the lack of positive flow into the BMP. Storm structure SS # 3-2 (18-inch RCP) has minor erosion around the drop inlet structure and concrete flume.

The above related comments are complex and serious issues related to the BMP, especially those related to the elevation of the normal pool in relation to the outfall elevation of inflow storm drainage pipes and the potential for lot flooding due to pond normal and design water surface elevations. These issues must be resolved by the applicant and engineer by reviewing storm drainage system and BMP asbuilt elevations with respect to that associated with the approved design plan; reviewing and revising appropriate approved design/stormwater management plans; and field changes to the drainage/stormwater management system and revision to the asbuilt (record) drawing. Also, it is your responsibility to provide proper advance notification to homeowner association members or residents who border the BMP, as appropriate, of any proposed work activity in the area to address field related punch list items. Caution shall be exercised to avoid rapid drawdown of the normal water pool. Rapid drawdown could cause a slide in saturated portions of the upstream embankment and other shoreline areas or cause alarm to residents who live adjacent to the facility. Generally, the facility should not be left unattended during drawdown, draining rate should not exceed 6 inches per day and any pumping operations shall have proper erosion and sediment control measures in accordance Minimum Standard & Spec. 3.26 of the Virginia Erosion and Sediment Control Handbook.

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

Please contact me at 757-253-6639 or the assigned Environmental Division inspector, Tina Cooke, at 757-253-6743 if you have any further comments or questions.

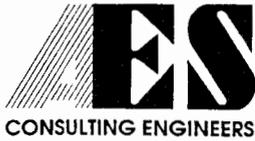
Sincerely



Scott J. Thomas, P.E.
Chief Engineer - Stormwater
Environmental Division

cc: AES – G.T. Wilson Jr. - via fax
ECS Mid-Atlantic, LLC – Michael Galli - via fax
JCC ENV DIV Inspector - Tina Cooke

G:\SWMProgram\AsBuilts\S1899.jr048



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

February 23, 2000

Mr. Scott Thomas
James City County
Environmental Division
101 Mounts Bay Road
P. O. Box 8784
Williamsburg, Virginia 23187-8784

RE: Greensprings West Phase III
AES Project No. 8656-4

Dear Scott:

To facilitate your review of the subject project, we are responding to your comments dated February 16, 2000:

- ✓
OK 1. A stockpile area was provided in Phase I at the south side of the entrance to Greensprings West that serves the entire project. The engineer, the contractor, and the County agreed upon this area. The contractor also agrees to maintain proper erosion and sediment controls at this location during construction. This includes such items as silt fence and check dams.
- ✓
OK 2. See note 1 above.
- ✓ 3. There is no three on comment list.
4. A 60-foot long rip rap apron is being provided in this swale.
A 60-FT RIPRAP APRON DOES NOTHING FOR FILTERING.
- ✓ 5. Clearing limits are extended accordingly.
- ✓ 6. A blow up on sheet 10 more clearly defines the trap boundaries.
- ✓ 7. Sheet 15 indicates all pertinent information for the rip rap. Sheet 8 and 10 labels are also revised.
- ✓ 8. Data for drainage areas, coefficients, time of concentration, and intensity are all provided in the storm sewer calculations provided. An additional sheet showing the derivation of Mannings "n" values is included.

Mr. Scott Thomas
February 23, 2000
Page 2

9. A note concerning inlet shaping is added to sheet 8.

We appreciate your effort in expediting this approval for a Land Disturbing Permit. Should you have further questions or need any additional information, please contact me at (757) 253-0040.

Sincerely,

AES Consulting Engineers



Howard W. Price
Project Engineer

Scott Thomas

From: Scott Thomas
Sent: Friday, July 28, 2000 3:03 PM
To: Mike Woolson
Subject: Greensprings West Phase I Wet Pond

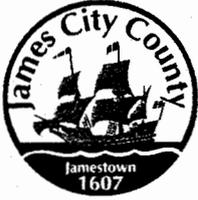
These are my comments pertaining to the primary control structure modifications as outlined via fax dated July 25th (Lynn Evans) for the Greensprings West Phase I wet pond.

Since it appears that the pond riser has been reconfigured (moved) waterward from interior to the embankment closer to the upstream pond toe/water pool, the riser structure will have different forces acting upon it during drawdown. In addition, the validity of the pond's hydraulic routing and design (2-, 10- and 100-year) design water surface elevations and 100-year design high water freeboard to top of dam are in question due to riser top changes and extension of the outlet barrel at least 25 feet. The following is required.

1. An vertical baffle plate will be required within the trash rack to prevent anti-vortex and swirling conditions since the riser is now out in the water pool area. The plate shall be at least 1/4 inch galvanized steel and welded to the trash rack bar. Rebar and baffle shall be painted a dull gray or rust color to blend with a natural setting.
2. Record drawings for the facility will require details and configurations specific to riser, barrel and trash rack modifications.
3. A pond check hydraulic routing with the new riser/outlet barrel configuration will be required prior to the record drawing phase and release of the bond posted for the facility. The earlier we see this the better, especially if the pond will be in service as a sediment basin for an extended period prior to conversion to a permanent BMP.

I put the fax back in your mailbox with this email attached. Please relay this to the responsible person. If you need me to take any other action (letter, phone call, etc.) let me know.

Scott



DEVELOPMENT MANAGEMENT

101-E MOUNTS BAY ROAD, P.O. BOX 8784, WILLIAMSBURG, VIRGINIA 23187-8784
(757) 253-6671 Fax: (757) 253-6850 E-MAIL: devtman@james-city.va.us

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codecomp@james-city.va.us

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environ@james-city.va.us

PLANNING
(757) 253-6685

planning@james-city.va.us

COUNTY ENGINEER
(757) 253-6678

INTEGRATED PEST MANAGEMENT
(757) 253-2620

Date: August 1, 2000

To: Jamestown LLC
213 Ingram Road
Williamsburg, VA 23188
Attn: Lynn Evans

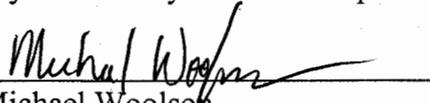
Re: Greensprings West, Phase 1 trash rack detail

The following comments pertain to the primary control structure and trash rack detail modifications that was submitted to our office for review on July 25th for the Greensprings West wet pond.

The pond riser has been reconfigured and moved waterward from the interior of the embankment out into the lake closer to the upstream embankment toe of slope. The riser structure now has different forces acting upon it during drawdown. In addition, the validity of the pond's hydraulic routing and designed 2-, 10-, and 100-year water surface elevations and 100-year design high water freeboard to the top of dam are in question due to the riser top changes and extension of the outlet barrel. The following information is required for our review so that we can make an informed decision about the proposed trash rack modifications.

1. A vertical baffle plate will be required within the trash rack to prevent anti-vortex and swirling conditions since the riser is now out into the normal pool area. The plate shall be at least ¼ inch, galvanized steel, and welded to the trash rack bar. Rebar and baffle shall be painted a dull gray or rust color to blend with a natural setting.
2. Record drawings for the facility will require details and configurations specific to the riser, barrel and trash rack.
3. A pond check routing of the 2-, 10-, and 100-year as-built water surface elevations with the new riser/outlet barrel configuration will be required prior to the record drawing phase and release of the bond posted for the facility. The earlier our office receives this information the better, because the pond is being used as a sediment basin for the duration of the buildout of the project prior to conversion to a permanent BMP facility.

If you have any concerns or questions regarding these issues, please call me at 253-6670.


Michael Woolson
Environmental Division Inspector



DEVELOPMENT MANAGEMENT

101-A MOUNTS BAY ROAD, P.O. BOX 8784, WILLIAMSBURG, VIRGINIA 23187-8784
(757) 253-6671

E-MAIL: devtman@james-city.va.us
FAX: (757) 253-6822

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environ@james-city.va.us

PLANNING
(757) 253-6685
planning@james-city.va.us

COUNTY ENGINEER
(757) 253-6678

MOSQUITO CONTROL
(757) 259-4116

March 31, 2010

Bob Oliver
Jamestown, LLC
213 Ingram Road
Williamsburg, VA
23188

Re: Greensprings West Phase 1 Wet Pond #1
County Plan No. S-18-99
County BMP ID Code: JR-048

Dear Mr. Oliver:

The Environmental Divisions has received a record drawing (asbuilt) and construction certification for the stormwater management facility for the above referenced project. The record drawing provides as-built information for a wet pond situated in the southern end of the site.

Based on our review of the project and a concurrent field inspection the following items must be addressed prior to release of the developers surety instrument for the stormwater management/BMP facility at the site and to proceed with closing out the project:

Construction - Related Items:

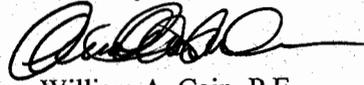
1. Repair erosion on BMP slopes around the entire perimeter.
2. The efforts to remove sediment from five inlets to the BMP have created erosion of the slopes and must be repaired. A limited area of sediment was removed from the end of the inlet pipes and should be tapered into the pond to reduce sediment accumulation in the future.
3. The stockpile of material removed from the rip rap channel associated with SS# 9-1 must be removed. The area should be stabilized thereafter.

Also, it is your responsibility to provide proper advance notification to homeowner association members or residents who border the BMP, as appropriate, of any proposed work activity in the area to address construction-related or routine maintenance items.

Once this work is satisfactorily completed, contact our office appropriately for a re-inspection. We can then proceed with final release of the surety and/or closing out the project.

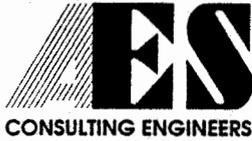
Please contact me at 757-253-6702 or the assigned Environmental Division inspector, Tina Creech, at 757-253-6743 if you have any further comments or questions.

Sincerely,

A handwritten signature in black ink, appearing to read 'W. A. Cain', with a long horizontal flourish extending to the right.

William A. Cain, P.E.
Chief Engineer
Environmental Division

cc: AES – G.T. Wilson Jr. - via fax
ECS Mid-Atlantic, LLC – Michael Galli - via fax
JCC ENV DIV Inspector - Tina Creech



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

May 4, 1999

Mr. Matthew Maxwell
James City County
Development Management
101-E Mounts Bay Road
P. O. Box 8784
Williamsburg, Virginia 23187-8784



RE: Greensprings West Phase I
AES Project No. 8656-1
James City County Case No. SP-5-18-99

Dear Mr. Maxwell:

To facilitate your review of the subject project, AES is pleased to provide you with the following letter detailing the action taken by us to address your comments. We hope this will expedite the final approval of this project.

Planning Division

- 1) The owner has requested a change for land bay S-1 included in the revised proffers. This was agreed upon at the D.R.C. meeting of 4/28/99.

- 2) A note has been added to the plat indicating the remaining lots.
- 3) The appropriate turn lane information is added to sheet 13.
- 4) The owner is planning to add a separate paved trail to the entrance road.

Environmental Division

- ✓ 1-6) The owner agrees to handle all these items.

Mr. Matthew Maxwell

May 3, 1999

Page 2

- ~~7)~~ Following our meeting with Darryl Cook and John Horne, the golf course grading is acceptable. *as this is correct*
- ✓ 8) Limits of clearing are labeled on the plan.
- ✓ 9) The limits of cut and fill slopes are also labeled.
- 12) Wetlands do not appear on our sheets. - ask WEG
- ✓ 13) The 100-year floodplain is noted on the plans. *Sheet 1*
- ✓ 14) There is a note on sheet 7 addressing the soil stockpile area.
- ✓ 15) Proper E & S measures are shown on the plans.
- 16) A construction sequence and narrative are now provided on the plans.
Sheet 7 Sheet 17
- ✓ 17) The top of the emergency spillway is in cut.
- 18) The stormwater management facility will act as a sediment basin during construction.
- ~~19)~~ Adequacy calculations are provided.
- ~~20)~~ System #1 shows all drainage areas flowing into the existing storm pipe at critical depth.
- ✓ 21) System #2 has also been revised.
- ~~22)~~ The attached drainage area map shows all pertinent information used to derive CN and TC. The tailwater is already included in the calculations for culvert #1.
- ~~23)~~ An updated BMP worksheet is included.
-
- ? 24) Conservation easements for Natural Open Space areas are specified on plans. *Do not see*
- ✓ 25) Fifteen-foot access easements above the 100-year elevation is provided.
- ✓ 26) Slope protection is provided as necessary.
- ✓ 27) Riprap is provided everywhere as requested.
- ✓ 28) More than 20 feet of clearing is shown for deep sewer, however, only 20-foot easements are provided for JCSA.
- ✓ 29) Slope stabilization has been accounted for on the plans.

Maxwell

*LOOK AT SHEET 8
ADDITIONAL FILL
AREAS THAT WERE
NOT ON FIRST
PLAN.*

- 30) Williamsburg Environmental Group has already provided the permit information.
- 31) The attached checklists are completed.

Fire Department

- 1) Road "C" waterline has been changed to 8 inch the entire length.

Heath Department

- 1) The cover sheet includes the note concerning any existing wells.

V.D.O.T.

- 1) Sheet 13 shows the striping plan for route 614.
- 2) Sight distance, speed limit, and distance to nearest intersection are provided.
- 3) Overall plan is provided.
- 4) VDOT general notes are provided.
- 5) Intersection radii have been adjusted accordingly.
- 6) Temporary tee turnarounds are provided.
- 7) Sight distance for Road "A" is revised.
- 8) Typical pavement section for the right turn lane is provided.

- 9) The note about the stormwater management facility is on sheet 8.
- 10) Vicinity map is revised.
- 11) There are easements provided to handle culvert pipes outside the right of way.
- 12) Underdrains are provided in all medians.
- 13) The spread calculations are revised.
- 14) Drop inlets have also been revised.

Mr. Matthew Maxwell
May 3, 1999
Page 4

- 15) A letter requesting an exception to pavement width has been sent to John Horne.
- 16) Drop inlet 4-1 works now.
- 17) All DI-5's now have type III grates.
- 18) System 2 has been revised.

Should you have further questions or need any additional information, please contact me at (757) 253-0040.

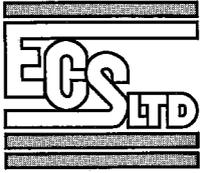
Sincerely,

AES Consulting Engineers



Howard W. Price
Project Engineer

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

March 12, 2003

Mr. Bob Oliver
Jamestown Management Corp., LLC
213 Ingram Road
Williamsburg, Virginia 23188

ECS Project No. 07:6104

Reference: BMP Dam Evaluation
Greensprings West Subdivision – Phase I
James City County, Virginia

Dear Mr. Oliver,

Engineering Consulting Services (ECS), Ltd. was requested to observe and evaluate the condition of the existing stormwater management pond dam constructed as a BMP facility for Phase I of the Greensprings West subdivision. Our records indicate the dam was constructed around July of 1999. Personnel with ECS, Ltd. provided earthwork observation and testing during the construction of the dam embankment.

