



## 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:** CC032

**DATE VERIFIED:** November 19, 2012

**QUALITY ASSURANCE TECHNICIAN:** Leah Hardenbergh

*Leah Hardenbergh*

**LOCATION:** WILLIAMSBURG, VIRGINIA



# Stormwater Division

## MEMORANDUM

Date: March 28, 2012  
To: Michael J. Gillis, Virginia Correctional Enterprises Document Management Services  
From: Leah Hardenbergh  
PO: 110426  
Re: Files Approved for Scanning

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**General File ID or BMP ID:** CC032  
**PIN:** 3911600002  
**Owner Name (if known):** BAY AGING APARTMENTS JCC INC  
**Legal Property Description:** NEW LOT A IRONBOUND SQUARE  
ELDERLY HOUSING DEVELOPMENT  
**Site Address:** 100 CARRIAGE ROAD

*(For internal use only):*

**Box # 2**

**Agreements (in file as of scan date):** Y **Book or Doc #:** 060015072/070027781

CC032

**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

COUNTY OF JAMES CITY, VIRGINIA

**9c COPY**

DECLARATION OF COVENANTS  
INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 25<sup>th</sup> day of September, 2007, between Bay Aging Apartments JCC, Inc., and all successors in interest, ("COVENANTOR(S)"), owner(s) of the following property:

Parcel Identification Number: 3911600002  
Legal Description: See "Page 3 of 3" of this Declaration of Covenants 100 Carriage Road  
Project or Subdivision Name: PARKER VIEW APARTMENTS  
Document No. 060015072  
OR Deed Book \_\_\_\_\_, Page No. \_\_\_\_\_  
and the County of James City, Virginia ("COUNTY.")

WITNESSETH:

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

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

*Instrument # 070027781  
Recorded on Oct. 4, 2007*

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)

Kathy E. Vesley  
Print Name / Signature  
KATHY E. VESLEY  
VICE PRESIDENT  
Print Title & Name

ACKNOWLEDGMENT

COMMONWEALTH OF VIRGINIA  
~~CITY~~ COUNTY OF Middlesex, to wit:

I hereby certify that on this 25<sup>th</sup> day of September, 2007, before the subscribed, a Notary Public for the Commonwealth of Virginia, personally appeared KATHY E. VESLEY and did acknowledge the foregoing instrument to be his/her Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 25<sup>th</sup> day of September, 2007.

[SEAL]

John C. Deard  
Notary Public

Notary Registration Number: 279529

My Commission expires: July 31, 2010 JDE

COVENANTOR(S)

Signature

Print Name

Title

ACKNOWLEDGMENT

COMMONWEALTH OF VIRGINIA

CITY/COUNTY OF \_\_\_\_\_, to wit:

I hereby certify that on this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_, before the subscribed, a Notary Public for the Commonwealth of Virginia, personally appeared and did acknowledge the foregoing instrument to be his/her Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

[SEAL]

\_\_\_\_\_  
Notary Public

Notary Registration Number: \_\_\_\_\_

My Commission expires: \_\_\_\_\_

Approved as to form:

*[Handwritten Signature]*  
\_\_\_\_\_  
County Attorney

This Declaration of Covenants prepared by:

Name: Joshua Gemerek

Print Name: Joshua Gemerek

Title: Senior VP, Property Management

Address: P.O. Box 610

Urbana, VA 23175

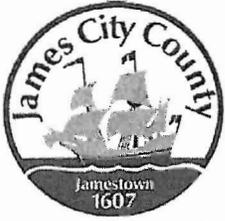
Phone Number: (804) 758-2386 (ext. 36)  
(804) 338-9772 (mobile)

(drainage1.pre)

## EXHIBIT A

All that certain lot, piece or parcel of land situate in Berkeley District, County of James City, Virginia, containing 3.75 acres, more or less, shown and designated as "NEW LOT 'A'" on a plat of survey entitled "PROPERTY LINE EXTINGUISHMENT & SUBDIVISION PLAT OF 7 PROPERTIES STANDING IN THE NAME OF WILLIAMSBURG REDEVELOPMENT AND HOUSING AUTHORITY 'IRONBOUND SQUARE ELDERLY HOUSING DEVELOPMENT'", dated May 5, 2005, revised July 6, 2005 and further revised September 26, 2005, made by Matthew H. Connolly, Certified Land Surveyor, of LandTech Resources, Inc., which plat was recorded in the Clerk's Office of the Circuit Court for the County of James City, Virginia on June 23, 2006 as instrument # 060015072, reference to which is made for a more complete description of the property herein described.

*Page 4 of 4*



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

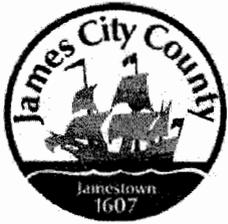
Project Name: Bay Aging Senior Housing Project  
County Plan No.: SP-100-05  
Stormwater Management Facility: Bio Retention Pond (Cherry Back)  
BMP Phase #:  I  II  III  
 Information Package Received. Date/By: 1/14/2009 Aaron B. Small  
 Completeness Check:  
 Record Drawing Date/By: 1/14/09 Aaron Small  
 Construction Certification Date/By: 1/14/09 Aaron Small  
 RD/CC Standard Forms (Required for all BMPs after Feb 1<sup>st</sup> 2001 Only)  
 Insp/Maint Agreement # / Date: 1070027781 10/4/2007  
 BMP Maintenance Plan Location: Sheet 10  
 Other: \_\_\_\_\_  
 Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review  
 Yes  No Location: Sheet 8, Item 20  
 Assign County BMP ID Code #: Code: 66032  
 Preliminary Input/Log into Division's "As-Built Tracking Log"  
 Add Location to GIS Map. Obtain basic site information (GPIN, Owner, Address, etc.)  
 Preliminary Log into Access Database (BMP ID #, Plan No., GPIN, Project Name, etc.)  
 Active Project File Review (correspondence, H&H, design computations, etc.)  
 Initial As-Built File setup (File label, folder, copy plan/details/design information, etc.)  
 Inspector Check of RD/CC (forward to Inspector using transmittal for cursory review).  
 Pre-Inspection Drawing Review of Approved Plan (Quick look prior to Field Inspection).  
 Final Inspection (FI) Performed Date: 3/4/2009  
 Record Drawing (RD) Review Date: 1/14/2009  
 Construction Certification (CC) Review Date: 1/14/2009  
 Actions:  
 No comments.  
 Comments. Letter Forwarded. Date: \_\_\_\_\_  
 Record Drawing (RD)  
 Construction Certification (CC)  
 Construction-Related (CR)  
 Site Issues (SI)  
 Other : \_\_\_\_\_  
 Second Submission: NA  
 Reinspection (if necessary): NA  
 Acceptable for SWM Purposes (RD/CC/CR/Other). Ok to proceed with bond release.  
 Complete "Surety Request Form".  
 Check/Clean active file of any remaining material and finish "As-Built" file.  
 Add to County BMP Inventory/Inspection schedule (Phase I, II or III).  
 Copy Final Inspection Report into County BMP Inspection Program file.  
 Obtain Digital Photographs of BMP and save into County BMP Inventory.  
 Request mylar/reproducible from As-Built plan preparer.  
 Complete "As-built Tracking Log".  
 Last check of BMP Access Database (County BMP Inventory).  
 Add BMP to JCC Hydrology & Hydraulic database (optional).  
 Add BMP to Municipal BMP list (if a County-owned facility)  
 Add BMP to PRIDE BMP ratings database.

**Final Sign-Off**

Inspector: \_\_\_\_\_ Date: \_\_\_\_\_

Chief Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

\*\*\* See separate checklist, if needed.



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

Project Name: Bay Aging Senior Housing Project  
County Plan No.: SP-100-05  
Stormwater Management Facility: Bio Retention Pond (Charge Back)  
BMP Phase #:  I  II  III  
Information Package Received. Date/By: 1/14/2009 Aaron B. Small  
Completeness Check:  
 Record Drawing Date/By: 1/14/09 Aaron Small  
 Construction Certification Date/By: 1/14/09 Aaron Small  
 RD/CC Standard Forms (Required for all BMPs after Feb 1<sup>st</sup> 2001Only)  
 Insp/Maint Agreement # / Date: #070027781 10/14/2007  
 BMP Maintenance Plan Location: Sheet 10  
 Other: \_\_\_\_\_  
 Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review  
 Yes  No Location: Sheet 8, Item 20  
 Assign County BMP ID Code #: Code: CC032  
 Preliminary Input/Log into Division's "As-Built Tracking Log"  
 Add Location to GIS Map. Obtain basic site information (GPIN, Owner, Address, etc.)  
 Preliminary Log into Access Database (BMP ID #, Plan No., GPIN, Project Name, etc.)  
 Active Project File Review (correspondence, H&H, design computations, etc.).  
 Initial As-Built File setup (File label, folder, copy plan/details/design information, etc.).  
 Inspector Check of RD/CC (forward to Inspector using transmittal for cursory review).  
 Pre-Inspection Drawing Review of Approved Plan (Quick look prior to Field Inspection).  
 Final Inspection (FI) Performed Date: 3/4/2009  
 Record Drawing (RD) Review Date: 1/14/2009  
 Construction Certification (CC) Review Date: 1/14/2009  
 Actions:  
 No comments.  
 Comments. Letter Forwarded. Date: \_\_\_\_\_  
 Record Drawing (RD)  
 Construction Certification (CC)  
 Construction-Related (CR)  
 Site Issues (SI)  
 Other : \_\_\_\_\_  
 Second Submission: NA  
 Reinspection (if necessary): NA  
 Acceptable for SWM Purposes (RD/CC/CR/Other). Ok to proceed with bond release.  
 Complete "Surety Request Form".  
 Check/Clean active file of any remaining material and finish "As-Built" file.  
 Add to County BMP Inventory/Inspection schedule (Phase I, II or III).  
 Copy Final Inspection Report into County BMP Inspection Program file.  
 Obtain Digital Photographs of BMP and save into County BMP Inventory.  
 Request mylar/reproducible from As-Built plan preparer.  
 Complete "As-built Tracking Log".  
 Last check of BMP Access Database (County BMP Inventory).  
 Add BMP to JCC Hydrology & Hydraulic database (optional).  
 Add BMP to Municipal BMP list (if a County-owned facility)  
 Add BMP to PRIDE BMP ratings database.

**Final Sign-Off**

Inspector: \_\_\_\_\_

Date: \_\_\_\_\_

Chief Engineer: \_\_\_\_\_

Date: \_\_\_\_\_

\*\*\* See separate checklist, if needed.



**James City County, Virginia  
Environmental Division**

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

*(Note: In accordance with the requirements of the Chesapeake Bay Preservation Ordinance, Chapter 23, Section 23-10(4), BMP's shall be designed and constructed in accordance with the manual entitled James City County Guidelines for Design and Construction of Stormwater Management BMP's. Erosion and sediment control policy and approved plans generally require that at the completion of the project and prior to release of surety, an "as-built" plan prepared by a registered Professional Engineer or Certified Land Surveyor must be provided for the drainage system for the project, including any Best Management Practice (BMP) facilities. In addition, for BMP facilities involving the construction of an impounding structure or dam embankment, certification is required by a Professional Engineer who has inspected the structure during its construction. Currently there are over 20 water quality type BMP's accepted by the County.)*

**Section 1 – Site Information:**

Project Name: Bay Aging Senior Housing Project  
 Structure/BMP Name: Basin #1 & Basin #2  
 Project Location: Corner of Ironbound Rd. & Carriage Rd.  
 BMP Location: ~~Basin #1 - East side of site~~ Basin #2 - West side of site  
 County Plan No.: SP - 100 - 05

Project Type:	<input type="checkbox"/> Residential	<input type="checkbox"/> Business	Tax Map/Parcel No.:	<u>3911600002</u>
	<input checked="" type="checkbox"/> Commercial	<input type="checkbox"/> Office	BMP ID Code (if known):	<u>CC032</u>
	<input type="checkbox"/> Institutional	<input type="checkbox"/> Industrial	Zoning District:	<u>MU</u>
	<input type="checkbox"/> Public	<input type="checkbox"/> Roadway	Land Use:	<u>Mixed Use</u>
	<input checked="" type="checkbox"/> Other <u>Senior Apartments</u>		Site Area (sf or acres):	<u>3.75 AC.</u>

Brief Description of Stormwater Management/BMP Facility: 2 Bioretention Filters

Nearest Visible Landmark to SWM/BMP Facility: Bay Aging Senior Housing Building (Parkerview Apartments)

Nearest Vertical Ground Control (if known):

JCC Geodetic Ground Control     USGS     Temporary     Arbitrary     Other

Station Number or Name: 325

Datum or Reference Elevation: 110.67

Control Description: 3 1/4" Disk in concrete, 2" below ground surface

Control Location from Subject Facility: Southwest of Site near Berkeley Middle School

**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: Basin #2 - 06/02/08 Basin #1 - 06/16/08  
Facility Monitored by County Representative during Construction:  Yes  No  Unknown  
Name of Site Work Contractor Who Constructed Facility: Toano Contractors  
Name of Professional Firm Who Routinely Monitored Construction: AES Consulting Engineers  
Date of Completion for SWM/BMP Facility: Basin #2 - 06/03/08 Basin #1 - 06/17/08 (Landscape 11/08)  
Date of Record Drawing/Construction Certification Submittal: 11/25/08

***(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: Bay Aging Senior Housing Project  
Mailing Address: P.O. Box 610  
Urbanna, VA 23175  
Business Phone: 804-758-2386 Fax: 804-758-5773  
Contact Person: Joshua Gemerek Title: Vice President, Property Management

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 Suite 1  
Williamsburg, VA 23188  
Business Phone: 757-253-0040  
Fax: 757-220-8994  
Responsible Plan Preparer: Aaron Small, PE  
Title: Project Manager  
Plan Name: Bay Aging Senior Housing Project  
Firm's Project No. 9551  
Plan Date: 08/03/05  
Sheet No.'s Applicable to SWM/BMP Facility: 05 / 10 / \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

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

Name: Toano Contractors  
Mailing Address: 8589 Richmond Rd  
Toano, VA 23168  
Business Phone: 757-566-0097  
Fax: 757-566-8874  
Contact Person: Randy Taylor  
Site Foreman/Supervisor: Randy Taylor  
Specialty Subcontractors & Purpose (for BMP Construction Only):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Section 4 – Professional Certifications:**

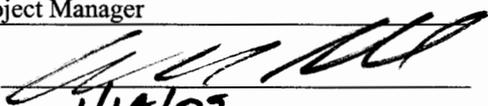
Certifying Professionals: *(Note: A Registered Professional Engineer or Certified Land Surveyor is responsible for preparation of a Record Drawing, sometimes referred to as an As-Built plan, for the drainage system for the project including any Stormwater Management/BMP Facilities. A Registered Professional 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 Rd Suite 1  
Williamsburg, VA 23188  
Business Phone: 757-253-0040  
Fax: 757-220-8994

Name: Aaron Small, PE  
Title: Project Manager

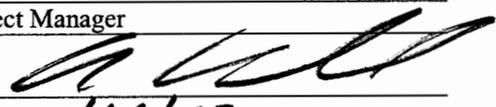
Signature:   
Date: 1/14/09

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.

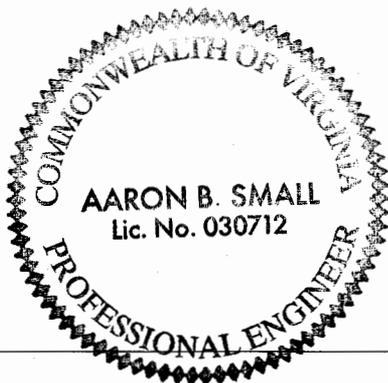
**Construction Certification**

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

Name: Aaron Small, PE  
Title: Project Manager

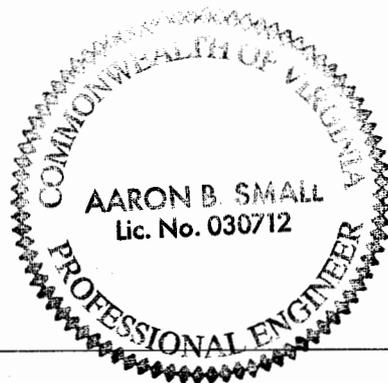
Signature:   
Date: 1/14/09

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  
Or Certified Land Surveyor



(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.
- N/A    6.    Cross-section of the embankment through the principal spillway or outlet barrel. Must extend at least 100 ft. downstream of the pipe outlet or to recorded site property line, whichever is closer. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the facility must reflect the required design storage volume(s) and/or design depth.
- N/A    7.    Profile or elevations along the entire centerline of the emergency spillway. Emergency spillway may be steeper, but no flatter or narrower than design.
- XX    8.    Elevation of the principal spillway crest or outlet crest of the structure.

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

## STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

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

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

- A1. All requirements of Section II, Minimum Standards, apply to Group A facilities.
- A2. Principal spillway consists of reinforced concrete pipe with O-Ring gaskets for watertight joint construction.
- A3. Sediment forebays or pretreatment devices provided at inlets to pond. Generally 4 to 6 ft. deep.
- 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.
- A5. Adequate fixed vertical sediment depth markers installed in the forebay(s) for future sediment monitoring purposes.
- 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.
- 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).
- A8. No trees are present within a zone 15 feet around the embankment toe and 25 feet from the principal spillway structure.
- A9. Wet permanent pool, typically 3 to 6 feet deep, is provided and maintains level within facility.
- A10. Low flow orifice has a non-clogging mechanism.
- A11. A pond drain pipe with valve was provided.
- A12. Pond side slopes are not steeper than 3H:1V, unless approved plan allowed for steeper slope.
- 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).*

- B1.    Same requirements as Group A Wet Ponds.
- B2.    Minimum 2:1 length to width flow path provided across the facility.
- B3.    Micropool provided at or around outlet from BMP (generally 3 to 6 ft. deep).
- 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.
- B5.    Adequate wetland buffer provided (Typically 25 ft. outward from maximum design water surface elevation and 15 ft. setback to structures).
- B6.    No more than one-half (½) of the wetland surface area is planted.
- B7.    Topsoil or wetland mulch provided to support vigorous growth of wetland plants.
- 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)
- \_\_\_\_\_ C1.    All requirements of Section II, Minimum Standards, apply to Group C facilities as applicable.
- \_\_\_\_\_ C2.    Facility is not located on fill slopes or on natural ground in excess of six (6) percent.
- \_\_\_\_\_ 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.
- \_\_\_\_\_ 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.
- \_\_\_\_\_ C5.    Sides of infiltration practice lined with filter fabric.
- \_\_\_\_\_ 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.
- \_\_\_\_\_ C7.    Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.
- \_\_\_\_\_ 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.
- \_\_\_\_\_ C9.    Minimum twenty-five (25) foot separation down gradient from any structure.
- \_\_\_\_\_ C10.    Stormwater outfalls provided for overflow associated with larger design storms.
- \_\_\_\_\_ C11.    No visual signs of erosion or channel degradation immediately downstream of facility.
- \_\_\_\_\_ C12.    Facility does not currently cause any apparent surface or subsurface water problems to downgrade properties.
- \_\_\_\_\_ C13.    Observation well provided.
- \_\_\_\_\_ 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)*
- XX    D1.    All requirements of Section II, Minimum Standards, apply to Group D facilities.
- XX    D2.    Sediment pretreatment devices provided.
- XX    D3.    For D-1 BMPs (Bioretention Cells), pretreatment consisting of a grass filter strip below level spreader (deflector); a gravel diaphragm; and mulch and planting soil layers were provided.
- XX    D4.    For D-1 BMPs (Bioretention Cells), plantings consist of native plant species; vegetation provided was based on zones of hydric tolerances; trees and understory of shrubs and herbaceous materials were provided; woody vegetation is absent from inflow locations; and trees are located around facility perimeter.
- XX    D5.    Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.
- XX    D6.    No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed.
- XX    D7.    Filtering system is off-line from storm drainage conveyance system.
- XX    D8.    Overflow outlet has adequate erosion protection.
- XX    D9.    Deflector, diversion, flow splitter or regulator structure provided to divert the water quality volume to the filtering structure.
- XX    D10.    Minimum four (4) inch perforated underdrain provided in a clean aggregate envelope layer beneath the facility.
- XX    D11.    Minimum fifty (50) foot separation from any slope fifteen (15) percent or greater. Minimum one hundred (100) foot separation horizontally from any known water supply well. Minimum one hundred (100) foot separation upslope and twenty-five (25) foot separation downslope from any building.
- XX    D12.    Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.
- XX    D13.    No visual signs of erosion or channel degradation immediately downstream of facility.
- XX    D14.    Adequate, direct access provided to the pretreatment area and/or filter bed for future maintenance.

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

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

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

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

- F1.    All requirements of Section II, Minimum Standards, apply to Group F facilities.
- F2.    Basin bottom has positive slope and drainage from all basin inflow points to the riser (or outflow) location.
- F3.    Timber wall BMP used in intermittent stream only. (ie. Prohibited in perennial streams.)
- F4.    Forebay provided approximately 20 ft. upstream of the facility. Forebays generally 4 to 6 feet in depth.
- F5.    A reverse slope pipe, vertical stand pipe or mini-barrel and riser was provided to prevent clogging
- F6.    Principal spillway and outlet barrel provided consisting of reinforced concrete pipe with O-Ring gaskets for watertight joint construction.
- F7.    Mini-barrel and riser, if used, contains a removable trash rack to reduce clogging.
- 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.
- F9.    Timbers properly reinforced or concrete footing provided if soil conditions were prohibitive.
- F10.   Timber wall cross members extended to a minimum depth of two (2) feet below ground elevation.
- F11.   Protection against erosion and scour from the low flow orifice and weir-flow trajectory provided.
- F12.   Stilling basin or standard outlet protection provided at principal spillway outlet.
- 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.
- F14.   No visual signs of undercutting of timber walls or clogging of the low orifice were present.
- F15.   No visual signs of erosion or channel degradation immediately downstream of facility.
- 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)***

- G1.    All requirements of Section II, Minimum Standards, apply to Group G facilities as applicable.
- 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.
- G3.    Dedicated open space areas are in undisturbed common areas, conservation easements or are protected by other enforceable instruments that ensures perpetual protection.
- G4.    Provisions included to clearly specify how the natural vegetated areas utilized as dedicated open space will be managed and field identified (marked).
- G5.    Adequate protection measures were implemented during construction to protect the defined dedicated open space areas.
- G6.    Dedicated open space areas were not disturbed during construction (ie. cleared, grubbed or graded).

## STORMWATER MANAGEMENT / BMP FACILITIES RECORD DRAWING CHECKLIST

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

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

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

- XX    SD1.    All requirements of Section II, Minimum Standards, apply to Storm Drainage Systems.
- XX    SD2.    Horizontal location of all pipe and structures relative to the SWM/BMP facility.
- XX    SD3.    Type, top elevation and invert elevation of all access type structures (inlets, manholes, etc.).
- XX    SD4.    Material type, size or diameter, class, invert elevations, lengths and slopes for all pipe segments.
- 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.)*

- \_\_\_\_\_ O1.    All requirements of Section II, Minimum Standards, apply to this section.
- \_\_\_\_\_ 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.)*

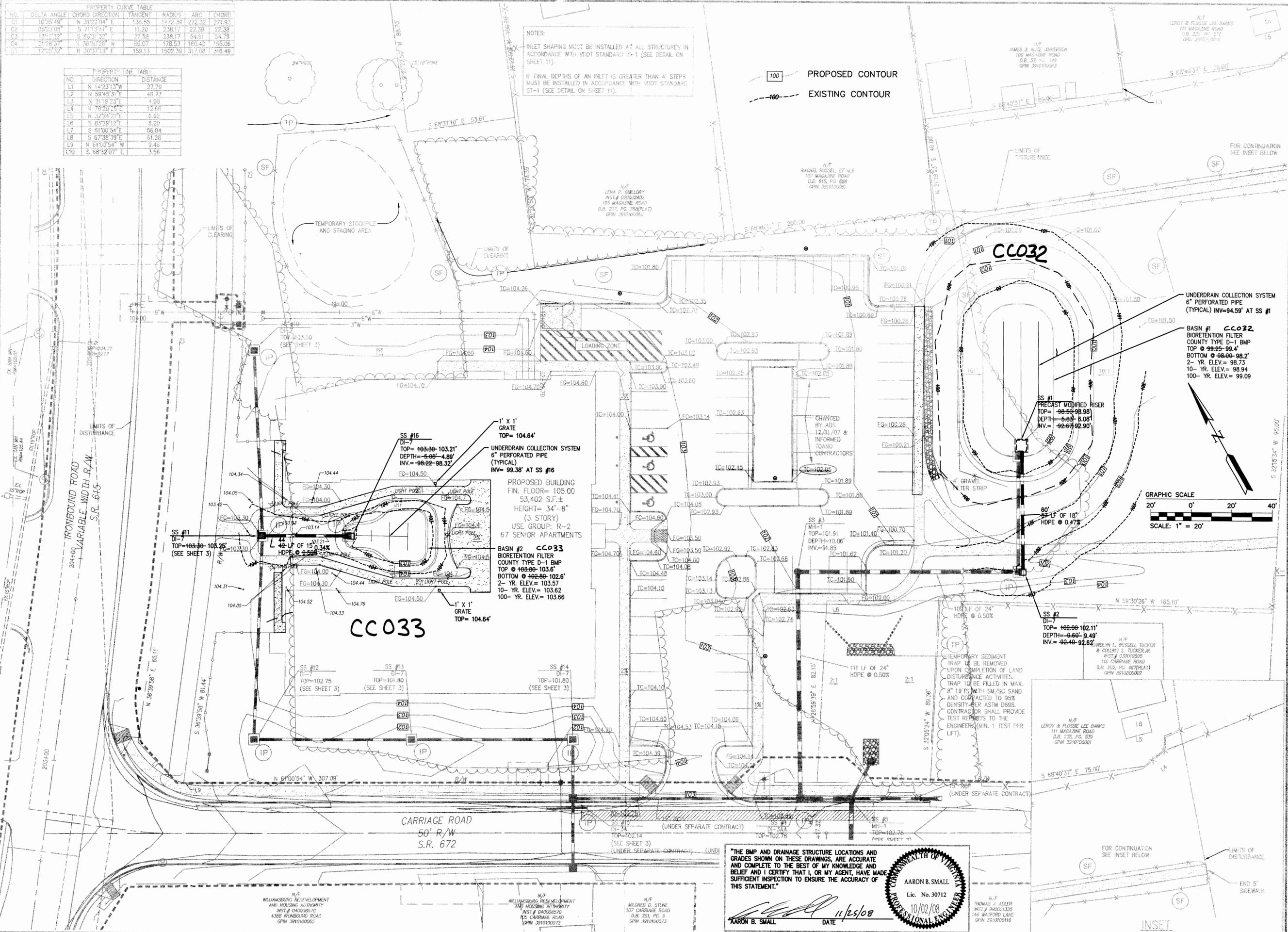
- Baltimore County, Maryland Soil Conservation District, As-Built Stormwater Management Pond Checklist.
- James City County, Virginia, Guidelines for Design and Construction of Stormwater Management BMP's (October 1999.)
- James City County, Virginia, Stormwater Detention/Retention Basin Design Checklist 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.

NO.	DELTA ANGLE	CHORD DIRECTION	TANGENT	RADIUS	ARC	CHORD
C1	10°35'49"	N 31°22'04" E	136.55	1472.59	272.32	271.93
C2	05°23'08"	S 71°13'41" E	11.20	238.17	22.39	22.38
C3	17°21'32"	S 87°31'32" E	27.58	238.17	54.61	54.79
C4	21°28'37"	N 36°31'26" W	86.07	178.53	180.43	155.06
C5	12°03'32"	N 50°37'13" E	159.13	1502.39	317.08	316.49

NO.	DIRECTION	DISTANCE
L1	N 14°23'13"W	27.79
L2	N 59°45'37"E	49.77
L3	N 21°16'03"E	4.00
L4	N 79°20'55"E	12.64
L5	N 57°24'21"E	6.62
L6	S 85°28'12"E	8.20
L7	S 91°00'54"E	56.04
L8	S 67°38'39"E	61.28
L9	N 61°00'54"W	9.46
L10	S 68°32'07"E	3.56

NOTES:  
 INLET SHAPING MUST BE INSTALLED AT ALL STRUCTURES IN ACCORDANCE WITH VDOT STANDARD S-1 (SEE DETAIL ON SHEET 11).  
 IF FINAL DEPTHS OF AN INLET IS GREATER THAN 4' STEPS MUST BE INSTALLED IN ACCORDANCE WITH VDOT STANDARD S-1 (SEE DETAIL ON SHEET 11).

100 PROPOSED CONTOUR  
 100 EXISTING CONTOUR

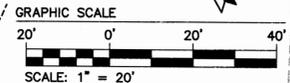


UNDERDRAIN COLLECTION SYSTEM  
 6" PERFORATED PIPE (TYPICAL) INV=94.59' AT SS #1

BASIN #1 CC032  
 BIORETENTION FILTER  
 COUNTY TYPE D-1 BMP  
 TOP @ 98.25-99.4'  
 BOTTOM @ 98.00-98.2'  
 2- YR. ELEV.= 98.73  
 10- YR. ELEV.= 98.94  
 100- YR. ELEV.= 99.09

PROPOSED BUILDING  
 FIN. FLOOR= 105.00  
 53,402 S.F.±  
 HEIGHT= 34'-8"  
 USE GROUP: R-2  
 67 SENIOR APARTMENTS

CC033



NO.	DATE	REVISION / COMMENT / NOTE
3	10/02/08	RECORD DRAWING
2	11/16/06	PER JCC COMMENTS DATED 11/16/05, 11/21/05, 12/19/05
1	10/19/05	PER JCC COMMENTS DATE 9/25/05, 10/3/05



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



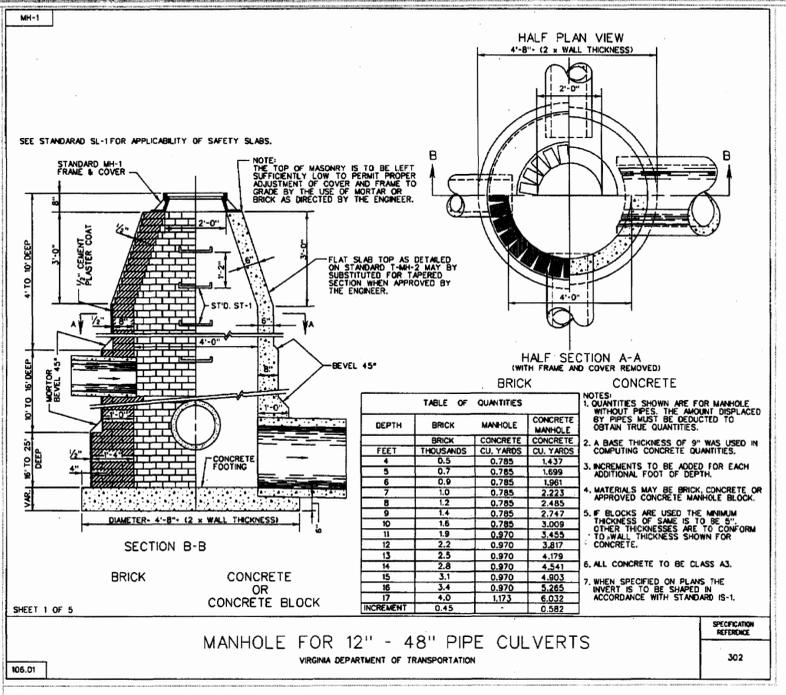
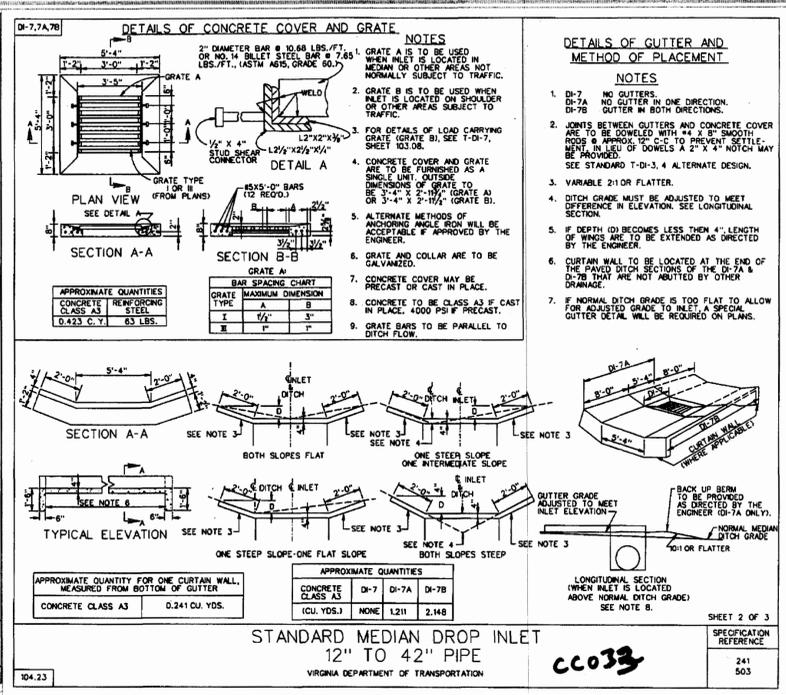
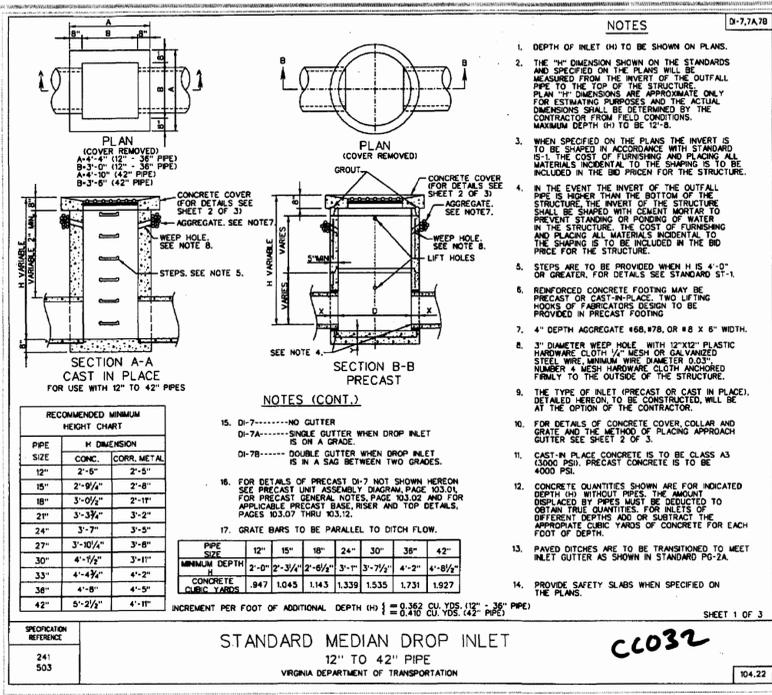
SP-10-08

BMP RECORD DRAWING  
 BAY AGING SENIOR HOUSING PROJECT  
 SITE DEVELOPMENT PLAN  
 IRONBOUND SQUARE

Designed	Drawn
ABS/BMC	SJP
Scale	Date
1" = 20'	8/03/05
Project No.	
9551-00	
Drawing No.	
5	

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

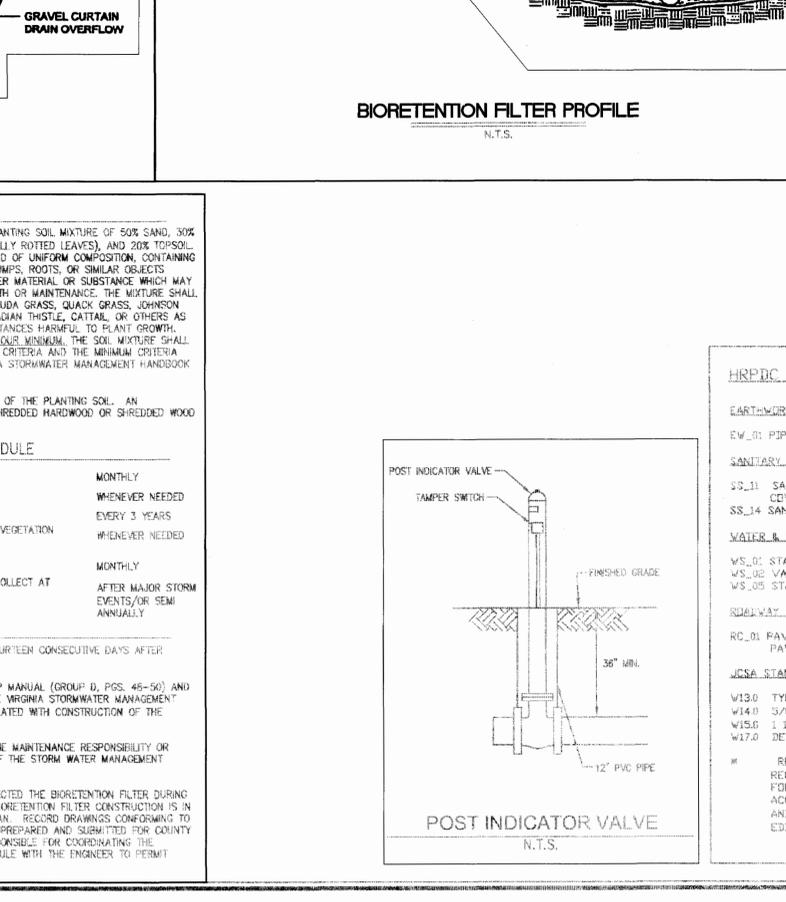
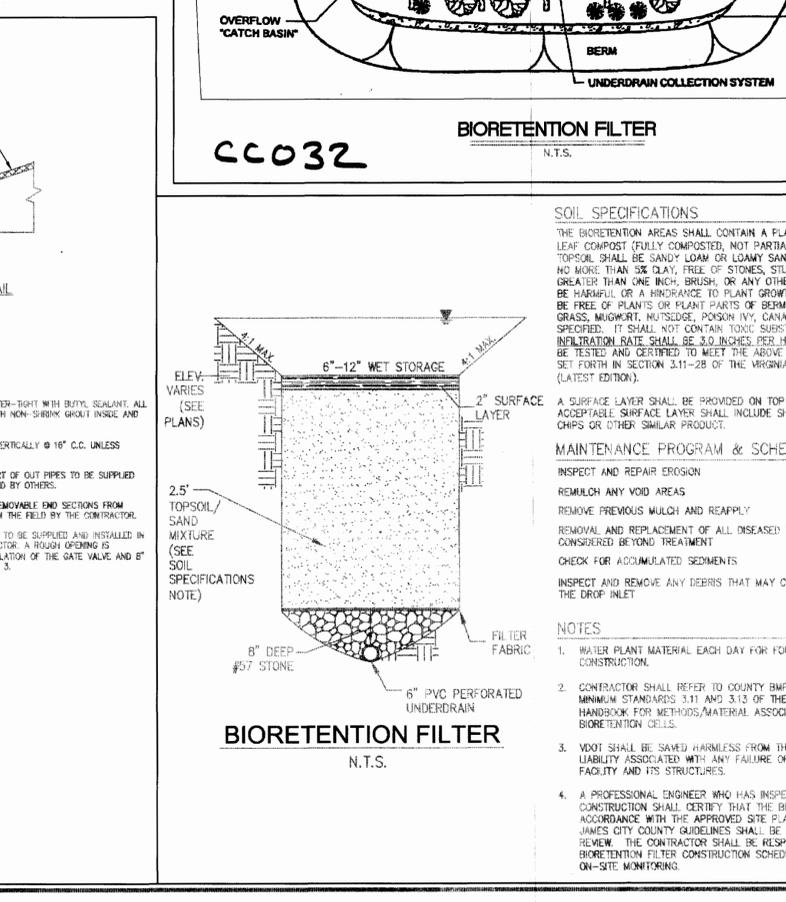
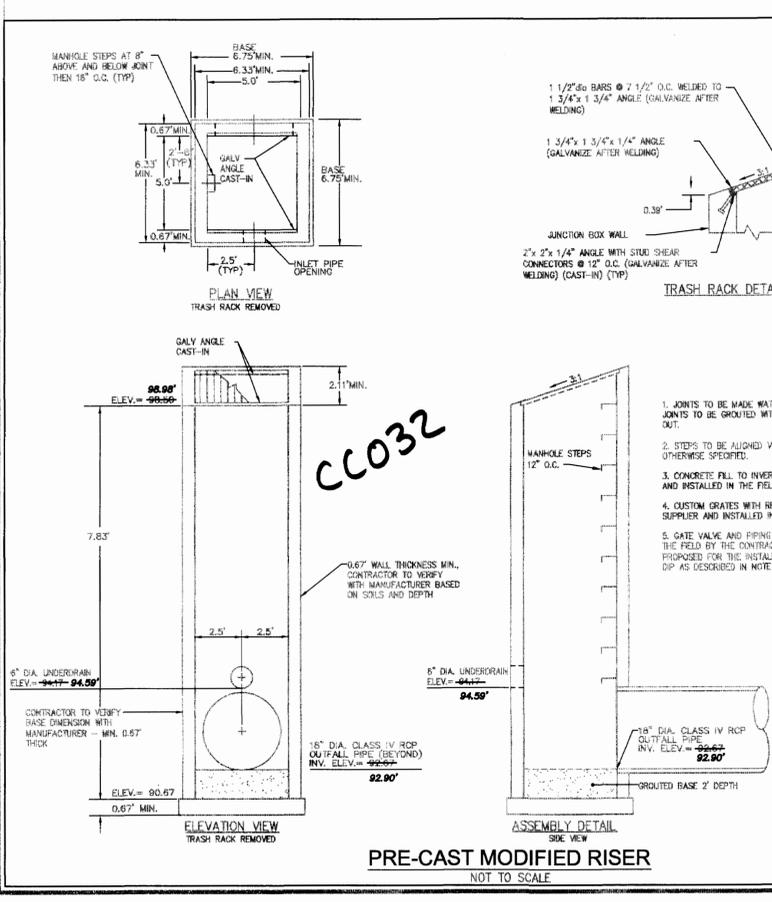
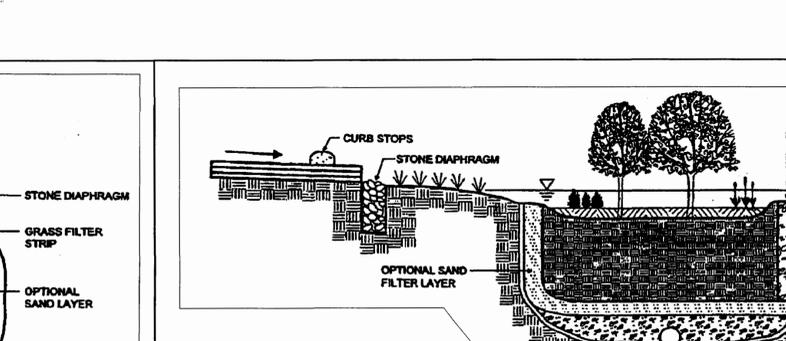
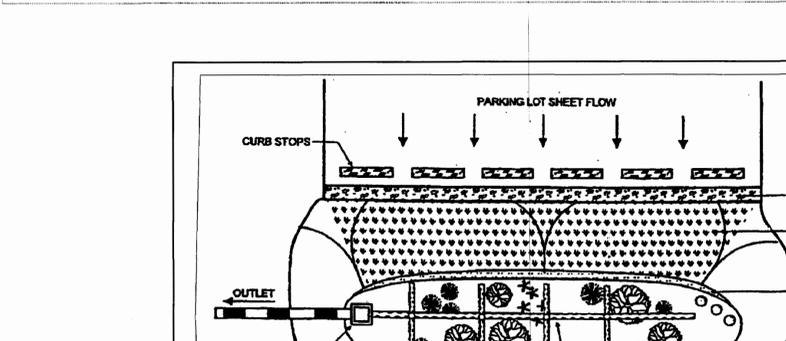
AARON B. SMALL  
 Lic. No. 30712  
 10/02/08  
 DATE 11/25/08



**PROFESSIONAL ENGINEER**  
AARON B. SMALL  
Lic. No. 30712  
10/02/08

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AARON B. SMALL DATE 11/25/08



NO.	DATE	REVISION / COMMENT / NOTE
1	10/02/08	RECORD DRAWING
2	11/16/08	PER ACC. COMMENTS DATED 11/16/08, 11/21/08, 12/19/08
3	11/19/08	PER ACC. COMMENTS DATED 8/25/08 & 10/2/08



5248 Olde Towne Road, Suite 1  
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Fax (757) 220-8894



**BMP RECORD DRAWING**  
BAY AGING SENIOR HOUSING PROJECT  
SITE DEVELOPMENT PLAN  
IRONBOUND SQUARE

DESIGNED: ABS/BMC  
DRAWN: SJP  
SCALE: NONE  
DATE: 8/03/05

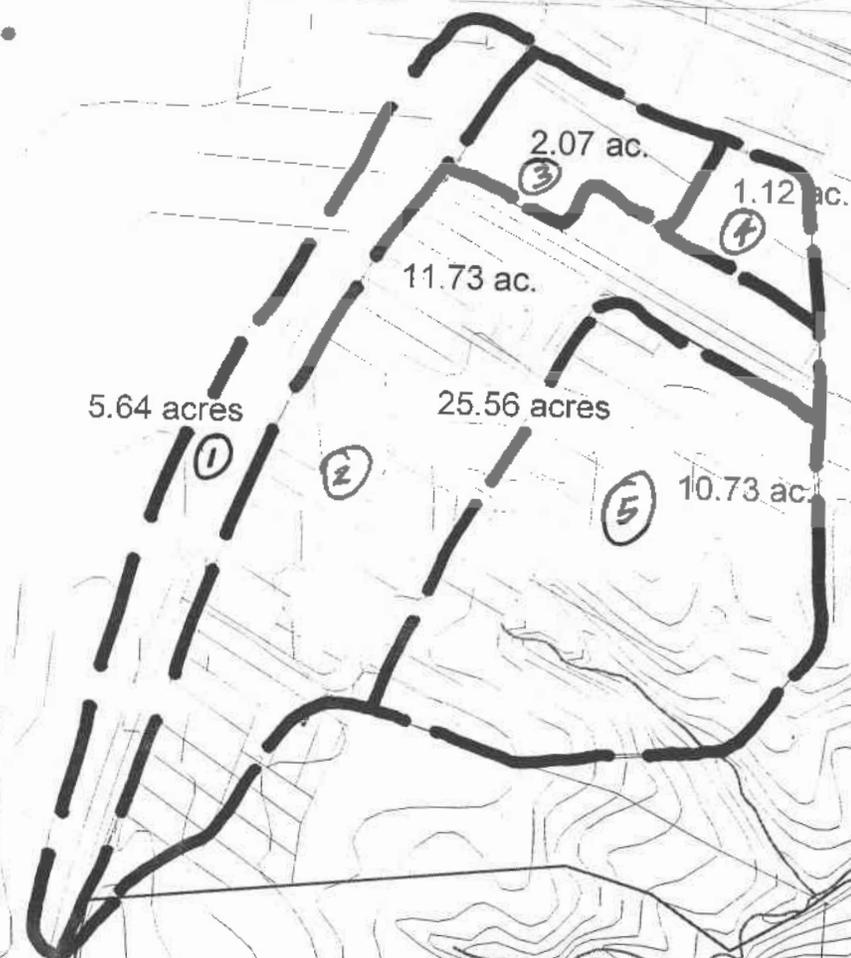
PROJECT NO.: 9551-00  
DRAWING NO.: 10

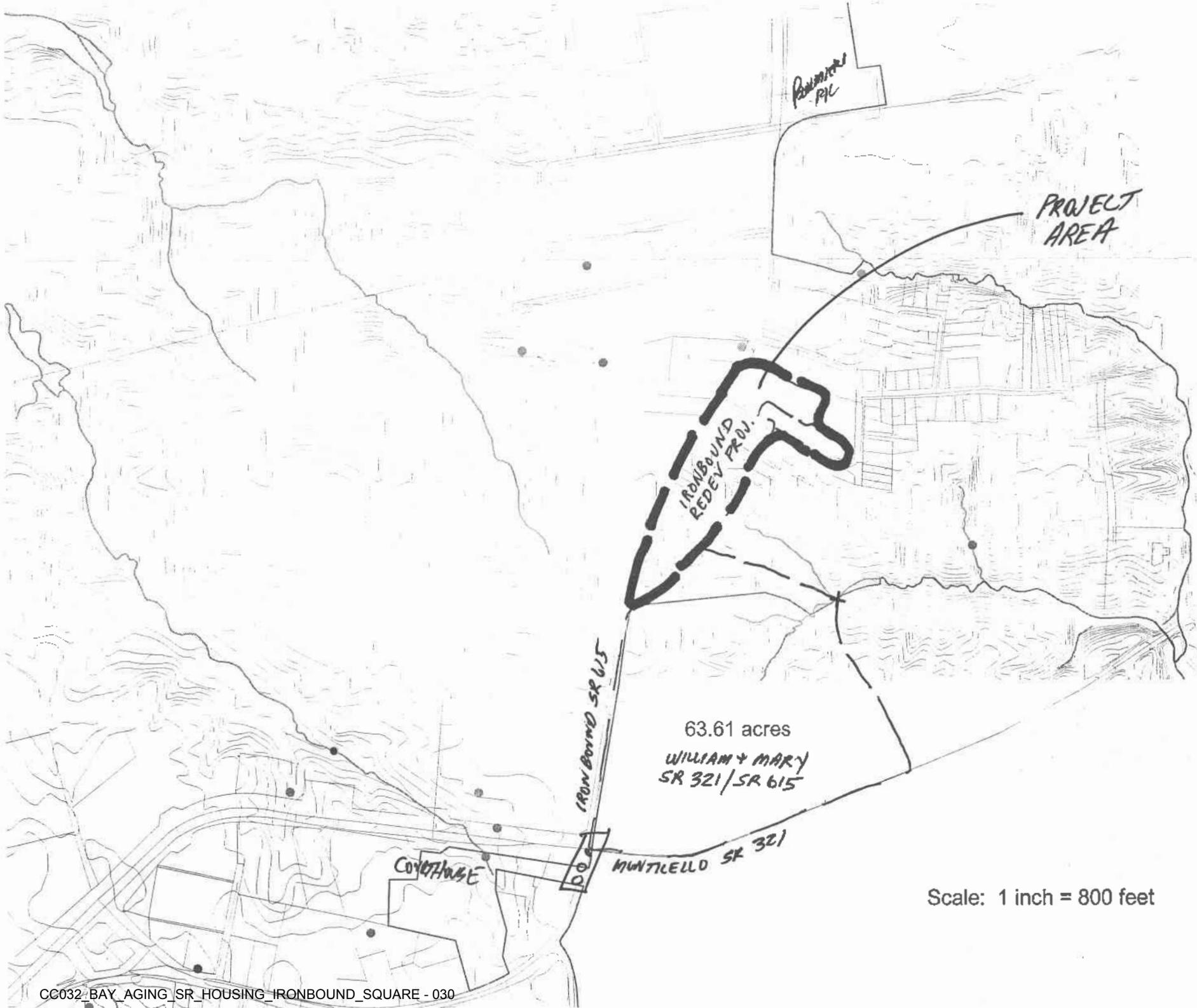
Scale: 1 inch = 350 feet

*VDOT*  
5.64 acres

25.56 acres  
*IBV REDEV*

Scale: 1 inch = 350 feet





PROJECT AREA

IRONBOUND REDEV PROJ.

