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: **CC033**

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

General File ID or BMP ID:	**CC033**
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 #: 070027781/060015072

CC033

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

COPY

DECLARATION OF COVENANTS
INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 25th 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 TOG
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 25th 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 25th day of September, 2007.

[SEAL]

John C. Dent
Notary Public

Notary Registration Number: 279529

My Commission expires: July 31, 2010

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:

ASST County Attorney

This Declaration of Covenants prepared by:

Name: Joshua Gemerek

Print Name: Joshua Gemerek

Title: Senior VP, Property Management + Development

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.

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

Project Name: Bay Aging Senior Housing Project
County Plan No.: SP-100-05
Stormwater Management Facility: Bio-Retention
BMP Phase #: ☐ I ☐ II ☐ III

- [x] Information Package Received. Date/By: 11/25/08 AES Aaron Small
- [x] Completeness Check:
  - [x] Record Drawing Date/By: 11/25/08 Aaron Small
  - [x] Construction Certification Date/By: 11/25/08 Aaron Small
  - [x] RD/CC Standard Forms (Required for all BMPs after Feb 1st 2001Only)
  - [x] Insp/Maint Agreement # / Date: 070027781 / 10/4/2007
  - [x] BMP Maintenance Plan Location Page/Sheet 10
  - ☐ Other:
- [x] Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review
  - [x] Yes ☐ No Location: Sheet 8, Item 20
- [x] Assign **County BMP ID Code #**: Code: CC-033
- [x] Preliminary Input/Log into Division's "As-Built Tracking Log"
- [x] Add Location to GIS Map. Obtain basic site information (GPIN, Owner, Address, etc.)
- [x] Preliminary Log into Access Database (BMP ID #, Plan No., GPIN, Project Name, etc.)
- [x] Active Project File Review (correspondence, H&H, design computations, etc.).
- [x] Initial As-Built File setup (File label, folder, copy plan/details/design information, etc.).
- [x] Inspector Check of RD/CC (forward to Inspector using transmittal for cursory review).
- [x] Pre-Inspection Drawing Review of Approved Plan (Quick look prior to Field Inspection).
- [x] Final Inspection (FI) Performed Date:
- [x] Record Drawing (RD) Review Date: 11/26/08
- [x] Construction Certification (CC) Review Date: 11/26/08
- ☐ Actions:
  - ☐ No comments.
  - ☐ Comments. Letter Forwarded. Date:
  - ☐ Record Drawing (RD)
  - ☐ Construction Certification (CC)
  - [x] Construction-Related (CR)
  - ☐ Site Issues (SI)
  - ☐ Other :
- ☐ Second Submission:
- ☐ Reinspection (if necessary):
- [x] Acceptable for SWM Purposes (RD/CC/CR/Other). Ok to proceed with bond release.
- [x] 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.
- [x] 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: 4/17/09

*** 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:
- ☐ Residential
- ☒ Commercial
- ☐ Institutional
- ☐ Public
- ☒ Other Senior Apartments
- ☐ Business
- ☐ Office
- ☐ Industrial
- ☐ Roadway

Tax Map/Parcel No.: 3911600002
BMP ID Code (if known): CC-033
Zoning District: MU
Land Use: Mixed Use
Site Area (sf or acres): 3.75 AC.

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

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: AES Consulting Engineers
Mailing Address: 5248 Olde Towne 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.

COMMONWEALTH OF VIRGINIA
AARON B. SMALL
Lic. No. 030712
PROFESSIONAL ENGINEER

(Seal)

Virginia Registered Professional Engineer
Or Certified Land Surveyor

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.

COMMONWEALTH OF VIRGINIA
AARON B. SMALL
Lic. No. 030712
PROFESSIONAL ENGINEER

(Seal)

Virginia Registered
Professional Engineer

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

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

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

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

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

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

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

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

XX 4. All 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 diaphrahm provided in areas where lateral sheet flow from impervious surgaces 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. <u>References</u> *(The James City County Record Drawing and Construction Certification Forms and Checklists for Stormwater Management / BMP facilities were developed using the following sources and references.)*

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

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

PROPERTY CURVE TABLE						
NO.	DELTA ANGLE	CHORD DIRECTION	TANGENT	RADIUS	ARC	CHORD
C1	10°35'49"	N 31°22'04" E	138.55	1472.39	272.32	271.93
C2	05°23'08"	S 71°13'41" E	11.20	238.17	22.39	22.38
C3	13°12'32"	S 80°31'32" E	27.58	238.17	54.91	54.79
C4	51°28'37"	N 38°30'26" W	86.07	178.53	160.40	155.06
C5	12°05'32"	N 30°37'13" E	159.13	1502.39	317.08	316.49

PROPERTY LINE TABLE		
NO.	DIRECTION	DISTANCE
L1	N 14°23'13"W	27.79
L2	N 59°45'31"E	46.77
L3	N 21°19'23"E	4.00
L4	N 79°20'25"E	12.66
L5	N 32°24'21"E	6.92
L6	S 83°29'12"E	8.20
L7	S 61°00'54"E	56.04
L8	S 67°38'39"E	61.28
L9	N 61°00'54" W	9.48
L10	S 68°32'07" E	3.56

NOTES:

INLET SHAPING MUST BE INSTALLED AT ALL STRUCTURES IN ACCORDANCE WITH VDOT STANDARD IS-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 ST-1 (SEE DETAIL ON SHEET 11).

100 PROPOSED CONTOUR

~~100~~ EXISTING CONTOUR

SS #16
DI-7
TOP= ~~103.30~~ 103.21'
DEPTH= ~~5.08'~~ 4.89'
INV.= ~~98.22~~ 98.32'

1' X 1' GRATE
TOP= 104.64'

UNDERDRAIN COLLECTION SYSTEM
6" PERFORATED PIPE
(TYPICAL)
INV= 99.38' AT SS #16

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

SS #11
DI-7
TOP= ~~103.30~~ 103.25'
(SEE SHEET 3)

L 44 ~~42~~ LF OF 15" HDPE @ ~~0.50%~~ 0.34%

BASIN #2
BIORETENTION FILTER
COUNTY TYPE D-1 BMP
TOP @ ~~103.00~~ 103.6'
BOTTOM @ ~~102.80~~ 102.6'
2- YR. ELEV.= 103.57
10- YR. ELEV.= 103.62
100- YR. ELEV.= 103.66

1' X 1' GRATE
TOP= 104.64'

SS #12
DI-7
TOP=102.75
(SEE SHEET 3)

SS #13
DI-7
TOP=101.80
(SEE SHEET 3)

SS #14
DI-7
TOP=101.80
(SEE SHEET 3)

SS #15
DI-3A
TOP=102.14
(SEE SHEET 3)
(UNDER SEPARATE CONTRACT)

SS #4
DI-3A
TOP=102.78

SS #5
MH-1
TOP=102.78
(SEE SHEET 3)

SS #1
PRECAST MODIFIED RISER
TOP= ~~98.50~~ 98.98'
DEPTH= ~~5.83'~~ 6.08'
INV.= ~~92.67~~ 92.90'

60' ~~57~~ LF OF 18" HDPE @ 0.47%

SS #2
DI-7
TOP= ~~102.00~~ 102.11'
DEPTH= ~~9.60'~~ 9.49'
INV.= ~~92.40~~ 92.62'

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

BASIN #1
BIORETENTION FILTER
COUNTY TYPE D-1 BMP
TOP @ ~~99.25~~ 99.4'
BOTTOM @ ~~98.00~~ 98.2'
2- YR. ELEV.= 98.73
10- YR. ELEV.= 98.94
100- YR. ELEV.= 99.09

GRAPHIC SCALE
20' 0' 20' 40'
SCALE: 1" = 20'

TEMPORARY SEDIMENT TRAP TO BE REMOVED UPON COMPLETION OF LAND DISTURBANCE ACTIVITIES. TRAP TO BE FILLED IN MAX. 8" LIFTS WITH SM/SC SAND AND COMPACTED TO 95% DENSITY PER ASTM D698. CONTRACTOR SHALL PROVIDE TEST REPORTS TO THE ENGINEER (MIN. 1 TEST PER LIFT).

111 LF OF 24" HDPE @ 0.50%

103 LF OF 24" HDPE @ 0.50%

GRAVEL FILTER STRIP

LOADING ZONE

CHANGED BY ABS 12/21/07 & INFORMED TOANO CONTRACTORS

LIMITS OF CLEARING

LIMITS OF DISTURBANCE

TEMPORARY STOCKPILE AND STAGING AREA

FOR CONTINUATION SEE INSET BELOW

END 5' SIDEWALK

IRONBOUND ROAD
VARIABLE WIDTH R/W
S.R. 615

CARRIAGE ROAD
50' R/W
S.R. 672

N/F
WILLIAMSBURG REDEVELOPMENT AND HOUSING AUTHORITY
INST.# 040008570
4388 IRONBOUND ROAD
GPIN 3910100065

N/F
WILLIAMSBURG REDEVELOPMENT AND HOUSING AUTHORITY
INST.# 040008570
105 CARRIAGE ROAD
GPIN 3910100072

N/F
MILDRED D. STONE
107 CARRIAGE ROAD
D.B. 231, PG. 9
GPIN 3910100073

N/F
THOMAS J. ADLER
INST.# 990021335
146 WATFORD LANE
GPIN 3910105116

N/F
CAROLYN L. RUSSELL TUCKER & COLLINS S. TUCKER JR.
INST.# 030018505
116 CARRIAGE ROAD
D.B. 202, PG. 467(PLAT)
GPIN 3910800002

N/F
LEROY & FLOSSIE LEE BANKS
111 MAGAZINE ROAD
D.B. 235, PG. 539
GPIN 3910700001

N/F
JAMES & ALICE JAMERSON
109 MAGAZINE ROAD
D.B. 57, PG. 245
GPIN 3910100063

N/F
RACHEL RUSSEL ET ALS
107 MAGAZINE ROAD
D.B. 615, PG. 688
GPIN 3910100061

N/F
LENA P. GUILLORY
INST.# 020002402
105 MAGAZINE ROAD
D.B. 207, PG. 788(PLAT)
GPIN 3910100080

"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."

THOMAS C. SUBLETT DATE

COMMONWEALTH OF VIRGINIA
10/02/08
THOMAS C. SUBLETT
No. 1886
LAND SURVEYOR

RECORD DRAWING 10/02/08

No.	DATE	REVISION / COMMENT / NOTE	BMC	ABS
3	10/02/08	RECORD DRAWING		ABS
2	1/16/06	PER JCC COMMENTS DATED 11/16/05, 11/21/05, 12/19/05	ABS	ABS
1	10/19/05	PER JCC COMMENTS DATE 9/23/05 & 10/3/05	BMC	ABS

COMMONWEALTH OF VIRGINIA
HAROLD B. SHALL
No. 030712
1/16/06
PROFESSIONAL ENGINEER

RECEIVED
JAN - 8 2009
ENVIRONMENTAL DIVISION

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

CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND

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

JAMES CITY COUNTY VIRGINIA
BERKELEY DISTRICT

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

PROPERTY CURVE TABLE						
NO.	DELTA ANGLE	CHORD DIRECTION	TANGENT	RADIUS	ARC	CHORD
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C4	31°28'37"	N 36°30'26" W	86.07	178.53	160.40	158.06
C5	12°05'32"	N 30°37'13" E	159.13	1502.39	317.08	316.49

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L9	N 61°00'54" W	9.46
L10	S 68°32'07" E	3.55

NOTES:

INLET SHAPING MUST BE INSTALLED AT ALL STRUCTURES IN ACCORDANCE WITH VDOT STANDARD IS-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 ST-1 (SEE DETAIL ON SHEET 11).

100 PROPOSED CONTOUR

100 EXISTING CONTOUR

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

BASIN #2
BIORETENTION FILTER
COUNTY TYPE D-1 BMP
TOP @ ~~103.00~~ 103.6'
BOTTOM @ ~~102.80~~ 102.6'
2- YR. ELEV.= 103.57
10- YR. ELEV.= 103.62
100- YR. ELEV.= 103.66

BASIN #1
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

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

SS #1
PRECAST MODIFIED RISER
TOP= ~~98.50~~ 98.98'
DEPTH= ~~5.83'~~ 6.08'
INV.= ~~92.67~~ 92.90'

SS #2
DI-7
TOP= ~~102.00~~ 102.11'
DEPTH= ~~9.60'~~ 9.49'
INV.= ~~92.40~~ 92.62'

SS #3
MH-1
TOP=101.91
DEPTH=13.06'
INV.=91.85

SS #11
DI-7
TOP=~~103.30~~ 103.25'
(SEE SHEET 3)

SS #12
DI-7
TOP=102.75
(SEE SHEET 3)

SS #13
DI-7
TOP=101.80
(SEE SHEET 3)

SS #14
DI-7
TOP=101.80
(SEE SHEET 3)

SS #16
DI-7
TOP= ~~103.30~~ 103.21'
DEPTH= ~~5.08'~~ 4.89'
INV.= ~~98.22~~ 98.32'

SS #5
MH-1
TOP=102.78
(SEE SHEET 3)

SS #15
DI-3A
TOP=102.14
(SEE SHEET 3)
(UNDER SEPARATE CONTRACT)

SS #4
DI-3AA
TOP=102.78
(SEE SHEET 3)

1' X 1'
GRATE
TOP= 104.64'

UNDERDRAIN COLLECTION SYSTEM
6" PERFORATED PIPE
(TYPICAL)
INV= 99.38' AT SS #16

~~42~~ 44 LF OF 15" 0.34%
HDPE @ ~~0.50%~~

111 LF OF 24"
HDPE @ 0.50%

108 LF OF 24"
HDPE @ 0.50%

59 LF OF 18"
HDPE @ 0.47%

15" RCP
(UNDER SEPARATE CONTRACT)

TEMPORARY STOCKPILE AND STAGING AREA

TEMPORARY SEDIMENT TRAP TO BE REMOVED UPON COMPLETION OF LAND DISTURBANCE ACTIVITIES. TRAP TO BE FILLED IN MAX. 8" LIFTS WITH SM/SC SAND AND COMPACTED TO 95% DENSITY PER ASTM D698. CONTRACTOR SHALL PROVIDE TEST REPORTS TO THE ENGINEER (MIN. 1 TEST PER LIFT).

LIMITS OF CLEARING

LIMITS OF DISTURBANCE

LOADING ZONE

4' GRAVEL FILTER STRIP

FOR CONTINUATION SEE INSET BELOW

END 5' SIDEWALK

GRAPHIC SCALE
20' 0' 20' 40'
SCALE: 1" = 20'

IRONBOUND ROAD
VARIABLE WIDTH R/W
S.R. 615

CARRIAGE ROAD
50' R/W
S.R. 672

N/F
LENA P. QUILLORY
INST.# 000002402
105 MAGAZINE ROAD
D.B. 207, PG. 789(PLAT)
GPIN 3910100080

N/F
RACHEL RUSSEL ET ALS
107 MAGAZINE ROAD
D.B. 615, PG. 688
GPIN 3910100081

N/F
JAMES & ALICE JAMERSON
109 MAGAZINE ROAD
D.B. 57, PG. 245
GPIN 3910100093

N/F
LEROY & FLOSSIE LEE BANKS
111 MAGAZINE ROAD
D.B. 235, PG. 539
GPIN 3910700001

N/F
CAROLYN L. RUSSELL TUCKER & COLLINS S. TUCKER JR.
INST.# 030019525
116 CARRIAGE ROAD
D.B. 202, PG. 467(PLAT)
GPIN 3910800002

N/F
WILLIAMSBURG REDEVELOPMENT AND HOUSING AUTHORITY
INST.# 040008570
4388 IRONBOUND ROAD
GPIN 3910100065

N/F
WILLIAMSBURG REDEVELOPMENT AND HOUSING AUTHORITY
INST.# 040008570
105 CARRIAGE ROAD
GPIN 3910100072

N/F
MILDRED D. STONE
107 CARRIAGE ROAD
D.B. 251, PG. 9
GPIN 3910100073

N/F
THOMAS J. ADLER
INST.# 990007135
146 WATFORD LANE
GPIN 3910100116

"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."

COMMONWEALTH OF VIRGINIA
10/02/08
THOMAS C. SUBLETT
No. 1886
LAND SURVEYOR

THOMAS C. SUBLETT DATE

RECORD DRAWING 10/02/08

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
3	10/02/08	RECORD DRAWING		
2	1/16/06	PER JCC COMMENTS DATED 1/16/05, 11/21/05, 12/19/05	ABS	ABS
1	10/19/05	PER JCC COMMENTS DATE 8/25/05 & 10/3/05	BMC	ABS

COMMONWEALTH OF VIRGINIA
AARON B. SHALL
No. 030072
1/16/06
PROFESSIONAL ENGINEER

JAN - 8 2009
ENVIRONMENTAL DIVISION

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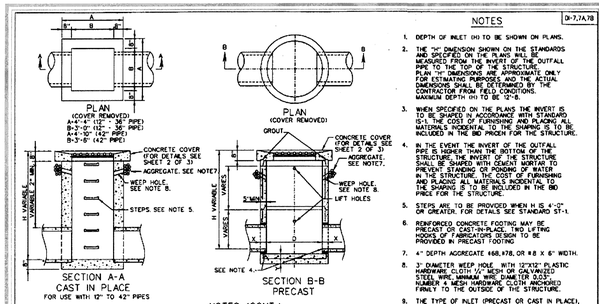
CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND

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

BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

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



RECOMMENDED MINIMUM HEIGHT CHART		
PIPE SIZE	H DIMENSION CONC.	H DIMENSION CORR. METAL
12"	2'-6"	2'-5"
15"	2'-9½"	2'-8"
18"	3'-0½"	2'-11"
21"	3'-3½"	3'-2"
24"	3'-7"	3'-5"
27"	3'-10½"	3'-8"
30"	4'-1½"	3'-11"
33"	4'-4½"	4'-2"
36"	4'-8"	4'-5"
42"	5'-2½"	4'-11"

NOTES

DI-7,7A,7B

1. DEPTH OF INLET (H) TO BE SHOWN ON PLANS.
2. THE "H" DIMENSION SHOWN ON THE STANDARDS AND SPECIFIED ON THE PLANS WILL BE MEASURED FROM THE INVERT OF THE OUTFALL PIPE TO THE TOP OF THE STRUCTURE. THE DIMENSIONS SHOWN ARE ADEQUATE ONLY FOR ESTIMATING PURPOSES AND THE ACTUAL DIMENSIONS SHALL BE DETERMINED BY THE CONTRACTOR FROM FIELD CONDITIONS. MAXIMUM DEPTH (H) TO BE 12'-0.
3. WHEN SPECIFIED ON THE PLANS THE INVERT IS TO BE SHAPED IN ACCORDANCE WITH STANDARD D-1. THE COST OF FURNISHING AND PLACING ALL MATERIALS INCIDENTAL TO THE SHAPING IS TO BE INCLUDED IN THE BID PRICE FOR THE STRUCTURE.
4. IN THE EVENT THE INVERT OF THE OUTFALL PIPE IS BELOW THE MAXIMUM DEPTH OF THE STRUCTURE, THE INVERT OF THE STRUCTURE SHALL BE SHAPED WITH CEMENT MORTAR TO PREVENT STANDING OR PONDING OF WATER IN THE STRUCTURE. THE COST OF FURNISHING AND PLACING ALL MATERIALS INCIDENTAL TO THE SHAPING IS TO BE INCLUDED IN THE BID PRICE FOR THE STRUCTURE.
5. STEPS ARE TO BE PROVIDED WHEN H IS 4'-0" OR GREATER. FOR DETAILS SEE STANDARD ST-1.
6. REINFORCED CONCRETE FOOTING MAY BE PRECAST OR CAST-IN-PLACE. TWO LIFTING HOOKS OF FABRICATORS DESIGN TO BE PROVIDED IN PRECAST FOOTING
7. 4" DEPTH AGGREGATE #68,#78, OR #8 X 6" WIDTH.
8. 3" DIAMETER WEEP HOLE WITH 12"X12" PLASTIC HARDWARE CLOTH 1/4" MESH OR GALVANIZED STEEL WIRE MINIMUM 19 GAUGE 0.03" THICKNESS. WEEP HOLE SHALL BE CONFIGURED FURNACE TO THE OUTSIDE OF THE STRUCTURE.
9. THE TYPE OF INLET (PRECAST OR CAST IN PLACE), DETAILED HEREON, TO BE CONSTRUCTED, WILL BE AT THE OPTION OF THE CONTRACTOR.
10. FOR DETAILS OF CONCRETE COVER, COLLAR AND GRATE AND THE METHOD OF PLACING APPROACH GUTTER SEE SHEET 2 OF 3.
11. CAST-IN PLACE CONCRETE IS TO BE CLASS A3 (3000 PSI). PRECAST CONCRETE IS TO BE 4000 PSI.
12. CONCRETE QUANTITIES SHOWN ARE FOR INDICATED DEPTH (H) WITHOUT PIPES. THE AMOUNT DISPLACED BY PIPES MUST BE DEDUCTED TO OBTAIN TRUE QUANTITIES. FOR INLETS OF DIFFERENT DEPTHS ADD OR SUBTRACT THE APPROPRIATE CUBIC YARDS OF CONCRETE FOR EACH FOOT OF DEPTH.
13. PAVED DITCHES ARE TO BE TRANSITIONED TO MEET INLET GUTTER AS SHOWN IN STANDARD PG-2A.
14. PROVIDE SAFETY SLABS WHEN SPECIFIED ON THE PLANS.

NOTES (CONT.)

15. DI-7 ····· NO GUTTER
    DI-7A ····· SINGLE GUTTER WHEN DROP INLET IS ON A GRADE
    DI-7B ····· DOUBLE GUTTER WHEN DROP INLET IS IN A SAG BETWEEN TWO GRADES.
16. FOR DETAILS OF PRECAST DI-7 NOT SHOWN HEREON SEE PRECAST UNIT ASSEMBLY DIAGRAM, PAGE 103.01. FOR PRECAST GENERAL NOTES, PAGE 103.02 AND FOR APPLICABLE PRECAST BASE, RISER AND TOP DETAILS, PAGES 103.07 THRU 103.12.
17. GRATE BARS TO BE PARALLEL TO DITCH FLOW.

PIPE SIZE	12"	15"	18"	24"	30"	36"	42"
MINIMUM DEPTH A	2'-0"	2'-3¼"	2'-8½"	3'-1"	3'-7½"	4'-2"	4'-8½"
CONCRETE CUBIC YARDS	.947	1.045	1.143	1.339	1.535	1.731	1.927

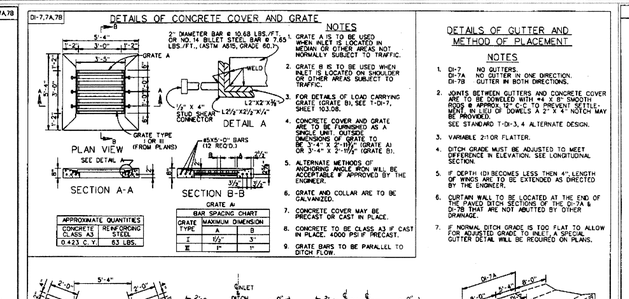
INCREMENT PER FOOT OF ADDITIONAL DEPTH (H) $\frac{3}{4}$ = 0.242 CU. YDS. (12" - 36" PIPE) or 0.476 CU. YDS. (42" PIPE)

SHEET 1 OF 3

SPECIFICATION REFERENCE: 241 503

STANDARD MEDIAN DROP INLET
12" TO 42" PIPE
VIRGINIA DEPARTMENT OF TRANSPORTATION

104.22



APPROXIMATE QUANTITIES	
CONCRETE CLASS A3	REINFORCING STEEL
0.423 C.Y.	53 LBS.

BAR SIZE BY CHART		
GRATE TYPE	MAXIMUM DIMENSION A	B
I	1½"	3"
II	1"	1"

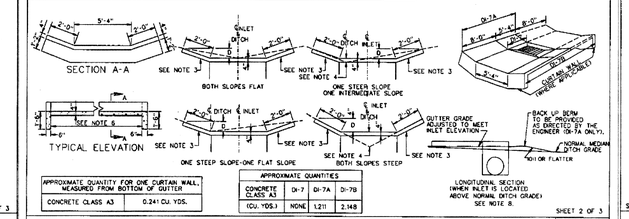
NOTES

1. GRATE A IS TO BE USED WHEN INLET IS LOCATED IN MEDIAN OR OTHER AREAS NOT NORMALLY SUBJECT TO TRAFFIC.
2. GRATE B IS TO BE USED WHEN INLET IS LOCATED ON SHOULDER OR OTHER AREAS SUBJECT TO TRAFFIC.
3. FOR DETAILS OF LOAD CARRYING GRATE (GRATE B1), SEE T-DI-7, SHEET 103.06.
4. CONCRETE COVER AND GRATE ARE TO BE FURNISHED AS A SINGLE UNIT. OUTSIDE DIMENSIONS OF GRATE TO BE 2'-0" x 3'-0" (GRATE A) OR 3'-4" x 2'-10½" (GRATE B).
5. ALTERNATE METHODS OF ANCHORING ANGLE IRON WILL BE ACCEPTABLE IF APPROVED BY THE ENGINEER.
6. GRATE AND COLLAR ARE TO BE GALVANIZED.
7. CONCRETE COVER MAY BE PRECAST OR CAST IN PLACE.
8. CONCRETE IS CLASS A3 IF CAST IN PLACE, 4000 PSI IF PRECAST.
9. GRATE BARS TO BE PARALLEL TO DITCH FLOW.

DETAILS OF GUTTER AND METHOD OF PLACEMENT

NOTES

1. DI-7, NO GUTTERS.
   DI-7A, NO GUTTER IN ONE DIRECTION.
   DI-7B GUTTER IN BOTH DIRECTIONS.
2. JOINTS BETWEEN GUTTERS AND CONCRETE COVER ARE TO BE DOWELED WITH #4 X 8" SMOOTH RODS @ APPROX 12" C.C. TO PREVENT SETTLE. USE #4 RODS OR DOWELS AS 2" X 4" NOTCH MAY BE PROVIDED.
   SEE STANDARD T-DI-3, 4 ALTERNATE DESIGN.
3. VARIABLE 21:OR FLATTER.
4. DITCH GRADE MUST BE ADJUSTED TO MEET DIFFERENCE IN ELEVATION. SEE LONGITUDINAL SECTION.
5. IF DEPTH (D) BECOMES LESS THEN 4" LENGTH OF WINGS ARE TO BE EXTENDED AS DIRECTED BY THE ENGINEER.
6. CURTAIN WALL TO BE LOCATED AT THE END OF THE PAVED DITCH SECTIONS OF THE DI-7A & DI-7B THAT ARE NOT ABUTTED BY OTHER DRAINAGE.
7. IF NORMAL DITCH GRADE IS TOO FLAT TO ALLOW FOR ADJUSTED GRADE TO INLET, A SPECIAL GUTTER DETAIL WILL BE REQUIRED ON PLANS.



APPROXIMATE QUANTITY FOR ONE CURTAIN WALL, MEASURED FROM BOTTOM OF GUTTER	
CONCRETE CLASS A3	0.241 CU. YDS.

APPROXIMATE QUANTITIES			
CONCRETE CLASS A3	DI-7	DI-7A	DI-7B
(CU. YDS.)	NONE	1.211	2.148

SHEET 2 OF 3

STANDARD MEDIAN DROP INLET
12" TO 42" PIPE
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE: 241 503

104.23

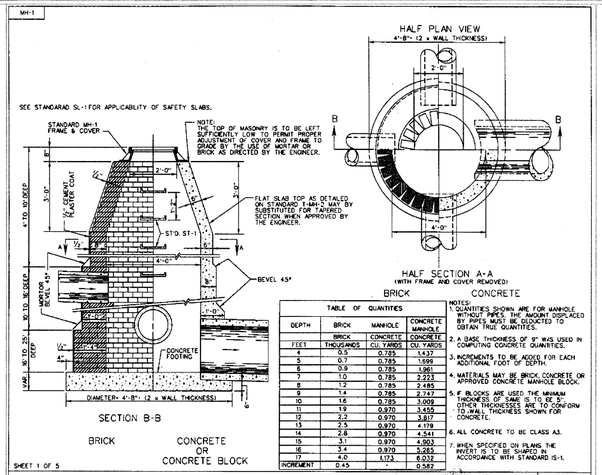


TABLE OF QUANTITIES				
DEPTH FEET	BRICK THOUSANDS	MANHOLE CONCRETE CU. YARDS	CONCRETE MANHOLE BLOCK CU. YARDS	CONCRETE CU. YARDS
4	0.5	0.785	1.437	
5	0.7	0.785	1.599	
6	0.9	0.785	1.961	
7	1.0	0.785	2.223	
8	1.2	0.785	2.485	
9	1.4	0.785	2.747	
10	1.6	0.785	3.009	
11	1.9	0.970	3.455	
12	2.2	0.970	3.817	
13	2.5	0.970	4.179	
14	2.8	0.970	4.541	
15	3.1	0.970	4.903	
16	3.4	0.970	5.265	
17	4.0	1.173	6.032	
INCREMENT	0.45	-	0.587	

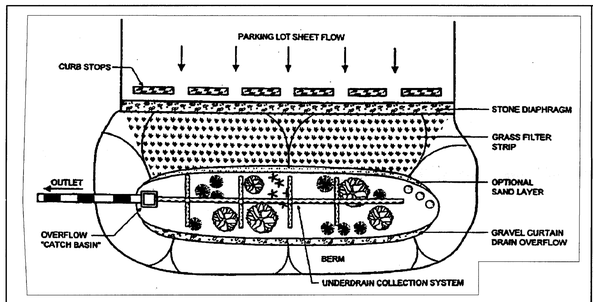
NOTES:
1. QUANTITIES SHOWN ARE FOR MANHOLE WITHOUT PIPES. THE AMOUNT DISPLACED BY PIPES MUST BE DEDUCTED TO OBTAIN TRUE QUANTITIES.
2. A BASE THICKNESS OF 8" WAS USED IN COMPUTING CONCRETE QUANTITIES.
3. INCREMENTS TO BE ADDED FOR EACH ADDITIONAL FOOT OF DEPTH.
4. MATERIALS MAY BE BRICK, CONCRETE OR APPROVED CONCRETE MANHOLE BLOCK.
5. IF BLOCKS ARE USED THE MINIMUM THICKNESS OF THE SAME IS TO BE 8". WALL THICKNESSES ARE TO CONFORM TO WALL THICKNESS SHOWN FOR CONCRETE.
6. ALL CONCRETE TO BE CLASS A3.
7. WHEN SPECIFIED ON PLANS THE INVERT IS TO BE SHAPED IN ACCORDANCE WITH STANDARD IS-1.

SHEET 1 OF 5

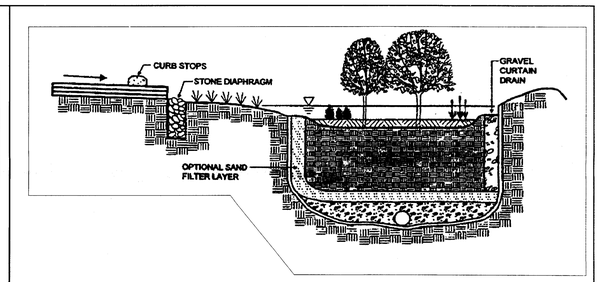
MANHOLE FOR 12" - 48" PIPE CULVERTS
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE: 302

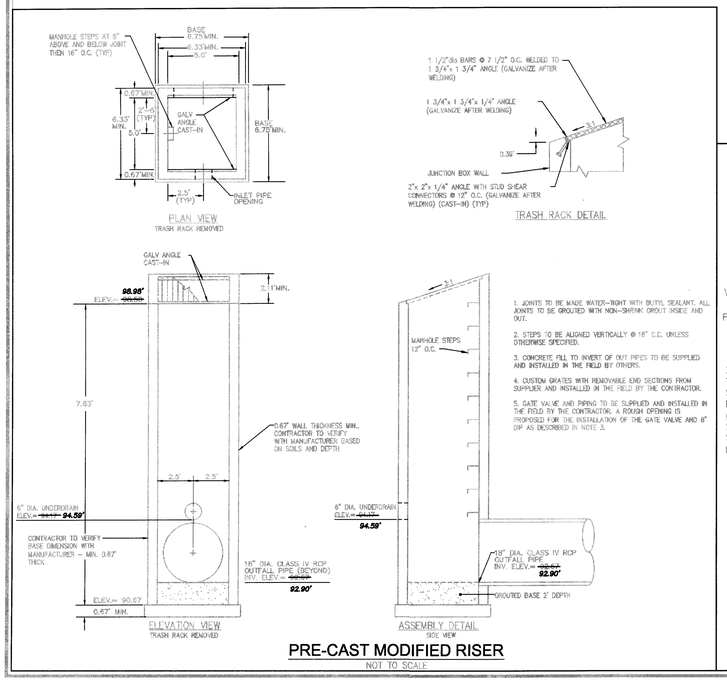
106.01



BIORETENTION FILTER
N.T.S.

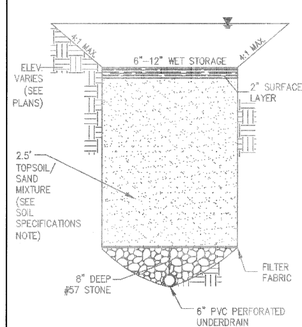


BIORETENTION FILTER PROFILE
N.T.S.



1. JOINTS TO BE MADE WATER-TIGHT WITH BUTYL SEALANT. ALL JOINTS TO BE GROUTED WITH NON-SHRINK GROUT INSIDE AND OUT.
2. STEPS TO BE ALIGNED VERTICALLY @ 16" O.C. UNLESS OTHERWISE SPECIFIED.
3. CONCRETE FILL TO INVERT OF OUT PIPES TO BE SUPPLIED AND INSTALLED IN THE FIELD BY OTHERS.
4. CUSTOM GRATES WITH REMOVABLE END SECTIONS FROM SUPPLIER AND INSTALLED IN THE FIELD BY THE CONTRACTOR.
5. GATE VALVE AND PIPING TO BE SUPPLIED AND INSTALLED IN THE FIELD BY THE CONTRACTOR. A BOUSH OPENING IS PROPOSED FOR THE INSTALLATION OF THE GATE VALVE AND 6" DIP AS DESCRIBED IN NOTE 3.

PRE-CAST MODIFIED RISER
NOT TO SCALE



BIORETENTION FILTER
N.T.S.

SOIL SPECIFICATIONS

THE BIORETENTION AREAS SHALL CONTAIN A PLANTING SOIL MIXTURE OF 50% SAND, 30% LEAF COMPOST (FULLY COMPOSTED, NOT PARTIALLY ROTTED LEAVES), AND 20% TOPSOIL. TOPSOIL SHALL BE SANDY LOAM OR LOAMY SAND OF UNIFORM COMPOSITION, CONTAINING NO MORE THAN 5% CLAY, FREE OF STONES, STUMPS, ROOTS, OR SIMILAR OBJECTS GREATER THAN ONE INCH, BRUSH, OR ANY OTHER MATERIAL OR SUBSTANCE WHICH MAY BE HARMFUL OR A HINDRANCE TO PLANT GROWTH OR MAINTENANCE. THE MIXTURE SHALL BE FREE OF PLANTS OR PLANT PARTS OF BERMUDA GRASS, QUACK GRASS, JOHNSON GRASS, MUGWORT, NUTSEDGE, POISON IVY, CANADIAN THISTLE, CATTAIL, OR OTHERS AS SPECIFIED. IT SHALL NOT CONTAIN TOXIC SUBSTANCES HARMFUL TO PLANT GROWTH. INFILTRATION RATE SHALL BE 3.0 INCHES PER HOUR MINIMUM. THE SOIL MIXTURE SHALL BE TESTED AND CERTIFIED TO MEET THE ABOVE CRITERIA AND THE MINIMUM CRITERIA SET FORTH IN SECTION 3.11-28 OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK (LATEST EDITION).