We performed key trench subgrade observations and compaction testing of the embankment fill during construction. Our density tests indicated compaction of the fill material to at least 95 percent of the Standard Proctor maximum dry density per ASTM D698 at the elevations tested. A follow up site visit was performed on March 12, 2003 to observe the condition of the dam embankment. At the time of this site visit, the dam embankment appeared to be structurally sound and covered with vegetation.

Based on test data, the follow up inspection and also considering that the dam has remained in generally good condition since its construction, it is our professional opinion that the BMP embankment appears to have been constructed in accordance with acceptable construction practices.

General Comments

This report has been prepared in order to aid in the evaluation of this stormwater management facility. 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 the embankment characteristics.

108 Ingram Road, Unit 1, Williamsburg, Virginia 23188 • (757) 229-6677 • Fax (757) 229-9978

Offices: Richmond, VA • Chesapeake, VA • Washington, D.C. • Williamsburg, VA • Roanoke, VA • Fredericksburg, VA • Danville, VA • Winchester, VA
Aberdeen, MD • Baltimore, MD • Frederick, MD • Research Triangle Park, NC • Wilmington, NC • Charlotte, NC • Greensboro, NC • Greenville, SC • Atlanta, GA

BMP Dam Evaluation
Greensprings West Subdivision
James City County, Virginia
ECS Project No. 07:6104
Page 2

We appreciate being of continued service to you on this project. 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.

J. David Eakes

J. David Eakes, E.I.T.
Field Engineer

Michael J. Galli

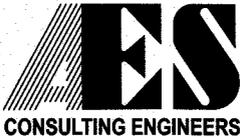
Michael J. Galli, P.E.
Principal Engineer



Enclosures: • Section 4 – Construction Certification

Copies:

Eakes/let/61044ltr.doc



5248 Olde Towne Road, Suite 1
Williamsburg, VA 23188
(757) 253-0040
Fax (757) 220-8994
www.aesva.com

June 12, 2009

Mr. Scott Thomas, P.E.
James City County Environmental Division
101-E Mounts Bay Road
P.O. Box 8784
Williamsburg, Virginia 23187-8784

**RE: Greensprings West Phase I Lake "F" BMP
County Plan No. S-18-99
County BMP ID Code: JR 048
AES Project No. 8656-07**

Dear Mr. Thomas:

The following is a response to comments received from your office in reference to Greensprings West Phase I Lake F Wet Pond No. 1.

Record Drawing:

1. Label the facility as "Lake F" on the record drawing, consistent with master plan designations.
Response: The facility has been labeled "Lake F" as requested. Please refer to Plan Sheet 8.
2. Label all roadways and lot numbers and subdivision sections on the record drawing.
Response: The requested information has been added to Plan Sheet 8 as requested.
3. Label the pump station below the Lake F dam as JCSA Lift Station # 9-6.
Response: The requested information has been added to Plan Sheet 8 as requested.
4. Additional as-built spot elevations are needed between the landscaping berms along top of dam. Although as-built top of dam elevation is shown at El. 62 on the cross-section on record drawing Sheet 2, contour and plan information on Sheet I shows that top of dam elevations may be lower than El. 62.
Response: Additional spot elevations were added to the top of dam as requested. Please refer to Plan Sheet 8.
5. The riser for the BMP is situated in the southern end of the wet pond is a 60-inch diameter riser. Riser crest controls normal pool. The as-built elevation of the crest of the riser is 0.96 feet higher than that approved in the design plan which results in a normal (permanent) pool elevation higher than the approved plan. This is not in conformance with the approved plan.
Response: Additional work was performed by the Owner this past summer to correct the riser elevation issue. The elevation, as will be noted in the attached calculation, has been reduced to 56.15 (design= 56.00).

Williamsburg • Richmond • Gloucester • Fredericksburg

6. The approved plan required a 5 ft safety bench along the upstream face of the dam fill embankment. Field observations and the record drawing confirm that a narrower bench was used. This is not in conformance with the approved plan.

Response: During the efforts to reduce the riser elevation the safety bench was redressed to achieve the planned 5' width. It should be noted that there are section of the dam's length where this width is plus or minus the required width. Average width of the bench is 5 foot in width

IT'S NICE TO KNOW WE GOT TO WHAT WE DESIRED FOR.

7. Pond bottom elevations on the approved plan (Elev 30) do not correspond with the as built contours show on the record drawing (Elev 43/44). This is not in conformance with design water quality volume per the approved plan.

Response: This elevation difference noted was due to a use change of the pond "wet" volume. Originally this pond was anticipated to be used as a facility to provide the primary irrigation for the golf course. Since this pond is now used in conjunction with other facilities within the subdivision the excess volume of this pond is being used for irrigation while maintaining the water quality volume. Please refer to the response to Item 7 (Note) below.

NEED - OLD AS-BUILT & THIS WITH APPROVED PLAN

Note To our knowledge the only variance granted to the configuration of the stormwater basin was to pull the principal spillway control structure from within the dam embankment lake ward and change the top unit from a EW-11 top unit to a flat top unit out in the lake with a triangular shaped trash rack/anti-vortex plate No revised plans were ever submitted or approved to change the pond (bottom) grading plan, narrow the safety bench or to change normal pool elevation of the basin Review of our records show no approval letter granted to make these changes It is noted, however, that based on water quality computations for the BMP that there was 2.8 times the water quality provided at El. 56.00 (3 1 million cubic feet) than that required (1.1 million cubic feet) The approved plan Was for a pond bottom at El. 30.00 and a normal pool at El 56.00. A transmittal by the project engineer dated January 12, 2001 was provided to show that the reconfigured riser structure would work and meet specified discharge parameters for the pond, mainly outflow discharges freeboard and water surface elevations The reservoir report in the as-built routing did show a normal pool at El 56.96 This was hidden in the as built routing package and cannot be construed as approval of a major change to an approved plan There was no subsequent revision or amendment to the approved design or stormwater management plan.

Response: BMP as-built conditions were revisited in the summer of 2008 by the Developer to address the non-compliance of the constructed safety bench versus the planned safety bench. It is noted that no calculations, or data, was provided for the reduction in pond depth, but it should be noted that this depth, was at one time, designed to fulfill the need for the golf course irrigation as well as to comply with water quality requirements. The fulfillment of this need for golf course irrigation water was achieved by the use of other ponds within the vicinity of the National Golf Course and not through the JCSA potable water supply. AES also has noted that the 1.1 million cubic foot requirement for water quality volume in the original design calculation at elevation 56.00, has been achieved, with the current volume of the as-built pond elevation of 56.0 is 1.432 million cubic feet, this volume does exceed the aforementioned 1.1 million cubic feet requirement. The 56.96 elevation was not intended to be hidden from County review but was meant to provide the County with the as-built conditions of the facility whether the construction was according to plan or not. Since the time these comments were offered by the Environmental Division, the Developer has returned to the site and corrected the riser condition. Given the limitations of the material used to construct the riser, the riser elevation has been reduced to elevation 56.15. As previously stated the safety bench and the riser/water quality should now be in compliance with the original design. Please refer to the attached plans with this submittal.

CAN YOU VERIFY THIS FORMER? I HAVE NO IDEA WHAT IS GOING ON HERE.

12

Construction - Related Items (Information concerning the following Items has been provided by Mr. Robert Oliver of Jamestown Management Corp. and is not verified by AES, except for the trash rack construction):

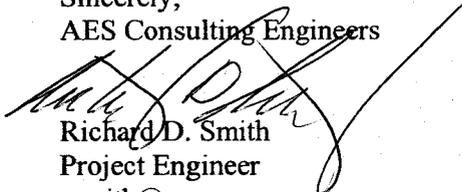
8. Remove debris from recently cut trees from and along the dam fill embankment.
Response: All debris has been removed from the dam embankment.
9. Repair erosion and bare soil areas on all interior graded pond slopes around the entire pond perimeter.
Response: All erosion has been addressed. Process is ongoing to maintain for golf and BMP quality.
10. Channel erosion accompanied by evident seepage and ground water present on the emergency spillway should be backfilled with compacted material, reseeded and mulched or matted for stabilization.
Response: Channel has been rebuilt and re-stabilized.
11. The approved plan indicates a trapezoidal channel for the emergency spillway. The spillway is parabolic, it is one half (1 /2) foot higher than designed has no defined channel, with standing water in the cart path.
Response: It is noted that the spillway is constructed higher than the planned elevation. Richard Smith of AES paid a visit to the site on January 28, 2009, which was a rainy day and observed a nearly flat section at this location, there was no standing water in the cart path at that time (please refer to the attached photographs) an approximate distance of 12' was noted across the flattest section of ground and cart path. Based upon this information it would be assumed this would be the location of the emergency spillway section.
The rectangular section was chosen for the computations to provide a more conservative approach to this comment item, it does not take into account the side slopes that would obviously come into play during an actual 100-year storm event where the emergency spillway would become active. The attached calculations show an emergency spillway with an average elevation of 60.07 (60.23 to 59.92), a conservative rectangular section of 12' wide produced a water elevation of 61.77 during the 100-year event (Please refer to the attached calculations). It is noted that this spillway is not at the planned elevation but does produce a water depth over the spillway of 1.77' (through a modeled rectangular section) where the original design model produced a depth of 1.77' as well.
12. Repair and stabilize bare soil and erosion areas present along the emergency spillway due to installation of the irrigation system.
Response: Area around irrigation system has been backfilled and stabilized.
13. Clear and remove all obstructions from around, inside and within 10 feet of the principal flow control (riser) structure This includes algae, sticks, construction debris, boards, vegetation, etc.
Response: Debris has been removed. Regular inspections maintain the free flow through the trash rack.
14. The approved plan called for a trash rack structure, however, none was found in the field. Provide a trash rack structure per the approved plan.
Response: Trash rack has been installed.

15. During the field inspection the outlet protection and the condition of the five storm drain inflow pipes into the basin were not visible due to the pond elevation (i.e. submerged). Storm drainage structure SS# 9-1 (36-inch pipe) was 3/4 full of water with 1'- 2' of sediment in the pipe at the outfall. The riprap channel downstream of outfall SS# 9-1 was not visible and needs to be cleaned after pond normal pool elevation issues are resolved. Please note that storm drainage structures SS # 9-4 and SS # 9-3 located on Lots 198 and 199 in Greensprings West Phase 3 of this project hold water and we have several documented occasions concerning flooded properties during rain events due to the lack of positive flow into the BMP Storm structure SS# 3-2 (18-inch RCP) has minor erosion around the drop inlet structure and concrete flume.

Response: All obstructions have been removed from piping. BMP channel downstream of #9-1 has been excavated to provide open, un-obstructed flow to main BMP.

It is our sincere request this as-built certification be granted with the efforts recently completed by the Developer to comply with the originally planned design intent for this facility.

Sincerely,
AES Consulting Engineers



Richard D. Smith
Project Engineer
rsmith@aesva.com

Tina Cooke

From: Tina Cooke
Sent: Wednesday, January 28, 2009 8:22 AM
To: 'Bob Oliver'
Cc: Joe Buchite; William Cain; Scott Thomas
Subject: Greensprings West Phase I - JR-048 - Lake F

Bob,

You indicated during our conversation yesterday that the necessary repairs were completed as requested in our 4/23/07 response to the as-builts submitted for review. It is imperative to submit the revised as-builts due to the seriousness of the BMP issues identified during our last inspection. Please contact me with a time frame concerning re-submission of the as-builts so that we may schedule the final inspection.

Thanks,

Tina Cooke
Environmental Inspector
James City Environmental Division
(757) 253-6743

Tina Cooke

From: Tina Cooke
Sent: Thursday, April 12, 2007 6:50 AM
To: 'Bob Oliver'
Subject: RE: Greensprings West Drainage Issues

When we met concerning the drainage problems Matt said that Willie had recently scoped/videoed the pipes with VDOT so that the roads could be taken into the system. He was going to either get the tape that applied to this drainage system or the notes that indicate the pipe conditions before the DI repairs were made in case the problem was more extensive (failures at joints, etc.)

Does this help? If not, I'm out of my classes for the week so just give me a call.

Tina

From: Bob Oliver [mailto:rmoliver@tni.net]
Sent: Wednesday, April 11, 2007 7:30 AM
To: Tina Cooke
Subject: RE: Greensprings West Drainage Issues

Tina,
Tell me again what you mean by pipe scoping?

Bob Oliver, PE
Jamestown Contracting, LLC
o) 757-220-0856
f) 757-220-0916

From: Tina Cooke [mailto:TCooke@james-city.va.us]
Sent: Tuesday, April 10, 2007 7:22 AM
To: Bob Oliver
Cc: Joe Buchite
Subject: RE: Greensprings West Drainage Issues

Bob,

Once again, several of the homeowners located at 3193 Eagles Watch are concerned with the yard drain sink hole. Has Matt obtained the pipe scoping or scheduled the repairs? These folks want to do some landscaping and I asked them to hold off until you can access the DI through their property.

*Thanks,
Tina Cooke
Environmental Inspector
James City Environmental Division
(757) 253-6743*

From: Bob Oliver [mailto:rmoliver@tni.net]
Sent: Thursday, December 14, 2006 11:33 AM
To: Tina Cooke
Subject: RE: Greensprings West Drainage Issues

The outfall was cleaned well, but accessing deep into the 'wetlands channel' will be almost impossible. The pipe is not obstructed although there are cattails down stream that probably should not be disturbed anyway. Simply put, the channel meanders but is not fully excavated to the bridge.
Cheers,

Bob Oliver, PE
Jamestown Contracting, LLC
o) 757-220-0856
f) 757-220-0916

From: Tina Cooke [mailto:TCooke@james-city.va.us]
Sent: Thursday, December 14, 2006 11:18 AM
To: Bob Oliver
Subject: RE: Greensprings West Drainage Issues

Bob,

Funny you should mention this.... Cindy Renault left me a message recently and I've been meaning to go out to look at the repairs. In her message she indicated that the homeowners did not feel that it was cleaned "enough" so I need to go and check it out. Have you looked at it since it was completed? If so, what do you think?

*Thanks,
Tina*

From: Bob Oliver [mailto:rmoliver@tni.net]
Sent: Thursday, December 14, 2006 10:37 AM
To: Tina Cooke
Subject: RE: Greensprings West Drainage Issues

Tina,
This is done. Is it to everyone's happiness?
Cheers

Bob Oliver, PE
Jamestown Contracting, LLC
o) 757-220-0856
f) 757-220-0916

From: Tina Cooke [mailto:TCooke@james-city.va.us]
Sent: Monday, November 27, 2006 9:02 AM
To: Bob Oliver
Subject: FW: Greensprings West Drainage Issues

Bob,

Just a reminder - two weeks ago you were going to call me with a clean out date. The homeowners are concerned and a scheduled date would be helpful.