63.61 acres  
WILLIAM + MARY  
SR 321 / SR 615

IRONBOUND SR 615

MUNTLELO SR 321

COYOTEHOUSE

PARKING LOT

Scale: 1 inch = 800 feet

Scale: 1 inch = 350 feet

5.64 acres

25.56 acres

Scale: 1 inch = 350 feet



# Table of Contents

Hydraflow Hydrographs by Intelisolve



SP-100-05  
BAY AGING  
3RD SVB

9551-00 -Bay Aging.gpw

Sunday, Jan 15 2006, 3:47 PM

**Hydrograph Return Period Recap ..... 1**

## 1 - Year

**Summary Report ..... 2**  
**Hydrograph Reports ..... 3**  
 Hydrograph No. 1, SCS Runoff, Predevelopment ..... 3  
 Hydrograph No. 3, SCS Runoff, PostDevelopment Area ..... 4  
 Hydrograph No. 5, SCS Runoff, Bioretention Area ..... 5  
 Hydrograph No. 6, Reservoir, Bioretention ..... 6  
 Pond Report ..... 7  
 Hydrograph No. 8, SCS Runoff, Small Bioretention Area ..... 8  
 Hydrograph No. 9, Reservoir, Small Bioretention ..... 9  
 Pond Report ..... 10  
 Hydrograph No. 11, Combine, Total Area ..... 11  
 Hydrograph No. 12, Reservoir, Dry Pond ..... 12  
 Pond Report ..... 13

## 2 - Year

**Summary Report ..... 14**  
**Hydrograph Reports ..... 15**  
 Hydrograph No. 1, SCS Runoff, Predevelopment ..... 15  
 Hydrograph No. 3, SCS Runoff, PostDevelopment Area ..... 16  
 Hydrograph No. 5, SCS Runoff, Bioretention Area ..... 17  
 Hydrograph No. 6, Reservoir, Bioretention ..... 18  
 Pond Report ..... 19  
 Hydrograph No. 8, SCS Runoff, Small Bioretention Area ..... 20  
 Hydrograph No. 9, Reservoir, Small Bioretention ..... 21  
 Pond Report ..... 22  
 Hydrograph No. 11, Combine, Total Area ..... 23  
 Hydrograph No. 12, Reservoir, Dry Pond ..... 24  
 Pond Report ..... 25

## 3 - Year

**Summary Report ..... 26**  
**Hydrograph Reports ..... 27**  
 Hydrograph No. 1, SCS Runoff, Predevelopment ..... 27  
 Hydrograph No. 3, SCS Runoff, PostDevelopment Area ..... 28  
 Hydrograph No. 5, SCS Runoff, Bioretention Area ..... 29  
 Hydrograph No. 6, Reservoir, Bioretention ..... 30  
 Pond Report ..... 31  
 Hydrograph No. 8, SCS Runoff, Small Bioretention Area ..... 32  
 Hydrograph No. 9, Reservoir, Small Bioretention ..... 33  
 Pond Report ..... 34  
 Hydrograph No. 11, Combine, Total Area ..... 35  
 Hydrograph No. 12, Reservoir, Dry Pond ..... 36  
 Pond Report ..... 37

## 10 - Year

**Summary Report** ..... **38**

**Hydrograph Reports** ..... **39**

    Hydrograph No. 1, SCS Runoff, Predevelopment ..... 39

    Hydrograph No. 3, SCS Runoff, PostDevelopment Area ..... 40

    Hydrograph No. 5, SCS Runoff, Bioretention Area ..... 41

    Hydrograph No. 6, Reservoir, Bioretention ..... 42

    Pond Report ..... 43

    Hydrograph No. 8, SCS Runoff, Small Bioretention Area ..... 44

    Hydrograph No. 9, Reservoir, Small Bioretention ..... 45

    Pond Report ..... 46

    Hydrograph No. 11, Combine, Total Area ..... 47

    Hydrograph No. 12, Reservoir, Dry Pond ..... 48

    Pond Report ..... 49

**25 - Year**

**Summary Report** ..... **50**

**Hydrograph Reports** ..... **51**

    Hydrograph No. 1, SCS Runoff, Predevelopment ..... 51

    Hydrograph No. 3, SCS Runoff, PostDevelopment Area ..... 52

    Hydrograph No. 5, SCS Runoff, Bioretention Area ..... 53

    Hydrograph No. 6, Reservoir, Bioretention ..... 54

    Pond Report ..... 55

    Hydrograph No. 8, SCS Runoff, Small Bioretention Area ..... 56

    Hydrograph No. 9, Reservoir, Small Bioretention ..... 57

    Pond Report ..... 58

    Hydrograph No. 11, Combine, Total Area ..... 59

    Hydrograph No. 12, Reservoir, Dry Pond ..... 60

    Pond Report ..... 61

**100 - Year**

**Summary Report** ..... **62**

**Hydrograph Reports** ..... **63**

    Hydrograph No. 1, SCS Runoff, Predevelopment ..... 63

    Hydrograph No. 3, SCS Runoff, PostDevelopment Area ..... 64

    Hydrograph No. 5, SCS Runoff, Bioretention Area ..... 65

    Hydrograph No. 6, Reservoir, Bioretention ..... 66

    Pond Report ..... 67

    Hydrograph No. 8, SCS Runoff, Small Bioretention Area ..... 68

    Hydrograph No. 9, Reservoir, Small Bioretention ..... 69

    Pond Report ..... 70

    Hydrograph No. 11, Combine, Total Area ..... 71

    Hydrograph No. 12, Reservoir, Dry Pond ..... 72

    Pond Report ..... 73

# 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	---	12.94	21.18	124.95	---	52.47	61.27	---	85.25	Predevelopment
3	SCS Runoff	---	12.22	20.00	117.98	---	49.55	57.86	---	80.50	PostDevelopment Area
5	SCS Runoff	---	2.40	3.53	15.91	---	7.49	8.54	---	11.35	Bioretention Area
6	Reservoir	5	1.03	2.47	14.37	---	6.80	7.86	---	10.64	Bioretention
8	SCS Runoff	---	0.67	0.94	3.73	---	1.85	2.09	---	2.71	Small Bioretention Area
9	Reservoir	8	0.58	0.94	3.60	---	1.80	2.02	---	2.63	Small Bioretention
11	Combine	3, 6, 9,	13.37	22.49	131.32	---	55.81	64.91	---	89.72	Total Area
12	Reservoir	11	6.14	16.05	130.76	---	51.08	64.37	---	88.85	Dry Pond

# 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	12.94	3	732	56,391	---	---	---	Predevelopment	
3	SCS Runoff	12.22	3	732	53,248	---	---	---	PostDevelopment Area	
5	SCS Runoff	2.40	3	720	6,573	---	---	---	Bioretention Area	
6	Reservoir	1.03	3	732	6,560	5	98.63	2,468	Bioretention	
8	SCS Runoff	0.67	3	717	1,524	---	---	---	Small Bioretention Area	
9	Reservoir	0.58	3	723	1,513	8	103.54	571	Small Bioretention	
11	Combine	13.37	3	732	61,321	3, 6, 9,	---	---	Total Area	
12	Reservoir	6.14	3	753	61,306	11	79.51	15,405	Dry Pond	
9551-00 -Bay Aging.gpw					Return Period: 1 Year			Sunday, Jan 15 2006, 3:47 PM		

# Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Jan 15 2006, 3:47 PM

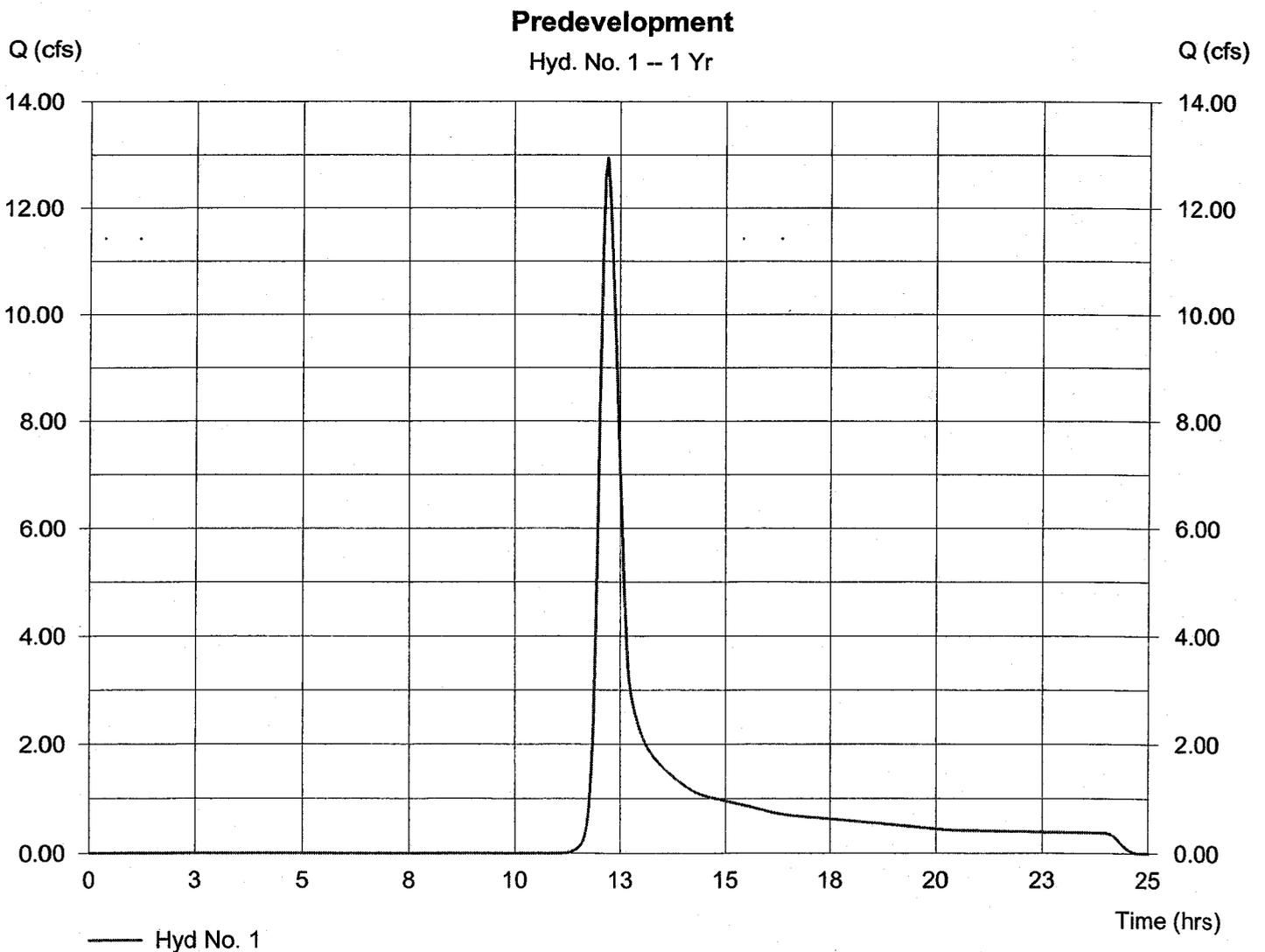
## Hyd. No. 1

### Predevelopment

Hydrograph type = SCS Runoff  
Storm frequency = 1 yrs  
Drainage area = 18.66 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 2.80 in  
Storm duration = 24 hrs

Peak discharge = 12.94 cfs  
Time interval = 3 min  
Curve number = 75  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 29 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 56,391 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 3

### PostDevelopment Area

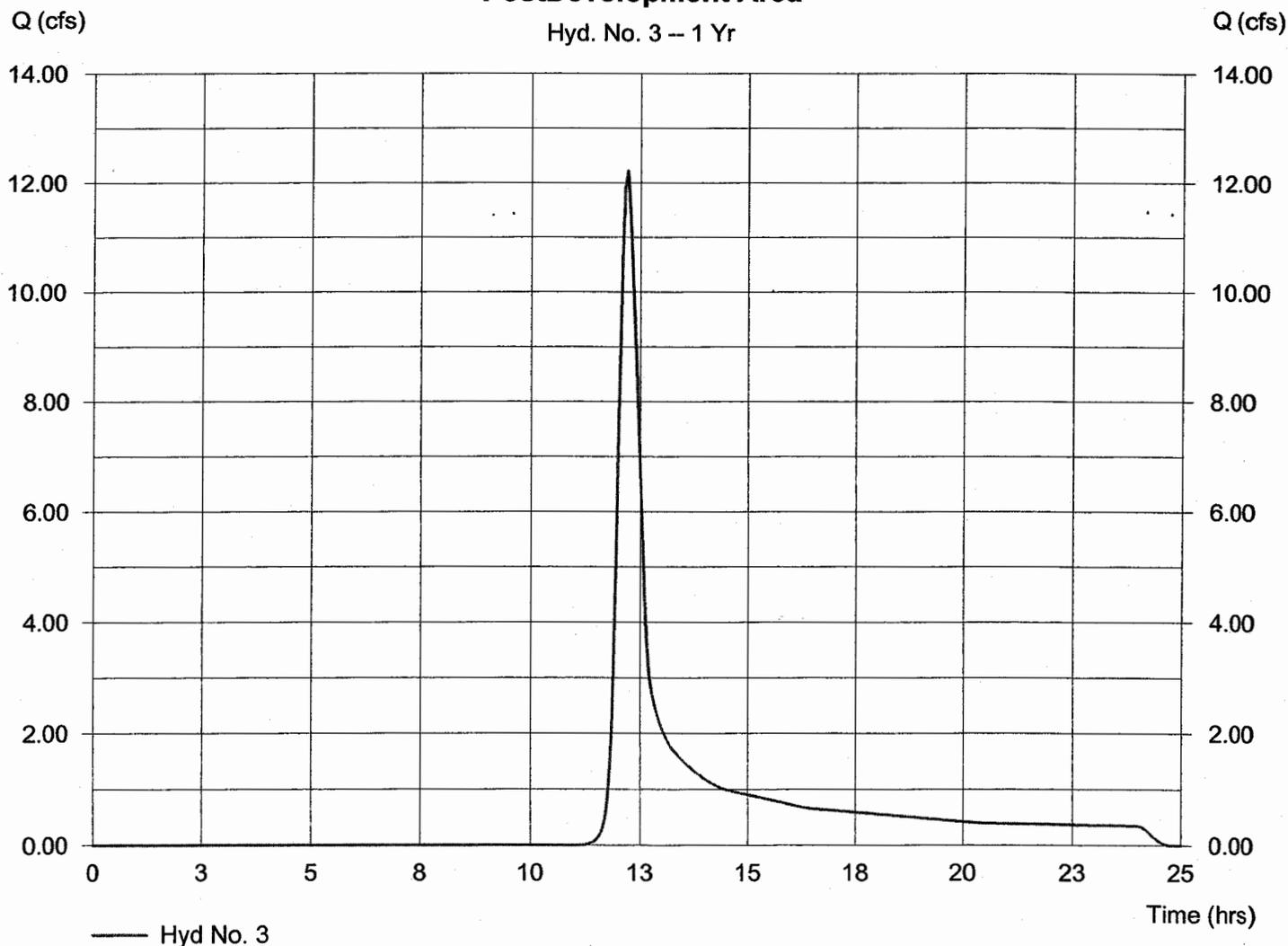
Hydrograph type = SCS Runoff  
Storm frequency = 1 yrs  
Drainage area = 17.62 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 2.80 in  
Storm duration = 24 hrs

Peak discharge = 12.22 cfs  
Time interval = 3 min  
Curve number = 75  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 29 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 53,248 cuft

### PostDevelopment Area

Hyd. No. 3 -- 1 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Jan 15 2006, 3:47 PM

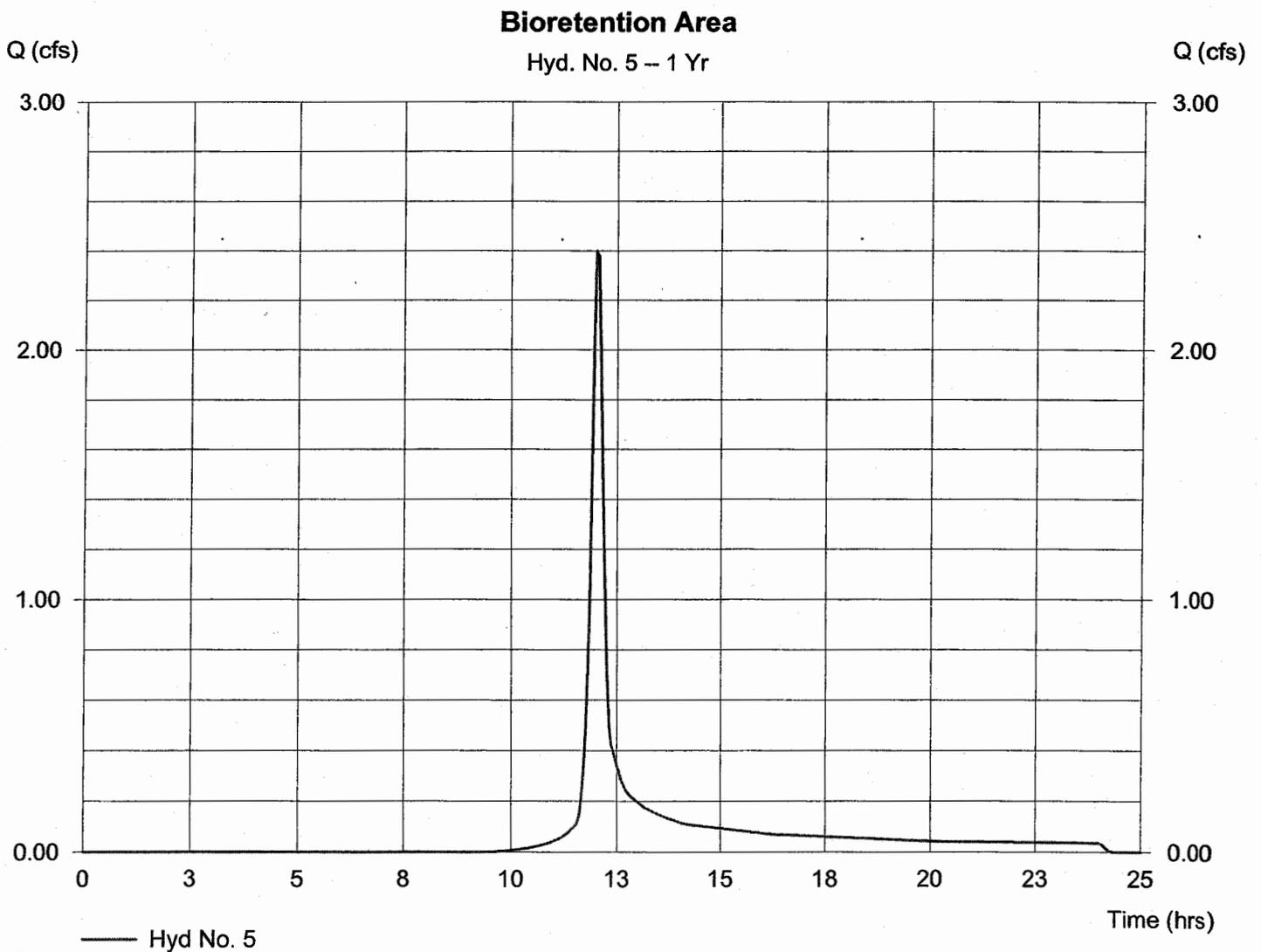
## Hyd. No. 5

### Bioretention Area

Hydrograph type = SCS Runoff  
Storm frequency = 1 yrs  
Drainage area = 1.48 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 2.80 in  
Storm duration = 24 hrs

Peak discharge = 2.40 cfs  
Time interval = 3 min  
Curve number = 82  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 10 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 6,573 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 6

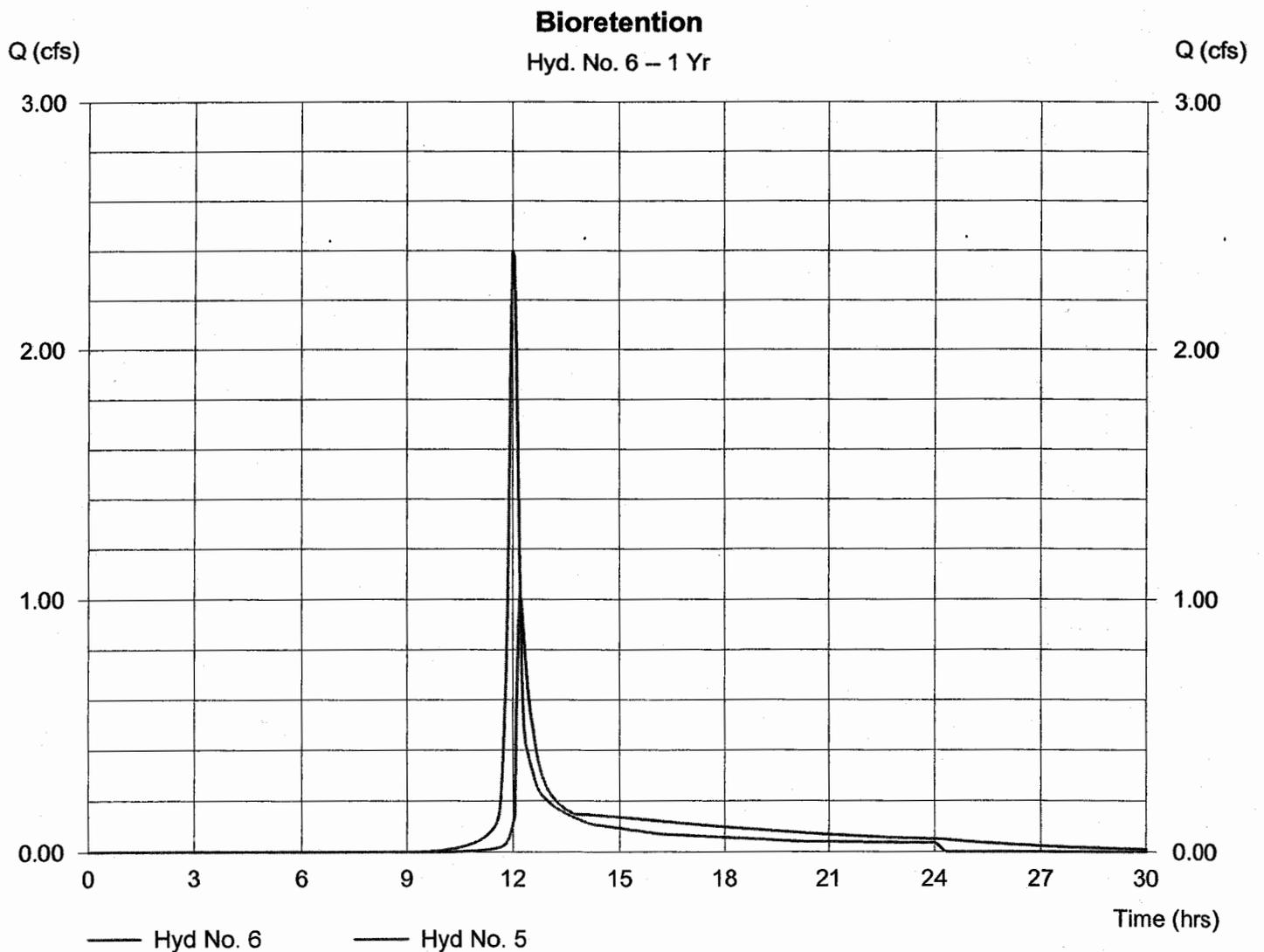
Bioretention

Hydrograph type = Reservoir  
Storm frequency = 1 yrs  
Inflow hyd. No. = 5  
Reservoir name = Bioretention

Peak discharge = 1.03 cfs  
Time interval = 3 min  
Max. Elevation = 98.63 ft  
Max. Storage = 2,468 cuft

Storage Indication method used.

Hydrograph Volume = 6,560 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 3 - Bioretention

### 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	98.00	2,432	0	0
1.25	99.25	5,351	4,864	4,864
2.00	100.00	8,334	5,132	9,996
3.00	101.00	16,244	12,289	22,285

### Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 92.67	0.00	0.00	0.00
Length (ft)	= 57.00	0.00	0.00	0.00
Slope (%)	= 0.47	0.00	0.00	0.00
N-Value	= .013	.013	.013	.000
Orif. Coeff.	= 0.60	0.60	0.60	0.00
Multi-Stage	= n/a	No	No	No

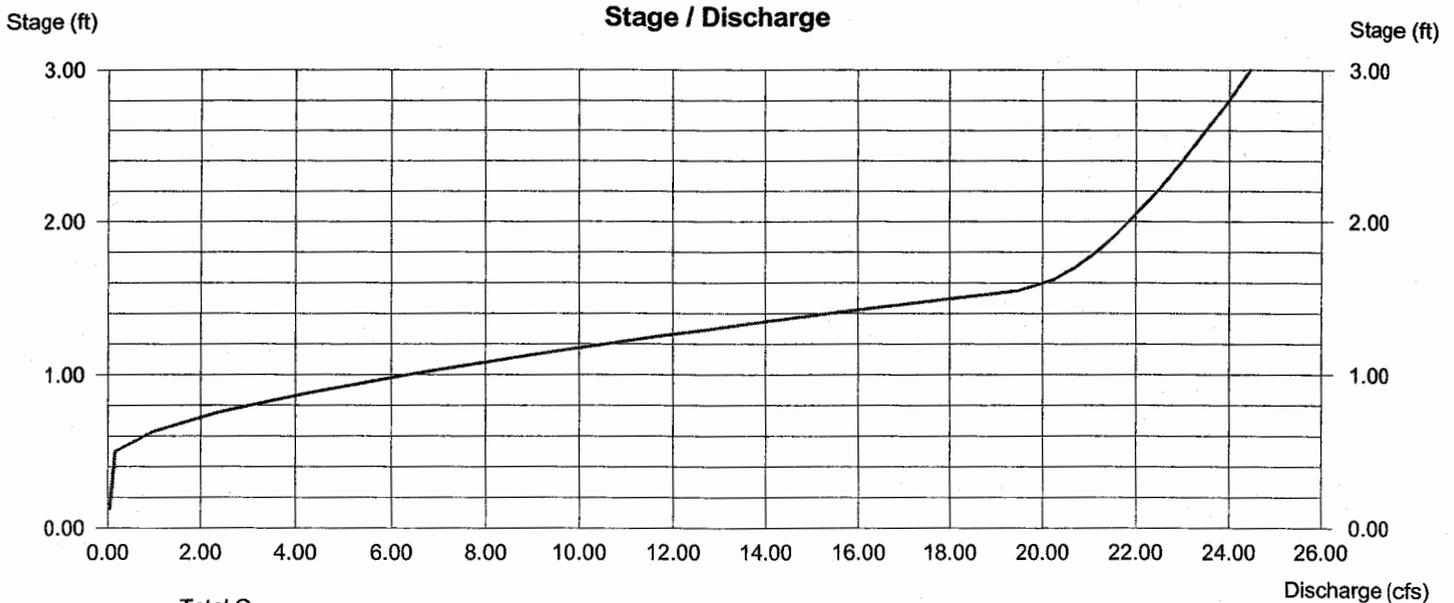
### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 5.00	0.00	5.00	0.00
Crest El. (ft)	= 98.50	98.50	100.61	0.00
Weir Coeff.	= 3.33	0.97	3.33	0.00
Weir Type	= Rect	70 degV	Rect	---
Multi-Stage	= Yes	Yes	Yes	No

Exfiltration = 3.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

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

*0.2 - 2.0 inches  
per hour per  
geotech report*



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

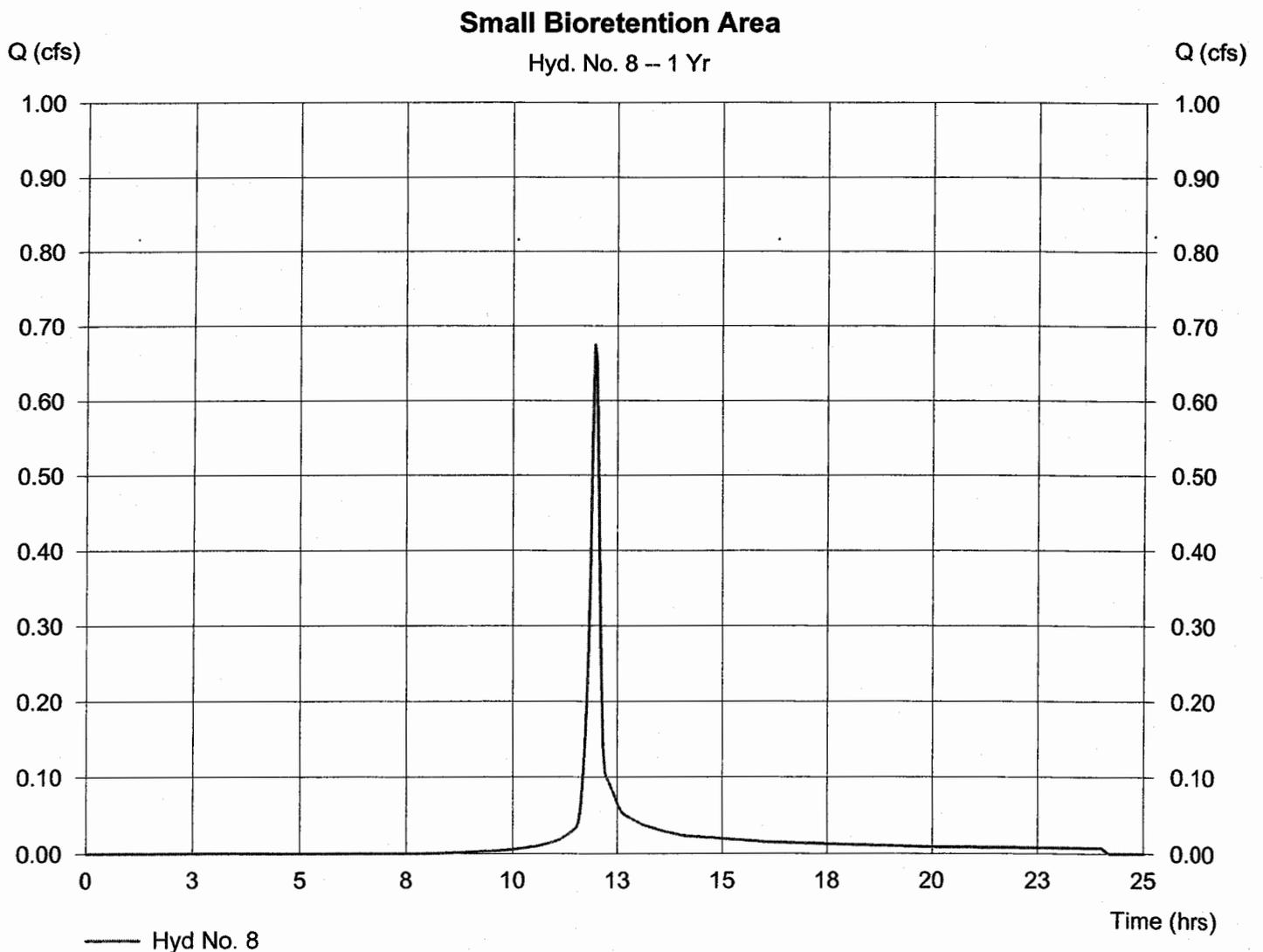
## Hyd. No. 8

### Small Bioretention Area

Hydrograph type = SCS Runoff  
Storm frequency = 1 yrs  
Drainage area = 0.30 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 2.80 in  
Storm duration = 24 hrs

Peak discharge = 0.67 cfs  
Time interval = 3 min  
Curve number = 86  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 5 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1,524 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 9

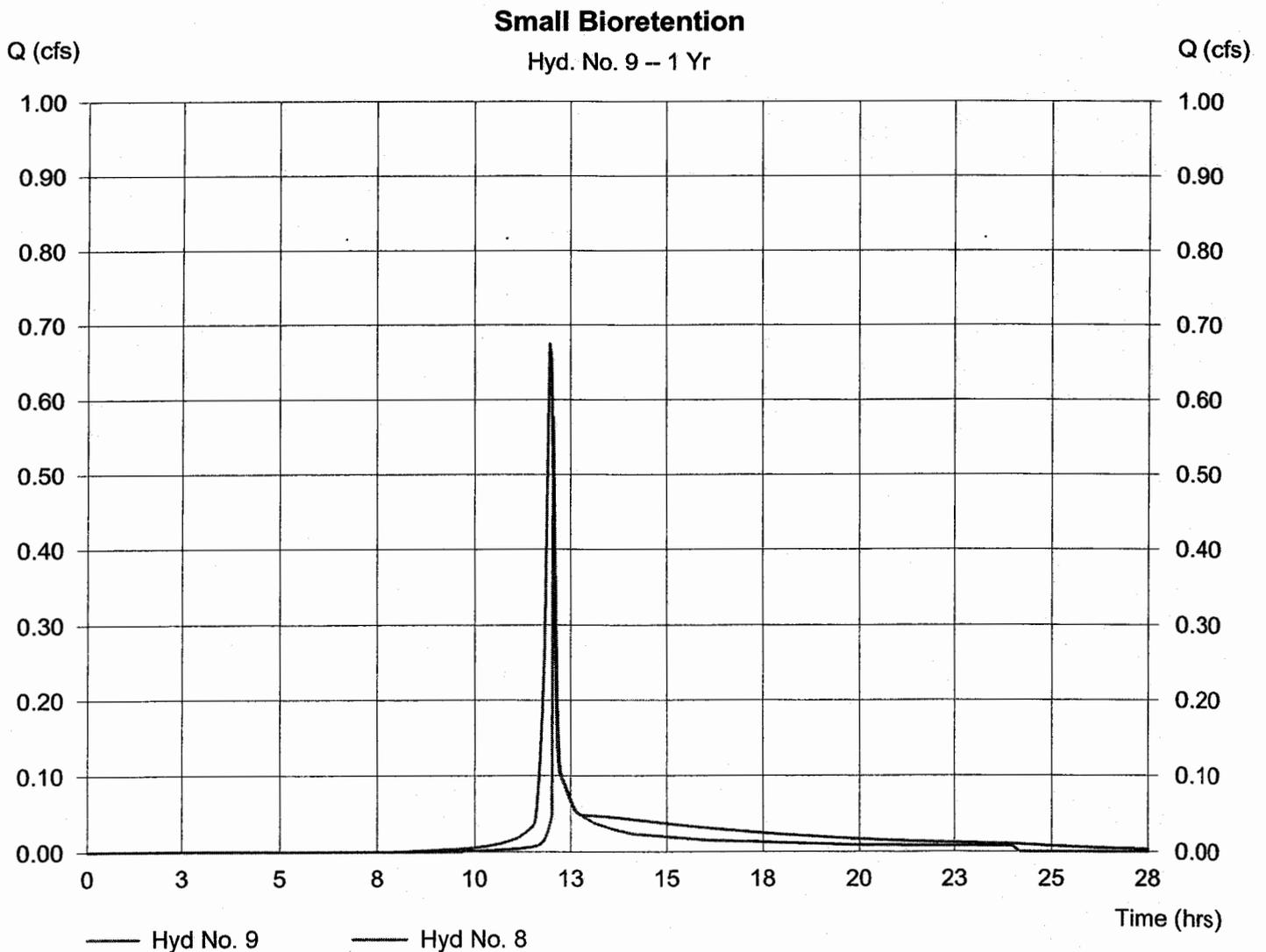
Small Bioretention

Hydrograph type = Reservoir  
Storm frequency = 1 yrs  
Inflow hyd. No. = 8  
Reservoir name = Small Bioretention

Peak discharge = 0.58 cfs  
Time interval = 3 min  
Max. Elevation = 103.54 ft  
Max. Storage = 571 cuft

Storage Indication method used.

Hydrograph Volume = 1,513 cuft



# Pond Report

Hydraflow Hydrographs by Intellisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 1 - Small Bioretention

### 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	103.00	736	0	0
1.00	104.00	1,372	1,054	1,054

### Culvert / Orifice Structures

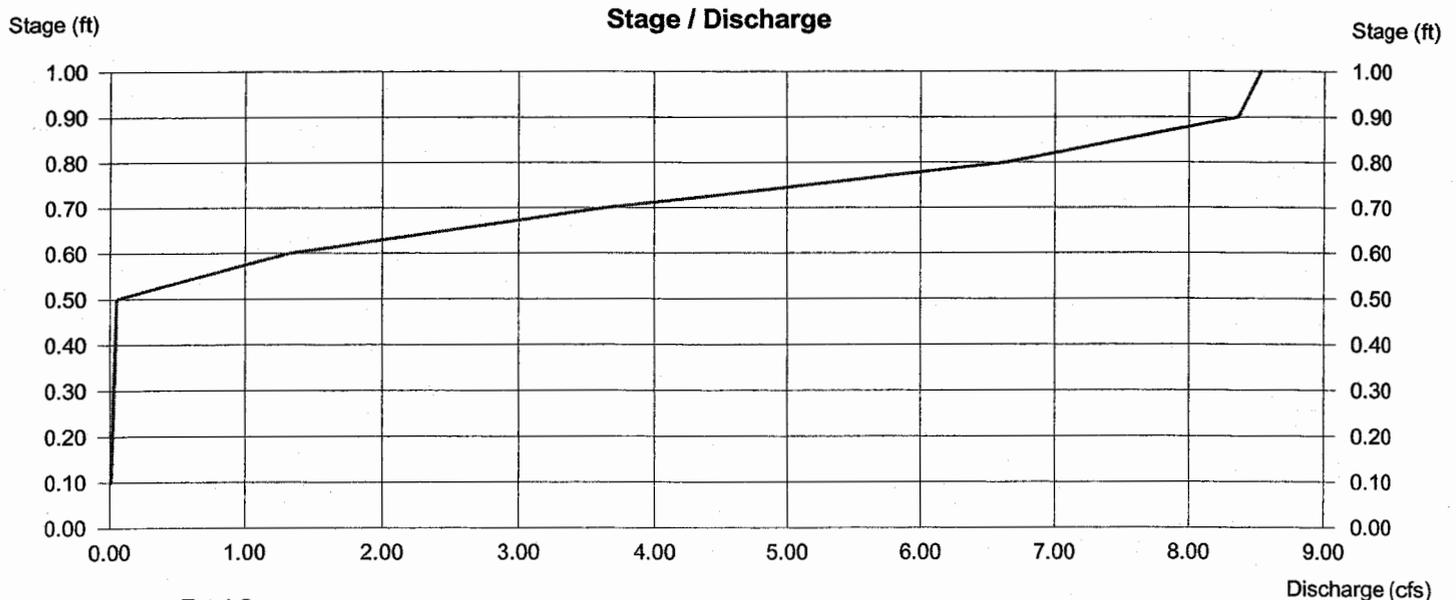
	[A]	[B]	[C]	[D]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 98.00	0.00	0.00	0.00
Length (ft)	= 44.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	0.00	0.00
Crest El. (ft)	= 103.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Riser	--	--	--
Multi-Stage	= Yes	No	No	No

Exfiltration = 3.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

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



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

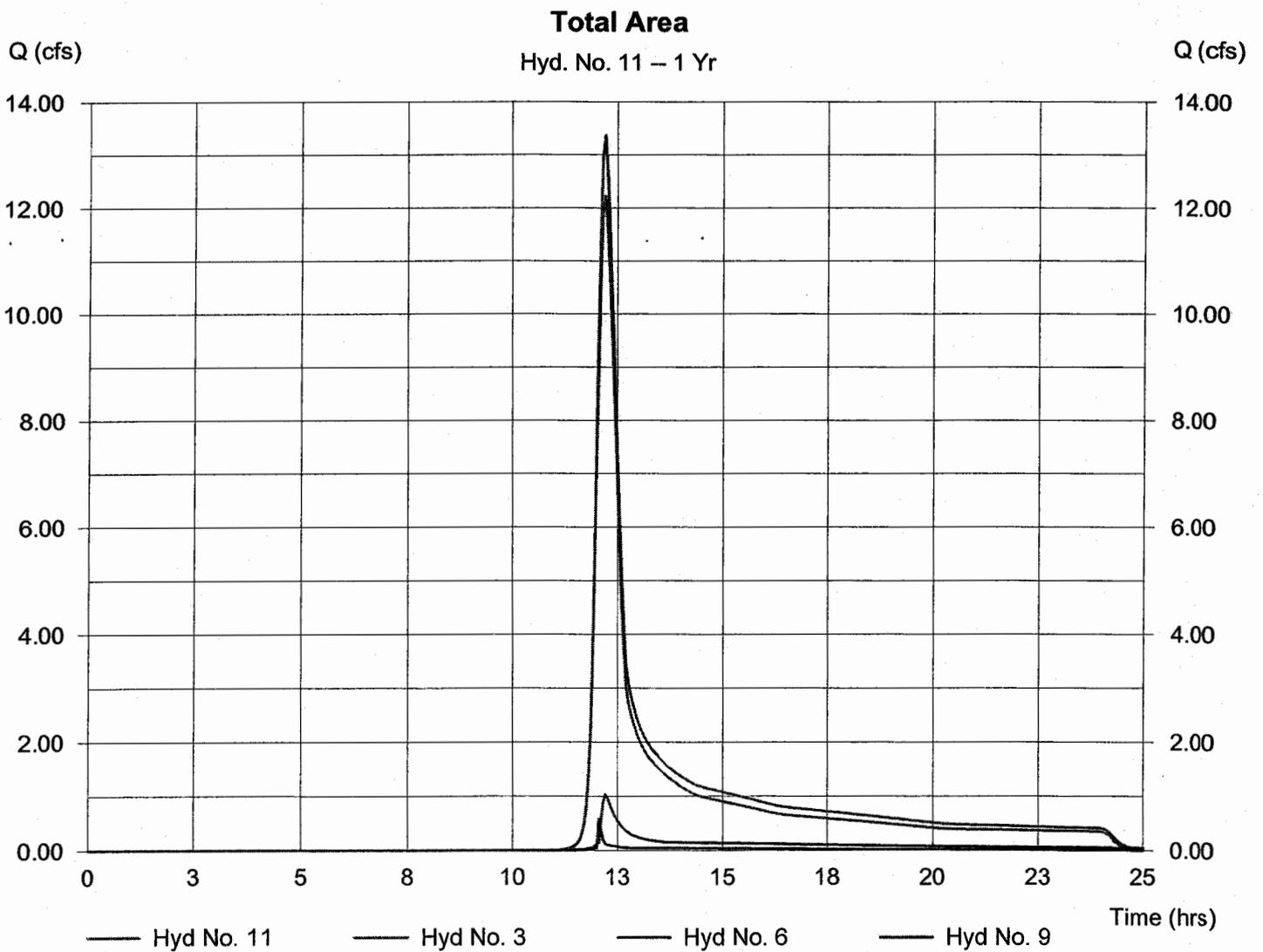
## Hyd. No. 11

Total Area

Hydrograph type = Combine  
Storm frequency = 1 yrs  
Inflow hyds. = 3, 6, 9

Peak discharge = 13.37 cfs  
Time interval = 3 min

Hydrograph Volume = 61,321 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 12

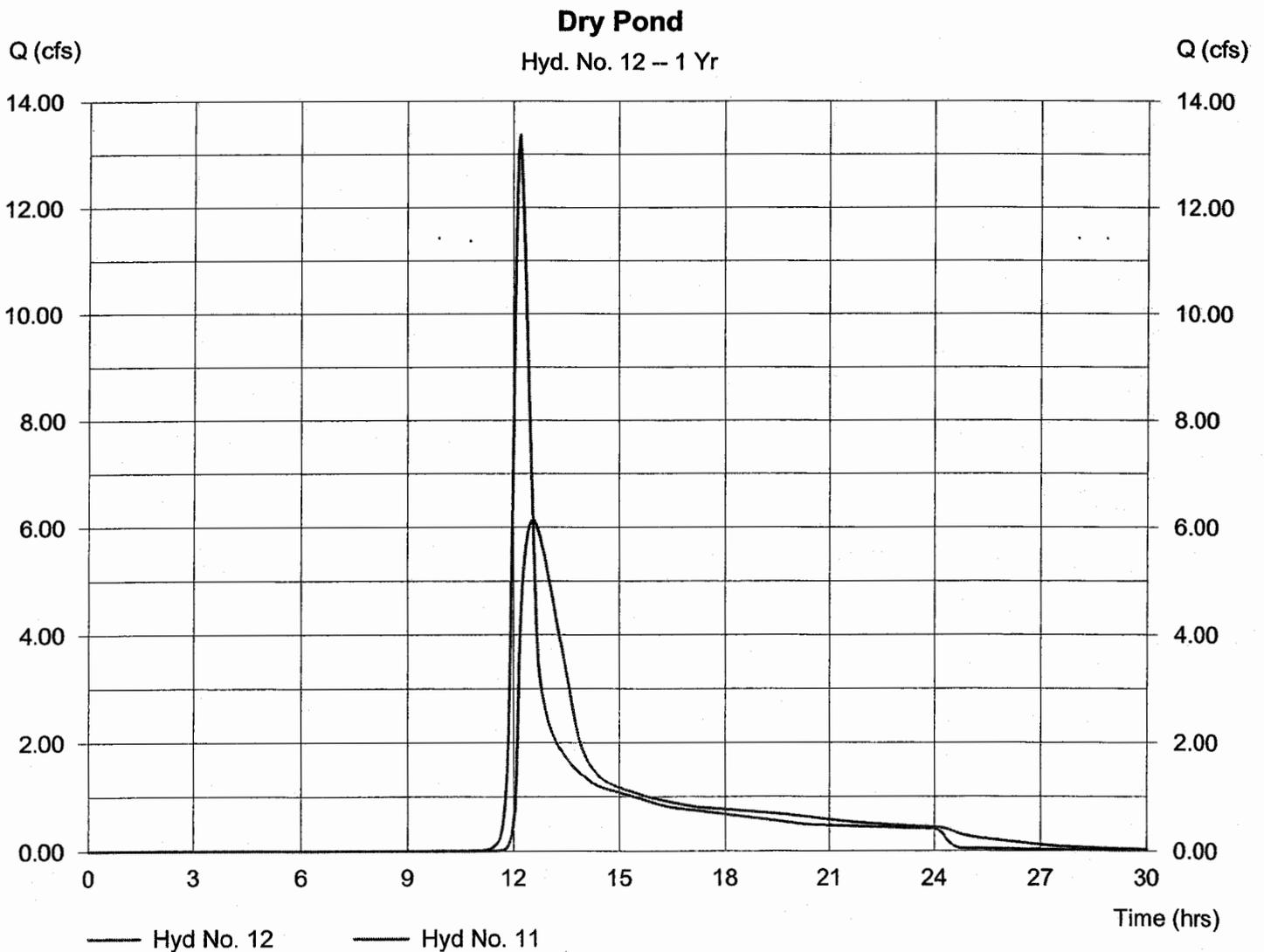
Dry Pond

Hydrograph type = Reservoir  
 Storm frequency = 1 yrs  
 Inflow hyd. No. = 11  
 Reservoir name = Dry Pond

Peak discharge = 6.14 cfs  
 Time interval = 3 min  
 Max. Elevation = 79.51 ft  
 Max. Storage = 15,405 cuft

Storage Indication method used.

Hydrograph Volume = 61,306 cuft



# Pond Report

Hydraflow Hydrographs by Intellisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 5 - Dry 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	76.00	3,242	0	0
1.00	77.00	3,854	3,548	3,548
2.00	78.00	4,505	4,180	7,728
3.00	79.00	5,189	4,847	12,575
4.00	80.00	5,912	5,551	18,125
5.00	81.00	6,663	6,288	24,413
6.00	82.00	7,447	7,055	31,468
7.00	83.00	8,263	7,855	39,323

### Culvert / Orifice Structures

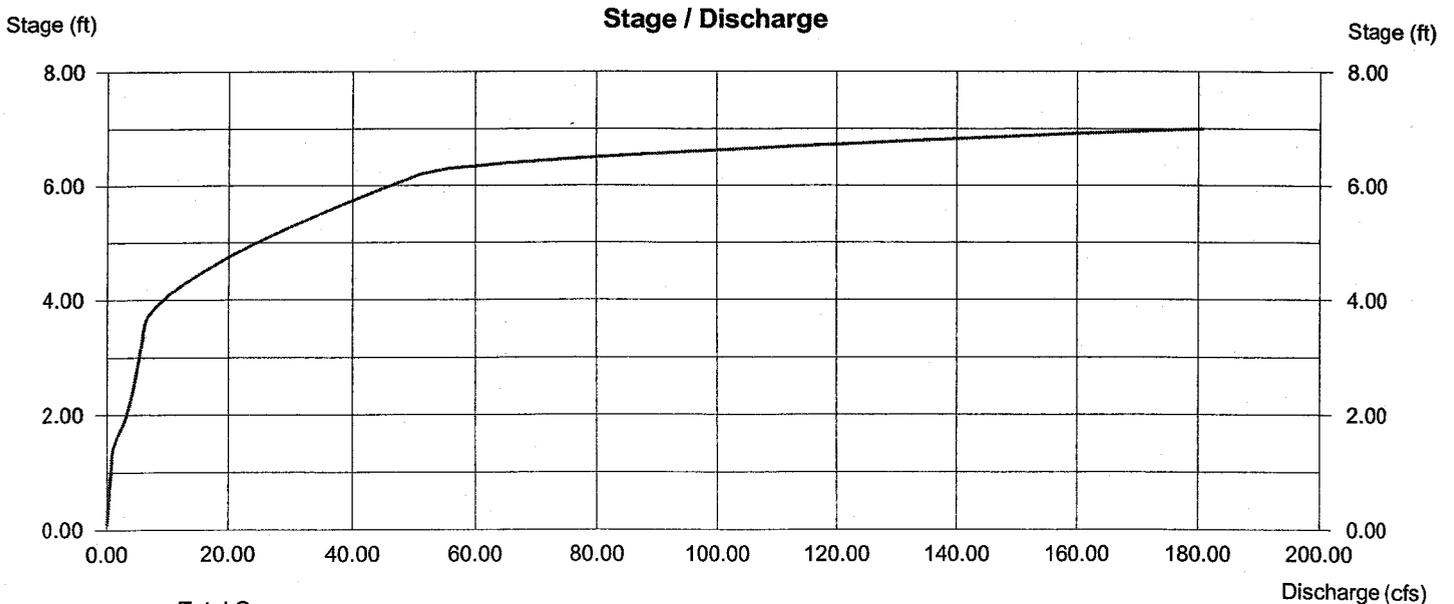
	[A]	[B]	[C]	[D]
Rise (in)	= 4.00	4.00	8.00	8.00
Span (in)	= 4.00	4.00	8.00	8.00
No. Barrels	= 1	1	1	1
Invert El. (ft)	= 76.00	76.50	77.25	77.25
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	50.00	0.00
Crest El. (ft)	= 79.60	0.00	82.25	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	—	Rect	—
Multi-Stage	= No	No	No	No

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

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



# Hydrograph 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	21.18	3	732	88,178	---	---	---	Predevelopment
3	SCS Runoff	20.00	3	732	83,264	---	---	---	PostDevelopment Area
5	SCS Runoff	3.53	3	720	9,577	---	---	---	Bioretention Area
6	Reservoir	2.47	3	729	9,564	5	98.76	2,955	Bioretention
8	SCS Runoff	0.94	3	717	2,142	---	---	---	Small Bioretention Area
9	Reservoir	0.94	3	720	2,131	8	103.57	601	Small Bioretention
11	Combine	22.49	3	729	94,959	3, 6, 9,	---	---	Total Area
12	Reservoir	16.05	3	741	94,944	11	80.51	21,303	Dry Pond

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

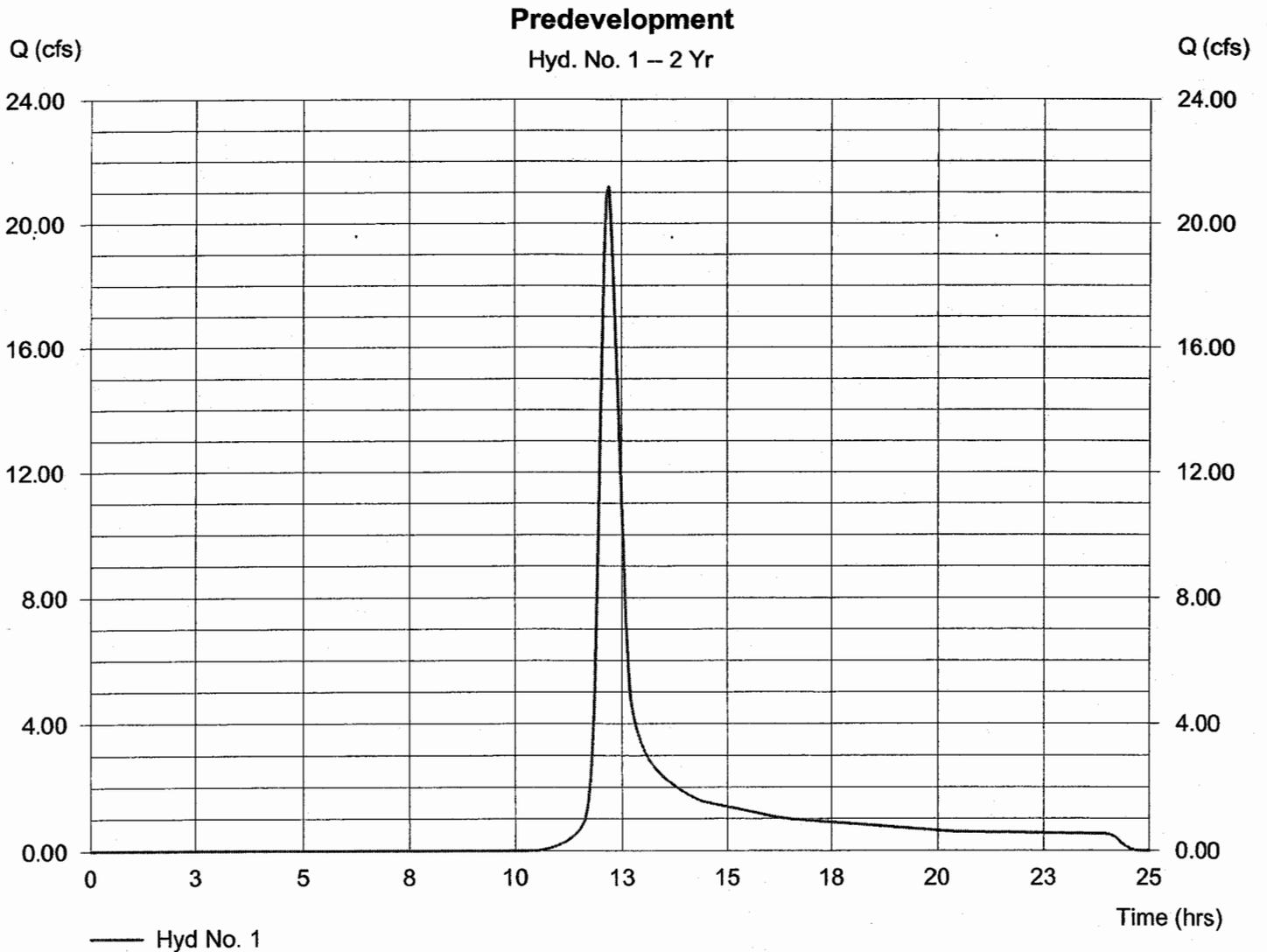
## Hyd. No. 1

### Predevelopment

Hydrograph type = SCS Runoff  
 Storm frequency = 2 yrs  
 Drainage area = 18.66 ac  
 Basin Slope = 0.0 %  
 Tc method = TR55  
 Total precip. = 3.50 in  
 Storm duration = 24 hrs

Peak discharge = 21.18 cfs  
 Time interval = 3 min  
 Curve number = 75  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 29 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 88,178 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 3

PostDevelopment Area

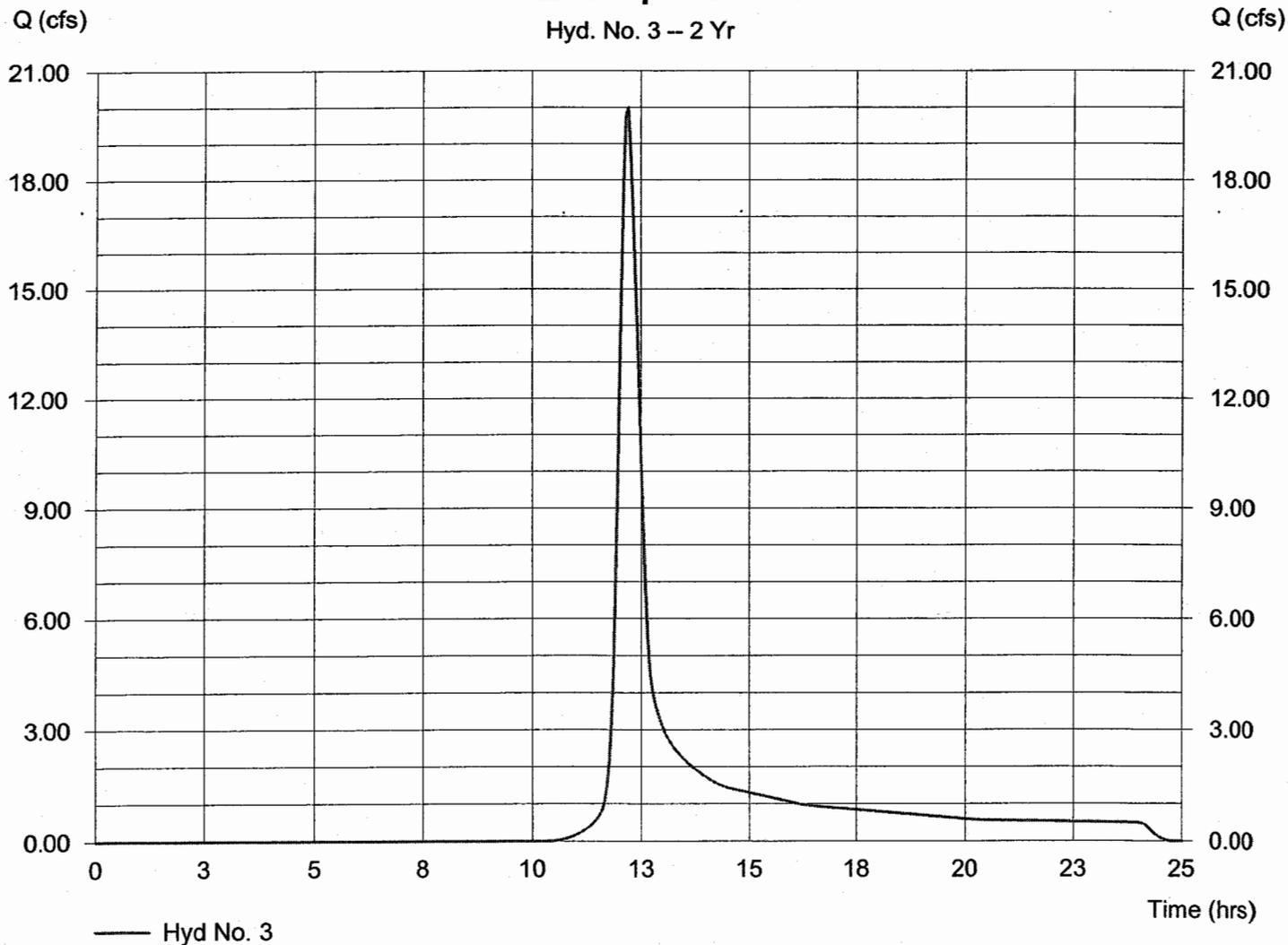
Hydrograph type = SCS Runoff  
 Storm frequency = 2 yrs  
 Drainage area = 17.62 ac  
 Basin Slope = 0.0 %  
 Tc method = TR55  
 Total precip. = 3.50 in  
 Storm duration = 24 hrs

Peak discharge = 20.00 cfs  
 Time interval = 3 min  
 Curve number = 75  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 29 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 83,264 cuft

### PostDevelopment Area

Hyd. No. 3 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

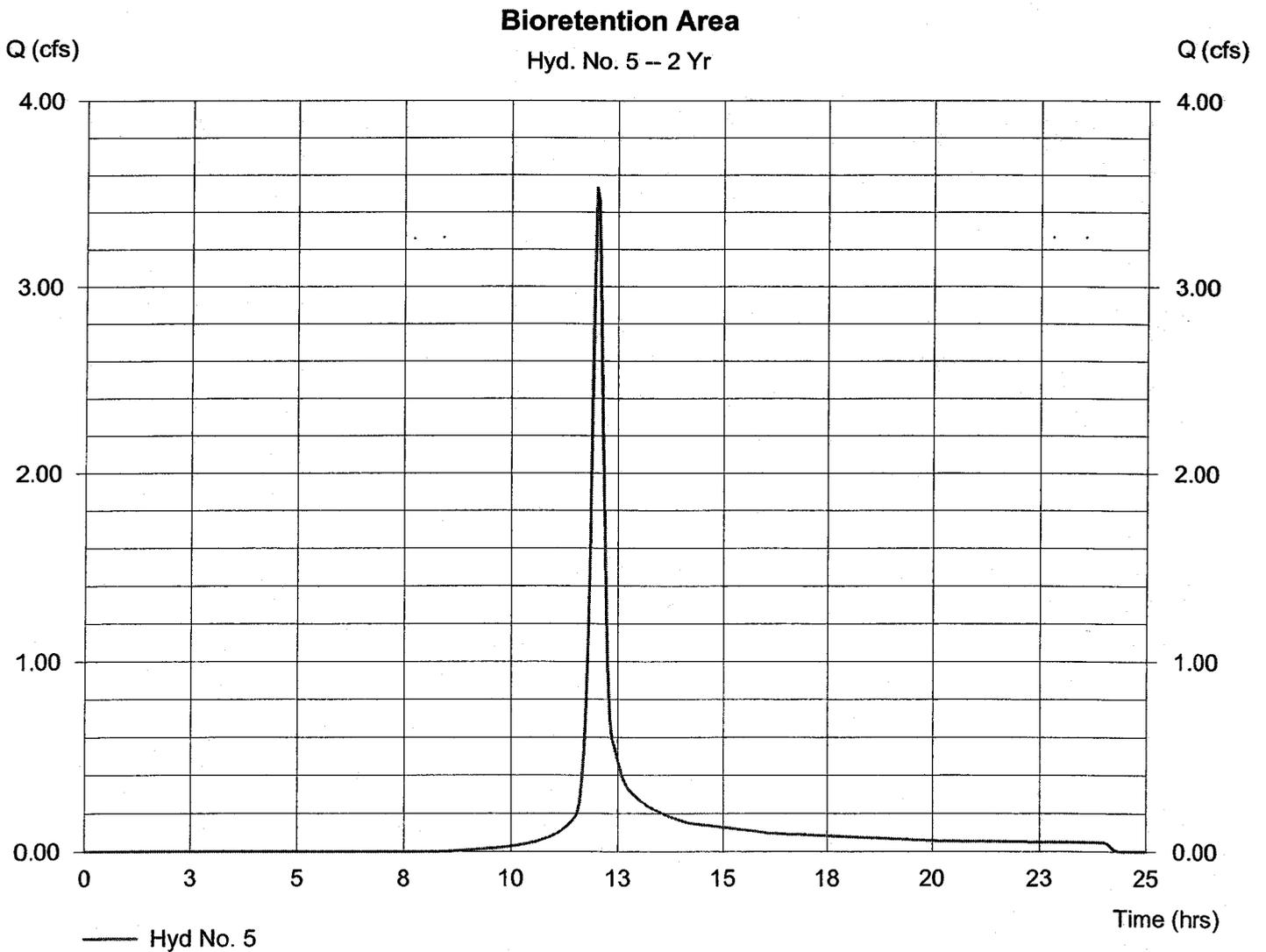
## Hyd. No. 5

### Bioretention Area

Hydrograph type = SCS Runoff  
 Storm frequency = 2 yrs  
 Drainage area = 1.48 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 3.50 in  
 Storm duration = 24 hrs

Peak discharge = 3.53 cfs  
 Time interval = 3 min  
 Curve number = 82  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 10 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 9,577 cuft



# Hydrograph Plot

Hydraflow-Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 6

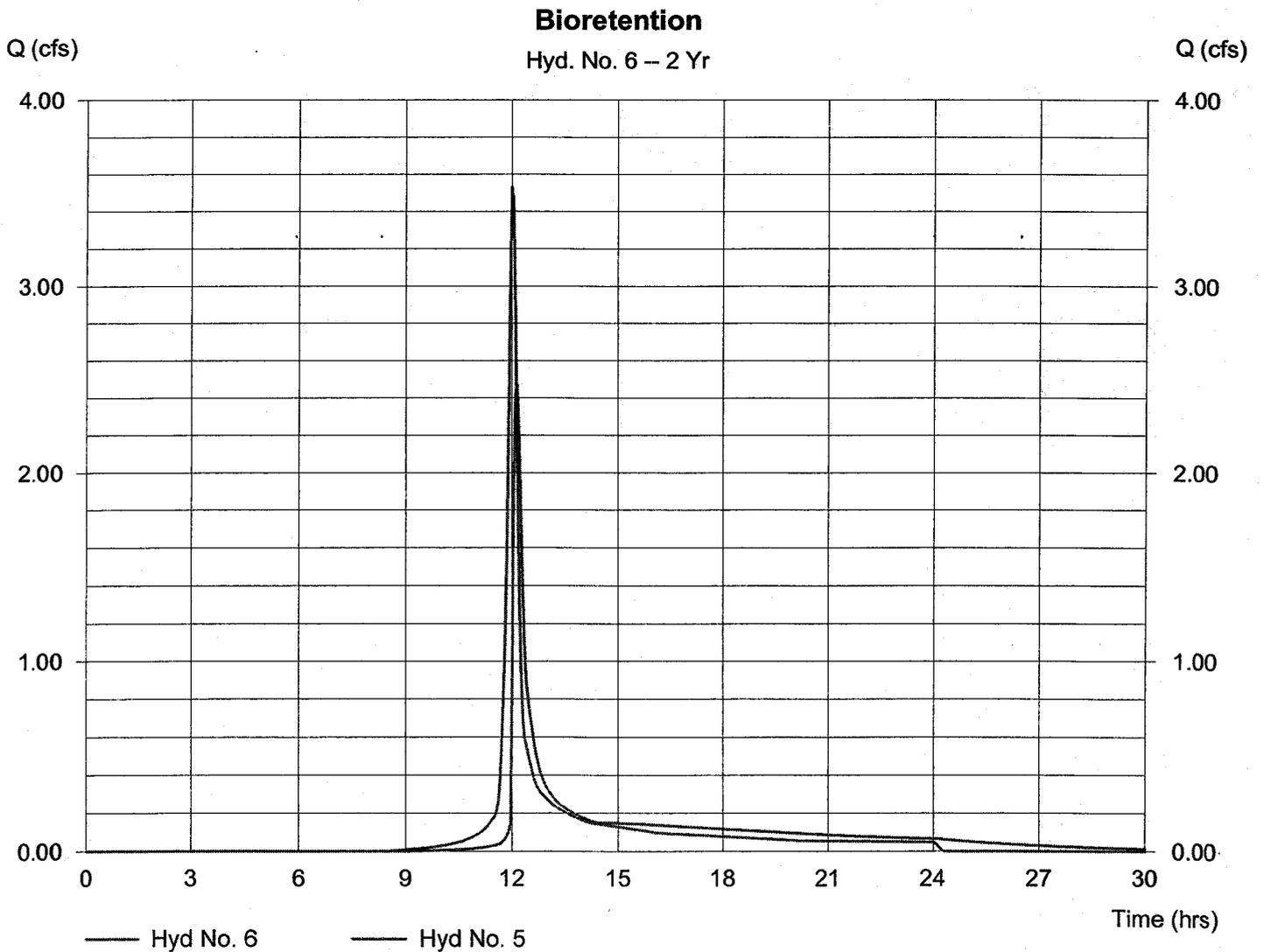
Bioretention

Hydrograph type = Reservoir  
 Storm frequency = 2 yrs  
 Inflow hyd. No. = 5  
 Reservoir name = Bioretention

Peak discharge = 2.47 cfs  
 Time interval = 3 min  
 Max. Elevation = 98.76 ft  
 Max. Storage = 2,955 cuft

Storage Indication method used.