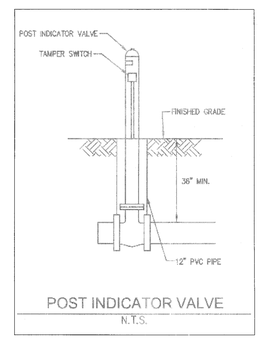
A SURFACE LAYER SHALL BE PROVIDED ON TOP OF THE PLANTING SOIL. AN ACCEPTABLE SURFACE LAYER SHALL INCLUDE SHREDDED HARDWOOD OR SHREDDED WOOD CHIPS OR OTHER SIMILAR PRODUCT.

MAINTENANCE PROGRAM & SCHEDULE

INSPECT AND REPAIR EROSION	MONTHLY
REMULCH ANY VOID AREAS	WHENEVER NEEDED
REMOVE PREVIOUS MULCH AND REAPPLY	EVERY 3 YEARS
REMOVAL AND REPLACEMENT OF ALL DISEASED VEGETATION CONSIDERED BEYOND TREATMENT	WHENEVER NEEDED
CHECK FOR ACCUMULATED SEDIMENTS	MONTHLY
INSPECT AND REMOVE ANY DEBRIS THAT MAY COLLECT AT THE DROP INLET	AFTER MAJOR STORM EVENTS/OR SEMI ANNUALLY

NOTES

1. WATER PLANT MATERIAL EACH DAY FOR FOURTEEN CONSECUTIVE DAYS AFTER CONSTRUCTION.
2. CONTRACTOR SHALL REFER TO COUNTY BMP MANUAL (GROUP D, PGS. 48-50) AND MINIMUM STANDARDS 3.11 AND 3.13 OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK FOR METHODS/MATERIAL ASSOCIATED WITH CONSTRUCTION OF THE BIORETENTION CELLS.
3. VDOT SHALL BE SAVED HARMLESS FROM THE MAINTENANCE RESPONSIBILITY OR LIABILITY ASSOCIATED WITH ANY FAILURE OF THE STORM WATER MANAGEMENT FACILITY AND ITS STRUCTURES.
4. A PROFESSIONAL ENGINEER WHO HAS INSPECTED THE BIORETENTION FILTER DURING CONSTRUCTION SHALL CERTIFY THAT THE BIORETENTION FILTER CONSTRUCTION IS IN ACCORDANCE WITH THE APPROVED SITE PLAN. RECORD DRAWINGS CONFORMING TO JAMES CITY COUNTY GUIDELINES SHALL BE PREPARED AND SUBMITTED FOR COUNTY REVIEW. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE BIORETENTION FILTER CONSTRUCTION SCHEDULE WITH THE ENGINEER TO PERMIT ON-SITE MONITORING.



POST INDICATOR VALVE
N.T.S.

HRPDC DETAIL REFERENCES

EARTHWORK (EW)

EW_01 PIPE BEDDING DETAILS

SANITARY SYSTEMS (SS)

SS_11 SANITARY SEWER LATERAL CLEAN OUT FRAME AND COVER *
SS_14 SANITARY SEWER SERVICE CONNECTION *

WATER & SANITARY SYSTEMS (WS)

WS_01 STANDARD VALVE BOX FRAME AND COVER
WS_02 VALVE SETTING DETAIL *
WS_03 STANDARD THRUST BLOCKS

ROADWAY CONSTRUCTION (RC)

RC_01 PAVEMENT PATCHING DETAIL FOR FLEXIBLE PAVEMENT

JCSA STANDARD DETAILS

W13.0 TYPICAL WATER METER INSTALLATION
W14.0 5/8"x3/4" THRU 1" METER SETTING
W15.0 1 1/2" & 2" WATER METER SETTING
W17.0 DETECTOR CHECK VALVE ASSEMBLY

* REFER TO SPECIAL PROVISIONS TO THE HRPDC REGIONAL CONSTRUCTION STANDARDS (3RD EDITION) FOUND IN APPENDIX A OF THE JCSA DESIGN AND ACCEPTANCE CRITERIA FOR WATER DISTRIBUTION AND SANITARY SEWER SYSTEMS (AUGUST 2005 EDITION).

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
3	10/02/08	RECORD DRAWING		
2	1/16/06	PER JCC COMMENTS DATED 11/16/05, 11/21/05, 12/19/05	ABS	ABS
1	10/19/05	PER JCC COMMENTS DATE 8/25/05 & 10/3/05	BMC	ABS

COMMONWEALTH OF VIRGINIA
AARON B. SMALL
No. 030172
1/16/06
PROFESSIONAL ENGINEER

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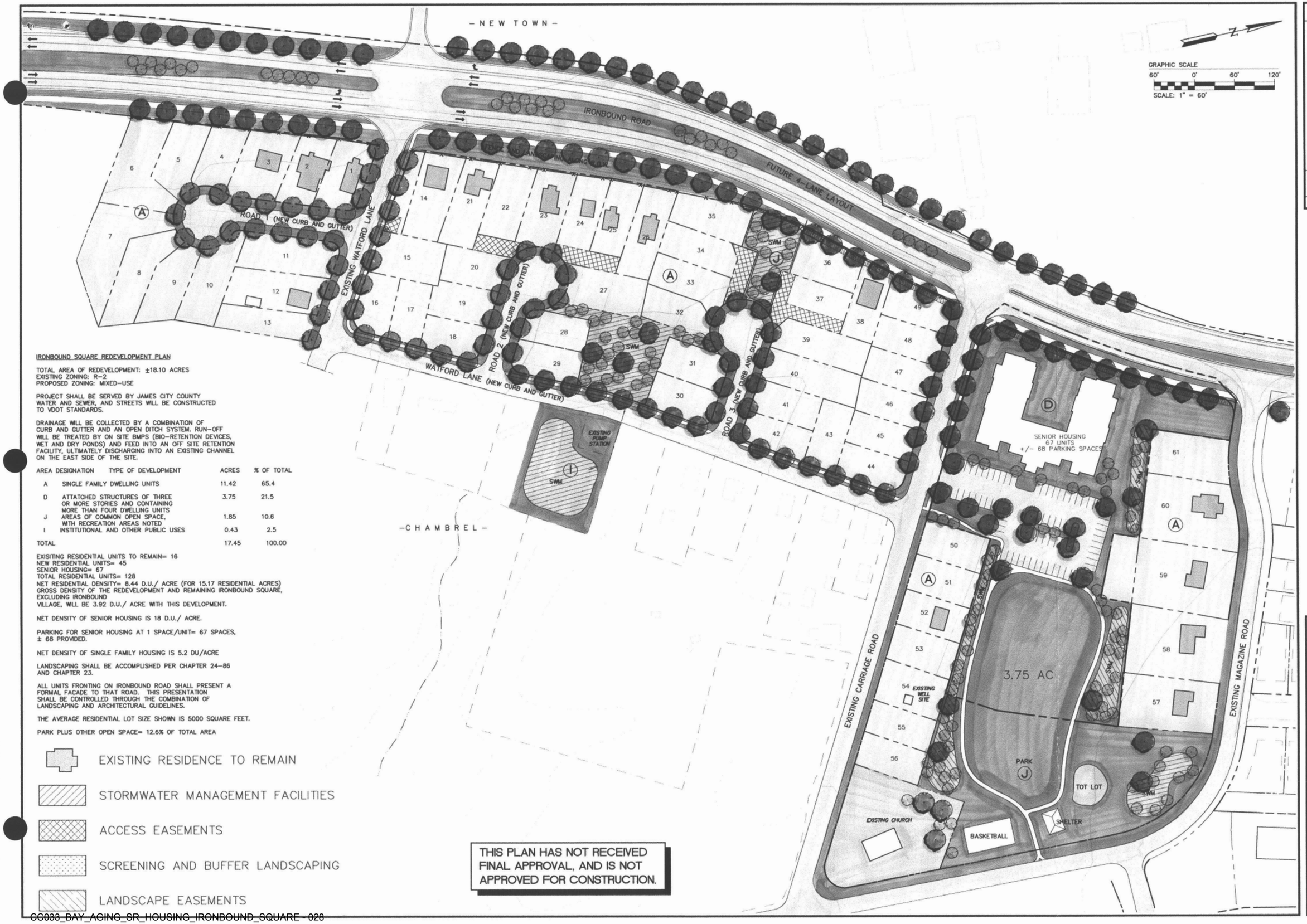
AES CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND

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

BERKELEY DISTRICT — JAMES CITY COUNTY — VIRGINIA

Designed	Drawn
ABS/BMC	SJP
Scale: NONE	Date: 8/03/05
Project No. 9551-00	
Drawing No. 10	

RECORD DRAWING 10/02/08



IRONBOUND SQUARE REDEVELOPMENT PLAN

TOTAL AREA OF REDEVELOPMENT: ±18.10 ACRES
EXISTING ZONING: R-2
PROPOSED ZONING: MIXED-USE

PROJECT SHALL BE SERVED BY JAMES CITY COUNTY WATER AND SEWER, AND STREETS WILL BE CONSTRUCTED TO VDOT STANDARDS.

DRAINAGE WILL BE COLLECTED BY A COMBINATION OF CURB AND GUTTER AND AN OPEN DITCH SYSTEM. RUN-OFF WILL BE TREATED BY ON SITE BMPS (BIO-RETENTION DEVICES, WET AND DRY PONDS) AND FEED INTO AN OFF SITE RETENTION FACILITY, ULTIMATELY DISCHARGING INTO AN EXISTING CHANNEL ON THE EAST SIDE OF THE SITE.

AREA DESIGNATION	TYPE OF DEVELOPMENT	ACRES	% OF TOTAL
A	SINGLE FAMILY DWELLING UNITS	11.42	65.4
D	ATTATCHED STRUCTURES OF THREE OR MORE STORIES AND CONTAINING MORE THAN FOUR DWELLING UNITS	3.75	21.5
J	AREAS OF COMMON OPEN SPACE, WITH RECREATION AREAS NOTED	1.85	10.6
I	INSTITUTIONAL AND OTHER PUBLIC USES	0.43	2.5
TOTAL		17.45	100.00

EXISITING RESIDENTIAL UNITS TO REMAIN= 16
NEW RESIDENTIAL UNITS= 45
SENIOR HOUSING= 67
TOTAL RESIDENTIAL UNITS= 128
NET RESIDENTIAL DENSITY= 8.44 D.U./ ACRE (FOR 15.17 RESIDENTIAL ACRES)
GROSS DENSITY OF THE REDEVELOPMENT AND REMAINING IRONBOUND SQUARE, EXCLUDING IRONBOUND VILLAGE, WILL BE 3.92 D.U./ ACRE WITH THIS DEVELOPMENT.

NET DENSITY OF SENIOR HOUSING IS 18 D.U./ ACRE.

PARKING FOR SENIOR HOUSING AT 1 SPACE/UNIT= 67 SPACES, ± 68 PROVIDED.

NET DENSITY OF SINGLE FAMILY HOUSING IS 5.2 DU/ACRE

LANDSCAPING SHALL BE ACCOMPLISHED PER CHAPTER 24-86 AND CHAPTER 23.

ALL UNITS FRONTING ON IRONBOUND ROAD SHALL PRESENT A FORMAL FACADE TO THAT ROAD. THIS PRESENTATION SHALL BE CONTROLLED THROUGH THE COMBINATION OF LANDSCAPING AND ARCHITECTURAL GUIDELINES.

THE AVERAGE RESIDENTIAL LOT SIZE SHOWN IS 5000 SQUARE FEET.

PARK PLUS OTHER OPEN SPACE= 12.6% OF TOTAL AREA

EXISTING RESIDENCE TO REMAIN

STORMWATER MANAGEMENT FACILITIES

ACCESS EASEMENTS

SCREENING AND BUFFER LANDSCAPING

LANDSCAPE EASEMENTS

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

No.	DATE	REVISION / COMMENT / NOTE	BY

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CONSULTING ENGINEERS

IRONBOUND SQUARE
CONCEPTUAL PLAN

BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
JSP	KSU
Scale	Date
1"=60'	12/07/04

Project No. 9014

Drawing No. 1 OF 1

S:\Jobs\9014\00\dwg\Planning\01-17-05 9014 Concept Drawing.dwg, 1/19/2005 2:42:13 PM, SCB

Community Impact Statement

For the

Master Plan

Prepared For

James City County Department of
Housing and Community Development

Phase I
Ironbound Square Redevelopment Project

February 22, 2005

AES Project Number: 9014

Z-2-05 |
MP-3-05

Prepared by:

AES CONSULTING ENGINEERS
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I. INTRODUCTION

James City County Office of Housing and Community Development (JCC OHCD) is proposing to rezone approximately 6.03 acres in James City County form R-2 to Mixed Use, MU zoning. The property is located along Ironbound Road (Route 615) in the section of the Ironbound Square neighborhood designated the Ironbound Square Redevelopment area. Ironbound Square is designated a "Community Development Focus Area" by the 2003 Comprehensive Plan. The property is compiled of 9 lots and comprises 6.03 acres zoned R-2.

The site currently contains 6 vacant lots, a neighborhood park and a James City Service Authority well site. In February of 2002 the James City County Board of Supervisors approved the Ironbound Square Redevelopment Plan in support of efforts to remove blighted structures, rehabilitate existing homes and to aid in the relocation of residents living in unsafe and unsanitary homes. These lots are located within the Redevelopment Area at its most northern region. In July 2002 James City County entered into a contract with the Williamsburg Redevelopment and Housing Authority (WRHA) to assist in implementing the Redevelopment Plan.

The JCC OHCD implemented a redevelopment effort in the Ironbound Square in the spring of 2000. The Office has used Community Development Block Grant (CDBG) funding to rehabilitate existing structures and remove blighted structures. The majority of the rehabilitation activities occurred on properties located in the eastern part of the neighborhood away from that part which fronts on Ironbound road. Many vacant and blighted lots front along the Ironbound road section of the neighborhood, this rezoning allows that property to be put to use in providing affordable housing for County residents and those who work in James City County, the City of Williamsburg. Developing this property enriches the property of the existing residents and provides strength and stability throughout the neighborhood.

Through its' innovative use of funding, the James City County Office of Housing and Community Development has been able to secure funding for below market rate mortgages for qualified first time homebuyers in the affordable housing market. These efforts are integral to meeting the stated need for housing affordable to those working residents in the County whose household income is at 80% or less of the Area Median Income. This income is currently computed to be $59,000 for a household of four.

II. THE PROJECT TEAM

The following organizations are involved in the planning and development of the 6.03 acre property.

• Applicant	Williamsburg Redevelopment Housing Authority and J.C.C. Housing and Community Development James City County, VA
• Developer	Bay Aging – Urbanna, VA
• Civil Engineer	AES Consulting Engineers - Williamsburg, VA
• Land Planning/ Landscape Architecture	AES Consulting Engineers - Williamsburg, VA
• Traffic Planning	DRW Consultants - Richmond, VA
• Architect	DBF Associates – Charlottesville, VA

III. PROJECT DESCRIPTION

Bay Aging is proposing to build 67 multifamily units as part of Senior Supportive housing for Low and Moderate Income senior citizens. The portion of the redevelopment area bounded on the north by Magazine road on the west by Ironbound road and on the south and east by Carriage road will be the location of a three story structure that houses the Senior Supportive housing apartments.

A site analysis reveals the following results:

Total acreage:	6.03 aces
Senior Supportive	3.75 acres
Single Family lots	.68 acres
Park / Open Space	1.60 acres

Drainage will be collected by a combination of curb and gutter and an open ditch system. DESIGNED IN ACCORDANCE W/JCC RQMTS.
Run-off will be treated by on site BMPS (Bio-Retention devices, wet and dry ponds) and feed into an off site retention facility, ultimately discharging into an existing channel on the east side of the site. & BASED ON ULTIMATE DRAINAGE AREA.

The open space adjacent to the Senior Supportive housing development will be dedicated as a neighborhood park. The eastern part of the site currently serves as a neighborhood park; the existing park will receive improvements to existing equipment and have additional facilities constructed.

The development of the property is as follows:

1. The existing lots along Ironbound road between Magazine road and Carriage road will form the site for the Senior Supportive housing facility, five single family lots and a park. This site totals 6.03 acres. This entire site will be rezoned from R-2 to MU.
2. 67 multi-family, affordable units will be built on approximately 3.75 acres (Use Designation D)
3. Five Single Family lots will be created as part of this rezoning, they will each have an area of approximately 5000sf (Use Designation A)
4. The remainder of the 6.03 acres will be park land (Land Use Designation J).

The project location is shown on the following exhibit:

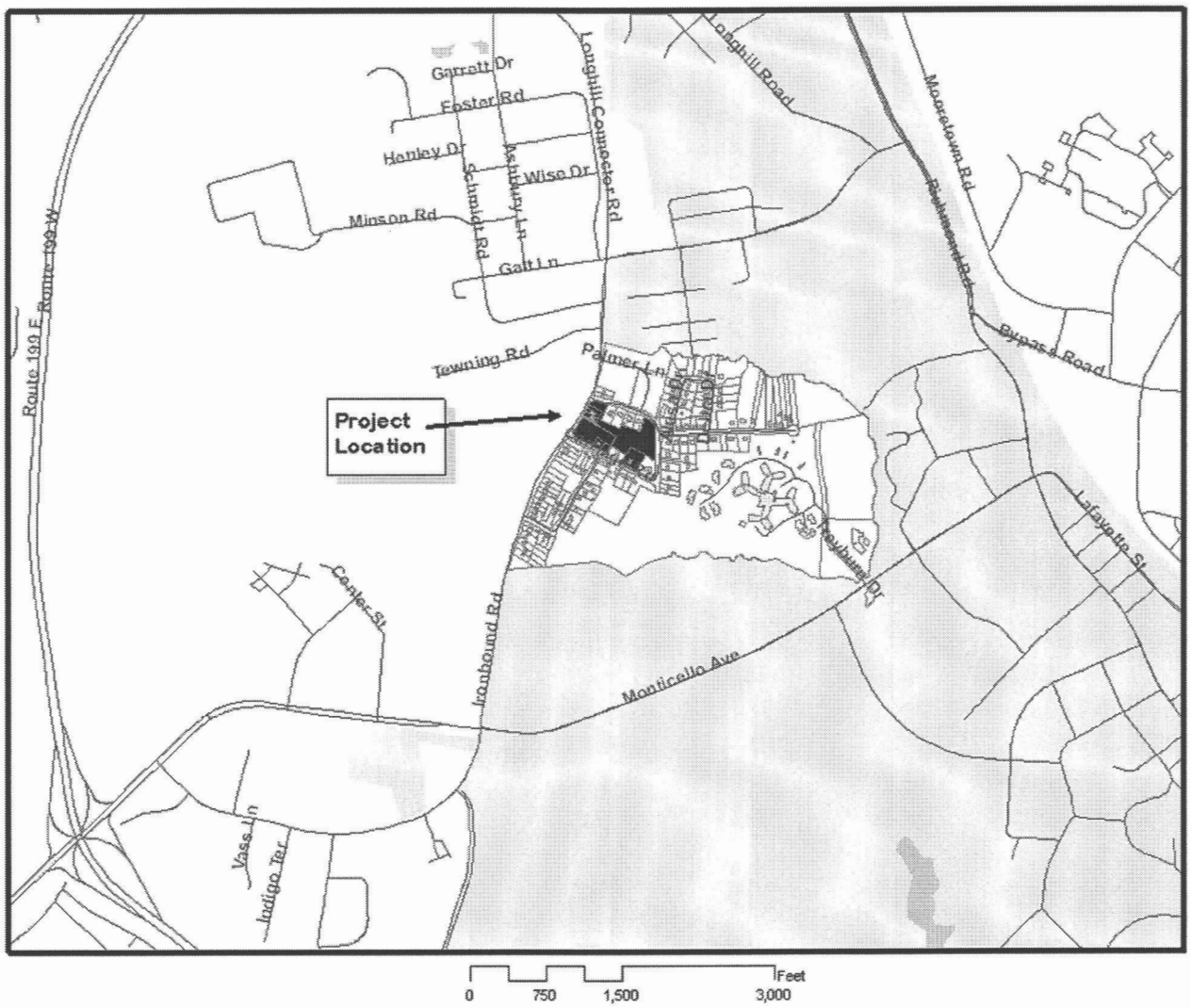

Exhibit 1

A. Planning Considerations

A review of the Comprehensive Plan of James City County shows this area designated as "Low Density Residential." Under this classification, a density of 1 dwelling unit per acre up to four dwelling units per acre is allowed. Site statistics provided for the entire redevelopment show that with this and future improvements the overall density for Ironbound Square, exclusive of Ironbound Village will not exceed 4 units per acres. The Mixed Use zoning designation is being requested because it provides the flexibility required to allow the Senior Apartments as well as single family lots that do not meet the

minimum requirements for R-2 zoning. Rezoning this area to Mixed Use will provide an urgently needed public benefit to the community. This zoning will allow 67 dwelling units with supportive services for residents of the area that are 62 years or older and with incomes that fall below 50% of the Area Median Income limit. The most current calculation places that amount at $20,700 for a single person.

An additional planning consideration is the management and services this particular facility will provide. Bay Aging, an Area Agency on Aging based in Urbanna, VA is partnering with the Peninsula Area Agency on Aging to provide management and support services for the 67 unit Senior Supportive housing facility.

IV. ANALYSIS OF IMPACTS TO PUBLIC FACILITIES AND SERVICES

A. Public Water Facilities

The subject properties will be served with public drinking water by the existing JCSA water distribution system in the area. JCSA currently maintains water mains along all existing roadways surrounding the site and include a 12-inch water main along Ironbound Road, an 8-inch water main along Carriage Road, and a 6-inch main along Watford Lane. Sufficient water supply and pressure is provided by the 1 MG Ironbound Road Water Storage Facility near the intersection of Monticello Avenue and Ironbound Road west of New Quarter Industrial Park on the south side of New Town. A 16-inch main on Monticello Avenue and numerous water main interconnections in New Town convey the water from the booster pump station to the 12-inch water main on Ironbound Road in front of the site. The existing well facility (JCSA W-23) located at 120 Carriage Road will be abandoned. JCSA has previously determined that this will is not needed to provide adequate water supply for the area.

A water distribution system model will be completed and submitted prior to or with the final site or subdivision plans. The model will examine flow rates and pressures throughout the immediate water system area. The water model will account for larger multi-family buildings having sprinkler fire suppression system meeting NFP-13R. The model may indicate that the upgrade of smaller pipes in the existing system including the 6-inch main along Watford Lane be required to meet current fire flow requirements.

B. Public Sewer Facilities

Sanitary sewer service can be provided to the subject development by existing JCSA Lift Station 4-1. This station conveys sewage flow into the existing 24-inch HRSD force main which runs along Ironbound Road. The HRSD main eventually discharges at the Williamsburg Wastewater Treatment Plant. JCSA Lift Station 4-1 is located on the east

side of Watford Lane (122A Watford Lane) and was built to serve Ironbound Square over 25 years ago as part of Sanitary District #3. All of the sewage flows generated from the proposed rezoning area will flow by gravity into this station. Table 1 below shows the flows generated by the redevelopment that will be conveyed to the existing lift station less the existing flows currently generated.

Table 1 – Total Estimated Wastewater Flows

Type of Development	No. of Units	Flow (GPD/Unit)	Average Daily Flow (GPD)	Duration (hrs)	Average Flow (GPM)	Peak Flow (GPM)
PROPOSED REDEVELOPMENT						
Single-family detached	5	300	1,500	24	1.0	2.6
Senior Apartments	67	225	15,075	24	10.5	26.2
Subtotal	72		16,575		11.5	28.8
EXISTING						
Single-family detached	7	300	2,100	24	1.5	3.6
Subtotal	7		2,100		1.5	3.6
Total Additional Flow	**65**		**14,475**		**10.1**	**25.1**

The existing 8-inch gravity sewer system can convey the flow for more than 660 single family detached homes. Therefore, the existing sewers are adequate for the proposed rezoning and have ample capacity.

JCSA Lift Station 4-1 has been renovated to provide better operating characteristics. However, due to unusually high operating pressures in the HRSD force main, the station has had periods where the pumps could not overcome the pressure. The station currently operates at approximately 200 GPM at a pressure of 95 feet. Because the pumps run at a constant speed, varying pressures in the destination force main create large variations in the pumping rate. At high pressures, the pumping rate may not exceed the inflow rate, limiting the station capacity. As a result, a complete study of the sanitary sewer will be completed and submitted prior to or with the final site or subdivision plans. Recommendations are likely to include upgrades to the station pumps and electrical system. Building renovations may also be recommended to maintain the character of the redevelopment project.

C. Schools

The 67 units proposed as part of this rezoning will be limited to households with at least one member who is 62 years of age or older and whose income does not exceed 50 percent of the area on a formula set out by HUD. The possibility of this development contributing to the Williamsburg James City school population is unlikely.

Five single family lots are also proposed as part of this rezoning. These lots will be developed in conjunction with the Ironbound Square Revitalization Program underway in the Ironbound Square Redevelopment Area. JCC OHCD will develop these lots within its' Affordable Housing Incentive Program (AHIP) which provides down-payment and closing cost assistance to financially qualified families and individuals. Some of these families may also purchase the homes built on these lots with below market rate (FHA, VHDA) mortgages provided through JCC OHCD.

JCC OHCD administers AHIP and has followed its' focus of providing affordable housing opportunities for persons with income at or below 80% of the median income. These individuals must also have the credit worthiness necessary to secure a mortgage. Priority is given to participants who live in James City County and to those persons who work in James City County or Williamsburg.

The impact of the development subject to this rezoning will have a negligible impact on the Williamsburg / James City County Schools system given that in all likelihood no net new students will be added to the population because a majority of the development is limited to households with at least one member being 62 years of age or older, and the single family lots will be marketed to persons who currently reside or work in James City County, and Williamsburg.

D. Fire Protection and Emergency Medical Services (EMS)

There are currently five fire stations providing fire protection and EMS services to James City County. In addition, there exists a mutual aid agreement with the City of Williamsburg and York County for backup assistance. The station located closest to the project is Station 4 located on Olde Towne Road. Station 4 is less than three miles from the site. Additionally, there is a fire station on Route 5 and the City of Williamsburg Fire Station located on Lafayette Street which provide backup to Station 4 for emergencies which may occur at this site. The physical locations of these stations in respect to the project will provide more than adequate response times for fire protection and EMS services.

E. Solid Waste

The property will generate solid waste that will require collection and disposal to ensure a safe and healthy environment. Collection of solid waste will be by private contract with reputable haulers acting in accordance with local health standards. This waste will be transported to the James City County Solid Waste transfer station.

F. Gas and Electricity

Electricity is supplied by Dominion / Virginia Power. Virginia Natural Gas, Cox Communications and Verizon Communications will also be providing services to the Redevelopment of Ironbound Square.

V. ANALYSIS OF STORMWATER MANAGEMENT/BMP

A brief needs-analysis for stormwater management, meeting the general criteria of the Commonwealth of Virginia and James City County's stormwater requirements, was completed as a component of the planning for the proposed project.

The goal of the stormwater management plan is to adhere to local and state stormwater requirements. In evaluating preliminary stormwater management solutions of the proposed development on the subject site, the unique site characteristics are considered. Preliminary site observations and mapping identify the following unique site characteristics to be considered in stormwater management planning:

- Existing stormwater management facilities do not exist.
- The project drains to the extreme upper reaches of College Creek, a tributary of the James River.
- Drainage is upstream of Lake Matoaka, located in the City of Williamsburg on the College of William and Mary Campus.
- Drainage from Ironbound Road passes through the project creating a large volume of runoff from impervious areas.

The planned stormwater management facilities will detain and release designed storm events for the on-site and the currently uncontrolled off-site drainage. Stormwater management will be accomplished in accordance with all current applicable standards including James City County Guidelines for Design and Construction of Stormwater Management BMP's, Virginia Stormwater Management Handbook, and Virginia Erosion and Sediment Control Handbook. BMPs will be designed to provide downstream channel protection by providing 24 hour drawdown of the 1-year, 24-hour storm volume.

WQ - LID
SCP - BASIN

Stormwater collection pipes will be constructed to convey runoff to a BMP located adjacent to JCSA Lift Station 4-1 on Watford Lane. This BMP will serve mostly as a peak attenuation device and detention of the 1-year, 24-hour runoff volume for downstream channel protection. Stormwater treatment will also occur in upstream Low Impact Development (LID) measures such as Bioretention basins, Dry Swales, etc. as needed to meet requirements for new developments.

Sounds Right!

A regional stormwater management pond is planned immediately downstream of the Watford Lane BMP. ~~It is not expected that this facility will be completed prior to the construction of the project which necessitates construction of the Watford Lane BMP.~~ This new facility will not only receive drainage from the proposed rezoning area, but the remainder of the Ironbound Square redevelopment project and all or portions of the Ironbound Road widening project currently under design by the Virginia Department of Transportation. ~~When this facility is constructed, the Watford Lane BMP will be converted into a forebay for the downstream facility.~~

In summary, with the preliminary analysis of the project, the stormwater management plan proposed will improve the overall downstream water quality and will

help to control downstream erosion from uncontrolled runoff from the neighboring properties.

The subject properties for rezoning are located within the Primary services Area of James City County. Parcels and subsequent land development activities within the Primary Service Area are required to connect to public water and sanitary sewer service provided by the James City County Service Authority (JCSA)

VI. ENVIRONMENTAL STUDIES

Utilizing the best available offsite references coupled with onsite review, the following resources were explored:

- Topography
- Soils
- Surface Water
- Wetlands
- Floodplains
- Chesapeake Bay Preservation Areas
- Vegetation
- Wildlife
- Rare, Threatened and Endangered Species
- Cultural

A. Existing Conditions

The property has few environmental resources related to physiography, drainage, vegetation cover, and historical land use. The environmental attributes of the property are described in the sections that follow.

B. Topography

OR GENERALLY?

The topography of the retail site gently slopes to the north and west of the site. Elevations on the site average approximately 100 feet mean sea level as indicated by the JCC GIS Mapping Department with a contour interval of 5-feet.

C. Soils

The *Soil Survey of James City and York Counties and the City of Williamsburg, Virginia* (USDA 1985) maps several soil types within the Chesapeake Retail property boundary. The retail site is situated on well-drained soils (e.g. Kempsville, Kempsville-Emporia and Suffolk). Shrink-swell potential is low in all soils mapped within the site boundary, and the erosion hazard potential is slight in all soils.

D. Surface Water

There is no surface water located on the subject property.

E. Wetlands

No jurisdictional wetlands are evident on the property.

F. Floodplain

No portions of the site lie within the FEMA determined 100-year floodplain limits.

G. Chesapeake Bay Prevention Areas

No RPA features are present on the subject property; however, James City County has been designated as a RMA in its entirety.

H. Vegetation

A few significant trees are located along the perimeter of the site, particularly in the park. None of which will be affected by the project. The site has been previously developed and most of the area affected by the proposed expansion is currently an open, mowed, grass field

I. Wildlife

As stated in paragraph g: Vegetation, the affected area is a grass field. No resident wildlife was observed on site.

J. Rare, Threatened and Endangered Species

Information concerning Virginia's threatened and endangered species, rare species, and unique natural communities is available from the databases maintained by the Virginia Department of Game and Inland Fisheries (DGIF), the Virginia Department of Conservation and Recreation Division of Natural Heritage (DCR), and/or the United States Fish and Wildlife Service (FWS). Based upon the data from DGIF, two federally listed species have been confirmed to occur in James City County. These include the bald eagle (*Haliaeetus leucocephalus*) and the small whorled pogonia (*Isotria medeoloides)*. This site does not contain the habitat to support either species.

K. Cultural Resources

According to the JCC Planning Staff, the site is not located in a highly sensitive area on the JCC Archaeological Assessment.

In conclusion there are no significant environmental resources present on the site.

VII. ANALYSIS OF THE IMPACTS TO TRAFFIC

(See Traffic Study by DRW, Consultants)

VIII. CONCLUSION

The proposed Ironbound Square Apartments for the Elderly will address a serious deficiency in James City County of housing which is appropriate to the special needs of the elderly, including the frail elderly, and which is affordable to lower income senior citizens. This development is also a key element in the Ironbound Square Redevelopment Plan. Bay Aging, in partnership with the Peninsula Area Agency on Aging, successfully obtained an award of $5.2 million dollars in U.S. Department of Housing and Urban Development (HUD) funding for a Section 202 Supportive Housing for the Elderly Program grant to finance the development and operation of this proposed apartment project.

Under the Section 202 program, HUD provides interest-free capital advances to private, nonprofit sponsors to finance the development of supportive housing for the elderly. Section 202 apartments are typically one bedroom, 550 square foot units. The

program guidelines allow for common areas and office space to enable the sponsors to provide supportive services on site. Residency in Section 202 financed developments is restricted to households with at least one member who is 62 years of age or older and whose income does not exceed 50 percent of the area median (currently $20,700 for a one person household). The Section 202 program provides project-based rental assistance which covers the difference between the HUD approved operating cost and tenant rental payments. Tenant rent payments equal 30 percent of the tenant's adjusted income.

The demand for Section 202 funding is high, and the number of projects which can be funded each year is very limited. Bay Aging, which is the Area Agency on Aging serving the Northern Neck and Middle Peninsula, has been very successful in obtaining Section 202 funding, developing and managing Section 202 fund communities, and providing support services to the residents. Bay Aging currently manages 195 elderly apartment units in five developments within the Northern Neck and Middle Peninsula. The inclusion of the Peninsula Area Agency on Aging, which currently provides a wide array of services to James City County elderly residents, as the project co-sponsor will ensure a strong support service component for the proposed Ironbound Square elderly development. The ability of the County to waive building permit fees and water connection fees under existing ordinances and regulations greatly improved the competitiveness of the application for Section 202 funding and will enable savings to be invested in upgrades to the building.

JCSA is also contributing the site where 3 single family lots are to be developed. These lots along with two others will be placed in the inventory of the County's Affordable Housing Incentive Program (AHIP). Through AHIP the County has been successful in assisting persons of moderate to low income in achieving the dream of homeownership. As a means of lessening fiscal and environmental impacts associated with development AHIP is focused on persons who currently live or work in James City County and Williamsburg.

In summary, this project provides for an acknowledged need for housing affordable to elderly citizens of the County who have low incomes. The James City County Office of Housing and Community Development has worked with the residents of the Ironbound Square over the past 5 years and the need for Senior Supportive Housing was identified by the residents as an important consideration in the planning of the Ironbound Square Redevelopment.

OCT 2005
RECEIVED
PLANNING DEPARTMENT

SUBMITTAL DOCUMENTS

FOR

BAY AGING SENIOR HOUSING PROJECT
AT
IRONBOUND SQUARE

SUBMITTED TO:

James City County
Environmental Division

SP-100-05

Prepared By:

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

COMMONWEALTH OF VIRGINIA
AARON B. SMALL
No. 030712
10/19/05
PROFESSIONAL ENGINEER

August 3, 2005
Revised: October 19, 2005

AES Project No. 9551-0

95510-EnvDiv-Cover 2nd submittal.doc

AES
CONSULTING ENGINEERS

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V. STORM SEWER CALCULATIONS

VI. SEDIMENT TRAP CALCULATIONS

AES CONSULTING ENGINEERS

4.