*Thanks,
Tina*

From: Tina Cooke
Sent: Tuesday, October 17, 2006 2:49 PM
To: Bob Oliver
Cc: Joe Buchite
Subject: Greensprings West Drainage Issues

Bob,

I spoke to Darryl & Wayland concerning the outfall to the pond at Greensprings West on Friday. I explained the need to clean the outfall as soon as possible & both of them indicated that according to the approved plan, the outfall calls for a 60' long rip rap apron with a variable width maintenance easement that allows for this clean out.

Please let me know when Matt has the drainage information we discussed on site & when the cleaning of the outfall noted above is scheduled.

*Thank you for responding so quickly,
Tina*



DEVELOPMENT MANAGEMENT

101-E MOUNTS BAY ROAD, P.O. BOX 8784, WILLIAMSBURG, VIRGINIA 23187-8784
(757) 253-6671

ENVIRONMENTAL DIVISION
(757) 253-6670
ENVIRON@JAMES-CITY.VA.US

PLANNING
(757) 253-6685
PLANNING@JAMES-CITY.VA.US

COUNTY ENGINEER
(757) 253-6678

E-MAIL: devtman@james-city.va.us
FAX: (757) 259-4032

MOSQUITO CONTROL
(757) 259-4116

Sent
April 23, 2007

Mr. Bob Oliver
Jamestown, LLC
213 Ingram Road
Williamsburg, VA 23188

Re: Greensprings West Phase I
Lake F Wet Pond #1
County Plan No. S-18-99
County BMP ID Code: JR 048

Dear Mr. Oliver:

The Environmental Divisions has received a record drawing (asbuilt) and construction certification as submitted on January 30, 2007 for the stormwater management facility for the above referenced project. The record drawing provides as-built information for a wet pond situated in the southern end of the site.

Based on our review of the project and a concurrent field inspection as performed on April 12th 2007, the following items must be addressed prior to release of the developer's surety instrument for the stormwater management/BMP facility at the site and to proceed with closing out the project:

Record Drawing:

1. Label the facility as "Lake F" on the record drawing, consistent with master plan designations.
2. Label all roadways and lot numbers and subdivision sections on the record drawing.
3. Label the pump station below the Lake F dam as JCSA Lift Station # 9-6.
4. Additional asbuilt spot elevations are needed between the landscaping berms along top of dam. Although asbuilt top of dam elevation is shown at El. 62 on the cross-section on record drawing Sheet 2, contour and plan information on Sheet 1 shows that top of dam elevations may be lower than El. 62.
5. The riser for the BMP is situated in the southern end of the wet pond is a 60-inch diameter riser. Riser crest controls normal pool. The asbuilt elevation of the crest of the riser is 0.96 feet higher than that approved in the design plan which results in a normal (permanent) pool elevation higher than the approved plan. This is not in conformance with the approved plan.

6. The approved plan required a 5 ft. safety bench along the upstream face of the dam fill embankment. Field observations and the record drawing confirm that a narrower bench was used. This is not in conformance with the approved plan.
7. Pond bottom elevations on the approved plan (Elev. 30) do not correspond with the asbuilt contours show on the record drawing (Elev. 43/44). This is not in conformance with design water quality volume per the approved plan.

Note: To our knowledge, the only variance granted to the configuration of the stormwater basin was to pull the principal spillway control structure from within the dam embankment lakeward and change the top unit from a EW-11 top unit to a flat top unit out in the lake with a triangular shaped trash rack/anti-vortex plate. No revised plans were ever submitted or approved to change the pond (bottom) grading plan, narrow the safety bench or to change normal pool elevation of the basin. Review of our records show no approval letter granted to make these changes. It is noted; however, that based on water quality computations for the BMP that there was 2.8 times the water quality provided at El. 56 (3.1 million cubic feet) than that required (1.1 million cubic feet). The approved plan was for a pond bottom at El. 30 and a normal pool at El. 56. A transmittal by the project engineer dated January 12 2001 was provided to show that the reconfigured riser structure would work and meet specified discharge parameters for the pond, mainly outflow discharges, freeboard and water surface elevations. The reservoir report in the asbuilt routing did show a normal pool at El. 56.96. This was hidden in the asbuilt routing package and cannot be construed as approval of a major change to an approved plan. There was no subsequent revision or amendment to the approved design or stormwater management plan.

Construction - Related Items:

8. Remove debris from recently cut trees from and along the dam fill embankment.
9. Repair erosion and bare soil areas on all interior graded pond slopes around the entire pond perimeter.
10. Channel erosion accompanied by evident seepage and ground water present on the emergency spillway should be backfilled with compacted material, reseeded and mulched or matted for stabilization.
11. The approved plan indicates a trapezoidal channel for the emergency spillway. The spillway is parabolic, it is one half (1/2) foot higher than designed, has no defined channel, with standing water in the cart path.
12. Repair and stabilize bare soil and erosion areas present along the emergency spillway due to installation of the irrigation system.
13. Clear and remove all obstructions from around, inside and within 10 feet of the principal flow control (riser) structure. This includes: algae, sticks, construction debris, boards, vegetation, etc.
14. The approved plan called for a trash rack structure; however, none was found in the field. Provide a trash rack structure per the approved plan.
15. During the field inspection the outlet protection and the condition of the five storm drain inflow pipes into the basin were not visible due to the pond elevation (ie. submerged). Storm drainage structure SS # 9-1 (36-inch pipe) was ¾ full of water with 1' - 2' of sediment in the pipe at the

outfall. The riprap channel downstream of outfall SS # 9-1 was not visible and needs to be cleaned after pond normal pool elevation issues are resolved. Please note that storm drainage structures SS # 9-4 and SS # 9-3 located on Lots 198 and 199 in Greensprings West Phase 3 of this project hold water and we have several documented occasions concerning flooded properties during rain events due to the lack of positive flow into the BMP. Storm structure SS # 3-2 (18-inch RCP) has minor erosion around the drop inlet structure and concrete flume.

The above related comments are complex and serious issues related to the BMP, especially those related to the elevation of the normal pool in relation to the outfall elevation of inflow storm drainage pipes and the potential for lot flooding due to pond normal and design water surface elevations. These issues must be resolved by the applicant and engineer by reviewing storm drainage system and BMP asbuilt elevations with respect to that associated with the approved design plan; reviewing and revising appropriate approved design/stormwater management plans; and field changes to the drainage/stormwater management system and revision to the asbuilt (record) drawing. Also, it is your responsibility to provide proper advance notification to homeowner association members or residents who border the BMP, as appropriate, of any proposed work activity in the area to address field related punch list items. Caution shall be exercised to avoid rapid drawdown of the normal water pool. Rapid drawdown could cause a slide in saturated portions of the upstream embankment and other shoreline areas or cause alarm to residents who live adjacent to the facility. Generally, the facility should not be left unattended during drawdown, draining rate should not exceed 6 inches per day and any pumping operations shall have proper erosion and sediment control measures in accordance Minimum Standard & Spec. 3.26 of the Virginia Erosion and Sediment Control Handbook.

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

Please contact me at 757-253-6639 or the assigned Environmental Division inspector, Tina Cooke, at 757-253-6743 if you have any further comments or questions.

Sincerely,

Scott J. Thomas, P.E.
Chief Engineer - Stormwater
Environmental Division

cc: AES - G.T. Wilson Jr. - via fax
ECS Mid-Atlantic, LLC - Michael Galli - via fax
JCC ENV.DIV Inspector - Tina Cooke

G:\SWMProgram\AsBuilts\1899_jr048



5248 Olde Towne Road, Suite 1
Williamsburg, VA 23188
(757) 253-0040
Fax (757) 220-8994
www.aesva.com

June 12, 2009

Mr. Scott Thomas, P.E.
James City County Environmental Division
101-E Mounts Bay Road
P.O. Box 8784
Williamsburg, Virginia 23187-8784

**RE: Greensprings West Phase I Lake "F" BMP
County Plan No. S-18-99
County BMP ID Code: JR 048
AES Project No. 8656-07**

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IT'S NICE TO KNOW WE GOT TO WHAT WE

NEED OLD AS-BUILT + THIS WITH APPROVED PLANS

CAN YOU VERIFY THIS FORMER? I HAVE NO TIME TO DO K. GUILLS

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Response: Area around irrigation system has been backfilled and stabilized.
13. Clear and remove all obstructions from around, inside and within 10 feet of the principal flow control (riser) structure This includes algae, sticks, construction debris, boards, vegetation, etc.
Response: Debris has been removed. Regular inspections maintain the free flow through the trash rack.
14. The approved plan called for a trash rack structure, however, none was found in the field. Provide a trash rack structure per the approved plan.
Response: Trash rack has been installed.

Mr. Scott Thomas, P.E.
June 12, 2009

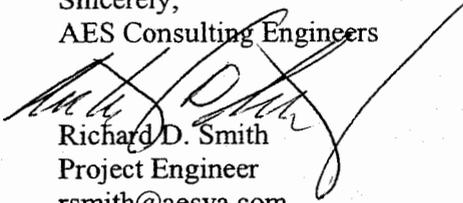
AES Project No. 8656-07
Page 4

15. During the field inspection the outlet protection and the condition of the five storm drain inflow pipes into the basin were not visible due to the pond elevation (i.e. submerged). Storm drainage structure SS# 9-1 (36-inch pipe) was 3/4 full of water with 1'- 2' of sediment in the pipe at the outfall. The riprap channel downstream of outfall SS# 9-1 was not visible and needs to be cleaned after pond normal pool elevation issues are resolved. Please note that storm drainage structures SS # 9-4 and SS # 9-3 located on Lots 198 and 199 in Greensprings West Phase 3 of this project hold water and we have several documented occasions concerning flooded properties during rain events due to the lack of positive flow into the BMP Storm structure SS# 3-2 (18-inch RCP) has minor erosion around the drop inlet structure and concrete flume.

Response: All obstructions have been removed from piping. BMP channel downstream of #9-1 has been excavated to provide open, un-obstructed flow to main BMP.

It is our sincere request this as-built certification be granted with the efforts recently completed by the Developer to comply with the originally planned design intent for this facility.

Sincerely,
AES Consulting Engineers



Richard D. Smith
Project Engineer
rsmith@aesva.com

N:\001\8656\07-BMP\ANGL1\Wordpro\Documents\8656-07 Lake II Response Letter June 12 2009.doc

Jamestown Management, LLC

213 Ingram Road
Williamsburg, Virginia 23185

DATE: June 2, 2000

MEMO TO: Michael Woolson

FROM: Lynn Evans

RE: Greensprings West E&S Inspection

Phase I

Mr. Woolson,

I wanted to get back with you concerning your inspection of Greensprings West June 1.

The silt fence on the down slope of the dam will be installed as requested.

The DI protection on Colonial Crescent is being repaired and cleaned.

The unstabilized areas on top of the dam are tee boxes for the golf hole that plays across the lake. We are in the process of installing the irrigation system for the golf hole at this time and these areas will be top soiled and seeded within the next couple of weeks .

We are trying to locate a precast Modified EW-11 for the riser pipe. If this cannot be done we will arrange to have it poured in place.

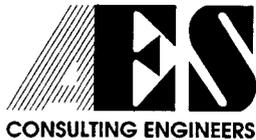
We will have the work on Colonial Crescent and the silt fence on the dam downslope completed by June 7, 2000, however we would like to have additional time to complete the remainder of you items.

Thank you for your attention to this matter and if you have any questions please let me know.

Lynn D. Evans

Cc: Wayne Reed, Site Superintendent

• Office (757) 220-0856 • Fax (757) 220-0916 •



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

February 23, 2000

Mr. Scott Thomas
James City County
Environmental Division
101 Mounts Bay Road
P. O. Box 8784
Williamsburg, Virginia 23187-8784

RE: Greensprings West Phase III
AES Project No. 8656-4

Dear Scott:

To facilitate your review of the subject project, we are responding to your comments dated February 16, 2000:

1. A stockpile area was provided in Phase I at the south side of the entrance to Greensprings West that serves the entire project. The engineer, the contractor, and the County agreed upon this area. The contractor also agrees to maintain proper erosion and sediment controls at this location during construction. This includes such items as silt fence and check dams.
2. See note 1 above.
3. There is no three on comment list.
4. A 60-foot long rip rap apron is being provided in this swale.
5. Clearing limits are extended accordingly.
6. A blow up on sheet 10 more clearly defines the trap boundaries.
7. Sheet 15 indicates all pertinent information for the rip rap. Sheet 8 and 10 labels are also revised.
8. Data for drainage areas, coefficients, time of concentration, and intensity are all provided in the storm sewer calculations provided. An additional sheet showing the derivation of Mannings "n" values is included.

Mr. Scott Thomas
February 23, 2000
Page 2

9. A note concerning inlet shaping is added to sheet 8.

We appreciate your effort in expediting this approval for a Land Disturbing Permit. Should you have further questions or need any additional information, please contact me at (757) 253-0040.

Sincerely,

AES Consulting Engineers



Howard W. Price
Project Engineer

C. LEWIS WALTRIP II, INC.

P.O. BOX 3522 WILLIAMSBURG, VIRGINIA 23187

(757) 253-1883 FAX (757) 253-0706

TRANSMITTAL

DATE: May 19, 1999

COMPANY: James City County

ATTENTION: Daryl Cook

FROM: Lynn

COMMENTS:

Daryl,

Please review the attached construction sequence for the stream protection for Greensprings West Phase I and let me know what your thoughts are.

Thanks,

Lynn



Subject: Record Drawing

Greensprings West Phase 1 – Lake F –
JR-048 BMP (One File)

TO: James City County Stormwater Division

From: Environmental Division

ATTN: Tina Creech

Comments:

For your files (One file).



4/16/01

Scott,
Here are the as-builts and
new trash rack for the
BMP in Greensprings West, Phase 1.