Hydrograph Volume = 9,564 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 3 - Bioretention

### 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	98.00	2,432	0	0
1.25	99.25	5,351	4,864	4,864
2.00	100.00	8,334	5,132	9,996
3.00	101.00	16,244	12,289	22,285

### Culvert / Orifice Structures

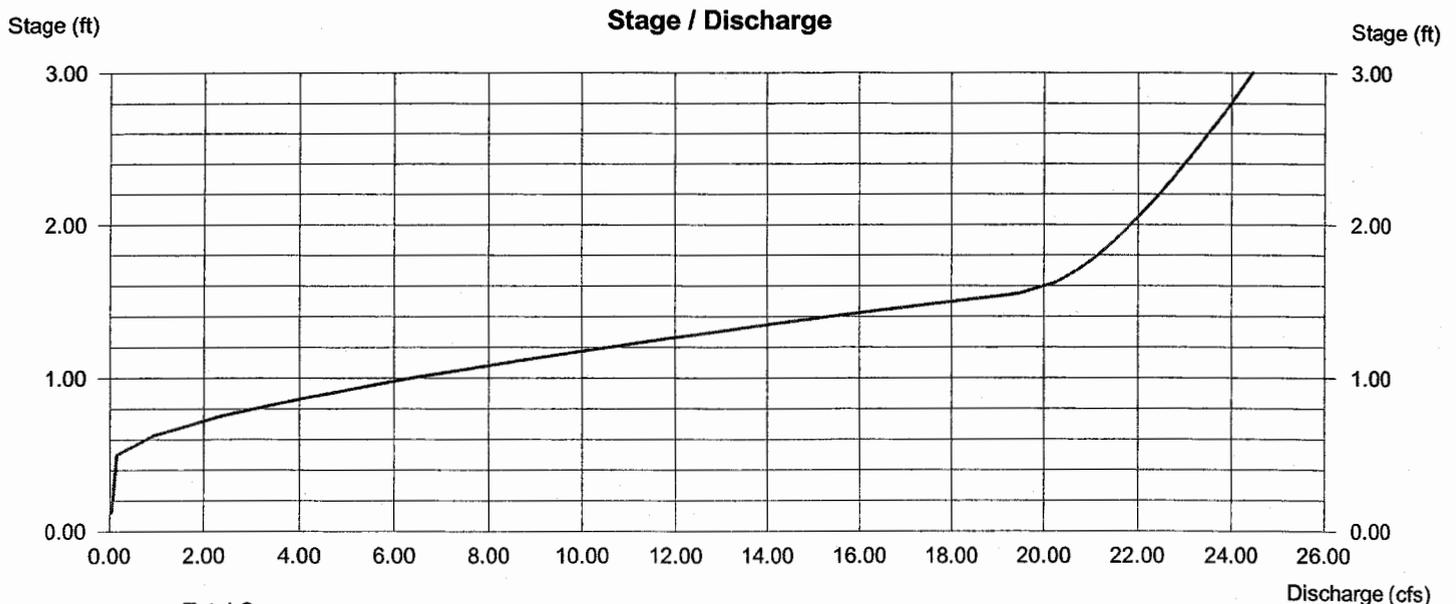
	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 92.67	0.00	0.00	0.00
Length (ft)	= 57.00	0.00	0.00	0.00
Slope (%)	= 0.47	0.00	0.00	0.00
N-Value	= .013	.013	.013	.000
Orif. Coeff.	= 0.60	0.60	0.60	0.00
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 5.00	0.00	5.00	0.00
Crest El. (ft)	= 98.50	98.50	100.61	0.00
Weir Coeff.	= 3.33	0.97	3.33	0.00
Weir Type	= Rect	70 degV	Rect	—
Multi-Stage	= Yes	Yes	Yes	No

Exfiltration = 3.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

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



# Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Jan 15 2006, 3:47 PM

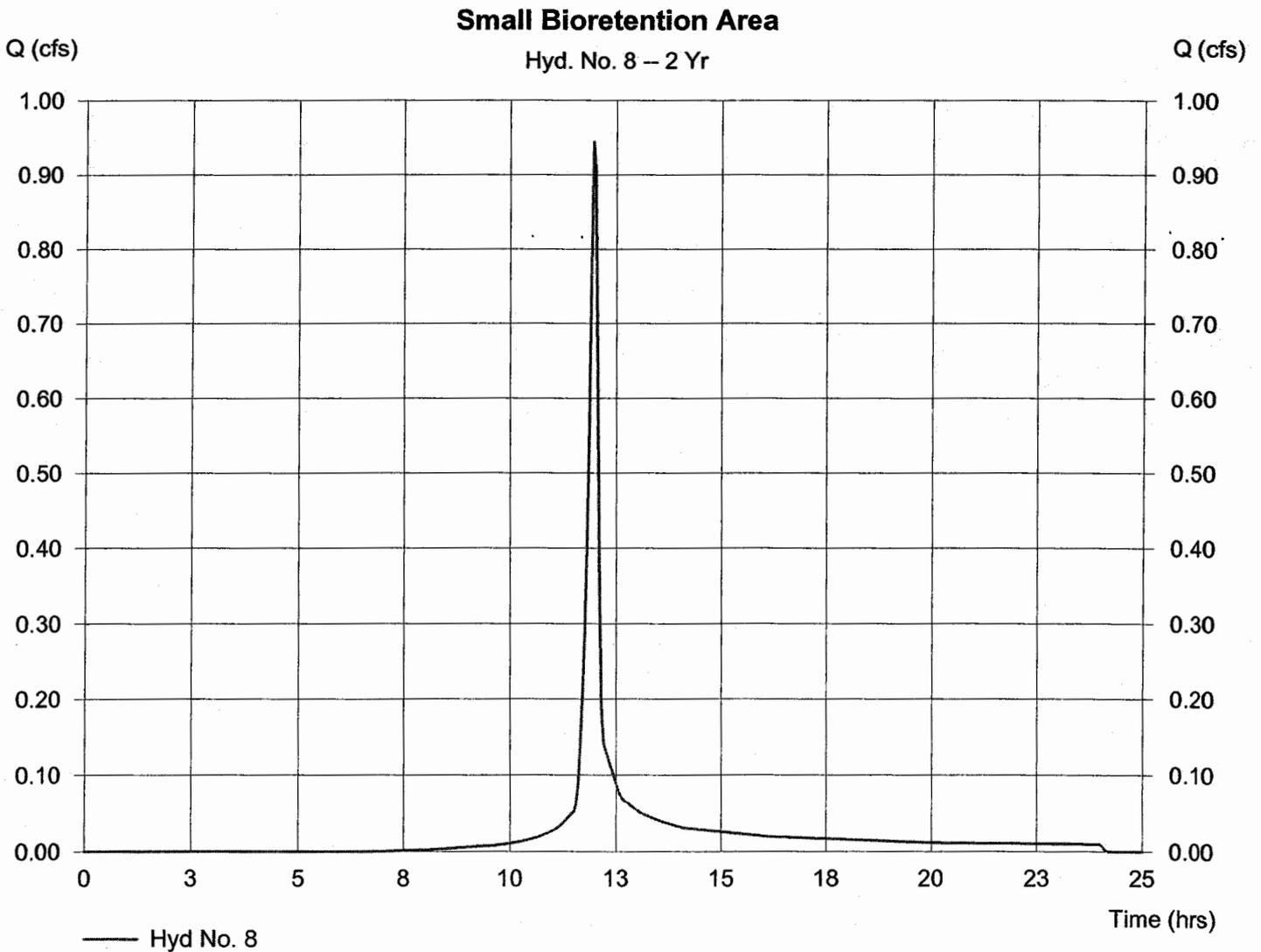
## Hyd. No. 8

### Small Bioretention Area

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 0.30 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.50 in  
Storm duration = 24 hrs

Peak discharge = 0.94 cfs  
Time interval = 3 min  
Curve number = 86  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 5 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 2,142 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 9

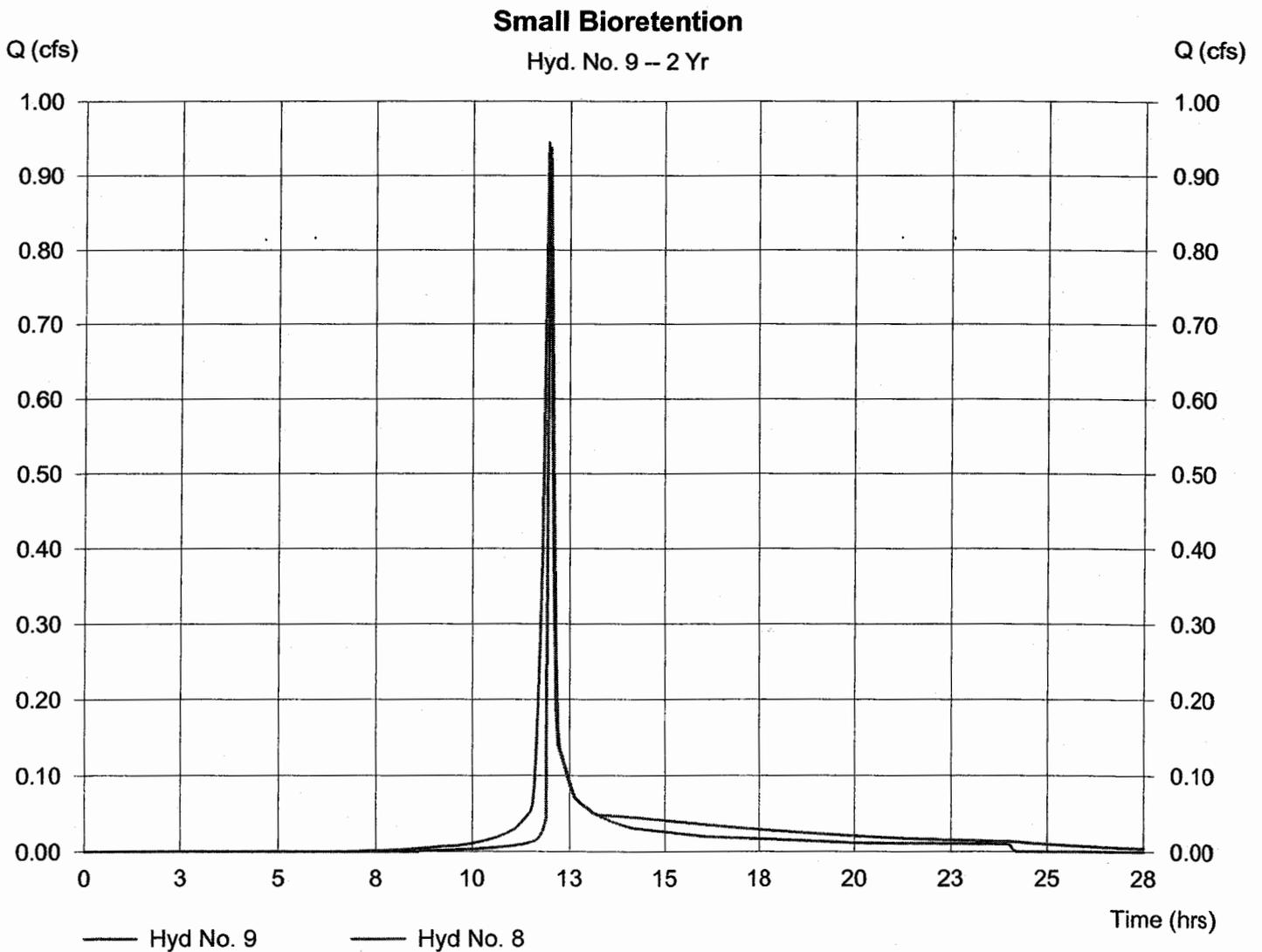
Small Bioretention

Hydrograph type = Reservoir  
Storm frequency = 2 yrs  
Inflow hyd. No. = 8  
Reservoir name = Small Bioretention

Peak discharge = 0.94 cfs  
Time interval = 3 min  
Max. Elevation = 103.57 ft  
Max. Storage = 601 cuft

Storage Indication method used.

Hydrograph Volume = 2,131 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 1 - Small Bioretention

### 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	103.00	736	0	0
1.00	104.00	1,372	1,054	1,054

### Culvert / Orifice Structures

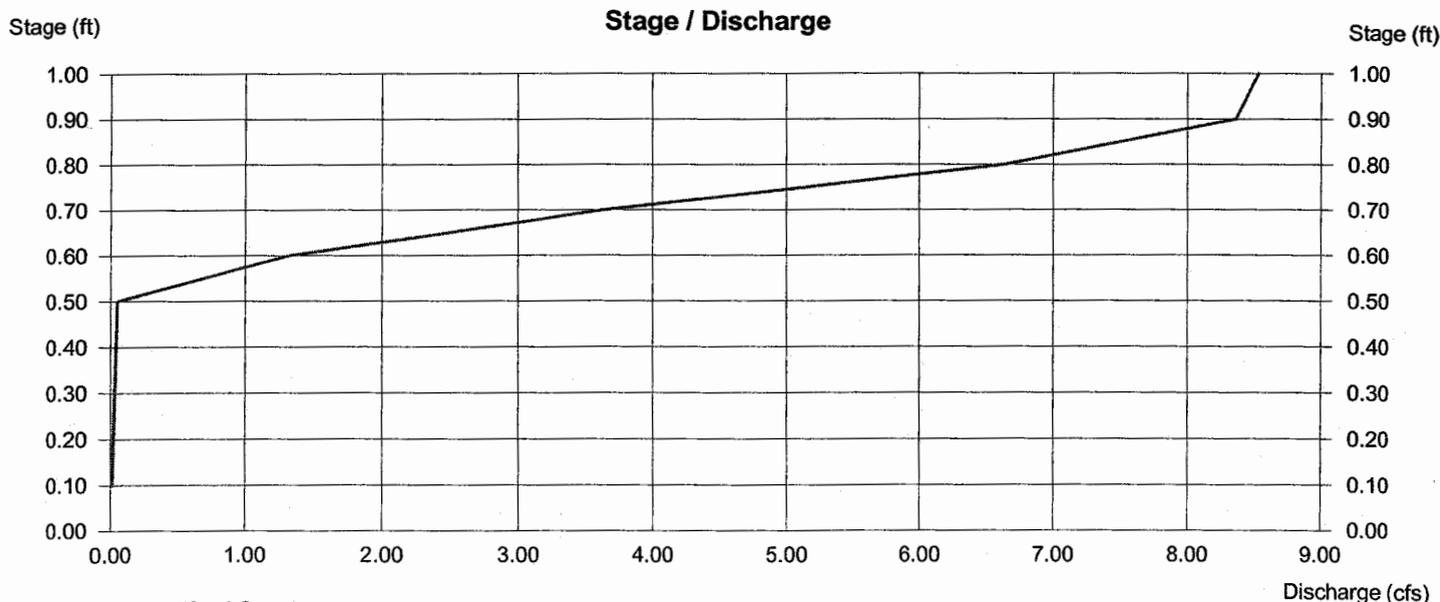
	[A]	[B]	[C]	[D]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 98.00	0.00	0.00	0.00
Length (ft)	= 44.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	0.00	0.00
Crest El. (ft)	= 103.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Riser	--	--	--
Multi-Stage	= Yes	No	No	No

Exfiltration = 3.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

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



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

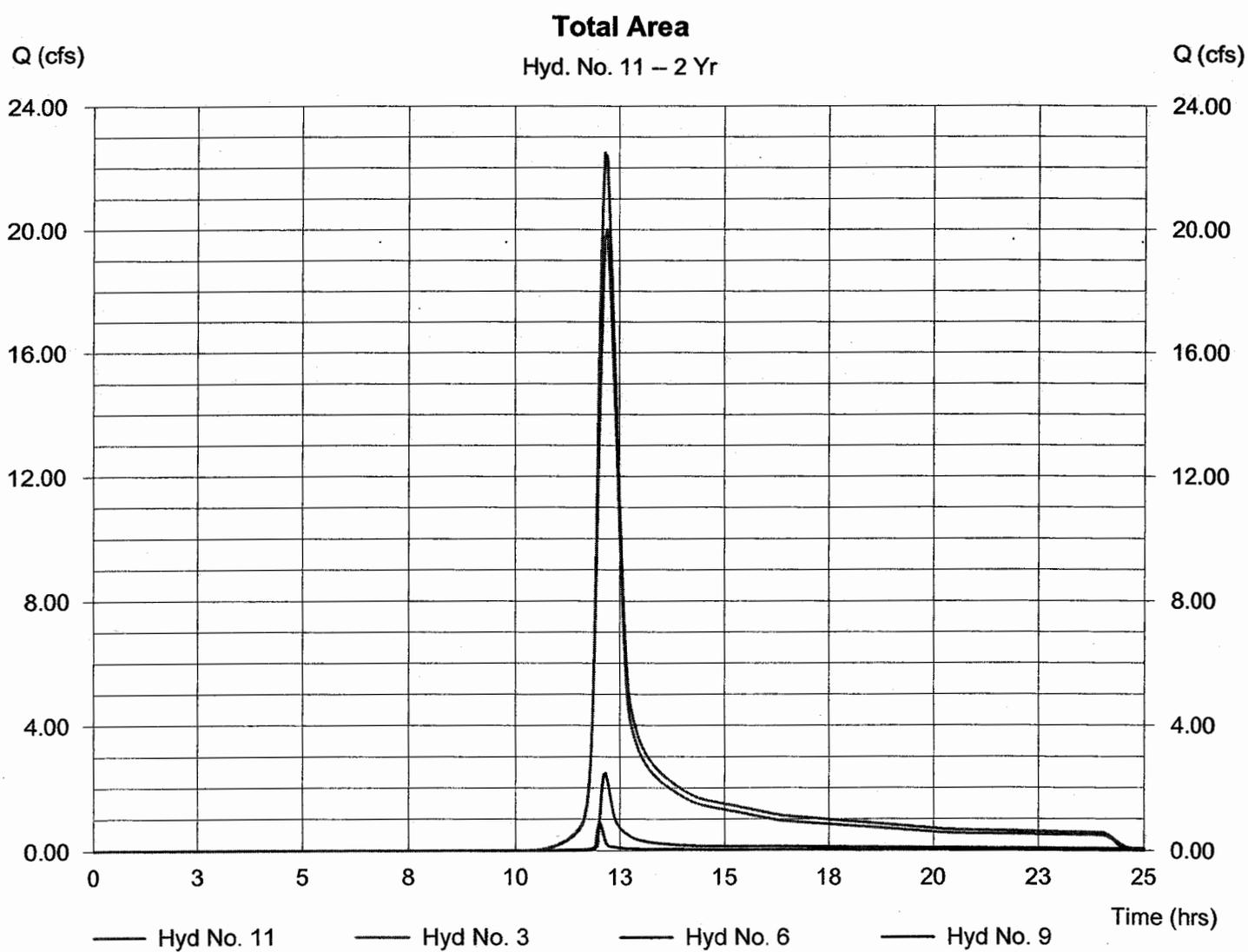
## Hyd. No. 11

Total Area

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 3, 6, 9

Peak discharge = 22.49 cfs  
Time interval = 3 min

Hydrograph Volume = 94,959 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 12

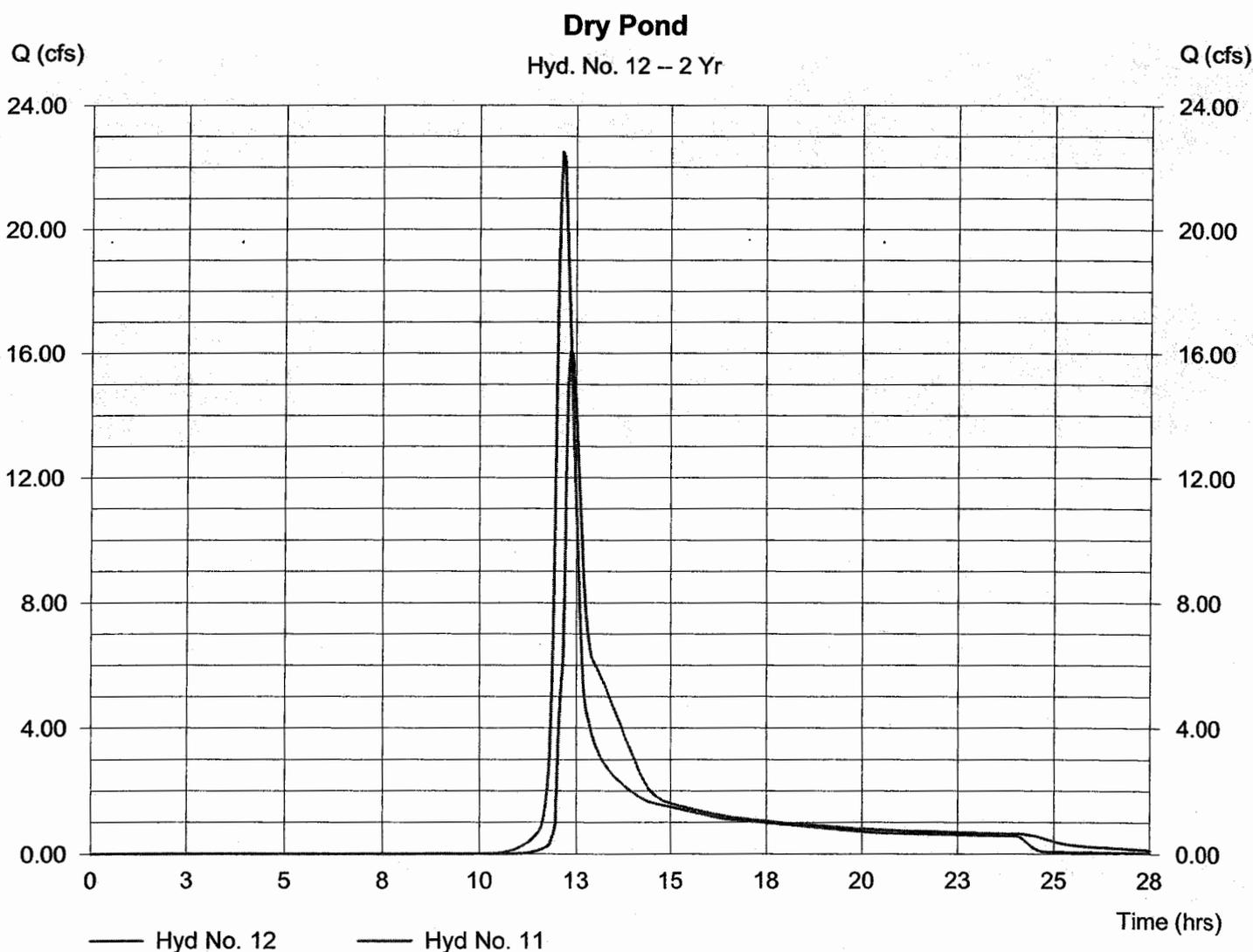
Dry Pond

Hydrograph type = Reservoir  
Storm frequency = 2 yrs  
Inflow hyd. No. = 11  
Reservoir name = Dry Pond

Peak discharge = 16.05 cfs  
Time interval = 3 min  
Max. Elevation = 80.51 ft  
Max. Storage = 21,303 cuft

Storage Indication method used.

Hydrograph Volume = 94,944 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 5 - Dry 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	76.00	3,242	0	0
1.00	77.00	3,854	3,548	3,548
2.00	78.00	4,505	4,180	7,728
3.00	79.00	5,189	4,847	12,575
4.00	80.00	5,912	5,551	18,125
5.00	81.00	6,663	6,288	24,413
6.00	82.00	7,447	7,055	31,468
7.00	83.00	8,263	7,855	39,323

### Culvert / Orifice Structures

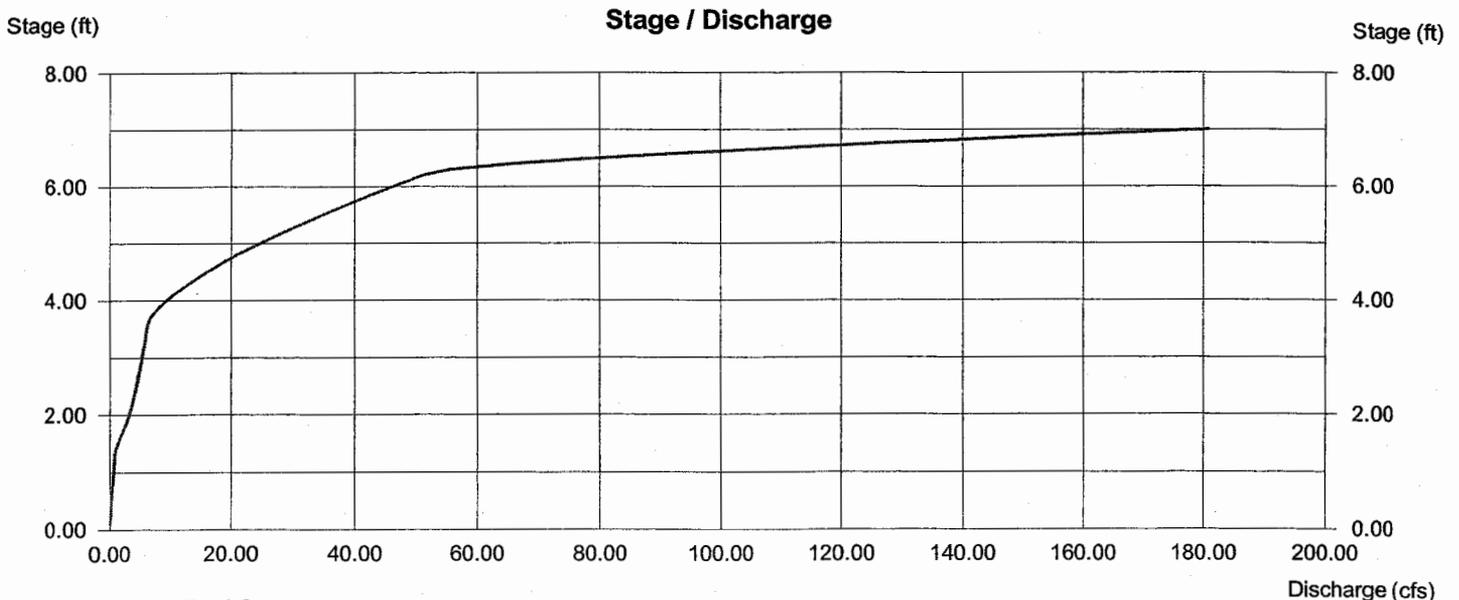
	[A]	[B]	[C]	[D]
Rise (in)	= 4.00	4.00	8.00	8.00
Span (in)	= 4.00	4.00	8.00	8.00
No. Barrels	= 1	1	1	1
Invert El. (ft)	= 76.00	76.50	77.25	77.25
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	50.00	0.00
Crest El. (ft)	= 79.60	0.00	82.25	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	Rect	---
Multi-Stage	= No	No	No	No

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

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



# Hydrograph 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	124.95	3	729	503,787	---	---	---	Predevelopment	
3	SCS Runoff	117.98	3	729	475,708	---	---	---	PostDevelopment Area	
5	SCS Runoff	15.91	3	720	44,891	---	---	---	Bioretention Area	
6	Reservoir	14.37	3	723	44,878	5	99.36	5,621	Bioretention	
8	SCS Runoff	3.73	3	717	9,055	---	---	---	Small Bioretention Area	
9	Reservoir	3.60	3	720	9,044	8	103.70	736	Small Bioretention	
11	Combine	131.32	3	729	529,630	3, 6, 9,	---	---	Total Area	
12	Reservoir	130.76	3	729	529,615	11	82.78	37,592	Dry Pond	
9551-00 -Bay Aging.gpw							Return Period: 3 Year		Sunday, Jan 15 2006, 3:47 PM	
CC032_BAY_AGING_SR_HOUSING_IRONBOUND_SQUARE - 060										

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 1

### Predevelopment

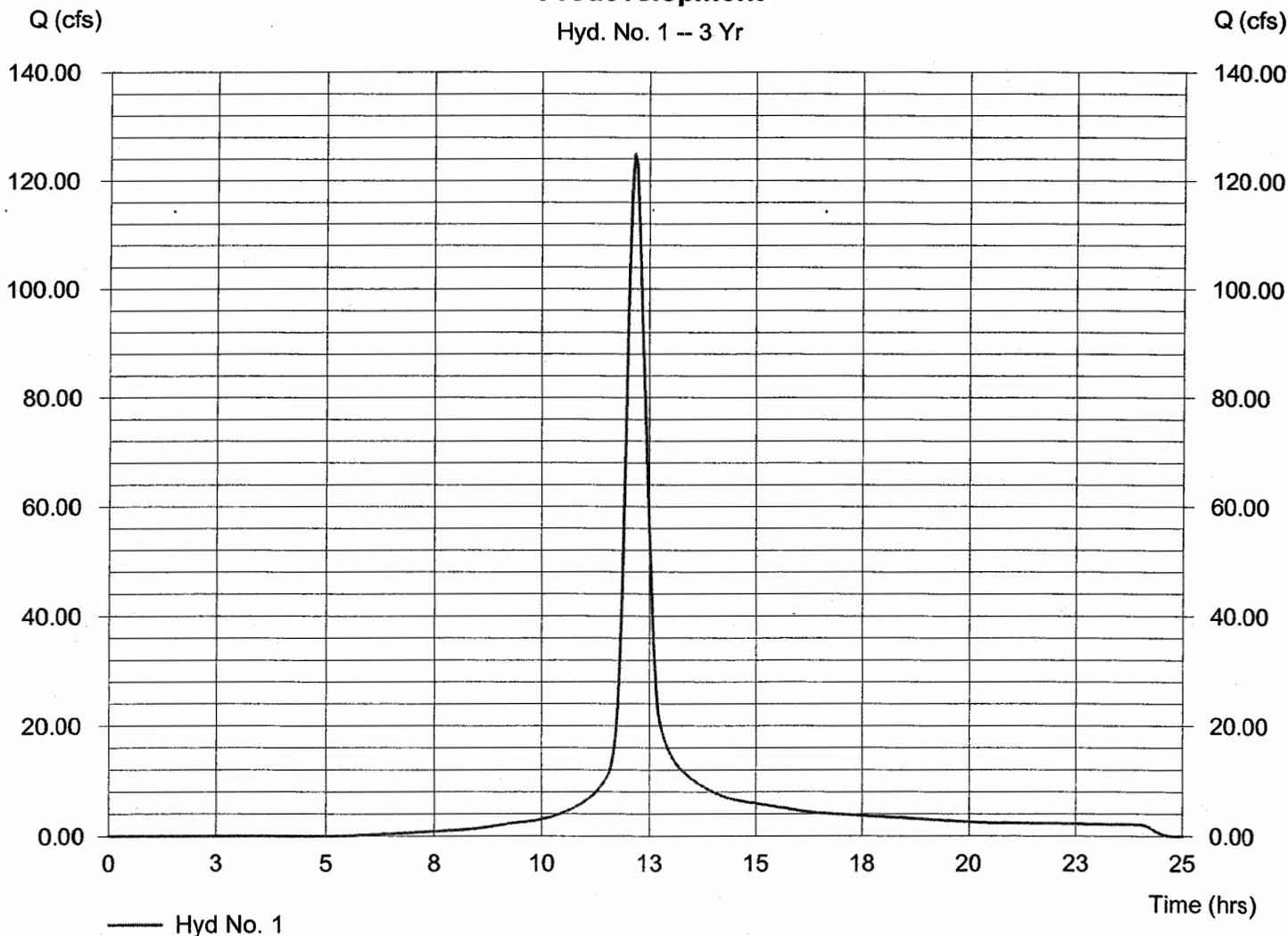
Hydrograph type = SCS Runoff  
 Storm frequency = 3 yrs  
 Drainage area = 18.66 ac  
 Basin Slope = 0.0 %  
 Tc method = TR55  
 Total precip. = 10.60 in  
 Storm duration = 24 hrs

Peak discharge = 124.95 cfs  
 Time interval = 3 min  
 Curve number = 75  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 29 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 503,787 cuft

### Predevelopment

Hyd. No. 1 -- 3 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Jan 15 2006, 3:47 PM

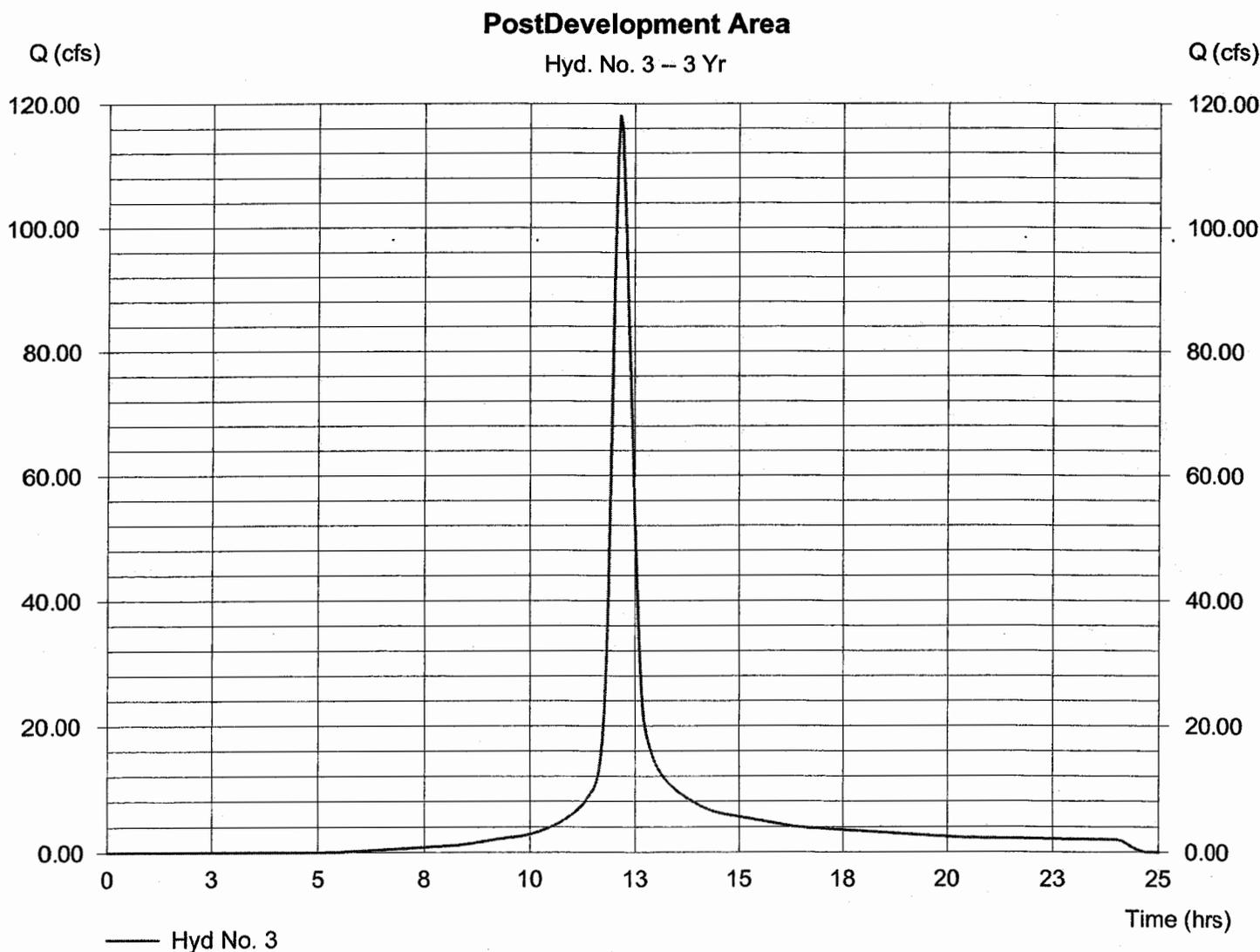
## Hyd. No. 3

PostDevelopment Area

Hydrograph type = SCS Runoff  
 Storm frequency = 3 yrs  
 Drainage area = 17.62 ac  
 Basin Slope = 0.0 %  
 Tc method = TR55  
 Total precip. = 10.60 in  
 Storm duration = 24 hrs

Peak discharge = 117.98 cfs  
 Time interval = 3 min  
 Curve number = 75  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 29 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 475,708 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

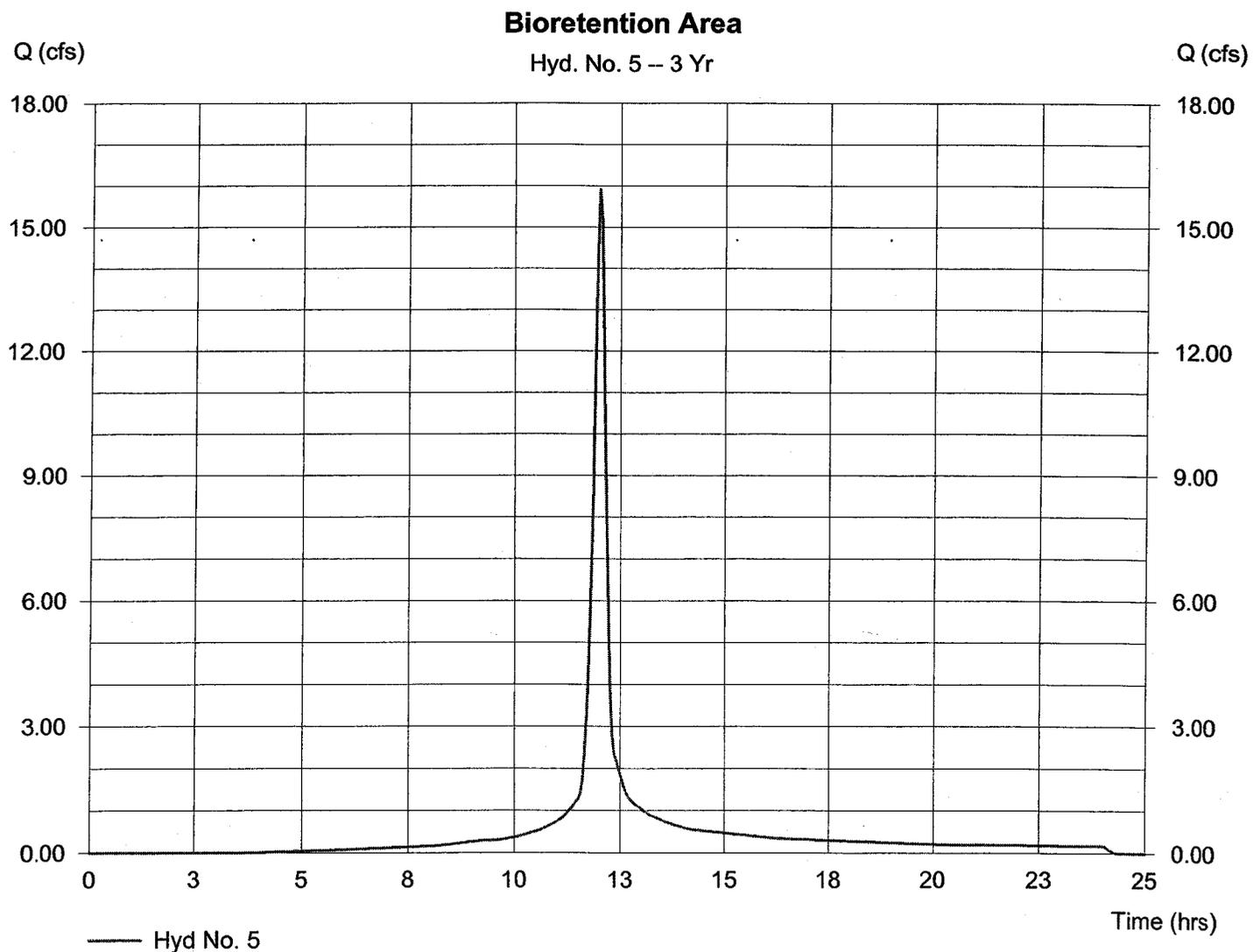
## Hyd. No. 5

### Bioretention Area

Hydrograph type = SCS Runoff  
 Storm frequency = 3 yrs  
 Drainage area = 1.48 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 10.60 in  
 Storm duration = 24 hrs

Peak discharge = 15.91 cfs  
 Time interval = 3 min  
 Curve number = 82  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 10 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 44,891 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 6

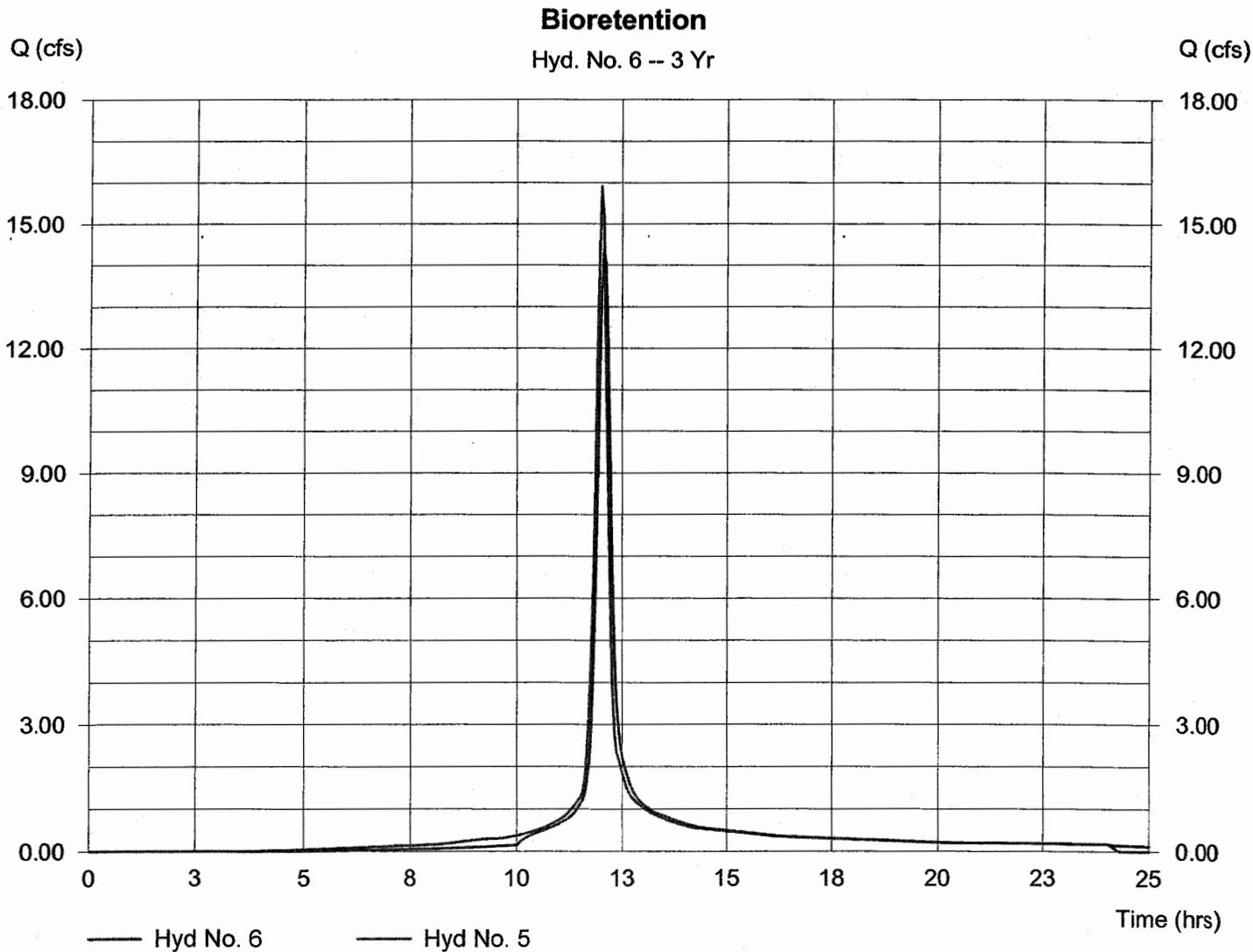
Bioretention

Hydrograph type = Reservoir  
 Storm frequency = 3 yrs  
 Inflow hyd. No. = 5  
 Reservoir name = Bioretention

Peak discharge = 14.37 cfs  
 Time interval = 3 min  
 Max. Elevation = 99.36 ft  
 Max. Storage = 5,621 cuft

Storage Indication method used.

Hydrograph Volume = 44,878 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 3 - Bioretention

### 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	98.00	2,432	0	0
1.25	99.25	5,351	4,864	4,864
2.00	100.00	8,334	5,132	9,996
3.00	101.00	16,244	12,289	22,285

### Culvert / Orifice Structures

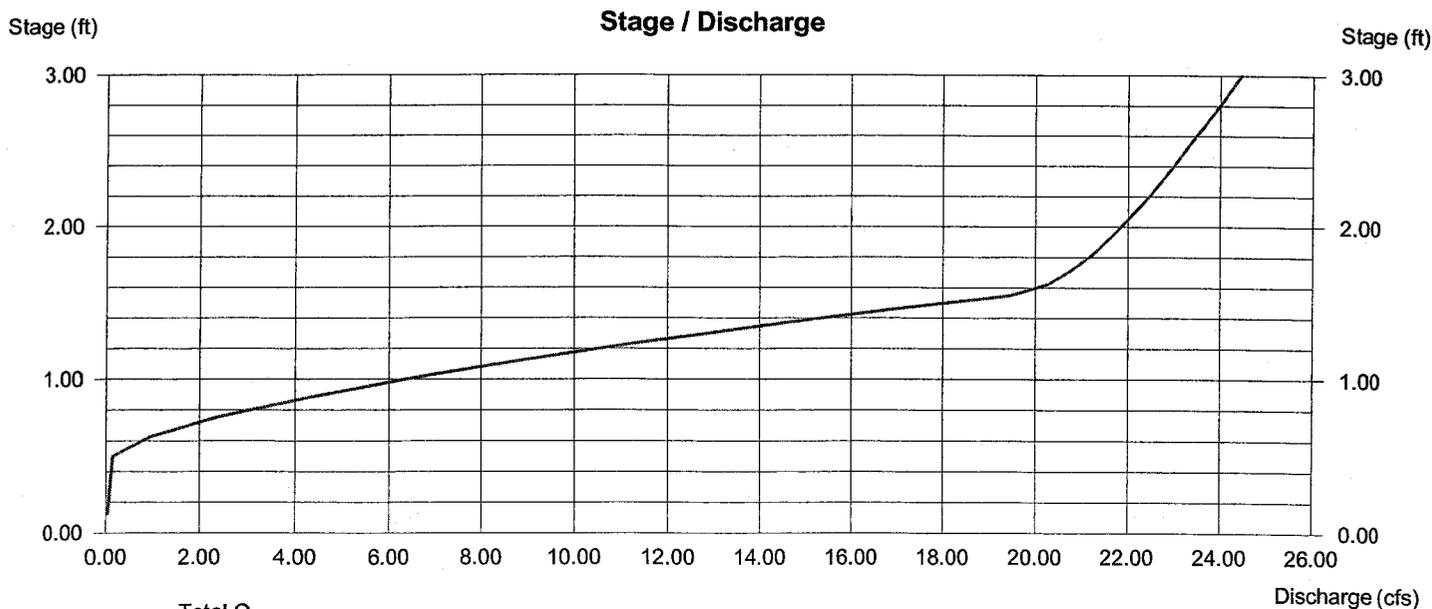
	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 92.67	0.00	0.00	0.00
Length (ft)	= 57.00	0.00	0.00	0.00
Slope (%)	= 0.47	0.00	0.00	0.00
N-Value	= .013	.013	.013	.000
Orif. Coeff.	= 0.60	0.60	0.60	0.00
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 5.00	0.00	5.00	0.00
Crest El. (ft)	= 98.50	98.50	100.61	0.00
Weir Coeff.	= 3.33	0.97	3.33	0.00
Weir Type	= Rect	70 degV	Rect	—
Multi-Stage	= Yes	Yes	Yes	No

Exfiltration = 3.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

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



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

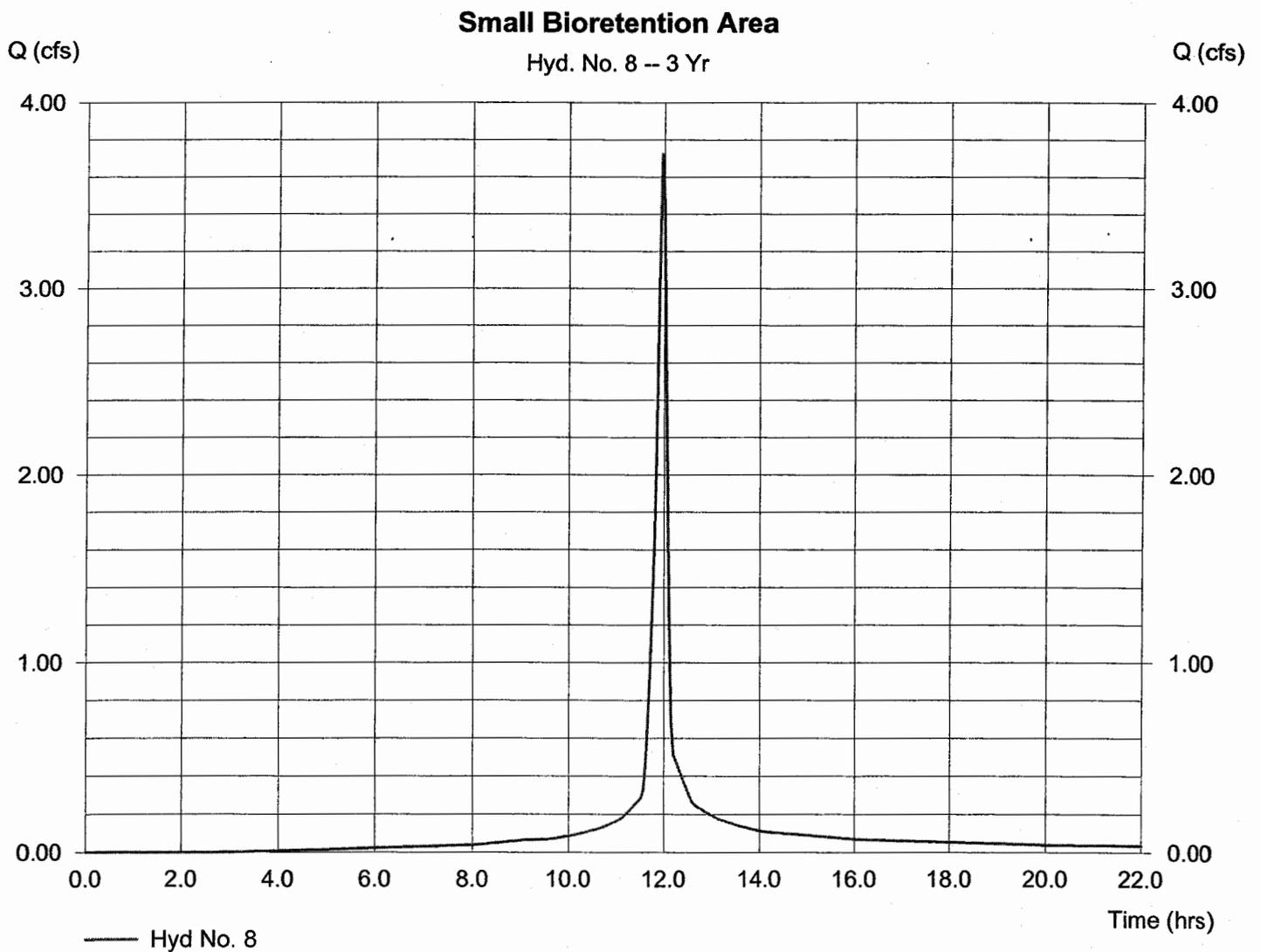
## Hyd. No. 8

### Small Bioretention Area

Hydrograph type = SCS Runoff  
 Storm frequency = 3 yrs  
 Drainage area = 0.30 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 10.60 in  
 Storm duration = 24 hrs

Peak discharge = 3.73 cfs  
 Time interval = 3 min  
 Curve number = 86  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 5 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 9,055 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 9

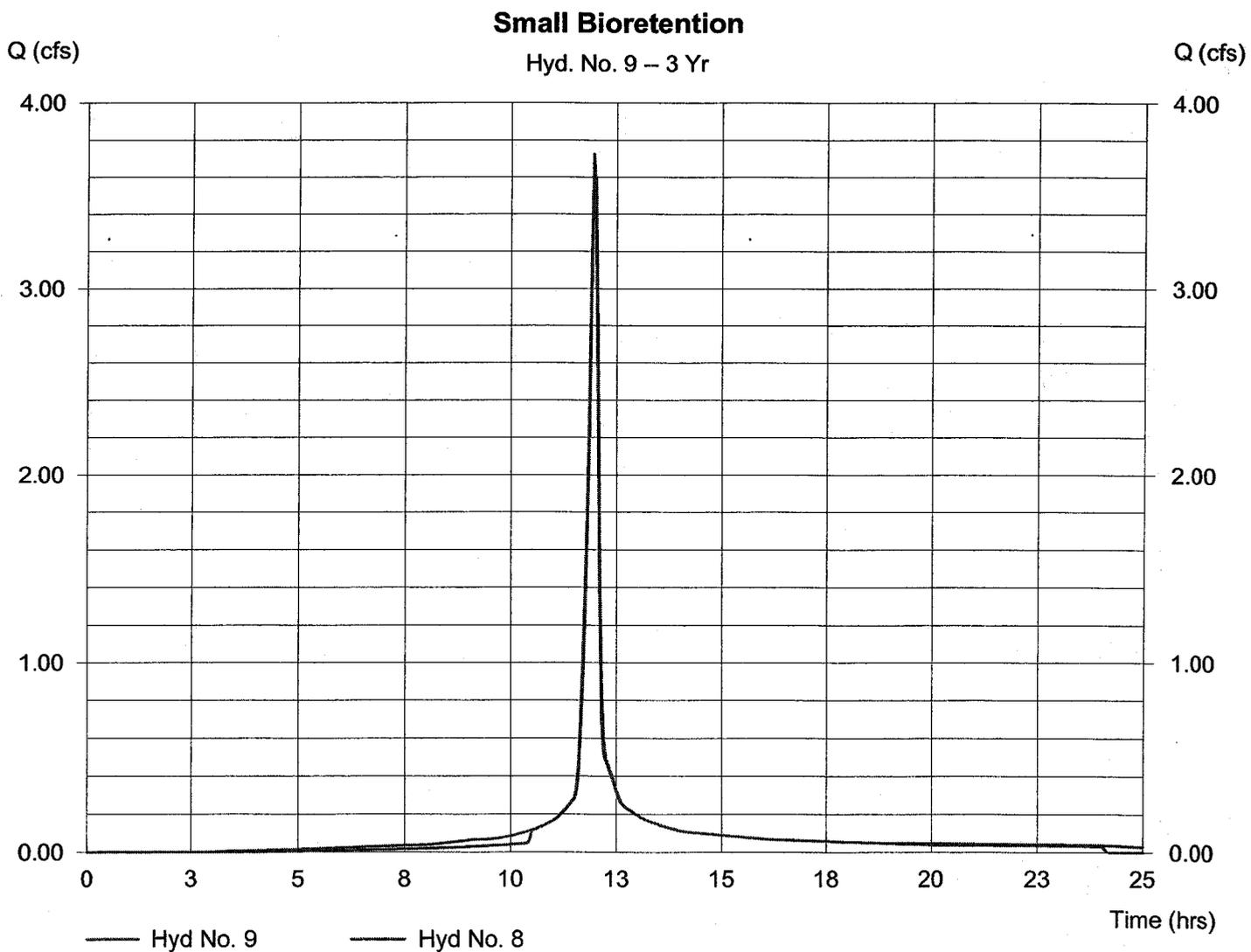
### Small Bioretention

Hydrograph type = Reservoir  
 Storm frequency = 3 yrs  
 Inflow hyd. No. = 8  
 Reservoir name = Small Bioretention

Peak discharge = 3.60 cfs  
 Time interval = 3 min  
 Max. Elevation = 103.70 ft  
 Max. Storage = 736 cuft

Storage Indication method used.