Watershed map

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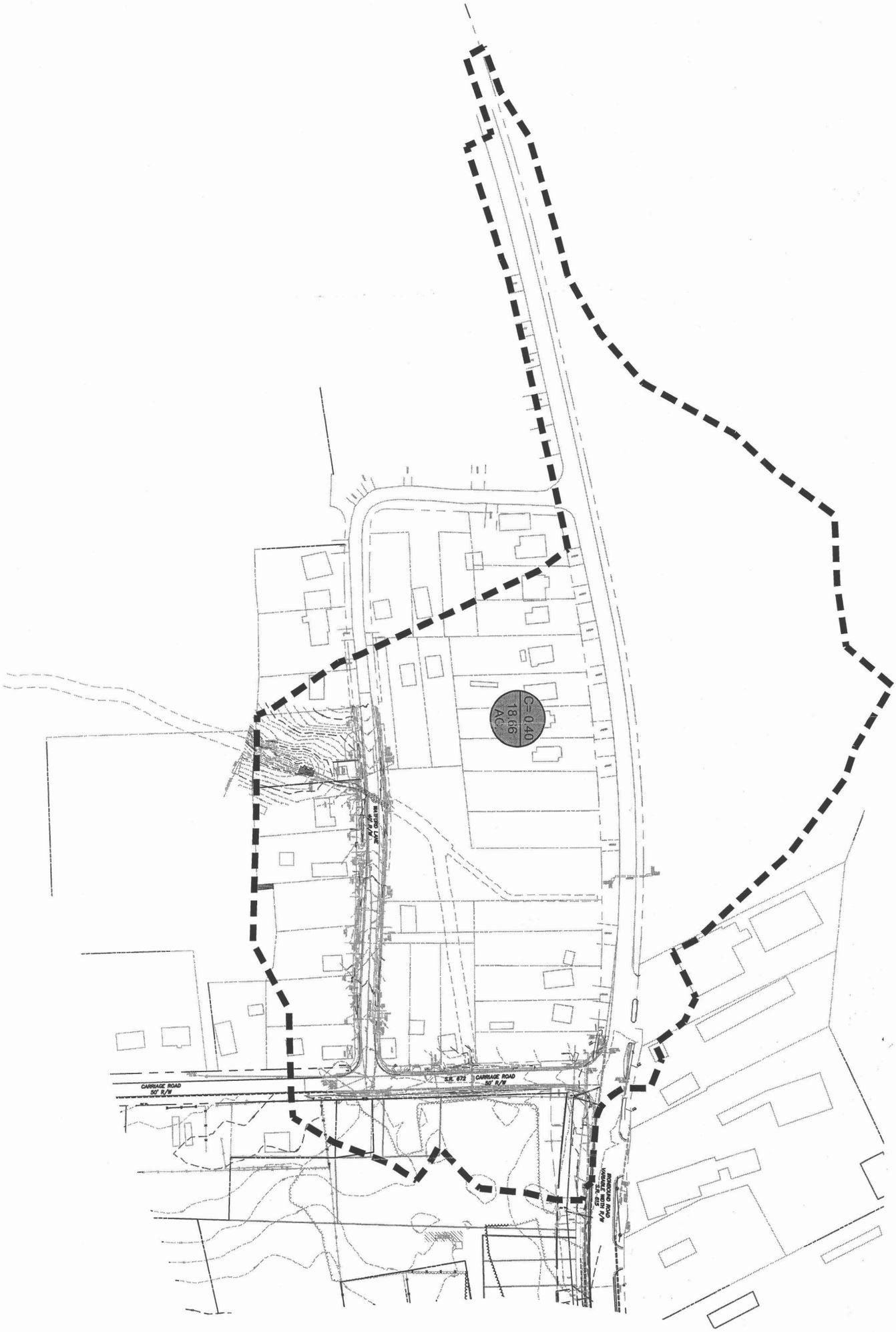

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Scale 1"=50'	Date 8/03/05		
Project No. 9551-00			
Drawing No. 1			

PRE-DEVELOPMENT DRAINAGE AREAS
BAY AGING SENIOR HOUSING PROJECT
SITE DEVELOPMENT PLAN
IRONBOUND SQUARE

BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

AES CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND

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COMMONWEALTH OF VIRGINIA
AARON B. SMALL
No. 030712
10/13/05
PROFESSIONAL ENGINEER

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY

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Scale: 1"=50'	Date: 8/03/05		
Project No. 9551--00			
Drawing No. 2			

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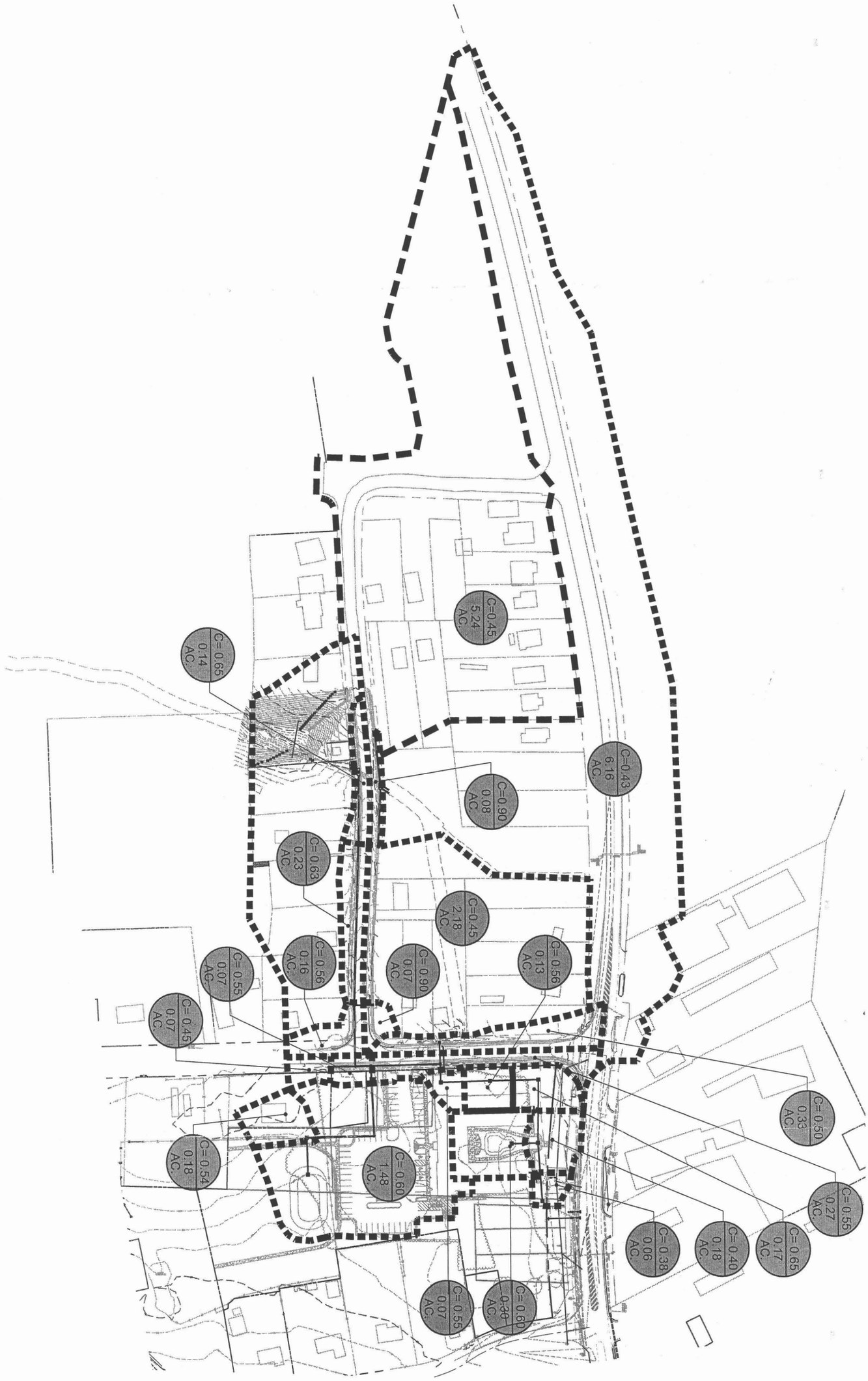

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Scale 1"=50'	Date 8/03/05		5248 Olde Towne Road, Suite 1 Williamsburg, Virginia 23188 (757) 253-0040 Fax (757) 220-8994
Project No. 9551-00			
Drawing No. 3			

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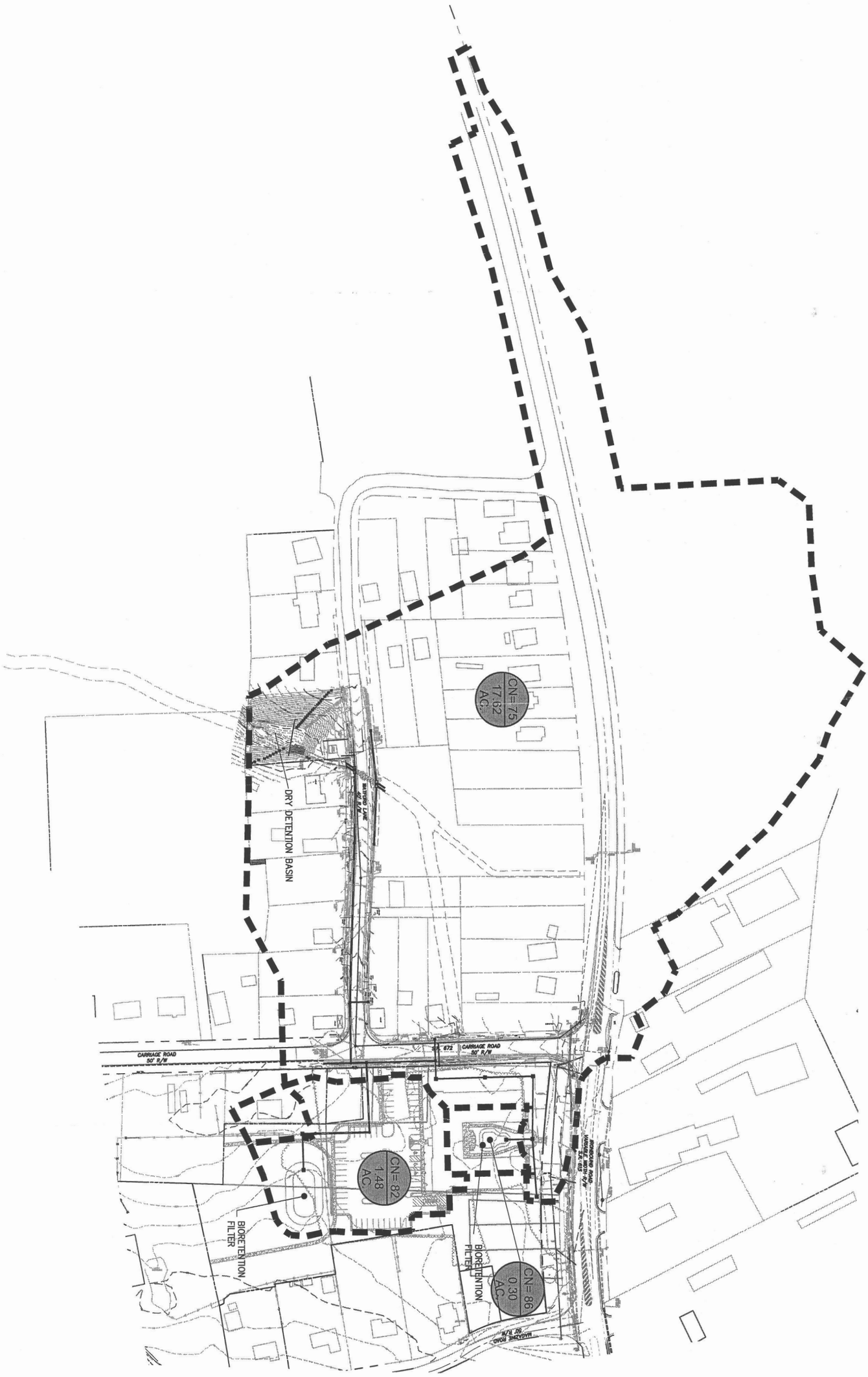

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Scale 1"=50'	Date 8/03/05		
Project No. 9551-00			
Drawing No. 4			

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COMMONWEALTH OF VIRGINIA
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10/13/05
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TABLE 3

WORKSHEET FOR BMP POINT SYSTEM
Bay Aging, AES PROJECT No. 9551-00
TOTAL AREA = 4.64* ACRE(s)

A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP Drainage Area	BMP Points		Fraction of Site Served by BMP (BMP Drainage Area/Total Area)		Weighted BMP Points
Bioretention Filter	1.51	10	X	0.325	=	3.25
Bioretention Filter	0.24	10	X	0.052	=	0.52
Dry Pond*	10.21 11.96*	4	X	2.578	=	10.31
Dry Pond	1.75	2	X	0.377	=	0.75
		TOTAL WEIGHTED STRUCTURAL BMP POINTS:				14.84

OR 2.89 = 4.64 - 1.75 → TOTAL = 7.017

13.32 STILL O.K.

B. NATURAL OPEN SPACE CREDIT

Open Space Area	Fraction of Site (Open Space Area/Total Area)	Natural Open Space Credit		Points for Natural Open Space (Fraction of Site * Natural Open Space Credit %)
		(0.1 per 1%)	=	
		(0.15 per 1%)	=	
		TOTAL OPEN SPACE POINTS:		0.00

C. TOTAL WEIGHTED POINTS

14.84	+	0.00	=	14.84
Structural BMP Points		Natural Open Space Points		TOTAL

* Total site area includes 5 single family lots and the Bay Aging property.

11.96 AC is used for the Dry Pond Drainage Area instead of 17.86 AC, which currently drains to the Dry Pond, because when New Town is built out the difference, 5.9 AC, will not be draining to this Dry Detention Pond.

17.86 TOTAL ACREAGE DRAINING TO POND
- 5.90 ACREAGE REMOVED TO NT
11.96 REMAINING ACREAGE INCLUDING BAY AGING
- 1.75 AREA SERVED BY BIORETENTION
10.21 AREA RECEIVING 4 PTS

OR IS IT

3.15
~~4.64~~ SITE ACREAGE
- 1.75 BMP
2.89 ACRES

9551-00 JCC BMP Point System.xls.xls

CALCULATION FOR SCS HYDROGRAPH GENERATION
DRY POND
Ironbound Square
AES Project No.: 9551-00
Date: June 22, 2005
Revised: October 13, 2005

I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN

A. Pre-Development Drainage Area to Point of Concern = 18.66 Acres

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

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)	
1)	8B	C	Woods, Fair	1.21	73	88	
2)	8B	C	Grassland-Range, Good	2.42	74	179	
3)	19B	B	Woods, Good	1.75	55	96	
4)	19B	B	Grassland-Range, Good	1.24	61	76	
5)	37	C	Woods, fair	0.01	73	1	
6)	19B	B	Commercial and Business	0.35	92	32	
7)	15E	C	Residential 1/3 Ac lots	0.32	81.0	26	
8)	15E	C	Road	0.06	98.0	6	
9)	11C	C	Residential 1/3 Ac lots	4.61	81.0	373	
10)	11C	C	Road	0.18	98.0	18	
11)	19B	B	Residential 1/3 Ac lots	1.69	72.0	122	
12)	18B	B	Residential 1/3 Ac lots	1.05	72.0	76	16.58
13)	18B	B	Road	0.27	98.0	26	
14)	19B	B	Road	0.48	98	47	
15)	8B	C	Residential 1/3 Ac lots	0.38	81	31	
16)	8B	C	Road	0.56	98	55	
17)	18B	B	Woods, fair	1.13	60	68	
18)	18B	B	Gravel	0.05	85	4	
19)	19B	B	Open Space, Poor	0.08	79	6	
20)	19B	B	Gravel	0.12	85	10	2.08
21)	15E	C	Woods, fair	0.45	73	33	
22)	15E	C	Residential 1/3 Ac lots	0.25	81	20	
	Totals =			18.66		1,393	
	Composite CN =					75	

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	Woods, Light Underbrus	
Manning's roughness coefficient., n (table 5-7)	0.4	
Length of overland flow, L	100	Feet
2-year 24-hour rainfall, P2	3.5	inches
Average slope of overland flow , s	0.02	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.34	hours

2) Shallow concentrated flow

Surface description, paved or unpaved	Unpaved	
Length of shallow concentrated flow, L	400	Feet
Average slope of shallow concentrated flow, s	0.01	feet per foot
Average velocity, v	1.60	feet per second
Travel time, Tt = L/(3600*v)	0.07	hours

3) Channel or Pipe Flow

Length of channel flow, L	600	Feet
Average velocity of channel flow, v	2.5	feet per second
Travel time, Tt = L/(3600*v)	0.07	hours
Total Time of Concentration =	0.45	hours 29 minutes

II. POST-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for area 2)

A. Post-Development Drainage Area to Point of Concern = 17.62 Acres

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

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)	Area Check (in Acres)
Offsite							
1)	8B	C	Woods, Fair	0.92	73	67	
2)	8B	C	Grassland-Range, Good	1.76	74	130	
3)	19B	B	Woods, Good	1.75	55	96	
4)	19B	B	Grassland-Range, Good	1.24	61	76	
5)	37	C	Woods, fair	0.01	73	1	
6)	19B	B	Commercial and Business	0.35	92	32	
7)	15E	C	Residential 1/3 Ac lots	0.32	81.0	26	
8)	15E	C	Road	0.06	98.0	6	
9)	11C	C	Residential 1/3 Ac lots	4.61	81.0	373	
10)	11C	C	Road	0.18	98.0	18	
11)	19B	B	Residential 1/3 Ac lots	1.69	72.0	122	
12)	18B	B	Residential 1/3 Ac lots	1.14	72.0	82	
13)	18B	B	Road	0.27	98.0	26	
14)	19B	B	Road	0.48	98	47	
15)	8B	C	Residential 1/3 Ac lots	0.38	81	31	
16)	8B	C	Road	0.56	98	55	
17)	18B	B	Building	0.25	98	25	
18)	18B	B	Sidewalk	0.08	98	8	
19)	18B	B	Open Space, Good	0.51	61	31	

20)	19B	B	Open Space, Good	0.23	61	14
21)	18B	B	Pavement	0.04	98	4
22)	18B	B	Residential 1/3 Ac lots	0.09	72	6
23)	15E	C	Woods, fair	0.45	73	33
24)	15E	C	Residential 1/3 Ac lots	0.25	81	20
	Total Adjusted CN =			17.62		1,329
	Composite CN =					76

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	Woods, Light Underbrush
Manning's roughness coefficient., n (table 5-7)	0.4
Length of overland flow, L	100 Feet
2-year 24-hour rainfall, P2	3.5 inches
Average slope of overland flow , s	0.02 feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.34 hours

2) Shallow concentrated flow

Surface description, paved or unpaved	Unpaved
Length of shallow concentrated flow, L	400 Feet
Average slope of shallow concentrated flow, s	0.01 feet per foot
Average velocity, v	1.60 feet per second
Travel time, Tt = L/(3600*v)	0.07 hours

3) Channel or Pipe Flow

Length of channel flow, L	600 Feet
Average velocity of channel flow, v	2.5 feet per second
Travel time, Tt = L/(3600*v)	0.07 hours
Total Time of Concentration =	0.48 hours 29 minutes

CALCULATION FOR SCS HYDROGRAPH GENERATION
BIORETENTION - Basin 1
Ironbound Square
AES Project No.: 9551-00
Date: June 20, 2005
Revised: October 13, 2005

I. POST DEVELOPMENT CONDITIONS TO POINT OF CONCERN (Bioretention Area)

A. Post Development Drainage Area to Point of Concern = 1.48 Acres

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

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	18B	B	Senior Housing	0.12	98	12
2)	18B	B	Parking Lot, Sidewalks	0.66	98	65
3)	18B	B	Open Space, Good Condition	0.52	61	32
4)	18B	B	Residential 1/3 Ac lots	0.18	72	13
	Totals =			1.48		121
	Composite CN =					82

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	Short Grass
Manning's roughness coefficient., n (table 5-7)	0.15
Length of overland flow, L	100 Feet
2-year 24-hour rainfall, P2	3.5 inches
Average slope of overland flow , s	0.03 feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.13 hours

2) Shallow concentrated flow

Surface description, paved or unpaved	Paved/Unpaved
Length of shallow concentrated flow, L	120 Feet
Average slope of shallow concentrated flow, s	0.02 feet per foot
Average velocity, v	2.90 feet per second
Travel time, Tt = L/(3600*v)	0.01 hours

3) Channel or Pipe Flow

Length of channel flow, L	Feet
Average velocity of channel flow, v	2.5 feet per second
Travel time, Tt = L/(3600*v)	0.00 hours
Total Time of Concentration =	0.14 hours 9 minutes

II. PROPOSED ESTIMATED POND(S) VOLUME

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
98	0	2,432	0	0	0	0
99	1.0	4,698	3,565	132	3,565	132
99.25	0.25	5,351	1,256	47	4,821	179

IV. Bioretention Cell Sizing

3630 C.F./ACRE

Size based on 1" per Impervious Area => 5% of Impervious Area = 0.05 · (35283.6 FT²) = 1764.18 S.F.

Total Drainage Area	1.58 Acre
Impervious Cover in Drainage Area	0.81 Acre = 35283.6 S.F
Surface Area Required	1764.18 Sq Ft
Surface Area Provided	2432 Sq Ft

$$1''/\text{IMP. ACER} \Rightarrow V_{REQ} = \left(\frac{1\ \text{IN}}{12\ \frac{\text{IN}}{\text{FT}}}\right) \cdot (.81\ \text{ACR})\ 43560\ \frac{\text{FT}^2}{\text{AC}}$$

$$= 2940.3\ \text{FT}^3$$

$$V_{AVAIL} \simeq 2432\ \text{FT}^2 \cdot \left(\frac{6''}{12\ \frac{''}{\text{FT}}}\right) = 1216\ \text{FT}^3$$

CALCULATION FOR SCS HYDROGRAPH GENERATION
BIORETENTION - Basin 2
Ironbound Square
AES Project No.: 9551-00
Date: June 8, 2005
Revised: October 13, 2005

I. POST DEVELOPMENT CONDITIONS TO POINT OF CONCERN (Bioretention Area)

A. Post-Development Drainage Area to Point of Concern = 0.30 Acres

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

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	18B	B	Senior Housing	0.17	98	17
2)	18B	B	Sidewalk	0.03	98	3
3)	18B	B	Open Space, Good Condition	0.10	62	6
	Totals =			0.30		26
	Composite CN =					88

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	Pasture, Good Cond.
Manning's roughness coefficient., n (table 5-7)	0.24
Length of overland flow, L	10 Feet
2-year 24-hour rainfall, P2	3.5 inches
Average slope of overland flow , s	0.01 feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.05 hours

2) Shallow concentrated flow

Surface description, paved or unpaved	Paved
Length of shallow concentrated flow, L	Feet
Average slope of shallow concentrated flow, s	0.01 feet per foot
Average velocity, v	2.00 feet per second
Travel time, Tt = L/(3600*v)	0.00 hours

3) Channel or Pipe Flow

Length of channel flow, L	Feet
Average velocity of channel flow, v	2.5 feet per second
Travel time, Tt = L/(3600*v)	0.00 hours
Total Time of Concentration =	0.05 hours 3 minutes

II. PROPOSED ESTIMATED POND(S) VOLUME

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
103	0	736	0	0	0	0
104	0.5	1,372	527	20	527	20

IV. Bioretention Cell Sizing

Size based on 1" per Impervious Area => 5% of Impervious Area

Total Drainage Area	0.24 Acre
Impervious Cover in Drainage Area	0.16 Acre
Surface Area Required	348.48 Sq Ft
Surface Area Provided	736 Sq Ft

Pond Report

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Pond No. 3 - Bioretention 1

Pond Data

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

DIA OPENING
15 5 FT.
X5 FT

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	8,385	5,151	10,015

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 92.67	0.00	0.00	0.00
Length (ft)	= 56.80	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	0.00
N-Value	= .013	.000	.013	.000
Orif. Coeff.	= 0.60	0.00	0.60	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.75	0.00	0.00	0.00
Crest El. (ft)	= 98.50	98.50	0.00	0.00
Weir Coeff.	= 3.33	0.97	3.33	0.00
Weir Type	= Rect	70 degV	---	---
Multi-Stage	= Yes	Yes	No	No

?

1 5'-1 2'

OVERFLOW?

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

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	98.00	0.00	---	---	---	0.00	---	---	---	0.000	0.00
1.25	4,864	99.25	31.47	---	---	---	14.60	0.47	---	---	0.372	15.44
2.00	10,015	100.00	35.96	---	---	---	33.78	2.18	---	---	0.582	36.54

Pond Report

Hydraflow Hydrographs by Intelisolve

Thursday, Oct 13 2005, 12:55 PM

Pond No. 1 - Small Bioretention 2

Pond Data

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

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	103.00	736	0	0
1.00	104.00	1,372	1,054	1,054

DI'-7

Culvert / Orifice Structures

15" SHOWN ON PLANS

	[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 = 1.500 in/hr (Contour) Tailwater Elev. = 0.00 ft

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	103.00	0.00	---	---	---	0.00	---	---	---	0.000	0.00
1.00	1,054	104.00	8.43	---	---	---	8.43	---	---	---	0.372	8.48

Pond Report

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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.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	76.00	0.00	0.00	0.00	0.00	0.00	---	0.00	---	---	0.00
1.00	3,548	77.00	0.38	0.24	0.00	0.00	0.00	---	0.00	---	---	0.63
2.00	7,728	78.00	0.57	0.49	1.08	1.08	0.00	---	0.00	---	---	3.22
3.00	12,575	79.00	0.71	0.64	2.00	2.00	0.00	---	0.00	---	---	5.35
4.00	18,125	80.00	0.82	0.77	2.61	2.61	2.53	---	0.00	---	---	9.34
5.00	24,413	81.00	0.92	0.87	3.11	3.11	16.55	---	0.00	---	---	24.56
6.00	31,468	82.00	1.01	0.97	3.53	3.53	37.14	---	0.00	---	---	46.19
7.00	39,323	83.00	1.10	1.06	3.91	3.91	62.63	---	108.14	---	---	180.75

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	-------	-------	52.47	61.27	-------	85.25	Predevelopment
3	SCS Runoff	-------	12.22	20.00	-------	-------	49.55	57.86	-------	80.50	PostDevelopment Area
5	SCS Runoff	-------	2.40	3.53	-------	-------	7.49	8.54	-------	11.35	Bioretention Area
6	Reservoir	5	1.13	2.70	-------	-------	7.04	8.07	-------	10.86	Bioretention
8	SCS Runoff	-------	0.67	0.94	-------	-------	1.85	2.09	-------	2.71	Small Bioretention Area
9	Reservoir	8	0.57	0.93	-------	-------	1.80	2.03	-------	2.63	Small Bioretention
11	Combine	3, 6, 9,	13.47	22.62	-------	-------	55.67	64.81	-------	89.51	Total Area
12	Reservoir	11	6.15	16.09	-------	-------	51.01	64.16	-------	88.74	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	1.13	3	732	6,560	5	98.62	2,406	Bioretention
8	SCS Runoff	0.67	3	717	1,524	----	------	------	Small Bioretention Area
9	Reservoir	0.57	3	723	1,502	8	103.54	573	Small Bioretention
11	Combine	13.47	3	732	61,310	3, 6, 9,	------	------	Total Area
12	Reservoir	6.15	3	753	61,295	11	79.52	15,447	Dry Pond

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

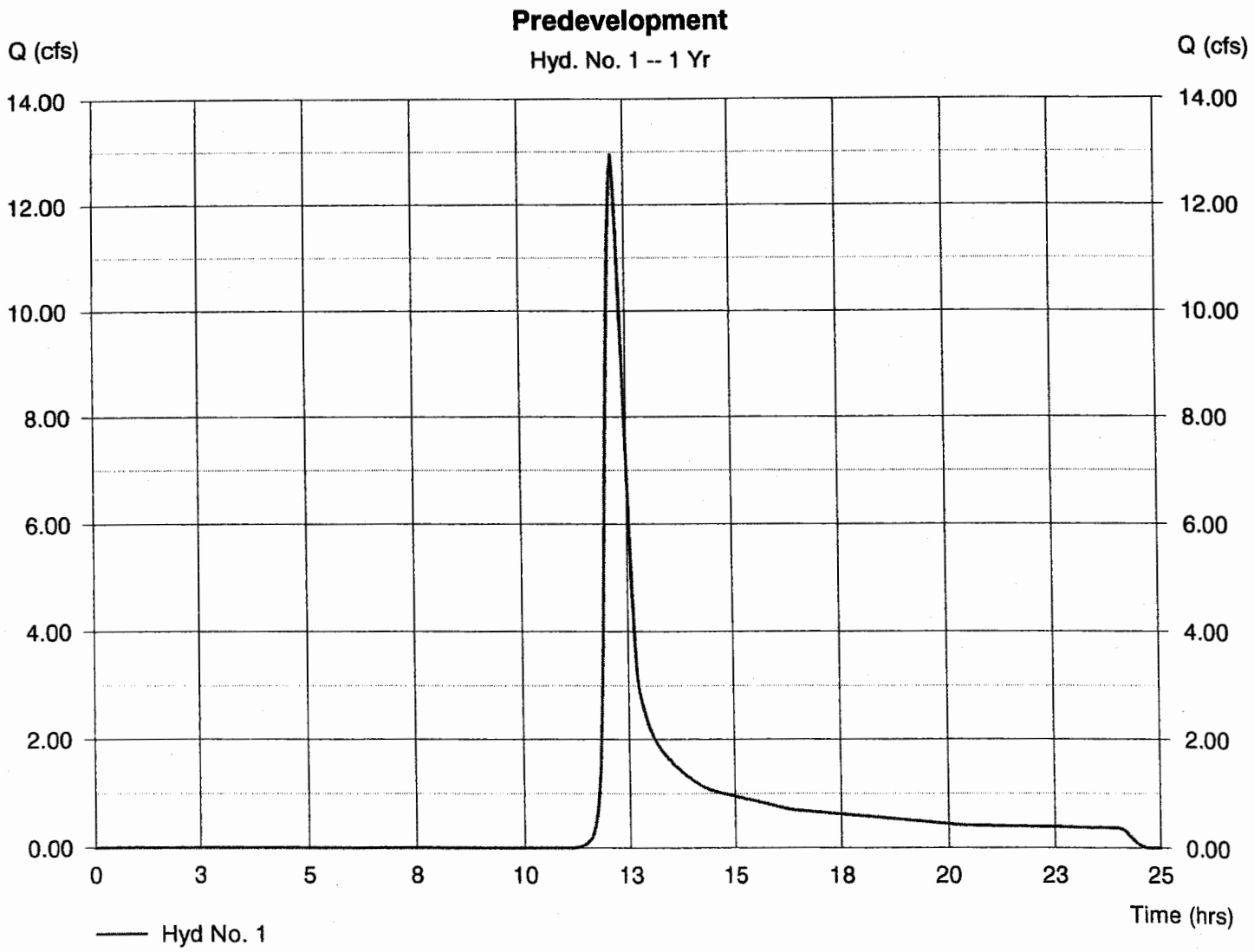
Thursday, Oct 13 2005, 12:54 PM

Hyd. No. 1

Predevelopment

Hydrograph type	= SCS Runoff	Peak discharge	= 12.94 cfs
Storm frequency	= 1 yrs	Time interval	= 3 min
Drainage area	= 18.66 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 56,391 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

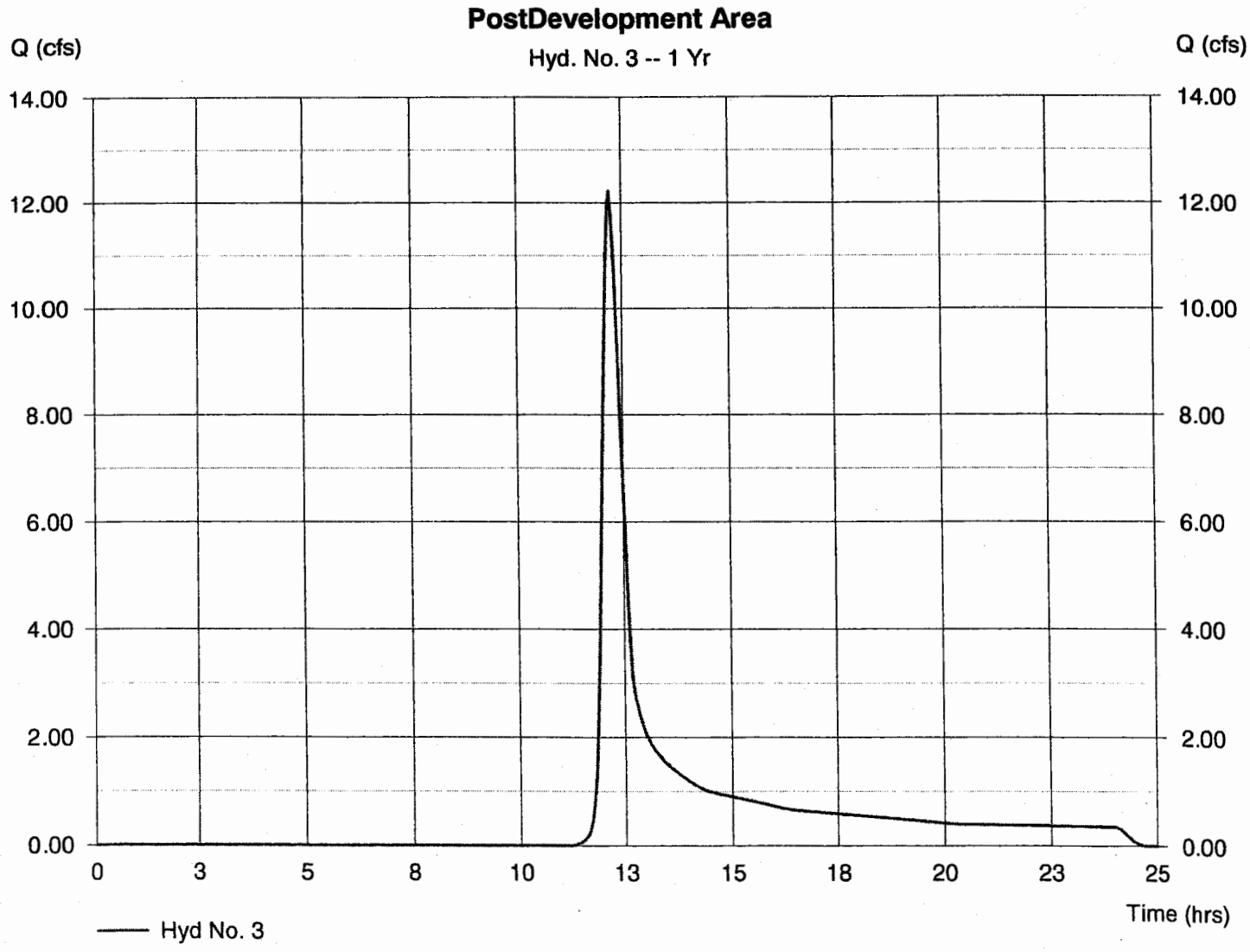
Thursday, Oct 13 2005, 12:54 PM

Hyd. No. 3

PostDevelopment Area

Hydrograph type	= SCS Runoff	Peak discharge	= 12.22 cfs
Storm frequency	= 1 yrs	Time interval	= 3 min
Drainage area	= 17.62 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 53,248 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Oct 13 2005, 12:54 PM

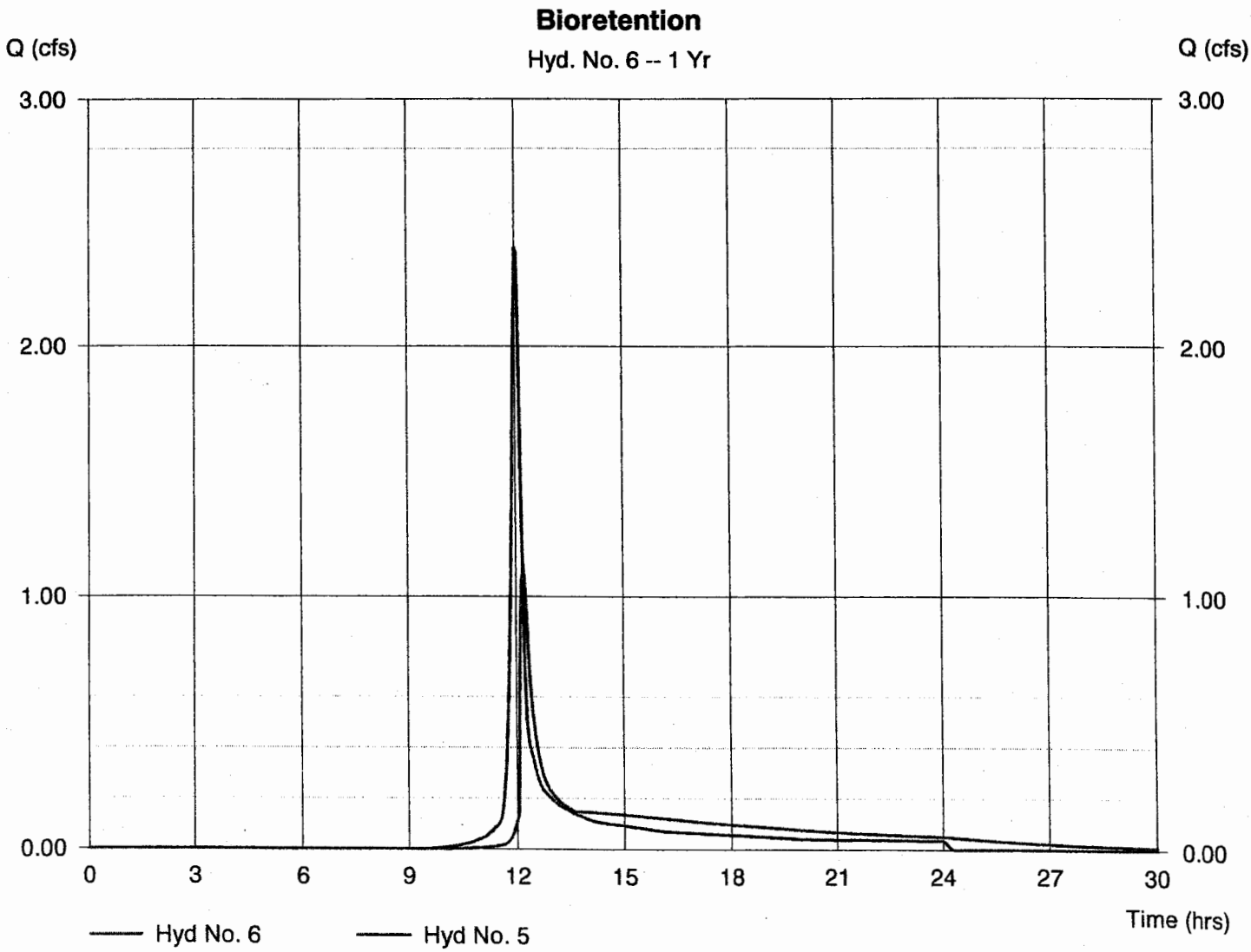
Hyd. No. 6

Bioretention

Hydrograph type	= Reservoir	Peak discharge	= 1.13 cfs
Storm frequency	= 1 yrs	Time interval	= 3 min
Inflow hyd. No.	= 5	Max. Elevation	= 98.62 ft
Reservoir name	= Bioretention	Max. Storage	= 2,406 cuft

Storage Indication method used.