Mike

Sheet 15 of 19
Not 18 5-18-99
JR 048

AB ✓ 1/10/01
Need CC
WEED 1/m Agree
Comment #4 ENVDIV
SP-18-99
3/25/99

AES CONSULTING ENGINEERS

Engineering, Surveying and Planning

5248 Olde Towne Road, Suite 1
WILLIAMSBURG, VIRGINIA 23188

LETTER OF TRANSMITTAL

(757) 253-0040
FAX (757) 220-8994

DATE <i>2/23/00</i>	JOB NO. <i>8656-4</i>
ATTENTION <i>SCOTT THOMAS</i>	
RE: <i>G-S. WEST - PH. 101</i> <i>(S-103-99)</i>	

TO JCC
ENVIRONMENTAL DIVISION

WE ARE SENDING YOU Attached Under separate cover via _____ the following items:

- Shop drawings Prints Plans Samples Specifications
 Copy of letter Change order _____

COPIES	DATE	NO.	DESCRIPTION
<i>1</i>		<i>9876</i>	<i>REVISED STAFFS 8-10, 15</i>
<i>1</i>		<i>-</i>	<i>LETTER w/ ATTACHMENTS</i>



THESE ARE TRANSMITTED as checked below:

- For approval Approved as submitted Resubmit _____ copies for approval
 For your use Approved as noted Submit _____ copies for distribution
 As requested Returned for corrections Return _____ corrected prints
 For review and comment _____
 FOR BIDS DUE _____ PRINTS RETURNED AFTER LOAN TO US

REMARKS

"
ADVANCE SLIPSHEET" TO ENVIRONMENTAL
DIVISION. REQUESTING L.D. PERMIT ISSUANCE.
SAT
2-24-00
~~*FEB 21 2000*~~
FEB 24 2000

COPY TO _____

SIGNED: *[Signature]*



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

LETTER OF TRANSMITTAL

(757) 253-0040
FAX (757) 220-8994

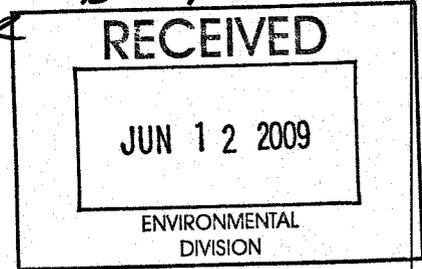
DATE	JUNE 12, 2009	JOB NO.	8656-07
ATTENTION	MR. SCOTT THOMAS		
RE:	GREENSPRINGS WEST LAKE F BMP CERTIFICATION		

TO JAMES CITY COUNTY
ENVIRONMENTAL DIV.

WE ARE SENDING YOU Attached Under separate cover via _____ the following items:

- Shop drawings
 Prints
 Plans
 Samples
 Specifications
 Copy of letter
 Change order
 RESPONSE LETTER / PHOTOS

COPIES	DATE	NO.	DESCRIPTION
2	1-29-09		BMP CALCULATIONS REVISED AS-BUILT CONDITIONS
1	6-12-09		COMMENT RESPONSE LETTER
2	11-12-08	8	BMP PLAN - AS BUILT
2	11-12-08	17	BMP SECTION - AS BUILT
2	1-28-09	SET	BMP SPILLWAY PHOTOS



THESE ARE TRANSMITTED as checked below:

- For approval
 Approved as submitted
 Resubmit _____ copies for approval
 For your use
 Approved as noted
 Submit _____ copies for distribution
 As requested
 Returned for corrections
 Return _____ corrected prints
 For review and comment

 FOR BIDS DUE _____
 PRINTS RETURNED AFTER LOAN TO US

REMARKS

COPY TO FILE SIGNED: [Signature]
 JR048_GREENSPRINGS_WEST - 312 *If enclosures are not as noted, kindly notify us at once.*



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

County BMP ID Code (if known): JR048
 Name of Facility: Greensprings West PH I BMP No.: 1 of 3 Date: 4/12/07
 Location: Longview Landing - Wet Pond #1
 Name of Owner: Jamestown LLC
 Name of Inspector: Tina Cooke
 Type of Facility: Wet Pond
 Weather Conditions: 13 in rainfall Type: Final Inspection County BMP Inspection Program Owner Inspection
6 hrs prior to inspection

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

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

Facility Item	O.K.	Routine	Urgent	Comments
Embankments and Side Slopes:				
Grass Height	✓			
Vegetation Condition	✓			
Tree Growth	✓			
Erosion		✓		recently cut perimeter erosion
Trash & Debris		✓		remove downed trees
Seepage			✓	
Fencing or Benches	N/A			
Interior Landscaping/Planted Areas: <input type="checkbox"/> None <input type="checkbox"/> Constructed Wetland/Shallow Marsh <input type="checkbox"/> Naturally Established Vegetation				
Vegetated Conditions	✓			
Trash & Debris	✓			
Floating Material	✓			
Erosion	✓			
Sediment	✓			
Dead Plant	✓			
Aesthetics	✓			
Other	✓			
Notes:				

Facility Item	O.K.	Routine	Urgent	Comments
Water Pools: <input checked="" type="checkbox"/> Permanent Pool (Retention Basin) <input type="checkbox"/> Shallow Marsh (Detention Basin) <input type="checkbox"/> None, Dry (Detention Basin)				
Shoreline Erosion		✓		perimeter erosion
Algae	✓			minor
Trash & Debris	✓			
Sediment	✓			
Aesthetics	✓			
Other				
Inflows (Describe Types/Locations):				
Condition of Structure			✓	SS# 9-1 36" RCP - 11-2' of sediment inside pipe - 3/4 full of water
Erosion		✓		SS# 3-2 - erosion around DI 18" RCP
Trash and Debris	✓			All ^{other} inlets were full of water, unable
Sediment			✓	to find outfall ends into pond.
Outlet Protection		✓		unable to visually inspect (OP) due
Other				to sediment & high water.
Principal Flow Control Structure - Riser, Intake, etc. (Describe Type):				
Condition of Structure			✓	1' higher than approved plan
Corrosion	✓			
Trash and Debris		✓		not approved riser sticks & boards on top of grate
Sediment	✓			
Vegetation		✓		algae around structure
Other			✓	1" difference in barrel elevations as well.
Principal Outlet Structure - Barrel, Conduit, etc. :				
Condition of Structure	✓			
Settlement	✓			
Trash & Debris	✓			
Erosion/Sediment	✓			
Outlet Protection	✓			
Other	* See above note			
Emergency Spillway (Overflow):				
Vegetation				
Lining				
Erosion			✓	channel erosion, seepage, & ground water
Trash & Debris				
Other		✓		spillway not trapezoidal, no defined channel & water standing in cent path.
Notes: irrigation system installed along emergency spillway.				

Facility Item	O.K.	Routine	Urgent	Comments
Nuisance Type Conditions:				
Mosquito Breeding	✓			
Animal Burrows	✓			
Graffiti	✓			
Other				
Surrounding Perimeter Conditions:				
Land Uses	✓			
Vegetation	✓			
Trash & Debris	✓			
Aesthetics	✓			
Access /Maintenance Roads or Paths	✓			
Other				
<p>Remarks: D1- 9-4 & 9-3 are always holding between 1'-2' of water due to the limited positive flow into Wet Pond #1. Water ponds 1'-3' onto Lots 198 & 199 (up to back check on 199)</p>				
<p>Overall Environmental Division Internal Rating: <u>5</u></p>				
<p>Signature: <u>Vina Cooke</u> Date: <u>4/12/07</u></p>				
<p>Title: <u>Environmental Inspector</u></p>				

SWMPProg\BMP\ColnspProg\InspForms\DetRet.wpd

**JAMES CITY COUNTY
 ENVIRONMENTAL DIVISION
 P. O. BOX 8784
 WILLIAMSBURG, VIRGINIA 23187-8784
 (757) 253-6670**

INSPECTION REPORT - EROSION AND SEDIMENT CONTROL

Date: 6-2-00
 Project: Greensprings West Phase I
 Phone/Fax: 220-0916

Permittee:
Jameson LLC
213 Ingram Rd
Williamsburg VA 23188

An inspection of the above-referenced project was conducted on _____, the following represents an evaluation of that projects compliance with James City County's Environmental Regulations. Items identified below as "Needs Repair" are deficiencies that must be corrected.

IN COMPLIANCE	NEEDS REPAIR	
<input type="checkbox"/>	<input type="checkbox"/>	SEDIMENT BASIN _____
<input type="checkbox"/>	<input type="checkbox"/>	SEDIMENT TRAP _____
<input type="checkbox"/>	<input type="checkbox"/>	CONSTRUCTION ENTRANCE _____
<input type="checkbox"/>	<input checked="" type="checkbox"/>	SILT FENCE <u>Install downslope of dam as shown on plans</u>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	INLET PROTECTION <u>Di's on Colonial Crescent need repair.</u>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	STABILIZATION <u>Dam stabilization need completion.</u>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	OTHER ITEMS <u>Grate on BMP needs to be a modified Ewell as shown on Sht 17. Outfall of BMP needs repair.</u>

Notice is hereby given that those deficiencies listed shall be corrected in accordance with James City County's Environmental Requirements on or before 6/7/00. The site will be reinspected at that time and you are invited to accompany the inspector on that date. Failure to comply with this report will result in Enforcement Actions .

Michael Workon
 JCC Environmental Division Inspector
 757-253-6670

Lynn Evans
 Project Representative Notified

JAMES CITY COUNTY
 ENVIRONMENTAL DIVISION
 P. O. BOX 8784
 WILLIAMSBURG, VIRGINIA 23187-8784
 (757) 253-6670

INSPECTION REPORT - EROSION AND SEDIMENT CONTROL

Date: 12-28-00
 Project: Greensprings West
Phase 1
 Phone/Fax: 220-0916

Permittee:
Jamestown LLC
213 Ingram Road
Williamsburg, VA 23188

An inspection of the above-referenced project was conducted on 12-27-00, the following represents an evaluation of that projects compliance with James City County's Environmental Regulations. Items identified below as "Needs Repair" are deficiencies that must be corrected.

IN COMPLIANCE	NEEDS REPAIR	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	SEDIMENT BASIN <u>What is the progress of the riser modification?</u>
<input type="checkbox"/>	<input type="checkbox"/>	SEDIMENT TRAP <u>N/A</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	CONSTRUCTION ENTRANCE _____
<input checked="" type="checkbox"/>	<input type="checkbox"/>	SILT FENCE _____
<input type="checkbox"/>	<input checked="" type="checkbox"/>	INLET PROTECTION <u>Repair inlet protection on Colonial Crescent.</u>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	STABILIZATION <u>Stabilize road shoulders on Colonial Crescent.</u>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	OTHER ITEMS <u>Remove sediment from roadway on Colonial Crescent.</u>

Notice is hereby given that those deficiencies listed shall be corrected in accordance with James City County's Environmental Requirements on or before 1-10-01. The site will be reinspected at that time and you are invited to accompany the inspector on that date. Failure to comply with this report will result in Enforcement Actions .

Beth Davis
 JCC Environmental Division Inspector
 757-253-6670

Bob Oliver
 Project Representative Notified

JAMES CITY COUNTY
 ENVIRONMENTAL DIVISION
 P. O. BOX 8784
 WILLIAMSBURG, VIRGINIA 23187-8784
 (757) 253-6670

INSPECTION REPORT - EROSION AND SEDIMENT CONTROL

Date: 12/19/01

Permittee:

Project: Greensprings West Phase I

Jamestown LLC

Phone/Fax: 220-0916

213 Ingram Rd.

Williamsburg VA 23188

An inspection of the above-referenced project was conducted on 12/18/01, the following represents an evaluation of that projects compliance with James City County's Environmental Regulations. Items identified below as "Needs Repair" are deficiencies that must be corrected.

IN COMPLIANCE	NEEDS REPAIR	
<input type="checkbox"/>	<input type="checkbox"/>	SEDIMENT BASIN _____
<input type="checkbox"/>	<input type="checkbox"/>	SEDIMENT TRAP _____
<input type="checkbox"/>	<input type="checkbox"/>	CONSTRUCTION ENTRANCE _____
<input type="checkbox"/>	<input type="checkbox"/>	SILT FENCE _____
<input type="checkbox"/>	<input type="checkbox"/>	INLET PROTECTION _____
<input type="checkbox"/>	<input checked="" type="checkbox"/>	STABILIZATION <u>stabilize disturbed area to the Northeast of "temporary T" turn-around and remove asphalt left by paver.</u>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	OTHER ITEMS <u>Clean ditchline east of drop inlet SS #4-2 to remove sediment that is impeding flow to inlet.</u>

Notice is hereby given that those deficiencies listed shall be corrected in accordance with James City County's Environmental Requirements **on or before** 12/24/01. The site will be reinspected at that time and you are invited to accompany the inspector on that date. Failure to comply with this report will result in Enforcement Actions.

Joe Buchite
 JCC Environmental Division Inspector
 757-253-6670

Bob Oliver
 Project Representative Notified

**JAMES CITY COUNTY
 ENVIRONMENTAL DIVISION
 P. O. BOX 8784
 WILLIAMSBURG, VIRGINIA 23187-8784
 (757) 253-6670**

INSPECTION REPORT - EROSION AND SEDIMENT CONTROL

Date: 5/13/02
 Project: Greensprings West Phase I
 Phone/Fax: 220-0916

Permittee:
Jamestown LLC
213 Ingram Rd.
Williamsburg VA

An inspection of the above-referenced project was conducted on 5/10/02, the following represents an evaluation of that projects compliance with James City County's Environmental Regulations. Items identified below as "Needs Repair" are deficiencies that must be corrected.

IN COMPLIANCE	NEEDS REPAIR	
<input type="checkbox"/>	<input type="checkbox"/>	SEDIMENT BASIN _____
<input type="checkbox"/>	<input type="checkbox"/>	SEDIMENT TRAP _____
<input type="checkbox"/>	<input type="checkbox"/>	CONSTRUCTION ENTRANCE _____
<input type="checkbox"/>	<input type="checkbox"/>	SILT FENCE _____
<input type="checkbox"/>	<input type="checkbox"/>	INLET PROTECTION _____
<input type="checkbox"/>	<input checked="" type="checkbox"/>	STABILIZATION <u>Stabilize disturbed area to N.E. of temporary "T" turn around.</u>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	OTHER ITEMS <u>Clean ditchline east of drop inlet ss #4-2 to remove sediment that impedes flow to inlet.</u>

Notice is hereby given that those deficiencies listed shall be corrected in accordance with James City County's Environmental Requirements on or before 5/16/02. The site will be reinspected at that time and you are invited to accompany the inspector on that date. Failure to comply with this report will result in Enforcement Actions .

Joe Buchite
 JCC Environmental Division Inspector
 757-253-6670

Bob Oliver
 Project Representative Notified

JAMES CITY COUNTY
ENVIRONMENTAL DIVISION
P.O. BOX 8784
WILLIAMSBURG, VA 23187
757-253-6670

NOTICE TO COMPLY

Date: June 12, 2000

To: Jamestown LLC
213 Ingram Road
Williamsburg, VA 23188

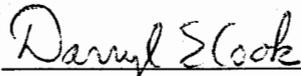
Re: Greensprings West, Phase 1

An inspection of the above referenced project on June 9, 2000 revealed that the following violations are present:

- Silt fence needs to be installed at outfall of dam.
- Outfall of dam needs to be cleaned out and riprap replaced.
- Grate of BMP needs modification; modification needs approval of this office.
- Stabilize golf holes as soon as practicable.