Hydrograph Volume = 9,044 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 1 - Small Bioretention

### 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	103.00	736	0	0
1.00	104.00	1,372	1,054	1,054

### Culvert / Orifice Structures

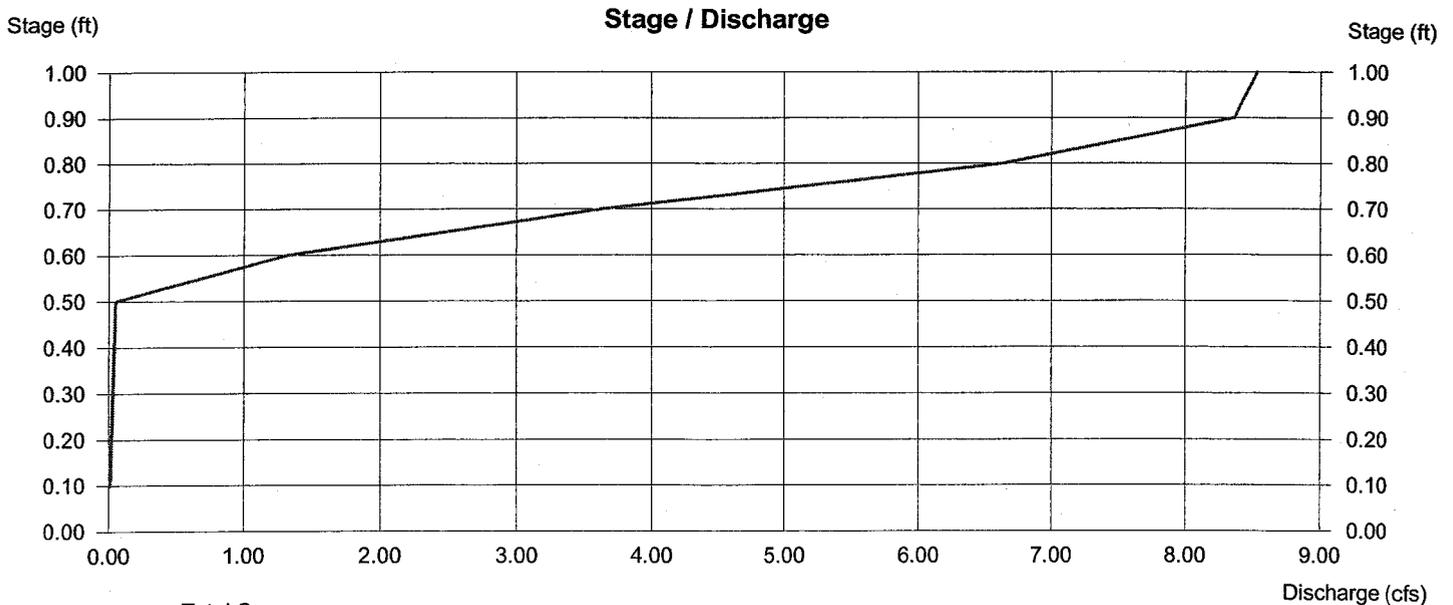
	[A]	[B]	[C]	[D]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 98.00	0.00	0.00	0.00
Length (ft)	= 44.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	0.00	0.00
Crest El. (ft)	= 103.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 3.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

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



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

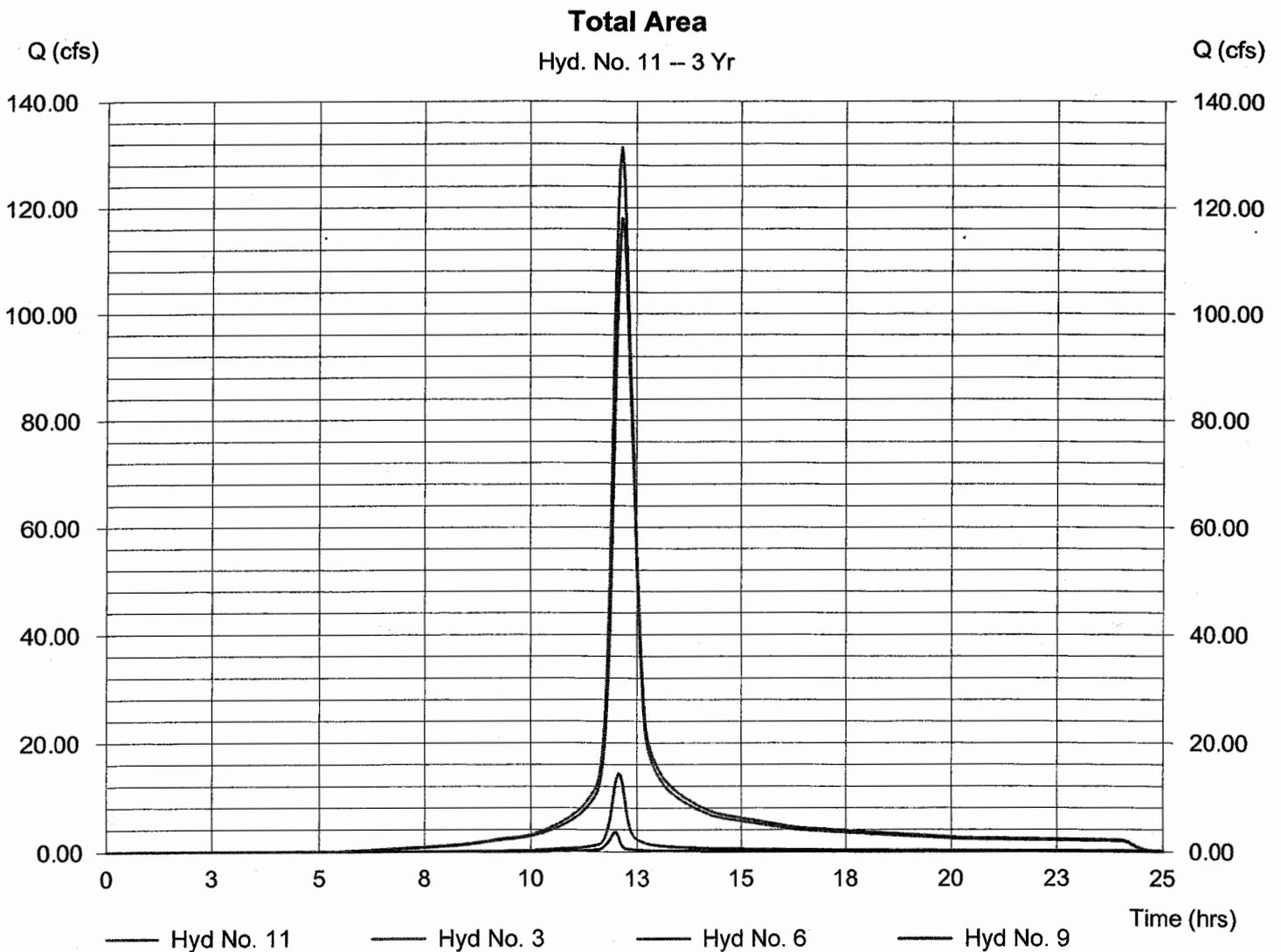
## Hyd. No. 11

Total Area

Hydrograph type = Combine  
Storm frequency = 3 yrs  
Inflow hyds. = 3, 6, 9

Peak discharge = 131.32 cfs  
Time interval = 3 min

Hydrograph Volume = 529,630 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 12

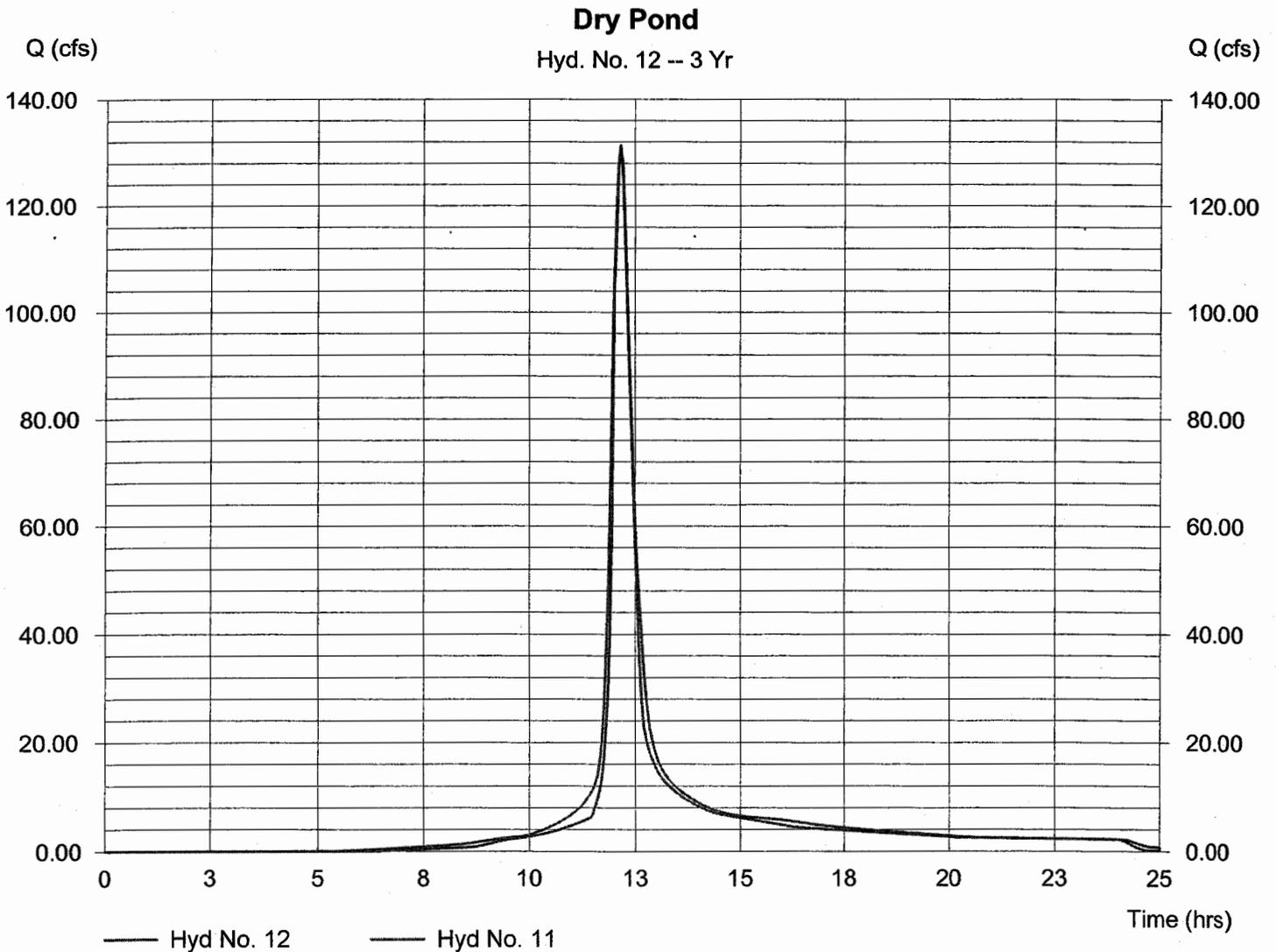
Dry Pond

Hydrograph type = Reservoir  
Storm frequency = 3 yrs  
Inflow hyd. No. = 11  
Reservoir name = Dry Pond

Peak discharge = 130.76 cfs  
Time interval = 3 min  
Max. Elevation = 82.78 ft  
Max. Storage = 37,592 cuft

Storage Indication method used.

Hydrograph Volume = 529,615 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 5 - Dry 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	76.00	3,242	0	0
1.00	77.00	3,854	3,548	3,548
2.00	78.00	4,505	4,180	7,728
3.00	79.00	5,189	4,847	12,575
4.00	80.00	5,912	5,551	18,125
5.00	81.00	6,663	6,288	24,413
6.00	82.00	7,447	7,055	31,468
7.00	83.00	8,263	7,855	39,323

### Culvert / Orifice Structures

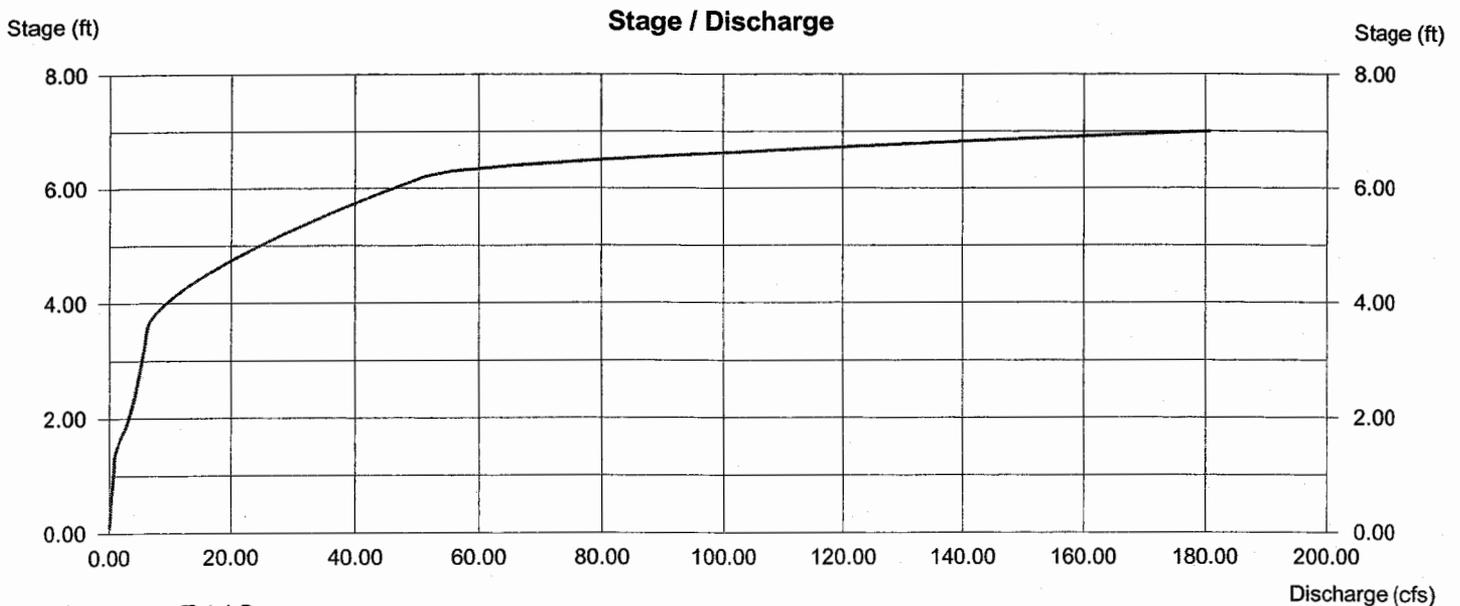
	[A]	[B]	[C]	[D]
Rise (in)	= 4.00	4.00	8.00	8.00
Span (in)	= 4.00	4.00	8.00	8.00
No. Barrels	= 1	1	1	1
Invert El. (ft)	= 76.00	76.50	77.25	77.25
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	50.00	0.00
Crest El. (ft)	= 79.60	0.00	82.25	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	Rect	---
Multi-Stage	= No	No	No	No

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

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



# Hydrograph 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	52.47	3	729	210,816	---	---	---	Predevelopment	
3	SCS Runoff	49.55	3	729	199,067	---	---	---	PostDevelopment Area	
5	SCS Runoff	7.49	3	720	20,434	---	---	---	Bioretention Area	
6	Reservoir	6.80	3	723	20,421	5	99.02	3,978	Bioretention	
8	SCS Runoff	1.85	3	717	4,308	---	---	---	Small Bioretention Area	
9	Reservoir	1.80	3	717	4,297	8	103.62	654	Small Bioretention	
11	Combine	55.81	3	729	223,785	3, 6, 9,	---	---	Total Area	
12	Reservoir	51.08	3	735	223,770	11	82.20	33,025	Dry Pond	
9551-00 -Bay Aging.gpw					Return Period: 10 Year			Sunday, Jan 15 2006, 3:47 PM		
CC032_BAY_AGING_SR_HOUSING_IRONBOUND_SQUARE - 072										

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

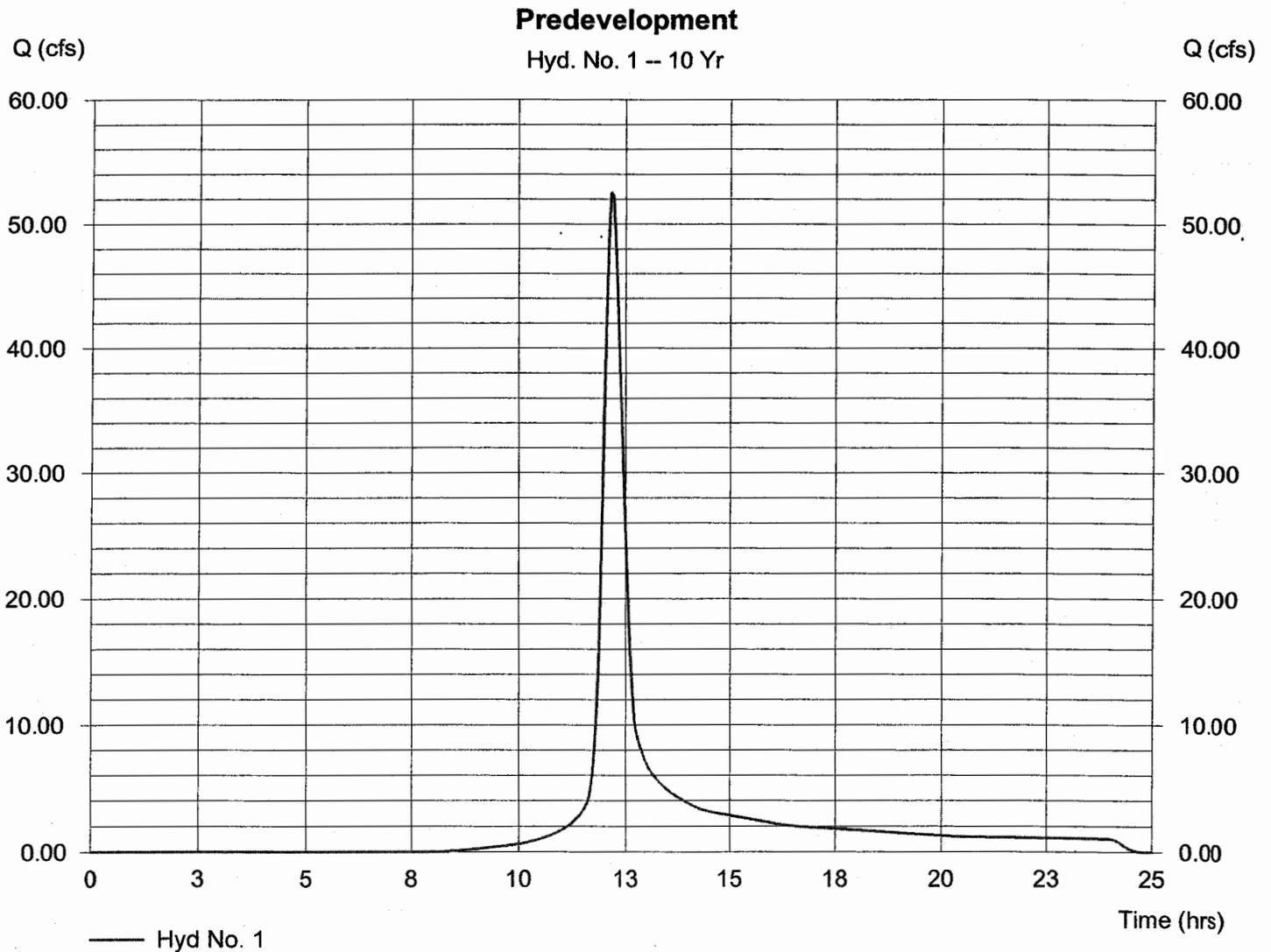
## Hyd. No. 1

### Predevelopment

Hydrograph type = SCS Runoff  
 Storm frequency = 10 yrs  
 Drainage area = 18.66 ac  
 Basin Slope = 0.0 %  
 Tc method = TR55  
 Total precip. = 5.80 in  
 Storm duration = 24 hrs

Peak discharge = 52.47 cfs  
 Time interval = 3 min  
 Curve number = 75  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 29 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 210,816 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Jan 15 2006, 3:47 PM

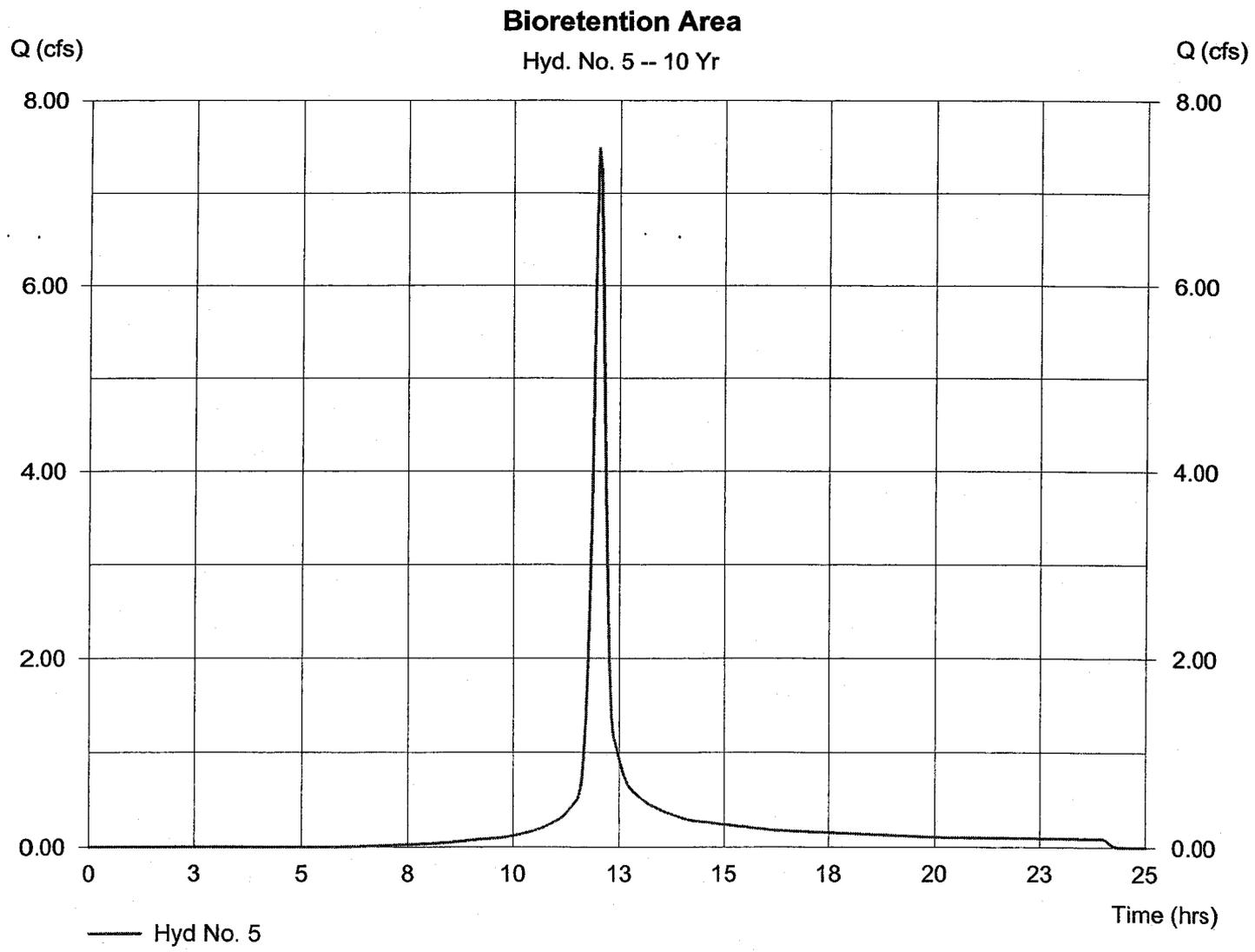
## Hyd. No. 5

### Bioretention Area

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 1.48 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.80 in  
Storm duration = 24 hrs

Peak discharge = 7.49 cfs  
Time interval = 3 min  
Curve number = 82  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 10 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 20,434 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15, 2006, 3:47 PM

## Hyd. No. 3

### PostDevelopment Area

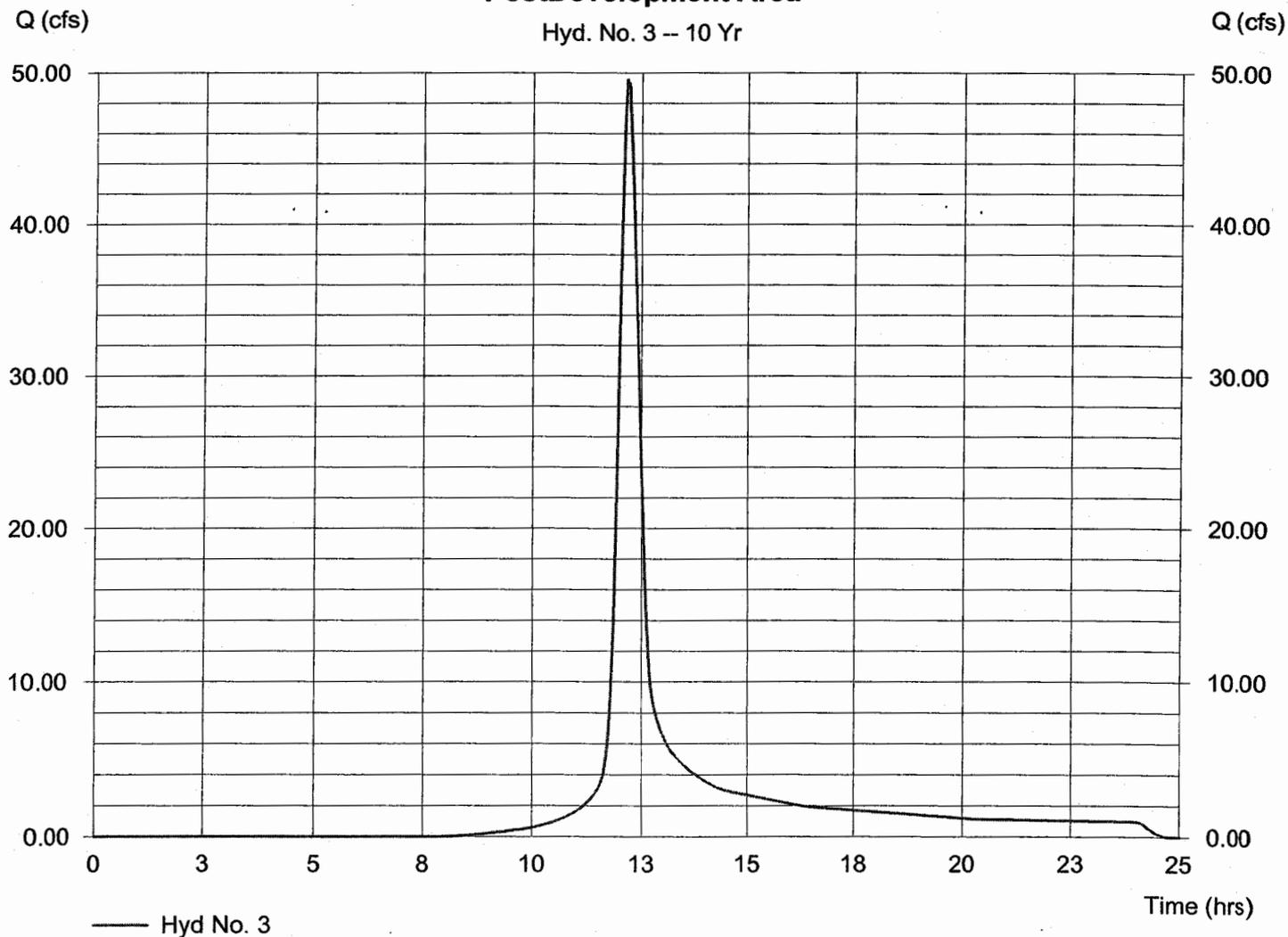
Hydrograph type = SCS Runoff  
 Storm frequency = 10 yrs  
 Drainage area = 17.62 ac  
 Basin Slope = 0.0 %  
 Tc method = TR55  
 Total precip. = 5.80 in  
 Storm duration = 24 hrs

Peak discharge = 49.55 cfs  
 Time interval = 3 min  
 Curve number = 75  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 29 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 199,067 cuft

### PostDevelopment Area

Hyd. No. 3 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 6

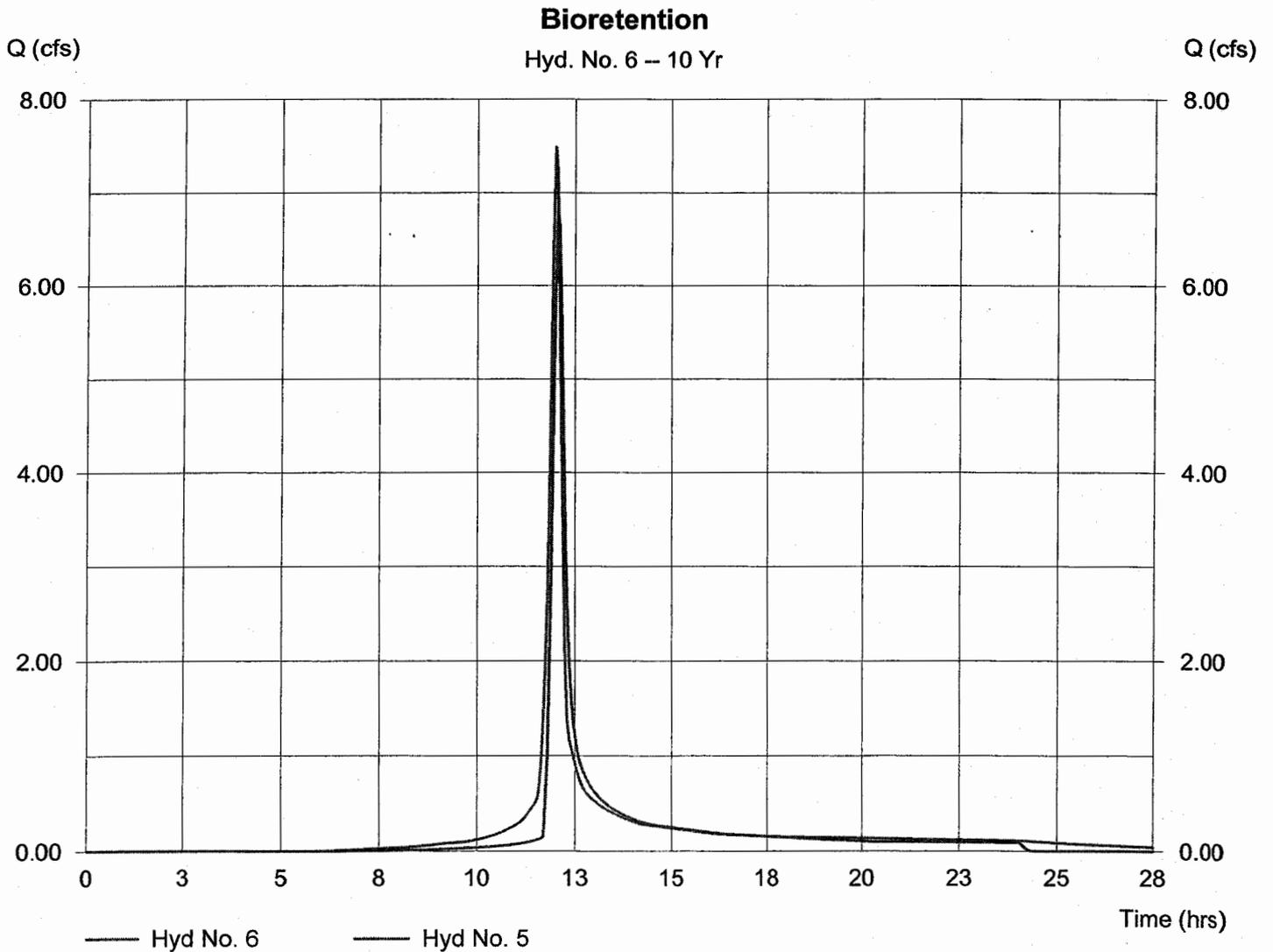
### Bioretention

Hydrograph type = Reservoir  
 Storm frequency = 10 yrs  
 Inflow hyd. No. = 5  
 Reservoir name = Bioretention

Peak discharge = 6.80 cfs  
 Time interval = 3 min  
 Max. Elevation = 99.02 ft  
 Max. Storage = 3,978 cuft

Storage Indication method used.

Hydrograph Volume = 20,421 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 3 - Bioretention

### 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	98.00	2,432	0	0
1.25	99.25	5,351	4,864	4,864
2.00	100.00	8,334	5,132	9,996
3.00	101.00	16,244	12,289	22,285

$Q = K(L - 0.2H) \cdot H^{1.5}$   
 $Q = K \cdot H^{2.5}$

### Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 92.67	0.00	0.00	0.00
Length (ft)	= 57.00	0.00	0.00	0.00
Slope (%)	= 0.47	0.00	0.00	0.00
N-Value	= .013	.013	.013	.000
Orif. Coeff.	= 0.60	0.60	0.60	0.00
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 5.00	0.00	5.00	0.00
Crest El. (ft)	= 98.50	98.50	100.61	0.00
Weir Coeff. (K)	= 3.33	0.97	3.33	0.00
Weir Type	= Rect	70 degV	Rect	—
Multi-Stage	= Yes	Yes	Yes	No

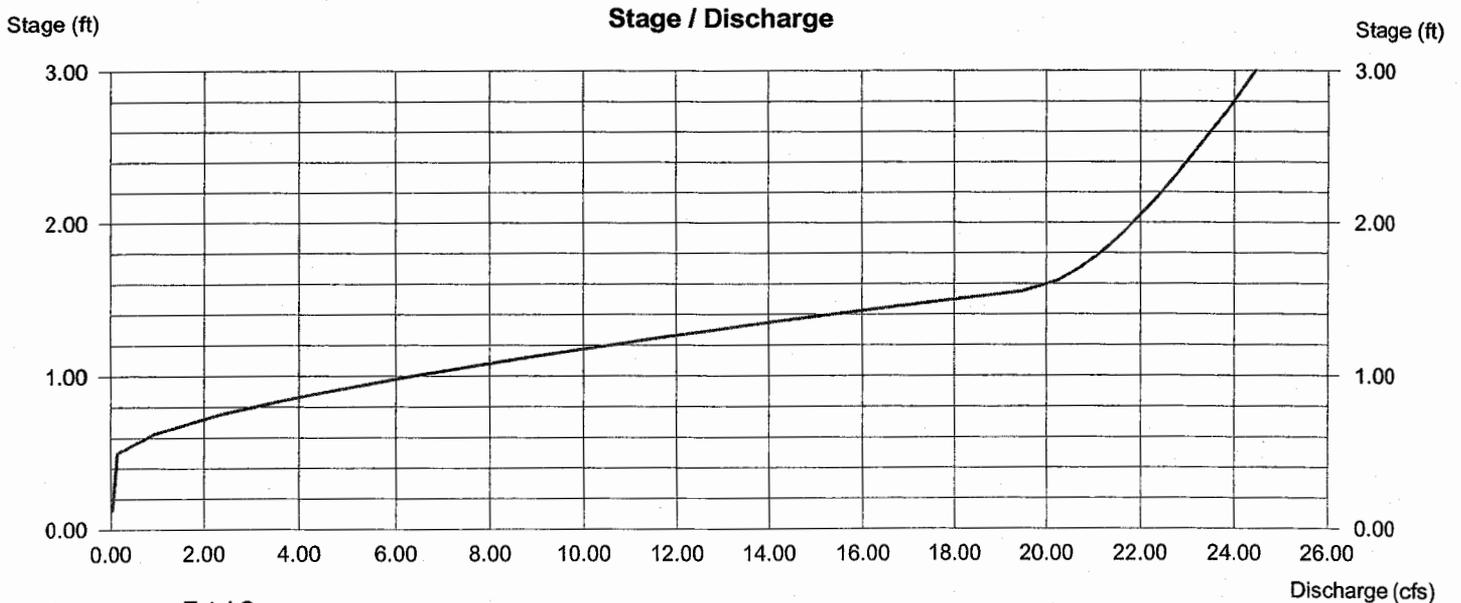
SHOULD BE SLIGHTLY HIGHER

Exfiltration = 3.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

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

TJAN  
1.443

FROM ISCO



# Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Jan 15 2006, 3:47 PM

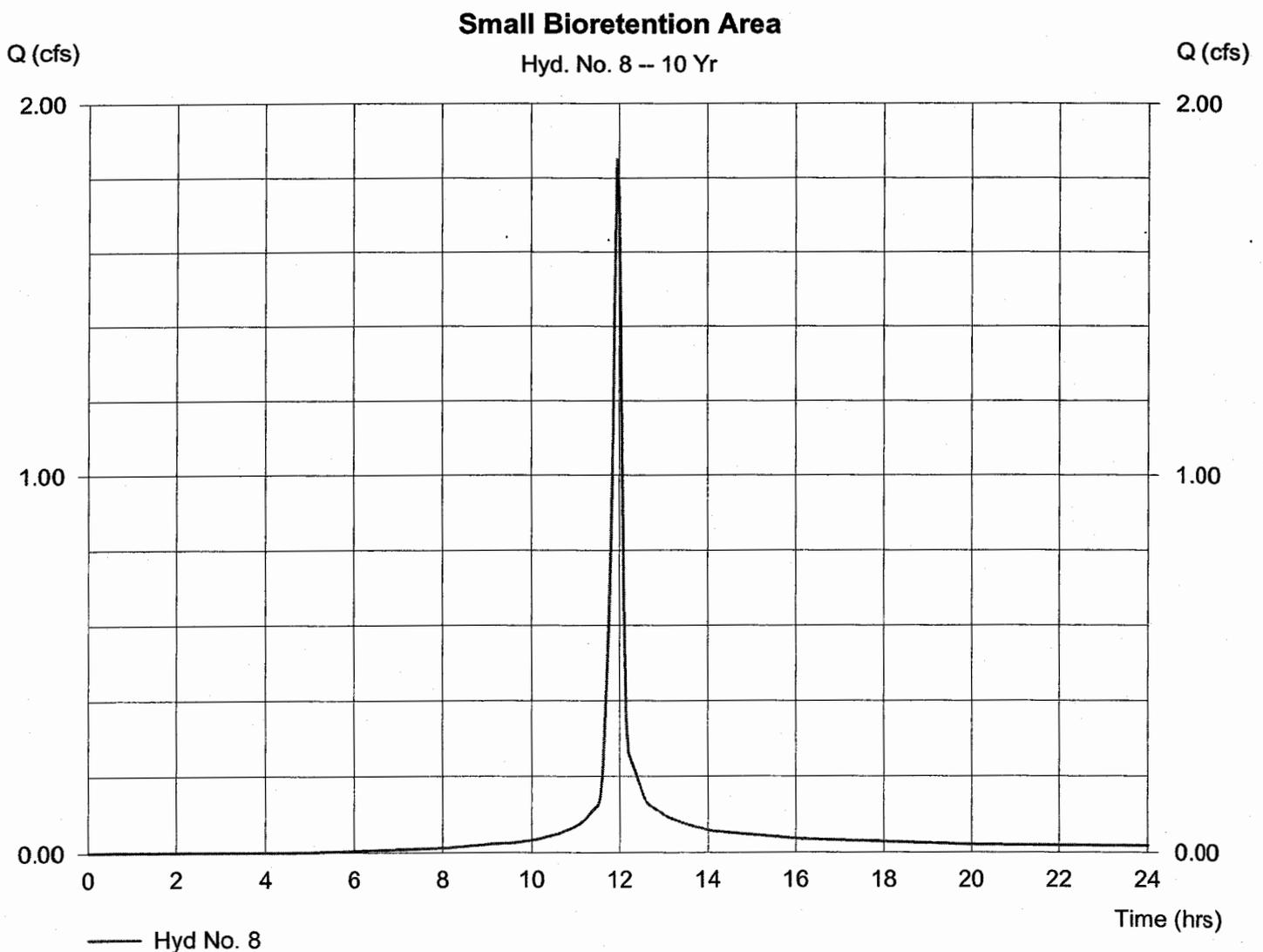
## Hyd. No. 8

### Small Bioretention Area

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 0.30 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.80 in  
Storm duration = 24 hrs

Peak discharge = 1.85 cfs  
Time interval = 3 min  
Curve number = 86  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 5 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 4,308 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 9

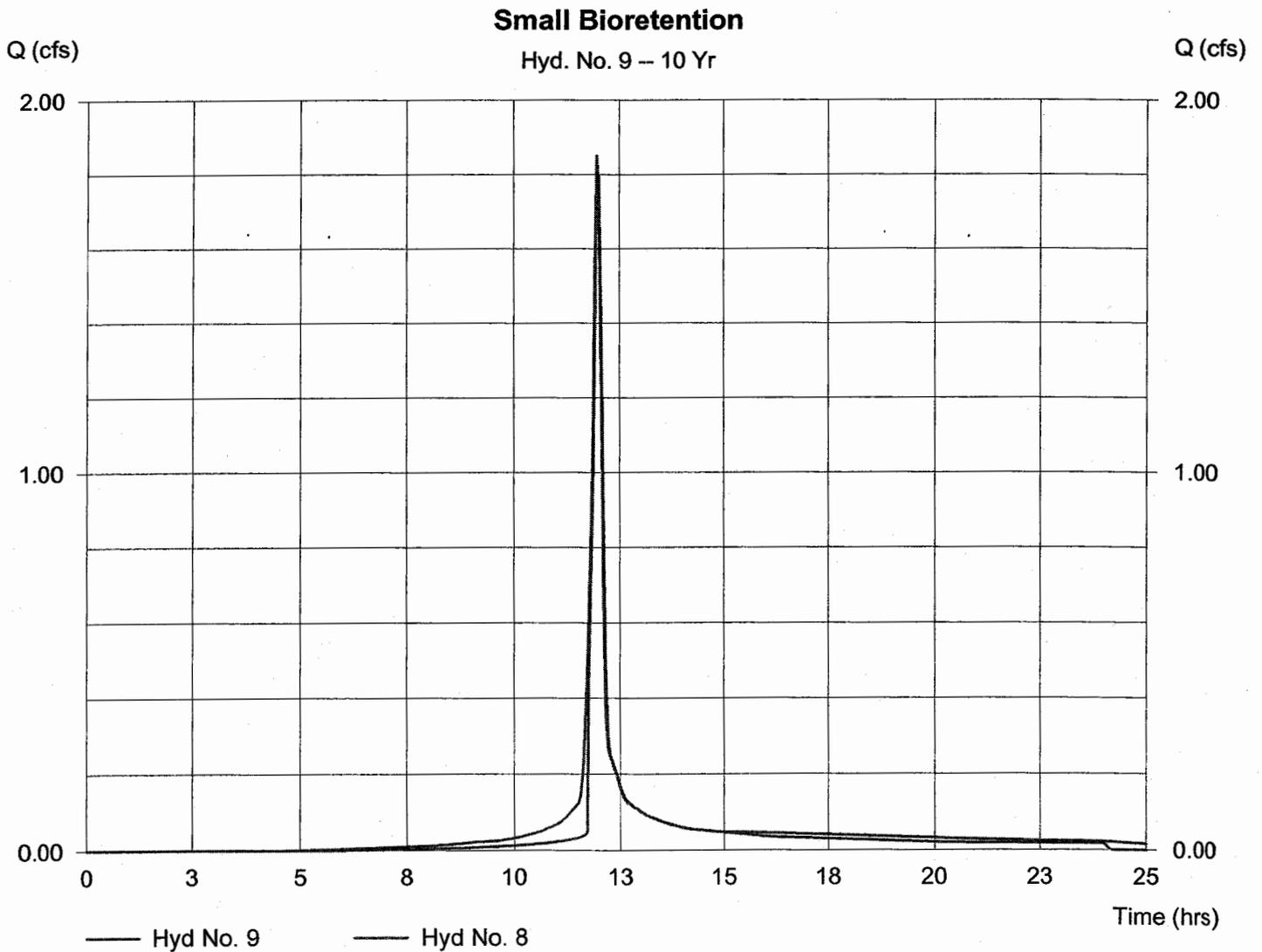
Small Bioretention

Hydrograph type = Reservoir  
Storm frequency = 10 yrs  
Inflow hyd. No. = 8  
Reservoir name = Small Bioretention

Peak discharge = 1.80 cfs  
Time interval = 3 min  
Max. Elevation = 103.62 ft  
Max. Storage = 654 cuft

Storage Indication method used.

Hydrograph Volume = 4,297 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 1 - Small Bioretention

### 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	103.00	736	0	0
1.00	104.00	1,372	1,054	1,054

### Culvert / Orifice Structures

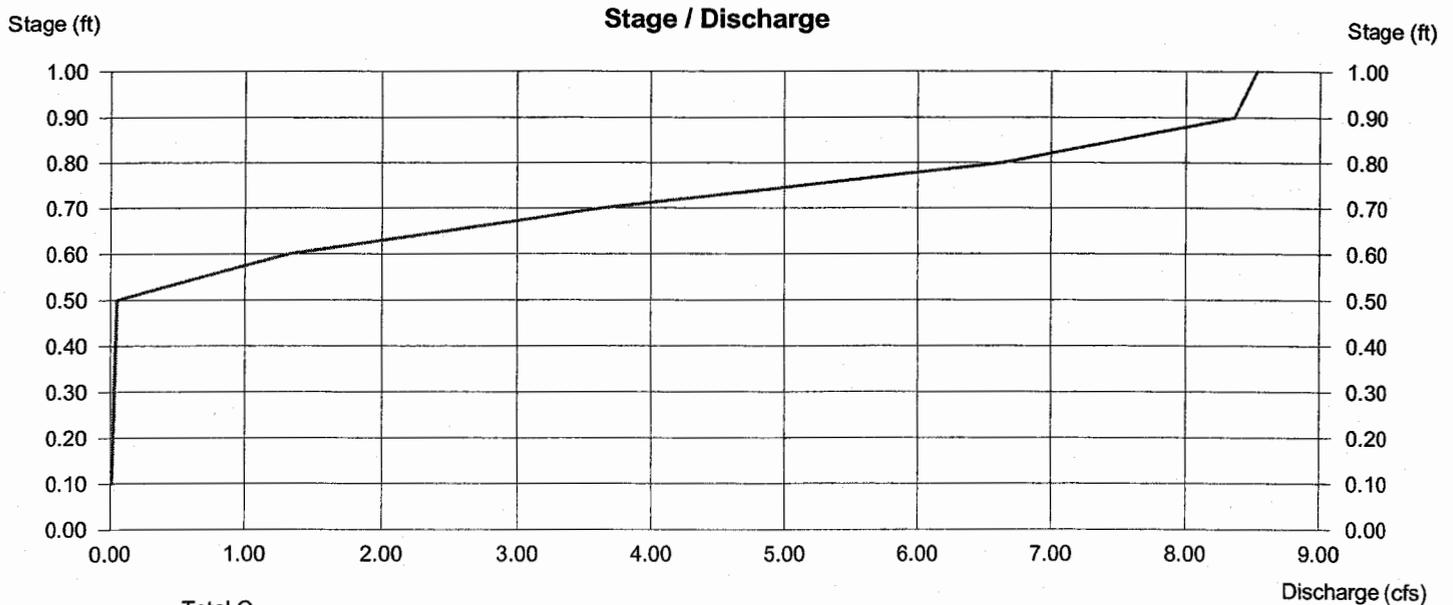
	[A]	[B]	[C]	[D]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 98.00	0.00	0.00	0.00
Length (ft)	= 44.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	0.00	0.00
Crest El. (ft)	= 103.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Riser	--	--	--
Multi-Stage	= Yes	No	No	No

Exfiltration = 3.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

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



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

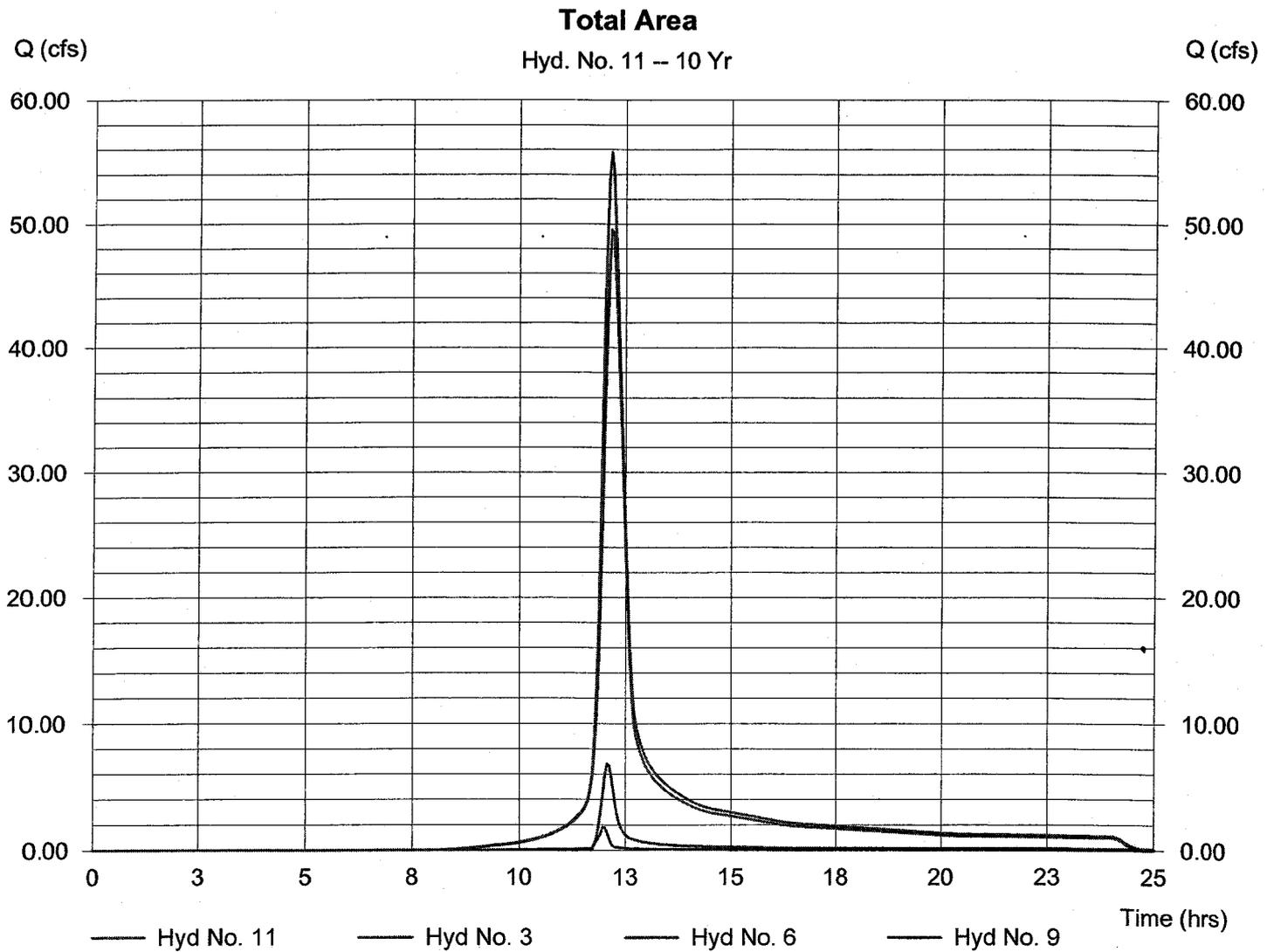
## Hyd. No. 11

Total Area

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 3, 6, 9

Peak discharge = 55.81 cfs  
Time interval = 3 min

Hydrograph Volume = 223,785 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 12

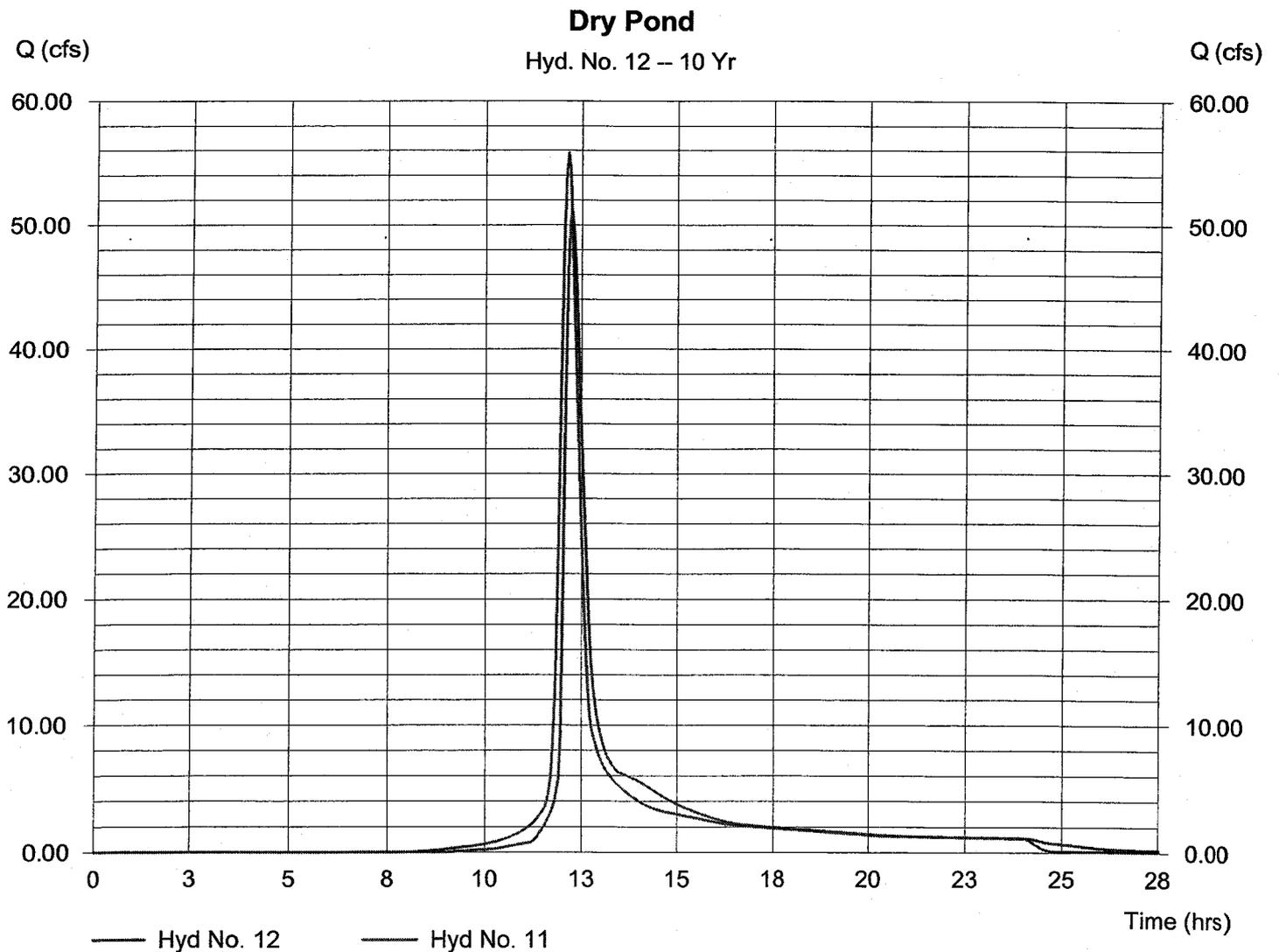
Dry Pond

Hydrograph type = Reservoir  
 Storm frequency = 10 yrs  
 Inflow hyd. No. = 11  
 Reservoir name = Dry Pond

Peak discharge = 51.08 cfs  
 Time interval = 3 min  
 Max. Elevation = 82.20 ft  
 Max. Storage = 33,025 cuft

Storage Indication method used.