Hydrograph Volume = 6,560 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Oct 13 2005, 12:54 PM

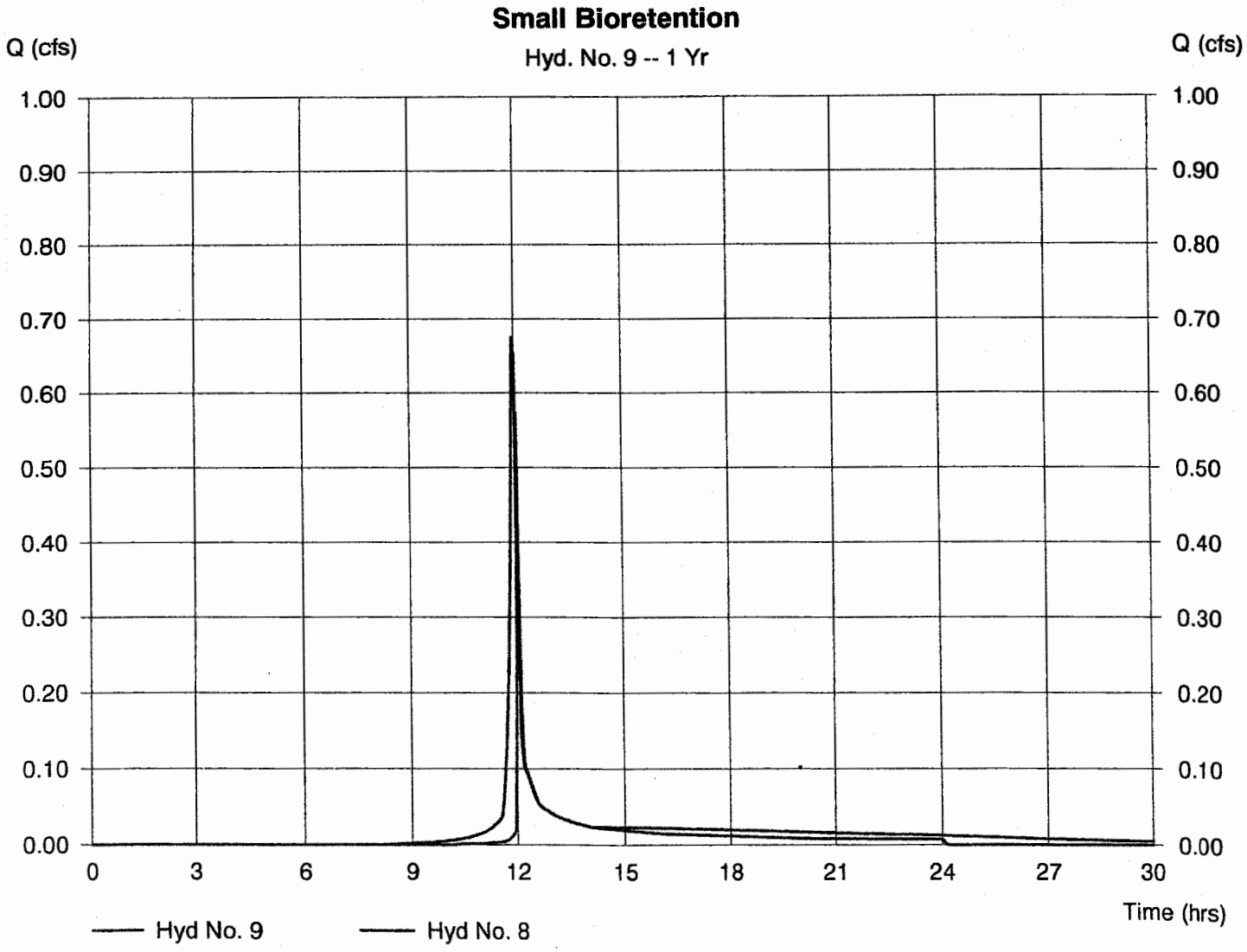
Hyd. No. 9

Small Bioretention

Hydrograph type	=	Reservoir	Peak discharge	=	0.57 cfs
Storm frequency	=	1 yrs	Time interval	=	3 min
Inflow hyd. No.	=	8	Max. Elevation	=	103.54 ft
Reservoir name	=	Small Bioretention	Max. Storage	=	573 cuft

Storage Indication method used.

Hydrograph Volume = 1,502 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Oct 13 2005, 12:54 PM

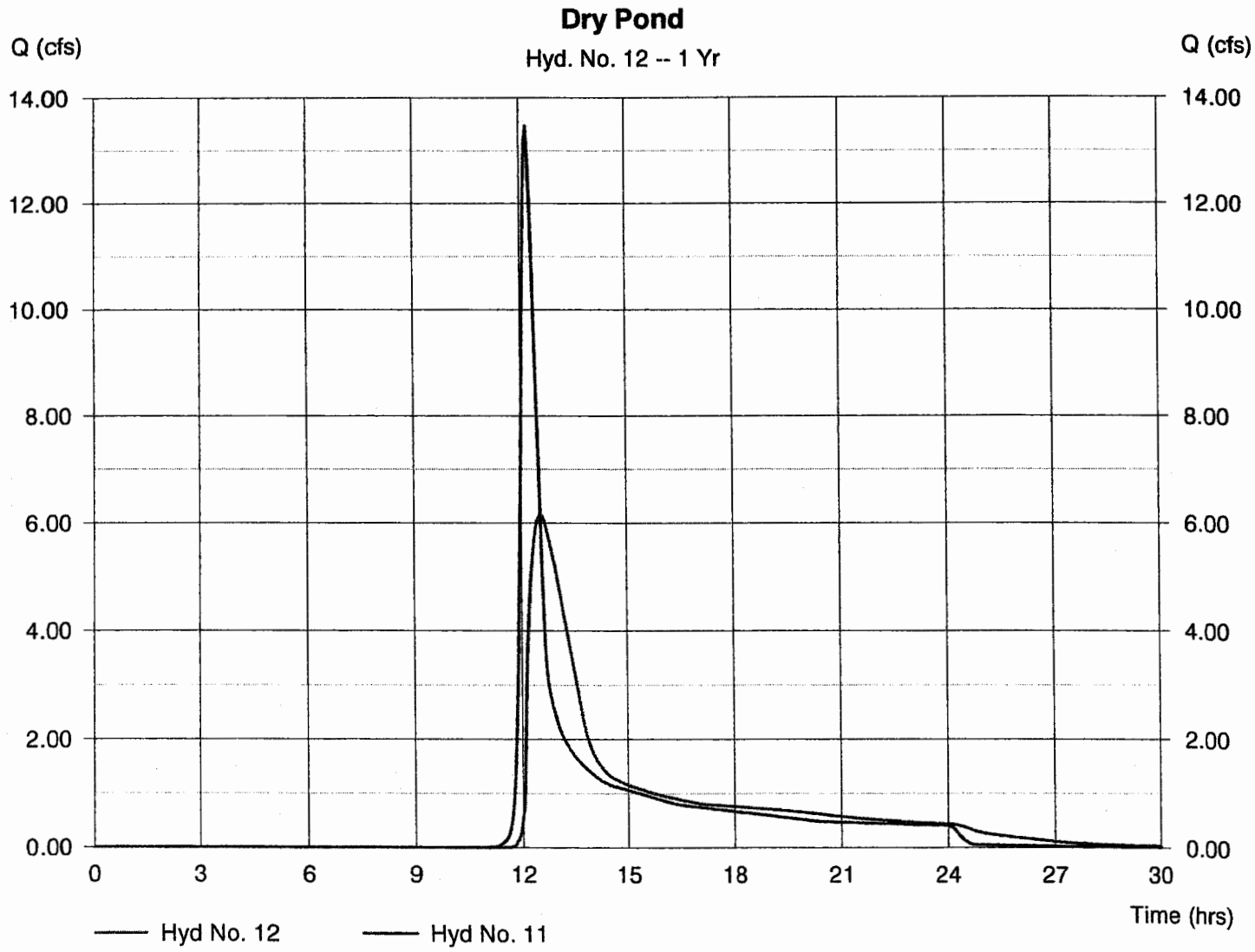
Hyd. No. 12

Dry Pond

Hydrograph type	= Reservoir	Peak discharge	= 6.15 cfs
Storm frequency	= 1 yrs	Time interval	= 3 min
Inflow hyd. No.	= 11	Max. Elevation	= 79.52 ft
Reservoir name	= Dry Pond	Max. Storage	= 15,447 cuft

Storage Indication method used.

Hydrograph Volume = 61,295 cuft



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	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	2.70	3	726	9,564	5	98.73	2,824	Bioretention
8	SCS Runoff	0.94	3	717	2,142	----	------	------	Small Bioretention Area
9	Reservoir	0.93	3	720	2,120	8	103.57	602	Small Bioretention
11	Combine	22.62	3	729	94,948	3, 6, 9,	------	------	Total Area
12	Reservoir	16.09	3	741	94,933	11	80.51	21,316	Dry Pond

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

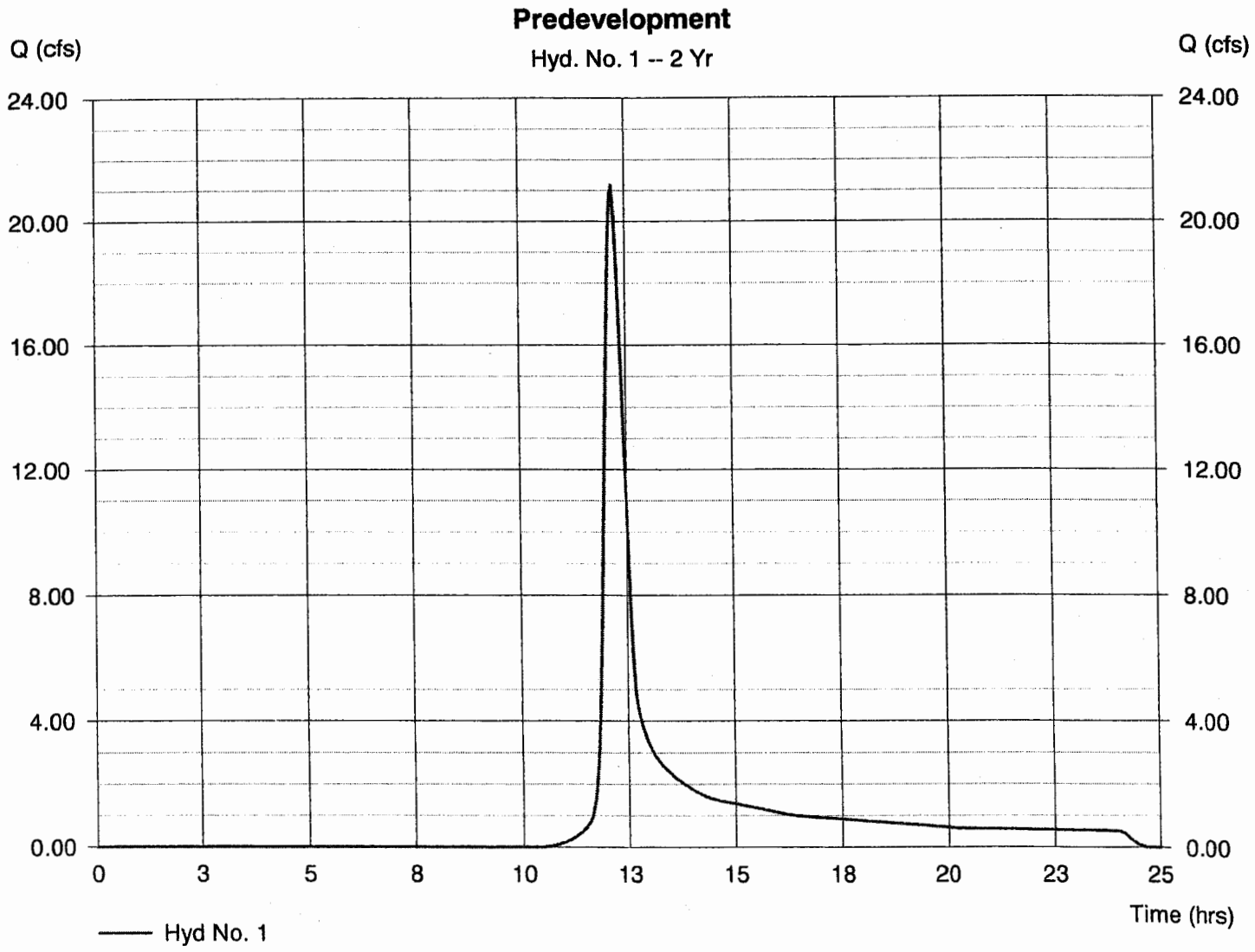
Thursday, Oct 13 2005, 12:54 PM

Hyd. No. 1

Predevelopment

Hydrograph type	= SCS Runoff	Peak discharge	= 21.18 cfs
Storm frequency	= 2 yrs	Time interval	= 3 min
Drainage area	= 18.66 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 88,178 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

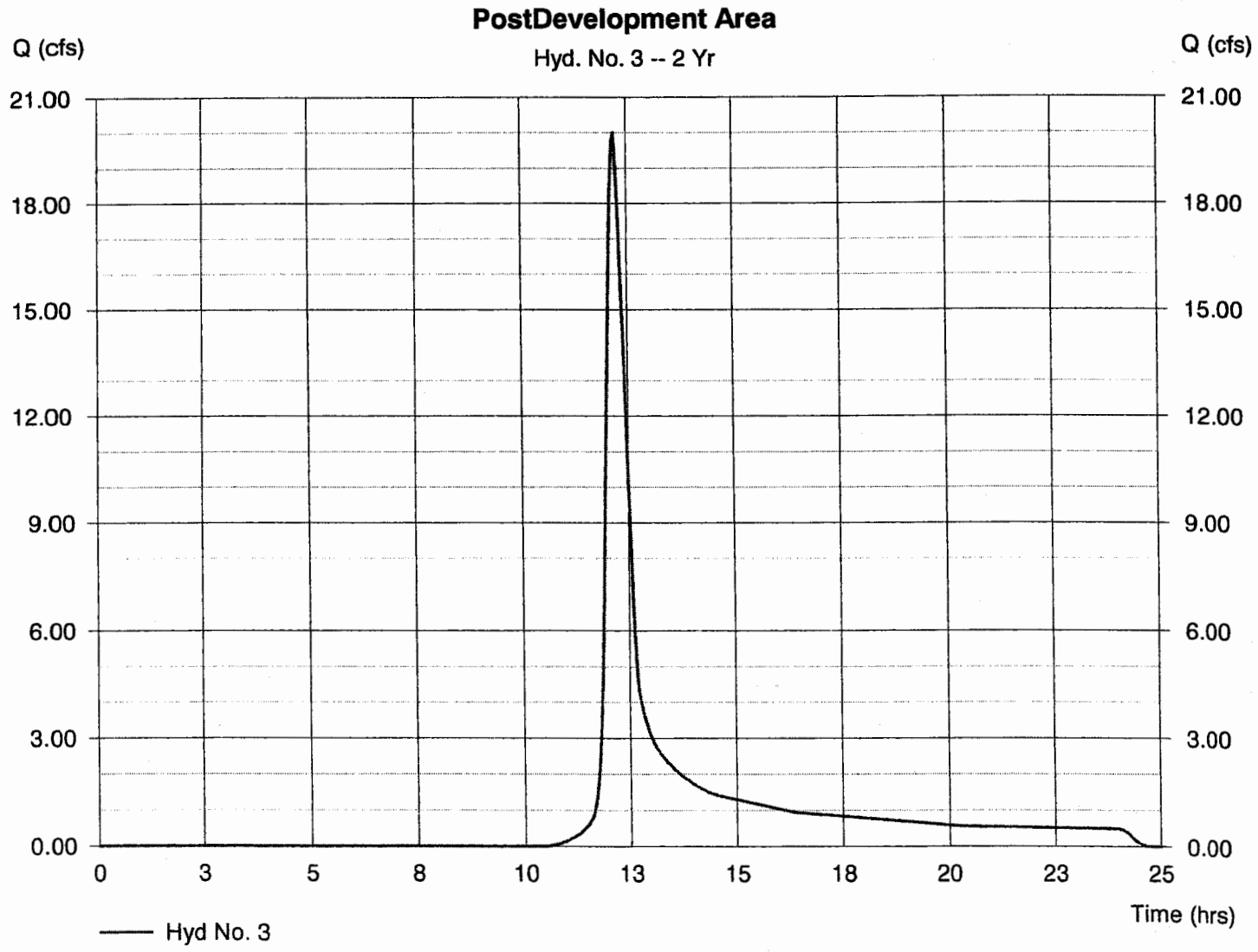
Thursday, Oct 13 2005, 12:54 PM

Hyd. No. 3

PostDevelopment Area

Hydrograph type	= SCS Runoff	Peak discharge	= 20.00 cfs
Storm frequency	= 2 yrs	Time interval	= 3 min
Drainage area	= 17.62 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 83,264 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Oct 13 2005, 12:54 PM

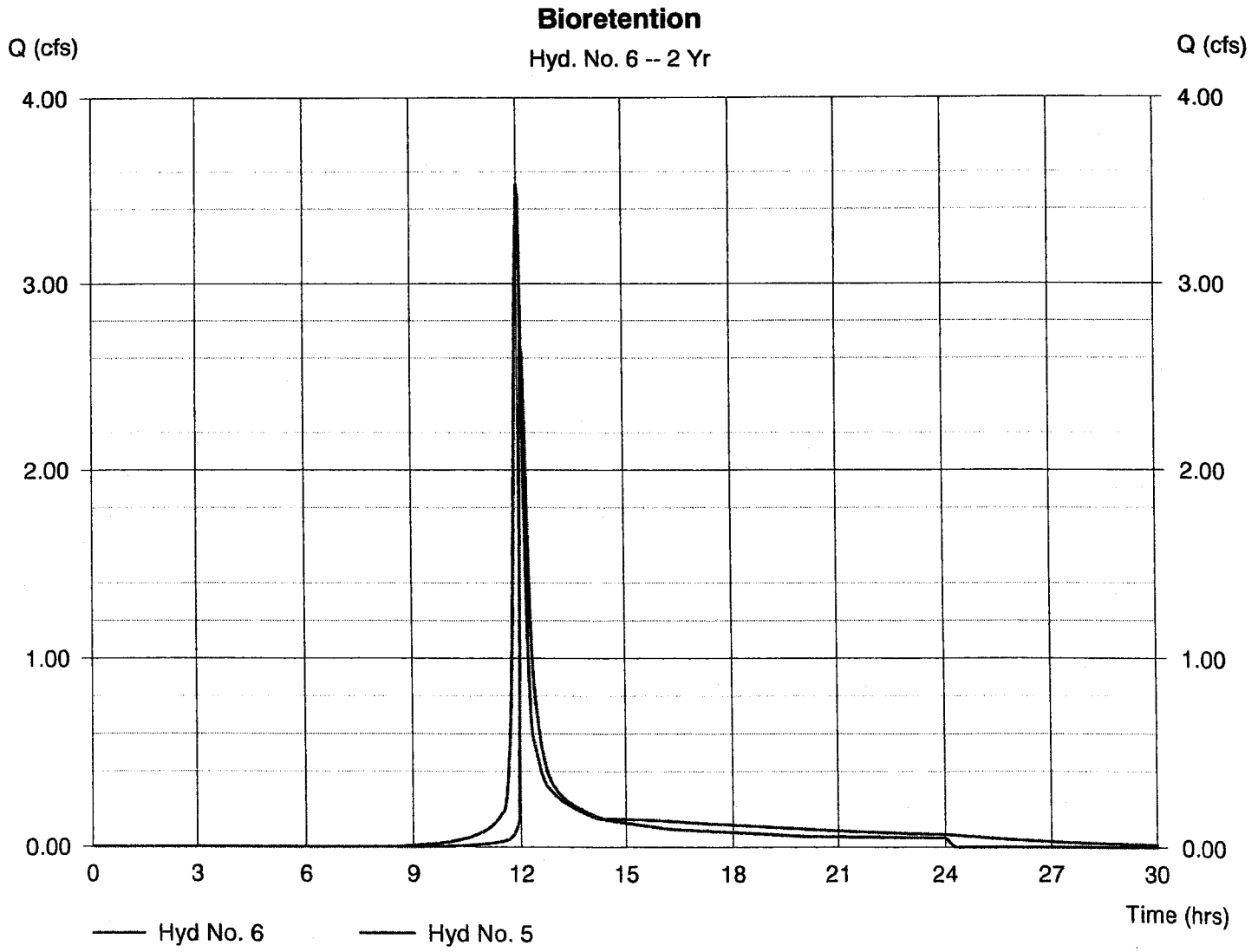
Hyd. No. 6

Bioretention

Hydrograph type	= Reservoir	Peak discharge	= 2.70 cfs
Storm frequency	= 2 yrs	Time interval	= 3 min
Inflow hyd. No.	= 5	Max. Elevation	= 98.73 ft
Reservoir name	= Bioretention	Max. Storage	= 2,824 cuft

Storage Indication method used.

Hydrograph Volume = 9,564 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Oct 13 2005, 12:54 PM

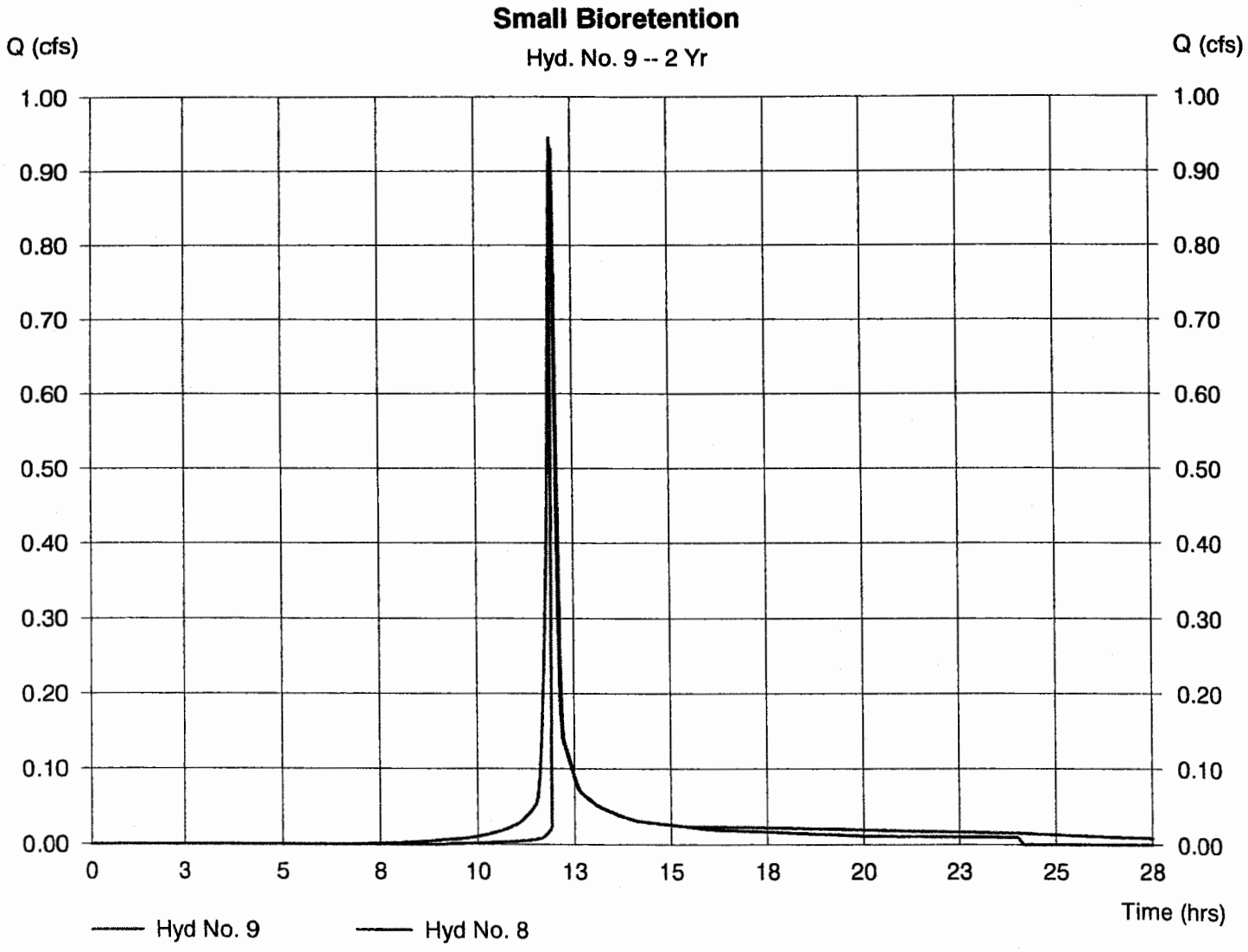
Hyd. No. 9

Small Bioretention

Hydrograph type	= Reservoir	Peak discharge	= 0.93 cfs
Storm frequency	= 2 yrs	Time interval	= 3 min
Inflow hyd. No.	= 8	Max. Elevation	= 103.57 ft
Reservoir name	= Small Bioretention	Max. Storage	= 602 cuft

Storage Indication method used.

Hydrograph Volume = 2,120 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Oct 13 2005, 12:54 PM

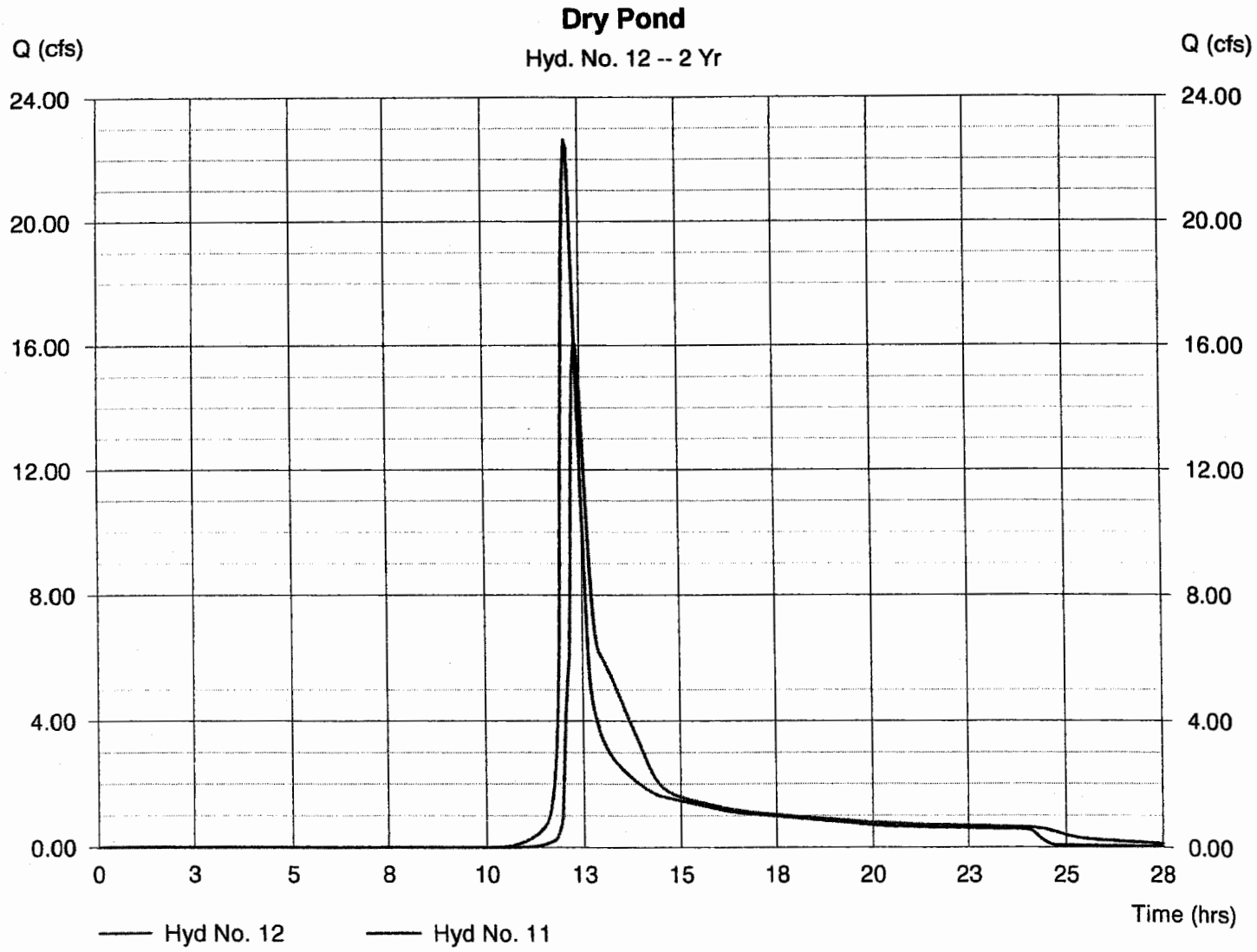
Hyd. No. 12

Dry Pond

Hydrograph type	=	Reservoir	Peak discharge	=	16.09 cfs
Storm frequency	=	2 yrs	Time interval	=	3 min
Inflow hyd. No.	=	11	Max. Elevation	=	80.51 ft
Reservoir name	=	Dry Pond	Max. Storage	=	21,316 cuft

Storage Indication method used.