Notice is hereby given that these violations shall be corrected in accordance with the approved Erosion and Sediment Control Plan on or before Friday June 15, 2000. The site will be reinspected at that time and you are invited to accompany the inspector on that date.

Failure to comply with this notice will result in the revoking of the Land Disturbing Permit, a Stop Work Order, or any other legal action necessary, including drawing on the project surety by the County to effect the implementation of the approved plan. Please contact this department if there are any questions.



Darryl Cook
Environmental Division Director

Z 273 082 524

US Postal Service
Receipt for Certified Mail
No Insurance Coverage Provided.
Do not use for International Mail (See reverse)

Sent to	
Jamestown LLC	
Street & Number	
213 Ingram Rd	
Post Office, State, & ZIP Code	
Williamsburg VA 23188	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date	

Form 3811, April 1995

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- 1. Addressee's Address
- 2. Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

JAMESTOWN LLC
213 INGRAM ROAD
WILLIAMSBURG VA 23188

4a. Article Number
Z 273 082 524

4b. Service Type

Registered Certified
 Express Mail Insured
 Return Receipt for Merchandise COD

7. Date of Delivery
6/15 RH 229

5. Received By: (Print Name)

8. Addressee's Address (Only if requested and fee is paid)

6. Signature: (Addressee or Agent)
X John Lowenapt

Thank you for using Return Receipt Service.

UNITED STATES POSTAL SERVICE



First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Print your name, address, and ZIP Code in this box •

ENVIRONMENTAL DIVISION
P O BOX 8784
WILLIAMSBURG VA 23187

Greensprings West-Phase 1

• **Place postage stamps to article to cover First-Class postage, certified mail fee, and charges for any selected optional services (See front).**

• **If you want this receipt postmarked, stick the gummed stub to the right of the return receipt, leaving the receipt attached, and present the article at a post office service counter or hand it to your rural carrier (no extra charge).**

• **If you do not want this receipt postmarked, stick the gummed stub to the right of the return receipt, address of the article, date, detach, and retain the receipt, and mail the article.**

• **If you want a return receipt, write the certified mail number and your name and address on the return receipt card, Form 3811, and attach it to the front of the article by means of the gummed ends if space permits. Otherwise, affix to back of article. Endorse front of article with RETURN RECEIPT REQUESTED adjacent to the number.**

• **If you want delivery restricted to the addressee, or to an authorized agent of the addressee, endorse RESTRICTED DELIVERY on the front of the article.**

• **Enter fees for the services requested in the appropriate spaces on the front of this receipt. If return receipt is requested, check the applicable blocks in item 1 of Form 3811.**

• **Save this receipt and present it if you make an inquiry.**

102595-99-M-0079

PS Form 3800, April 1995 (Reverse)

Jamestown, LLC

213 Ingram Road • Williamsburg, Virginia 23188
 Telephone: (757) 220-0856 • Facsimile: (757) 220-0916
 • Email: boliver@widomaker.com

FAX Transmittal

To: Mike Woolson	Org./Firm: James City Co.
Fax Number: 259-4032	Date: July 25, 2000
From: Lynn Evans	Pages Including Cover Page: 2
cc:	cc Fax Number:
Subject: Greensprings West	

Urgent For Approval For Review Please Comment Please Reply

Comments:

Mike,

Please review the attached detail for the trash rack to replace the existing grate at the riser pipe in the lake at Greensprings West. Call if you have questions

Lynn

Confidentiality Note: The documents accompanying this fax may contain confidential information. This information is intended only for the use of the individual or entity named on the transmission sheet. If you are not the intended recipient, you are hereby notified that any disclosure, copying, distribution, or the taking of any action in reliance on the contents of this faxed information is strictly prohibited, and that the documents should be returned to Jamestown, LLC. If you have received this fax in error, please notify us by telephone immediately at the number above so that we can arrange for the return of the original document at no cost to you.

WATERSHED	JR	MAINTENANCE PLAN	No	CTRL STRUC DESC	RCP Riser
BMP ID NO	048	SITE AREA acre	15.12	CTRL STRUC SIZE inches	60
PLAN NO	S-18-99	LAND USE	Resid Planned Co	OTLT BARRL DESC	RCP Barrel
TAX PARCEL	(36-03)(02-1C)	old BMP TYP	Wet Pond	OTLT BARRL SIZE inch	24
PIN NO	3630200001C	JCC BMP CODE			
CONSTRUCTION DATE	7/1/1999	POINT VALUE	9	EMERG SPILLWAY	Yes
PROJECT NAME	Greensprings West Phase 1			DESIGN HW ELEV	60.61
FACILITY LOCATION	Near Entrance at Centerville Road			PERM POOL ELE	56.96
CITY-STATE	Williamsburg, Va. 23188	SVC DRAIN AREA acres	154.8	2-YR OUTFLOW cfs	31.40
CURRENT OWNER	Jamestown LLC			10-YR OUTFLOW cfs	44.90
OWNER ADDRESS	P.O. Box 3011			REC DRAWING	Yes
OWNER ADDRESS 2		SERVICE AREA DESCRI	SF Lot, Roads and Future Rec site		
CITY-STATE-ZIP CODE	Williamsburg, Va. 23187	IMPERV AREA acres	60.35	CONSTR CERTI	No
OWNER PHONE		RECV STREAM	UT of Shellbank Creek		
MAINT AGREEMENT	No	EXT DET-WQ-CTRL	Yes	LAST INSP DATE	
EMERG ACTION PLAN	No	WTR QUAL VOL acre-ft	25.8	INTERNAL RATING	
		CHAN PROT CTRL	No	MISC/COMMENTS	Ph 1 (ll lots). Riser modified. AB routing.
		CHAN PROT VOL acre-ft	0		
		SW/FLOOD CONTROL	Yes		
		GEOTECH REPORT	Yes		

[Get Last BMP No](#)

[Return to Menu](#)

Required w/
Greenspring West
Phase 3-C PLAN

S-107-02

ENVIRONMENTAL DIVISION REVIEW COMMENTS
 GREENSPRINGS WEST PHASE 3-C
 COUNTY PLAN NO. S - 107 - 02
 March 20, 2003

GEL/SJT

General:

1. Lake F Wet Pond (JR048). No additional information was received to address previous comment # 6. According to our records, a record drawing was received by our office on January 12th 2001. This record drawing provided asbuilt information for the reconfigured riser structure. A hydraulic model based on asbuilt conditions was also included with this submittal. However, construction certification as required per Note 18 on Sheet 15 of approved plan S-18-99 was not provided. Once this information is submitted a final inspection will be performed at the BMP. Additional construction (field) related items may be necessary. A Land-Disturbing permit can not be issued for Phase 3-C until the construction certification for this BMP is submitted and reviewed. *(Note: Issuance of the land-disturbing permit will not be contingent upon completion of any construction-related items for the BMP as determined by final inspection. However, it will be contingent upon review of the construction certification for the BMP. Surety being held for the BMP will not be released in full until the record drawing and construction certification are approved and any construction-related items are completed and reinspected.)*

RECEIVED
 AB (AES)
 EC (ECS)

Erosion and Sediment Control Plan:

2. Diversion Dike. Response to previous comment # 22 is noted. However, the concern is for safe conveyance of disturbed area runoff down the 2H:1V side slope of the basin, prior to installation of the inlet SS # 12-2 and the associated storm drainage piping system. As is evident on Sheet 5 and the sequence of construction on Sheet 8, installation of the diversion dikes and sediment trap system is one of the first steps for the project. Installation of the storm drainage system will not occur until some time into the project following clearing, grubbing, topsoil removal and initial grading. Therefore, slope drains or riprap stabilization would be necessary to prevent erosion of the interior sediment trap slope. *(Note: There is approximately 15 ft. of fall from the location where the temporary diversion dikes terminate at top of slope El. 65.0 to the wet pool storage elevation at El. 50. Stabilization would be necessary at this location to prevent slope erosion.)*
3. Perimeter Controls. Provide a general note on Sheet 5 that diversion dike (DD) and silt fence (SF) perimeter controls as shown on the plan are intended to be placed at/along the Limit of Clearing and Grading. It should not be interpreted that silt fence and diversion dike features as shown on the plan at Lots 127 through 136 are to be installed outside the designated limit of work.

Stormwater Management / Drainage:

4. Stormwater Management Plan. Responses to previous comment # 28 and # 29 are acknowledged. Due to the uncontrolled nature of this development plan and heavy reliance on existing, offsite BMPs to provide interim quantity and quality control by overcompensation until the downstream future dry pond is constructed, the construction certification issue as outlined in comment # 1 above will be an important characteristic relative to approval of the stormwater management plan for this plan of development by the Environmental Division. In order to be fully convinced of the overcompensation concept as outlined in the response to previous comment # 28 and # 29, it must be shown that the offsite BMPs were constructed and are functioning properly to meet the concept as intended. Review and approval of the construction certification is therefore a critical component to the proposal as forwarded.

**CONSTRUCTION SEQUENCE
GREENSPRINGS WEST PHASE I
EXISTING STREAM FLOW CONTROL**

Upon completion of the clearing activities a temporary sediment trap will be constructed 30'X 30'X 4' deep at the intake of a 6" outfall in line with the existing stream.

As the dam is constructed the temporary sediment trap will contain the filtered sediments and the 6" outfall pipe will allow the filtered water to pass across the dam construction area and to it's natural course.

The inlet of the 6" outfall pipe 2 CY of #3 stone will be placed to act as a secondary filter.

Silt fence will be installed on the down stream side of the dam during dam construction, and remain in place until the area is stabilized by vegetation.

As the dam is constructed and the riser section is built the 6" pipe will become a part of the riser and the outfall discharge will be controlled with a gate valve in the riser section.

As the dam is being constructed material will be excavated from the east side of the stream and as the pond reaches it's design depth the sediment trap will removed and the excavated pond will act as the sediment trap.

Upon completion of the dam construction the dam will be topsoiled and seeded to stabilize the disturbed areas.



ENVIRONMENTAL DIVISION REVIEW COMMENTS
GREENSPRINGS WEST, PHASE III

PLAN NO. S - 103 - 99

February 16, 2000

SJT

Erosion & Sediment Control Plan:

✓ 1. Temporary Stockpile areas. The approved plan for Phase I does not designate any temporary stockpile locations or excess material (waste) disposal areas for Phase III activities. Location(s) with required erosion and sediment controls must be defined prior to the start of Phase III activities.

✓ 2. Offsite Land Disturbing areas. The response provided did not properly address comment # 8 from our December 8th 1999 comments. If stockpile, borrow or disposal areas are anticipated beyond the Phase III site area, locations and erosion and sediment control measures must be defined. If designated areas are to coincide with previously established areas, identify previously installed erosion and sediment controls and describe any maintenance/repairs necessary prior to the start of Phase III earthmoving.

4. Interim E&SC. On Sheet 9, maximum contributing drainage area and flow are exceeded for use of a silt fence (check) across the existing swale downstream of SS #9-1. Replace the silt fence with a rock check dam in accordance with VESCH, Minimum Standard 3.20.

✓ 5. Clearing Limits. On Sheet 10, extend limits of clearing to include the sediment trap at SS # 10-1. **A RIPRAP APRON DOES NOTHING FOR FILTERING. REPLACE SILT FENCE WITH A ROCK CHECK DAM AS PREVIOUSLY REQUESTED.**

✓ 6. Sediment Trap at SS # 10-1. On Sheet 10, grading (contour) labels provided for the excavated sediment trap are not readable. Based on the 1 ft. contours, it appears that the trap will be approximately 12 ft. deep at the eastern excavated toe. For clarity purposes, show pertinent construction data (bottom and top elevation, outlet elevation, etc.) either in tabular form on the sediment trap detail on Sheet 15 or provide a informative cross-section on plan sheet 10.

OK ✓ 7. Forebay at SS # 11-1. On Sheet 15, indicate class, dimensions and rock thickness required for the riprap apron and cross reference SS # 11-1 on the forebay detail. On Sheet 10, label SS # 11-1 on the plan view. On Sheet 8, the label/leader associated with SS # 11-1 is incorrect. **NO**

OK ✓ 8. Channel Adequacy. Outfalls for System 10 (SS # 10-1) and System 11 (SS # 11-1) were shown to be "adequate" based on 2-year velocities. Additional data is required to support these conclusions. Include data for drainage area, postdeveloped runoff coefficient, time of concentration and intensity used to determine design discharge (Q2) values of 4.39 cfs and 6.00 cfs, respectively. Also, provide information used to select permissible velocities and Mannings "n" values for the channel sections. Reference the VESCH, Page V-122. **CHANNEL ADEQUACY APPEARS OK.**

Stormwater Management / Drainage:

OK ✓ **PROVIDED NOTE FOR 15-1 @ 90° TYPE JUNCTIONS.**
Inlet Shaping. Drainage inlets for Phase III are generally serving smaller-sized storm sewers (15-18 inch). Many inlets for the System 9, 10 and 11 layouts are 90-degree type junctions with multiple pipes and no minimum drops across inlets were shown. Therefore, inlet shaping is recommended to minimize and prevent debris buildups and reduce future required maintenance.

NOTE:

FIRST WE ALLOWED REMOVAL OF A SED. TRAP DUE TO THE BMP. PLANS SHOW A SILT FENCE IN A SWALE THAT WILL SEE PEAK DISCHARGE OF (14.35AL); Q₁₀ = 27.38cfs; V = 3.87 FPS.

Bill -
This is the "Lake F"
Greensprings west file
we talked about.

Jira

ENVIRONMENTAL DIVISION REVIEW COMMENTS
GREENSPRINGS WEST, PHASE 1
PLAN NO. S-18-99
May 17, 1999 MCE/DEC

1. The following comments refer to the BMP facility:
 - A. Provide a copy of the geotechnical report.
 - B. Provide either anti-seep collars or a filter diaphragm to control seepage through the dam.
 - C. Provide minimum dimensions on the plan for the core trench.
 - D. Provide buoyancy calculations for the riser. It is unclear how much of the riser will be filled below the invert of the pipe to provide weight against floating.

2. There are some discrepancies in system # 1 between the calculations and the plan sheet:
 - A. SS# 1-3B does not appear in the calculations while SS# 1-3 is listed twice.
 - B. On sheet 4, there does not appear to be a line to separate the drainage areas for 1-3 and 1-3B.
 - C. The drainage area for 1-5 is listed as 0.19 on the plan while in the calculations it is 0.23. Please revise.