Hydrograph Volume = 223,770 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 5 - Dry 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	76.00	3,242	0	0
1.00	77.00	3,854	3,548	3,548
2.00	78.00	4,505	4,180	7,728
3.00	79.00	5,189	4,847	12,575
4.00	80.00	5,912	5,551	18,125
5.00	81.00	6,663	6,288	24,413
6.00	82.00	7,447	7,055	31,468
7.00	83.00	8,263	7,855	39,323

### Culvert / Orifice Structures

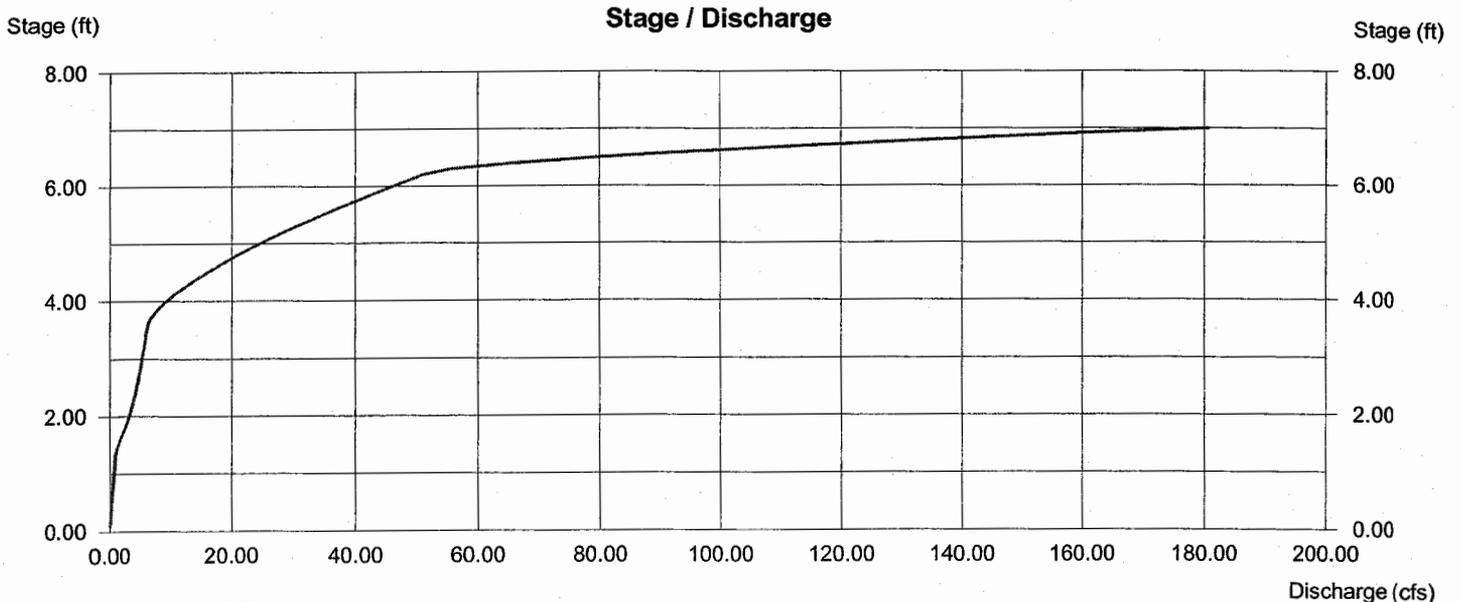
	[A]	[B]	[C]	[D]
Rise (in)	= 4.00	4.00	8.00	8.00
Span (in)	= 4.00	4.00	8.00	8.00
No. Barrels	= 1	1	1	1
Invert El. (ft)	= 76.00	76.50	77.25	77.25
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	50.00	0.00
Crest El. (ft)	= 79.60	0.00	82.25	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	Rect	---
Multi-Stage	= No	No	No	No

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

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



# Hydrograph 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	61.27	3	729	245,576	---	---	---	Predevelopment	
3	SCS Runoff	57.86	3	729	231,889	---	---	---	PostDevelopment Area	
5	SCS Runoff	8.54	3	720	23,406	---	---	---	Bioretention Area	
6	Reservoir	7.86	3	723	23,393	5	99.08	4,185	Bioretention	
8	SCS Runoff	2.09	3	717	4,891	---	---	---	Small Bioretention Area	
9	Reservoir	2.02	3	720	4,880	8	103.63	664	Small Bioretention	
11	Combine	64.91	3	729	260,161	3, 6, 9,	---	---	Total Area	
12	Reservoir	64.37	3	732	260,146	11	82.39	34,493	Dry Pond	
9551-00 -Bay Aging.gpw					Return Period: 25 Year			Sunday, Jan 15 2006, 3:47 PM		
CC032_BAY_AGING_SR_HOUSING_IRONBOUND_SQUARE_084										

# Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 1

Predevelopment

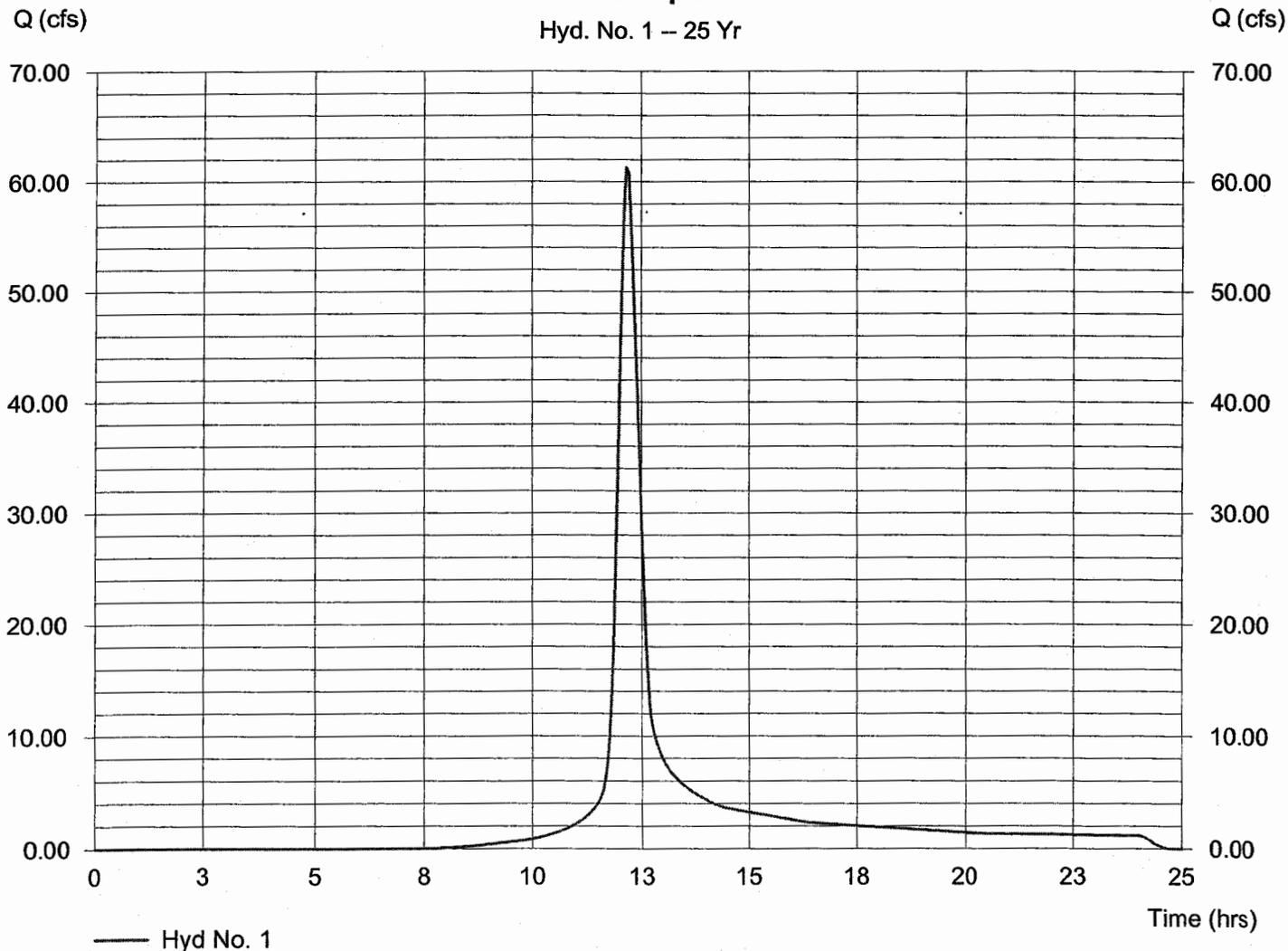
Hydrograph type = SCS Runoff  
 Storm frequency = 25 yrs  
 Drainage area = 18.66 ac  
 Basin Slope = 0.0 %  
 Tc method = TR55  
 Total precip. = 6.40 in  
 Storm duration = 24 hrs

Peak discharge = 61.27 cfs  
 Time interval = 3 min  
 Curve number = 75  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 29 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 245,576 cuft

### Predevelopment

Hyd. No. 1 - 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 3

### PostDevelopment Area

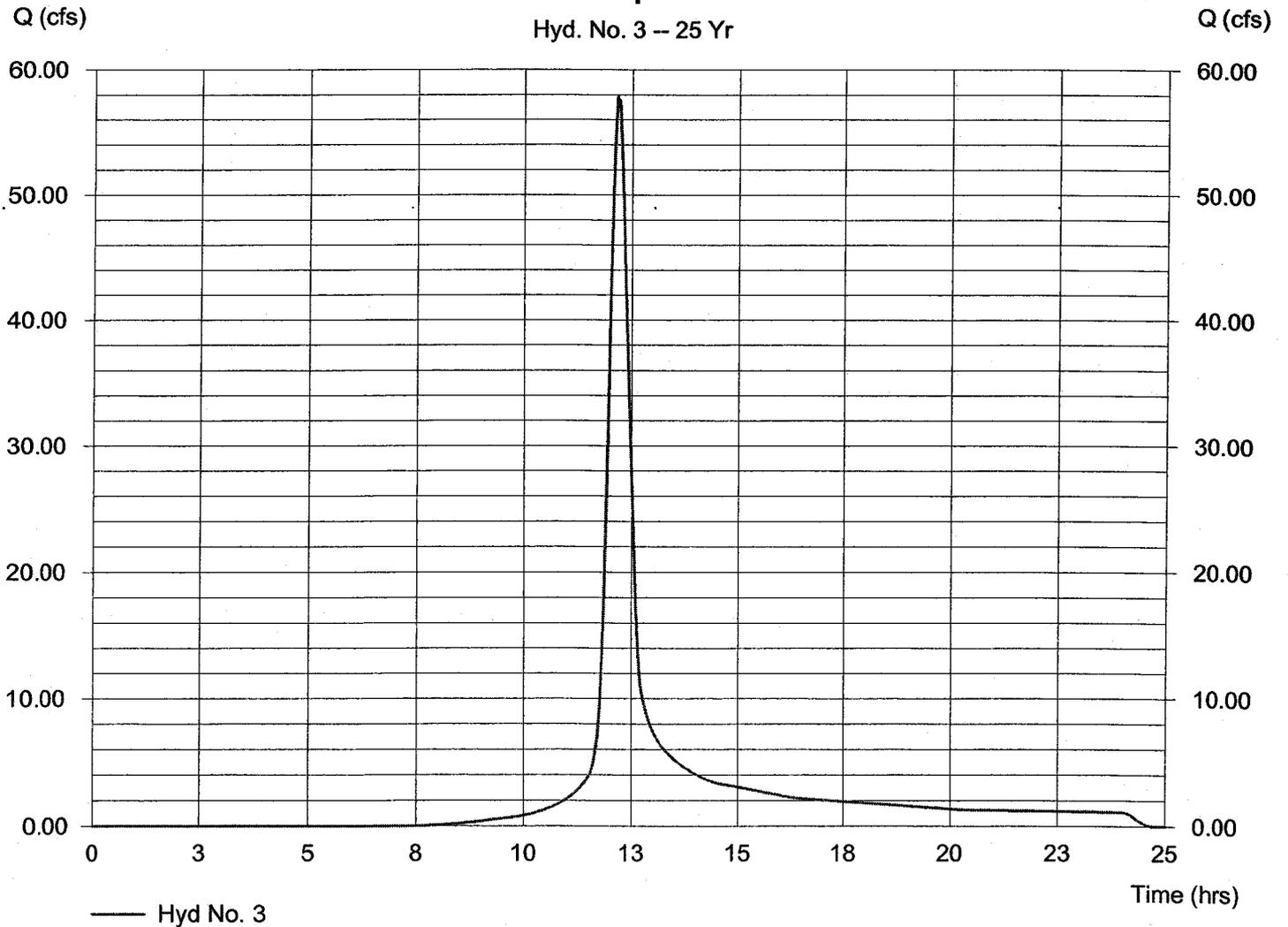
Hydrograph type = SCS Runoff  
 Storm frequency = 25 yrs  
 Drainage area = 17.62 ac  
 Basin Slope = 0.0 %  
 Tc method = TR55  
 Total precip. = 6.40 in  
 Storm duration = 24 hrs

Peak discharge = 57.86 cfs  
 Time interval = 3 min  
 Curve number = 75  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 29 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 231,889 cuft

### PostDevelopment Area

Hyd. No. 3 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 5

### Bioretention Area

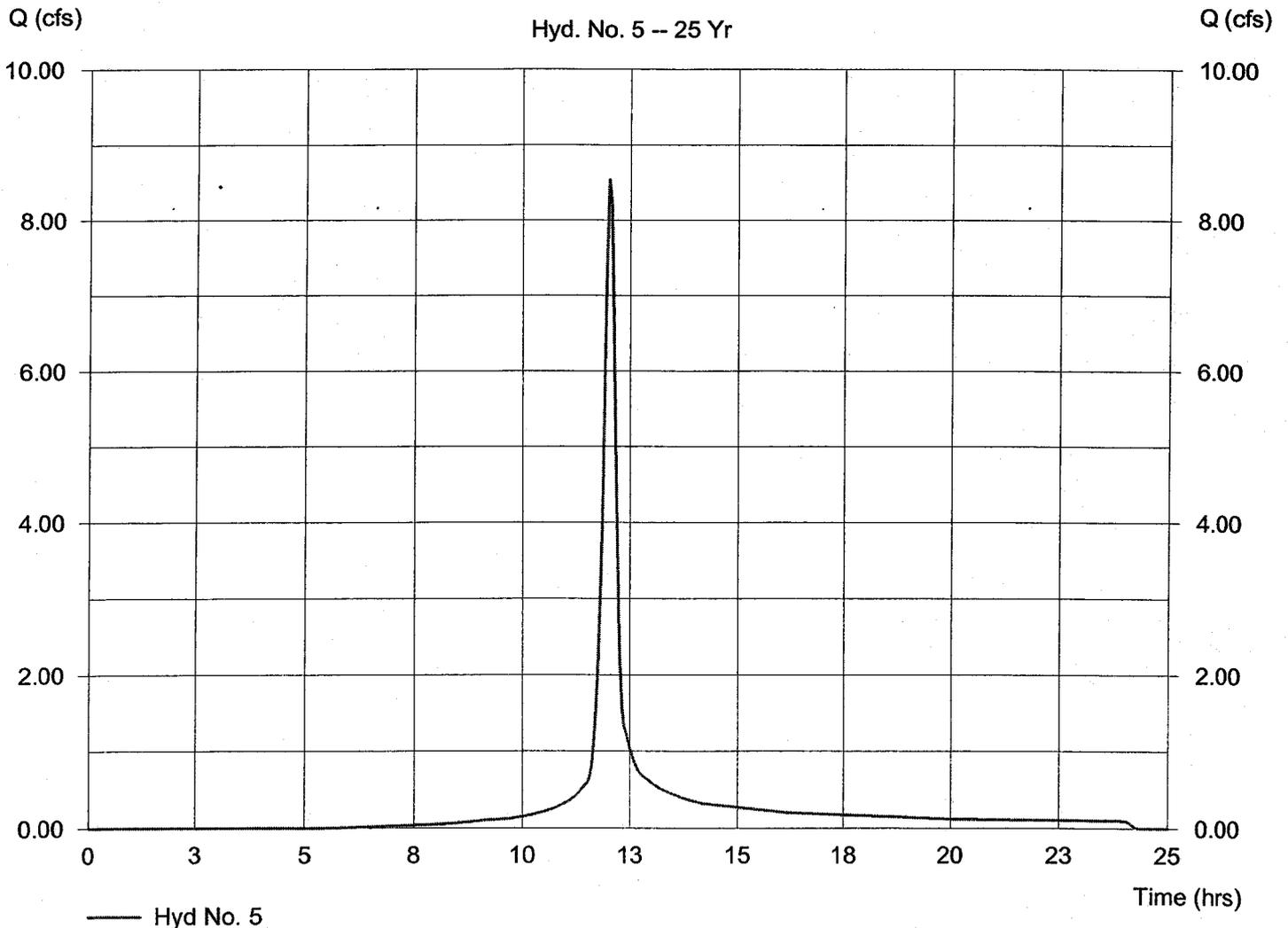
Hydrograph type = SCS Runoff  
 Storm frequency = 25 yrs  
 Drainage area = 1.48 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 6.40 in  
 Storm duration = 24 hrs

Peak discharge = 8.54 cfs  
 Time interval = 3 min  
 Curve number = 82  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 10 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 23,406 cuft

### Bioretention Area

Hyd. No. 5 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 6

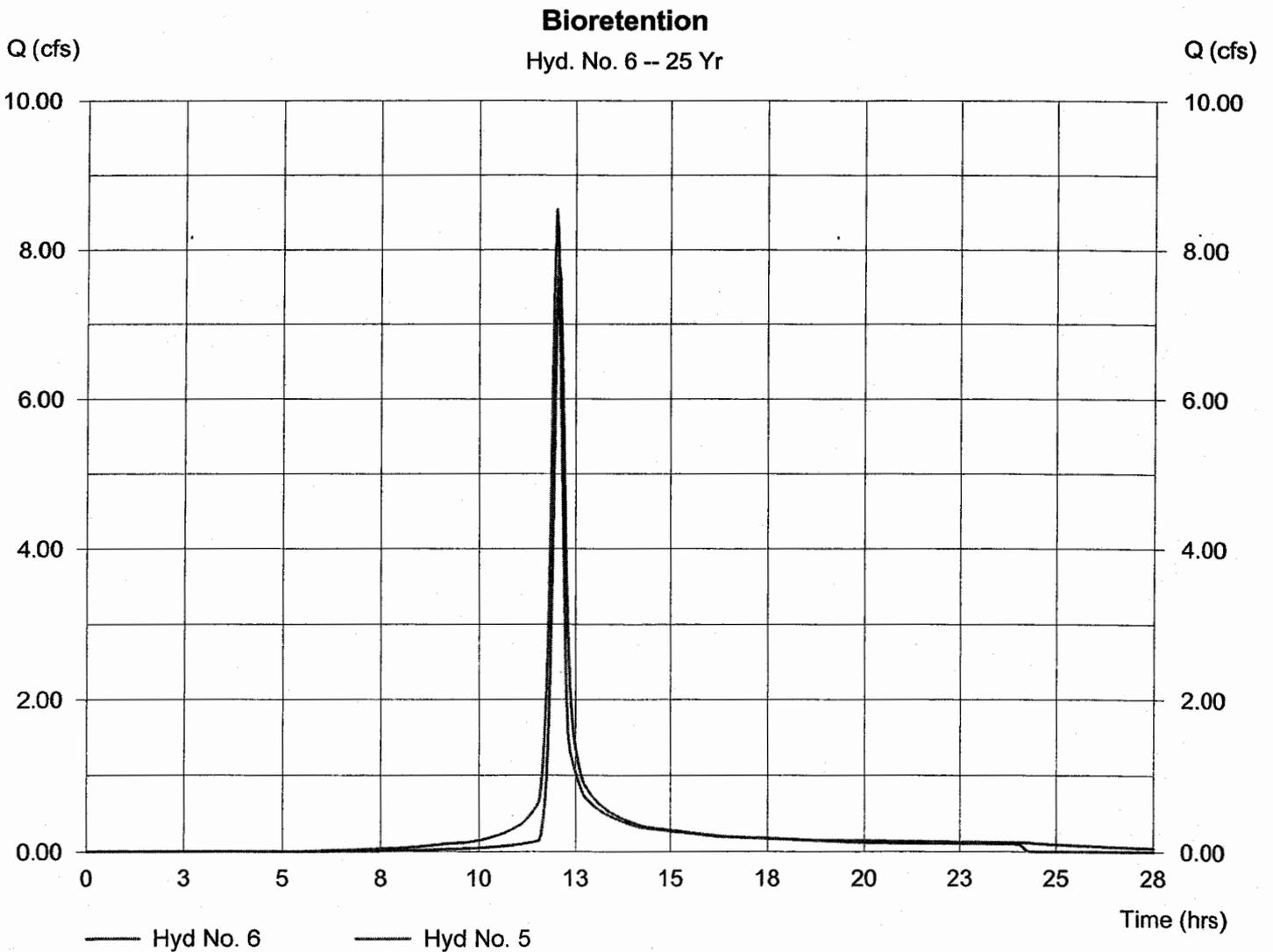
Bioretention

Hydrograph type = Reservoir  
 Storm frequency = 25 yrs  
 Inflow hyd. No. = 5  
 Reservoir name = Bioretention

Peak discharge = 7.86 cfs  
 Time interval = 3 min  
 Max. Elevation = 99.08 ft  
 Max. Storage = 4,185 cuft

Storage Indication method used.

Hydrograph Volume = 23,393 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 3 - Bioretention

### 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	98.00	2,432	0	0
1.25	99.25	5,351	4,864	4,864
2.00	100.00	8,334	5,132	9,996
3.00	101.00	16,244	12,289	22,285

### Culvert / Orifice Structures

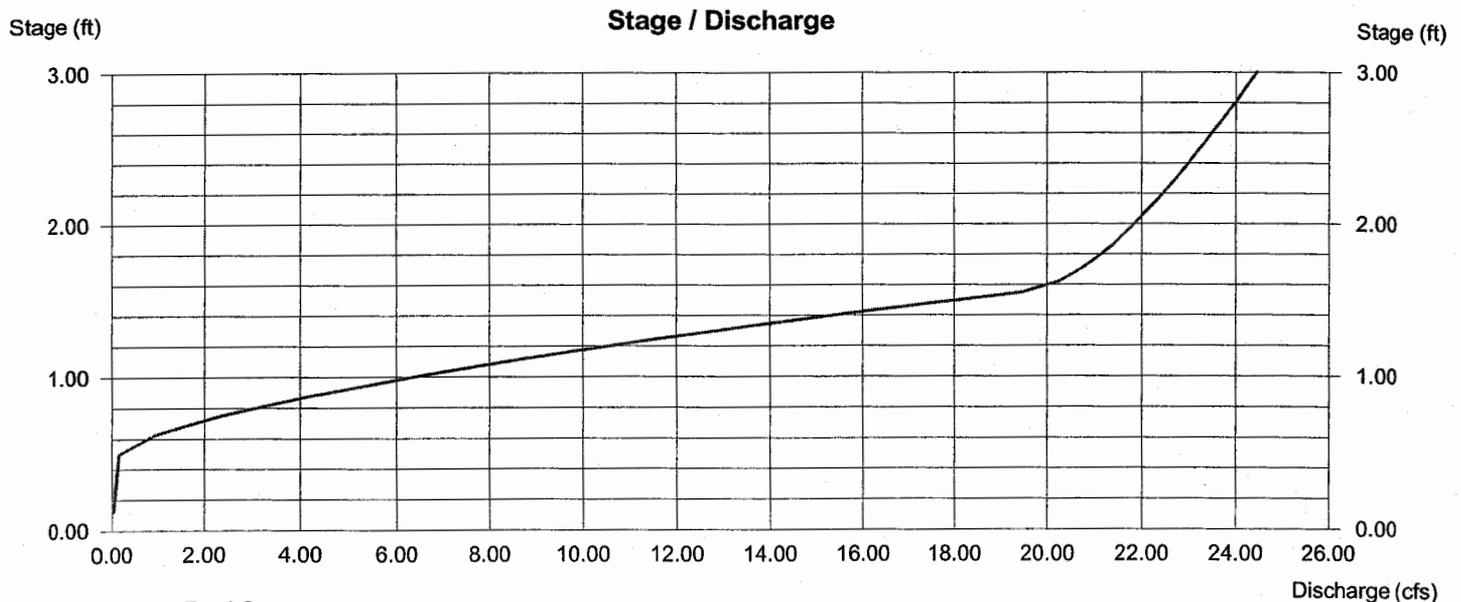
	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 92.67	0.00	0.00	0.00
Length (ft)	= 57.00	0.00	0.00	0.00
Slope (%)	= 0.47	0.00	0.00	0.00
N-Value	= .013	.013	.013	.000
Orif. Coeff.	= 0.60	0.60	0.60	0.00
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 5.00	0.00	5.00	0.00
Crest El. (ft)	= 98.50	98.50	100.61	0.00
Weir Coeff.	= 3.33	0.97	3.33	0.00
Weir Type	= Rect	70 degV	Rect	—
Multi-Stage	= Yes	Yes	Yes	No

Exfiltration = 3.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

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



# Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 8

### Small Bioretention Area

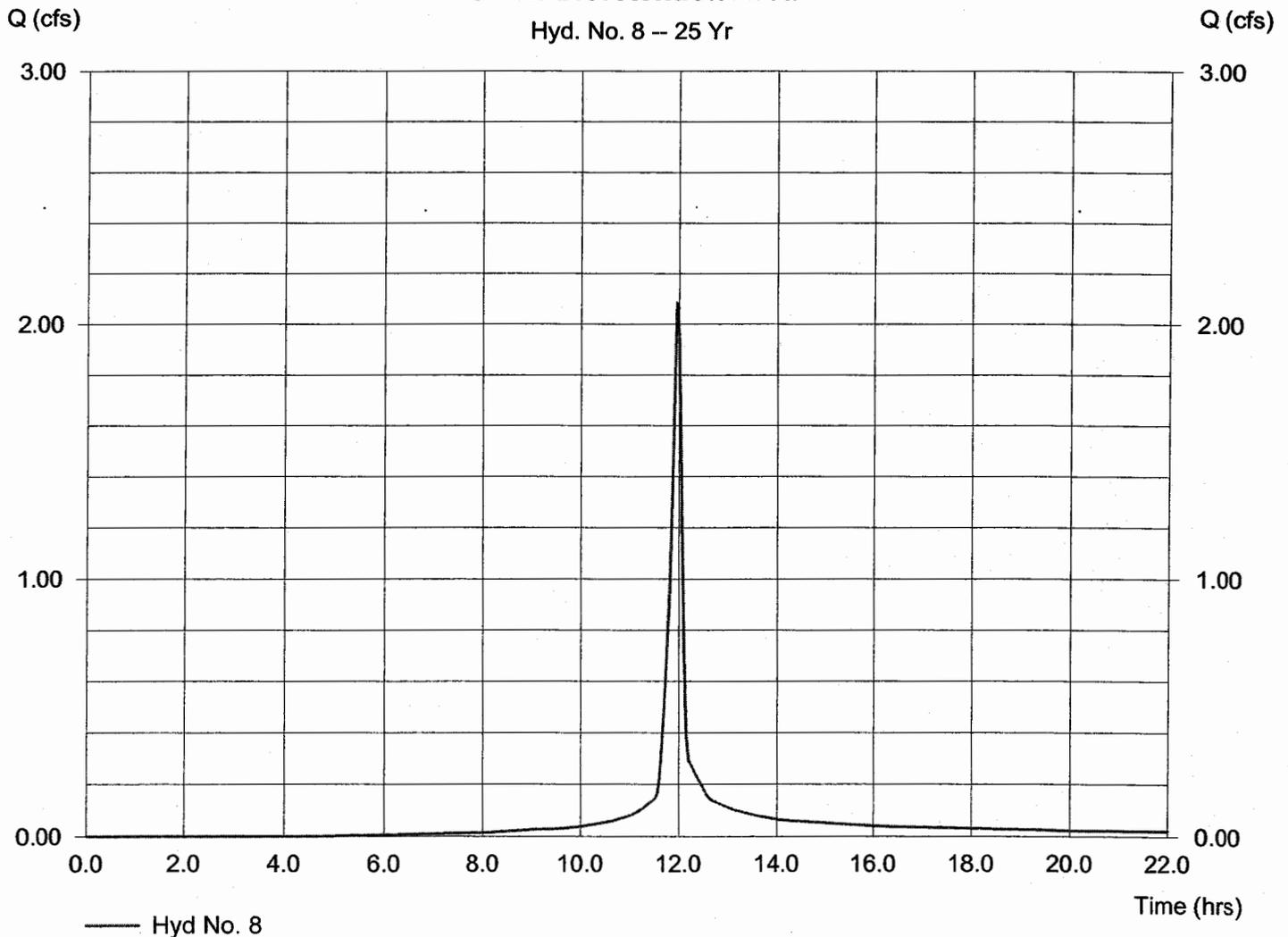
Hydrograph type = SCS Runoff  
 Storm frequency = 25 yrs  
 Drainage area = 0.30 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 6.40 in  
 Storm duration = 24 hrs

Peak discharge = 2.09 cfs  
 Time interval = 3 min  
 Curve number = 86  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 5 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 4,891 cuft

### Small Bioretention Area

Hyd. No. 8 - 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 9

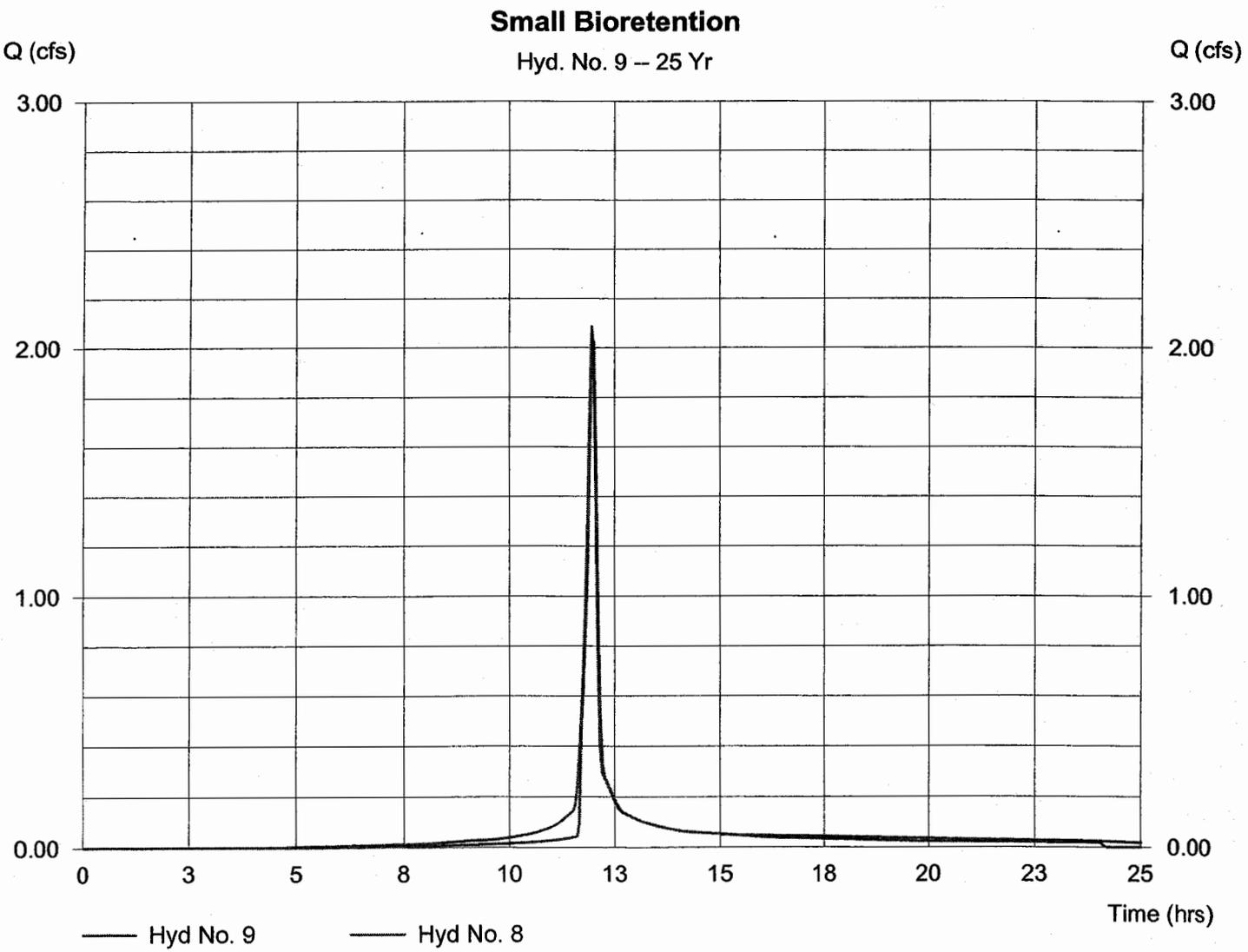
Small Bioretention

Hydrograph type = Reservoir  
Storm frequency = 25 yrs  
Inflow hyd. No. = 8  
Reservoir name = Small Bioretention

Peak discharge = 2.02 cfs  
Time interval = 3 min  
Max. Elevation = 103.63 ft  
Max. Storage = 664 cuft

Storage Indication method used.

Hydrograph Volume = 4,880 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 1 - Small Bioretention

### 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	103.00	736	0	0
1.00	104.00	1,372	1,054	1,054

### Culvert / Orifice Structures

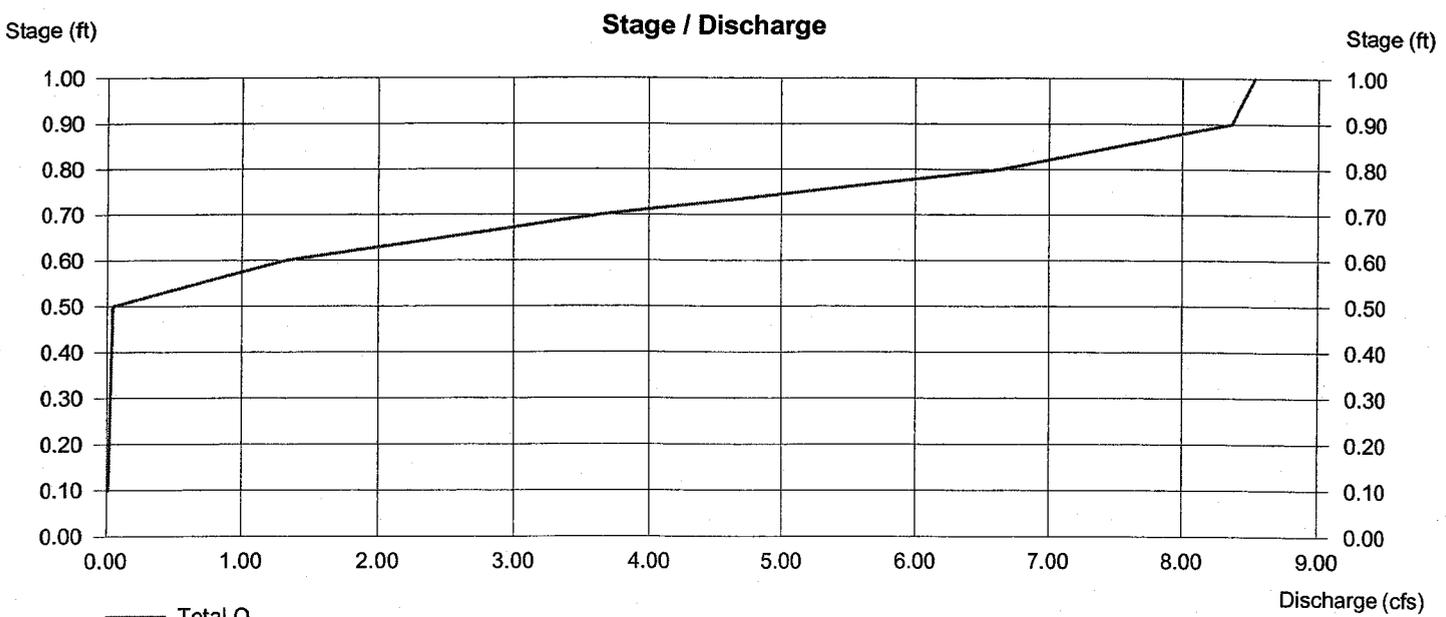
	[A]	[B]	[C]	[D]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 98.00	0.00	0.00	0.00
Length (ft)	= 44.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	0.00	0.00
Crest El. (ft)	= 103.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 3.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

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



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan. 15 2006, 3:47 PM

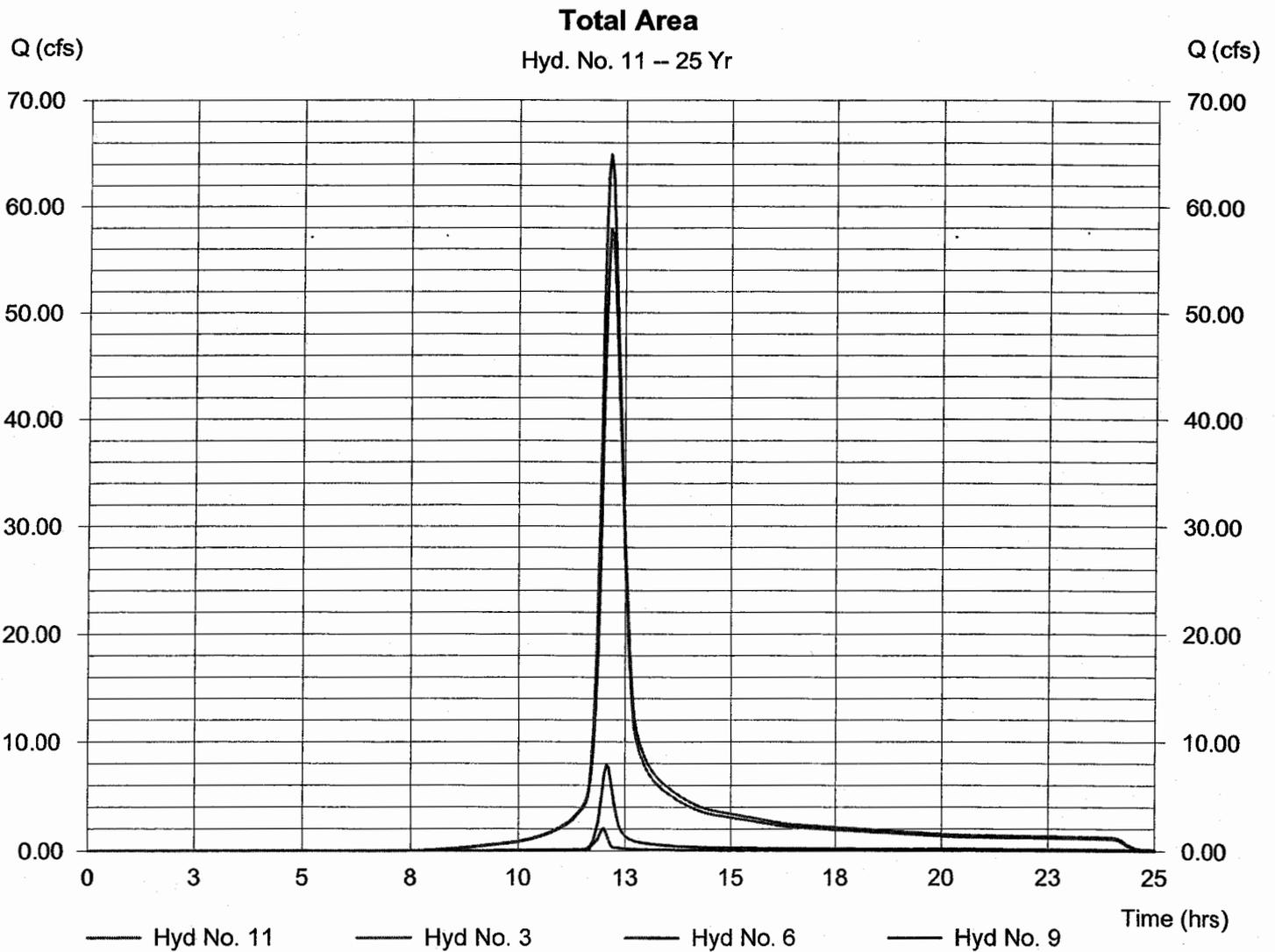
## Hyd. No. 11

Total Area

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 3, 6, 9

Peak discharge = 64.91 cfs  
Time interval = 3 min

Hydrograph Volume = 260,161 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 12

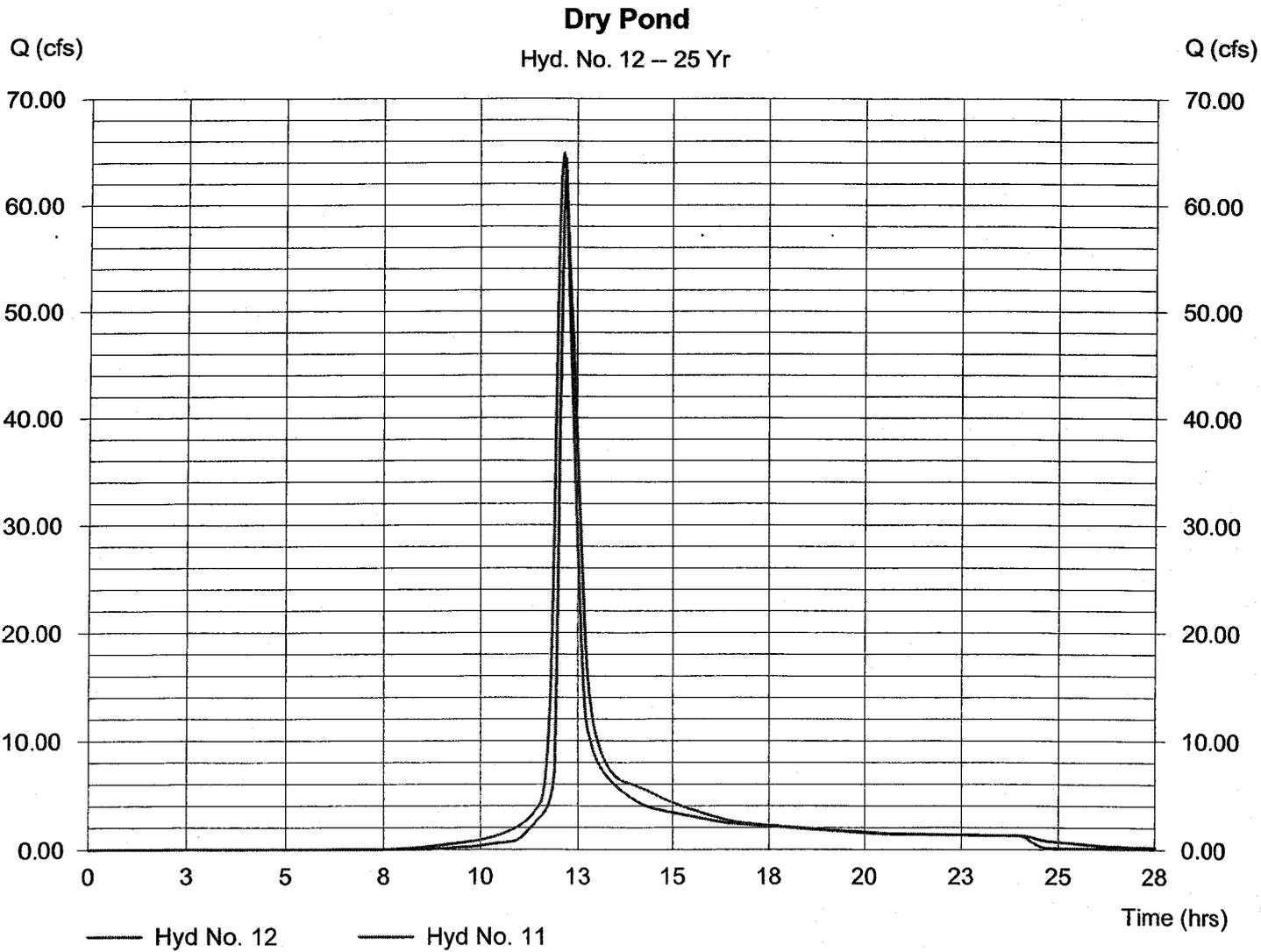
Dry Pond

Hydrograph type = Reservoir  
Storm frequency = 25 yrs  
Inflow hyd. No. = 11  
Reservoir name = Dry Pond

Peak discharge = 64.37 cfs  
Time interval = 3 min  
Max. Elevation = 82.39 ft  
Max. Storage = 34,493 cuft

Storage Indication method used.