Hydrograph Volume = 94,933 cuft



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	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	7.04	3	723	20,421	5	98.94	3,662	Bioretention
8	SCS Runoff	1.85	3	717	4,308	----	------	------	Small Bioretention Area
9	Reservoir	1.80	3	717	4,286	8	103.62	655	Small Bioretention
11	Combine	55.67	3	729	223,774	3, 6, 9,	------	------	Total Area
12	Reservoir	51.01	3	735	223,759	11	82.20	33,002	Dry Pond

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

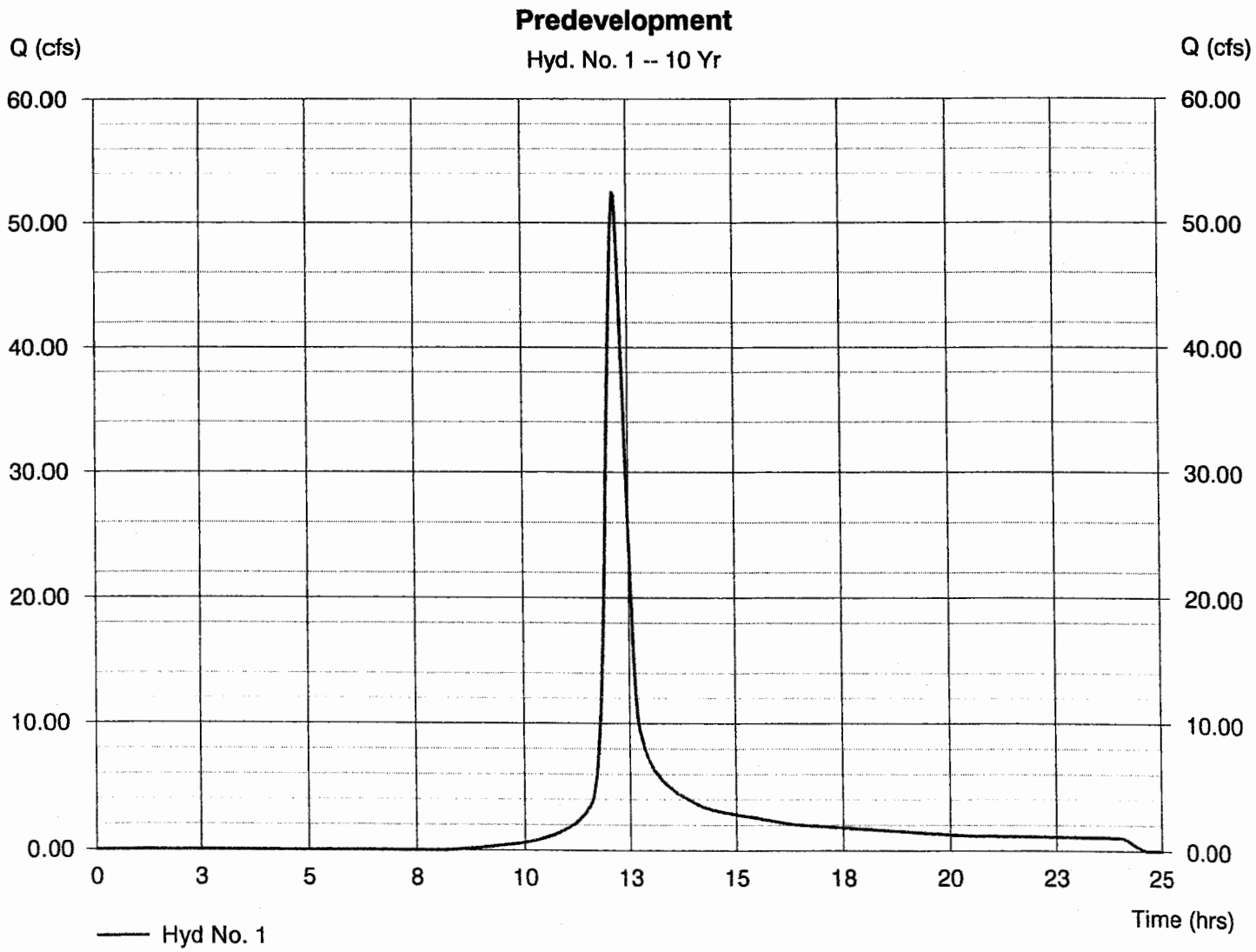
Thursday, Oct 13 2005, 12:54 PM

Hyd. No. 1

Predevelopment

Hydrograph type	= SCS Runoff	Peak discharge	= 52.47 cfs
Storm frequency	= 10 yrs	Time interval	= 3 min
Drainage area	= 18.66 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 210,816 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

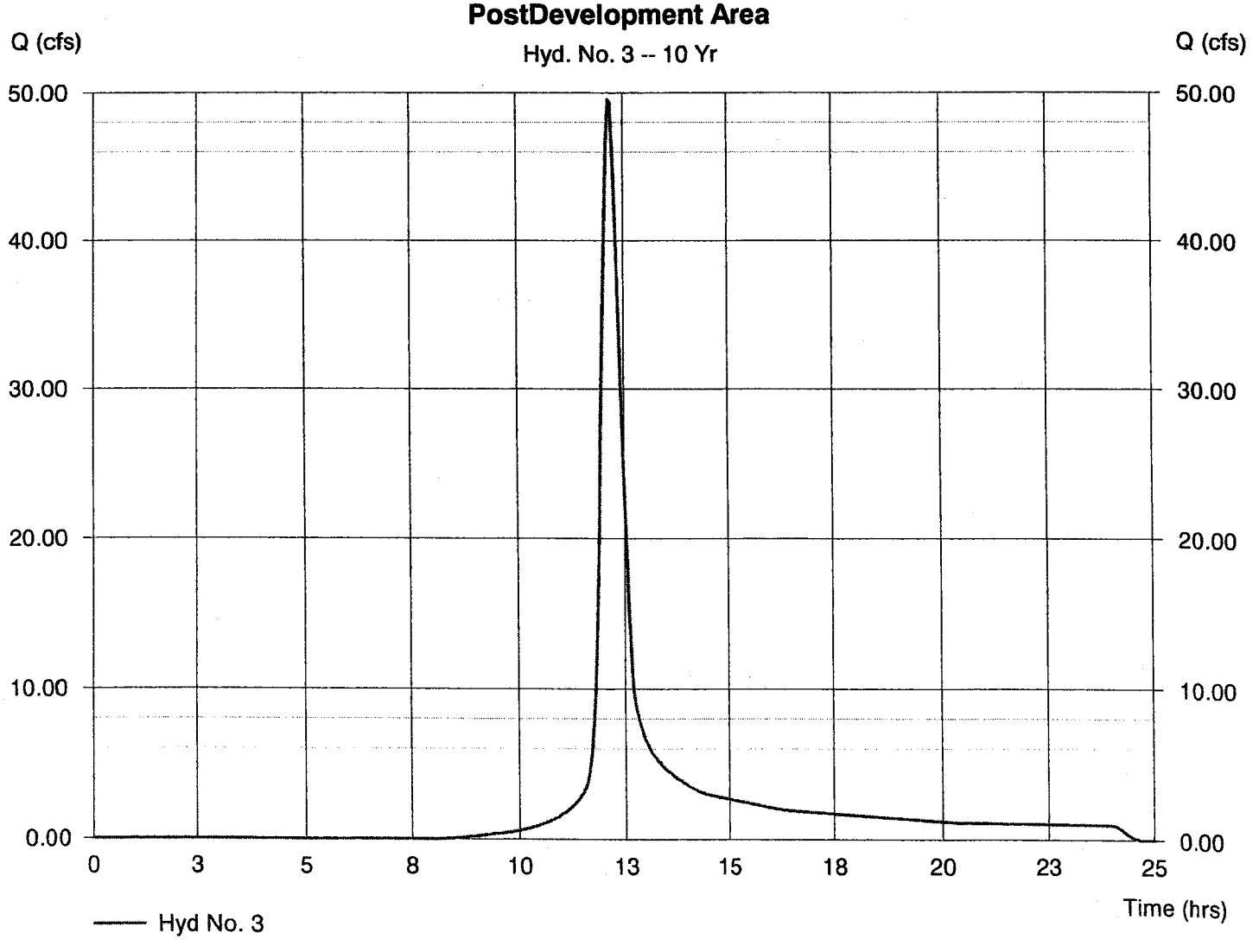
Thursday, Oct 13 2005, 12:54 PM

Hyd. No. 3

PostDevelopment Area

Hydrograph type	= SCS Runoff	Peak discharge	= 49.55 cfs
Storm frequency	= 10 yrs	Time interval	= 3 min
Drainage area	= 17.62 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 199,067 cuft



Hydrograph Plot

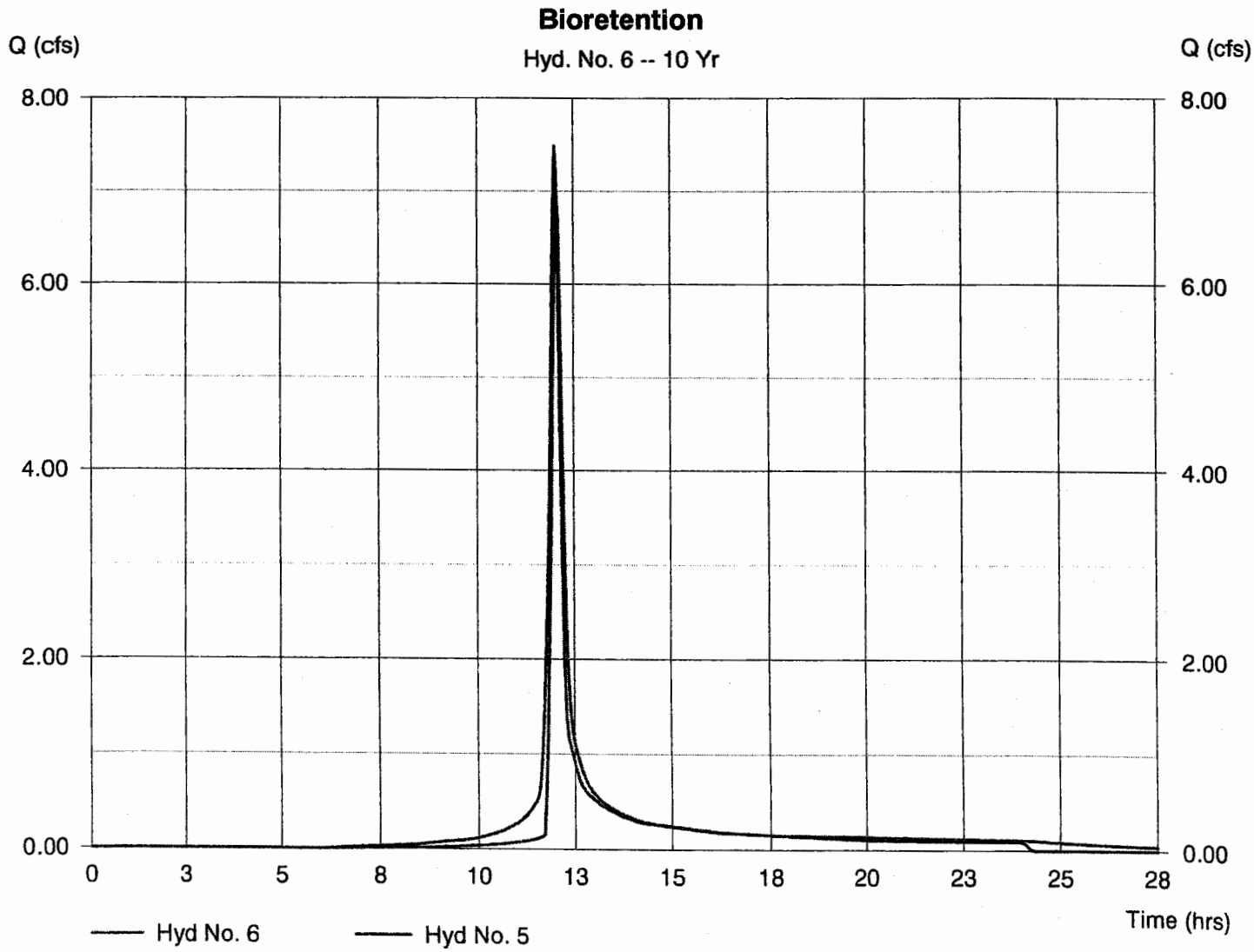
Hydraflow Hydrographs by Intelisolve | Thursday, Oct 13 2005, 12:54 PM

Hyd. No. 6

Bioretention

Hydrograph type	= Reservoir	Peak discharge	= 7.04 cfs
Storm frequency	= 10 yrs	Time interval	= 3 min
Inflow hyd. No.	= 5	Max. Elevation	= 98.94 ft
Reservoir name	= Bioretention	Max. Storage	= 3,662 cuft

Storage Indication method used. | Hydrograph Volume = 20,421 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Oct 13 2005, 12:54 PM

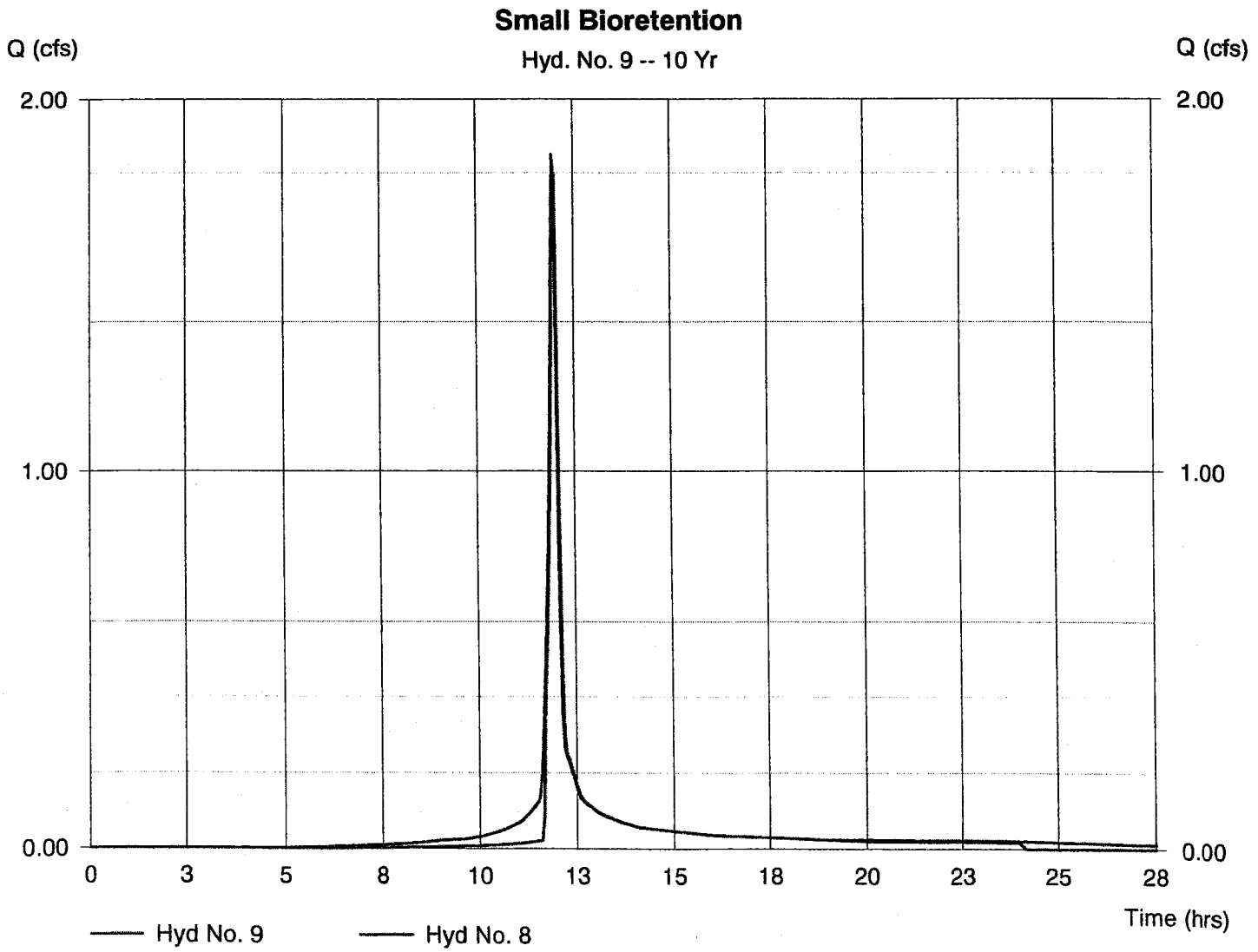
Hyd. No. 9

Small Bioretention

Hydrograph type	= Reservoir	Peak discharge	= 1.80 cfs
Storm frequency	= 10 yrs	Time interval	= 3 min
Inflow hyd. No.	= 8	Max. Elevation	= 103.62 ft
Reservoir name	= Small Bioretention	Max. Storage	= 655 cuft

Storage Indication method used.

Hydrograph Volume = 4,286 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Oct 13 2005, 12:54 PM

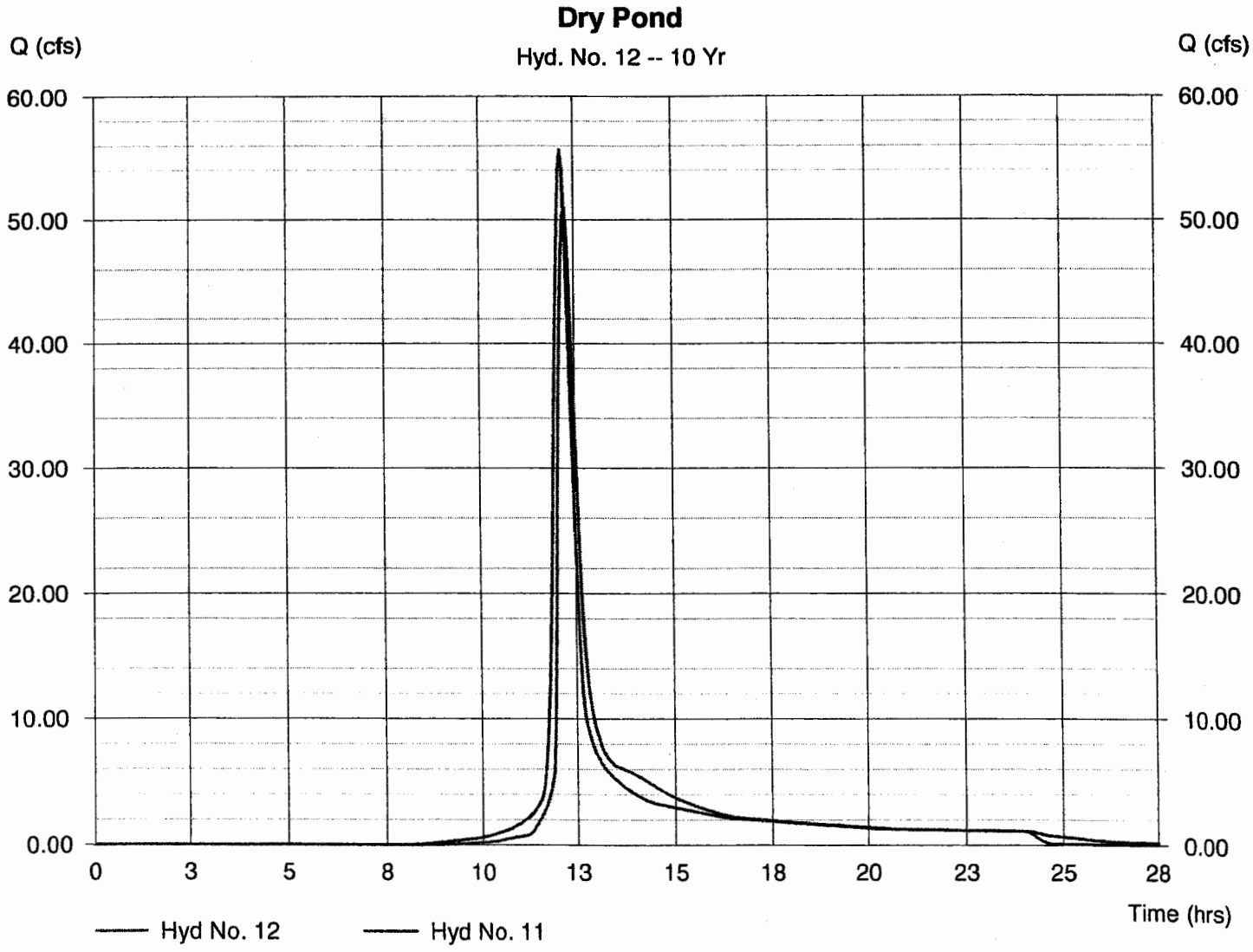
Hyd. No. 12

Dry Pond

Hydrograph type	= Reservoir	Peak discharge	= 51.01 cfs
Storm frequency	= 10 yrs	Time interval	= 3 min
Inflow hyd. No.	= 11	Max. Elevation	= 82.20 ft
Reservoir name	= Dry Pond	Max. Storage	= 33,002 cuft

Storage Indication method used.

Hydrograph Volume = 223,759 cuft



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	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	8.07	3	723	23,393	5	98.99	3,833	Bioretention
8	SCS Runoff	2.09	3	717	4,891	----	------	------	Small Bioretention Area
9	Reservoir	2.03	3	720	4,869	8	103.63	666	Small Bioretention
11	Combine	64.81	3	729	260,150	3, 6, 9,	------	------	Total Area
12	Reservoir	64.16	3	732	260,135	11	82.38	34,477	Dry Pond

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

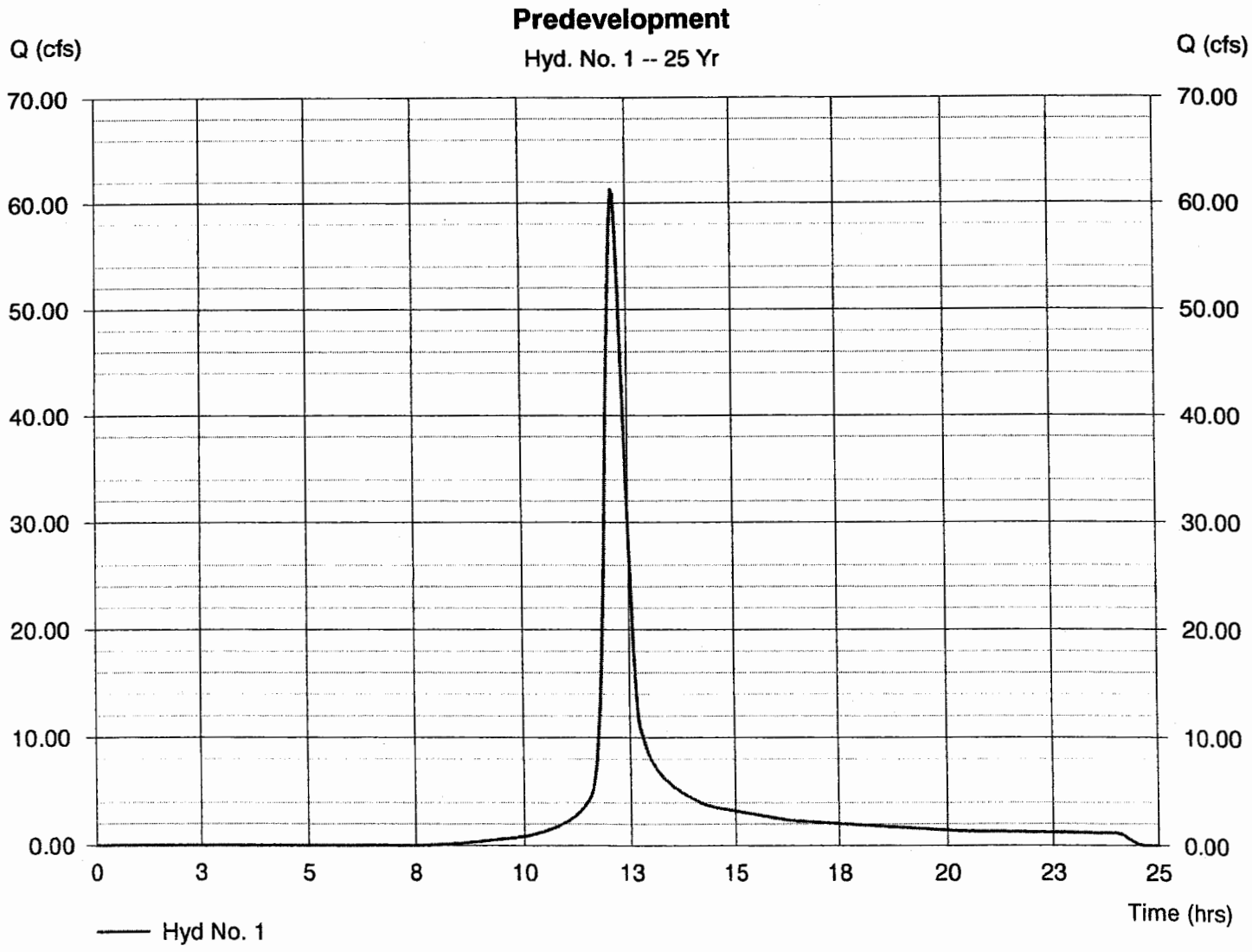
Thursday, Oct 13 2005, 12:54 PM

Hyd. No. 1

Predevelopment

Hydrograph type	= SCS Runoff	Peak discharge	= 61.27 cfs
Storm frequency	= 25 yrs	Time interval	= 3 min
Drainage area	= 18.66 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29 min
Total precip.	= 6.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 245,576 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

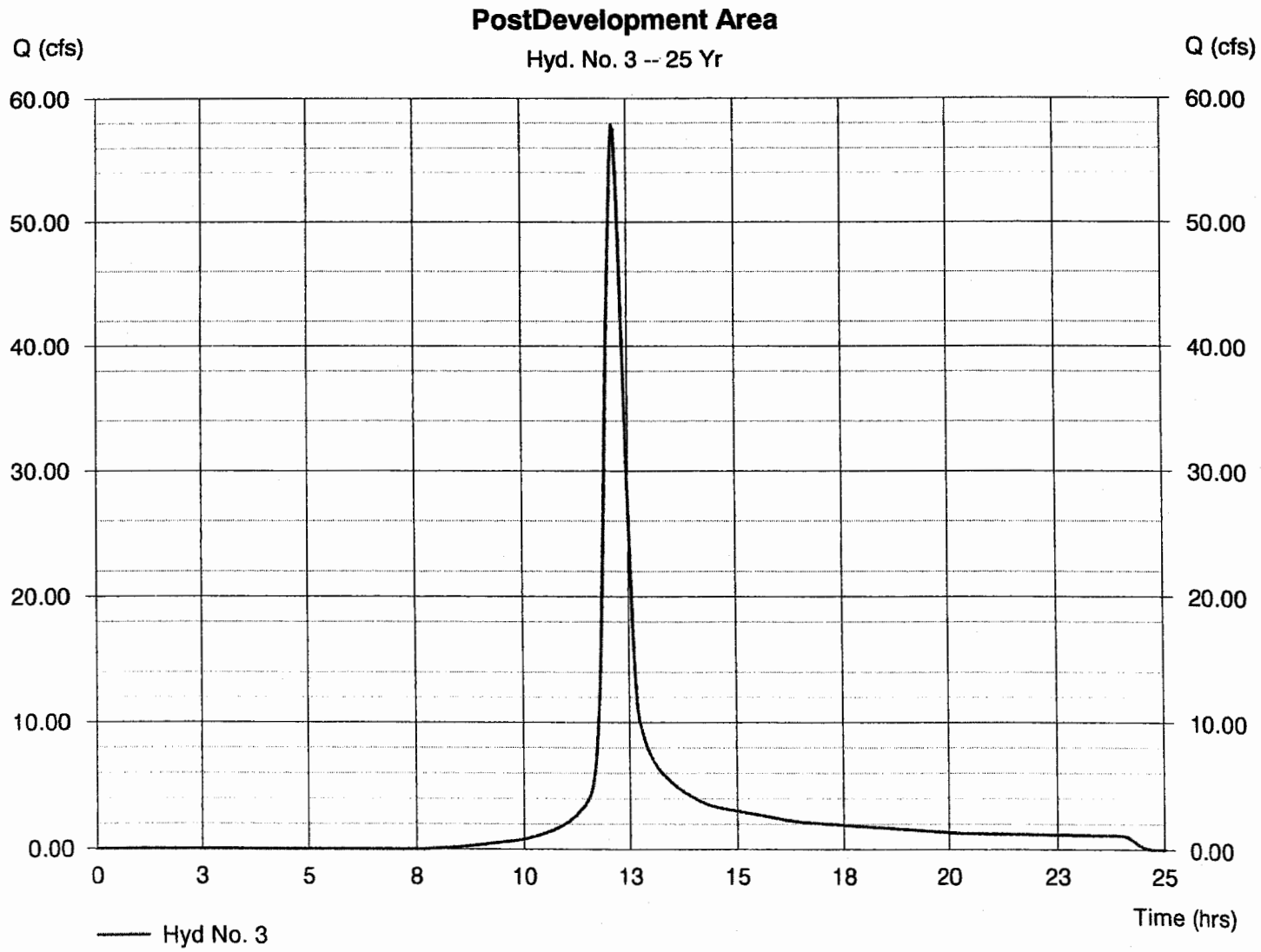
Thursday, Oct 13 2005, 12:54 PM

Hyd. No. 3

PostDevelopment Area

Hydrograph type	= SCS Runoff	Peak discharge	= 57.86 cfs
Storm frequency	= 25 yrs	Time interval	= 3 min
Drainage area	= 17.62 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29 min
Total precip.	= 6.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 231,889 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Oct 13 2005, 12:54 PM

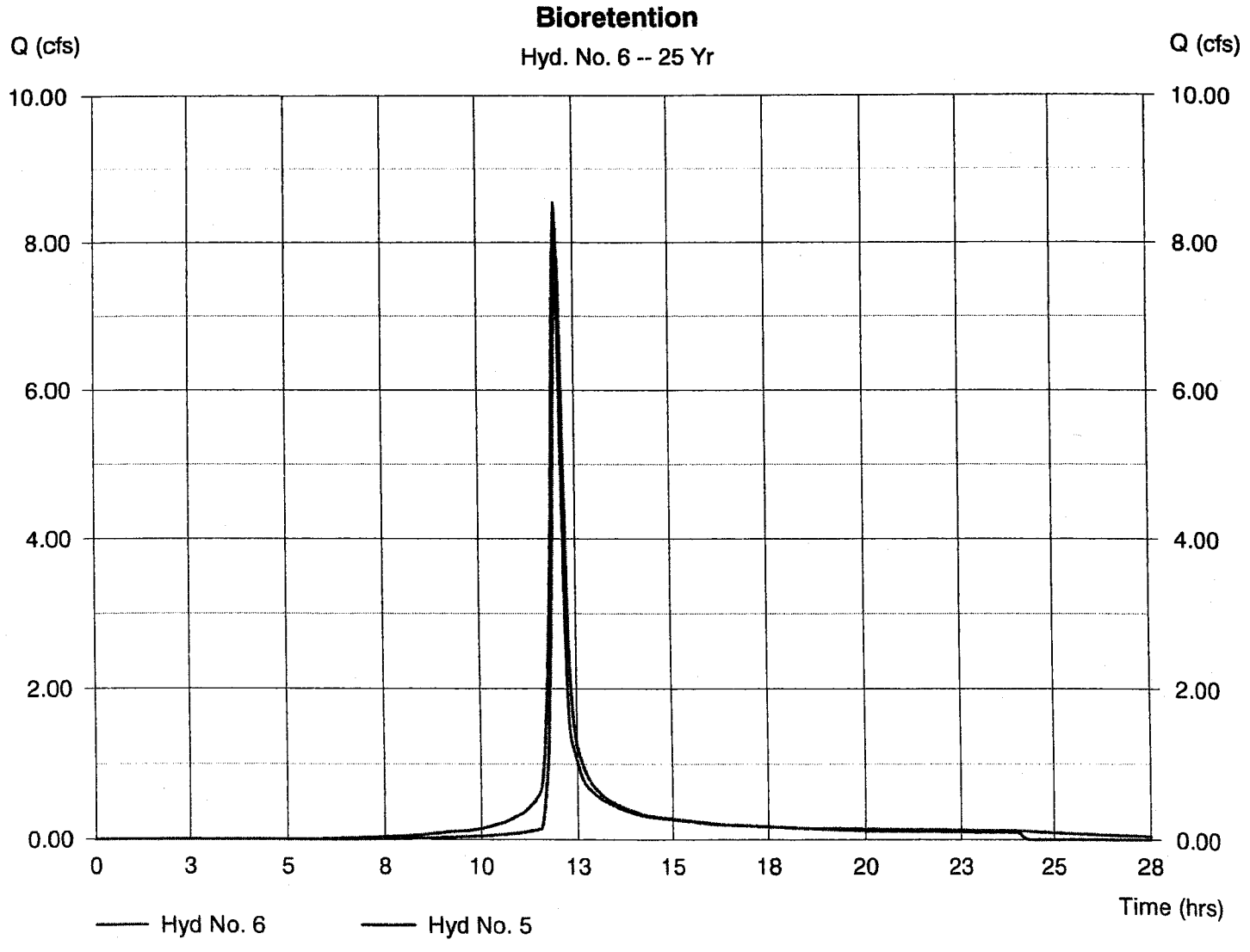
Hyd. No. 6

Bioretention

Hydrograph type	= Reservoir	Peak discharge	= 8.07 cfs
Storm frequency	= 25 yrs	Time interval	= 3 min
Inflow hyd. No.	= 5	Max. Elevation	= 98.99 ft
Reservoir name	= Bioretention	Max. Storage	= 3,833 cuft

Storage Indication method used.

Hydrograph Volume = 23,393 cuft



Hydrograph Plot

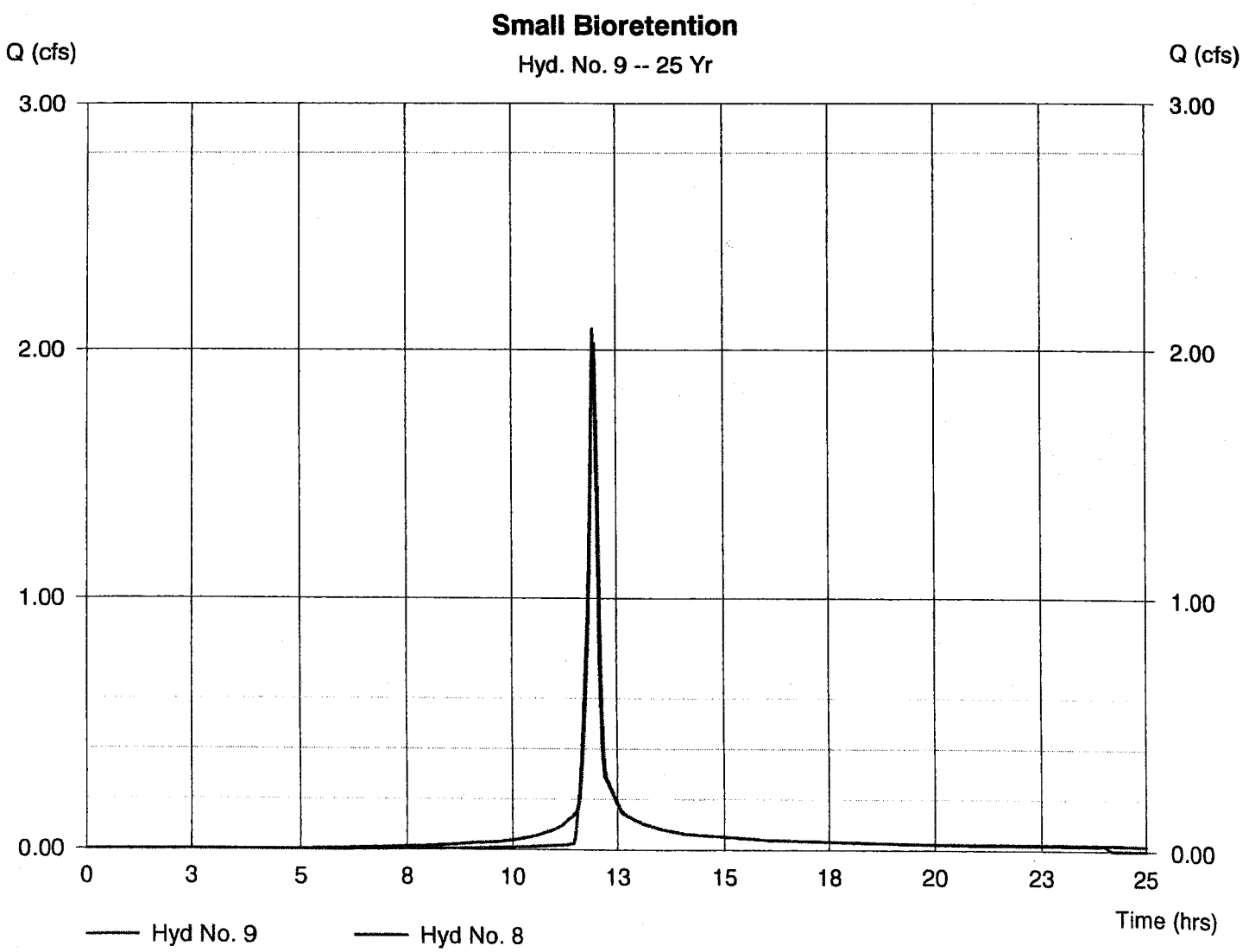
Hydraflow Hydrographs by Intelisolve | Thursday, Oct 13 2005, 12:54 PM

Hyd. No. 9

Small Bioretention

Hydrograph type	= Reservoir	Peak discharge	= 2.03 cfs
Storm frequency	= 25 yrs	Time interval	= 3 min
Inflow hyd. No.	= 8	Max. Elevation	= 103.63 ft
Reservoir name	= Small Bioretention	Max. Storage	= 666 cuft

Storage Indication method used. | Hydrograph Volume = 4,869 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Oct 13 2005, 12:54 PM

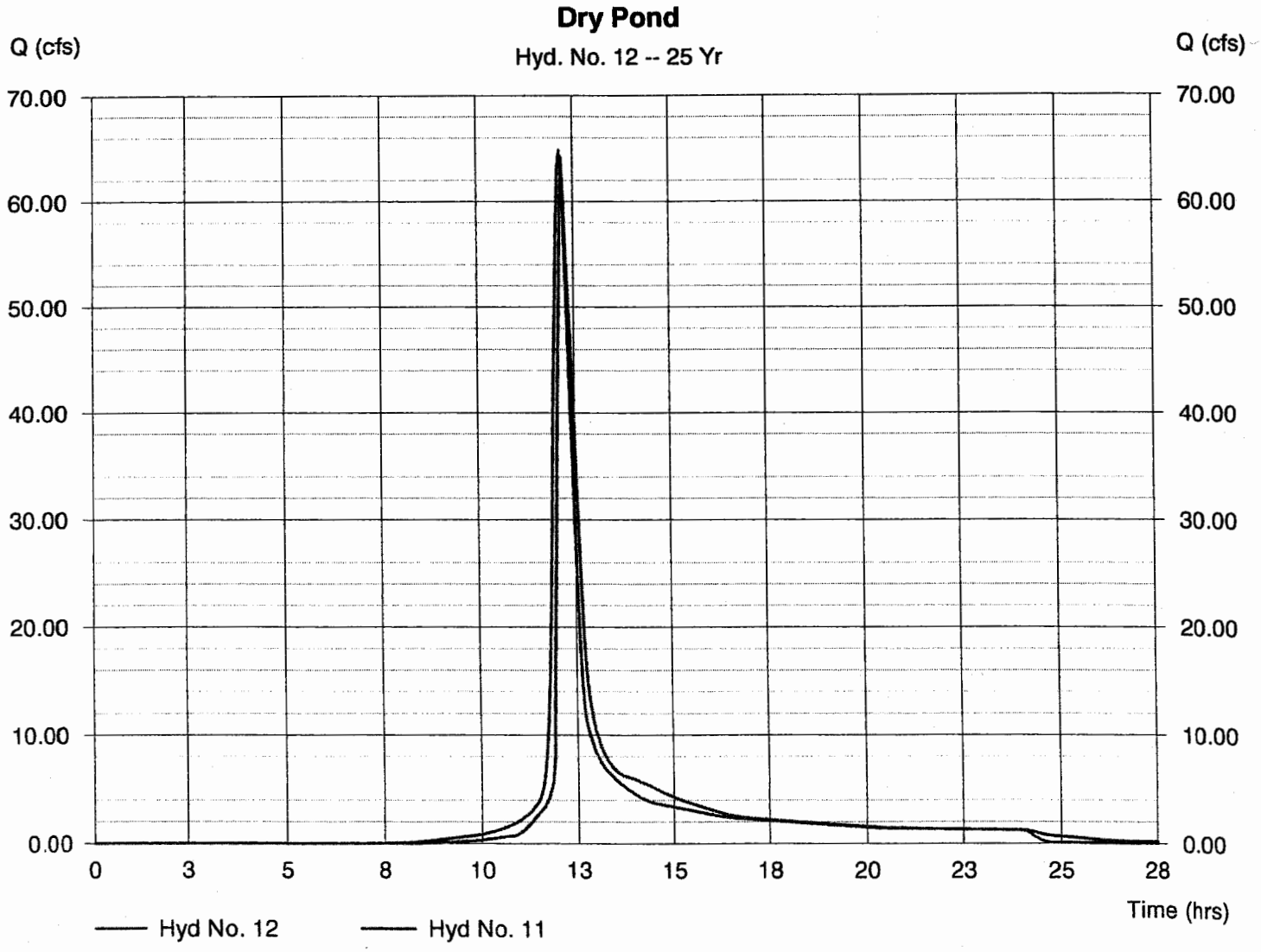
Hyd. No. 12

Dry Pond

Hydrograph type	=	Reservoir	Peak discharge	=	64.16 cfs
Storm frequency	=	25 yrs	Time interval	=	3 min
Inflow hyd. No.	=	11	Max. Elevation	=	82.38 ft
Reservoir name	=	Dry Pond	Max. Storage	=	34,477 cuft

Storage Indication method used.