3. Provide more information in the sequence of construction on how the sediment basin will be installed. The basin is to be built in a large drainage course and will be subject to receiving large stormflows while under construction. The management of this water needs to be discussed. The water will need to be diverted, pumped or in some other fashion kept out of the work area.

4. The existing wetlands permit does not allow for the filling of the large wetland area northwest of the pond. The grading plan on sheet 8 needs to be revised to eliminate the filling of this area and the grading between this area and the pond. The grading will cutoff the drainage from the wetland area into the pond and create a drainage problem.

5. Wetlands must be shown on the environmental inventory.

MARK

**CONSTRUCTION SEQUENCE
GREENSPRINGS WEST PHASE I
EXISTING STREAM FLOW CONTROL**

Upon completion of the clearing activities required for a temporary sediment trap and the golf hole areas a trap will be constructed 100'X 100'X 4' deep at the intake of a 6" outfall in line with the existing stream through the dam area.

The material from the golf hole area on the west side of the pond will be used for the dam construction. The unusable material from the excavation of the pond will be spoiled and graded on the golf hole on the east side of the pond.

As the dam is constructed the temporary sediment trap will contain the filtered sediments and the 6" outfall pipe will allow the filtered water to pass across the dam construction area and to it's natural course.

The inlet of the 6" outfall pipe 2 CY of #3 stone will be placed to act as a secondary filter.

Silt fence will be installed on the down stream side of the dam during dam construction, and remain in place until the area is stabilized by vegetation.

As the dam is constructed and the riser section is built the 6" pipe will become a part of the riser and the outfall discharge will be controlled with a gate valve in the riser section.

As the dam is being constructed material will be excavated from the east side of the stream and as the pond reaches it's design depth the sediment trap will removed and the excavated pond will act as the sediment trap.

Upon completion of the dam construction the dam will be topsoiled and seeded to stabilize the disturbed areas.

ENVIRONMENTAL DIVISION REVIEW COMMENTS
GREENSPRINGS WEST - PHASE 1
PLAN NO. SP-18-99
March 25, 1999

MCE/DEC

- ✓ 1. A Land Disturbing Permit and Siltation Agreement, with surety, are required for this project.
- ✓ 2. A Subdivision Agreement, with surety, shall be executed with the County prior to recordation of lots.
- ✓ 3. Water and sewer inspection fees must be paid prior to the issuance of a Land Disturbing Permit.
- ✓ 4. An Inspection/Maintenance Agreement shall be executed with the county for the BMP facility for this project.
- ✓ 5. As-built drawings must be provided for the detention basin on completion. Also, a note shall be provided on the plan stating that upon completion, the construction of the dam will be certified by a professional engineer who has inspected the structure during construction.
- ✓ 6. A streetlight rental fee for 11 lights must be paid prior to the recordation of the subdivision plat.
- ✓ 7. This plan shows excessive clearing and grading not needed to build the roads and pond. As this is not a plan for construction of the golf course, there is not need to clear and grade these areas. Revise the limits of clearing to reflect only the minimum amount of disturbed area needed to construct the subdivision infrastructure. - discuss w/John - DMT
- ✓ 8. Provide and label the limits of clearing on the plan.
- ✓ 9. Provide and label the limits of cut and fill slopes on the plan.
12. Provide on the environmental inventory and the plan sheets the location of the wetlands.
- ✓ 13. Show the limit of the 100-year floodplain if present on this site.
- ✓ 14. Show any temporary soil stockpile areas, staging and equipment storage areas. Provide information on where the excavated material for the pond will stored or used. - Golf course area
- ✓ 15. Identify any off-site land disturbing areas required with proper erosion control measures.
- ✓ 16. Due to the size and nature of this project, provide a phasing plan and sequence of construction on the plan and provide a Narrative Plan. As the pond is the primary erosion control measure for the entire project, it must be constructed to a point where it can function as a sediment basin as a first step measure.
- ✓ 17. It appears from the plans that the top of the emergency spillway is not in a cut. If this is the case then that portion of the spillway constructed on fill must be concrete.

18. Provide a plan to carry upstream runoff water through the pond dam construction and excavation area so that it may pass cleanly through the disturbed area.

DEC 19. Submit an adequacy analysis for all receiving channels to ensure that the channel is stable for the 2-year velocity.

20. Provide information that demonstrates the existing storm drain system is adequate to convey the flow from system #1.

✓ 21. On sheet 3, there is a drainage area of 2.77 acres that is shown as draining to SS2-8. In the calculations, this area is presented as draining to SS2-4. Please clarify and revise as necessary.

DEC 22. Provide more documentation on the design assumptions for the culvert 1 system. Provide the basis for the time of concentration and Runoff Curve number. Also, discuss how the tailwater from the pond is accounted for in the calculations.

23. Submit an updated BMP calculation for the Greensprings' stormwater management master plan to show how this project helps the site achieve its required 10 BMP points.

24. Provide conservation easements for all Natural Open Space areas claimed in the BMP master plan.

✓ 25. The perimeter of the stormwater management facility must be completely accessible including an area 15 feet above the 100-year storm elevation and including the dam and outlet structure. If all this area is not in common ownership, easements must be provided to ensure this access.

✓ 26. Provide for slope protection where the three swales carry road runoff into the pond and channel, in the vicinity of the four 36" RCP culverts at the upper end of the pond

✓ 27. Provide riprap outlet protection for all pipe systems and culverts. Specify the amount of stone to be used in accordance with Spec 3.19 of the third edition of the Virginia Erosion Control Handbook (VESCH).

✓ 28. Sanitary sewer easements are all shown as a standard 20 foot clearing. Much of the sanitary sewer is 15 to 25 feet deep. How reasonable is it to assume the 20 foot clearing can be enforced?

✓ 29. A note on the Environmental Inventory sheet states that there are no 25% slopes on the project site. However, the grading plan shows that slopes greater than 3:1 will be created. State what special measures, sodding etc., will be undertaken to restabilize these slopes.

30. Provide evidence that any required wetlands permits have been obtained.

31. Complete the attached ~~SWM Detention Basin Design Checklist~~ to verify the BMP meets the County's criteria. Include a copy of the geotechnical report for the dam.

- need seepage control

- geotech report

- provide maintenance plan

- buoys - specify depth of case.

Not provided

1 of 3

EMERGENCY SPILLWAY
LOOKING UPSTREAM FROM
DOWNSTREAM SLOPE OF DAM
(LEFT OF CENTER)

JAN. 28, 2009
LAKE F
GREENSPRINGS WEST
PHASE I



2 OF 3

EMERGENCY SPILLWAY
LOOKING UPSTREAM FROM
DOWNSTREAM SLOPE OF DAM
(CENTER)

JAN 28, 2009
LAKE F
GREENSPRINGS WEST
PHASE I

16' 4"

3 of 3

EMERGENCY SPILLWAY
LOOKING UPSTREAM FROM
DOWNSTREAM SLOPE OF DAM
(RIGHT OF CENTER)

JAN. 28, 2009
LAKE F
GREENSPRINGS WEST
PHASE I



1 of 3

EMERGENCY SPILLWAY
LOOKING UPSTREAM FROM
DOWNSTREAM SLOPE OF DAM
(LEFT OF CENTER)

JAN. 28, 2009
LAKE F
GREENSPRINGS WEST
PHASE I

IS THIS
GROUNDWATER?
SEEMS A BIT
WET FOR THIS HIGH
ON THE DAM.

2 OF 3

EMERGENCY SPILLWAY
LOOKING UPSTREAM FROM
DOWNSTREAM SLOPE OF DAM
(CENTER)

JAN. 28, 2009
LAKE F
GREENSPRINGS WEST
PHASE I

12' ±

IT WOULD BE NICE TO
HAVE SOMETHING OF SCALE
IN THE PHOTO. THIS
COULD BE 40' FOR ALL
I KNOW.

3 OF 3

EMERGENCY SPILLWAY
LOOKING UPSTREAM FROM
DOWNSTREAM SLOPE OF DAM
(~~CENTER~~ RIGHT OF CENTER)

JAN. 28, 2009
LAKE F
GREENSPRINGS WEST
PHASE 1





JR048

US 5

Call to schedule meeting time

ENVIRONMENTAL DIVISION CITIZEN COMPLAINT RESPONSE FORM

Complainant's Name: Joe Williams

Address: _____

Telephone No.: 564-3360

Date Received: 4/5/07 ja

Date Assigned: _____

Location of Problem: Behind 3189 Eagle's Watch

Type of Complaint Greensprings West

- Drainage
- Erosion
- Land Disturbing
- Tree Removal
- Sink Hole
- Street Sign
- Street Light
- Other:

Storm drain - rear of lot
Very large hole around the drain

Inspector Assigned: _____

Watershed Code: _____

Date Investigated: _____

Complainant Contacted? Yes No

Field Investigation? Yes No

Follow up Required? Yes No

Results of Investigation:
SEE #1

- 220-0061 -
- DAVE on Dotter -

ENVIRONMENTAL DIVISION CITIZEN COMPLAINT RESPONSE FORM

Complainant's Name: Jeff Hartzog

Address: 3193 Eagles watch Greensprings West

Telephone No.: 565-4739 cell: 434-610-5333

Date Received: 10/10/06

Date Assigned: _____

Location of Problem: water under house

Type of Complaint Parcel ID
3630200168

- Drainage
- Erosion
- Land Disturbing
- Tree Removal
- Sink Hole
- Street Sign
- Street Light
- Other:

*Lot 168
P# 33*

sprinkler?

*Repair water line to home
Ken Parkins 564-7144*

Inspector Assigned: Tina Cooke

Watershed Code: _____

Date Investigated: _____

Complainant Contacted? Yes No *7:30am 10/12/06 Thursday*

Field Investigation? Yes No *Met w/ Developer 10/13/06 -
Concerning yard drain - Bob*

Follow up Required? Yes No *Will repair the washouts & check
line to street for failures*

Results of Investigation: *> Left Message 10/17/06*

- Homeowner suggestions Given:
- ① Need downspouts to direct water around foundations
 - ② JCSA/Keith - test the water under the home for chlorine. This will give them an idea of where the water is coming from.
 - ③ Tree & berm at rear of lot, near yard drain is in the direct line of the swale - divert water around tree to yard drain.

10/17/06 - Gordon Berryman returned my call - no longer legally resp. - asked Hartzog to call Drying Company that responded prior to closing.

Forms 4/03

X	1. ORIGINAL	CERTIFICATE OF USE AND OCCUPANCY JAMES CITY COUNTY	4 TAX MAP NO (36-3)(02-0-0168-)
	2. CHANGE IN USE		5 BUILDING PERMIT NO B04-0094
	3. TEMPORARY (See Special Conditions)		

This certificate is issued pursuant to the requirements of Section 117.0 of the Virginia Uniform Statewide Building Code and it (1) certifies that at the date of issuance this structure as identified below is deemed to be in compliance with the applicable provisions of the Virginia Uniform Statewide Building Code as they apply to the following use and occupancy and (2) authorizes the use and occupancy as described below.

41428

(The expiration date of a Temporary Certificate appears beside Special Conditions.)

STRUCTURE	LOCATION	6 NUMBER AND STREET 3193 EAGLES WATCH		LOCATION CHARACTERISTIC		YES	NO	
		7 CITY AND ZIP CODE Williamsburg, 23185		9 PRIMARY SERVICE AREA		YES		
		8 PROJECT NAME GREENSPRINGS WEST		10 OVERLAY DISTRICT				
				11 FLOODPLAIN			NO	
	USE	12 PURPOSE FOR WHICH STRUCTURE MAY BE USED SFD SAME AS 97-2		13 ZONING DISTRICT R-4				
		SPECIAL CONSIDERATION (PLACE CASE NUMBER IN BOXES)						
ACTION		YES	NO	ACTION		YES	NO	
14. SPECIAL USE PERMIT			/	15. SITE PLAN			NO	
16. CONDITIONAL USE PERMIT			/	17. VARIANCE			/	
IMPROVEMENT DATA	18. USE GROUP CLASSIFICATION R5			19. TYPE OF CONSTRUCTION 5B				
	20. TYPE OF IMPROVEMENT DWELLING, NEW SINGLE FAMILY							
OWNER	21. NAME GORDON BERRYMAN							
	22. NUMBER AND STREET							
	23. CITY AND STATE				24. ZIP CODE			
SPECIAL CONDITIONS	25. LIST DETAILS OF SPECIAL CONDITIONS SAME AS 97-2							
SIGNATURE	26. BUILDING OFFICIAL Douglas H. Murrow 			27. DATE OF ISSUE 20-Oct-2004				



Landscape Elements, LLC
 107 Knollwood Drive
 Williamsburg, VA 23188
 757-741-2416

Invoice

DATE	INVOICE #
9/27/2006	550

BILL TO	SHIP TO
Mr. & Mrs. Lowman 3208 Windsor Ridge South Williamsburg VA 23188	

TERMS	DUE DATE
	9/27/2006

ITEM	QUAN.	DESCRIPTION	RATE	SERVICED	AMOUNT
RIVER ROCK	9	Pick-up, delivery & installation of RIVER ROCK -9 tons to be installed in swales; 3' width along back fence, 18"-24" along front bed edge, widened areas at drainage areas along fence at bottom of yard. Spread excavated dirt to raise bed area, fill in low spots	180.00		1,620.00
MULCH	8	Pick-up, delivery & installation of hardwood bark mulch by the yard.	47.50		380.00
SOD	1	Remove bad sod area, disposal, till in compost/topsoil blend to raise area, install new sod approx. 500 sq. ft.	575.00		575.00

Thank you for your business.	Total	\$2,575.00
------------------------------	--------------	-------------------

Tina:

~~Enclosed~~
Pictures of flooded yards
were dated 07/04 -

DAVID + I purchased this house
12/04 - which was after the pict.
(Floods were not disclosed when we
bought here)

However we were flooded twice
in 2006, I believe Sept.-Oct.
After we paid for Landscaping