Hydrograph Volume = 260,146 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 5 - Dry 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	76.00	3,242	0	0
1.00	77.00	3,854	3,548	3,548
2.00	78.00	4,505	4,180	7,728
3.00	79.00	5,189	4,847	12,575
4.00	80.00	5,912	5,551	18,125
5.00	81.00	6,663	6,288	24,413
6.00	82.00	7,447	7,055	31,468
7.00	83.00	8,263	7,855	39,323

### Culvert / Orifice Structures

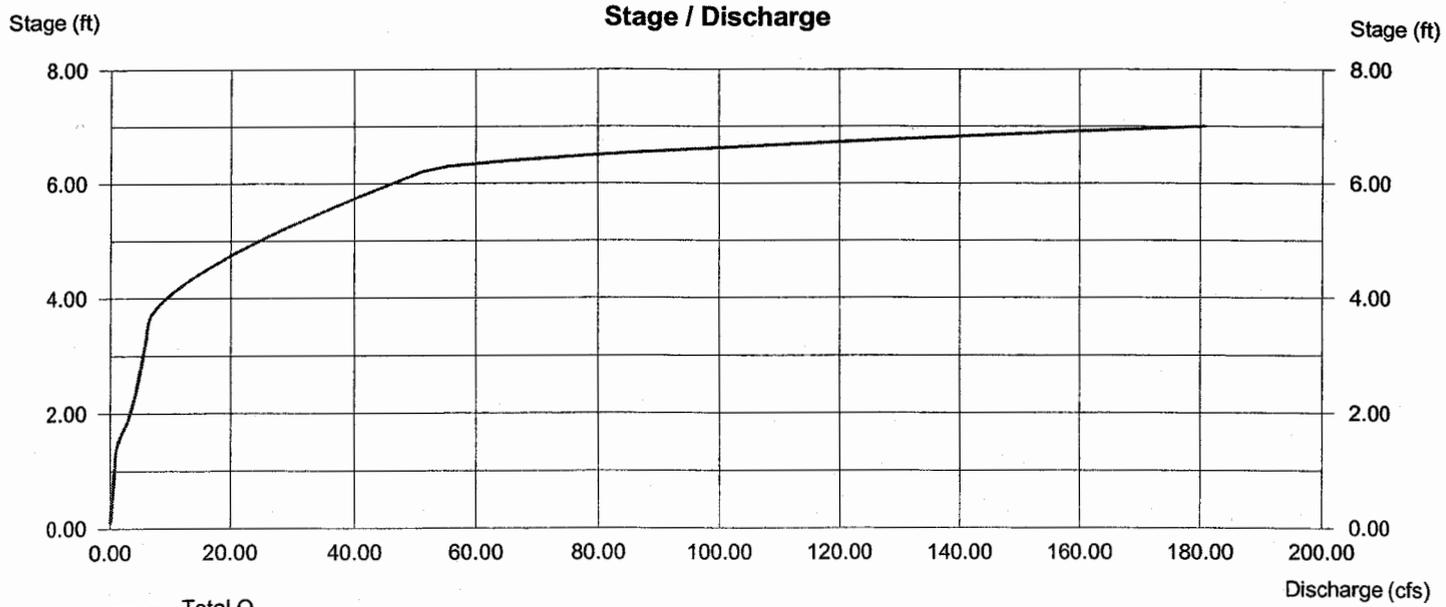
	[A]	[B]	[C]	[D]
Rise (in)	= 4.00	4.00	8.00	8.00
Span (in)	= 4.00	4.00	8.00	8.00
No. Barrels	= 1	1	1	1
Invert El. (ft)	= 76.00	76.50	77.25	77.25
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	50.00	0.00
Crest El. (ft)	= 79.60	0.00	82.25	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	Rect	---
Multi-Stage	= No	No	No	No

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

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



# Hydrograph 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	85.25	3	729	341,501	---	---	---	Predevelopment	
3	SCS Runoff	80.50	3	729	322,468	---	---	---	PostDevelopment Area	
5	SCS Runoff	11.35	3	720	31,481	---	---	---	Bioretention Area	
6	Reservoir	10.64	3	723	31,468	5	99.20	4,688	Bioretention	
8	SCS Runoff	2.71	3	717	6,464	---	---	---	Small Bioretention Area	
9	Reservoir	2.63	3	720	6,453	8	103.66	692	Small Bioretention	
11	Combine	89.72	3	729	360,388	3, 6, 9,	---	---	Total Area	
12	Reservoir	88.85	3	729	360,374	11	82.56	35,837	Dry Pond	
9551-00 -Bay Aging.gpw					Return Period: 100 Year			Sunday, Jan 15 2006, 3:47 PM		
CC032_BAY_AGING_SR_HOUSING_IRONBOUND_SQUARE_096										

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

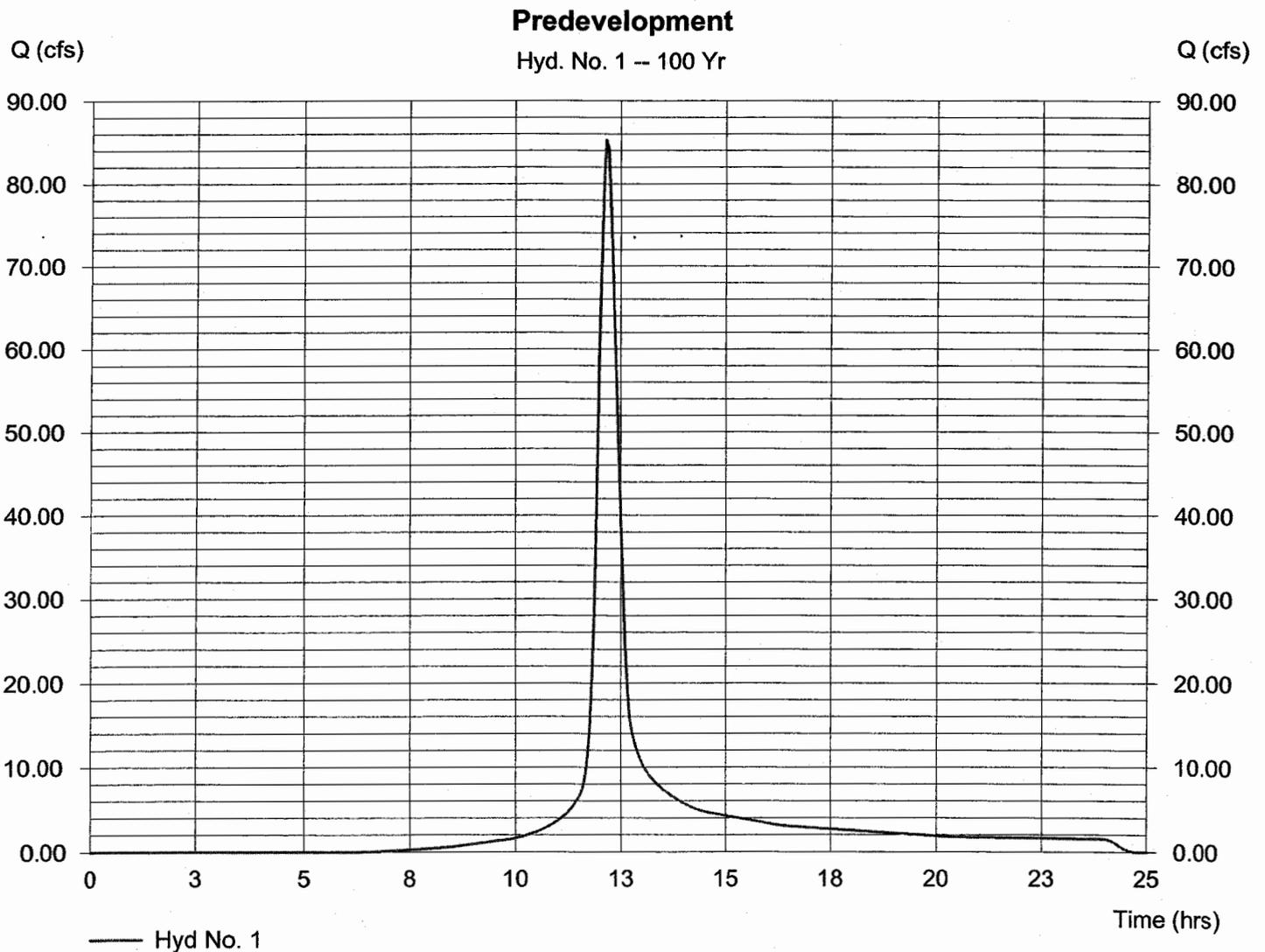
## Hyd. No. 1

### Predevelopment

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 18.66 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 8.00 in  
Storm duration = 24 hrs

Peak discharge = 85.25 cfs  
Time interval = 3 min  
Curve number = 75  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 29 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 341,501 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

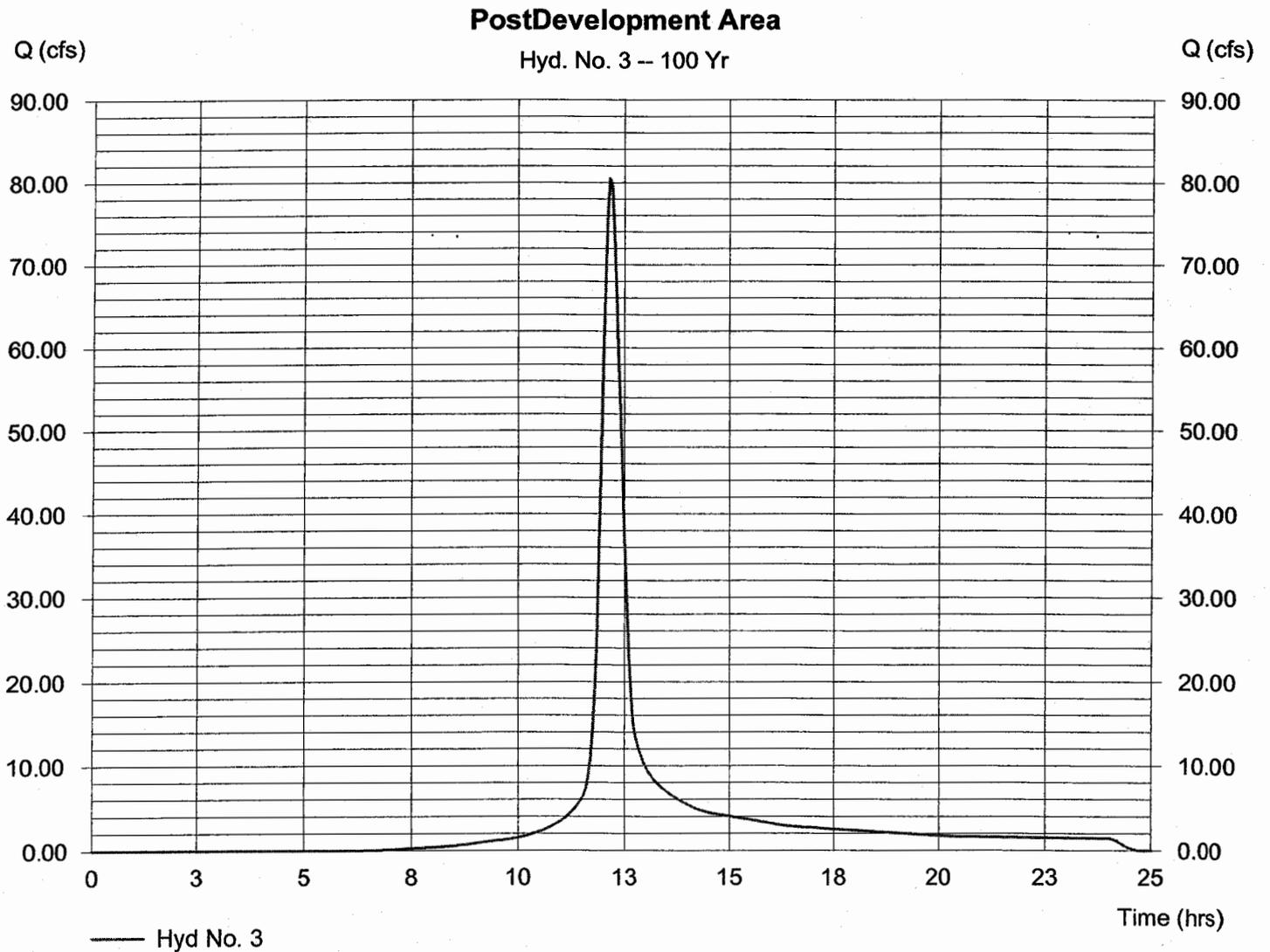
## Hyd. No. 3

### PostDevelopment Area

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 17.62 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 8.00 in  
Storm duration = 24 hrs

Peak discharge = 80.50 cfs  
Time interval = 3 min  
Curve number = 75  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 29 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 322,468 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

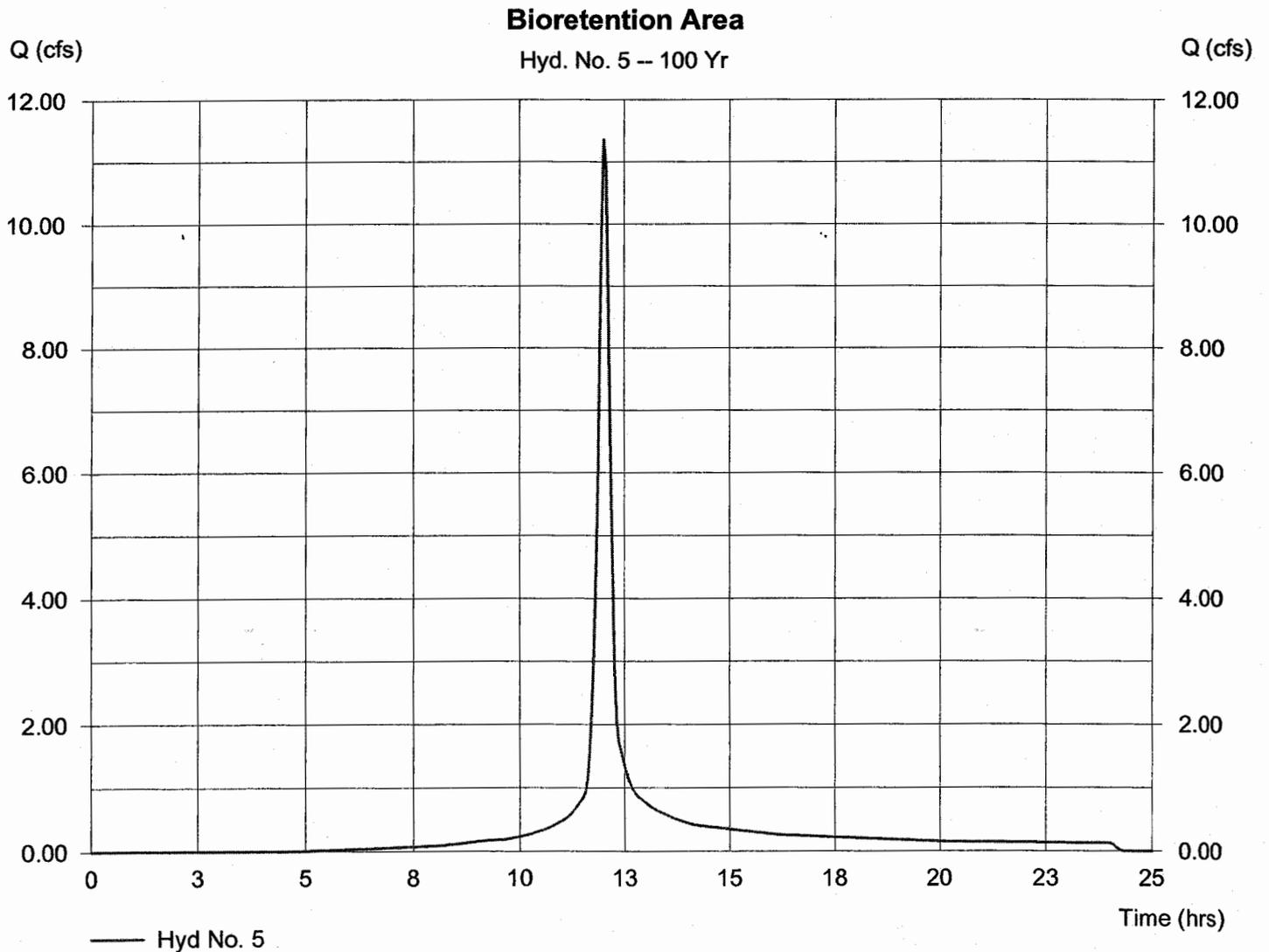
## Hyd. No. 5

### Bioretention Area

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 1.48 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 8.00 in  
Storm duration = 24 hrs

Peak discharge = 11.35 cfs  
Time interval = 3 min  
Curve number = 82  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 10 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 31,481 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 6

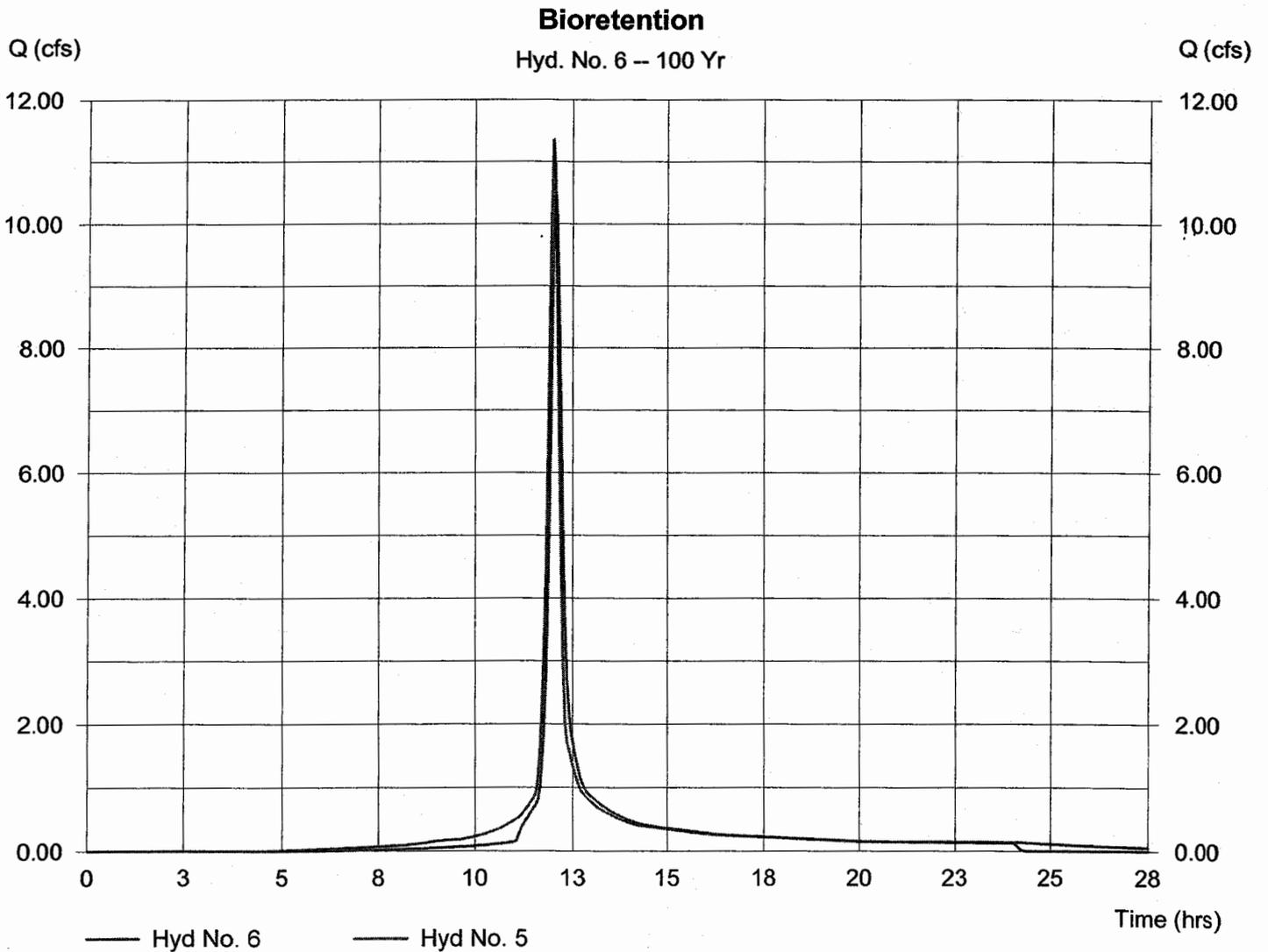
### Bioretention

Hydrograph type = Reservoir  
Storm frequency = 100 yrs  
Inflow hyd. No. = 5  
Reservoir name = Bioretention

Peak discharge = 10.64 cfs  
Time interval = 3 min  
Max. Elevation = 99.20 ft  
Max. Storage = 4,688 cuft

Storage Indication method used.

Hydrograph Volume = 31,468 cuft



POND REPORT  
LARGE BMP

# Pond Report

Hydraflow Hydrographs by Intellisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 3 - Bioretention

### 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	98.00	2,432	0	0
1.25	99.25	5,351	4,864	4,864
2.00	100.00	8,334	5,132	9,996
3.00	101.00	16,244	12,289	22,285

### Culvert / Orifice Structures

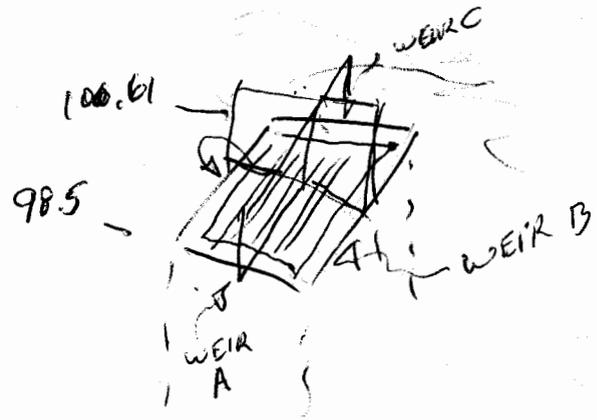
	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 92.67	0.00	0.00	0.00
Length (ft)	= 57.00	0.00	0.00	0.00
Slope (%)	= 0.47	0.00	0.00	0.00
N-Value	= .013	.013	.013	.000
Orif. Coeff.	= 0.60	0.60	0.60	0.00
Multi-Stage	= n/a	No	No	No

### Weir Structures

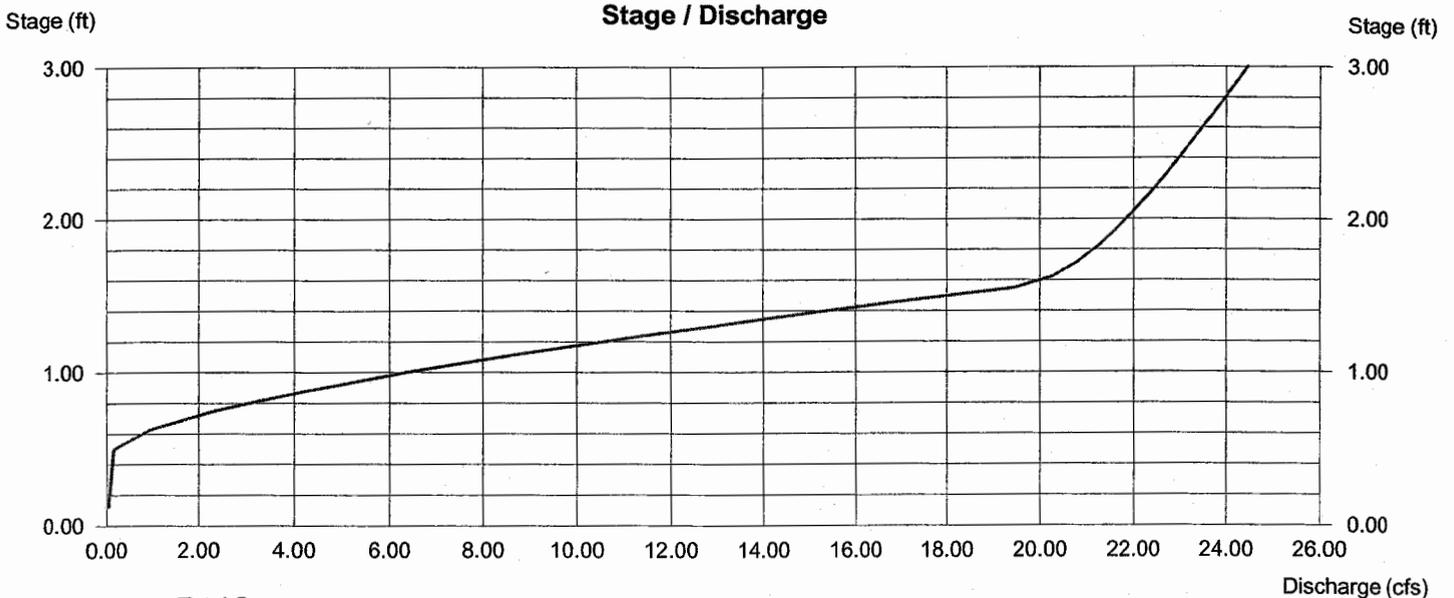
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 5.00	0.00	5.00	0.00
Crest El. (ft)	= 98.50	98.50	100.61	0.00
Weir Coeff.	= 3.33	0.97	3.33	0.00
Weir Type	= Rect	70 deg V	Rect	--
Multi-Stage	= Yes	Yes	Yes	No

Exfiltration = 3.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

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



RECLINED WEIR FACE EQUATION



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 8

### Small Bioretention Area

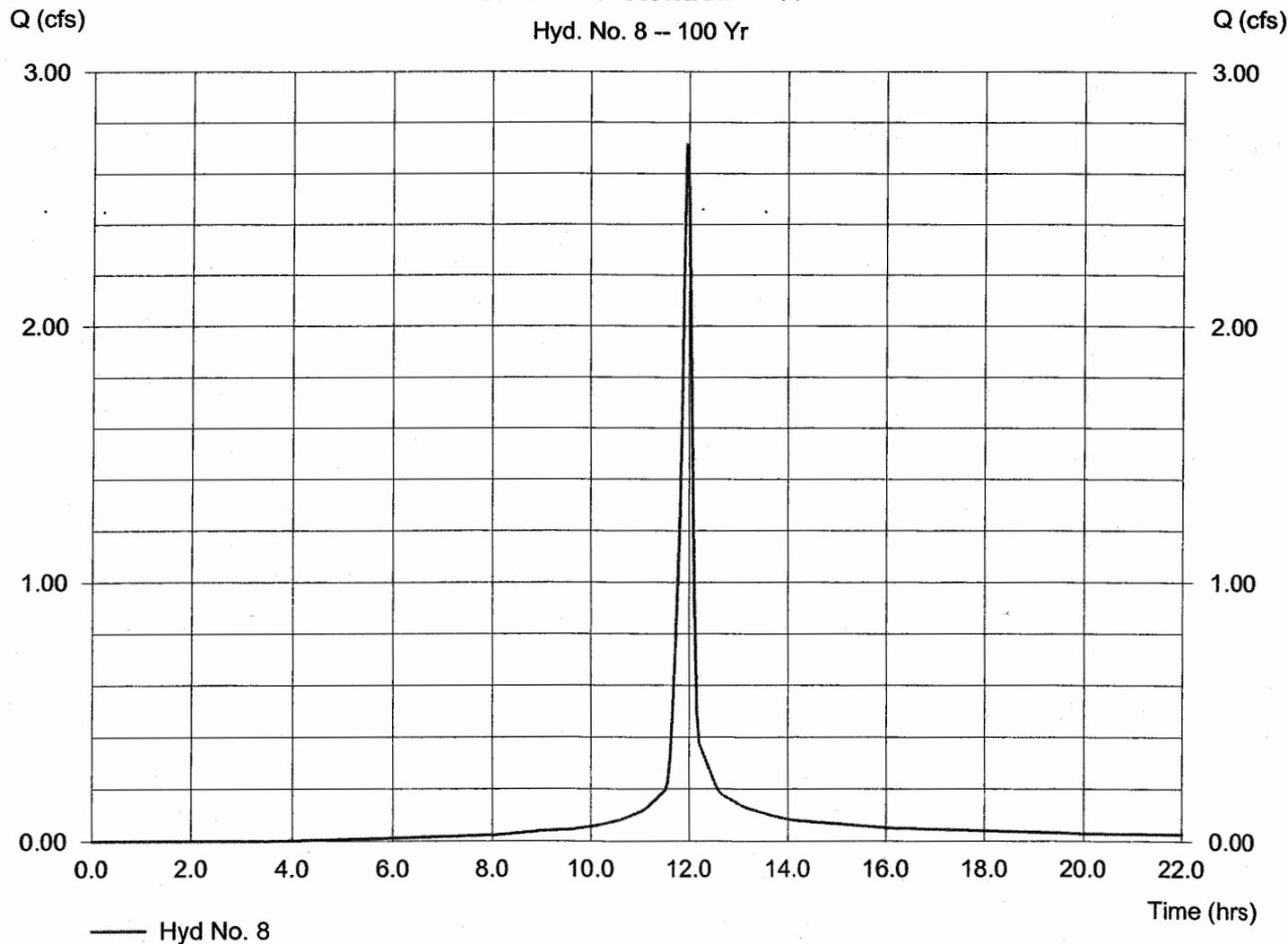
Hydrograph type = SCS Runoff  
 Storm frequency = 100 yrs  
 Drainage area = 0.30 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 8.00 in  
 Storm duration = 24 hrs

Peak discharge = 2.71 cfs  
 Time interval = 3 min  
 Curve number = 86  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 5 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 6,464 cuft

### Small Bioretention Area

Hyd. No. 8 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 9

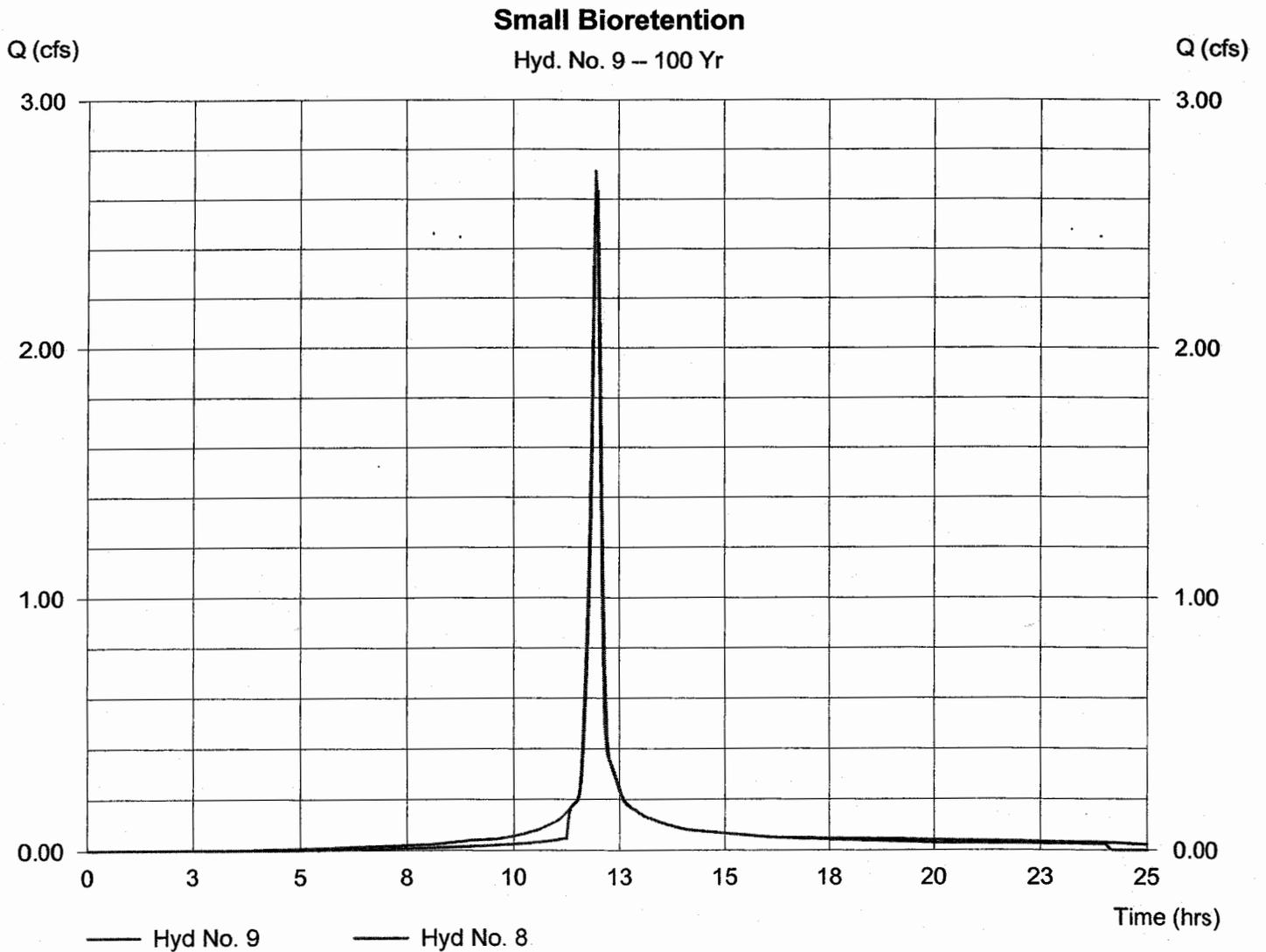
### Small Bioretention

Hydrograph type = Reservoir  
Storm frequency = 100 yrs  
Inflow hyd. No. = 8  
Reservoir name = Small Bioretention

Peak discharge = 2.63 cfs  
Time interval = 3 min  
Max. Elevation = 103.66 ft  
Max. Storage = 692 cuft

Storage Indication method used.

Hydrograph Volume = 6,453 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 1 - Small Bioretention

### 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	103.00	736	0	0
1.00	104.00	1,372	1,054	1,054

### Culvert / Orifice Structures

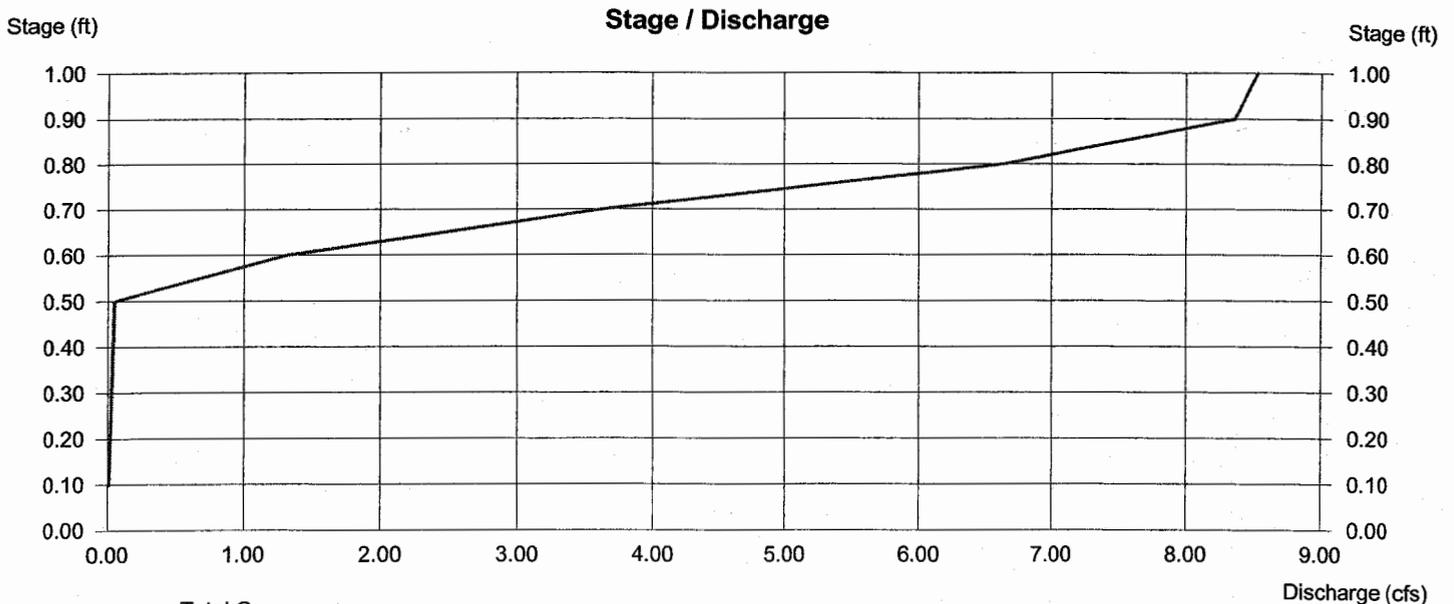
	[A]	[B]	[C]	[D]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 98.00	0.00	0.00	0.00
Length (ft)	= 44.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	0.00	0.00
Crest El. (ft)	= 103.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Riser	--	--	--
Multi-Stage	= Yes	No	No	No

Exfiltration = 3.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

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



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

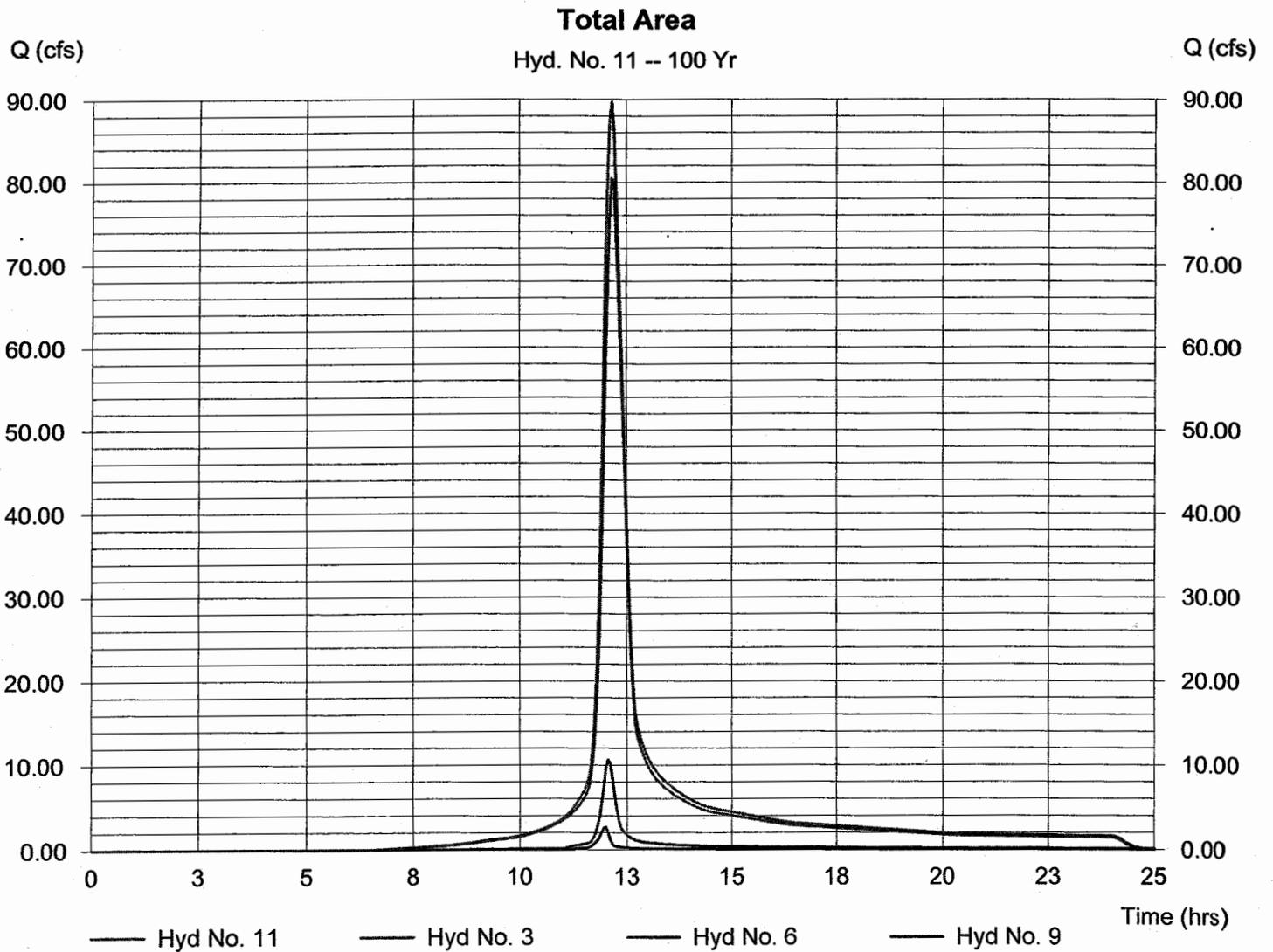
## Hyd. No. 11

Total Area

Hydrograph type = Combine  
 Storm frequency = 100 yrs  
 Inflow hyds. = 3, 6, 9

Peak discharge = 89.72 cfs  
 Time interval = 3 min

Hydrograph Volume = 360,388 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Hyd. No. 12

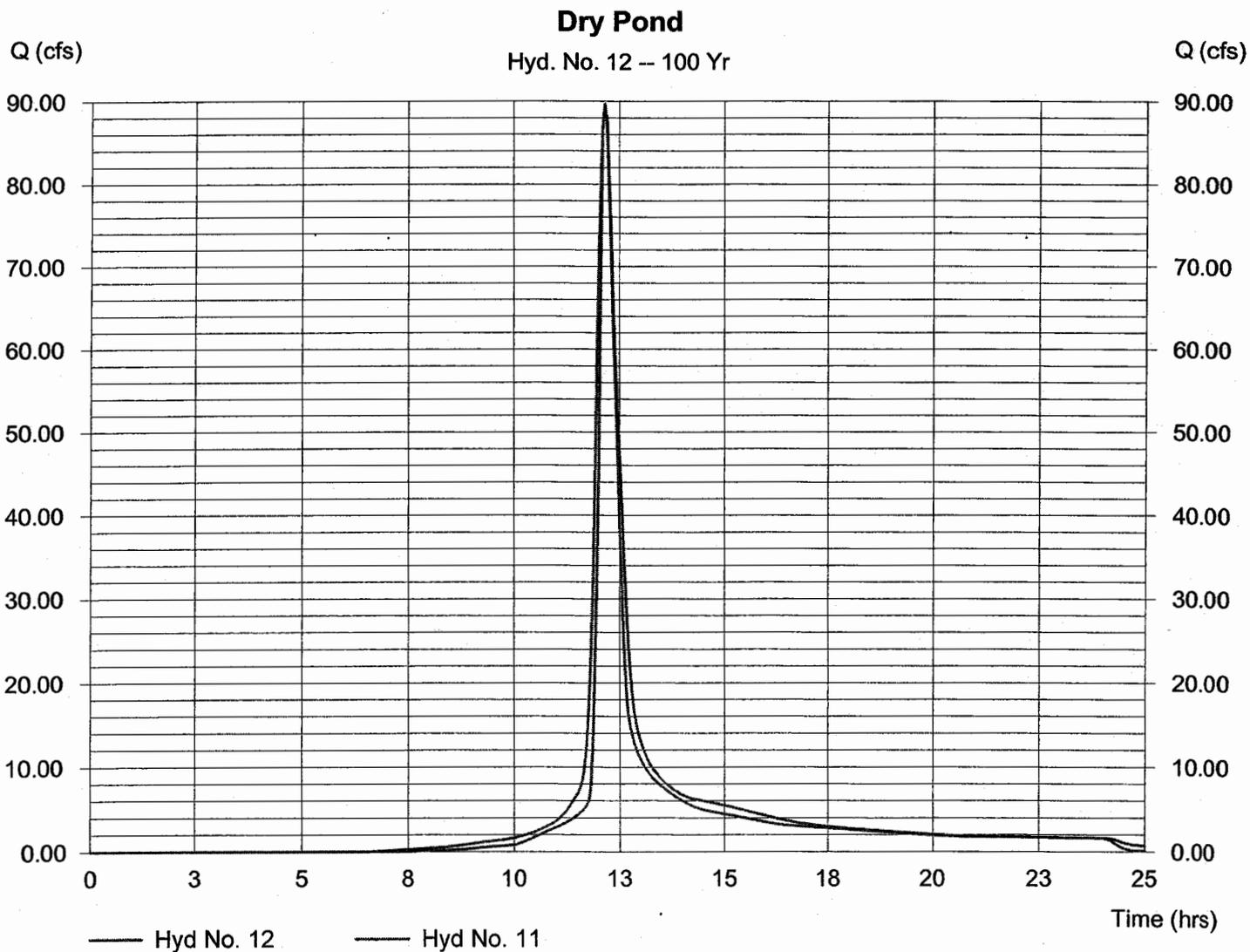
Dry Pond

Hydrograph type = Reservoir  
 Storm frequency = 100 yrs  
 Inflow hyd. No. = 11  
 Reservoir name = Dry Pond

Peak discharge = 88.85 cfs  
 Time interval = 3 min  
 Max. Elevation = 82.56 ft  
 Max. Storage = 35,837 cuft

Storage Indication method used.

Hydrograph Volume = 360,374 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Sunday, Jan 15 2006, 3:47 PM

## Pond No. 5 - Dry 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	76.00	3,242	0	0
1.00	77.00	3,854	3,548	3,548
2.00	78.00	4,505	4,180	7,728
3.00	79.00	5,189	4,847	12,575
4.00	80.00	5,912	5,551	18,125
5.00	81.00	6,663	6,288	24,413
6.00	82.00	7,447	7,055	31,468
7.00	83.00	8,263	7,855	39,323

### Culvert / Orifice Structures

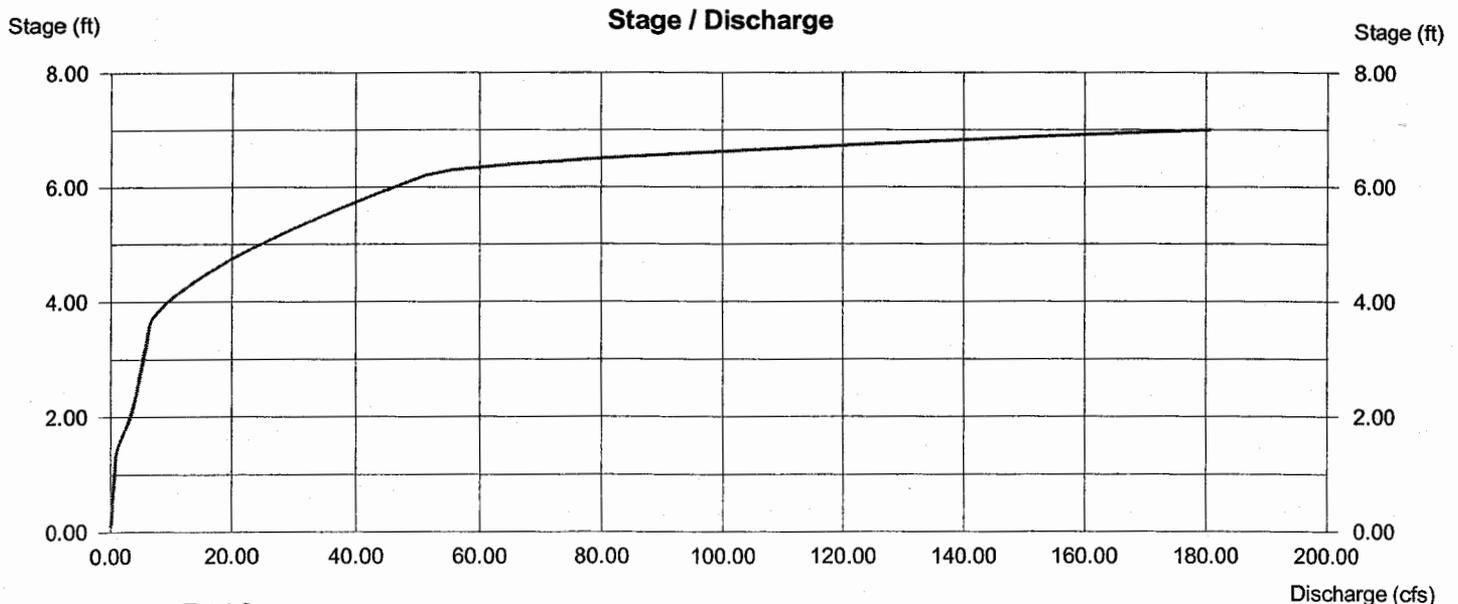
	[A]	[B]	[C]	[D]
Rise (in)	= 4.00	4.00	8.00	8.00
Span (in)	= 4.00	4.00	8.00	8.00
No. Barrels	= 1	1	1	1
Invert El. (ft)	= 76.00	76.50	77.25	77.25
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	50.00	0.00
Crest El. (ft)	= 79.60	0.00	82.25	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	—	Rect	—
Multi-Stage	= No	No	No	No

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

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



**SUMMARY – PRELIMINARY HYDROLOGY**  
**IRONBOUND VILLAGE REDEV PROJECT / SR615 REGIONAL BMP**

*Note: These estimates/figures to not reflect any drainage from the high point on Ironbound Road near New Town Discovery Boulevard south to the intersection of SR 321 Monticello Avenue and SR 615 Ironbound Road and from improvements to SR 321 Monticello Avenue east of the intersection.*

**VDOT CONTRIBUTIONS TO REGIONAL BASIN**

	By Area	By 1-year Volume	By 10-year Flow
<b>VDOT</b>	5.64 acres (18.1 %)	0.772 acre-ft. (22.6 %)	33.55 cfs (35.10 %)
<b>I.B.V.</b>	25.56 acres (81.9 %)	2.640 acre-ft. (77.4 %)	62.03 cfs (64.9 %)
	31.20 acres	3.412 acre-ft.	95.58 cfs

**TOTAL AREA**

<b>VDOT</b>	5.64 acre
<b>IRONBOUND VILLAGE REDEV</b>	<u>25.56 acre</u>
	31.20 acre

**Soils – Predominantly HSG B/C soil groups per Soil Survey Map # 17**

**SUBAREAS**

Subarea 1	VDOT SR 615	5.64 acre
Subarea 2	Ironbound Village Redev – Lots/Roads	11.73 acre
Subarea 3	Ironbound Village – Area D Building/Parking	2.00 acre
Subarea 4	Existing JCC Park Area	1.12 acre
Subarea 5	Downslope Ironbound Village – Lots/Tower/Woods	<u>10.70 acre</u>
		31.20 acre

	<u>Subarea 1</u>	<u>Subarea 2</u>	<u>Subarea 3</u>	<u>Subarea 4</u>	<u>Subarea 5</u>
A =	5.64 acres	11.73 acres	2.00 acres	1.12 acres	10.73 acres
CN =	88	87	93	69	74
Tc =	9 minutes	30 minutes	10 minutes	18 minutes	35 minutes

**IMPERVIOUS COVER ESTIMATES**

Subarea 1	VDOT SR 615	2.52 acre
Subarea 2	Ironbound Village Redev – Lots/Roads	5.19 acre
Subarea 3	Ironbound Village – Area D Building/Parking	1.50 acre
Subarea 4	Existing JCC Park Area	0.00 acre
Subarea 5	Downslope Ironbound Village – Lots/Tower/Woods	<u>0.75 acre</u>
		9.96, say 10 acres

**REGIONAL POND DESIGN**

Due to drainage area size, expected flows and safety/maintenance considerations, assume a wet extended detention pond design, County type A-3 BMP. This is a 10-point BMP with WQv treatment of 2-inch per impervious acre split at 1-inch per impervious acre in permanent pool and 1-inch per impervious acre in extended detention pool. Would also include the County's stream channel protection (1-year storm control; aquatic and safety bench with 3H:1V interior graded side slopes or aquatic bench with 4H:1V interior side slopes; pretreatment sediment forebay; pond buffer; designed emergency spillway with 1 ft. freeboard from design high water to top of dam or token emergency spillway with 2 ft. freeboard from design high water to top of dam.

1-year Storm Volume to Regional Pond (SR615 & I.B.V.) = 3.412 acre-feet

Volume Available to Top-of-Dam (Existing Contours) = 5.22 acre-feet

Volume Available to Top-of-Dam (Graded Pond) = Unknown yet

Permanent Pool – 36,300 cf (0.83 acre-ft.) in permanent pool – roughly 4 feet deep based on current topography.

# IRONBOUND VILLAGE REDEV / SR 615 <sup>REGIONAL</sup> BASIN

## PRELIMINARY HYDROLOGY + HYDRAULICS

		ACRES	CN	A X CN
NEWTOWN		4.2	96	403
NEW IRONBOUND RD				
VDOT SHEET 9	R/W	0.4		
VDOT SHEET 8	R/W	1.9		
VDOT SHEET 7	R/W	2.2		
SUBTOTAL		4.5	92	414
EXISTING VDOT R/W				
WATFORD LANE		1		
CARRIAGE RD		0.9		
SUBTOTAL		1.9	92	175
NEW ROADS ON SITE		0.9	92	83
CARE FACILITY		3.5	96	336
1/4 ACRE LOTS		14	83	1162
TOTAL		29		2573

### Area Round Estimate

$$\begin{aligned}
 \text{VDOT} &= 5.64 \text{ AC} \quad (18.1\%) \\
 \text{I.B.V.} &= 25.56 \text{ AC} \quad (81.9\%) \\
 \hline
 &= 31.20 \text{ AC.}
 \end{aligned}$$

### BASIC AREA

- SUBAREA 1 (VDOT SR 615)
- SUBAREA 2 (IRONBOUND VILLAGE REDEV)
- SUBAREA 3 (IRONBOUND VILLAGE - AREA D BLDG)
- SUBAREA 4 (EXISTING PARK AREA)
- SUBAREA 5 (WOODS, EX. SF, BMP AREA)

<u>1ST TRY</u>	<u>ADJUSTED</u>
5.64 AC.	5.64 AC.
11.73 AC.	11.73 AC.
2.07 AC.	2.00 AC.
1.12 AC.	1.12 AC.
10.73 AC.	10.7 AC.
<u>31.29 AC.</u>	<u>31.20 AC.</u>

### VDOT CONTRIBUTION

FROM SUBAREA 1 SR 615 TO NODE J1  
 1-YEAR STORM VOLUME = 0.772 ACRE-FEET  
 10-YEAR DISCHARGE = 33.55 CFS

TOTAL 1-YEAR VOLUME TO POND = 3.412 ACRE-FEET

4.5 AC ~ CN 92  
 5.64 AC ~ CN 88

### DRAINAGE AREA

$$\begin{aligned}
 5.64 / 31.2 &= 18.08\% \\
 25.56 / 31.2 &= 81.92\% \\
 \hline
 &= 100\%
 \end{aligned}$$

### 1-YEAR VOL

VDOT	0.772 AC-FT
REST	2.64 AC-FT
	<u>3.412</u>
22.6%	VDOT
77.4%	REST

# IMPERVIOUS COVER ESTIMATE

		<u>D. A.</u>	<u>IMPERV.</u>	
SUBAREA 1	VDOT SR 615	5.64 AC.	2.52 AC.	FROM ROAD SECTION
SUBAREA 2	IBV REDEV SF LOTS/ROADS	11.73 AC.	5.19 AC.	ROADS & LOTS
SUBAREA 3	IBV AREA D BUILDING/PARKING	2.07 AC.	1.50 AC.	BUILD/PARKING
SUBAREA 4	EAST JCL PARK	1.12 AC.	- 0 -	NEGLECTIBLE IMPERV AMOUNT
SUBAREA 5	EX. LOTS, TOWER & WOODS	10.73 AC.	0.75 AC.	13 LOTS & TOWER
			<u>9.96 AC.</u>	
			<u>SAY 10 ACRES</u>	

\* IMPERVIOUS COVER PER LOT BASED ON 2,500 SF PER LOT.

County Type A-3 BMP

2 inches per impervious acre

$$2 \text{ inches} \times 1.0 \text{ acres} \times \frac{1 \text{ ft.}}{12 \text{ inch}} \times \frac{43,560 \text{ SF}}{1 \text{ AC.}} = 72,600 \text{ C.F.} \\ 1.66 \text{ AC-FT.}$$

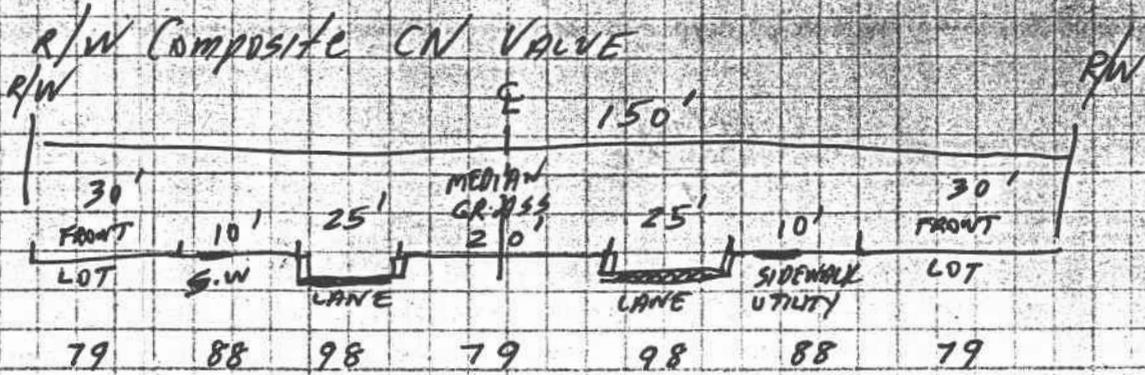
$$72,600 \text{ C.F.} / 2 = 36,300 \text{ CF PERM. POOL} \\ 36,300 \text{ CF ED. POOL}$$

22-141 50 SHEETS  
22-142 100 SHEETS  
22-144 200 SHEETS



SUBAREA 1 (VDDT-SR 615) A = 5.64 AC.

TYPICAL 150' R/W THRU D.A.  
L = 1900' +



$$\frac{60(79) + 20(88) + 50(98) + 20(79)}{150} = 86 \quad \text{CN R/W-R/W}$$

USE 88

SR 615 A = 5.64 AC  
CN = 88

TIME OF CONCENTRATION IN SUB AREA

HIGH POINT @ DISCOVERY BLVD. TO LOW POINT @ REDEV SWIM AREA J, LOT 34 THRU 37. VDDT PRELIM INDICATION THAT THIS WILL BE PIPE OUTFALL LOCATION. JUNCTION J2

~~1300 L.F. OF STORM PIPE~~ INITIAL FLOW 24" PIPE ~ 15.5 CFS

$$V = Q/A = \frac{15.5 \text{ CFS}}{\frac{\pi (2)^2}{4}} = 4.93 \text{ FPS} \quad \text{SAY 5 FPS}$$

$$T = L/V = \frac{1300}{5} = 260 \text{ s} = 4.33 \text{ min.} \quad \text{SAY 5 min.}$$

NOTE: Very quick Tc assumed, roadside storm system.

SEE COMP Tc = 0.0902 HRS. 5.4 min SAY 6 minutes.

J2 TO J1 ASSUME 560' OF 24" TO 27" STORM PIPE.

$$L/V = \frac{560'}{3 \text{ FPS}} = 186.6 \text{ s} = 3.11 \text{ min}$$

$$6 \text{ min} + 3 \text{ min} = 9 \text{ min. (0.15 hrs.)}$$

22-141 50 SHEETS  
22-142 100 SHEETS  
22-144 200 SHEETS



File... C:\HAESTAD\PPKW\JCCPROJECTS\IBVREDEV.PPW  
Title... SR 615

.....  
TIME OF CONCENTRATION CALCULATOR  
.....

SR 615

-----  
Segment #1: Tc: TR-55 Sheet  
Description: Paved Roadway

Mannings n .0110  
Hydraulic Length 12.00 ft  
2yr, 24hr P 3.5000 in  
Slope .020800 ft/ft

Avg.Velocity .96 ft/sec

Segment #1 Time: .0035 hrs

-----  
Segment #2: Tc: TR-55 Shallow  
Description: Paved/Storm

Hydraulic Length 300.00 ft  
Slope .005000 ft/ft  
Paved

Avg.Velocity 1.44 ft/sec

Segment #2 Time: .0580 hrs

-----  
Segment #3: Tc: TR-55 Shallow  
Description: Storm

Hydraulic Length 210.00 ft  
Slope .010000 ft/ft  
Paved

Avg.Velocity 2.03 ft/sec

Segment #3 Time: .0287 hrs

=====  
Total Tc: .0902 hrs  
=====

SUB AREA 2 (IRON BOUND VILLAGE - SF REDEV AREA)

A = 11.73 AC.

ALL SF REDEV DRAINS TO JUNCTION J1

ROADS & CUL-DE-SACS CN = 98

ROADS	30' W x 900' WATFORD	27,000 SF
	30' W x 730' CARRIAGE	21,900 SF
	30' W x 300' EX. WATFORD	21,900 SF
	30' W x 150' ROAD 1	5400 SF
	30' W x 120' ROAD 2	3600 SF
	30' W x 120' ROAD 3	3600 SF
	CUL-DE-SAC 1	2800 SF.
	CUL-DE-SAC 2	3800 SF.
	CUL-DE-SAC 3	3800 SF

93,800 SF (2.15 AC)

TYPICAL LOT = 100 x 50 = 5,000 SF

IMPERV 2,000-3,000 = 2,500 SF AVG.

CN =  $\frac{2,500(98) + 2,500(79)}{5,000} = 88$

11.55  
75-83 B/C SOILS.  
USE CN 85

# LOTS 53

ROUGH TOTAL AREA 53 x 5,000 SF = 265,000 SF = 6.08 AC.

COMMON AREAS (2) 11.73 - 2.15 - 6.08 = 3.5 AC.

100' x 100' = 10,000 SF = 0.22 AC.

80' x 140' = 11,200 SF = 0.25 AC.

0.47 ~ 0.50

ROADS & CUL-DE-SAC 98 2.15 AC.

LOTS 5,000 SF AVG. 85 9.08 AC.

1/4 AC ±  
COMMON AREA 79 0.50 AC

11.73 AC.

CN  
COMPOSITE  
87

A = 11.73 AC.

H56 C

CN = 87

TIME OF CONCENTRATION

Most remote point in watershed, south ROAD 1

T<sub>c</sub> = 0.65 HRS.

33 minutes

USE 30 minutes.

OL: 300', n = 0.40, 7%

SC: 810' PIPE



Type.... Runoff CN-Area  
Name.... CN 10

File.... C:\HAESTAD\PPKW\SAMPLE\PROJECT1.PPW  
Title... Subarea 2 (Ironbound Village SF Redev Area)

RUNOFF CURVE NUMBER DATA

.....

Subarea 2 (Ironbound Village SF Redev Area)

Soil/Surface Description	CN	Area acres	Impervious Adjustment		Adjusted CN
			%C	%UC	
Roads & Cul-de-sac, HSG C	98	2.150			98.00
Lots, 1/4 ac, HSG C	85	9.080			85.00
Common Areas, HSG C	79	.500			79.00

COMPOSITE AREA & WEIGHTED CN --->                    11.730                    87.13 (87)

.....

*CN SUBAREA 2*

File.... C:\HAESTAD\PPKW\SAMPLE\PROJECT1.PPW  
Title... Subarea 2 (IBV SF Redev Area)

.....  
TIME OF CONCENTRATION CALCULATOR  
.....

Subarea 2 (IBV SF Redev Area)  
-----

Segment #1: Tc: TR-55 Sheet  
Description: Road 1 West of Lot 6

Mannings n .4000  
Hydraulic Length 300.00 ft  
2yr, 24hr P 3.5000 in  
Slope .070000 ft/ft

Avg.Velocity .17 ft/sec

Segment #1 Time: .4993 hrs  
-----

Segment #2: Tc: TR-55 Shallow  
Description: Shallow Conc/Pipe Flow (800 ft. pipe)

Hydraulic Length 800.00 ft  
Slope .010000 ft/ft

~~Unpaved~~ **PAVED**

Avg.Velocity 1.61 ft/sec

Segment #2 Time: **0.1093**  
~~.1377~~ hrs  
-----

**0.6086**  
=====

Total Tc: **0.6086**  
~~.6370~~ hrs  
=====

**Tc SUBAREA 2**

# SUBAREA 3 (IRONBOUND VILLAGE - AREA D BUDG)

North Part of site near CARRIAGE

A = 2.07 AC.

HSB B/C

		AC.	CN
IMPERVIOUS			
PARKING	180' x 240' =	0.99 AC.	1.00 AC. 98
BUDG	21,600' =	0.49 AC.	0.50 AC. 98
LANDSCAPE			0.50 AC. 79

COMPOSITE CN = 93; A = 2.07 AC.

## TIME OF CONCENTRATION (TO JUNCTION 1)

OVERLAND, LANDSCAPE 40', 3H:1V

S.H. CONC. PARKING 190', 240'

PIPE, 500 C.I.F. 0.5% SLOPE

$T_c = 0.165 \text{ HRS.} = 9.9 \text{ MIN.}$  say 10 min.