Hydrograph Volume = 260,135 cuft



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	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	10.86	3	723	31,468	5	99.09	4,249	Bioretention
8	SCS Runoff	2.71	3	717	6,464	----	------	------	Small Bioretention Area
9	Reservoir	2.63	3	720	6,442	8	103.66	693	Small Bioretention
11	Combine	89.51	3	729	360,378	3, 6, 9,	------	------	Total Area
12	Reservoir	88.74	3	729	360,363	11	82.56	35,831	Dry Pond

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

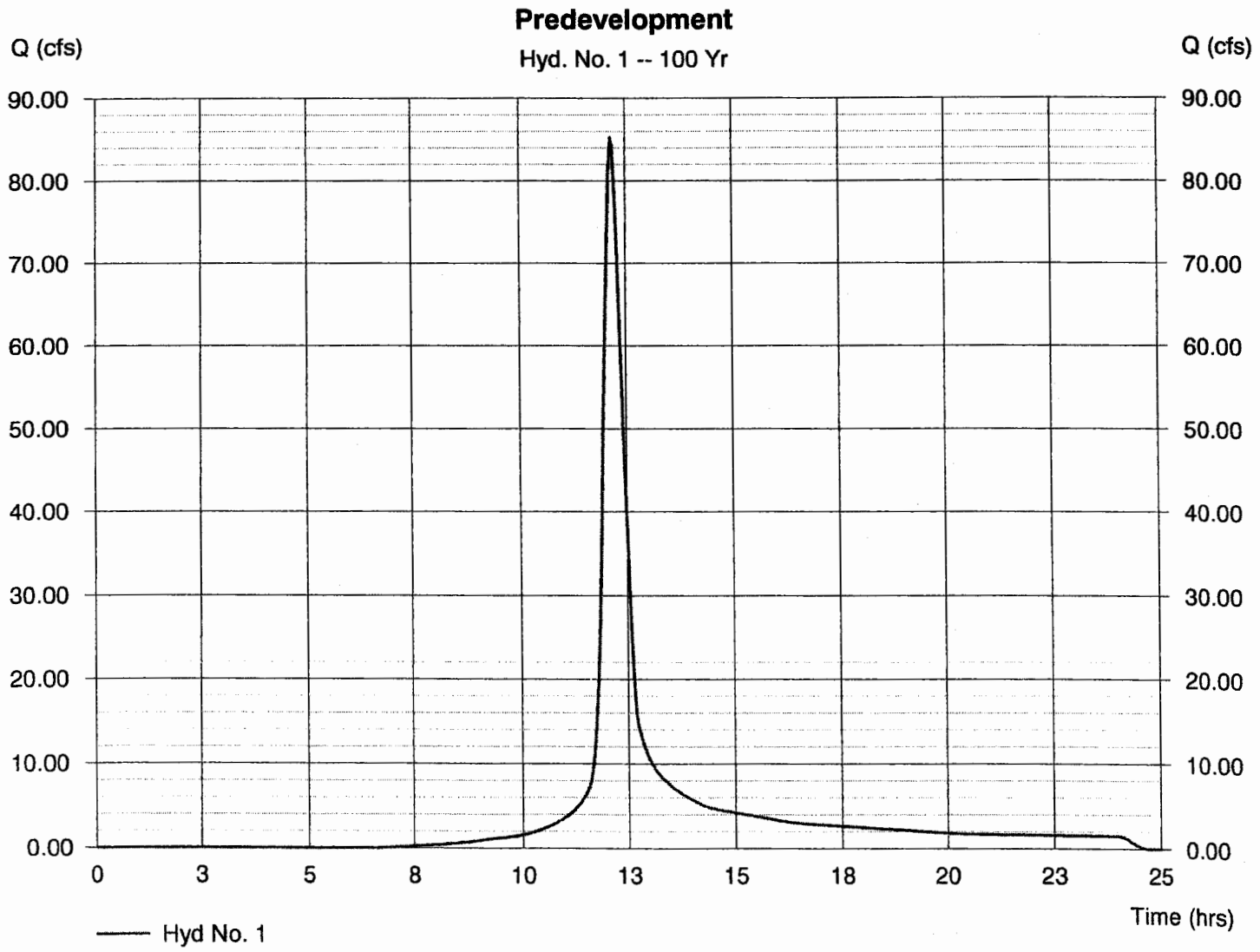
Thursday, Oct 13 2005, 12:54 PM

Hyd. No. 1

Predevelopment

Hydrograph type	= SCS Runoff	Peak discharge	= 85.25 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Drainage area	= 18.66 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 341,501 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

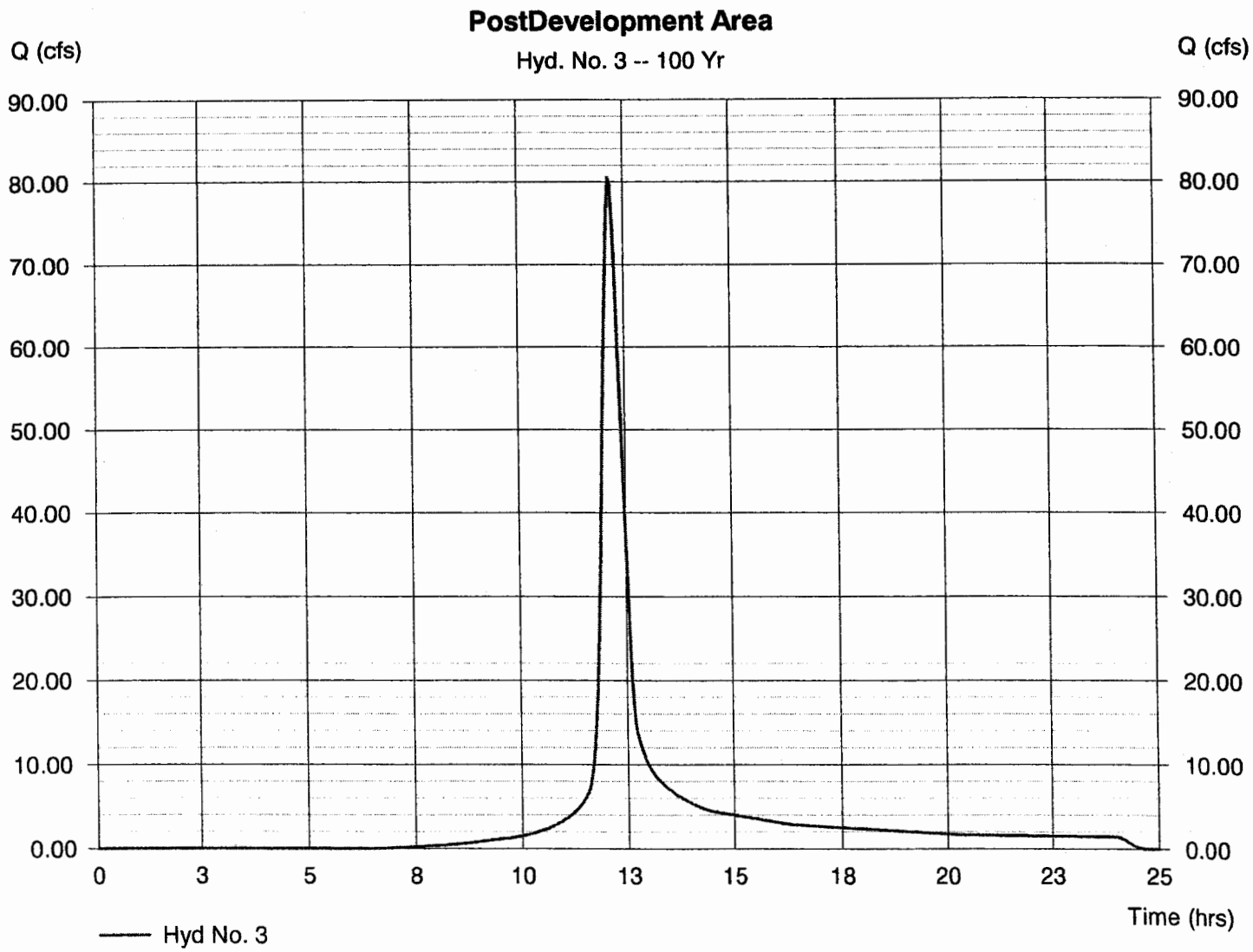
Thursday, Oct 13 2005, 12:54 PM

Hyd. No. 3

PostDevelopment Area

Hydrograph type	= SCS Runoff	Peak discharge	= 80.50 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Drainage area	= 17.62 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 29 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 322,468 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Oct 13 2005, 12:54 PM

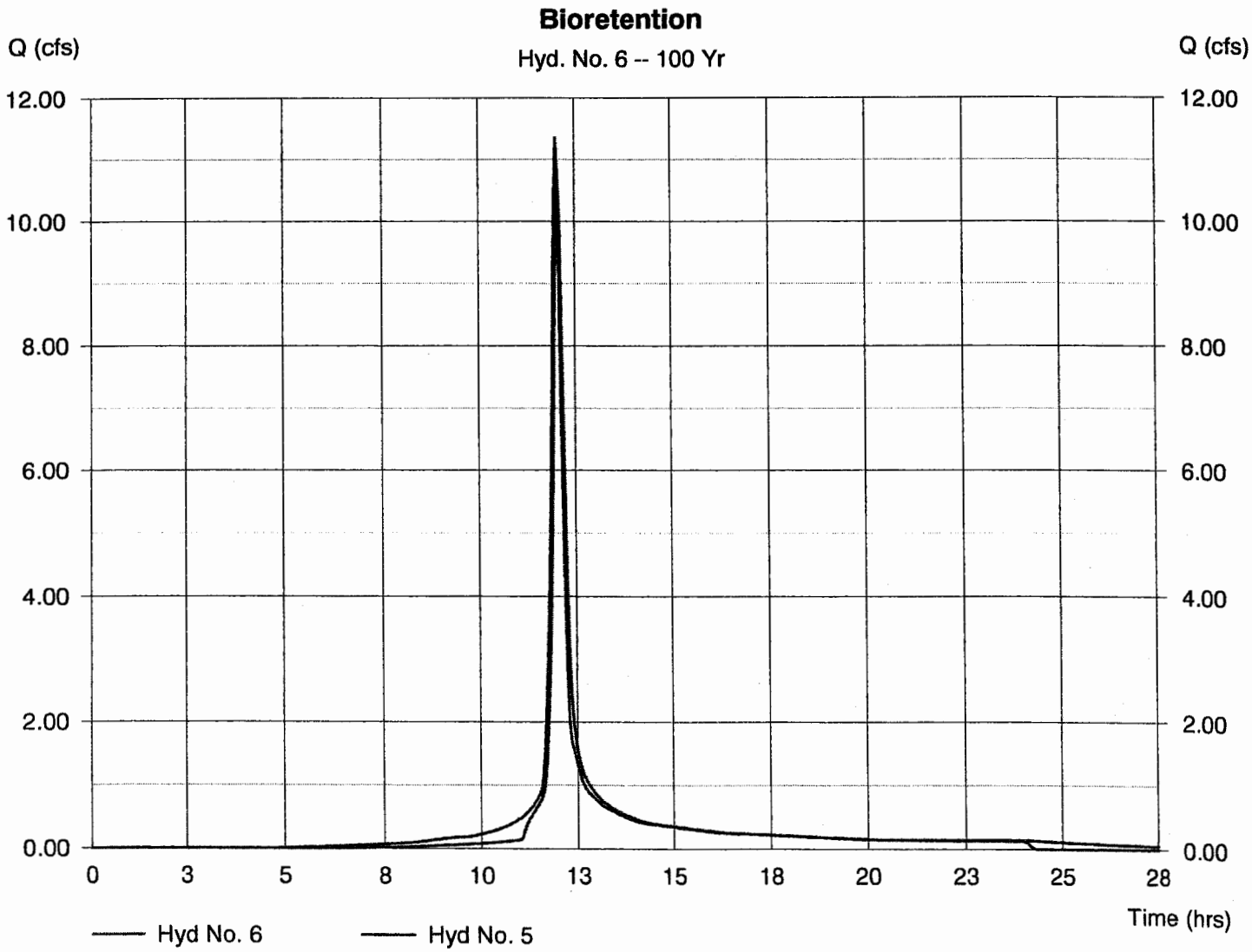
Hyd. No. 6

Bioretention

Hydrograph type	=	Reservoir	Peak discharge	=	10.86 cfs
Storm frequency	=	100 yrs	Time interval	=	3 min
Inflow hyd. No.	=	5	Max. Elevation	=	99.09 ft
Reservoir name	=	Bioretention	Max. Storage	=	4,249 cuft

Storage Indication method used.

Hydrograph Volume = 31,468 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Oct 13 2005, 12:54 PM

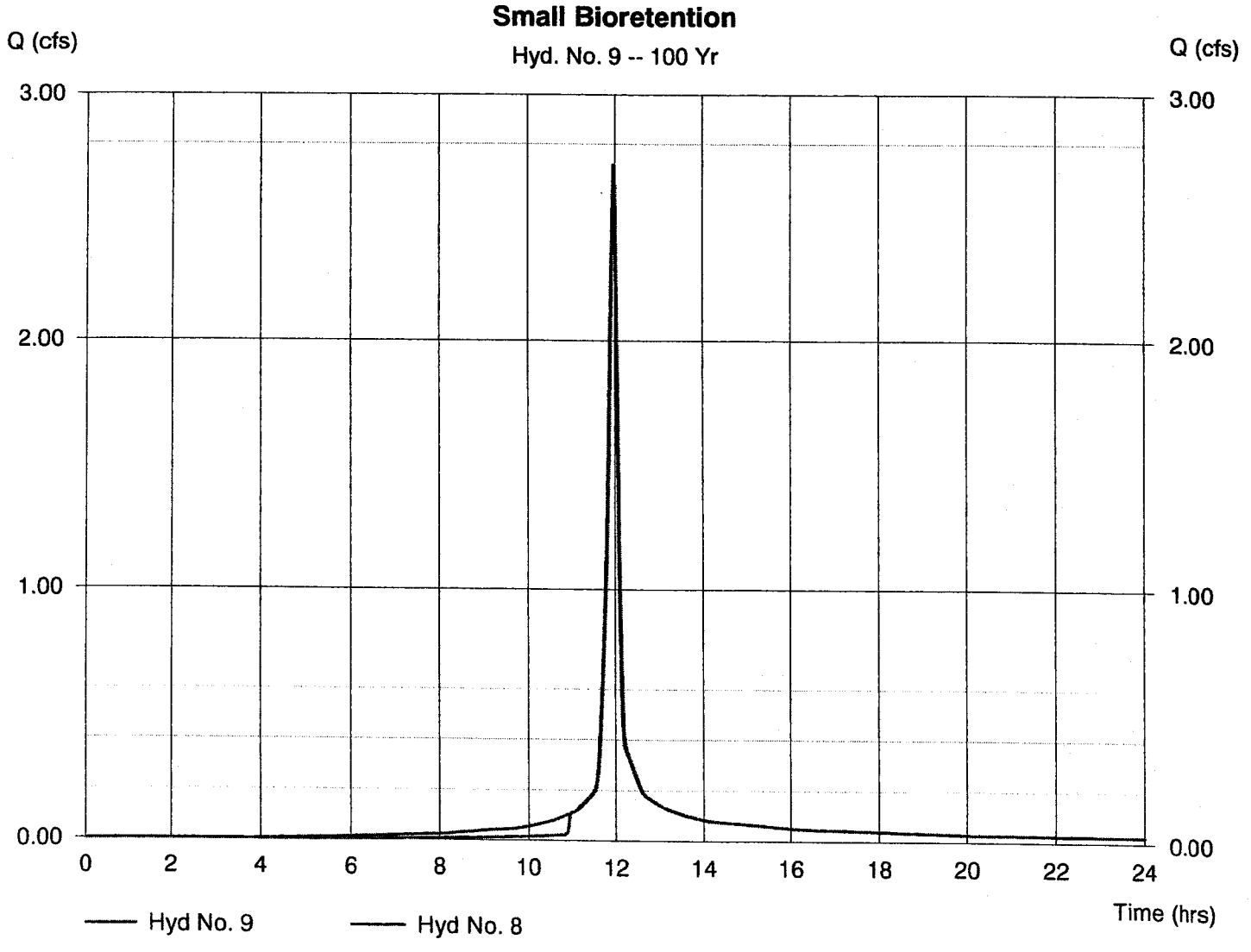
Hyd. No. 9

Small Bioretention

Hydrograph type	=	Reservoir	Peak discharge	=	2.63 cfs
Storm frequency	=	100 yrs	Time interval	=	3 min
Inflow hyd. No.	=	8	Max. Elevation	=	103.66 ft
Reservoir name	=	Small Bioretention	Max. Storage	=	693 cuft

Storage Indication method used.

Hydrograph Volume = 6,442 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Oct 13 2005, 12:54 PM

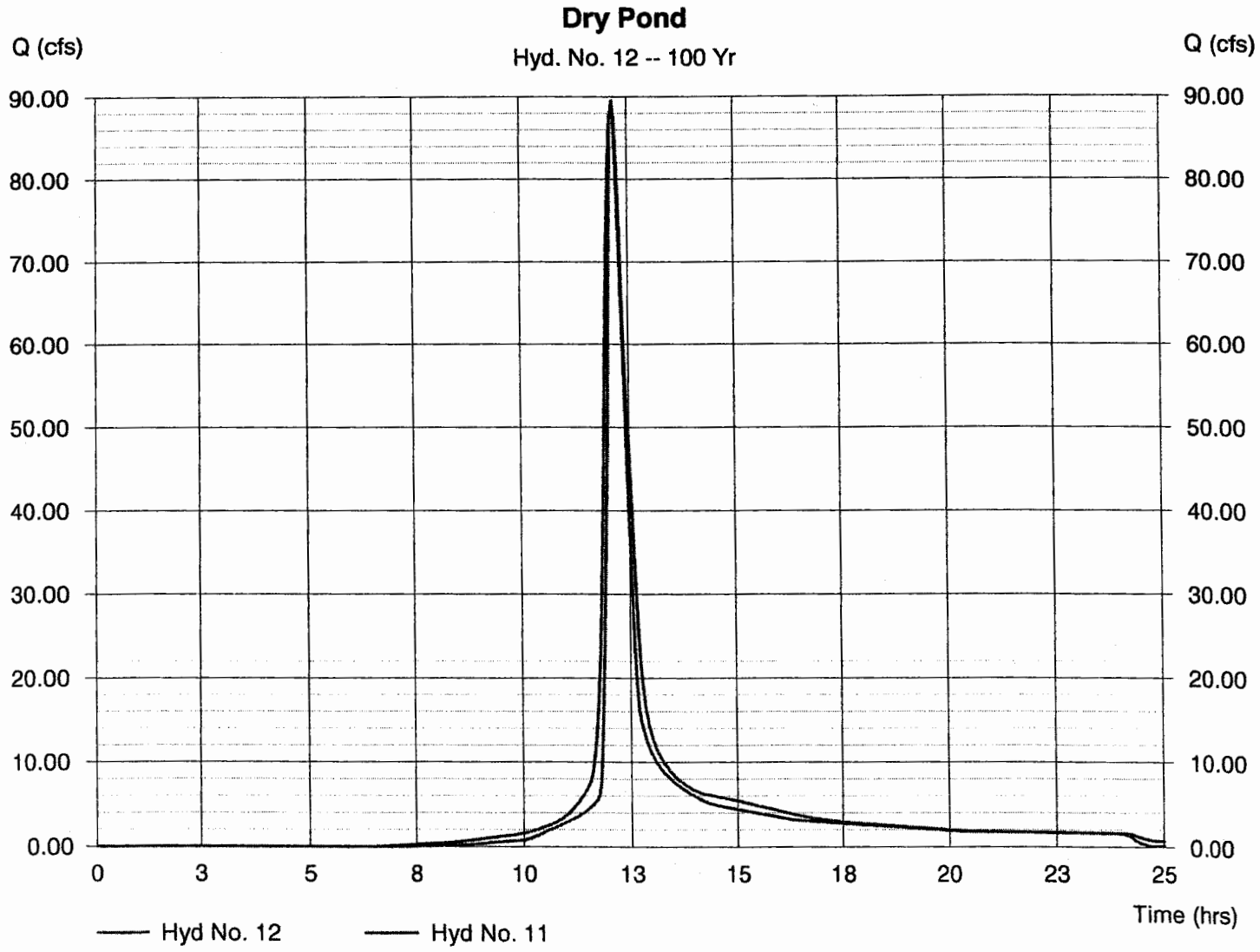
Hyd. No. 12

Dry Pond

Hydrograph type	= Reservoir	Peak discharge	= 88.74 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Inflow hyd. No.	= 11	Max. Elevation	= 82.56 ft
Reservoir name	= Dry Pond	Max. Storage	= 35,831 cuft

Storage Indication method used.

Hydrograph Volume = 360,363 cuft



BAY AGING (9551-00)
Stormwater Management Pond 1.1 (~~4 Point Dry Pond~~)
BOUYANCE CALCULATIONS
(Single Grate Type Riser)

BASIN #1
NONE SUPPLIED FOR SMALL BASIN

Note: THESE CALCULATIONS PROVIDED ARE TO INSURE THE PRINCIPAL SPILLWAY / RISER DOES NOT HAVE THE TENDENCY TO FLOAT.

LOOKS LIKE BASIN #1 INLET A/WOOD WALL WIER IS PROPOSED FOR DRY POND

ELEVATION OF RISER CREST =	98.50	
ELEVATION OF INVERT OF RISER = (Before Grouting)	90.67	
AREA OF INSIDE DIMENSION OF RISER = (Inside Area of Riser= 5' x 5'= 25 S.F.)	39.06	SF
OUTSIDE DIMENSION OF RISER = (Outside Area of Riser= 6.34' x 6.34' = 40.20 S.F.)	45.56	SF

WEIGHT OF WATER DISPLACED BY AIR

Outside area of Riser * (El. Of Riser Crest - El. Of riser invert) * Weight of water per cu. Ft. (62.4# / c.f.)

Weight of water displaced by air = (1 c.f. equals 62.4 Pounds)

Weight of water displaced by air = 22,261 lbs.

WEIGHT OF PRINCIPAL SPILLWAY / RISER

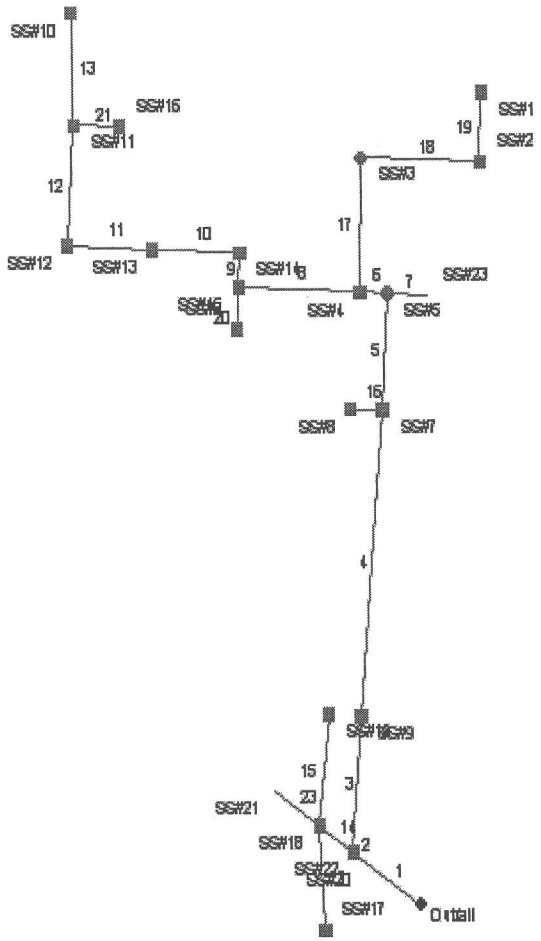
(Outside area of riser - Inside area of riser) * (El. Of Riser Crest - El. Of riser invert) * Weight of concrete per cu. Ft. (150# / c.f.)

Weight lost thru 2'x2' opening=	N/A	lbs.
Weight of Concrete Riser =	7,634	lbs.
Weight of Grouted Section= (Grout= area of riser x 1'x150# / c.f.	11,719	lbs.
Weight of Extended Base Only = (Weight of Extended Base=7.42' x 7.42' x 0.67' x 150# / c.f.)	5,530	lbs.
Total Weight of Riser =	24,883	lbs.

Total Weight of Principal Spillway / Riser > Weight of Water Displaced. The riser will not float.

Note:
The weight of the spillway grate, soil, and friction of soil was not taken into account. Riser weight at this point exceeds the bouyance uplift force.

Hydraflow Plan View



9014-Ironbound Square - Const.	No. Lines: 23	10-18-2005

Hydraflow Storm Sewers 2005

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	60.0	0.00	15.73	0.00	0.00	7.51	0.0	29.5	3.7	36.53	434.0	5.80	36 72 b	4.45	84.67	82.00	85.72	83.05	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	36.55	64.18	7.49	37	0.80	84.79	84.67	86.71	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	16.87	29.64	6.13	24	1.72	86.77	84.83	88.22	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	16.27	25.30	6.15	24	1.25	89.96	86.77	91.39	88.55	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	15.51	25.26	5.96	24	1.25	91.17	89.96	92.56	91.72	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	15.30	15.67	5.38	24	0.48	91.29	91.17	92.98	92.88	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	93.32	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	4.06	34	0.84	85.15	84.83	87.27	87.28	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	7.87	16.07	2.51	24	0.50	91.85	91.29	93.80	93.68	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	7.89	16.07	2.77	24	0.50	92.40	91.85	93.95	93.85	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	7.04	7.23	3.98	18	0.47	92.67	92.40	94.31	94.05	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: 10-18-2005

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

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
22	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	4.19	34	0.34	85.32	85.15	87.40	87.34	85.32	90.79	SS#21 - SS#18

9014-Ironbound Square - Const. | Number of lines: 23 | Run Date: 10-18-2005

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

Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	36 72 b	36.53	82.00	83.05	1.05	6.30	5.80	0.52	83.57	0.360	60.0	84.67	85.72 j	1.05**	6.29	5.81	0.52	86.24	0.361	0.361	n/a	0.25	n/a
2	37	36.55	84.67	86.58	1.91*	4.87	7.51	0.88	87.46	0.519	15.0	84.79	86.71	1.92**	4.89	7.47	0.87	87.58	0.513	0.516	0.077	0.00	0.00
3	24	16.87	84.83	87.13	2.00	3.14	5.37	0.45	87.58	0.557	113	86.77	88.22 j	1.45**	2.45	6.89	0.74	88.96	0.720	0.638	0.721	0.25	n/a
4	24	16.27	86.77	88.55	1.78	2.95	5.52	0.47	89.02	0.461	255	89.96	91.39 j	1.43**	2.40	6.78	0.71	92.10	0.701	0.581	n/a	0.75	0.54
5	24	15.51	89.96	91.72	1.76	2.93	5.29	0.44	92.16	0.422	97.0	91.17	92.56 j	1.39**	2.34	6.63	0.68	93.25	0.677	0.550	n/a	0.50	n/a
6	24	15.30	91.17	92.88	1.71	2.86	5.35	0.44	93.32	0.427	25.0	91.29	92.98	1.69	2.83	5.40	0.45	93.43	0.435	0.431	0.108	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	93.32	1.25	1.12	5.88	0.54	93.86	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	87.28	2.45	5.80	3.78	0.22	87.50	0.135	38.0	85.15	87.27	2.12	5.06	4.33	0.29	87.56	0.177	0.156	0.059	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	7.87	91.29	93.68	2.00	3.14	2.51	0.10	93.77	0.121	111	91.85	93.80	1.95	3.12	2.52	0.10	93.90	0.108	0.114	0.127	0.50	0.05
18	24	7.89	91.85	93.85	2.00	3.14	2.51	0.10	93.95	0.122	109	92.40	93.95	1.55	2.61	3.02	0.14	94.09	0.136	0.129	0.141	0.75	0.11
19	18	7.04	92.40	94.05	1.50	1.77	3.98	0.25	94.30	0.450	57.0	92.67	94.31	1.50	1.77	3.98	0.25	94.56	0.449	0.450	0.256	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: 10-18-2005

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

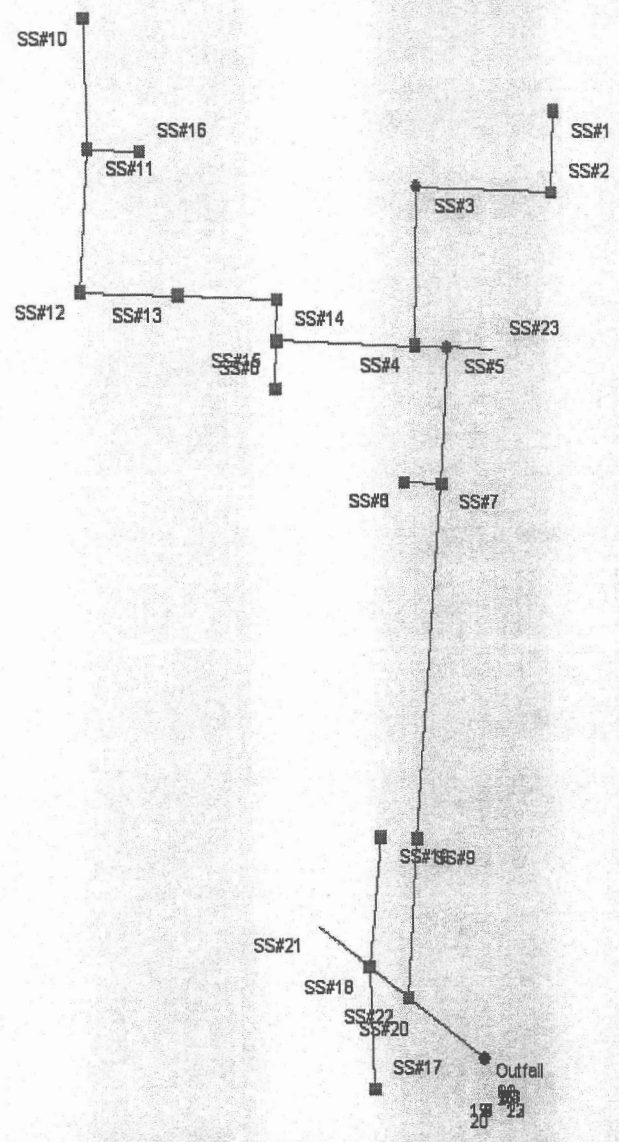
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor 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	1.32	0.28	0.00	87.63	0.002	0.001	0.001	0.50	0.00
23	34	21.31	85.15	87.34	2.19	5.24	4.07	0.26	87.60	0.155	50.0	85.32	87.40	2.08	4.95	4.30	0.29	87.68	0.176	0.166	0.083	0.25	0.07

9014-Ironbound Square - Const. | Number of lines: 23 | Run Date: 10-18-2005

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

Hydraflow Plan View



9014-Ironbound Square - Post	No. Lines: 23	10-17-2005

Hydraflow Storm Sewers 2005

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	60.0	0.00	15.73	0.00	0.00	7.27	0.0	29.5	3.7	35.63	434.0	5.73	36 72 b	4.45	84.67	82.00	85.70	83.04	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	35.66	64.18	7.41	37	0.80	84.79	84.67	86.69	86.56	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	14.49	29.64	5.52	24	1.72	86.77	84.83	88.12	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	13.94	25.30	5.63	24	1.25	89.96	86.77	91.28	88.45	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	13.30	25.26	5.48	24	1.25	91.17	89.96	92.46	91.63	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	13.11	15.67	4.90	24	0.48	91.29	91.17	92.85	92.79	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	5.10	15	4.03	96.55	92.04	97.49	93.21	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	4.16	34	0.84	85.15	84.83	87.21	87.23	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	87.60	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	7.46	16.07	2.54	24	0.50	91.85	91.29	93.48	93.39	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	7.47	16.07	3.12	24	0.50	92.40	91.85	93.64	93.57	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	7.04	7.23	4.17	18	0.47	92.67	92.40	94.00	93.80	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: 10-17-2005

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

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
22	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	87.59	87.60	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	4.31	34	0.34	85.32	85.15	87.34	87.29	85.32	90.79	SS#21 - SS#18