129,000⁰⁰ BOND ONE

VA LAKE MANAGEMENT

April 2010 turn over to HOA

Greensprings West Transition Punch List

Item Detail	Resolution or Cost
Missing landscaping from the Recreation Area – 74 Trees, 460 Shrubs <ul style="list-style-type: none"> 74 Trees, 460 Shrubs 	\$28,700.00
Missing Tennis court bleachers and Aggregate walkway <ul style="list-style-type: none"> Bleacher - 3 rows 7.5' x30" x60" \$870.45 + \$85 S&H = \$955.45 Aggregate walkway to bleachers 240sqft @ \$5.80/sqft = \$1392.00 Prep area for bleachers and install over crushed stone \$290.00 	\$955.45 \$1,392.00 \$290.00
Pond #1 at St James Place – <ul style="list-style-type: none"> Installation of Vertex Air 5 Submersed Aeration System Electric Utility hookup Escarole funding for SONAR systemic herbicide treatment in spring for existing weed problems, pending property transfer Serious erosion on most of the east side of the pond, and large erosion area up next to a home on the North West side noted by attached maps to repair 	\$5,154.00 \$850.00 \$2,542.00 Developer
Pond #2 at Torrington Trail and Chartston Crescent <ul style="list-style-type: none"> Installation of AquaMaster Masters Series ½ HP (240V / 1PH) Submersed Aeration System Electric Utility hookup 	\$3,830.00 \$850.00
Pond #3 behind lot 319 & 320 Chartston Crescent <ul style="list-style-type: none"> Installation of Air Plus One Submersed Aeration System. Pending property transfer Electric Utility hookup Serious shoreline weed infestation to be resolved repair 	\$2,280.00 \$850.00 Developer to
Pond #1, #2 and #3 Lake management program for period April 1, 2010 through March 31, 2011 for existing problem control. Pending property transfer	\$3,920.00
Entrance Sign at Manor Gate – Upgrade center sign section to decorative brick and signage to match Torrington Trail signage. <ul style="list-style-type: none"> Install 2 wall sections 576 sqft @ 24.70/sqft Emblem and name signage 	\$14,227.00 \$1,800.00
Club House Repairs – Major repairs made due to original installation of pressboard Sheeting, improper siding caused extensive water Intrusion resulting in rot and mold in framing and windows. (Pending inspection results)	\$59,569.67
Upgrade of deficient irrigation system – Replacement of 1" mains with 2" mains	\$5,350.00
Deficient design in erosion control behind the pool house	

- Install tiered block retaining wall with crushed stone and drainage system To divert high volumes of runoff water from poorly designed pool deck.
\$18,000.00

Deficient design in fountain outside of clubhouse, costs to remove pump and replace with flagpoles, back fill and supply irrigation and plantings \$2,500.00

Greensprings West Transition Punch List

Item Detail	Resolution or Cost
Supply copies of all Governing Documents, Property Transfer Documents and deeds to all GSW properties supply	Developer to
Provide for transfer of ownership of the following properties <ul style="list-style-type: none"> • Parcel 3630200001F – Cultural resource area Shadow Lane Circle • Parcel 3630200001G - Open Space area across from 4008 Shadow Lane • Parcel 3630200001H – 4 Open Space Areas around Carlton House Crescent, includes pond #1 between Haymarket and ST James. • Parcel 3630200001J – Between Chartstone Cr and Waterloo Pl , includes Developer to Transfer ponds #2 and #3 • Determination of ownership of Parcel 3630100022 behind Shadow Lane research 	Developer
Seal and stripe Recreation Center parking lot supply	Developer to
Top seal and stripe Tennis Courts	Developer to supply
Repairs to Colonel Crescent pathway supply	Developer to
Upgrade clay soil with top soil and seed bear spots greater than 2 sqft, in common areas along all roads with finished pavement supply	Developer to
Arrange an agreement between GSW and Williamsburg National Golf whereas WNG will install and maintain three lighted fountains in the lake along Longview Landing in return GSW will provide electric for said fountains. Also WNG will restrict lake drawdown to a "last source of water" thus using all available resources before drawdown of this lake.	Developer to supply
Sign agreement stating that a playground similar in design as the existing playground at The recreation center will be provided for and installed in section 7 when developed. Provide for no dumping to take place at the Thorngate entrance to Section 7. Provide that all homes in section 7 will be similar in nature to existing homes in GSW and have at least 2 car attached garages.	Developer to agree



Landscape Elements, LLC
 107 Knollwood Drive
 Williamsburg, VA 23188
 757-741-2416

Invoice

DATE	INVOICE #
9/27/2006	550

BILL TO	SHIP TO
Mr. & Mrs. Lowman 3208 Windsor Ridge South Williamsburg VA 23188	

TERMS	DUE DATE
	9/27/2006

ITEM	QUAN.	DESCRIPTION	RATE	SERVICED	AMOUNT
RIVER ROCK	9	Pick-up, delivery & installation of RIVER ROCK -9 tons to be installed in swales; 3' width along back fence, 18"-24" along front bed edge, widened areas at drainage areas along fence at bottom of yard. Spread excavated dirt to raise bed area, fill in low spots	180.00		1,620.00
MULCH	8	Pick-up, delivery & installation of hardwood bark mulch by the yard.	47.50		380.00
SOD	1	Remove bad sod area, disposal, till in compost/topsoil blend to raise area, install new sod approx. 500 sq. ft.	575.00		575.00

Thank you for your business.	Total	\$2,575.00
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WALTRIP RECYCLING, INC.
11 Marclay Road
Williamsburg, Virginia 23185
PHONE: (757) 229-0434
www.waltriprecycling.com

63640

SOLD BY: <i>Beecher</i>		DATE: <i>3-12-06</i>	
NAME: <i>DAVID LOWMAN</i>			
ADDRESS:			
CITY:		ZIP:	
PHONE NO: <i>220-0061</i>		OTHER:	
BILL TO:			
CREDIT CARD #:		EXP:	
<input checked="" type="checkbox"/> CASH	<input type="checkbox"/> ACCOUNT	PO #	INT. / TIME <i>8:56</i>
<input type="checkbox"/> VISA	<input type="checkbox"/> MASTERCARD		
QUAN.	DESCRIPTION	AMOUNT	
	STUMPS		
	BRUSH		
	TOP SOIL		
	TRASH		
	CONCRETE		
	FIREWOOD		
	COMPOST		
<i>2</i>	<i>MULCH #3</i>	<i>19.00</i>	
		DELIVERY FEE	
LICENSE <i>David Lowman</i>		SALES TAX <i>.13</i>	
RECEIVED _____		TOTAL <i>26.13</i>	
		DUE UPON RECEIPT	
<i>Thank You!</i>			

Neighbors worry about flooding

Greensprings West is just one example

THE BIG PICTURE

Flooding in Greensprings West has wider implications. About 90 people attended a James City County Citizens' Coalition workshop on failing stormwater ponds last week.

The reason ponds fail, Greg Hancock, associate professor of geology at the College of William & Mary, told the group, was because "by their very nature, these ponds are designed not to achieve."

He explained that weaknesses in the regulatory process allow for ponds to be built with a holding capacity of less than a one-year storm, much less the 100-year storms that sweep through all too regularly.

Hancock and his students have studied a number of local ponds and found that none consistently meets regs. That was sobering news for the audience, many of whom said their homeowner associations inherited stormwater ponds and

By Cortney Langley

JAMES CITY — Who's responsible for neighborhood flooding? Folks in Greensprings West are wondering because they live next to a large stormwater pond.

Tim Saumier of Windsor Ridge South moved to Greensprings West about five years ago. For three

years, heavy summer rains and storms overloaded the large golf course pond, flooding his yard right up to the garage door. Each year, thousands of dollars worth of landscaping got washed away or drowned.

Doty Lowman echoed his story. She hired a landscaper to handle stormwater rushing through her yard. But the special design completely washed out as berms, rocks, plants and mulches all piled up against a fence.

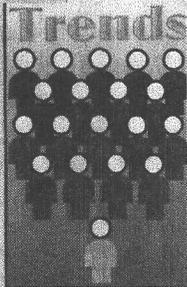
They and other neighbors blame developer Jamestown LLC for inadequate drainage and the stormwater backup. So far

the proposed design when it is actually completed.

"We saw some problems with the lake's construction," Thomas said. "We're holding the bond until it gets resolved."

Thomas said drainage both into and from the pond is a problem.

The news gave Lowman some hope that the developer would drain and dig out the pond. She said that the area hasn't flooded in the last two summers, and she is hopeful that the situation will work out. A new



Windsor Ridge South residents blame a stormwater pond on Williamsburg National Golf Course for flooding in the neighborhood.

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er of local ponds and found that none consistently meets regs. That was sobering news for the audience, many of whom said their homeowner associations inherited stormwater ponds and were struggling with maintenance.

Originally, the ponds were designed to prevent flooding. Through the years, water quality and stream health became the main focus. The engineering is constantly evolving, said Tom Simpson, coordinator of University of Maryland's Chesapeake Bay Agriculture Program and president of the non-profit Water Stewardship Inc.

Today experts prefer a mix of different methods, including rain gardens, rain barrels, green roofs, porous pavement and soil enrichment, to send water underground before a collection basin is even necessary.

Sullivan said that many localities have instituted stormwater utilities to pay for improvements. "We tried that already," someone informed him dryly.

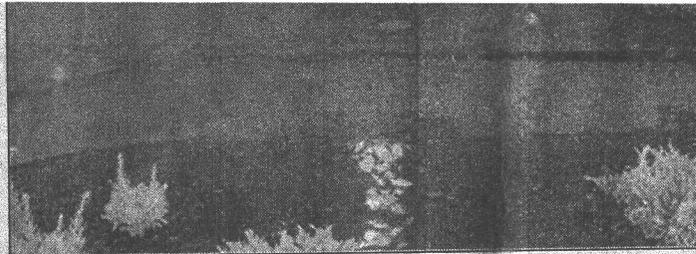
mulches all piled up against a fence.

They and other neighbors blame developer Jamestown LLC for inadequate drainage and the stormwater backup. So far there is little recourse. Greensprings West does not yet have enough homeowners to form an HOA board of directors.

Jamestown LLC has done some work in the area, Saumier said, but sinkholes are recurring. He fears for the safety of his 3-year-old daughter.

Meanwhile, Saumier and Lowman have been working with the county Environmental Division. The director, Scott Thomas, is holding \$163,000 in bonds on the project, with no immediate plans to refund the money to the developer.

More than a year ago, Jamestown LLC submitted "as-built drawings" to the county, he said. As-builts detail any deviations from



Tim Saumier

Greensprings West residents faced up to two feet of standing stormwater in heavy storms in July 2004.

division manager seems responsive and she's pleased with the Environmental Division's attention.

Robert Oliver of Jamestown LLC said that the issue has been resolved. He explained that when Matoaka Elementary was under construction, a failure overtaxed Greensprings West's pond. He said he would be "really surprised" if the zone were to flood again.

"There really hasn't been any substantial flooding in Greensprings West since then," he said. What's

more, "The county recognizes that the major flooding from the schools was not our fault."

Lowman's optimism is tempered by Saumier's caution. He has considered hiring a lawyer. "I don't want to be that guy," he said. "But gosh! Five years! Five years of Band-Aids."

Want help? Find the county's PRIDE program at www.protectedwithpride.org or call the Stormwater or Environmental divisions. Call the Colonial Soil & Water Conservation District at 804 932-4376, ext. 4.

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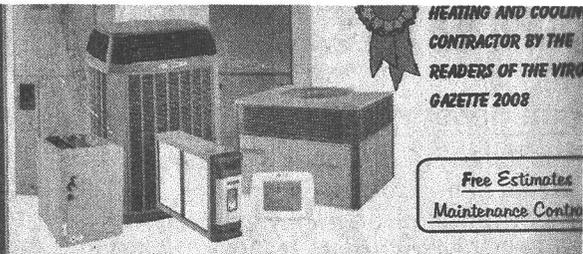


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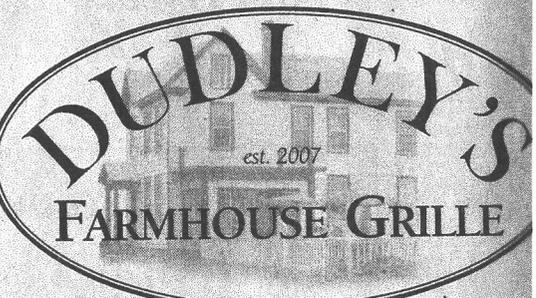
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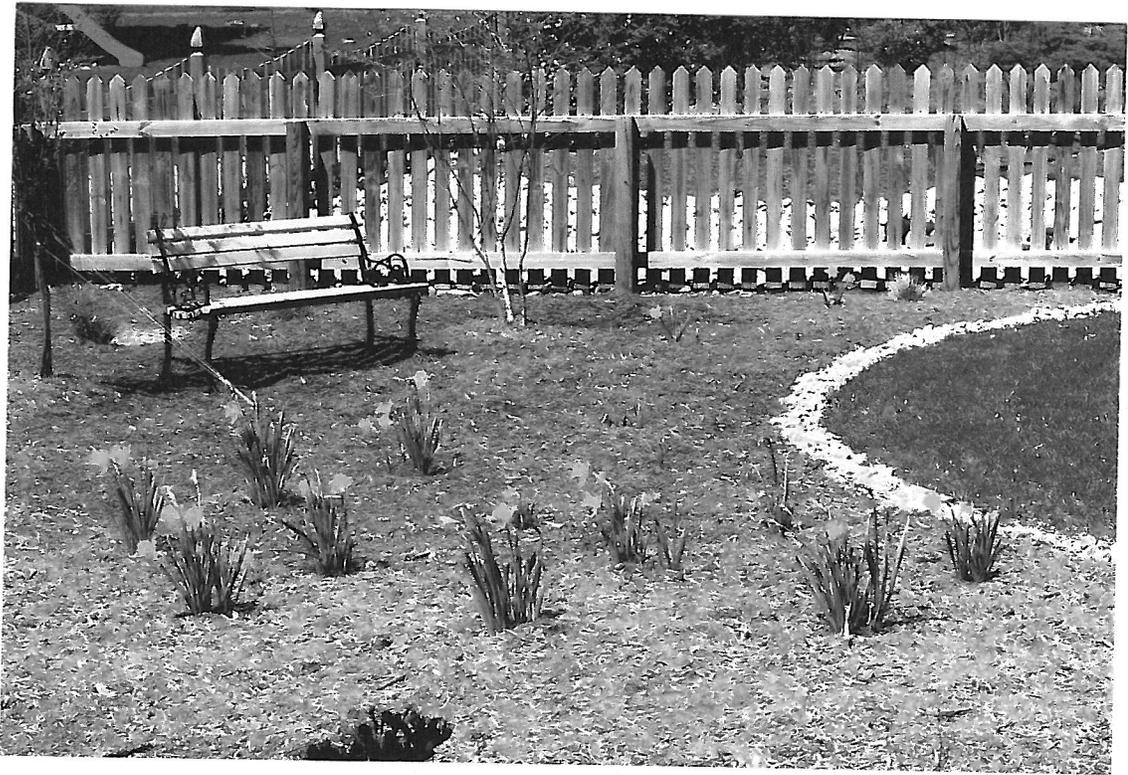
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TIMOTHY E. SAUMIER 02-03
MIRANDA B. SAUMIER
3204 WINDSOR RDG S.
WILLIAMSBURG, VA 23188-1435