22-141 50 SHEETS  
22-142 100 SHEETS  
22-144 200 SHEETS



Type.... Runoff CN-Area  
Name.... AREA D

File.... C:\HAESTAD\PPKW\SAMPLE\PROJECT1.PPW  
Title... IBV Redev - Area D Parking & Building

RUNOFF CURVE NUMBER DATA

IBV Redev - Area D Parking & Building

Soil/Surface Description	CN	Area acres	Impervious Adjustment		Adjusted CN
			%C	%UC	
Parking Area, HSG B/C	98	1.000			98.00
Building, 21500 sf	98	.500			98.00
Landscape/O.S., HSG C	79	.500			79.00
COMPOSITE AREA & WEIGHTED CN ---->		2.000			93.25 (93)

*CN SUBAREA 3*

SUBAREA 4 (EXIST. PARK, NE Part of Project)

EXIST. JCC Park Area; Park J.

H&B B (1&B) SOILS

CN = 69 (FAIR CONDITION, GRASS 50-75%)

A = 1.12 AC.

TIME OF CONCENTRATION TO JUNCTION 1

Overland 200', n = 0.13, 2%

SC within area east of Park lot, 200', 1%

SL in pipe system connect w/ Area D, 500 LF, 0.5%

$T_c = 0.303 \text{ HRS.} = 18 \text{ minutes}$

SUBAREA 5 (BYPASS AREA BELOW 18V. Direct Drains to Proposed BMP)

DA = 10.73 ACRES. 11C/15E SOILS H&B C

13 existing SF LOTS + RADIO TOWER

AVG 15,000 SF (3 AC. LOTS)

13 x 15,000 SF = 4.47 AC CN 77

WOODS 10.73 - 4.47 AC = 6.26 AC. CN = 70

WOODS	70	6.26 AC	} CN = 74
EX. LOTS	77	4.47 AC	
		<u>10.73 AC</u>	

CN OF 74

TIME OF CONCENTRATION

Most remote at intx. Watford + Carriage

Overland SF Lot, 100'

OL SH CONL 25/500 = 5%; 200' UNGRAVED WOODS.

SH CONL 5%, 300'

$T_c = 0.5927 \text{ HRS} = 35 \text{ MIN.}$

22-141 50 SHEETS  
22-142 100 SHEETS  
22-144 200 SHEETS



File.... C:\HAESTAD\PPKW\SAMPLE\PROJECT1.PPW  
Title... Existing Park to Junction 1

.....  
TIME OF CONCENTRATION CALCULATOR  
.....

Existing Park to Junction 1  
-----

Segment #1: Tc: TR-55 Sheet  
Description: Park

Mannings n .1300  
Hydraulic Length 200.00 ft  
2yr, 24hr P 3.5000 in  
Slope .020000 ft/ft

Avg.Velocity .23 ft/sec

Segment #1 Time: .2425 hrs  
-----

Segment #2: Tc: TR-55 Shallow  
Description: Shallow Conc (east of parking lot)

Hydraulic Length 200.00 ft  
Slope .010000 ft/ft  
Paved

Avg.Velocity 2.03 ft/sec

Segment #2 Time: .0273 hrs  
-----

Segment #3: Tc: TR-55 Shallow  
Description: Meets Sub 3 Pipe flow

Hydraulic Length 500.00 ft  
Slope .050000 ft/ft  
Paved

Avg.Velocity 4.55 ft/sec

Segment #3 Time: .0306 hrs  
-----

=====  
Total Tc: .3003 hrs  
=====

*Tc SUBAREA 4*

File.... C:\HAESTAD\PPKW\SAMPLE\PROJECT1.PPW  
Title... Subarea 5 (Bypass Area)

.....  
TIME OF CONCENTRATION CALCULATOR  
.....

Subarea 5 (Bypass Area)  
-----

Segment #1: Tc: TR-55 Sheet  
Description: SF Lot area

Mannings n .2400  
Hydraulic Length 100.00 ft  
2yr, 24hr P 3.5000 in  
Slope .040000 ft/ft

Avg.Velocity .16 ft/sec

Segment #1 Time: .1723 hrs  
-----

Segment #2: Tc: TR-55 Sheet  
Description: Overland Woods

Mannings n .4000  
Hydraulic Length 200.00 ft  
2yr, 24hr P 3.5000 in  
Slope .050000 ft/ft

Avg.Velocity .13 ft/sec

Segment #2 Time: .4130 hrs  
-----

Segment #3: Tc: TR-55 Shallow  
Description: Shallow Conc Tower Site/slopes

Hydraulic Length 300.00 ft  
Slope .500000 ft/ft  
Unpaved

Avg.Velocity 11.41 ft/sec

Segment #3 Time: .0073 hrs  
-----

=====  
Total Tc: .5927 hrs  
=====

*Tc SUBAREA 5*

MASTER DESIGN STORM SUMMARY

Default Network Design Storm File, ID JCC.RNQ JCCSCSdata

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

MASTER NETWORK SUMMARY  
 SCS Unit Hydrograph Method

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

Storage Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond ac-ft
J1 (WATFORD)	JCT	1	2.711		12.0250	29.47		
J1 (WATFORD)	JCT	2	3.760		12.0250	40.76		
J1 (WATFORD)	JCT	10	7.411		12.0250	78.84		
J1 (WATFORD)	JCT	25	8.391		12.0250	88.84		
J1 (WATFORD)	JCT	100	11.033		12.0250	115.46		
*OUTFALL CHANNEL	JCT	1	3.412		12.0500	32.66		
*OUTFALL CHANNEL	JCT	2	4.869		12.0500	46.66		
*OUTFALL CHANNEL	JCT	10	10.109		12.0500	95.58		
*OUTFALL CHANNEL	JCT	25	11.542		12.0500	108.69		
*OUTFALL CHANNEL	JCT	100	15.438		12.0500	143.93		
<i>TOTAL 1-YR STORM VOLUME</i>								
REGIONAL PONDIN	POND	1	3.412		12.0500	32.66		
REGIONAL PONDIN	POND	2	4.869		12.0500	46.66		
REGIONAL PONDIN	POND	10	10.109		12.0500	95.58		
REGIONAL PONDIN	POND	25	11.542		12.0500	108.69		
REGIONAL PONDIN	POND	100	15.438		12.0500	143.93		
REGIONAL PONDOUT	POND	1	3.412		12.0500	32.66		
REGIONAL PONDOUT	POND	2	4.869		12.0500	46.66		
REGIONAL PONDOUT	POND	10	10.109		12.0500	95.58		
REGIONAL PONDOUT	POND	25	11.542		12.0500	108.69		

*10-YR IN PIPE SYSTEM AT WATFORD LANE*

*IF UNCONTROLLED*

*NO ROUTING*

MASTER NETWORK SUMMARY  
 SCS Unit Hydrograph Method

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

Storage Node ID	Return Type	Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond ac-ft
REGIONAL PONDOUT	POND	100	15.438		12.0500	143.93		
					<i>VDOT CONTRIBUTION TO 1-YR STORM VOLUME</i>			
SR615	AREA	1	<u>.772</u>		11.9750	12.92		
SR615	AREA	2	1.066		11.9750	17.70		
SR615	AREA	10	2.084		11.9750	33.55		
SR615	AREA	25	2.356		11.9750	37.67		
SR615	AREA	100	3.087		11.9500	48.60		
<hr/>								
SUB2(IBV SF)	AREA	1	1.531		12.2000	15.68		
SUB2(IBV SF)	AREA	2	2.133		12.2000	21.81		
SUB2(IBV SF)	AREA	10	4.229		12.2000	42.40		
SUB2(IBV SF)	AREA	25	4.791		12.2000	47.77		
SUB2(IBV SF)	AREA	100	6.305		12.2000	62.05		
<hr/>								
SUB3	AREA	1	.356		11.9750	5.65		
SUB3	AREA	2	.472		11.9750	7.38		
SUB3	AREA	10	.860		11.9750	13.01		
SUB3	AREA	25	.962		11.9750	14.46		
SUB3	AREA	100	1.236		11.9750	18.31		
<hr/>								
SUB4	AREA	1	.053		12.1000	.59		
SUB4	AREA	2	.089		12.0750	1.09		
SUB4	AREA	10	.239		12.0750	3.19		
SUB4	AREA	25	.283		12.0750	3.79		
SUB4	AREA	100	.406		12.0750	5.46		
<hr/>								
SUB5	AREA	1	.701		12.2500	5.72		
SUB5	AREA	2	1.109		12.2500	9.64		
SUB5	AREA	10	2.698		12.2500	24.68		
SUB5	AREA	25	3.151		12.2500	28.90		
SUB5	AREA	100	4.405		12.2500	40.42		

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

Page 2.01  
 Event: 1 yr

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

DEFAULT Design Storm File, ID = JCC.RNQ JCCSCSdata

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

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

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
J1 (WATFORD)	JCT	2.711	12.0250	29.47	
Outfall	OUTFALL CHANNEL	3.412	12.0500	32.66	
	REGIONAL PONDIN	3.412	12.0500	32.66	
	REGIONAL PONDOUT	3.412	12.0500	32.66	
	SR615	.772	11.9750	12.92	
	SUB2(IBV SF)	1.531	12.2000	15.68	
	SUB3	.356	11.9750	5.65	
	SUB4	.053	12.1000	.59	
	SUB5	.701	12.2500	5.72	

TOTAL 1-YEAR STORM VOLUME TO BMP = 3.412 ACRE-FT.  
 TOTAL VDOT 1-YEAR STORM CONTRIBUTION = 0.772 AC-FT.

VDOT 0.772 AC-FT (22.6%)  
 I.B.V. 2.64 AC-FT (77.4%)

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

Page 2.02  
 Event: 2 yr

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

DEFAULT Design Storm File, ID = JCC.RNQ JCCSCSdata

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

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

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
J1 (WATFORD)	JCT	3.760	12.0250	40.76	
Outfall	OUTFALL CHANNEL	4.869	12.0500	46.66	
	REGIONAL PONDIN	4.869	12.0500	46.66	
	REGIONAL PONDOUT	4.869	12.0500	46.66	
	SR615	1.066	11.9750	17.70	
	SUB2 (IBV SF)	2.133	12.2000	21.81	
	SUB3	.472	11.9750	7.38	
	SUB4	.089	12.0750	1.09	
	SUB5	1.109	12.2500	9.64	

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

James City County  
 Compute Time: 11:34:28

Date: 02/09/2005

=====  
JOB TITLE  
=====

Job title was not entered.

PRELIMINARY H & H REPORT

IRONBOUND ~~AD~~ Village REDEV & SR 615  
Proposed Regional BMP

Table of Contents

\*\*\*\*\* MASTER SUMMARY \*\*\*\*\*

Watershed..... Master Network Summary ..... 1.01

\*\*\*\*\* NETWORK SUMMARIES (DETAILED) \*\*\*\*\*

Watershed..... Dev..1  
Executive Summary (Nodes) ..... 2.01

Watershed..... Dev..2  
Executive Summary (Nodes) ..... 2.02

Watershed..... Dev.10  
Executive Summary (Nodes) ..... 2.03  
Executive Summary (Links) ..... 2.04

Watershed..... Dev.25  
Executive Summary (Nodes) ..... 2.06

Watershed..... Dev100  
Executive Summary (Nodes) ..... 2.07  
Network Calcs Sequence ..... 2.08

\*\*\*\*\* DESIGN STORMS SUMMARY \*\*\*\*\*

JCCSCSdata..... Design Storms ..... 3.01

\*\*\*\*\* RUNOFF HYDROGRAPHS \*\*\*\*\*

SR615..... Dev..1  
SCS Unit Hyd. Summary ..... 4.01

SUB2(IBV SF).... Dev..1  
SCS Unit Hyd. Summary ..... 4.02

Table of Contents (continued)

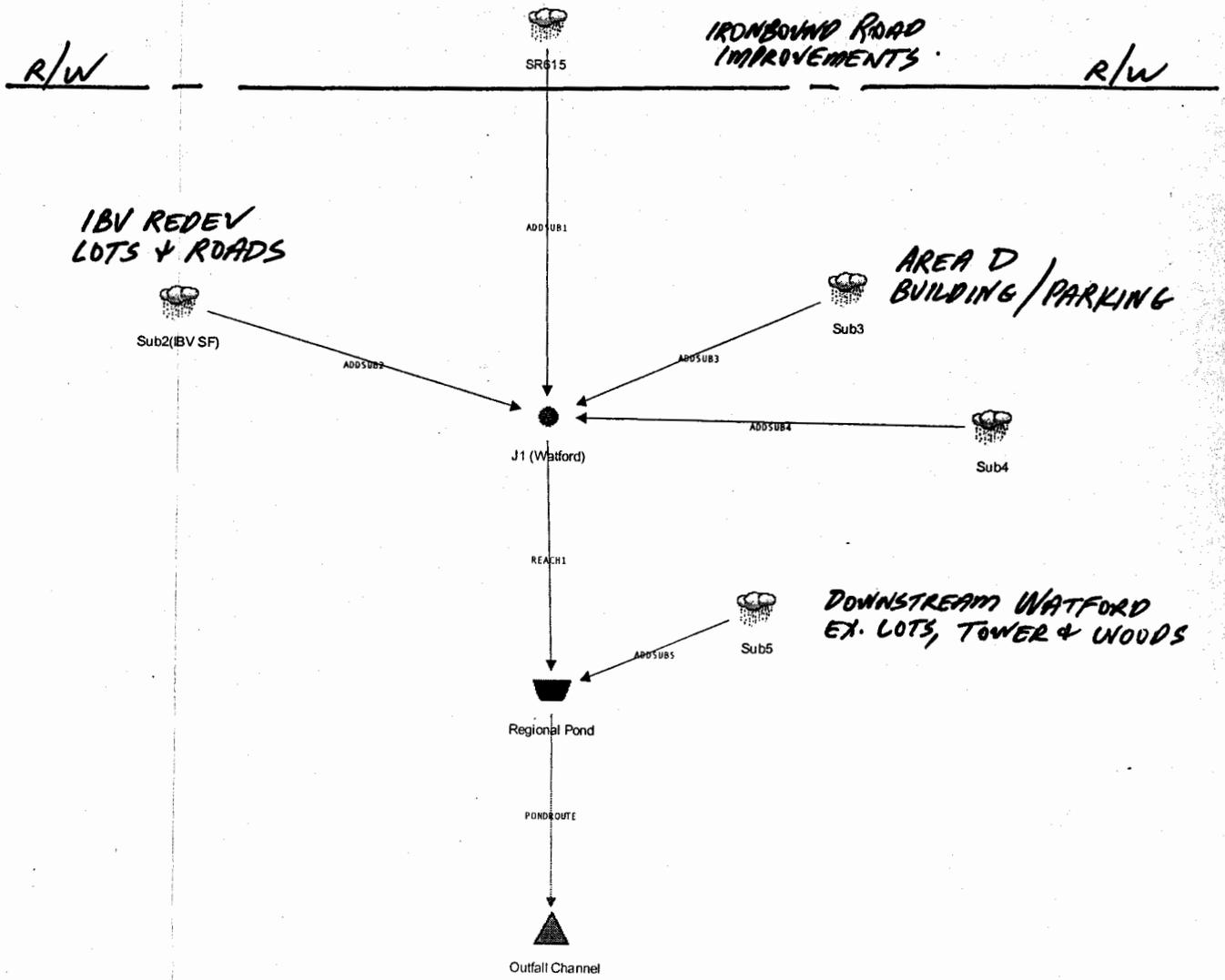
SUB3..... Dev..1  
SCS Unit Hyd. Summary ..... 4.03

SUB4..... Dev..1  
SCS Unit Hyd. Summary ..... 4.04

SUB5..... Dev..1  
SCS Unit Hyd. Summary ..... 4.05

\*\*\*\*\* HYG ADDITION \*\*\*\*\*

J1 (WATFORD).... Dev.10  
Node: Addition Summary ..... 5.01



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

Page 2.03  
 Event: 10 yr

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

DEFAULT Design Storm File, ID = JCC.RNQ JCCSCSdata

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

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

Node ID	Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
J1 (WATFORD)	JCT	7.411		12.0250	<u>78.84</u>	
Outfall	OUTFALL CHANNEL	10.109		12.0500	95.58	
	REGIONAL PONDIN	10.109		12.0500	95.58	
	REGIONAL PONDOUT	10.109		12.0500	95.58	
	SR615	2.084		11.9750	<u>33.55</u>	
	SUB2 (IBV SF)	4.229		12.2000	42.40	
	SUB3	.860		11.9750	13.01	
	SUB4	.239		12.0750	3.19	
	SUB5	2.698		12.2500	24.68	

*VDOT 10-YEAR STORM CONTRIBUTION  
 TO IBV PIPE SYSTEM = 33.55 CFS*

*TOTAL 10-YR STORM FLOW  
 TO POND = 95.58 CFS*

*VDOT 33.55 CFS (35.10%)  
 REST ~~12.03~~ 62.03 CFS (64.90%)  
 -----  
 95.58 CFS*

Type... Executive Summary (Links)  
 Name... Watershed  
 File... C:\HAESTAD\PPKW\JCCPROJECTS\IBVREDEV.PPW  
 Storm... TypeII 24hr Tag: Dev.10

Page 2.04  
 Event: 10 yr

NETWORK SUMMARY -- LINKS  
 (UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)  
 (Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = JCC.RNQ JCCSCSdata

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

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

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points
ADDSUB1	ADD	UN	2.084		11.9750	33.55	SR615
		DL	2.084		11.9750	33.55	
		DN	7.411		12.0250	78.84	J1 (WATFORD)
ADDSUB2	ADD	UN	4.229		12.2000	42.40	SUB2 (IBV SF)
		DL	4.229		12.2000	42.40	
		DN	7.411		12.0250	78.84	J1 (WATFORD)
ADDSUB3	ADD	UN	.860		11.9750	13.01	SUB3
		DL	.860		11.9750	13.01	
		DN	7.411		12.0250	78.84	J1 (WATFORD)
ADDSUB4	ADD	UN	.239		12.0750	3.19	SUB4
		DL	.239		12.0750	3.19	
		DN	7.411		12.0250	78.84	J1 (WATFORD)
ADDSUB5	ADD	UN	2.698		12.2500	24.68	SUB5
		DL	2.698		12.2500	24.68	
		DN	10.109		12.0500	95.58	REGIONAL PONDIN
PONDROUTE PONDROUTE	PONDrt	UN	10.109		12.0500	95.58	REGIONAL PONDIN
			10.109		12.0500	95.58	REGIONAL PONDOUT
		DL	10.109		12.0500	95.58	
		DN	10.109		12.0500	95.58	OUTFALL CHANNEL

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

James City County  
 Compute Time: 11:34:28

Date: 02/09/2005

Type.... Executive Summary (Links)  
 Name.... Watershed  
 File.... C:\HAESTAD\PPKW\JCCPROJECTS\IBVREDEV.PPW  
 Storm... TypeII 24hr Tag: Dev.10

Page 2.05  
 Event: 10 yr

NETWORK SUMMARY -- LINKS  
 (UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)  
 (Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points
REACH1	REACH	UN	7.411		12.0250	78.84	J1 (WATFORD)
		DL	7.411		12.0250	78.45	
		DN	10.109		12.0500	95.58	REGIONAL PONDIN

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

Page 2.06  
 Event: 25 yr

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

DEFAULT Design Storm File, ID = JCC.RNQ JCCSCSdata

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

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

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
J1 (WATFORD)	JCT	8.391	12.0250	88.84	
Outfall	OUTFALL CHANNEL	11.542	12.0500	108.69	
	REGIONAL PONDIN	11.542	12.0500	108.69	
	REGIONAL PONDOUT	11.542	12.0500	108.69	
	SR615	2.356	11.9750	37.67	
	SUB2(IBV SF)	4.791	12.2000	47.77	
	SUB3	.962	11.9750	14.46	
	SUB4	.283	12.0750	3.79	
	SUB5	3.151	12.2500	28.90	

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

Page 2.07  
 Event: 100 yr

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

DEFAULT Design Storm File, ID = JCC.RNQ JCCSCSdata

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

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

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
J1 (WATFORD)	JCT	11.033	12.0250	115.46	
Outfall	OUTFALL CHANNEL	15.438	12.0500	143.93	
	REGIONAL PONDIN	15.438	12.0500	143.93	
	REGIONAL PONDOUT	15.438	12.0500	143.93	
	SR615	3.087	11.9500	48.60	
	SUB2(IBV SF)	6.305	12.2000	62.05	
	SUB3	1.236	11.9750	18.31	
	SUB4	.406	12.0750	5.46	
	SUB5	4.405	12.2500	40.42	

Type.... Network Calcs Sequence  
Name.... Watershed  
File.... C:\HAESTAD\PPKW\JCCPROJECTS\IBVREDEV.PPW  
Storm... TypeII 24hr Tag: Dev100

Page 2.08  
Event: 100 yr

NETWORK RUNOFF NODE SEQUENCE

Runoff Data	Apply to Node	Receiving Link
SCS UH SR615	Subarea SR615	Add Hyd SR615
SCS UH Sub2(IBV SF)	Subarea SUB2(IBV SF)	Add Hyd SUB2(IBV SF)
SCS UH Sub3	Subarea SUB3	Add Hyd SUB3
SCS UH Sub4	Subarea SUB4	Add Hyd SUB4
SCS UH Sub5	Subarea SUB5	Add Hyd SUB5

Type.... Network Calcs Sequence  
 Name.... Watershed  
 File.... C:\HAESTAD\PPKW\JCCPROJECTS\IBVREDEV.PPW  
 Storm... TypeII 24hr Tag: Dev100

Page 2.09  
 Event: 100 yr

NETWORK ROUTING SEQUENCE

Link Operation	UPstream Node	DNstream Node	
Add Hyd ADDSUB2	Subarea SUB2(IBV SF)	Jct	J1 (WATFORD)
Add Hyd ADDSUB3	Subarea SUB3	Jct	J1 (WATFORD)
Add Hyd ADDSUB1	Subarea SR615	Jct	J1 (WATFORD)
Add Hyd ADDSUB4	Subarea SUB4	Jct	J1 (WATFORD)
Reach REACH1	Jct J1 (WATFORD)	Pond	REGIONAL PONDIN
Add Hyd ADDSUB5	Subarea SUB5	Pond	REGIONAL PONDIN
POND ROUTE TOTAL OUTFLOW...			
Total Pond Outflow	Pond REGIONAL PONDIN	Outflow	REGIONAL PONDOUT
SET POND ROUTING LINK TO TOTAL POND OUTFLOW...			
Outlet PONDRUTE	Outflow REGIONAL PONDOUT	Jct	OUTFALL CHANNEL

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

File.... C:\HAESTAD\PPKW\RAINFALL\JCC.RNQ  
Title... Job title was not entered.

DESIGN STORMS SUMMARY

Design Storm File, ID = JCC.RNQ            JCCSCSdata

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

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

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

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

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

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

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

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

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

Page 3.02

File.... C:\HAESTAD\PPKW\RAINFALL\JCC.RNQ  
Title... Job title was not entered.

DESIGN STORMS SUMMARY

Design Storm File, ID = JCC.RNQ      JCCSCSdata

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

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

Type.... SCS Unit Hyd. Summary  
Name.... SR615 Tag: Dev..1  
File.... C:\HAESTAD\PPKW\JCCPROJECTS\IBVREDEV.PPW  
Storm... TypeII 24hr Tag: Dev..1

Page 4.01  
Event: 1 yr

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 1 year storm  
Duration = 24.0000 hrs Rain Depth = 2.8000 in  
Rain Dir = C:\HAESTAD\PPKW\RAINFALL\  
Rain File -ID = SCSTYPES.RNF - TypeII 24hr  
Unit Hyd Type = Default Curvilinear  
HYG Dir = C:\HAESTAD\PPKW\JCCPROJECTS\  
HYG File - ID = IBVREDEV.HYG - SR615 Dev..1  
Tc = .1500 hrs  
Drainage Area = 5.640 acres Runoff CN= 88

=====  
Computational Time Increment = .02000 hrs  
Computed Peak Time = 11.9800 hrs  
Computed Peak Flow = 12.92 cfs

Time Increment for HYG File = .0250 hrs  
Peak Time, Interpolated Output = 11.9750 hrs  
Peak Flow, Interpolated Output = 12.92 cfs  
=====

DRAINAGE AREA

-----  
ID:None Selected  
CN = 88  
Area = 5.640 acres  
S = 1.3636 in  
0.25 = .2727 in

Cumulative Runoff

-----  
1.6415 in  
.772 ac-ft

HYG Volume... .772 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .15000 hrs (ID: SR615)  
Computational Incr, Tm = .02000 hrs = 0.20000 Tp  
Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
Unit peak, qp = 42.60 cfs  
Unit peak time Tp = .10000 hrs  
Unit receding limb, Tr = .40000 hrs  
Total unit time, Tb = .50000 hrs

Type.... SCS Unit Hyd. Summary  
Name.... SUB2(IBV SF) Tag: Dev..1  
File.... C:\HAESTAD\PPKW\JCCPROJECTS\IBVREDEV.PPW  
Title... Subarea 2 (Ironbound Village Redev SF & Roads)  
Storm... TypeII 24hr Tag: Dev..1

Page 4.02  
Event: 1 yr

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 1 year storm  
Duration = 24.0000 hrs Rain Depth = 2.8000 in  
Rain Dir = C:\HAESTAD\PPKW\RAINFALL\  
Rain File -ID = SCSTYPES.RNF - TypeII 24hr  
Unit Hyd Type = Default Curvilinear  
HYG Dir = C:\HAESTAD\PPKW\JCCPROJECTS\  
HYG File - ID = IBVREDEV.HYG - SUB2(IBV SF) Dev..1  
Tc = .5000 hrs  
Drainage Area = 11.730 acres Runoff CN= 87

=====  
Computational Time Increment = .06667 hrs  
Computed Peak Time = 12.2000 hrs  
Computed Peak Flow = 15.68 cfs

Time Increment for HYG File = .0250 hrs  
Peak Time, Interpolated Output = 12.2000 hrs  
Peak Flow, Interpolated Output = 15.68 cfs  
=====

DRAINAGE AREA

-----  
ID:None Selected  
CN = 87  
Area = 11.730 acres  
S = 1.4943 in  
0.2S = .2989 in

Cumulative Runoff

-----  
1.5657 in  
1.531 ac-ft

HYG Volume... 1.531 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .50000 hrs (ID: None Selected)  
Computational Incr, Tm = .06667 hrs = 0.20000 Tp  
Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp)))  
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
Unit peak, qp = 26.58 cfs  
Unit peak time Tp = .33333 hrs  
Unit receding limb, Tr = 1.33333 hrs  
Total unit time, Tb = 1.66667 hrs

Type.... SCS Unit Hyd. Summary  
Name.... SUB3 Tag: Dev..1  
File.... C:\HAESTAD\PPKW\JCCPROJECTS\IBVREDEV.PPW  
Title... Subarea 3 (IBV Area D Building)  
Storm... TypeII 24hr Tag: Dev..1

Page 4.03  
Event: 1 yr

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 1 year storm  
Duration = 24.0000 hrs Rain Depth = 2.8000 in  
Rain Dir = C:\HAESTAD\PPKW\RAINFALL\  
Rain File -ID = SCSTYPES.RNF - TypeII 24hr  
Unit Hyd Type = Default Curvilinear  
HYG Dir = C:\HAESTAD\PPKW\JCCPROJECTS\  
HYG File - ID = IBVREDEV.HYG - SUB3 Dev..1  
Tc = .1667 hrs  
Drainage Area = 2.070 acres Runoff CN= 93

=====  
Computational Time Increment = .02223 hrs  
Computed Peak Time = 11.9802 hrs  
Computed Peak Flow = 5.67 cfs  
  
Time Increment for HYG File = .0250 hrs  
Peak Time, Interpolated Output = 11.9750 hrs  
Peak Flow, Interpolated Output = 5.65 cfs  
=====

DRAINAGE AREA

-----  
ID:None Selected  
CN = 93  
Area = 2.070 acres  
S = .7527 in  
0.2S = .1505 in

Cumulative Runoff

-----  
2.0633 in  
.356 ac-ft

HYG Volume... .356 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .16670 hrs (ID: None Selected)  
Computational Incr, Tm = .02223 hrs = 0.20000 Tp  
  
Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
  
Unit peak, qp = 14.07 cfs  
Unit peak time Tp = .11113 hrs  
Unit receding limb, Tr = .44453 hrs  
Total unit time, Tb = .55567 hrs

Type.... SCS Unit Hyd. Summary Page 4.04  
 Name.... SUB4 Tag: Dev..1 Event: 1 yr  
 File.... C:\HAESTAD\PPKW\JCCPROJECTS\IBVREDEV.PPW  
 Title... Subarea 4 (Exist. JCC Park to NE)  
 Storm... TypeII 24hr Tag: Dev..1

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 1 year storm  
 Duration = 24.0000 hrs Rain Depth = 2.8000 in  
 Rain Dir = C:\HAESTAD\PPKW\RAINFALL\  
 Rain File -ID = SCSTYPES.RNF - TypeII 24hr  
 Unit Hyd Type = Default Curvilinear  
 HYG Dir = C:\HAESTAD\PPKW\JCCPROJECTS\  
 HYG File - ID = IBVREDEV.HYG - SUB4 Dev..1  
 Tc = .3030 hrs  
 Drainage Area = 1.120 acres Runoff CN= 69

=====  
 Computational Time Increment = .04040 hrs  
 Computed Peak Time = 12.1200 hrs  
 Computed Peak Flow = .59 cfs

Time Increment for HYG File = .0250 hrs  
 Peak Time, Interpolated Output = 12.1000 hrs  
 Peak Flow, Interpolated Output = .59 cfs  
 =====

DRAINAGE AREA

-----  
 ID:None Selected  
 CN = 69  
 Area = 1.120 acres  
 S = 4.4928 in  
 0.25 = .8986 in

Cumulative Runoff

-----  
 .5654 in  
 .053 ac-ft

HYG Volume... .053 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .30300 hrs (ID: None Selected)  
 Computational Incr, Tm = .04040 hrs = 0.20000 Tp  
 Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)  
 K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))  
 Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)  
 Unit peak, qp = 4.19 cfs  
 Unit peak time Tp = .20200 hrs  
 Unit receding limb, Tr = .80800 hrs  
 Total unit time, Tb = 1.01000 hrs

Type.... SCS Unit Hyd. Summary  
Name.... SUB5 Tag: Dev..1  
File.... C:\HAESTAD\PPKW\JCCPROJECTS\IBVREDEV.PPW  
Title... Subarea 5 (Bypass Woods, Ex. SF and Tower site)  
Storm... TypeII 24hr Tag: Dev..1

Page 4.05  
Event: 1 yr

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 1 year storm  
Duration = 24.0000 hrs Rain Depth = 2.8000 in  
Rain Dir = C:\HAESTAD\PPKW\RAINFALL\  
Rain File -ID = SCSTYPES.RNF - TypeII 24hr  
Unit Hyd Type = Default Curvilinear  
HYG Dir = C:\HAESTAD\PPKW\JCCPROJECTS\  
HYG File - ID = IBVREDEV.HYG - SUB5 Dev..1  
Tc = .5927 hrs  
Drainage Area = 10.730 acres Runoff CN= 74

=====  
Computational Time Increment = .07903 hrs  
Computed Peak Time = 12.2491 hrs  
Computed Peak Flow = 5.72 cfs

Time Increment for HYG File = .0250 hrs  
Peak Time, Interpolated Output = 12.2500 hrs  
Peak Flow, Interpolated Output = 5.72 cfs  
=====

DRAINAGE AREA

-----  
ID:None Selected  
CN = 74  
Area = 10.730 acres  
S = 3.5135 in  
0.2S = .7027 in

Cumulative Runoff

-----  
.7840 in  
.701 ac-ft

HYG Volume... .701 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .59270 hrs (ID: None Selected)  
Computational Incr, Tm = .07903 hrs = 0.20000 Tp

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

Unit peak, qp = 20.51 cfs  
Unit peak time Tp = .39513 hrs  
Unit receding limb, Tr = 1.58053 hrs  
Total unit time, Tb = 1.97567 hrs

Type.... Node: Addition Summary  
 Name.... J1 (WATFORD)  
 File.... C:\HAESTAD\PPKW\JCCPROJECTS\IBVREDEV.PPW  
 Storm... TypeII 24hr Tag: Dev.10

Page 5.01  
 Event: 10 yr

SUMMARY FOR HYDROGRAPH ADDITION  
 at Node: J1 (WATFORD)

HYG Directory: C:\HAESTAD\PPKW\JCCPROJECTS\

```

=====
Upstream Link ID  Upstream Node ID  HYG file      HYG ID        HYG tag
-----
ADDSUB2          SUB2(IBV SF)    IBVREDEV.HYG  SUB2(IBV SF)  Dev.10
ADDSUB3          SUB3            IBVREDEV.HYG  SUB3          Dev.10
ADDSUB1          SR615          IBVREDEV.HYG  SR615        Dev.10
ADDSUB4          SUB4            IBVREDEV.HYG  SUB4          Dev.10
=====
  
```

INFLOWS TO: J1 (WATFORD)

```

-----
HYG file      HYG ID        HYG tag      Volume      Peak Time    Peak Flow
ac-ft         hrs           cfs
-----
IBVREDEV.HYG SUB2(IBV SF)  Dev.10       4.229       12.2000     42.40
IBVREDEV.HYG SUB3            Dev.10       .860        11.9750     13.01
IBVREDEV.HYG SR615          Dev.10       2.084       11.9750     33.55
IBVREDEV.HYG SUB4            Dev.10       .239        12.0750     3.19
  
```

TOTAL FLOW INTO: J1 (WATFORD)

```

-----
HYG file      HYG ID        HYG tag      Volume      Peak Time    Peak Flow
ac-ft         hrs           cfs
-----
IBVREDEV.HYG J1 (WATFORD)  Dev.10       7.411       12.0250     78.84
  
```

Type.... Node: Addition Summary  
 Name.... J1 (WATFORD)  
 File.... C:\HAESTAD\PPKW\JCCPROJECTS\IBVREDEV.PPW  
 Storm... TypeII 24hr Tag: Dev.10

Page 5.02  
 Event: 10 yr

TOTAL NODE INFLOW...  
 HYG file = C:\HAESTAD\PPKW\JCCPROJECTS\IBVREDEV.HYG  
 HYG ID = J1 (WATFORD)  
 HYG Tag = Dev.10

-----  
 Peak Discharge = 78.84 cfs  
 Time to Peak = 12.0250 hrs  
 HYG Volume = 7.411 ac-ft  
 -----

HYDROGRAPH ORDINATES (cfs)  
 Output Time increment = .0250 hrs  
 Time on left represents time for first value in each row.

Time hrs	Output Time increment = .0250 hrs				
2.4500	.00	.00	.00	.00	.00
2.5750	.00	.00	.00	.01	.01
2.7000	.01	.01	.01	.01	.01
2.8250	.01	.01	.01	.01	.01
2.9500	.01	.01	.02	.02	.02
3.0750	.02	.02	.02	.02	.02
3.2000	.02	.02	.02	.02	.02
3.3250	.02	.02	.03	.03	.03
3.4500	.03	.03	.03	.03	.03
3.5750	.03	.03	.03	.03	.03
3.7000	.03	.03	.04	.04	.04
3.8250	.04	.04	.04	.04	.04
3.9500	.04	.04	.04	.04	.04
4.0750	.05	.05	.05	.05	.05
4.2000	.06	.06	.06	.06	.06
4.3250	.07	.07	.07	.07	.08
4.4500	.08	.08	.09	.09	.09
4.5750	.09	.10	.10	.11	.11
4.7000	.11	.12	.12	.13	.13
4.8250	.14	.14	.15	.15	.16
4.9500	.16	.17	.17	.18	.18
5.0750	.19	.19	.20	.21	.21
5.2000	.22	.22	.23	.23	.24
5.3250	.24	.25	.26	.26	.27
5.4500	.27	.28	.29	.29	.30
5.5750	.30	.31	.32	.32	.33
5.7000	.33	.34	.35	.35	.36
5.8250	.36	.37	.38	.38	.39
5.9500	.40	.40	.41	.41	.42
6.0750	.43	.43	.44	.45	.45
6.2000	.46	.47	.47	.48	.49
6.3250	.49	.50	.51	.51	.52
6.4500	.52	.53	.54	.54	.55

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

James City County  
 Compute Time: 11:34:28

Date: 02/09/2005

HYDROGRAPH ORDINATES (cfs)  
 Output Time increment = .0250 hrs  
 Time on left represents time for first value in each row.

---

Time hrs					
6.5750	.56	.57	.57	.58	.59
6.7000	.59	.60	.61	.61	.62
6.8250	.63	.63	.64	.65	.65
6.9500	.66	.67	.67	.68	.69
7.0750	.70	.70	.71	.72	.72
7.2000	.73	.74	.74	.75	.76
7.3250	.77	.77	.78	.79	.79
7.4500	.80	.81	.82	.82	.83
7.5750	.84	.85	.85	.86	.87
7.7000	.87	.88	.89	.90	.90
7.8250	.91	.92	.93	.93	.94
7.9500	.95	.95	.96	.97	.98
8.0750	.99	1.00	1.01	1.02	1.03
8.2000	1.04	1.05	1.07	1.08	1.09
8.3250	1.11	1.12	1.14	1.15	1.17
8.4500	1.18	1.20	1.22	1.24	1.25
8.5750	1.27	1.29	1.31	1.33	1.34
8.7000	1.36	1.38	1.40	1.42	1.44
8.8250	1.46	1.48	1.50	1.52	1.54
8.9500	1.56	1.58	1.60	1.63	1.65
9.0750	1.66	1.68	1.70	1.72	1.74
9.2000	1.75	1.77	1.78	1.79	1.81
9.3250	1.82	1.83	1.84	1.86	1.87
9.4500	1.88	1.89	1.90	1.91	1.92
9.5750	1.93	1.95	1.96	1.98	2.00
9.7000	2.02	2.04	2.06	2.09	2.11
9.8250	2.14	2.16	2.19	2.22	2.25
9.9500	2.28	2.31	2.34	2.37	2.40
10.0750	2.44	2.48	2.51	2.55	2.59
10.2000	2.63	2.68	2.72	2.77	2.81
10.3250	2.86	2.90	2.95	3.00	3.05
10.4500	3.10	3.15	3.21	3.26	3.31
10.5750	3.37	3.43	3.49	3.56	3.63
10.7000	3.70	3.77	3.84	3.92	3.99
10.8250	4.07	4.15	4.24	4.32	4.41
10.9500	4.49	4.58	4.67	4.76	4.86
11.0750	4.97	5.09	5.20	5.33	5.48
11.2000	5.62	5.78	5.94	6.11	6.28
11.3250	6.46	6.64	6.84	7.03	7.23
11.4500	7.43	7.65	7.89	8.22	8.82
11.5750	9.71	10.75	12.12	13.83	16.05
11.7000	18.67	21.41	24.73	28.58	32.54
11.8250	37.53	43.39	50.64	58.85	66.17
11.9500	72.01	75.75	78.05	78.84	78.02
12.0750	75.04	70.46	66.36	62.23	58.88
12.2000	56.51	53.46	50.83	48.23	45.34
12.3250	42.62	39.92	37.22	34.58	32.25

HYDROGRAPH ORDINATES (cfs)  
 Output Time increment = .0250 hrs  
 Time on left represents time for first value in each row.

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Time hrs					
12.4500	29.93	27.79	25.99	24.23	22.72
12.5750	21.34	19.99	18.90	17.84	16.86
12.7000	16.02	15.19	14.48	13.83	13.18
12.8250	12.65	12.13	11.65	11.23	10.81
12.9500	10.45	10.11	9.77	9.49	9.21
13.0750	8.95	8.71	8.48	8.27	8.08
13.2000	7.89	7.72	7.56	7.40	7.26
13.3250	7.12	6.98	6.85	6.72	6.61
13.4500	6.49	6.37	6.27	6.17	6.07
13.5750	5.98	5.89	5.81	5.73	5.66
13.7000	5.58	5.51	5.44	5.37	5.31
13.8250	5.24	5.18	5.11	5.05	4.99
13.9500	4.93	4.87	4.80	4.75	4.69
14.0750	4.64	4.59	4.54	4.49	4.45
14.2000	4.40	4.36	4.33	4.29	4.26
14.3250	4.22	4.19	4.16	4.13	4.10
14.4500	4.07	4.05	4.02	4.00	3.98
14.5750	3.95	3.93	3.91	3.88	3.86
14.7000	3.84	3.82	3.80	3.78	3.76
14.8250	3.74	3.72	3.70	3.68	3.66
14.9500	3.64	3.62	3.60	3.58	3.56
15.0750	3.54	3.52	3.50	3.48	3.46
15.2000	3.44	3.42	3.40	3.38	3.36
15.3250	3.34	3.32	3.30	3.28	3.26
15.4500	3.25	3.23	3.21	3.19	3.17
15.5750	3.15	3.13	3.11	3.09	3.07
15.7000	3.05	3.03	3.01	2.99	2.97
15.8250	2.95	2.93	2.91	2.90	2.88
15.9500	2.86	2.84	2.82	2.80	2.78
16.0750	2.76	2.74	2.73	2.71	2.70
16.2000	2.68	2.67	2.66	2.64	2.63
16.3250	2.62	2.61	2.60	2.59	2.58
16.4500	2.57	2.56	2.55	2.54	2.53
16.5750	2.53	2.52	2.51	2.50	2.49
16.7000	2.49	2.48	2.47	2.46	2.46
16.8250	2.45	2.44	2.43	2.43	2.42
16.9500	2.41	2.41	2.40	2.39	2.38
17.0750	2.38	2.37	2.36	2.36	2.35
17.2000	2.34	2.34	2.33	2.32	2.31
17.3250	2.31	2.30	2.29	2.29	2.28
17.4500	2.27	2.27	2.26	2.25	2.25
17.5750	2.24	2.23	2.22	2.22	2.21
17.7000	2.20	2.20	2.19	2.18	2.18
17.8250	2.17	2.16	2.15	2.15	2.14
17.9500	2.13	2.13	2.12	2.11	2.11
18.0750	2.10	2.09	2.08	2.08	2.07
18.2000	2.06	2.06	2.05	2.04	2.04

HYDROGRAPH ORDINATES (cfs)  
 Output Time increment = .0250 hrs  
 Time on left represents time for first value in each row.

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Time hrs					
18.3250	2.03	2.02	2.01	2.01	2.00
18.4500	1.99	1.99	1.98	1.97	1.97
18.5750	1.96	1.95	1.94	1.94	1.93
18.7000	1.92	1.92	1.91	1.90	1.90
18.8250	1.89	1.88	1.87	1.87	1.86
18.9500	1.85	1.85	1.84	1.83	1.83
19.0750	1.82	1.81	1.80	1.80	1.79
19.2000	1.78	1.78	1.77	1.76	1.76
19.3250	1.75	1.74	1.73	1.73	1.72
19.4500	1.71	1.71	1.70	1.69	1.69
19.5750	1.68	1.67	1.66	1.66	1.65
19.7000	1.64	1.64	1.63	1.62	1.61
19.8250	1.61	1.60	1.59	1.59	1.58
19.9500	1.57	1.57	1.56	1.55	1.54
20.0750	1.54	1.53	1.53	1.52	1.52
20.2000	1.51	1.51	1.50	1.50	1.50
20.3250	1.49	1.49	1.49	1.48	1.48
20.4500	1.48	1.47	1.47	1.47	1.47
20.5750	1.47	1.46	1.46	1.46	1.46
20.7000	1.46	1.46	1.45	1.45	1.45
20.8250	1.45	1.45	1.45	1.44	1.44
20.9500	1.44	1.44	1.44	1.44	1.44
21.0750	1.43	1.43	1.43	1.43	1.43
21.2000	1.43	1.43	1.42	1.42	1.42
21.3250	1.42	1.42	1.42	1.42	1.41
21.4500	1.41	1.41	1.41	1.41	1.41
21.5750	1.41	1.41	1.40	1.40	1.40
21.7000	1.40	1.40	1.40	1.40	1.39
21.8250	1.39	1.39	1.39	1.39	1.39
21.9500	1.39	1.38	1.38	1.38	1.38
22.0750	1.38	1.38	1.38	1.38	1.37
22.2000	1.37	1.37	1.37	1.37	1.37
22.3250	1.37	1.36	1.36	1.36	1.36
22.4500	1.36	1.36	1.36	1.35	1.35
22.5750	1.35	1.35	1.35	1.35	1.35
22.7000	1.34	1.34	1.34	1.34	1.34
22.8250	1.34	1.34	1.33	1.33	1.33
22.9500	1.33	1.33	1.33	1.33	1.32
23.0750	1.32	1.32	1.32	1.32	1.32
23.2000	1.32	1.31	1.31	1.31	1.31
23.3250	1.31	1.31	1.31	1.31	1.30
23.4500	1.30	1.30	1.30	1.30	1.30
23.5750	1.30	1.29	1.29	1.29	1.29
23.7000	1.29	1.29	1.29	1.28	1.28
23.8250	1.28	1.28	1.28	1.28	1.28
23.9500	1.27	1.27	1.27	1.25	1.21
24.0750	1.13	1.03	.93	.84	.76

Type.... Node: Addition Summary  
Name.... J1 (WATFORD)  
File.... C:\HAESTAD\PPKW\JCCPROJECTS\IBVREDEV.PPW  
Storm... TypeII 24hr Tag: Dev.10

Page 5.06  
Event: 10 yr

HYDROGRAPH ORDINATES (cfs)  
Output Time increment = .0250 hrs  
Time on left represents time for first value in each row.

---

Time hrs						
24.2000	.70	.64	.58	.53	.48	
24.3250	.43	.39	.35	.31	.27	
24.4500	.24	.21	.19	.16	.14	
24.5750	.13	.11	.10	.09	.08	
24.7000	.07	.06	.05	.05	.04	
24.8250	.04	.03	.03	.03	.02	
24.9500	.02	.02	.01	.01	.01	
25.0750	.01	.01	.01	.01	.01	
25.2000	.01	.00	.00	.00	.00	
25.3250	.00	.00	.00	.00	.00	
25.4500	.00					

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

James City County  
Compute Time: 11:34:28

Date: 02/09/2005

## Index of Starting Page Numbers for ID Names

----- J -----

JCCSCSdata... 3.01

----- S -----

SR615 Dev..1... 4.01

SUB2(IBV SF) Dev..1... 4.02

SUB3 Dev..1... 4.03

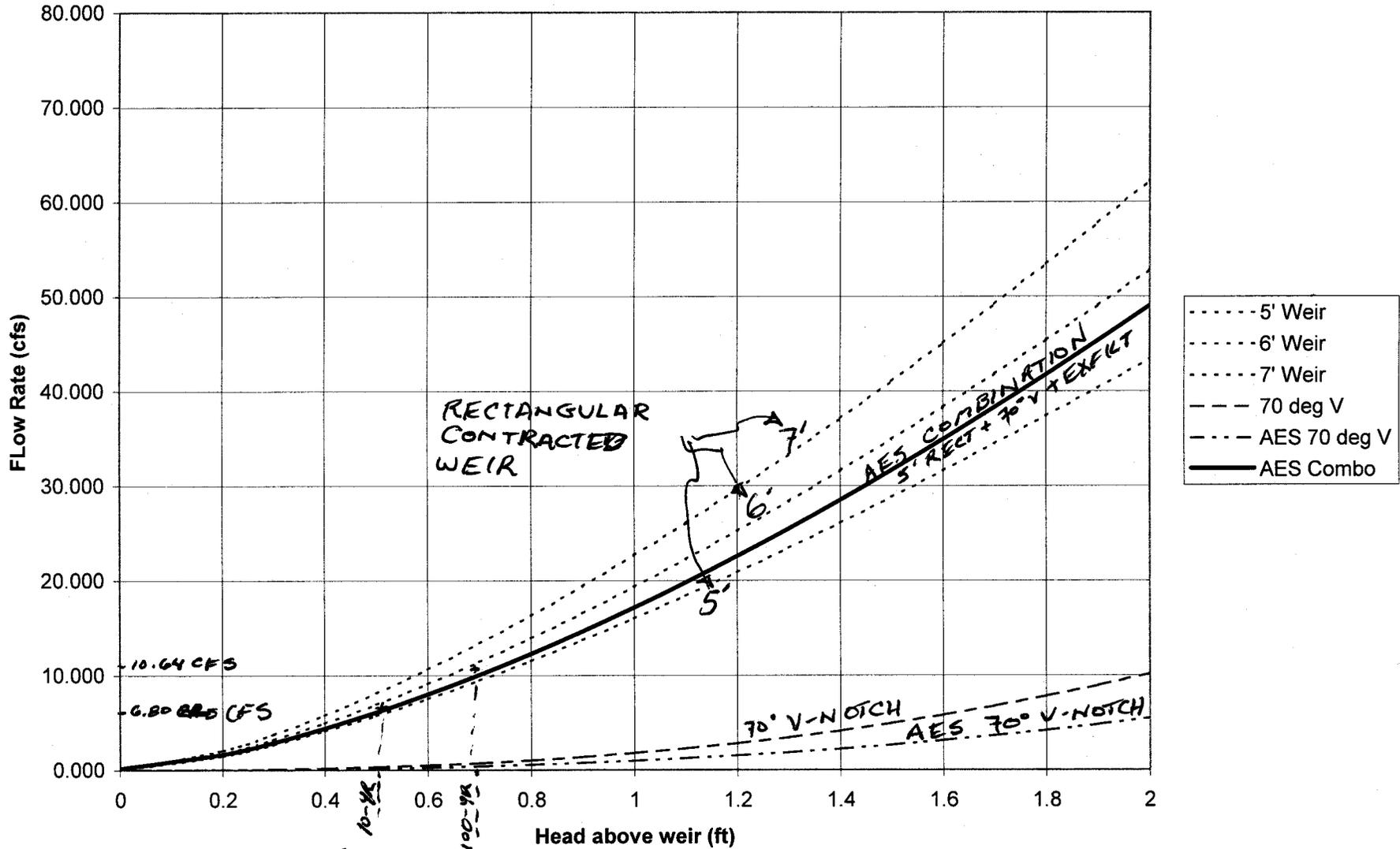
SUB4 Dev..1... 4.04

SUB5 Dev..1... 4.05

----- W -----

Watershed... 1.01, 2.01, 2.02, 2.03,  
2.04, 2.06, 2.07, 2.08

# Weir Flow Comparison BAY AGING SP-100-05



ELEV 98.5

99.02 99.2

18-INCH BARREL; 50' LONG @ 0.5% CAPACITY = 7.23 CFS

INTERPOLATED  
K-VALUE

VALUE USED  
BY AES

H (FT)	Weir			V-notch			0.97	2432 sq. ft.	
	3.333	3.333	3.333	1.443	1.795	2.5		3 in/hr	AES
	5'	6'	7'	60 deg	70 deg*	90 deg	70 deg**	Exfilt	Combo
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.169	0.169
0.2	1.479	1.777	2.075	0.026	0.032	0.045	0.017	0.169	1.665
0.3	2.705	3.253	3.801	0.071	0.089	0.123	0.048	0.169	2.922
0.4	4.148	4.992	5.835	0.146	0.182	0.253	0.098	0.169	4.416
0.5	5.774	6.953	8.131	0.255	0.317	0.442	0.171	0.169	6.114
0.6	7.559	9.108	10.657	0.402	0.501	0.697	0.270	0.169	7.999
0.7	9.487	11.439	13.391	0.592	0.736	1.025	0.398	0.169	10.053
0.8	11.543	13.928	16.313	0.826	1.028	1.431	0.555	0.169	12.267
0.9	13.717	16.562	19.408	1.109	1.380	1.921	0.745	0.169	14.631
1	15.998	19.331	22.664	1.443	1.795	2.500	0.970	0.169	17.137
1.1	18.380	22.226	26.071	1.831	2.278	3.173	1.231	0.169	19.780
1.2	20.855	25.237	29.618	2.276	2.832	3.944	1.530	0.169	22.554
1.3	23.417	28.357	33.297	2.781	3.459	4.817	1.869	0.169	25.455
1.4	26.060	31.581	37.102	3.346	4.164	5.798	2.250	0.169	28.478
1.5	28.779	34.902	41.025	3.976	4.947	6.889	2.673	0.169	31.621
1.6	31.569	38.315	45.060	4.673	5.814	8.095	3.141	0.169	34.879
1.7	34.427	41.814	49.202	5.437	6.765	9.420	3.655	0.169	38.251
1.8	37.348	45.397	53.446	6.273	7.804	10.867	4.217	0.169	41.733
1.9	40.328	49.057	57.786	7.180	8.934	12.440	4.827	0.169	45.324
2	43.365	52.792	62.219	8.163	10.156	14.142	5.487	0.169	49.021
2.1	46.455	56.598	66.741	9.222	11.473	15.977	6.199	0.169	52.823
2.2	49.595	60.471	71.347	10.359	12.888	17.947	6.964	0.169	56.727
2.3	52.782	64.408	76.033	11.577	14.403	20.057	7.782	0.169	60.733

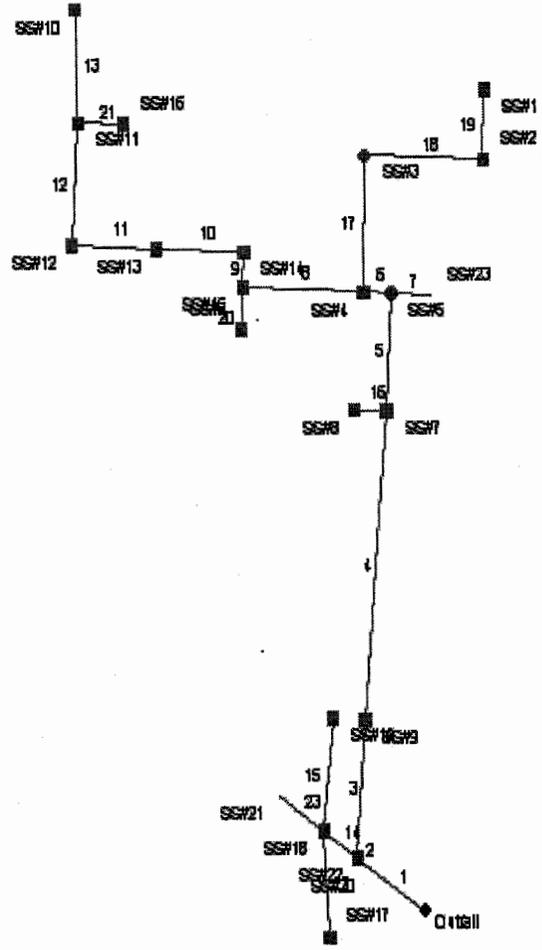
CFS

$$EXFILT = \frac{3 \text{ IN}}{\text{HR}} \cdot \frac{\text{HR}}{3600} \cdot \frac{\text{FT}}{12 \text{ IN}} \cdot A \text{ FT}^2 \left[ \frac{\text{FT}^3}{\text{S}} \right]$$

$$= \frac{AREA^*}{14,400} \text{ CFS}$$

\* AREA MAY VARY BY STAGE/CONTOUR

# Hydraflow Plan View



Also  
see  
SP-131-05  
WATFORD  
LANE  
ROAD  
IMPROVEMENTS

SP-100-05  
BAY AGING  
3RD SUB

9014-Ironbound Square - Const.