9014-Ironbound Square - Post

Number of lines: 23

Run Date: 10-17-2005

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

Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	36 72 b	35.63	82.00	83.04	1.04	6.24	5.71	0.51	83.55	0.352	60.0	84.67	85.70 j	1.03**	6.19	5.76	0.52	86.22	0.361	0.357	n/a	0.25	0.13
2	37	35.66	84.67	86.56	1.89*	4.80	7.43	0.86	87.42	0.513	15.0	84.79	86.69	1.90**	4.82	7.40	0.85	87.54	0.507	0.510	0.076	0.00	0.00
3	24	14.49	84.83	87.21	2.00	3.14	4.61	0.33	87.54	0.410	113	86.77	88.12 j	1.35**	2.25	6.43	0.64	88.76	0.648	0.529	n/a	0.25	0.16
4	24	13.94	86.77	88.45	1.68	2.82	4.94	0.38	88.83	0.363	255	89.96	91.28 j	1.32**	2.20	6.33	0.62	91.90	0.633	0.498	n/a	0.75	0.47
5	24	13.30	89.96	91.63	1.67	2.80	4.76	0.35	91.98	0.336	97.0	91.17	92.46 j	1.29**	2.15	6.20	0.60	93.06	0.615	0.476	n/a	0.50	0.30
6	24	13.11	91.17	92.79	1.62	2.72	4.82	0.36	93.15	0.344	25.0	91.29	92.85	1.56	2.63	4.98	0.39	93.24	0.370	0.357	0.089	0.75	0.29
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	93.21	1.17	1.20	4.62	0.33	93.54	0.632	112	96.55	97.49 j	0.94**	0.99	5.58	0.48	97.97	0.873	0.752	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	87.23	2.40	5.69	3.86	0.23	87.46	0.139	38.0	85.15	87.21	2.06	4.90	4.47	0.31	87.52	0.191	0.165	0.063	0.25	0.08
15	18	0.43	85.90	87.60	1.50	1.77	0.24	0.00	87.60	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	7.46	91.29	93.39	2.00	3.14	2.37	0.09	93.48	0.109	111	91.85	93.48	1.63	2.75	2.71	0.11	93.60	0.109	0.109	0.121	0.50	0.06
18	24	7.47	91.85	93.57	1.72	2.87	2.60	0.11	93.67	0.101	109	92.40	93.64	1.24	2.05	3.65	0.21	93.85	0.218	0.160	0.174	0.75	0.16
19	18	7.04	92.40	93.80	1.40	1.71	4.11	0.26	94.06	0.389	57.0	92.67	94.00	1.33	1.66	4.24	0.28	94.28	0.400	0.394	0.225	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: 10-17-2005

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

Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
22	24	0.37	85.15	87.60	2.00	3.14	0.12	0.00	87.60	0.000	86.0	86.76	87.59	0.83	1.24	0.30	0.00	87.60	0.002	0.001	0.001	0.50	0.00
23	34	21.31	85.15	87.29	2.14	5.10	4.18	0.27	87.56	0.165	50.0	85.32	87.34	2.02	4.81	4.43	0.31	87.64	0.189	0.177	0.088	0.25	0.08

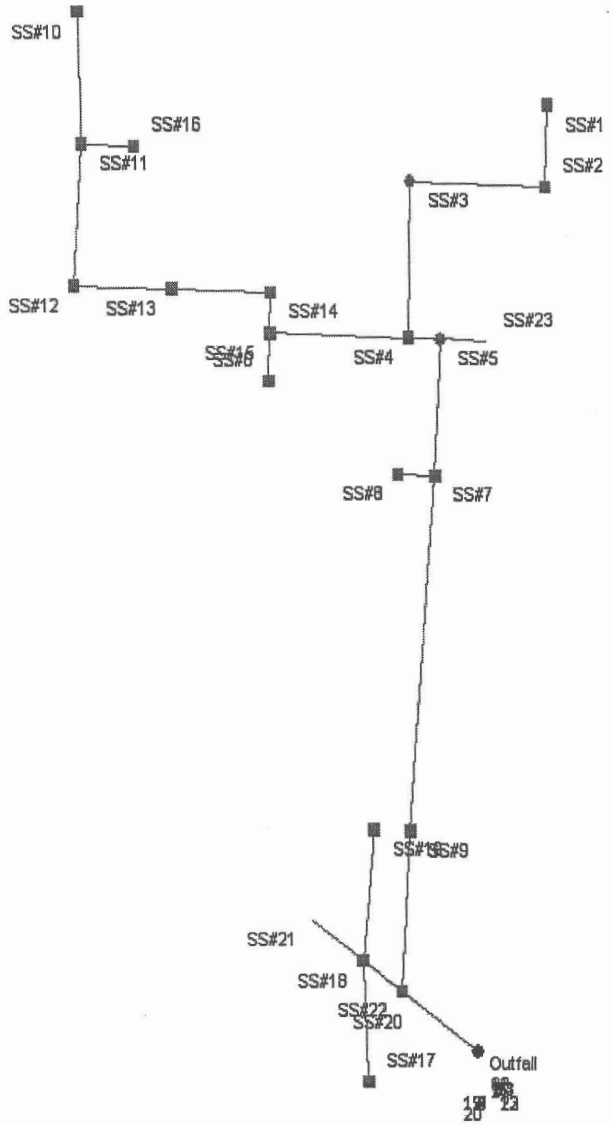
9014-Ironbound Square - Post

Number of lines: 23

Run Date: 10-17-2005

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

Hydraflow Plan View



9014-Ironbound Square - Future	No. Lines: 23	10-17-2005

Hydraflow Storm Sewers 2005

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	60.0	0.00	15.80	0.00	0.00	7.41	0.0	20.6	4.5	41.90	434.0	6.05	36 72 b	4.45	84.67	82.00	85.82	83.16	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	41.93	64.18	7.92	37	0.80	84.79	84.67	86.85	86.72	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	14.49	29.64	5.52	24	1.72	86.77	84.83	88.12	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	13.94	25.30	5.63	24	1.25	89.96	86.77	91.28	88.45	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	13.30	25.26	5.48	24	1.25	91.17	89.96	92.46	91.63	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	13.11	15.67	4.90	24	0.48	91.29	91.17	92.85	92.79	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	5.10	15	4.03	96.55	92.04	97.49	93.21	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	6.51	34	0.84	85.15	84.83	87.30	87.32	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	7.46	16.07	2.54	24	0.50	91.85	91.29	93.48	93.39	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	7.47	16.07	3.12	24	0.50	92.40	91.85	93.64	93.57	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	7.04	7.23	4.17	18	0.47	92.67	92.40	94.00	93.80	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: 10-17-2005

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

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
22	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	87.93	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: 10-17-2005

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

Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	36 72 b	41.90	82.00	83.16	1.16	6.96	6.02	0.56	83.72	0.352	60.0	84.67	85.82 j	1.15**	6.89	6.08	0.57	86.39	0.362	0.357	n/a	0.25	0.14
2	37	41.93	84.67	86.72	2.05*	5.27	7.96	0.98	87.70	0.560	15.0	84.79	86.85	2.06	5.31	7.89	0.97	87.82	0.550	0.555	0.083	0.00	0.00
3	24	14.49	84.83	87.49	2.00	3.14	4.61	0.33	87.82	0.410	113	86.77	88.12 j	1.35**	2.25	6.43	0.64	88.76	0.648	0.529	n/a	0.25	0.16
4	24	13.94	86.77	88.45	1.68	2.82	4.94	0.38	88.83	0.363	255	89.96	91.28 j	1.32**	2.20	6.33	0.62	91.90	0.633	0.498	n/a	0.75	0.47
5	24	13.30	89.96	91.63	1.67	2.80	4.76	0.35	91.98	0.336	97.0	91.17	92.46 j	1.29**	2.15	6.20	0.60	93.06	0.615	0.476	n/a	0.50	0.30
6	24	13.11	91.17	92.79	1.62	2.72	4.82	0.36	93.15	0.344	25.0	91.29	92.85	1.56	2.63	4.98	0.39	93.24	0.370	0.357	0.089	0.75	0.29
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	93.21	1.17	1.20	4.62	0.33	93.54	0.632	112	96.55	97.49 j	0.94**	0.99	5.58	0.48	97.97	0.873	0.752	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	87.32	2.49	5.88	6.07	0.57	87.90	0.349	38.0	85.15	87.30	2.15	5.13	6.96	0.75	88.05	0.455	0.402	0.153	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	7.46	91.29	93.39	2.00	3.14	2.37	0.09	93.48	0.109	111	91.85	93.48	1.63	2.75	2.71	0.11	93.60	0.109	0.109	0.121	0.50	0.06
18	24	7.47	91.85	93.57	1.72	2.87	2.60	0.11	93.67	0.101	109	92.40	93.64	1.24	2.05	3.65	0.21	93.85	0.218	0.160	0.174	0.75	0.16
19	18	7.04	92.40	93.80	1.40	1.71	4.11	0.26	94.06	0.389	57.0	92.67	94.00	1.33	1.66	4.24	0.28	94.28	0.400	0.394	0.225	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: 10-17-2005

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

Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
22	24	14.08	85.15	87.93	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: 10-17-2005

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

BAY AGING SENIOR HOUSING PROJECT
SEDIMENT TRAP CALCULATIONS

Job. No.:	9551-00
Date:	August 3, 2005
Revised:	October 18, 2005
By:	Brendan Clisso, E.I.T.

Drainage Area to Sediment Trap = 2.14 Acres

Required Wet Storage = 67 cy/acre * (Drainage Area) = 143.38 cubic yards, or 3871 cubic feet

Required Dry Storage = 67 cy/acre * (Drainage Area) = 143.38 cubic yards, or 3871 cubic feet

Determining Volume of Sediment Trap by Contour

Elevation	Depth	Area (sq. ft.)	Volume (cu. ft.)	Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
95	0	902	0	0	0	0
96	1	1161	1032	38	1032	38
97	1	1447	1304	48	2336	87
98	1	1952	1700	63	4035	149
99	1	2309	2131	79	6166	228
100	1	2692	2501	93	8666	321
101	1	3099	2896	107	11562	428

Width of Aggregate Outlet Weir = 6 ft/acre * (Drainage Area) = **12.84 feet**

Elevation of Wet Storage Volume = **97.90**

Elevation of Dry Storage Volume = **99.63**

Elevation of accumulated sediment when sediment removed is required (1/2 wet storage volume) **96.69**

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	60.0	0.00	15.80	0.00	0.00	7.41	0.0	20.6	4.5	41.90	434.0	6.05	36 72 b	4.45	84.67	82.00	85.82	83.16	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	41.93	64.18	7.92	37	0.80	84.79	84.67	86.85	86.72	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	14.49	29.64	5.52	24	1.72	86.77	84.83	88.12	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	13.94	25.30	5.63	24	1.25	89.96	86.77	91.28	88.45	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	13.30	25.26	5.48	24	1.25	91.17	89.96	92.46	91.63	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	13.11	15.67	4.90	24	0.48	91.29	91.17	92.85	92.79	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	5.10	15	4.03	96.55	92.04	97.49	93.21	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	6.51	34	0.84	85.15	84.83	87.30	87.32	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	7.46	16.07	2.54	24	0.50	91.85	91.29	93.48	93.39	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	7.47	16.07	3.12	24	0.50	92.40	91.85	93.64	93.57	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	7.04	7.23	4.17	18	0.47	92.67	92.40	94.00	93.80	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: 10-17-2005

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

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
22	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	87.93	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: 10-17-2005

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

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	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)	(K)	(ft)
1	36 72 b	41.90	82.00	83.16	1.16	6.96	6.02	0.56	83.72	0.352	60.0	84.67	85.82 j	1.15**	6.89	6.08	0.57	86.39	0.362	0.357	n/a	0.25	0.14
2	37	41.93	84.67	86.72	2.05*	5.27	7.96	0.98	87.70	0.560	15.0	84.79	86.85	2.06	5.31	7.89	0.97	87.82	0.550	0.555	0.083	0.00	0.00
3	24	14.49	84.83	87.49	2.00	3.14	4.61	0.33	87.82	0.410	113	86.77	88.12 j	1.35**	2.25	6.43	0.64	88.76	0.648	0.529	n/a	0.25	0.16
4	24	13.94	86.77	88.45	1.68	2.82	4.94	0.38	88.83	0.363	255	89.96	91.28 j	1.32**	2.20	6.33	0.62	91.90	0.633	0.498	n/a	0.75	0.47
5	24	13.30	89.96	91.63	1.67	2.80	4.76	0.35	91.98	0.336	97.0	91.17	92.46 j	1.29**	2.15	6.20	0.60	93.06	0.615	0.476	n/a	0.50	0.30
6	24	13.11	91.17	92.79	1.62	2.72	4.82	0.36	93.15	0.344	25.0	91.29	92.85	1.56	2.63	4.98	0.39	93.24	0.370	0.357	0.089	0.75	0.29
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	93.21	1.17	1.20	4.62	0.33	93.54	0.632	112	96.55	97.49 j	0.94**	0.99	5.58	0.48	97.97	0.873	0.752	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	87.32	2.49	5.88	6.07	0.57	87.90	0.349	38.0	85.15	87.30	2.15	5.13	6.96	0.75	88.05	0.455	0.402	0.153	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	7.46	91.29	93.39	2.00	3.14	2.37	0.09	93.48	0.109	111	91.85	93.48	1.63	2.75	2.71	0.11	93.60	0.109	0.109	0.121	0.50	0.06
18	24	7.47	91.85	93.57	1.72	2.87	2.60	0.11	93.67	0.101	109	92.40	93.64	1.24	2.05	3.65	0.21	93.85	0.218	0.160	0.174	0.75	0.16
19	18	7.04	92.40	93.80	1.40	1.71	4.11	0.26	94.06	0.389	57.0	92.67	94.00	1.33	1.66	4.24	0.28	94.28	0.400	0.394	0.225	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: 10-17-2005

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

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	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)	(K)	(ft)
22	24	14.08	85.15	87.93	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: 10-17-2005

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

BAY AGING SENIOR HOUSING PROJECT
SEDIMENT TRAP CALCULATIONS

Job. No.:	9551-00
Date:	August 3, 2005
Revised:	October 18, 2005
By:	Brendan Clisso, E.I.T.

Drainage Area to Sediment Trap = 2.14 Acres

Required Wet Storage = 67 cy/acre * (Drainage Area) = 143.38 cubic yards, or 3871 cubic feet

Required Dry Storage = 67 cy/acre * (Drainage Area) = 143.38 cubic yards, or 3871 cubic feet

Determining Volume of Sediment Trap by Contour

Elevation	Depth	Area (sq. ft.)	Volume (cu. ft.)	Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
95	0	902	0	0	0	0
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Width of Aggregate Outlet Weir = 6 ft/acre * (Drainage Area) = **12.84 feet**

Elevation of Wet Storage Volume = **97.90**

Elevation of Dry Storage Volume = **99.63**

Elevation of accumulated sediment when sediment removed is required (1/2 wet storage volume) **96.69**

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PLANNING DIVISION

GEOTECHNICAL ENGINEERING STUDY

Proposed Ironbound Square Senior Housing
Ironbound at Carriage Roads
James City County, Virginia

SP-100-05

ATLANTIC GEOTECHNICAL SERVICES, INC.

REPORT

PROJECT

Geotechnical Engineering Study
Proposed Ironbound Square Senior Housing
Ironbound at Carriage Roads
James City County, Virginia

CLIENT

Agency on Aging Apartments
P.O. Box 622
Urbana, Virginia 23175

SUBMITTED BY

Atlantic Geotechnical Services, Inc.
10971 Richardson Road
Ashland, Virginia 23005

DATE

September 7, 2005

REPORT

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DATE

September 7, 2005

GEOTECHNICAL ENGINEERING STUDY

Proposed Ironbound Square Senior Housing
Ironbound at Carriage Roads
James City County, Virginia

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APPENDIX

Figure 1:	Plan of Borings
Figures 2 - 19:	Logs of Borings
Figure 20:	Reference Notes for Boring Logs
Figure 21:	Proctor Test Results
Figure 22:	California Bearing Ratio Test Results
Table 1:	Laboratory Test Results - Classification
Table 1A:	Laboratory Test Results – Standard Proctor & CBR

ATLANTIC GEOTECHNICAL SERVICES, INC.
Geotechnical + Materials Testing + Environmental

September 7, 2005
AGS Report No. RG05-618

Mr. Joshua Gemerek
Agency on Aging Apartments
P.O. Box 622
Urbana, Virginia 23175

Reference: Geotechnical Engineering Study
Proposed Ironbound Square Senior Housing
Ironbound at Carriage Roads
James City County, Virginia

Dear Mr. Gemerek:

Presented herein are the results of Atlantic Geotechnical Services, Inc. (AGS) geotechnical engineering study for the proposed above referenced complex to be located at the corner of Ironbound and Carriage Roads in James City County, Virginia.

Purposes and Scope of Work

The purposes of our geotechnical engineering study were to assess subsurface conditions at the site and develop geotechnical recommendations for design and construction of building foundations and pavements for the improvements proposed. Our work was performed in the following phases:

- Field Exploration Program
- Laboratory Soil Testing
- Engineering Evaluation/Analyses

The results of our study, as well as our recommendations for foundation design and construction, are included in subsequent sections of this report. Preliminary recommendations for pavement design and construction are also included in this report.

10971 Richardson Road, Ashland, Virginia 23005 • 804-550-2203 • FAX 804-550-2204

Limitations

The analyses and recommendations presented in this report are based on the data obtained from eighteen (18) soil borings drilled at this site as well as observations made during a cursory site walkover. The nature and extent of variations across the site may not become evident until construction commences. This is particularly true of this previously developed site where it appears uncontrolled fill has been placed in some areas. If variations then appear evident, it may be necessary to reevaluate our recommendations after performing onsite observations and tests to establish the engineering significance of the variations.

The scope of our geotechnical engineering study does not include an environmental assessment of the air, soil or water conditions either on or adjacent to this site. No environmental opinions were prepared for or presented in this report.

Project Description

Planned improvements consist of a one-story building and accompanying paved parking areas and entrance drives. Light structural loads are anticipated for the proposed building, with column, wall and floor loads not expected to exceed 100 kips, 4 kips per linear foot, and 150 lbs per sq ft, respectively. No retaining walls, basement levels, or other below grade structures are anticipated for this facility; consequently, design recommendations for such structural elements have not been included in this report. Finished floor for the building is planned to be at El 105.00. We anticipate only minor cut and fill operations as the site is relatively flat. In addition, two bio-retention areas are planned (one "large" and one "small").

For purposes of our preliminary pavement analyses, we have assumed heavy-duty pavements for the facility will be subjected to two dumpster trucks and one semi-tractor trailer per week, three delivery trucks per day, and an average 400 automobiles/light pickup trucks per day.

Existing Site Conditions

The project site is a mostly wooded piece of property. This site may have previously been the location of several residential structures. Based on the existing topography, site drainage is visually estimated to be poor. The ground surface was soft to firm at the time of our field exploration and exhibited a little rutting under drill rig traffic. There appears to be scattered amounts of fill on the property.

Field Exploration Program

The geotechnical exploration consisted of drilling eighteen (18) borings at the approximate locations shown on the Plan of Borings (Figure 1) in the Appendix of this report. Eleven (11) borings were drilled within the proposed future building footprint, three (3) in pavement areas, and four (4) in the bio-retention areas.

The borings were advanced using an all-terrain, vehicle-mounted drill rig and hollow-stem auger drilling techniques to depths varying from 7 to 75 feet below existing grades. The boring locations were staked in the field prior to the start of drilling by a representative of AGS using tape and right angle measurements from the adjacent roads. Drilling and sampling activities were performed by Ayers & Ayers, Inc. of Powhatan, Virginia under the coordination of AGS personnel.

Soil samples were obtained in the borings using Standard Penetration Test (SPT) procedures (ASTM D 1586) at approximate 2-ft intervals to 10-ft depth and at 5-ft intervals thereafter. In addition, bulk samples of the subgrade soils in proposed pavement areas were collected. All soil samples obtained were sealed in protective containers and returned to our laboratory for further classification and testing. Logs of stratigraphic conditions encountered in the individual borings are presented on Figures 2 through 19 in the Appendix.

Water levels in the open boreholes were measured at the completion of drilling, at which time the boreholes were backfilled with the soil auger cuttings for safety purposes.

Water levels recorded in the boreholes at the time of our field exploration are presented on the respective boring log.

Laboratory Soil Testing Program

All soil samples were visually classified by a staff engineer. Soil tests performed in our laboratory on recovered soil samples consist primarily of classification tests, i.e., moisture content, sieve analyses (percent passing No. 200 sieve) and Atterberg limits. One standard Proctor compaction and one California Bearing Ratio (CBR) tests were performed on a selected bulk sample. The results of all the tests are submitted in the Appendix.

All soil samples will be retained in our laboratory for thirty days following completion of this report, at which time they will be discarded unless further testing is requested by the Client.

Subsurface Conditions

A brief description of stratigraphic and groundwater conditions is presented in the following paragraphs. The boring logs provided in the Appendix of this report should be consulted for specific information concerning soil and groundwater conditions beneath this site.

Stratigraphy. Up to about 12 inches of topsoil covers most of the site, although roots from trees in wooded areas will likely make deeper stripping necessary.

What appeared to be an uncontrolled fill was observed in several of the soil boring samples. Fill depth varied from non-existent to as much as four (4) feet. In some of the borings, it was difficult to ascertain whether the upper soil was fill or natural. The best way to delineate fill thicknesses is to excavate a series of test pits around the site in the presence of the Geotechnical Engineer. The thickness of this surficial fill (as measured in the borings) is listed below:

Boring No.	Thickness of Fill, ft.
B-1	1.5
B-2	2.0
B-3	0
B-4	1.5
B-5	0
B-6	1.5
B-7	0 – 1.5
B-8	0
B-9	0
B-10	0
B-11	1.5
P-1	0 – 2.0
P-2	4.0
P-3	0
R-1	0 – 4.5
R-2	0
R-3	2.0
R-4	0

The natural soils are typically a loose to medium dense, silty and/or clayey sand. This stratum has blow counts (N values) varying from 6 to 100 blows per foot. The loose zone is typically a surficial 2-ft thick stratum; found in Boring Nos. B-2, B-3 and P-1.

Plastic, sandy clays were found beneath the surficial sands. These clays are of low plasticity and found between 47 and 57-ft depths.

Ground Water. Upon completion of drilling, measurements conducted within the hollow stem augers prior to removal from the ground in the deep boring revealed water a considerable depth below the surface.

Based on the findings of the test borings, we anticipate the static groundwater table beneath the higher elevations at this site exists at a depth of at least 15 feet below the existing ground surface. However, groundwater seepage may exist at shallower depths on a transient basis beneath this site following periods of heavy or prolonged precipitation. Such seepage may present problems to utility construction for the

improvements proposed. Seepage encountered in utility excavations following completion of mass grading activities will require some type of dewatering system.

Foundation Design Recommendations

Design Considerations. The following factors are expected to influence foundation design and construction at this site:

- This project site is characterized by a mostly wooded and fairly flat terrain and a native stratigraphy consisting of upper loose to dense, silty and/or clayey sands with some sandy clay strata.
- The upper fill soils (up to 4-ft depth) and weak, natural soils (2-ft in thickness) will likely have to be undercut.
- While the natural soils range from low plasticity silty and/or clayey sands to plastic clays, only the sands are suitable for use as structural fill. These may become wet of their optimum moisture content and have to be dried prior to adequate compaction. Site work should be performed in the drier months to optimize the use of onsite soil as fill.
- Ground water is not expected to impact shallow foundation construction for the building. Groundwater seepage may be encountered in deeper utility excavations.
- Conventional soil excavating, moving and compaction equipment is expected to suffice in completing mass earthwork and shallow footing/utility trench excavation activities at this site.

Based on the above design considerations and the relatively light structural loads anticipated, the building may be supported on a shallow footing foundation bearing in both the deeper, strong, undisturbed native soils and/or compacted, select structural fill materials. Recommendations for foundation design are presented in the following sections, along with recommendations for accompanying site earthwork procedures.

Foundation Types and Depths. The building may be supported on shallow spread and continuous footings bearing in the strong, undisturbed native soil and/or compacted, select structural fill materials at a minimum depth of 24 inches **below perimeter finished grade**.

Allowable Bearing Capacity. Isolated spread and continuous footings bearing at the minimum specified depth in the strong, undisturbed native soils and/or compacted, select structural fill materials may be designed for a net allowable bearing pressure of 2,500 pounds per square foot (psf). This bearing capacity is expected to provide a factor of safety in excess of two (2) with respect to the shear strength anticipated for the stronger, native soils and well compacted structural fill materials (see subsequent criteria). The structural fill materials should be selected and placed in accordance with the recommendations outlined in the **Select Structural Fill** section of this report.

Foundations must be proportioned so that the maximum net contact pressure under the combined effects of dead, live and transient loads does not exceed the allowable bearing pressure. To reduce the possibility of localized shear failure, we recommend a minimum reinforced foundation width of 24 inches for continuous footings, a minimum least plan dimension of 36 inches for isolated spread footings, and a minimum thickness of 12 inches for both spread and continuous footings. Total settlements of 1 inch or less are anticipated for isolated footings proportioned using the above design parameters, with differential settlements estimated to be 1/2 inch or less.

Seismic Design Considerations. With respect to the 2000 International Building Code, we recommend a Site Area Classification of "D" be used for seismic design considerations for this site.

Floor Slabs. Based on the existing topography, we anticipate the floor slabs will rest on both native soils and compacted, select structural fill materials. Floor loads anticipated for the buildings can be carried by a soil-supported floor slab bearing on these soils.

The floor slabs can be designed assuming either the native soils or the compacted structural fill materials will provide a unit modulus of subgrade reaction of 100 to 200 pounds per square inch per inch deflection (pci), provided the site is prepared and the structural fill materials are selected and placed in accordance with the recommendations presented in the **Site Preparation** and **Select Structural Fill** sections of this report. **Moisture content in the slab subgrade soils must be kept within the structural fill criteria until after the completion of construction and then the building pad area protected from becoming excessively wet after construction.**

To provide a stable working pad and capillary moisture break beneath the slab, we recommend the floor slab bear on a minimum 4-inch thick cushion of VDOT No. 57 aggregate or other suitable open-graded stone. A suitable vapor barrier (such as plastic sheeting) should be placed over the stone to provide additional resistance against moisture migration into the concrete slab.

Drainage. Surface and roof runoff and other water must be diverted from this site to reduce the chances of decreased bearing capacity, and/or increased settlements or swell resulting from water migration into the foundation soils. We recommend water collecting in roof drains and gutters be piped to drainage structures.

Earthwork Considerations

Site Preparation. The topsoil and rootmat should be stripped from this site; about 6 to 12 inches is anticipated to remove most of it. Undercut of the upper, uncontrolled fill stratum is required (see earlier section and boring logs for fill thicknesses). Test pits can be useful in more accurately defining the limits of the fill.

The upper, loose, native clayey sands may be able to be improved in place and not have to be undercut. This will be to a large degree dependent upon the weather before and at the time of earthwork construction. We recommended excavating a series of test pits into the surficial soils and a subsequent meeting with the Owner, Contractor and appropriate design professionals to discuss the best ways to work this zone.

Upon completion of clearing, grubbing, stripping and removal of any soft, surficial soils and fill, areas ready to receive structural fill materials or ready for the next phase of construction should be proofrolled with a loaded, tandem-axle dump truck or equally heavy, pneumatic-tired equipment in the presence of the Geotechnical Engineer to help identify any remaining soft areas.

Weak, soft areas identified during subgrade proofrolling should be undercut further to strong soils at the discretion of the Geotechnical Engineer and the resulting excavations backfilled using structural fill materials selected and placed as described in a subsequent section of this report. If earthwork activities take place during the drier months, as recommended, undercutting activities will likely be reduced. Conversely, if earthwork activities commence during seasonal wet months, more extensive undercutting will likely be required to remove surficial soils wetted as a result of seasonal precipitation.

Select Structural Fill. Upon completion of proofrolling, placement of the structural fill materials may commence. Depending on the time of year earthwork activities take place, some soil processing (i.e., wetting or drying) may be required to adjust soil moisture contents to near-optimum conditions prior to final compaction (depending upon the moisture of fill materials used). The natural lower, plasticity, clayey and/or silty sands (SC/SM) can be used as fill; however, their current moisture content may require some adjustments for use as fill.

With respect to imported materials, natural borrow materials classified as GC (clayey gravels) and SC (clayey sands) under the Unified Soil Classification System

(USCS) are preferred for use as structural fill materials on this project. Some imported CL soils (such as sandy clays) may also be suitable for use as structural fill materials on this site, provided the sandy clays possess a liquid limit of less than 40, a plasticity index less than 20 and a sand content greater than 25 percent. Processed stone products such as VDOT No. 21A or 21B aggregate or VDOT No. 10 aggregate (screenings) may also be considered for use as structural fill materials on this project. Imported materials proposed for use as structural fill materials on this project should be submitted to AGS for visual assessment and final approval.

All structural fill materials should be placed in maximum 8-inch loose lifts and compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D 698 (standard Proctor compaction) procedures. **The moisture content of the structural fill materials and natural subgrade soils should be established and maintained within plus or minus 2 percent of optimum moisture content until permanently covered and protected.**

AGS representatives should be present at the site during structural fill placement activities to ensure that the structural fill materials satisfy the selection and placement criteria presented in this report.

The above soil placement and compaction criteria also pertain to backfill materials for utility trench excavations traversing beneath the building and pavements. If the onsite excavated soils are deemed unsuitable for reuse as backfill materials in trench excavations due to elevated moisture contents, the above selection criteria for structural fill materials remains applicable for imported trench backfill materials.

Preliminary Pavement Recommendations

As requested, preliminary pavement design analyses were performed for this site. The preliminary pavement analyses were performed in accordance with the 1986 AASHTO Design Criteria using the laboratory CBR value and assumed traffic frequency and loading parameters.

Pavement Design Input Data. One CBR laboratory bearing ratio test was performed (4 percent test result). A reduced CBR value of 3 percent was used in our design analyses. This reduced CBR value provides a small factor of safety against possible anomalies in pavement subgrade conditions. The following additional pavement data was used in our analyses:

Reliability	75%
Overall Deviation (Asphalt)	0.45
Subgrade Modulus	2,400
Drainage Coefficient	1.0
Initial Serviceability	4.2
Terminal Serviceability	2.0
Pavement Design Life	20 years

For purposes of our analyses, we have assumed heavy-duty pavements for the facility will be subjected to two dumpster trucks and one fully-loaded semi-tractor trailer per week, three delivery trucks per day, and an average 400 automobiles and light pickup trucks per day. Light-duty pavements (parking areas) will be limited solely to a percentage of the above automobile/light pickup truck traffic.

The vehicle loading for the above is as follows:

Automobiles/Pickup Trucks	2,000 lbs/axle
Delivery Trucks	
Front Axle	10,000 lbs
Rear Axle	24,000 lbs
Dumpster Trucks	
Front Axle	12,000 lbs
Rear Axle	34,000 lbs
18-Wheeler (Tractor-Trailers)	
Front Axles	12,000 lbs
Rear Axles	34,000 lbs

If the above loading conditions are not correct, AGS should be notified so the pavement analyses presented below can be recalculated using correct data.

Recommended Preliminary Pavement Sections. The proposed pavement section load-carrying capacity was compared to the anticipated traffic loading to help select these preliminary pavement sections (for planning purposes). Based on our analyses, we preliminarily recommend the following **minimum** pavement sections:

Heavy-Duty Flexible Pavements	**Thickness**
SM-9.5D Asphaltic Concrete	1.5 inches
BM-25.0 Bituminous Base	4 inches
21A or 21B Stone	7 inches

Light-Duty Flexible Pavements (Auto Parking Only)	**Thickness**
SM-9.5D Asphaltic Concrete	2 inches
21A or 21B Stone	6 inches

Concrete Service Areas/Pads	**Thickness**
Portland Cement Concrete	5 inches
21A or 21B Stone	5 inches

All pavement materials (or their equivalents) and installation procedures should conform to Virginia Department of Transportation (VDOT) criteria presented in the most recent VDOT Bridge and Roadway Specifications.

A pavement design life normally assumes some action will be required on the pavement at about the quarter points of the design life. For maintenance budgeting, the following can be assumed for the 20-year life:

Age, Years	Action
0 – 5	Minor repairs in localized areas, possible slurry seal
10	Overlay (1.5 to 2 inches)
10 – 15	Slurry Seal
20	Reconstruction

Subgrade Preparation. The subgrade in proposed pavement areas should be prepared using the site preparation and select structural fill procedures recommended previously, i.e., the areas should be stripped (undercut) of all existing topsoil, rootmat and upper, soft soils and fills, the exposed soils proofrolled, and identified remaining weak areas removed.

It may be necessary to use combinations of geotextiles and bridge lifts for soft, surficial conditions. However, this should be determined on site (in areas where appropriate) by the geotechnical engineer.

Pavement Drainage. The above pavement design assumes the pavement is well drained. Water allowed to collect in the base course stone and/or on the subgrade can result in saturated conditions and a decreased pavement life. Therefore, adequate surface and subsurface drains should be provided to remove water from the pavement areas. We recommend use of area drains and pavement subdrains to collect and discharge surface runoff and subsurface seepage.

Use of Pavements Prior to Completion. Pavements are sometimes either partially or fully completed when construction traffic is allowed access to them. Heavy construction traffic loading can be especially detrimental to a partially completed pavement section and can substantially reduce pavement life. No construction traffic loading was included in the pavement design analyses.

Bioremediation Area Soil Properties

Four (4) borings (Boring Nos. R-1 through R-4) were drilled to depths ranging from 7 to 11 feet below the present ground surface. The soil texture is a clayey and/or silty fine sand in all borings (see boring logs in Appendix). The natural ground water measured at the time of the field exploration program was at least 15 feet below current grade. The James City and York Counties and City of Williamsburg Soil Survey

classifies these soils as Kempsville fine, sandy loam and lists them as having a water table in excess of 6 feet and a permeability ranging from 0.6 to 6.0 inches per hour. Based on our experience, we would estimate a lower permeability of 0.2 to 2.0 inches per hour.

* * *

Atlantic Geotechnical Services appreciates the opportunity to be of service to you on this project. We hope this provides you with the information needed. Please call if you have any questions, or if we may be of additional assistance during the materials testing-quality control phase of the project.

Sincerely,

ATLANTIC GEOTECHNICAL
SERVICES, INC.