1505

DATE 21 Mar 05

68-1/510 VA
1337

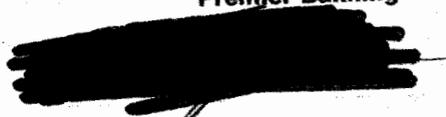
PAY TO THE ORDER OF Landscape Elements, LLC \$ 7500.00
Seven thousand five hundred — 00/100 — DOLLARS

Bank of America



Premier Banking

ACH R/T 051000017



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TIMOTHY E. SAUMIER 02-03
MIRANDA B. SAUMIER
3204 WINDSOR RDG S.
WILLIAMSBURG, VA 23188-1435

1513

DATE 9 April 2005

68-1/510 VA
1337

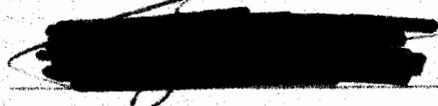
PAY TO THE ORDER OF Landscape Elements \$ 7771.50
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The total of these checks equals the final amount
agreed upon. (MBS)



Landscape Elements, LLC

107 Knollwood Drive
Williamsburg, VA 23188
757-741-2416

Estimate

DATE	ESTIMATE NO.
2/21/2005	104

NAME / ADDRESS
Miranda Somier 3204 Windsor Ridge South Williamsburg VA 23185

QTY	ITEM	DESCRIPTION	RATE	TOTAL
	MISC	Miscellaneous service provided: Install 1 run of temporary silt fence, on other side of the fence until soil is stabilized on properties behind backyard.	120.00	120.00
1	MISC	Miscellaneous service provided: Remove fence section, remove edging as needed for access to perform job, dig up all plants in berm areas and for access, place plants in pots & set aside. Re-install all good plants and edging after completion of drain work. Remove & replace drip irrigation system as needed for access to perform job. Replace fabric underlayment damaged during construction, re-install fabric salvaged.	950.00	950.00
1	GRADIN...	Grading and preparation: Remove and set aside decorative gravel from work areas for pipe and grading. Re-grade yard to flow to center infiltration drain in areas needed. Re-install gravel iand fabric in yard & pathways.	1,200.00	1,200.00
125	PIPE-4'	BACK YARD 125 feet total--- Install 50' of 4" solid corrugated drain pipe from downspout #1 to storm drain, approx. 5' of 4" pipe from downspout #2 to connect to 8" main drainpipe, and approx. 20' of 4" pipe from downspout #3 to connect with adapter to 8" main drainpipe. Install 40' of 4" drainpipe from downspout #4 to start of 8" pipe. All adapters included. NOTE: All connections will be caulked with silicone. Repairs will be made to any damaged underground irrigation pipes.	4.75	593.75
120	PIPE-4'	RIGHT SIDE YARD Install 4" solid pipe from fence to street, perforated pipe with gravel and "sock" in back yard, connect in both downspouts and run outlet at street	6.50	780.00
80	PIPE-8"	Install 4 drainpipe to recieve 3 downspouts	6.50 8.50	680.00
120	Drain	Install infiltration drain system (See attached drawing) 4 perforated pipe with fabric sleeve. Excavation 3' width and 1' depth, lined top and bottom with heavy duty fabric. 10 Tons of #68 and #57 drainage gravel. Soil from excavation to be used to start building up raised berms.	15.00 12.50	1,800.00
1	Top Soil	Install and grade heavy Top soil to build up berms for water diversion/planting. 25 yards. ALSO build up box garden, adjacent bed along house and amend plantings in other beds. All soil will be rolled with sod roller and tamped to firm out air pockets and minimize absorbtion of water, settling and washout.	1,400.00	1,400.00

Thank you for the opportunity to quote your landscape needs.

TOTAL

Accepted By

A 50% deposit is required upon acceptance of estimate, with the balance due upon completion of work.

Handwritten notes:
200
460
200
460



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Miranda Somier 3204 Windsor Ridge South Williamsburg VA 23185

QTY	ITEM	DESCRIPTION	RATE	TOTAL
1	RIVER R...	Pick-up, delivery & installation of RIVER ROCK with fabric underlayment. 1) Continue channel along side and rear fence at least up to bermed area where back neighbors water begins to cross into your property. Side channel 32' to 36" width. Rear channel along berm 24" (see drawing.) 3) Re-grade subsoil and re-install existing river rock in corner and around storm drain. (Up to start of new berm where water crosses over- rock approx. 6 tons total including left side.)	1,540.00	1,540.00
30	MULCH	Pick-up, delivery & installation of hardwood bark mulch by the yard. Entire yard.	45.00	1,350.00
	MISC	Miscellaneous service provided -STUMP REMOVAL FRONT YARD LAWN	175.00	175.00
1	Blend	Topdress front yard with sand & fine soil to fill low spots, seed. PLANTINGS	350.00	350.00
2	TREE-15g	15 Gallon tree- BALDCYPRESS - 8' Corner by storm drain	185.00	370.00
1	TREE-15g	15 Gallon tree- PINK DOGWOOD 6'- 7' (Remove dead cherry, transplant one shrub)	195.00	195.00
10	3g SHRUB	3 Gallon shrub - GLOSSY ABELIA - Replace Lorepetalum by telephone boxes with 5 Abelia, replace 3 Hollies at right front by street with 5 Abelia	18.75	187.50
4	7g SHRUB	7 Gallon shrub - LIGUSTRUM - TO FILL GAPS IN SCREEN	75.00	300.00
10	1g SHRUB	1 Gallon shrub - JAPANESE WATER IRIS	8.50	85.00
14	1g SHRUB	1 Gallon shrub - SIBERIAN IRIS	8.50	119.00
5	5g SHRUB	5 Gallon shrub - WINTERBERRY	37.50	187.50
5	5g SHRUB	5 Gallon shrub - INKBERRY	42.50	212.50
32	3g SHRUB	3 Gallon shrub - HOOGENDORN HOLLY (OR SOFT TOUCH)	21.50	688.00
17	3g SHRUB	3 Gallon shrub 'CRIMSON PYGMY' BARBERRY	21.50	365.50
1	7g SHRUB	7 Gallon shrub - CURLY LEAF LIGUSTRUM (HINOKI CYPRESS \$175) (AXILLARUS STATUARY\$?)	75.00	75.00
2	7g SHRUB	7 Gallon shrub - CHESAPEAKE HOLLY	55.00	110.00
5	3g SHRUB	3 Gallon shrub - COMPACTA NANDINA	18.75	93.75
1	7g SHRUB	7 Gallon shrub - TINUS VIBURNUM	55.00	55.00
1	TRANSP...	Transplant LIRIOPE	40.00	40.00

Thank you for the opportunity to quote your landscape needs.	TOTAL
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2/21/2005	104

NAME / ADDRESS
Miranda Somier 3204 Windsor Ridge South Williamsburg VA 23185

QTY	ITEM	DESCRIPTION	RATE	TOTAL
		PLANTINGS - GARAGE		
2	7g SHRUB	7 Gallon shrub - CHESAPEAKE HOLLY	55.00	110.00
1	7g SHRUB	7 Gallon shrub - CAMELLIA SASANQUA	75.00	75.00
5	3g SHRUB	3 Gallon shrub - 'RAINBOW' LEUCOTHOE	29.50	147.50
7	3g SHRUB	3 Gallon shrub - 'HARBOR BELLE OR FIREPOWER NANDINA	23.50	164.50
	LABOR	LABOR -INSTALL ALL NEW PLANTS	500.00	500.00
	NOTES	NOTES: We will have to place the larger stones on the outside edges of the channel against the fence and mulch, in order to inhibit the mulch and silt from the neighboring properties clogging up your drainage systems. We may seriously consider installing the fabric underlayment against the fence vertically, with the rock against it as a barrier to their mulch.	0.00	0.00
	Guarantee	All plant material is guaranteed for one year . Customer is responsible for proper amount of watering, disease and pest control. Correct amount of fertilizer is recommended.	0.00	0.00
	3/21/05	<i>Miranda Somier</i>		
Thank you for the opportunity to quote your landscape needs.			TOTAL	\$15,019.50

Accepted By

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$$\begin{array}{r}
 1509.50 \\
 7500.00 \\
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 150.00 \text{ - fertilizer} \\
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 7944.50 \\
 - 185.00 \\
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 460.00 \text{ - P.p.c.} \\
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LANDSCAPE ELEMENTS Landscape Elements, LLC
 107 Knollwood Drive
 Williamsburg, VA 23188
 757-741-2416

Estimate

DATE	ESTIMATE NO.
2/21/2005	104

*How - BT
 silt fence
 closer to driveway*

NAME / ADDRESS
Miranda Somier 3204 Windsor Ridge South Williamsburg VA 23185

QTY	ITEM	DESCRIPTION	RATE	TOTAL
	MISC	Miscellaneous service provided: Install 2 runs of temporary silt fence, on other side of the fence until soil is stabilized on properties behind backyard. (Ask neighbors for permission to work on property.)	240.00	240.00
1	MISC	Miscellaneous service provided: Remove fence section, remove edging as needed for access to perform job, dig up all plants in berm areas and for access, place plants in pots & set aside. Re-install all good plants and edging after completion of drain work. Remove & replace drip irrigation system as needed for access to perform job. Replace fabric underlayment damaged during construction, re-install fabric salvaged.	675.00	675.00
1	GRADIN...	Grading and preparation: Remove and set aside decorative gravel from work areas for pipe and grading. Re-grade yard to flow to center infiltration drain in areas needed. Re-install gravel in yard & pathways & grade smooth.	750.00	750.00
110	PIPE-4'	110 feet total--- Install 50' of 4" solid corrugated drain pipe from downspout #1 to storm drain, approx. 5' of 4" pipe from downspout #2 to connect to 6" main drainpipe, and approx. 20' of 4" pipe from downspout #3 to connect with adapter to 6" main drainpipe. Install 35' of 4" drainpipe from downspout at front right corner of house, to the street with pop-up outlet. All adapters included. NOTE: All connections will be caulked with silicone. Repairs will be made to any damaged underground irrigation pipes.	4.50	495.00
125	PIPE-6'	Approx 125' - Install 6' corrugated drain pipe connecting from rear downspouts to outlet at storm drain, including adapters and connectors as needed. All connections to be silicone caulked. Grade will be checked for slope.	6.50	812.50
120	Drain	Install infiltration drain system (See attached drawing) 6" perforated pipe with fabric sleeve. Excavation 3' width and 1' depth, lined top and bottom with heavy duty fabric. 10 Tons of #68 and #57 drainage gravel. Soil from excavation to be used to start building up raised berms.	10.00	1,200.00

Thank you for the opportunity to quote your landscape needs.	TOTAL
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NAME / ADDRESS
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QTY	ITEM	DESCRIPTION	RATE	TOTAL
1	Top Soil	Install and grade heavy Top soil to build up berms for water diversion/planting. I would like to start with one tandem dump truck, 10 yards, added to the excavated soil and see if new height feels adequate. It is possible I could decide we need another load, but would discount price some since heavy equipment is already onsite for the day. This soil needs to have some lime tilled in to raise pH (acidity level.) I would also like to discuss with you raising the other bed areas with compost/topsoil blend, mainly the "courtyard" garden (square with circle inside.) All soil will be rolled with sod roller and tamped to firm out air pockets and minimize absorption of water, settling and washout.	650.00	650.00
1	RIVER R...	Pick-up, delivery & installation of RIVER ROCK with fabric underlayment. 1) Widen existing channel between front yards to 32' to 36" 2) Continue channel along side and rear fence at least up to bermed area where back neighbors water begins to cross into your property. Side channel 32' to 36" width. Rear channel along berm 24" (see drawing.) 3) Re-grade subsoil and re-install existing river rock in corner and around storm drain. (Up to start of new berm where water crosses over- rock approx. 6 tons total including left side.) (Entire back fence approx. 5 tons additional \$700)	1,340.00	1,340.00
10	MULCH	Pick-up, delivery & installation of hardwood bark mulch by the yard. Re-mulch disturbed areas in back yard	45.00	450.00
1	Blend	FRONT YARD - I would like to discuss several options here and need to measure grade on right side yard especially, in order to make a better determination of problem solving. The following is the front yard approach: Remove and replant existing front foundation plants. Install 3 yards compost/topsoil blend, tilled in and grade for drainage away from house.	420.00	420.00
1	RMV	Install 1 yard soil in small side bed to divert neighbors water to street. Removal of existing sod in front yard and discard in landfill. (We can strip it with sod cutting machine and try to save it but bumpy spots, etc. will make end product uneven, better to get new sod with level amount of soil on it.)	350.00	350.00

Thank you for the opportunity to quote your landscape needs.

TOTAL

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QTY	ITEM	DESCRIPTION	RATE	TOTAL
1	Blend	Install compost/topsoil blend 2 to 3 yards of soil blend to pick up grade drainage level off of bed and continue drainage to street. (I roll tilled soil with a sod roller to firm out air pockets which reduces bumps due to settling.) Install sod by the square yard - 80 square yards Pick-up, delivery & installation of hardwood bark mulch by the yard. Re-mulch front bed	350.00	350.00
80	SOD		4.50	360.00
3	MULCH		45.00	135.00
Thank you for the opportunity to quote your landscape needs.			TOTAL	

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NAME / ADDRESS
Miranda Somier 3204 Windsor Ridge South Williamsburg VA 23185

QTY	ITEM	DESCRIPTION	RATE	TOTAL
	NOTES	<p>NOTES: 1) I would recommend neighbors to the left and rear install river rock channels along the fence. If this was possible I could use less rock and width on your side and save money. As it is, we will have to place the larger stones on the outside edges of the channel against the fence and mulch, in order to inhibit the mulch and silt from the neighboring properties clogging up your drainage systems. We may seriously consider installing the fabric underlayment against the fence vertically, with the rock against it as a barrier to their mulch and silt (or go under the fence with the fabric and staple it to their side of the fence at the bottom six inches.) The neighbors to the rear will contribute alot of silt/soil to clog your system, so I will build accordingly to handle it as long as possible.</p> <p>2) Regarding the downspout labeled #5: There is very little roof collected from this pipe. I would like to re-interview you regarding this side and check the grade with an instrument before making approach to solving any problem on the right side.</p> <p>3) I apologize for the wordiness of this quote. I have never included so much detail in a quote, but felt it was necessary for you to understand my approach with your property.</p> <p>4) Although the view of the yard is good, you may want to re-locate the bench in the courtyard due to the water, pipes, etc., and also if there is standing water in the storm drain there is likely to be mosquitoes.</p>	0.00	0.00

Thank you for the opportunity to quote your landscape needs.	TOTAL	\$8,227.50
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Kevin Martin

Accepted By

A 50% deposit is required upon acceptance of estimate, with the balance due upon completion of work.