No. Lines: 23

01-15-2006

# Storm Sewer Tabulation

DURING CONST

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	60.0	0.00	15.73	0.00	0.00	7.51	0.0	29.5	3.7	36.29	434.0	5.79	36 72 b	4.45	84.67	82.00	85.71	83.04	87.00	82.00	CHANNEL - Outf
2	1	15.0	0.14	15.73	0.65	0.09	7.51	5.0	29.4	3.7	36.31	64.18	7.47	37	0.80	84.79	84.67	86.70	86.58	90.74	87.00	SS#22 - CHANN
3	2	113.0	0.23	1.99	0.63	0.14	1.50	5.0	13.5	5.4	16.63	29.64	6.07	24	1.72	86.77	84.83	88.21	87.13	95.07	90.74	SS#9- SS#22
4	3	255.0	0.16	1.76	0.56	0.09	1.35	5.0	12.7	5.5	16.03	25.30	6.09	24	1.25	89.96	86.77	91.38	88.54	101.30	95.07	SS#7 - SS#9
5	4	97.0	0.00	1.53	0.00	0.00	1.20	0.0	12.4	5.5	15.27	25.26	5.91	24	1.25	91.17	89.96	92.55	91.71	103.60	101.30	SS#5 - SS#7
6	5	25.0	0.07	1.46	0.75	0.05	1.16	5.0	12.3	5.6	15.06	15.67	5.33	24	0.48	91.29	91.17	92.96	92.87	103.14	103.60	SS#4 - SS#5
7	5	36.0	0.07	0.07	0.60	0.04	0.04	5.0	5.0	7.1	0.30	21.52	2.07	15	11.11	103.00	99.00	103.22	99.22	103.00	103.60	SS#23 - SS#5
8	6	112.0	0.27	1.21	0.85	0.23	0.97	5.0	12.0	5.6	7.21	12.96	6.15	15	4.03	96.55	92.04	97.63	93.30	102.26	103.14	SS#15 - SS#4
9	8	29.0	0.07	0.61	0.80	0.06	0.49	5.0	11.9	5.6	4.55	5.09	3.70	15	0.62	96.73	96.55	98.20	98.05	101.30	102.26	SS#14 - SS#15
10	9	80.0	0.13	0.54	0.80	0.10	0.43	5.0	11.5	5.7	4.26	4.68	3.47	15	0.52	97.15	96.73	98.73	98.38	101.30	101.30	SS#13 - SS#14
11	10	78.0	0.17	0.41	0.80	0.14	0.33	5.0	11.2	5.8	3.69	4.57	3.01	15	0.50	97.54	97.15	99.08	98.82	102.00	101.30	SS#12 - SS#13
12	11	100.0	0.18	0.24	0.80	0.14	0.19	5.0	10.5	5.9	2.93	4.38	2.39	15	0.46	98.00	97.54	99.44	99.24	103.30	102.00	SS#11 - SS#12
13	12	92.0	0.06	0.06	0.80	0.05	0.05	5.0	5.0	7.1	0.34	10.05	1.22	15	2.42	100.23	98.00	100.46	99.59	103.00	103.30	SS#10 - SS#11
14	2	38.0	0.09	13.60	0.90	0.08	5.92	5.0	29.2	3.7	21.93	52.55	4.08	34	0.84	85.15	84.83	87.26	87.27	90.79	90.74	SS#18 - SS#22
15	14	93.0	0.11	0.11	0.55	0.06	0.06	5.0	5.0	7.1	0.43	18.32	1.23	18	3.04	88.73	85.90	88.98	87.63	94.57	90.79	SS#19 - SS#18
16	4	30.0	0.07	0.07	0.85	0.06	0.06	5.0	5.0	7.1	0.42	12.25	2.29	15	3.60	98.05	96.97	98.31	97.23	101.30	101.30	SS#8 - SS#7
17	6	111.0	0.00	0.18	0.00	0.00	0.14	0.0	11.0	5.8	7.63	16.07	2.45	24	0.50	91.85	91.29	93.77	93.65	101.86	103.14	SS#3 - SS#4
18	17	109.0	0.18	0.18	0.80	0.14	0.14	5.0	10.2	5.9	7.65	16.07	2.74	24	0.50	92.40	91.85	93.90	93.82	102.00	101.86	SS#2 - SS#3
19	18	57.0	0.00	0.00	0.00	0.00	0.00	10.0	10.0	0.0	6.80	7.23	3.85	18	0.47	92.67	92.40	94.25	94.01	98.50	102.00	SS#1 - SS#2
20	8	34.0	0.33	0.33	0.75	0.25	0.25	5.0	5.0	7.1	1.76	17.37	2.49	15	7.24	99.01	96.55	99.54	98.23	102.26	102.26	SS#6 - SS#15
21	12	42.0	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.80	4.67	1.47	15	0.52	98.22	98.00	99.60	99.56	103.30	103.30	SS#16 - SS#11

9014-Ironbound Square - Const.

Number of lines: 23

Run Date: 01-15-2006

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

# 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	14	86.0	0.08	0.08	0.65	0.05	0.05	5.0	5.0	7.1	0.37	30.95	0.20	24	1.87	86.76	85.15	87.63	87.63	92.32	90.79	SS#17 - SS#18
23	14	50.0	13.32	13.32	0.43	5.73	5.73	29.0	29.0	3.7	21.31	33.39	4.21	34	0.34	85.32	85.15	87.38	87.33	85.32	90.79	SS#21 - SS#18
9014-Ironbound Square - Const.																Number of lines: 23				Run Date: 01-15-2006		
NOTES: Intensity = 143.72 / (Inlet time + 19.20) ^ 0.94; Return period = 10 Yrs.																						

# Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream								Len (ft)	Upstream								Check		JL coeff (K)	Minor loss (ft)
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
1	36 72 b	36.29	82.00	83.04	1.04	6.26	5.79	0.52	83.57	0.361	60.0	84.67	85.71 j	1.04**	6.26	5.79	0.52	86.24	0.361	0.361	n/a	0.25	0.13
2	37	36.31	84.67	86.58	1.91*	4.85	7.49	0.87	87.45	0.518	15.0	84.79	86.70	1.91**	4.87	7.45	0.86	87.57	0.512	0.515	0.077	0.00	0.00
3	24	16.63	84.83	87.13	2.00	3.14	5.29	0.44	87.57	0.541	113	86.77	88.21 j	1.44**	2.43	6.84	0.73	88.94	0.712	0.626	n/a	0.25	0.18
4	24	16.03	86.77	88.54	1.77	2.94	5.45	0.46	89.00	0.450	255	89.96	91.38 j	1.42**	2.38	6.73	0.70	92.08	0.693	0.571	n/a	0.75	n/a
5	24	15.27	89.96	91.71	1.75	2.92	5.23	0.43	92.14	0.412	97.0	91.17	92.55 j	1.38**	2.32	6.58	0.67	93.23	0.670	0.541	n/a	0.50	0.34
6	24	15.06	91.17	92.87	1.70	2.85	5.29	0.43	93.31	0.417	25.0	91.29	92.96	1.67	2.81	5.36	0.45	93.41	0.428	0.422	0.106	0.75	0.34
7	15	0.30	99.00	99.22	0.22*	0.14	2.07	0.07	99.29	0.481	36.0	103.00	103.22 j	0.22**	0.14	2.07	0.07	103.29	0.481	0.481	n/a	0.50	n/a
8	15	7.21	92.04	93.30	1.25	1.12	5.88	0.54	93.84	1.247	112	96.55	97.63 j	1.08**	1.12	6.42	0.64	98.27	1.154	1.201	n/a	1.13	n/a
9	15	4.55	96.55	98.05	1.25	1.23	3.70	0.21	98.27	0.496	29.0	96.73	98.20	1.25	1.23	3.70	0.21	98.41	0.495	0.496	0.144	0.75	0.16
10	15	4.26	96.73	98.38	1.25	1.23	3.47	0.19	98.57	0.435	80.0	97.15	98.73	1.25	1.23	3.47	0.19	98.92	0.434	0.435	0.348	0.25	0.05
11	15	3.69	97.15	98.82	1.25	1.23	3.01	0.14	98.96	0.326	78.0	97.54	99.08	1.25	1.23	3.01	0.14	99.22	0.326	0.326	0.254	0.75	0.11
12	15	2.93	97.54	99.24	1.25	1.23	2.39	0.09	99.32	0.206	100	98.00	99.44	1.25	1.23	2.39	0.09	99.53	0.206	0.206	0.206	0.75	0.07
13	15	0.34	98.00	99.59	1.25	1.23	0.28	0.00	99.60	0.003	92.0	100.23	100.46 j	0.23**	0.16	2.15	0.07	100.54	0.478	0.241	n/a	0.50	0.04
14	34	21.93	84.83	87.27	2.44	5.77	3.80	0.22	87.49	0.136	38.0	85.15	87.26	2.11	5.03	4.36	0.30	87.55	0.180	0.158	0.060	0.25	0.07
15	18	0.43	85.90	87.63	1.50	1.77	0.24	0.00	87.63	0.002	93.0	88.73	88.98 j	0.25**	0.19	2.22	0.08	89.06	0.458	0.230	n/a	0.50	0.04
16	15	0.42	96.97	97.23	0.26*	0.19	2.29	0.08	97.31	0.475	30.0	98.05	98.31 j	0.26**	0.19	2.29	0.08	98.39	0.476	0.476	n/a	0.50	0.04
17	24	7.63	91.29	93.65	2.00	3.14	2.43	0.09	93.75	0.114	111	91.85	93.77	1.92	3.10	2.46	0.09	93.86	0.099	0.107	0.118	0.50	0.05
18	24	7.65	91.85	93.82	1.97	3.13	2.44	0.09	93.91	0.103	109	92.40	93.90	1.50	2.53	3.03	0.14	94.04	0.137	0.120	0.131	0.75	0.11
19	18	6.80	92.40	94.01	1.50	1.77	3.85	0.23	94.24	0.419	57.0	92.67	94.25	1.50	1.77	3.85	0.23	94.48	0.419	0.419	0.239	0.50	0.12
20	15	1.76	96.55	98.23	1.25	1.23	1.44	0.03	98.27	0.075	34.0	99.01	99.54 j	0.53**	0.50	3.55	0.20	99.74	0.526	0.300	n/a	0.50	n/a
21	15	1.80	98.00	99.56	1.25	1.23	1.47	0.03	99.60	0.078	42.0	98.22	99.60	1.25	1.23	1.47	0.03	99.63	0.078	0.078	0.033	0.50	0.02

9014-Ironbound Square - Const.

Number of lines: 23

Run Date: 01-15-2006

Notes: \* Critical depth assumed.; \*\* Critical depth.; j-Line contains hyd. jump.

# Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream								Len (ft)	Upstream								Check		JL coeff (K)	Minor loss (ft)
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
22	24	0.37	85.15	87.63	2.00	3.14	0.12	0.00	87.63	0.000	86.0	86.76	87.63	0.87	1.31	0.28	0.00	87.63	0.002	0.001	0.001	0.50	0.00
23	34	21.31	85.15	87.33	2.18	5.21	4.09	0.26	87.59	0.157	50.0	85.32	87.38	2.06	4.92	4.33	0.29	87.68	0.179	0.168	0.084	0.25	0.07

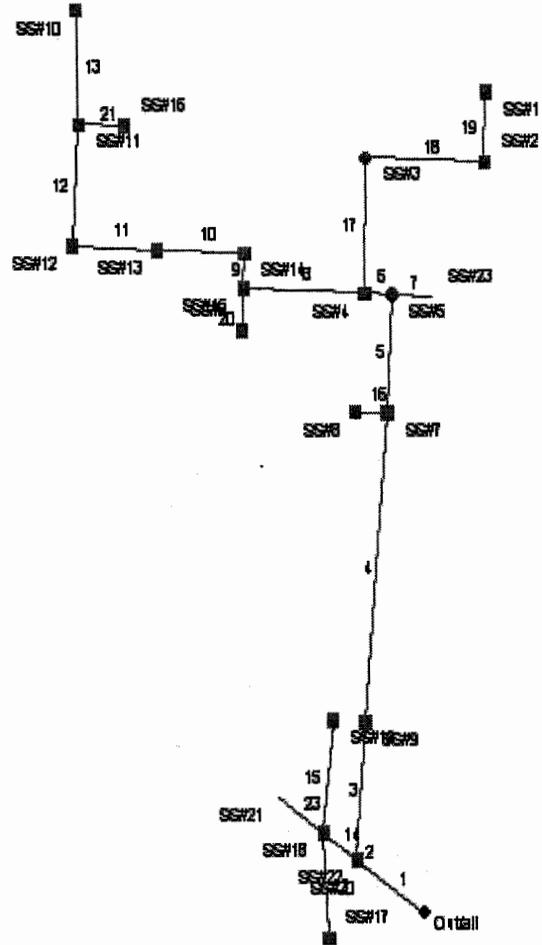
9014-Ironbound Square - Const.

Number of lines: 23

Run Date: 01-15-2006

Notes: \* Critical depth assumed.; \*\* Critical depth.; j-Line contains hyd. jump.

# Hydraflow Plan View



9014-Ironbound Square - Post

No. Lines: 23

01-15-2006

# Storm Sewer Tabulation

POST DEV

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	60.0	0.00	15.73	0.00	0.00	7.27	0.0	29.5	3.7	35.39	434.0	5.75	36 72 b	4.45	84.67	82.00	85.70 ✓	83.03	87.00	82.00	CHANNEL - Outf
2	1	15.0	0.14	15.73	0.65	0.09	7.27	5.0	29.4	3.7	35.42	64.18	7.39	37	0.80	84.79	84.67	86.68 ✓	86.55	90.74	87.00	SS#22 - CHANN
3	2	113.0	0.23	1.99	0.63	0.14	1.25	5.0	20.2	4.5	14.24	29.64	5.46	24	1.72	86.77	84.83	88.11 ✓	87.21	95.07	90.74	SS#9- SS#22
4	3	255.0	0.16	1.76	0.56	0.09	1.11	5.0	19.3	4.6	13.70	25.30	5.58	24	1.25	89.96	86.77	91.27 ✓	88.44	101.30	95.07	SS#7 - SS#9
5	4	97.0	0.00	1.53	0.00	0.00	0.96	0.0	18.9	4.6	13.06	25.26	5.42	24	1.25	91.17	89.96	92.45 ✓	91.62	103.60	101.30	SS#5 - SS#7
6	5	25.0	0.07	1.46	0.75	0.05	0.92	5.0	18.8	4.7	12.87	15.67	4.85	24	0.48	91.29	91.17	92.84 ✓	92.78	103.14	103.60	SS#4 - SS#5
7	5	36.0	0.07	0.07	0.60	0.04	0.04	5.0	5.0	7.1	0.30	21.52	2.07	15	11.11	103.00	99.00	103.22	99.22	103.00	103.60	SS#23 - SS#5
8	6	112.0	0.27	1.21	0.85	0.23	0.79	5.0	18.5	4.7	5.52	12.96	5.13	15	4.03	96.55	92.04	97.49 ✓	93.19	102.26	103.14	SS#15 - SS#4
9	8	29.0	0.07	0.61	0.55	0.04	0.32	5.0	18.4	4.7	3.29	5.09	2.72	15	0.62	96.73	96.55	97.90 ✓	97.84	101.30	102.26	SS#14 - SS#15
10	9	80.0	0.13	0.54	0.56	0.07	0.28	5.0	17.9	4.8	3.12	4.68	2.74	15	0.52	97.15	96.73	98.16 ✓	98.01	101.30	101.30	SS#13 - SS#14
11	10	78.0	0.17	0.41	0.65	0.11	0.21	5.0	17.4	4.8	2.79	4.57	2.84	15	0.50	97.54	97.15	98.37 ✓	98.25	102.00	101.30	SS#12 - SS#13
12	11	100.0	0.18	0.24	0.40	0.07	0.09	5.0	16.6	4.9	2.27	4.38	2.55	15	0.46	98.00	97.54	98.73 ✓	98.60	103.30	102.00	SS#11 - SS#12
13	12	92.0	0.06	0.06	0.38	0.02	0.02	5.0	5.0	7.1	0.16	10.05	0.95	15	2.42	100.23	98.00	100.39 ✓	98.98	103.00	103.30	SS#10 - SS#11
14	2	38.0	0.09	13.60	0.90	0.08	5.92	5.0	29.2	3.7	21.93	52.55	4.20	34	0.84	85.15	84.83	87.19 ✓	87.21	90.79	90.74	SS#18 - SS#22
15	14	93.0	0.11	0.11	0.55	0.06	0.06	5.0	5.0	7.1	0.43	18.32	1.23	18	3.04	88.73	85.90	88.98 ✓	87.58	94.57	90.79	SS#19 - SS#18
16	4	30.0	0.07	0.07	0.85	0.06	0.06	5.0	5.0	7.1	0.42	12.25	2.29	15	3.60	98.05	96.97	98.31 ✓	97.23	101.30	101.30	SS#8 - SS#7
17	6	111.0	0.00	0.18	0.00	0.00	0.07	0.0	11.0	5.8	7.22	16.07	2.48	24	0.50	91.85	91.29	93.46 ✓	93.37	101.86	103.14	SS#3 - SS#4
18	17	109.0	0.18	0.18	0.40	0.07	0.07	5.0	10.2	5.9	7.23	16.07	3.09	24	0.50	92.40	91.85	93.61 ✓	93.54	102.00	101.86	SS#2 - SS#3
19	18	57.0	0.00	0.00	0.00	0.00	0.00	10.0	10.0	0.0	6.80	7.23	4.12	18	0.47	92.67	92.40	93.96 ✓	93.76	98.50	102.00	SS#1 - SS#2
20	8	34.0	0.33	0.33	0.75	0.25	0.25	5.0	5.0	7.1	1.76	17.37	2.49	15	7.24	99.01	96.55	99.54 ✓	97.94	102.26	102.26	SS#6- SS#15
21	12	42.0	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.80	4.67	2.45	15	0.52	98.22	98.00	98.86 ✓	98.84	103.30	103.30	SS#16 - SS#11

9014-Ironbound Square - Post

Number of lines: 23

Run Date: 01-15-2006

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

# 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	14	86.0	0.08	0.08	0.65	0.05	0.05	5.0	5.0	7.1	0.37	30.95	0.21	24	1.87	86.76	85.15	87.58	87.58	92.32	90.79	SS#17 - SS#18
23	14	50.0	13.32	13.32	0.43	5.73	5.73	29.0	29.0	3.7	21.31	33.39	4.34	34	0.34	85.32	85.15	87.33	87.27	85.32	90.79	SS#21 - SS#18
9014-Ironbound Square - Post																Number of lines: 23				Run Date: 01-15-2006		
NOTES: Intensity = $143.72 / (\text{Inlet time} + 19.20)^{0.94}$ ; Return period = 10 Yrs.																						

# Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream								Len (ft)	Upstream								Check		JL coeff (K)	Minor loss (ft)
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
1	36 72 b	35.39	82.00	83.03	1.03	6.16	5.75	0.51	83.54	0.361	60.0	84.67	85.70 j	1.03**	6.16	5.75	0.51	86.21	0.361	0.361	n/a	0.25	n/a
2	37	35.42	84.67	86.55	1.88*	4.78	7.41	0.85	87.41	0.511	15.0	84.79	86.68	1.89**	4.80	7.38	0.85	87.53	0.505	0.508	0.076	0.00	0.00
3	24	14.24	84.83	87.21	2.00	3.14	4.54	0.32	87.53	0.397	113	86.77	88.11 j	1.34**	2.23	6.38	0.63	88.74	0.641	0.519	n/a	0.25	0.16
4	24	13.70	86.77	88.44	1.67	2.81	4.88	0.37	88.81	0.354	255	89.96	91.27 j	1.31**	2.18	6.28	0.61	91.88	0.626	0.490	n/a	0.75	n/a
5	24	13.06	89.96	91.62	1.66	2.78	4.70	0.34	91.96	0.328	97.0	91.17	92.45 j	1.28**	2.12	6.15	0.59	93.04	0.609	0.468	n/a	0.50	0.29
6	24	12.87	91.17	92.78	1.61	2.71	4.76	0.35	93.13	0.336	25.0	91.29	92.84	1.55	2.61	4.94	0.38	93.22	0.363	0.350	0.087	0.75	0.28
7	15	0.30	99.00	99.22	0.22*	0.14	2.07	0.07	99.29	0.481	36.0	103.00	103.22 j	0.22**	0.14	2.07	0.07	103.29	0.481	0.481	n/a	0.50	n/a
8	15	5.52	92.04	93.19	1.15	1.18	4.69	0.34	93.53	0.636	112	96.55	97.49 j	0.94**	0.99	5.58	0.48	97.97	0.873	0.755	n/a	1.13	0.55
9	15	3.29	96.55	97.84	1.25	1.23	2.68	0.11	97.95	0.260	29.0	96.73	97.90	1.17	1.20	2.75	0.12	98.02	0.224	0.242	0.070	0.75	0.09
10	15	3.12	96.73	98.01	1.25	1.23	2.55	0.10	98.11	0.234	80.0	97.15	98.16	1.01	1.07	2.93	0.13	98.30	0.238	0.236	0.189	0.25	0.03
11	15	2.79	97.15	98.25	1.10	1.14	2.44	0.09	98.34	0.168	78.0	97.54	98.37	0.83	0.86	3.24	0.16	98.53	0.310	0.239	0.186	0.75	0.12
12	15	2.27	97.54	98.60	1.06	1.11	2.04	0.06	98.66	0.117	100	98.00	98.73	0.73	0.74	3.06	0.15	98.87	0.301	0.209	0.209	0.75	0.11
13	15	0.16	98.00	98.98	0.98	1.03	0.16	0.00	98.98	0.001	92.0	100.23	100.39 j	0.16**	0.09	1.75	0.05	100.44	0.500	0.250	n/a	0.50	0.02
14	34	21.93	84.83	87.21	2.38	5.65	3.88	0.23	87.44	0.141	38.0	85.15	87.19	2.04	4.86	4.52	0.32	87.51	0.195	0.168	0.064	0.25	0.08
15	18	0.43	85.90	87.58	1.50	1.77	0.24	0.00	87.58	0.002	93.0	88.73	88.98 j	0.25**	0.19	2.22	0.08	89.06	0.458	0.230	n/a	0.50	0.04
16	15	0.42	96.97	97.23	0.26*	0.19	2.29	0.08	97.31	0.475	30.0	98.05	98.31 j	0.26**	0.19	2.29	0.08	98.39	0.476	0.476	n/a	0.50	0.04
17	24	7.22	91.29	93.37	2.00	3.14	2.30	0.08	93.45	0.102	111	91.85	93.46	1.61	2.70	2.67	0.11	93.57	0.106	0.104	0.115	0.50	0.06
18	24	7.23	91.85	93.54	1.69	2.83	2.55	0.10	93.64	0.097	109	92.40	93.61	1.21	1.99	3.63	0.21	93.82	0.220	0.159	0.173	0.75	0.15
19	18	6.80	92.40	93.76	1.36	1.69	4.03	0.25	94.02	0.366	57.0	92.67	93.96	1.29	1.61	4.21	0.28	94.23	0.390	0.378	0.215	0.50	0.14
20	15	1.76	96.55	97.94	1.25	1.23	1.44	0.03	97.97	0.075	34.0	99.01	99.54 j	0.53**	0.50	3.55	0.20	99.74	0.526	0.300	n/a	0.50	n/a
21	15	1.80	98.00	98.84	0.84	0.87	2.06	0.07	98.90	0.125	42.0	98.22	98.86	0.64	0.64	2.83	0.12	98.99	0.283	0.204	0.086	0.50	0.06

9014-Ironbound Square - Post

Number of lines: 23

Run Date: 01-15-2006

Notes: \* Critical depth assumed.; \*\* Critical depth.; j-Line contains hyd. jump.

# Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream								Len (ft)	Upstream								Check		JL coeff (K)	Minor loss (ft)
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
22	24	0.37	85.15	87.58	2.00	3.14	0.12	0.00	87.58	0.000	86.0	86.76	87.58	0.82	1.22	0.30	0.00	87.59	0.002	0.001	0.001	0.50	0.00
23	34	21.31	85.15	87.27	2.12	5.05	4.22	0.28	87.54	0.168	50.0	85.32	87.33	2.01	4.77	4.46	0.31	87.64	0.192	0.180	0.090	0.25	0.08

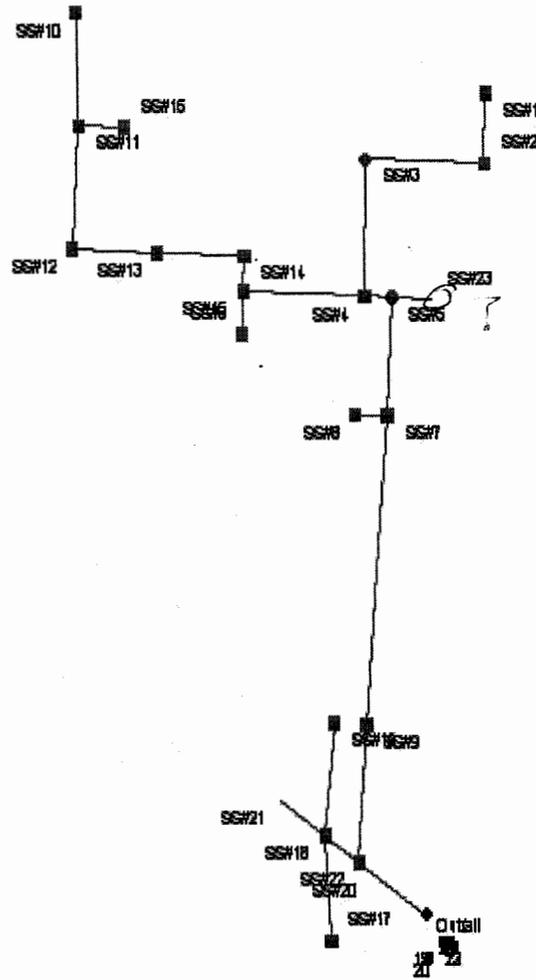
9014-Ironbound Square - Post

Number of lines: 23

Run Date: 01-15-2006

Notes: \* Critical depth assumed.; \*\* Critical depth.; j-Line contains hyd. jump.

# Hydraflow Plan View



9014-Ironbound Square - Future

No. Lines: 23

01-15-2006

# 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	60.0	0.00	15.80	0.00	0.00	7.41	0.0	20.6	4.5	41.63	434.0	6.07	36 72 b	4.45	84.67	82.00	85.81	83.14	87.00	82.00	CHANNEL - Outf
2	1	15.0	0.14	15.80	0.65	0.09	7.41	5.0	20.6	4.5	41.66	64.18	7.90	37	0.80	84.79	84.67	86.85	86.71	90.74	87.00	SS#22 - CHANN
3	2	113.0	0.23	1.99	0.63	0.14	1.25	5.0	20.2	4.5	14.24	29.64	5.46	24	1.72	86.77	84.83	88.11	87.49	95.07	90.74	SS#9- SS#22
4	3	255.0	0.16	1.76	0.56	0.09	1.11	5.0	19.3	4.6	13.70	25.30	5.58	24	1.25	89.96	86.77	91.27	88.44	101.30	95.07	SS#7 - SS#9
5	4	97.0	0.00	1.53	0.00	0.00	0.96	0.0	18.9	4.6	13.06	25.26	5.42	24	1.25	91.17	89.96	92.45	91.62	103.60	101.30	SS#5 - SS#7
6	5	25.0	0.07	1.46	0.75	0.05	0.92	5.0	18.8	4.7	12.87	15.67	4.85	24	0.48	91.29	91.17	92.84	92.78	103.14	103.60	SS#4 - SS#5
7	5	36.0	0.07	0.07	0.60	0.04	0.04	5.0	5.0	7.1	0.30	21.52	2.07	15	11.11	103.00	99.00	103.22	99.22	103.00	103.60	SS#23 - SS#5
8	6	112.0	0.27	1.21	0.85	0.23	0.79	5.0	18.5	4.7	5.52	12.96	5.13	15	4.03	96.55	92.04	97.49	93.19	102.26	103.14	SS#15 - SS#4
9	8	29.0	0.07	0.61	0.55	0.04	0.32	5.0	18.4	4.7	3.29	5.09	2.72	15	0.62	96.73	96.55	97.90	97.84	101.30	102.26	SS#14 - SS#15
10	9	80.0	0.13	0.54	0.56	0.07	0.28	5.0	17.9	4.8	3.12	4.68	2.74	15	0.52	97.15	96.73	98.16	98.01	101.30	101.30	SS#13 - SS#14
11	10	78.0	0.17	0.41	0.65	0.11	0.21	5.0	17.4	4.8	2.79	4.57	2.84	15	0.50	97.54	97.15	98.37	98.25	102.00	101.30	SS#12 - SS#13
12	11	100.0	0.18	0.24	0.40	0.07	0.09	5.0	16.6	4.9	2.27	4.38	2.55	15	0.46	98.00	97.54	98.73	98.60	103.30	102.00	SS#11 - SS#12
13	12	92.0	0.06	0.06	0.38	0.02	0.02	5.0	5.0	7.1	0.16	10.05	0.95	15	2.42	100.23	98.00	100.39	98.98	103.00	103.30	SS#10 - SS#11
14	2	38.0	0.09	13.67	0.90	0.08	6.07	5.0	10.5	5.9	35.69	52.55	6.57	34	0.84	85.15	84.83	87.27	87.31	90.79	90.74	SS#18 - SS#22
15	14	93.0	2.18	2.18	0.45	0.98	0.98	10.0	10.0	6.0	5.86	18.32	4.22	18	3.04	88.73	85.90	89.65	88.07	94.57	90.79	SS#19 - SS#18
16	4	30.0	0.07	0.07	0.85	0.06	0.06	5.0	5.0	7.1	0.42	12.25	2.29	15	3.60	98.05	96.97	98.31	97.23	101.30	101.30	SS#8 - SS#7
17	6	111.0	0.00	0.18	0.00	0.00	0.07	0.0	11.0	5.8	7.22	16.07	2.48	24	0.50	91.85	91.29	93.46	93.37	101.86	103.14	SS#3 - SS#4
18	17	109.0	0.18	0.18	0.40	0.07	0.07	5.0	10.2	5.9	7.23	16.07	3.09	24	0.50	92.40	91.85	93.61	93.54	102.00	101.86	SS#2 - SS#3
19	18	57.0	0.00	0.00	0.00	0.00	0.00	10.0	10.0	0.0	6.80	7.23	4.12	18	0.47	92.67	92.40	93.96	93.76	98.50	102.00	SS#1 - SS#2
20	8	34.0	0.33	0.33	0.75	0.25	0.25	5.0	5.0	7.1	1.76	17.37	2.49	15	7.24	99.01	96.55	99.54	97.94	102.26	102.26	SS#6- SS#15
21	12	42.0	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.80	4.67	2.45	15	0.52	98.22	98.00	98.86	98.84	103.30	103.30	SS#16 - SS#11

9014-Ironbound Square - Future Number of lines: 23 Run Date: 01-15-2006

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

# 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	14	86.0	5.24	5.24	0.45	2.36	2.36	10.0	10.0	6.0	14.08	30.95	5.40	24	1.87	86.76	85.15	88.09	87.92	92.32	90.79	SS#17 - SS#18
23	14	50.0	6.16	6.16	0.43	2.65	2.65	10.0	10.0	6.0	15.81	33.39	2.51	34	0.34	85.32	85.15	88.15	88.13	85.32	90.79	SS#21 - SS#18
9014-Ironbound Square - Future																Number of lines: 23				Run Date: 01-15-2006		
NOTES: Intensity = 143.72 / (Inlet time + 19.20) ^ 0.94; Return period = 10 Yrs.																						

# Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream								Len (ft)	Upstream								Check		JL coeff (K)	Minor loss (ft)
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
1	36 72 b	41.63	82.00	83.14	1.14	6.86	6.07	0.57	83.72	0.362	60.0	84.67	85.81 j	1.14**	6.86	6.07	0.57	86.39	0.362	0.362	n/a	0.25	0.14
2	37	41.66	84.67	86.71	2.04*	5.25	7.93	0.98	87.69	0.558	15.0	84.79	86.85	2.06	5.29	7.87	0.96	87.81	0.547	0.553	0.083	0.00	0.00
3	24	14.24	84.83	87.49	2.00	3.14	4.54	0.32	87.81	0.397	113	86.77	88.11 j	1.34**	2.23	6.38	0.63	88.74	0.641	0.519	n/a	0.25	0.16
4	24	13.70	86.77	88.44	1.67	2.81	4.88	0.37	88.81	0.354	255	89.96	91.27 j	1.31**	2.18	6.28	0.61	91.88	0.626	0.490	n/a	0.75	n/a
5	24	13.06	89.96	91.62	1.66	2.78	4.70	0.34	91.96	0.328	97.0	91.17	92.45 j	1.28**	2.12	6.15	0.59	93.04	0.609	0.468	n/a	0.50	0.29
6	24	12.87	91.17	92.78	1.61	2.71	4.76	0.35	93.13	0.336	25.0	91.29	92.84	1.55	2.61	4.94	0.38	93.22	0.363	0.350	0.087	0.75	0.28
7	15	0.30	99.00	99.22	0.22*	0.14	2.07	0.07	99.29	0.481	36.0	103.00	103.22 j	0.22**	0.14	2.07	0.07	103.29	0.481	0.481	n/a	0.50	n/a
8	15	5.52	92.04	93.19	1.15	1.18	4.69	0.34	93.53	0.636	112	96.55	97.49 j	0.94**	0.99	5.58	0.48	97.97	0.873	0.755	n/a	1.13	0.55
9	15	3.29	96.55	97.84	1.25	1.23	2.68	0.11	97.95	0.260	29.0	96.73	97.90	1.17	1.20	2.75	0.12	98.02	0.224	0.242	0.070	0.75	0.09
10	15	3.12	96.73	98.01	1.25	1.23	2.55	0.10	98.11	0.234	80.0	97.15	98.16	1.01	1.07	2.93	0.13	98.30	0.238	0.236	0.189	0.25	0.03
11	15	2.79	97.15	98.25	1.10	1.14	2.44	0.09	98.34	0.168	78.0	97.54	98.37	0.83	0.86	3.24	0.16	98.53	0.310	0.239	0.186	0.75	0.12
12	15	2.27	97.54	98.60	1.06	1.11	2.04	0.06	98.66	0.117	100	98.00	98.73	0.73	0.74	3.06	0.15	98.87	0.301	0.209	0.209	0.75	0.11
13	15	0.16	98.00	98.98	0.98	1.03	0.16	0.00	98.98	0.001	92.0	100.23	100.39 j	0.16**	0.09	1.75	0.05	100.44	0.500	0.250	n/a	0.50	0.02
14	34	35.69	84.83	87.31	2.48	5.86	6.09	0.58	87.89	0.351	38.0	85.15	87.27	2.12	5.07	7.04	0.77	88.04	0.468	0.409	0.156	0.25	0.19
15	18	5.86	85.90	88.07	1.50	1.77	3.31	0.17	88.24	0.311	93.0	88.73	89.65 j	0.92**	1.14	5.13	0.41	90.06	0.637	0.474	n/a	0.50	n/a
16	15	0.42	96.97	97.23	0.26*	0.19	2.29	0.08	97.31	0.475	30.0	98.05	98.31 j	0.26**	0.19	2.29	0.08	98.39	0.476	0.476	n/a	0.50	0.04
17	24	7.22	91.29	93.37	2.00	3.14	2.30	0.08	93.45	0.102	111	91.85	93.46	1.61	2.70	2.67	0.11	93.57	0.106	0.104	0.115	0.50	0.06
18	24	7.23	91.85	93.54	1.69	2.83	2.55	0.10	93.64	0.097	109	92.40	93.61	1.21	1.99	3.63	0.21	93.82	0.220	0.159	0.173	0.75	0.15
19	18	6.80	92.40	93.76	1.36	1.69	4.03	0.25	94.02	0.366	57.0	92.67	93.96	1.29	1.61	4.21	0.28	94.23	0.390	0.378	0.215	0.50	0.14
20	15	1.76	96.55	97.94	1.25	1.23	1.44	0.03	97.97	0.075	34.0	99.01	99.54 j	0.53**	0.50	3.55	0.20	99.74	0.526	0.300	n/a	0.50	n/a
21	15	1.80	98.00	98.84	0.84	0.87	2.06	0.07	98.90	0.125	42.0	98.22	98.86	0.64	0.64	2.83	0.12	98.99	0.283	0.204	0.086	0.50	0.06

9014-Ironbound Square - Future

Number of lines: 23

Run Date: 01-15-2006

Notes: \* Critical depth assumed.; \*\* Critical depth.; j-Line contains hyd. jump.

# Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream								Len (ft)	Upstream								Check		JL coeff (K)	Minor loss (ft)
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
22	24	14.08	85.15	87.92	2.00	3.14	4.48	0.31	88.24	0.387	86.0	86.76	88.09 j	1.33**	2.23	6.33	0.62	88.72	0.630	0.509	0.438	0.50	0.31
23	34	15.81	85.15	88.13	2.83	6.30	2.51	0.10	88.23	0.076	50.0	85.32	88.15	2.83	6.31	2.51	0.10	88.25	0.076	0.076	0.038	0.25	0.02

9014-Ironbound Square - Future

Number of lines: 23

Run Date: 01-15-2006

Notes: \* Critical depth assumed.; \*\* Critical depth.; j-Line contains hyd. jump.



DEPARTMENT OF THE ARMY  
NORFOLK DISTRICT, CORPS OF ENGINEERS  
FORT NORFOLK, 803 FRONT STREET  
NORFOLK, VIRGINIA 23510-1096

RECEIVED

MAR 24 2006

DEPARTMENT OF  
PLANNING AND ZONINGREPLY TO  
ATTENTION OF:

March 21, 2006

Western Virginia Regulatory Section  
06-R0329 (unnamed tributary to College Creek)

James City County  
Office of Community Development  
Attn: Keith Denny  
5320 Palmer Lane  
Williamsburg, Virginia 23188-8784

Dear Mr. Denny:

This letter is regarding your request to perform work in waters of the United States, to construct a class 1 rip rap fore bay and a treated timber retaining structure as depicted in project drawings entitled, "Watford Lane Improvements / Ironbound Square Revitalization / Roadway Improvements - Phase 1" and dated 10/19/05. As a result, 106.35 LF of stream will be permanently impacted by the project, described in part 4 above. This activity has been reviewed and found to provisionally satisfy the criteria contained in the Corps Nationwide Permit (18), attached, pending completion of coordination with the US Fish and Wildlife Service (see special condition below for additional information). (The Corps Nationwide Permits were published in the Federal Register (67 FR 2020) on January 15, 2002 as corrected by Federal Register (67 FR 6692) on February 13, 2002 and Federal Register (67 FR 8579) on February 25, 2002 and the regulations governing their use can be found in 33 CFR 330 published in Volume 56, Number 226 of the Federal Register dated November 22, 1991.) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

Provided the enclosed conditions and the special condition below is met, an individual Department of the Army Permit will not be required. You must also adhere to the 401 certification conditions issued by the Virginia Department of Environmental Quality (DEQ) outlined in their letter of March 29, 2002 or obtain an individual permit from DEQ. The Corps' Nationwide Permit conditions and 401 certification conditions are attached.

This authorization does not relieve your responsibility to comply with local requirements pursuant to the Chesapeake Bay Preservation Act (CBPA), nor does it supersede local government authority and responsibilities pursuant to the Act. You should contact your local government before you begin work to find out how the CBPA applies to your project.

**SPECIAL CONDITION:**

- I. You must conduct a habitat survey for the small whorled pogonia (*Isotria medeoloides*), a federally listed threatened species which is known to occur in James City County, VA. The survey must be conducted by a qualified pogonia surveyor and the results forwarded to our office for coordination with the US Fish and Wildlife Service. If suitable habitat is found, additional survey work may be required at the appropriate time of the year to determine presence or absence of the pogonia. No work in wetlands/waters of the United States may commence under this provisional permit until you have received, in writing, notification from our office that you may proceed with the work.

Enclosed is a "compliance certification" form, which must be signed and returned within 30 days of completion of the project, including any required mitigation (see nationwide permit condition number 14). Your signature on this form certifies that you have completed the work in accordance with the nationwide permit terms and conditions.

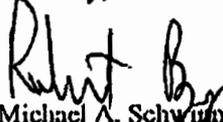
This verification is valid until the NWP is modified, reissued, or revoked. All of the existing NWPs are scheduled to be modified, reissued, or revoked prior to March 18, 2007. It is incumbent upon you to remain informed of changes to the NWPs. We will issue a public notice when the NWPs are reissued. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant nationwide permit is modified or revoked, you will have twelve (12) months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this nationwide permit, unless the Norfolk District Engineer uses discretionary authority to modify, suspend or revoke this verification.

It is your responsibility to remain informed of changes to the nationwide permits. We will issue a special public notice announcing any changes to the nationwide permits when they occur.

This letter does not authorize the placement of dredged or fill material or mechanized land clearing in wetlands or waters of the United States. The term discharge of dredged material is defined as "any addition, including any redeposit, of dredged material, including excavated material, into waters of the United States which is incidental to any activity including mechanized landclearing, ditching, channelization, or other excavation (33 CFR Part 232.2(1)(iii)).

If you have any questions, please contact Ms. Floyd at (757) 201-7367 or you may email her at [scharlene.a.floyd@nao02.usace.army.mil](mailto:scharlene.a.floyd@nao02.usace.army.mil)

Sincerely,

  
for Michael A. Schwinn  
Chief, Western Virginia Regulatory Section

**Copies furnished:**

The Timmons Group  
Department of Environmental Quality  
James City County Planning and Zoning

**Melanie Davis**

---

**From:** Matthew J. Smolnik  
**Sent:** Thursday, September 27, 2007 10:24 AM  
**To:** Melanie Davis; Ellen Cook  
**Cc:** Tina R. Cantwell  
**Subject:** RE: SP-100-05 - Bay Aging - Parker View Apts

**Melanie,**

**Please see the note below from Case Tracking. Other than this, I am not aware of any other Planning issues that would hold up issuance of a LDP. Thanks.**

A land disturbing permit cannot be issued for this project until the offsite storm drainage system and dry detention basin is installed and functional in accordance with the Ironbound Square Revitalization Roadway Improvement Plan- re:SP-131-05.

**Matthew J. Smolnik**  
**Senior Planner**  
**James City County Planning Division**  
**(757) 253-6685**  
**MSmolnik@james-city.va.us**

---

**From:** Melanie Davis  
**Sent:** Thursday, September 27, 2007 9:13 AM  
**To:** Ellen Cook; Matthew J. Smolnik  
**Cc:** Tina R. Cantwell  
**Subject:** SP-100-05 - Bay Aging - Parker View Apts

The planner listed on this project is Joel Almquist – so I'm not sure who has it now but, are there any issues holding up issuance of a land disturbing permit for this project?

Thanks

*Melanie Davis*  
*Senior Engineering Assistant*

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

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

# LETTER OF TRANSMITTAL

ATTN: **Gregory B. Johnson**

CO.: **JCC Environmental Division**

Address: **101-E Mounts Bay Road**  
**Williamsburg, VA 23188**

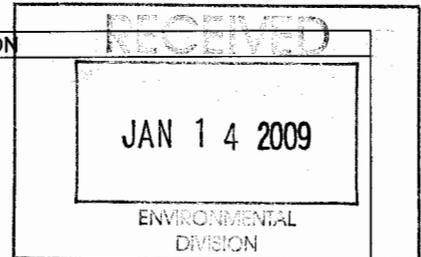
cc:

DATE 1/13/09	JOB NO. 9551
FROM: Aaron B. Small, P.E.	
RE Bay Aging Senior Housing Complex BMP Record Drawings & 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: form

COPIES	DATE	No. of Pages	DESCRIPTION
1			BMP Construction Certification



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:

VIA:  Hand Deliver     UPS Ground     UPS Next Day Air     USPS Mail     Other:

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





**James City County Environmental Division  
Stormwater Management / BMP Inspection Report  
Bioretention Facilities**

County BMP ID Code (if known): CC-032

Name of Facility: Bay Aging Senior Housing Project BMP No.: #2 Date: 1/15/2008

Location: \_\_\_\_\_

Name of Owner: Bay Aging Senior Housing Project

Name of Inspector: Gregory B. Johnson

Type of Facility: Senior Citizen Housing

Weather Conditions: Clear/Cold Type:  Final Inspection  County BMP Inspection Program  Owner Inspection

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

- O.K. - The item checked is in adequate condition and the maintenance program is currently satisfactory. No action required.
- Routine - The item checked requires attention, but does not present an immediate threat to the function/integrity of the BMP.
- Urgent - The item checked requires immediate attention to keep the BMP operational and 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
<b>Accessibility:</b>				
Roads	✓			
Parking Areas	✓			
Gates	NA			
Locks	NA			
Safety Fencing	NA			
<b>Observation Wells/Areas:</b>				
Trap Doors	NA			
Manhole Covers	NA			
Grates	NA			
Steps	NA			
<b>Pretreatment Devices:</b> <input checked="" type="checkbox"/> Inlet <input type="checkbox"/> Sump <input type="checkbox"/> Forebay <input type="checkbox"/> Other				
Sediment	✓			
Trash & Debris	✓			
Structure	✓			
Other				
<b>Inflow Structure (Describe Type/Location):</b>				

Facility Item	O.K.	Routine	Urgent	Comments
Condition	✓			
Erosion		✓		Various locations around BMP
Trash and Debris	✓			
Sediment	✓			
Aesthetics	✓			Plantings verified
Other	-			
<b>Primary Infiltration (Bioretention Cell) Area:</b>				
Specialty Landscaping	✓			
Mulch Layer	✓			
Planting Soil/Sand	✓			
Subgrade Soil	✓			
Aggregate	✓			
Underdrain	✓			
Sediment	✓			
Aesthetics	✓			
<b>Overflow or Bypass Control Structure (Describe Type/Location):</b> D1-7 - Upper end of pond				
Condition	✓			
Erosion	✓			
Trash & Debris	✓			
Sediment	✓			
Other	✓			
<b>Outlet Structure (Describe Type/Location):</b>				
Condition				
Erosion				
Trash & Debris				
Sediment				
Other				
<b>Contributing Drainage Area/Perimeter Conditions:</b>				
Land Use	✓			
Stabilization	✓			
Trash & Debris	✓			
Pollutant Hazard	✓			
Other	✓			

Facility Item	O.K.	Routine	Urgent	Comments
<p>Sketch and/or Remarks:</p>				
<p>Overall Environmental Division Internal Rating: _____</p> <p>Signature: <u><i>[Handwritten Signature]</i></u> Date: <u><i>1/15/2009</i></u></p> <p>Title: <u><i>Inspector</i></u></p>				

SWMProg\BMP\CoInspProg\Bioret.wpd

Date Record Created: [REDACTED]

WS\_BMPNO:  
CC032

Print  
Record

Created By: [REDACTED]

**PRINTED ON**  
**Thursday, March 11, 2010**  
**8:23:52 AM**

WATERSHED CC  
 BMP ID NO 032  
 PLAN NO SP-100-05  
 TAX PARCEL  
 PIN NO  
 CONSTRUCTION DATE  
 PROJECT NAME Bay Aging  
 FACILITY LOCATION Corner of Ironbound Road and Carriage Rd  
 CITY-STATE Williamsburg, VA  
 CURRENT OWNER Bay Aging Senior Housing  
 OWNER ADDRESS P.O. Box 610  
 OWNER ADDRESS 2  
 CITY-STATE-ZIP CODE Urbanna, VA 23175  
 OWNER PHONE 804-758-2386  
 MAINT AGREEMENT Yes  
 EMERG ACTION PLAN No

MAINTENANCE PLAN Yes  
 SITE AREA acre 3.75  
 LAND USE Residential  
 old BMP TYP Bioretention  
 JCC BMP CODE D1 Bioretention  
 POINT VALUE 4

SVC DRAIN AREA acres 2.89

SERVICE AREA DESCRI Parking lot Senior Housing  
 IMPERV AREA acres 1.20  
 RECV STREAM College Creek  
 EXT DET-WQ-CTRL No  
 WTR QUAL VOL acre-ft  
 CHAN PROT CTRL No  
 CHAN PROT VOL acre-ft  
 SW/FLOOD CONTROL No  
 GEOTECH REPORT No

CTRL STRUC DESC NA  
 CTRL STRUC SIZE inches NA  
 OTLT BARRL DESC NA  
 OTLT BARRL SIZE inch  
 EMERG SPILLWAY No  
 DESIGN HW ELEV 99.25  
 PERM POOL ELEV  
 2-YR OUTFLOW cfs 98.73  
 10-YR OUTFLOW cfs 98.94  
 REC DRAWING Yes  
 CONSTR CERTIF Yes

LAST INSP DATE 3/4/2009

Inspected by: [REDACTED]

INTERNAL RATING  
MISC/COMMENTS

Get Last BMP No

Return to Menu

Additional Comments:

Larger Bioretention Basin in Back

COUNTY OF JAMES CITY, VIRGINIA

EROSION AND SEDIMENTATION CONTROL BOND

Bond No. 0123565

KNOWN ALL MEN BY THESE PRESENTS: that we E D Parker Corporation and Bay Aging Apartments JCC, Inc., Principal, and Berkley Regional Insurance Company, as Surety, are held and firmly bound unto the County of James City, Virginia, Obligee, of the Commonwealth of Virginia, in the Penal Sum of Eighty Four Thousand (\$84,000.00) dollars, for the payment hereof to the Obligee, the Principal binds its heirs, executors, administrators, successors and assigns, and the Surety binds itself, its successors, and assigns severally and jointly by their presents and to each hereby waive our homestead exemption as to this debt and obligation.

WHEREAS, the Principal desires to have approved by James City County, Virginia, a certain erosion and sedimentation control plan pursuant to the terms of the Code of the County of James City, Virginia, (and any amendment thereto) for a project known as Parker View Apartments located at James City County, Virginia 100 Carriage Road JRG, and in order to have said plan approved, said Principal must have complied with all terms and provisions of said code.

NOW, THEREFORE, THE CONDITION OF THE OBLIGATION IS SUCH, that if the above Principal shall satisfactorily complete the erosion and sedimentation control measures in accordance with the approved plan and Chapter 8 of the Code of the County of James City, Erosion and Sedimentation Control, and shall fully indemnify and save harmless the Obligee from all costs and damages which the Obligee may suffer by reason of the Principal's failure to do so, then this obligation shall be void; otherwise, to remain in full force and effect.

PROVIDED FURTHER, that this is a continuous bond and the Surety hereby waives notice of any extension hereunder granted by Obligee to Principal.

IN WITNESS WHEREOF, the Principal and the Surety have caused their respective names to be hereunto subscribed and their seals to be hereunto affixed, this 26th day of September 2007, duly authorized.



(Impress Corporate Seal here if applicable)

ATTEST:

By [Signature]

(Impress Corporate Seal here if applicable)

ATTEST:

By [Signature]

Principal: E D Parker Corporation

By: [Signature]  
E. Dale Parker

Title: President

Principal: Bay Aging Apartments JCC, Inc.

By: [Signature]  
Title: Senior VP, Property Management & Development Revised 3/06

(Impress Surety's Seal here)

Surety: Berkley Regional Insurance Company

Sam Alured  
Witness

By James M. Anderson  
Attorney in Fact  
James M. Anderson

Michael W. Howell  
10201 Fairfax Blvd., Ste 500  
Fairfax, VA 22030  
Names & Address of Virginia Resident Agent

325 Columbia Turnpike Suite 203  
Florham Park, NJ 07932  
Address of Home Office

**POWER OF ATTORNEY MUST BE ATTACHED**

0358c.pre  
Rev. 3/06

Revised 3/06



COUNTY OF JAMES CITY, VIRGINIA

SILTATION AGREEMENT

THIS AGREEMENT, made this 25<sup>th</sup> day of September, 2007, by and between Bay Aging Apartments JCC, Inc., and all successors in interest, a corporation ("Developer"), and the County of James City, Virginia, ("County"), and Scott J. Thomas, ("Agent") the County's Administrator of the Erosion and Sediment Control Ordinance.

WITNESSETH:

WHEREAS, Developer, desires approval of plans by the Agent for the County, for a project known as Parker View Apartments, located at 100 Carriage Road, Williamsburg, Virginia 23188, which plans include provision of siltation and erosion control measures as required by Chapter 8 of the Code of the County, and

WHEREAS, County desires to ensure the installation, maintenance and adequate performance of such control measures,

NOW THEREFORE, for and in consideration of the foregoing premises and the following terms and conditions, and in further consideration of the approval of the aforesaid plans by the County and the issuance of permits for the work proposed to be done thereunder the parties hereto agree as follows:

1. Developer has either:
  - a. deposited with Agent, and Agent by this execution hereof acknowledges that he holds, the sum of \_\_\_\_\_ dollars (\$ \_\_\_\_\_) in escrow under and subject to the terms of this agreement, or;
  - b. has furnished the County an irrevocable letter of credit or bond with corporate surety, whose terms and conditions are acceptable in substance and in form to the County Attorney, in the sum of Eighty Four Thousand dollars (\$84,000.00), which letter of credit or bond is under and subject to the terms of this agreement.

The deposit, letter of credit or bond (collectively "Security Instrument") is designed to insure performance of the Developer's obligations and to insure reimbursement to the County in the event that it performs work or causes work to be performed pursuant to this Agreement and plans approved by and on file with the County.

2. In the event measures for the control of siltation and/or erosion as provided for on the plans referred to herein, or on any approved revision thereof, are not constructed at or prior to the occurrence of any rainstorm or other phenomena actually causing any siltation or erosion, County or its authorized

agent shall have the right to enter upon Developer's property and construct such measures or do such other work as may be necessary to prevent further erosion or siltation, provided that County shall first give notice in writing to Developer or his superintendent of its intent so to do.

3. In the event measures for the control of siltation and/or erosion have been constructed, but fail, through overload and/or inadequate maintenance, to perform the function for which they were intended, County or its authorized agent, may in like manner to paragraph 2 above, enter to perform such reconstruction or maintenance as may be necessary to restore performance in accord with the plans, or approved revisions thereof, upon giving notice in writing to Developer or his superintendent of its intent so to do.

4. In the event there occurs siltation and/or erosion from the property covered by the plans referred to herein in sufficient quantity adversely to affect downstream drainage, or travel on any street, road, highway or other public way, then County may take such steps as may be necessary to restore functions to the affected drainage or travel way.

5. a. In the event County determines work shall be performed or causes to be performed work of any nature, including labor, use of equipment, and materials, under the provisions of paragraphs 2, 3 and 4 above, either by County staff, or other contractor, Agent shall draw and disburse to County on its order such sum or sums as may be requested, provided, however, that Agent's liability so to disburse shall be limited to the undistributed balance in its hands of:

1. the escrow amount, or
2. the letter of credit, or
3. the bond

Such surety may be drawn in total, if at the time the surety is to expire, if all improvements or any portion thereof are not complete and surety has not been adequately extended or replaced to ensure completion of the improvements. In addition, the County may draw a Security Instrument in the event it is not renewed or amended to remain in effect at least 10 days prior to its expiration. A notice that such draw has been made shall be delivered or mailed by County to Developer.

b. In the event the County calls, collects or otherwise draws on the Security Instrument pledged under this agreement, Developer agrees to either pay, or have the County use the proceeds of the draw to pay, a reasonable administrative fee of \$35.00 plus any costs actually incurred by the County in drawing on the Security Instrument. The charge for an administrative fee plus costs shall apply regardless of whether the County later accepts a renewal or amendment of the Security Instrument.

6. In the event Agent makes disbursement pursuant hereto, Developer agrees to deposit within ten (10) days of such disbursement, an amount sufficient either:

a. to restore escrow amount to its original balance as shown in paragraph 1; or

- b. to furnish an additional letter of credit in the amount of the draft; or
- c. to secure such additional bonds as to restore same to its original balance as shown in paragraph 1.

7. It is expressly agreed by all parties hereto that it is the purpose and intent of this Agreement to ensure the installation, maintenance, and performance of measures provided for on approved plans or revisions thereof, for the control of siltation and erosion, and for the restoration of function of facilities for drainage or vehicular travel if such facilities are adversely affected in their function by siltation or erosion from the property the subject of such plans. This Agreement shall not be deemed to create or affect any liability of any party hereto for any damage alleged to result from or be caused by erosion or siltation.

8. It is expressly agreed by the parties hereto that either:

- a. the escrow amount shall be held by Agent unless distributed in accordance with paragraph 5 above, or paid to County as part of the cost to complete improvements required by ordinance and/or agreement, or released in writing by County, through its Agent, or
- b. the letter of credit or bond shall be held by Agent unless distributed in accordance with paragraph 5 above, or paid to County as part of the cost to complete improvements required by ordinance and/or agreement, or released in writing by County, through its Agent.

IN WITNESS WHEREOF, the parties hereto, being first duly authorized, have affixed their signatures on the date first above written.

ATTEST:

*KATHY E. VESLEY, Vice President*

Owner: *Kathy E. Vesley* (SEAL)  
(Print Name and Title)

*John Deuch*

BY: *Kathy E. Vesley*  
(Signature)

Approved as to form:

COUNTY OF JAMES CITY VIRGINIA

BY: *Scotty Thomas*  
County Agent

*1557* *Quincy C. Lopez*  
County Attorney

0359c.agr

19B

Scale: 1 inch = 350 feet

15E

COUNTY

8B	C
19B	B
19B	B/C
11C	G/A
15E	C
<hr/>	
B/C SOILS	

37

19B

14C

DRAINAGE AREA

29B

2.07 ac.

18B

1.12 ac.

31B

19B

11.73 ac.

11C

11C

5.64 acres

25.56 acres

10.73 ac.

615

8B

15E

19B

15E

11C

15F

15D

15D

11C

8B



# Land Disturbing Permit Application

James City County  
Environmental Division  
P.O. Box 8784  
Williamsburg, VA 23187-8784  
Telephone: (757) 253-6670

Josh 804-338-9772

SP-100-05  
CC-094

## Landowner

Name: BAY AGING APARTMENTS JCC, INC. Date: September 25, 2007

Mailing Address: P.O. Box 622 (5306 Old Virginia Street) Phone: (804) 758-2386

URBANNA, VA 23175 Fax: (804) 758-5773

Project: PARKER VIEW APARTMENTS

Project Street Address: 100 CARRIAGE ROAD, WILLIAMSBURG, VA 23188

Total Size of Tract or Lot: 3.75 ACRES

Total Area to Be Disturbed: 3.51 ACRES

Description of Land Disturbing Activity: Land disturbance to include parking lot, water detention facilities (bioretention) and building pads for the construction of 67 units of housing for senior citizens. Plans call for one three-story building.

## Right of Entry

I, John A. Serach, (Signature) hereby grant designated officials of James City County, \_\_\_\_\_ (Print Name and Title)

Virginia, the right to enter my property for the purpose of inspection or monitoring for compliance with the approved erosion and sediment plan on the above-referenced project.