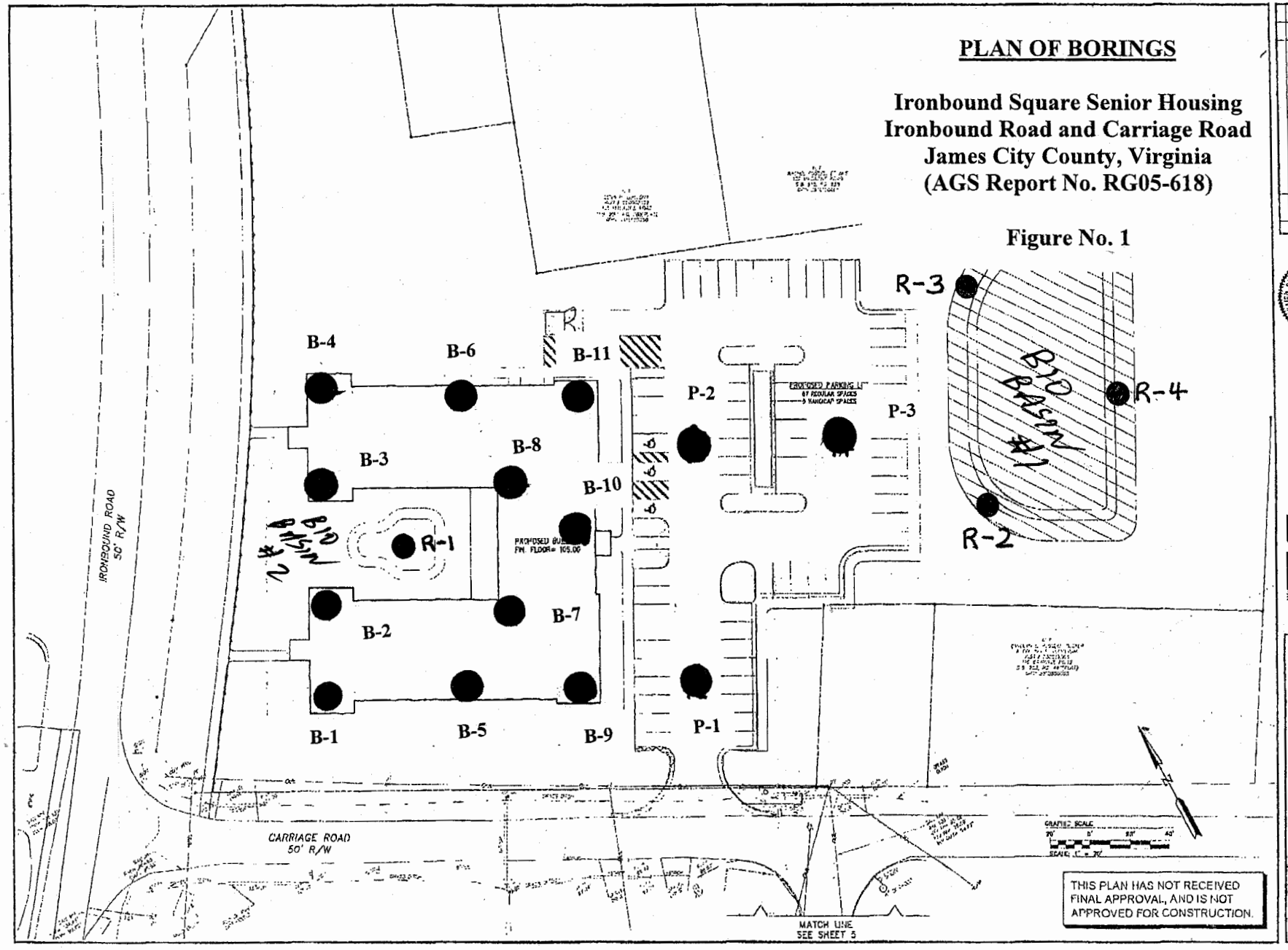
Michael O. Noggle, P.E.
Principal Engineer

COMMONWEALTH OF VIRGINIA
MICHAEL O. NOGGLE
NO. 019495
PROFESSIONAL ENGINEER

MON/eap
Enclosures
Copies Submitted: Above (2 bound)
Mr. Rick Funk
dBF Associates, Architects (2 bound, 1 unbound)
Mr. Brendan Clisso, EIT
AES Consulting Engineers (1 bound)

APPENDIX

Figure 1:	Plan of Borings
Figures 2 - 19:	Logs of Borings
Figure 20:	Reference Notes for Boring Logs
Figure 21:	Proctor Test Results
Figure 22:	California Bearing Ratio Test Results
Table 1:	Laboratory Test Results - Classification
Table 1A:	Laboratory Test Results – Standard Proctor & CBR


PLAN OF BORINGS
Ironbound Square Senior Housing
Ironbound Road and Carriage Road
James City County, Virginia
(AGS Report No. RG05-618)
Figure No. 1
B-1
B-2
B-3
B-4
B-5
B-6
B-7
B-8
B-9
B-10
B-11
P-1
P-2
P-3
R-1
R-2
R-3
R-4
BIO BASIN #1
BIO BASIN #2
IRONBOUND ROAD
50' R/W
CARRIAGE ROAD
50' R/W
PROPOSED PARKING LOT
67 REGULAR SPACES
3 HANDICAP SPACES
PROPOSED BUILDING
FIN. FLOOR= 105.00
GRAPHIC SCALE
SCALE: 1" = 20'
MATCH LINE
SEE SHEET 3
THIS PLAN HAS NOT RECEIVED
FINAL APPROVAL, AND IS NOT
APPROVED FOR CONSTRUCTION.
CONSULTING ENGINEERS
SITE AND UTILITY PLAN
BAY AGING SENIOR HOUSING PROJECT
SITE DEVELOPMENT PLAN
IRONBOUND SQUARE
ABS/BMC
SJP
1"=20'
8/1/06
9351-00
3 OF 8

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	B-1	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×— — — — — × LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL / SURFACE ELEVATION:	FINES (%)	ELEVATION (FEET)
0	1	SS	18	FILL: Brown Clayey Sand w/Crushed Stone, Dry		
2.5	2	SS	18	Medium Dense Brown Clayey Fine SAND (SC)	55	
				- Silty to 6 ft		
				- Damp below 6 ft		
5	3	SS	18	- Brown and Gray 9 to 12 ft		
				- Dense and Gray below 12 ft		
7.5	4	SS	18			
10	5	SS	18			
12.5						
	6	SS	18			
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 25, 2005	CAVE-IN DEPTH AT 9.0 ft
AFTER DRILLING Dry FT.	BORING COMPLETED July 25, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

Figure 2

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	B-2	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL / SURFACE ELEVATION:	FINES (%)	ELEVATION (FEET)
0	1	SS	18	FILL: CRUSHED STONE/TOPSOIL		
2.5	2	SS	18	Loose Brown Silty Clayey Fine SAND (SC)		
				- Dense and Damp below 6 ft		
5	3	SS	18	- Gray below 8.5 ft		
7.5	4	SS	18			
10	5	SS	18			
12.5						
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 25, 2005	CAVE-IN DEPTH AT 7.0 ft
AFTER DRILLING Dry FT.	BORING COMPLETED July 25, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

Figure 3

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	B-3	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×——— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL (SURFACE ELEVATION:)	FINES (%)	ELEVATION (FEET)
0	1	SS	18	TOPSOIL Dense Brown Silty Clayey Fine SAND (SC), Dry		
2.5	2	SS	18	- Loose 2 to 5 ft - Damp below 2 ft		
5	3	SS	18	- Medium Dense below 5 ft - Gray below 8.5 ft	41	
7.5	4	SS	18			
	5	SS	18			
10						
12.5						
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED **July 25, 2005**	CAVE-IN DEPTH AT **5.5 ft**
AFTER DRILLING **Dry** FT.	BORING COMPLETED **July 25, 2005**	DRILLING METHOD **Hollow Stem Auger**
AFTER HRS: FT.	DRILLER **Ayers & Ayers, Inc.**	

Figure 4

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	B-4	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×—————× LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL / SURFACE ELEVATION:	FINES (%)	ELEVATION (FEET)
0	1	SS	18	TOPSOIL FILL: Brown Clayey Fine Sand w/Crushed Stone, Dry		
				Medium Dense Brown Silty Clayey Fine SAND (SC), Damp		
2.5	2	SS	18	- Dense 5 to 12 ft		
				- Gray below 9 ft		
5	3	SS	18			
7.5	4	SS	18			
10	5	SS	18			
12.5	6	SS	18			
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 26, 2005	CAVE-IN DEPTH AT 9.0 ft
AFTER DRILLING Dry FT.	BORING COMPLETED July 26, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

Figure 5

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	B-5	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×——— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL	FINES (%)	ELEVATION (FEET)
				SURFACE ELEVATION:		
0				TOPSOIL		
	1	SS	18	Dense Brown Silty Clayey Fine SAND (SC)		
				- Brown and Gray 2 to 8.5 ft		
2.5	2	SS	18	- Medium Dense and Damp below 6 ft		
				- Gray below 8.5 ft		
5	3	SS	18			
7.5	4	SS	18			
	5	SS	18			
10						
12.5						
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 26, 2005	CAVE-IN DEPTH AT 5.0 ft
AFTER DRILLING Dry FT.	BORING COMPLETED July 26, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

Figure 6

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	B-6	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×——— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL (SURFACE ELEVATION:)	FINES (%)	ELEVATION (FEET)
0				TOPSOIL		
	1	SS	18	FILL: Dark Brown Clayey Sand w/Topsoil and Roots		
				Dense Brown Clayey Fine SAND (SC)		
2.5	2	SS	18	- Silty to 4 ft - Damp below 6 ft - Brown and Gray below 8.5 ft	53	
5	3	SS	18			
7.5	4	SS	18			
	5	SS	18			
10						
12.5						
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 26, 2005	CAVE-IN DEPTH AT 6.0 ft
AFTER DRILLING Dry FT.	BORING COMPLETED July 26, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

Figure 7

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	B-7	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×——— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL	FINES (%)	ELEVATION (FEET)
				SURFACE ELEVATION:		
0				TOPSOIL		
	1	SS	18	Medium Dense Brown Silty Clayey Fine SAND (SC)		
				- Dark Gray Brown (Possible Fill/Topsoil) to 1.5 ft		
2.5	2	SS	18	- Dense below 2.5 ft		
				- Sandy CLAY (CL) 4 to 6 ft		
	3	SS	18	- Damp below 7.5 ft		
5						
7.5	4	SS	18			
	5	SS	18			
10						
12.5						
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 26, 2005	CAVE-IN DEPTH AT 5.0 ft
AFTER DRILLING Dry FT.	BORING COMPLETED July 26, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

Figure 8

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	B-8	1 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×——— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

SURFACE ELEVATION:

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL	FINES (%)	ELEVATION (FEET)
0				TOPSOIL		
	1	SS	18	Medium Dense Brown Silty Clayey Fine SAND (SC)		
				- Brown and Gray 6 to 12 ft		
2.5	2	SS	18	- Damp by 6 ft		
				- Wet by 18 ft		
	3	SS	18	- Gray 12 to 18 ft - Very Loose below 20 ft	54	
5						
7.5	4	SS	18			
	5	SS	18			
10						
12.5						
	6	SS	18			
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 25, 2005	CAVE-IN DEPTH AT 4.0 ft
AFTER DRILLING 61.5 FT.	BORING COMPLETED July 25, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

Figure 9

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	B-8	2 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION
Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ⊲— — — —⊳ LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL SURFACE ELEVATION:	FINES (%)	ELEVATION (FEET)
20	7	SS	18			
22.5						
25	8	SS	18			
27.5				Interlayered Stiff Brown Sandy CLAY (CL/SC) and Loose Brown Clayey SAND		
30	9	SS	18			
32.5						
35	10	SS	18			
37.5				Very Loose Brown Clayey Fine SAND (SC), Wet		

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

Figure 9

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	B-8	3 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×—— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL	FINES (%)	ELEVATION (FEET)
				SURFACE ELEVATION:		
40	11	SS	18			
42.5						
45	12	SS	18			
47.5				Firm Brown Sandy CLAY (CL) w/Shells, Wet - Dark Gray below 50 ft		
50	13	SS	18			
52.5						
55	14	SS	18			
57.5				Medium Dense Gray CLayey Fine SAND (SC), Wet - Loose to 62 ft - w/Shells to 72 ft		

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

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	B-8	4 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)

WATER CONTENT ● (%)

PLASTIC LIMIT ×— — — — —× LIQUID LIMIT

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

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL / SURFACE ELEVATION:	FINES (%)	ELEVATION (FEET)
60	15	SS	18			
62.5						
65	16	SS	18			
67.5						
70	17	SS	18			
72.5						
75	18	SS	18			
77.5						

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

Figure 9

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	B-9	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×——— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL / SURFACE ELEVATION:	FINES (%)	ELEVATION (FEET)
0				TOPSOIL		
	1	SS	18	Dense Brown Silty Clayey Fine SAND (SC)		
				- Brown and Gray 2 to 4 ft and 6 to 12 ft		
2.5	2	SS	18	- Damp below 6 ft		
				- Medium Dense 6 to 12 ft		
				- Gray below 12 ft		
5	3	SS	18			
7.5	4	SS	18			
10	5	SS	18			
12.5						
	6	SS	18			
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 26, 2005	CAVE-IN DEPTH AT 9.0 ft
AFTER DRILLING Dry FT.	BORING COMPLETED July 26, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

Figure 10

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	B-10	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×——— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL (SURFACE ELEVATION:)	FINES (%)	ELEVATION (FEET)
0				TOPSOIL		
	1	SS	18	Medium Dense Brown Silty Clayey Fine SAND (SC)		
				- Dense below 2 ft		
2.5	2	SS	18	- Damp below 7.5 ft	51	
	3	SS	18			
5						
7.5	4	SS	18			
	5	SS	18			
10						
12.5						
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 26, 2005	CAVE-IN DEPTH AT 9.0 ft
AFTER DRILLING Dry FT.	BORING COMPLETED July 26, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	B-11	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×—— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL	FINES (%)	ELEVATION (FEET)
				SURFACE ELEVATION:		
0				TOPSOIL		
	1	SS	18	FILL: Topsoil and Brown and Gray Clayey Sand		
				Dense Brown Silty Clayey Fine SAND (SC)		
2.5	2	SS	18	- Damp below 7 ft		
				- Very Dense below 9 ft		
5	3	SS	18			
7.5	4	SS	18			
	5	SS	18			
10						
12.5						
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 26, 2005	CAVE-IN DEPTH AT 6.0 ft
AFTER DRILLING Dry FT.	BORING COMPLETED July 26, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

Figure 12

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	P-1	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×——— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL (SURFACE ELEVATION:)	FINES (%)	ELEVATION (FEET)
0				TOPSOIL		
	1	SS	18	Loose Brown and Gray Clayey Fine SAND (SC)		
				-w/Organics to 2 ft		
				- Brown and Dense below 2 ft		
2.5	2	SS	18			
5	3	SS	18			
	4	SS	18			
7.5						
10						
12.5						
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED **July 26, 2005**	CAVE-IN DEPTH AT **4.5 ft**
AFTER DRILLING **Dry** FT.	BORING COMPLETED **July 26, 2005**	DRILLING METHOD **Hollow Stem Auger**
AFTER HRS: FT.	DRILLER **Ayers & Ayers, Inc.**	

Figure 13

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	P-2	1 OF 1

PROJECT NAME: Ironbound Square Senior Housing

ARCHITECT-ENGINEER: dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)

WATER CONTENT ● (%)

PLASTIC LIMIT ×——— LIQUID LIMIT

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

SURFACE ELEVATION:

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL	FINES (%)	ELEVATION (FEET)
0				TOPSOIL		
	1	SS	18	FILL: Brown Topsoil w/Shells		
2.5	2	SS	18			
				Dense Brown Clayey Fine SAND (SC)		
5	3	SS	18			
	4	SS	18			
7.5						
10						
12.5						
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 26, 2005	CAVE-IN DEPTH AT 3.5 ft
AFTER DRILLING Dry FT.	BORING COMPLETED July 26, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

Figure 14

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	P-3	1 OF 1
PROJECT NAME: Ironbound Square Senior Housing	ARCHITECT-ENGINEER: dBF Associates, Architects		

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMT ×—— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL (SURFACE ELEVATION:)	FINES (%)	ELEVATION (FEET)
0				TOPSOIL		
	1	SS	18	Medium Dense Brown Clayey Fine SAND (SC)		
				- Dry to 2 ft		
2.5	2	SS	18	- Dense below 4 ft		
	3	SS	18			
5						
	4	SS	18			
7.5						
10						
12.5						
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 26, 2005	CAVE-IN DEPTH AT 4.0 ft
AFTER DRILLING Dry FT.	BORING COMPLETED July 26, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

Figure 15

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	R-1	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×—— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL / SURFACE ELEVATION:	FINES (%)	ELEVATION (FEET)
0				TOPSOIL		
	1	SS	18	FILL: Brown Clayey Fine Sand w/Topsoil (Possible Natural)		
2.5	2	SS	18	~~Bottom~~		
5	3	SS	18	Medium Dense Brown Clayey Fine SAND (SC), Damp		
	4	SS	18		47	
7.5						
10				NG rot 103 BTM ~~98~~ 102.80 ~~3'~~ deep 1' deep		
12.5						
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 26, 2005	CAVE-IN DEPTH AT 4.5 ft
AFTER DRILLING Dry FT.	BORING COMPLETED July 26, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

Figure 16

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	R-2	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×——— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL / SURFACE ELEVATION:	FINES (%)	ELEVATION (FEET)
0				TOPSOIL		
	1	SS	18	Medium Dense Brown Clayey Fine SAND (SC)		
				- Dense below 2 ft		
2.5	2	SS	18	- Very Dense below 4 ft 3'		
5	3	SS	18		44	
7.5	4	SS	18			
10	5	SS	18			
12.5				N.G 107 BTM 98 / 31		
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 26, 2005	CAVE-IN DEPTH AT 6.0 ft
AFTER DRILLING Dry FT.	BORING COMPLETED July 26, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

Figure 17

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	R-3	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×——— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL / SURFACE ELEVATION:	FINES (%)	ELEVATION (FEET)
0				TOPSOIL		
	1	SS	18	FILL/TOPSOIL		
2.5	2	SS	18	Dense Brown Silty Clayey Fine SAND (SC) - Very Dense below 4.5 ft - Dry to 6 ft		
5	3	SS	18			
7.5	4	SS	7			
10	5	SS	10			
12.5						
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED July 26, 2005	CAVE-IN DEPTH AT 7.0 ft
AFTER DRILLING Dry FT.	BORING COMPLETED July 26, 2005	DRILLING METHOD Hollow Stem Auger
AFTER HRS: FT.	DRILLER Ayers & Ayers, Inc.	

OWNER	JOB #	BORING #	SHEET
Agency on Aging	RG05-618	R-4	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Ironbound Square Senior Housing	dBF Associates, Architects

SITE LOCATION: Ironbound Road, James City County, Virginia

CALIBRATED PENETROMETER ○ TONS/FT2 (1, 2, 3, 4, 5)
WATER CONTENT ● (%)
PLASTIC LIMIT ×——— LIQUID LIMIT
STANDARD PENETRATION ⊗ (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	DESCRIPTION OF MATERIAL	FINES (%)	ELEVATION (FEET)
				SURFACE ELEVATION:		
0				TOPSOIL		
	1	SS	18	Dense Brown Clayey Fine SAND (SC)		
				- Dry to 2 ft		
				- Very Dense below 4 ft		
2.5	2	SS	18			
				- Gray below 9.5 ft		
				- Damp below 9.5 ft		
5	3	SS	18			
7.5	4	SS	18			
10	5	SS	9			
12.5						
15						
17.5						

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

WATER DEPTH IN BOREHOLE	BORING STARTED **July 26, 2005**	CAVE-IN DEPTH AT **5.5 ft**
AFTER DRILLING **Dry** FT.	BORING COMPLETED **July 26, 2005**	DRILLING METHOD **Hollow Stem Auger**
AFTER HRS: FT.	DRILLER **Ayers & Ayers, Inc.**	

Figure 19

REFERENCE NOTES FOR BORING LOGS

Drilling and Sampling Symbols		
SS - Split Spoon Sampler	DC - Dutch Cone Penetrometer	DCP - Dynamic Cone Penetrometer
ST - Shelby Tube Sampler	RB - Rock Bit Drilling	HS - Hollow Stem Auger
RC - Rock Core; NX, BX, AX	BS - Bulk Sample of Cuttings	WS – Wash Sample
PM – Pressuremeter	PA - Power Auger (no sample)	

Correlation of Typical Sampler Penetration Resistances to Soil Properties

Relative Density - Sands, Silts		Consistency of Cohesive Soils		
SPT-N	Relative Density	Unconfined Compressive Strength, tsf	Consistency	SPT-N
0 - 4	Very Loose	Under 0.25	Very Soft	0 - 2
5 - 9	Loose	0.25 - 0.49	Soft	3 - 4
10 - 29	Medium Dense	0.50 - 0.99	Firm	5 - 8
30 - 49	Dense	1.00 - 1.99	Stiff	9 - 16
50 - 80	Very Dense	2.00 - 3.99	Very Stiff	17 - 32
		4.00 - 8.00	Hard	33+

SPT (in Blows/Ft) refers to the blows required of a 140-lb hammer, falling 30 inches on a 2-inch O.D. split-spoon sampler (as specified in ASTM D 1586) to drive the required sampler the last 12 inches. The blow count is commonly referred to as the N value; denoted by ⊗ on the boring logs.

Unified Soil Classification Abbreviations		
GP - Poorly Graded Gravels	SW - Well Graded Sands	CL - Low Plasticity Clays
GW - Well Graded Gravels	SM - Silty Sands	CH - High Plasticity Clays
GM - Silty Gravels	SC - Clayey Sands	OL - Low Plasticity Organic Soils
GC - Clayey Gravels	ML - Low Plasticity Silts	OH - High Plasticity Organic Soils
SP - Poorly Graded Sands	MH - High Plasticity Silts	CL/ML - Dual Classification (Typical)

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

Figure 20

PROCTOR TEST REPORT

Project No.: RG05-618 Date: 8-04-2005

Project: IRONBOUND SQUARE SENIOR HOUSING

Location: JAMES CITY COUNTY, VIRGINIA

Elev/Depth: 0'-5'

Remarks:

Sample Collected from Boring P-1 Drill Cuttings

MATERIAL DESCRIPTION

Description: Grayish-Brown Silty SAND

Classifications: USCS: SM AASHTO: A-4

Nat. Moist. = 10% Sp.G. =

Liquid Limit = 22 Plasticity Index = 1

%< No.200 = 43%

TEST RESULTS
Maximum dry density = 106.1 pcf
Optimum moisture = 14.3 %

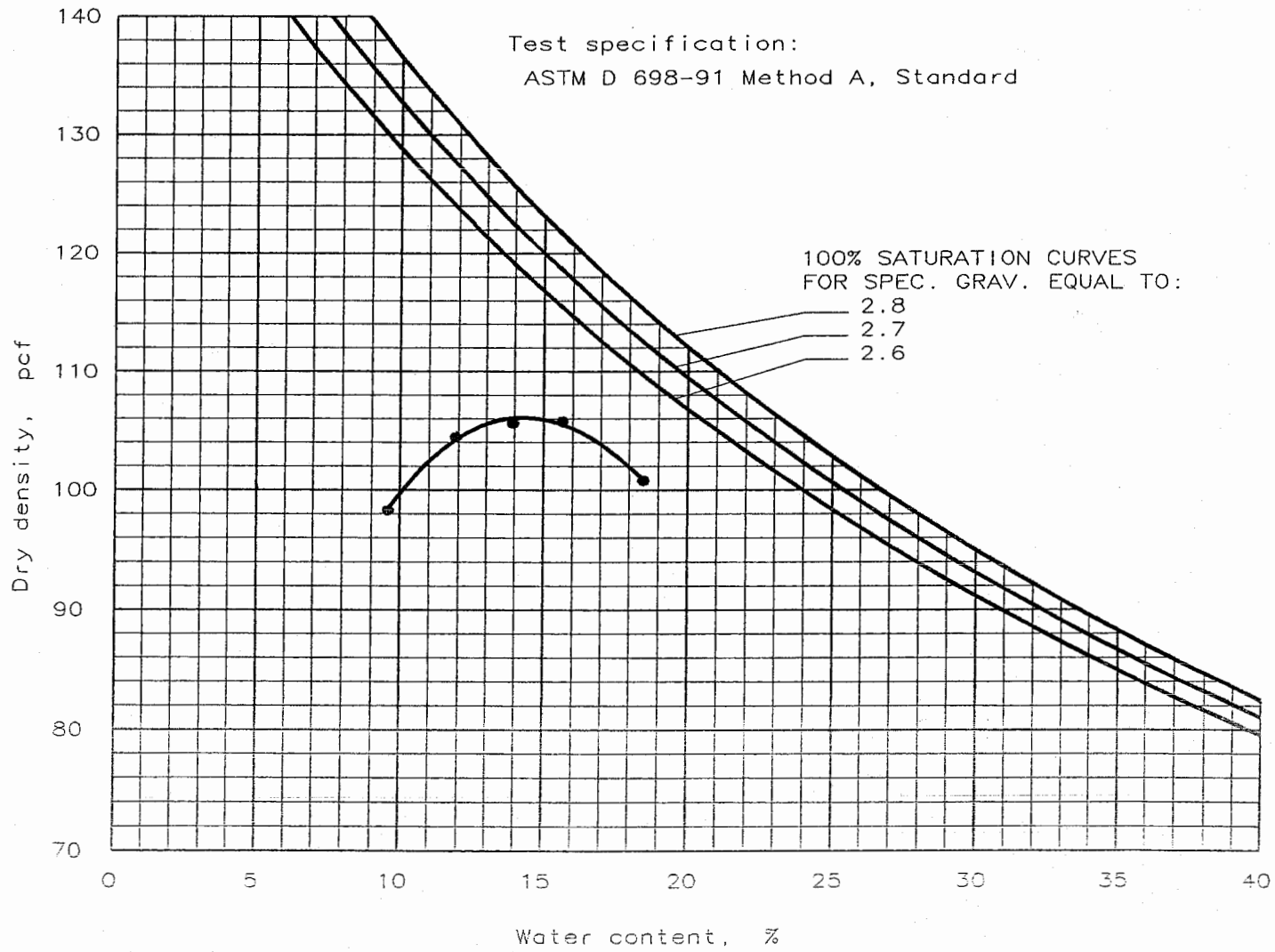
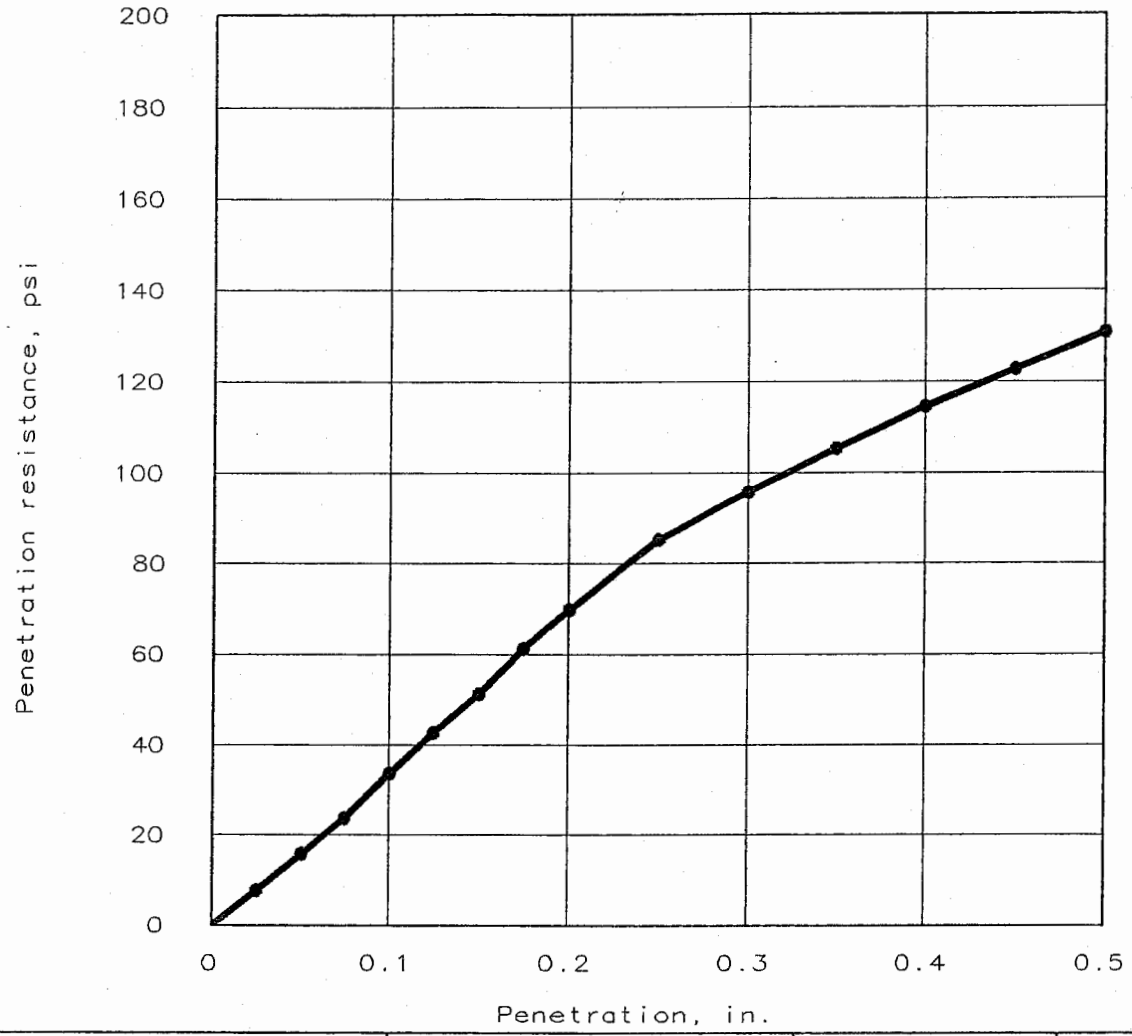


Plate No. 21

Atlantic Geotechnical Services, Inc.

BEARING RATIO TEST REPORT



	Molded			Soaked			CBR, (%)		Lin.	Pen.	Swell
	Dens.	% max	moist	Dens.	% max	moist	0.1"	0.2"	Cor.	Sur.	%
1 ●	104.9	98.9	15.1%	104.9	98.9	16.7%	3.7	4.9	0.010	10	0.0
2 ▲											
3 ■											

MATERIAL DESCRIPTION	USCS	Max. dens.	Opt. w.c.	LL	PI
		106.1	14.3	22	1

Project No: RG05-618

Project: IRONBOUND SQUARE SENIOR HOUSING

Location: JAMES CITY COUNTY, VIRGINIA

Date: 8-26-2005

Test Descr./Remarks:

ASTM D1883

Sample Collected from Boring P-1 Drill Cuttings

BEARING RATIO TEST REPORT

Atlantic Geotechnical Services, Inc.

Fig. No. 22

TABLE 1 - LABORATORY TEST RESULTS

Proposed Ironbound Square Senior Housing
Ironbound at Carriage Roads
James City County, Virginia

Boring No.	Depth, ft	Moisture Content, %	% Passing No. 200 Sieve	Atterberg Limits Plastic	Liquid	Plasticity Index
B-1	1.0	3				
	3.0	16	55	16	33	17
	5.0	15				
B-2	1.0	2				
	3.0	15				
	5.0	14				
B-3	1.0	8				
	3.0	13				
	5.0	17	41	17	34	17
B-4	1.0	3				
	3.0	12				
	5.0	16				
B-5	1.0	8				
	3.0	10				
	5.0	14				
B-6	1.0	14				
	3.0	15	53	16	38	22
	5.0	10				
B-7	1.0	13				
	3.0	14				
	5.0	17				

Proposed Ironbound Square Senior Housing
Ironbound at Carriage Roads
James City County, Virginia

Boring No.	Depth, ft	Moisture Content, %	% Passing No. 200 Sieve	Atterberg Limits Plastic	Liquid	Plasticity Index
B-8	1.0	11				
	3.0	14				
	5.0	16	54	15	34	19
	8.0	16				
B-9	1.0	6				
	3.0	11				
	5.0	12				
B-10	1.0	10				
	3.0	13	51	14	26	12
	5.0	14				
B-11	1.0	9				
	3.0	13				
	5.0	14				
P-1	1.0	16				
	3.0	10				
	0-5	10	43	21	22	1
P-2	1.0	6				
	3.0	10				
P-3	1.0	9				
	3.0	7				

Proposed Ironbound Square Senior Housing
Ironbound at Carriage Roads
James City County, Virginia

Boring No.	Depth, ft	Moisture Content, %	% Passing No. 200 Sieve	Atterberg Limits Plastic	Liquid	Plasticity Index
R-1	1.0	6				
	3.0	7				
	5.0	12				
	6.5	13	47	15	29	14
R-2	1.0	3				
	3.0	12				
	5.0	12	44	17	38	21
	8.0	11				
	10.5	12				
R-3	1.0	8				
	3.0	8				
	5.0	9				
	7.0	10				
	10.0	9				
R-4	1.0	4				
	3.0	11				
	5.0	11				
	8.0	8				
	10.0	10				

TABLE 1A - LABORATORY TEST RESULTS
PROCTOR/CALIFORNIA BEARING RATIO

Proposed Ironbound Square Senior Housing
Ironbound at Carriage Roads
James City County, Virginia

Boring No.	Moisture Content, %	Atterberg Limits			Standard Proctor Compaction		Soaked CBR, %	Percent Fines
		PL	LL	PI	Opt. Moist., %	Max. Dry Wt., pcf		
P-1	16	21	22	1	14.3	106.1	4	43

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

County BMP ID Code (if known): CC033

Name of Facility: Bay Aging Senior Housing Project BMP No.: #1 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
Accessibility:				
Roads	✓			
Parking Areas	✓			
Gates	NA			
Locks	NA			
Safety Fencing	NA			
Observation Wells/Areas:				
Trap Doors				
Manhole Covers				
Grates			✓	NONE FOUND (?)
Steps				
Pretreatment Devices: ☐ Inlet ☒ Sump ☐ Forebay ☐ Other				
Sediment		✓		
Trash & Debris	✓			
Structure	✓			
Other				
Inflow Structure (Describe Type/Location):				

Facility Item	O.K.	Routine	Urgent	Comments
Condition	✓			
Erosion			✓	
Trash and Debris	✓			
Sediment				
Aesthetics		✓		Shrub Plantings
Other				
Primary Infiltration (Bioretention Cell) Area:				
Specialty Landscaping		✓		Shrub Plantings
Mulch Layer		✓		
Planting Soil/Sand	✓			
Subgrade Soil	✓			
Aggregate	✓			
Underdrain	✓			
Sediment		✓		
Aesthetics		✓		Shrub Plantings
Overflow or Bypass Control Structure (Describe Type/Location): DI-1				
Condition	✓			
Erosion	✓			
Trash & Debris	✓			
Sediment	✓			
Other	✓			
Outlet Structure (Describe Type/Location): DI-1				
Condition	✓			
Erosion	✓			
Trash & Debris	✓			
Sediment	✓			
Other	✓			
Contributing Drainage Area/Perimeter Conditions:				
Land Use	✓			
Stabilization		✓		
Trash & Debris	✓			
Pollutant Hazard	NA			
Other				

Facility Item	O.K.	Routine	Urgent	Comments

Sketch and/or Remarks:

① Request planting list invoice from developer.

Overall Environmental Division Internal Rating: _____

Signature:_____ **Date:**_____

Title:_____

SWMProg\BMP\CoInspProg\Bioret.wpd

Date Record Created:

Created By:

WS_BMPNO: CC033

Print Record

PRINTED ON
Thursday, March 11, 2010
8:41:19 AM

WATERSHED	CC
BMP ID NO	033
PLAN NO	SP-100-05
TAX PARCEL	
PIN NO	
CONSTRUCTION DATE	11/1/2008
PROJECT NAME	Bay Aging
FACILITY LOCATION	Ironbound Rd and Carrige Rd
CITY-STATE	
CURRENT OWNER	Bay Aging Senior Housing Project
OWNER ADDRESS	PO Box 610
OWNER ADDRESS 2	
CITY-STATE-ZIP CODE	Urbanna, VA 23175
OWNER PHONE	804-758-2386
MAINT AGREEMENT	Yes
EMERG ACTION PLAN	Yes

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MAINTENANCE PLAN	Yes	CTRL STRUC DESC	DI-7
SITE AREA acre	3.75	CTRL STRUC SIZE inches	
LAND USE	Residential	OTLT BARRL DESC	
old BMP TYP	Bioretention	OTLT BARRL SIZE inch	
JCC BMP CODE	D1 Bioretention		
POINT VALUE	4	EMERG SPILLWAY	No
		DESIGN HW ELEV	104.3
		PERM POOL ELEV	
SVC DRAIN AREA acres	0.42	2-YR OUTFLOW cfs	103.57
		10-YR OUTFLOW cfs	103.62
		REC DRAWING	Yes
SERVICE AREA DESCRI	Senior Housing		
IMPERV AREA acres	0.42	CONSTR CERTIF	Yes
RECV STREAM	College Creek		
EXT DET-WQ-CTRL	No	LAST INSP DATE 3/4/2009	Inspected by:
WTR QUAL VOL acre-ft		INTERNAL RATING	
CHAN PROT CTRL	No	MISC/COMMENTS	
CHAN PROT VOL acre-ft			
SW/FLOOD CONTROL	No		
GEOTECH REPORT	No		

Additional Comments: Small Rain Garden by Building