



See also WC074

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.

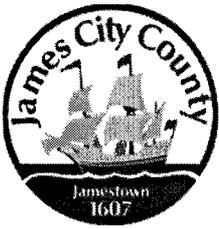
BMP NUMBER: WC073

DATE VERIFIED: October 15, 2012

QUALITY ASSURANCE TECHNICIAN: Leah Hardenbergh

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA



Stormwater Division

MEMORANDUM

DATE: March 12, 2010
TO: Michael J. Gillis, Virginia Correctional Enterprises Document Management Services
FROM: Tina Cantwell, Stormwater
PO: 270712
RE: Files Approved for Scanning

General File ID or BMP ID: WC073

PIN: 0520300001A

Subdivision, Tract, Business or Owner

Name (if known):

Association at Stonehouse, Inc. (The)

Property Description:

West of 9923 Walnut Creek Lot 17

Site Address:

Walnut Creek in Stonehouse Subdivision

(For internal use only)

Box 13

Drawer: 8

Agreements: (in file as of scan date)

Y

Book or Doc#:

990026872

Page:

010012943

Comments

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

COPY

THIS DECLARATION, made this 13th day of July, 2001, 19 ,
between STONE HOUSE DEVELOPMENT COMPANY, L.L.C.,
and all successors in interest, hereinafter referred to as the "COVENANTOR(S)," owner(s) of the JMB
following property: DEVELOPMENT AREA ONE, PHASE I, SECT. V-B, BENT TREE - PHASE 2, WALNUT CREEK
Deed Book , Page No. or Instrument No. 99-0026872 SECTION,
and James City County, Virginia, hereinafter referred to as the "COUNTY."

WITNESSETH:

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

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

*Instrument # 010012943
Recorded July 24, 2001*

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of this 13th day of July, 19 2001

COVENANTOR(S)

[Signature]

Print Name/Title

LAWRENCE O. MYERS ^{TREASURER}

ATTEST:

[Signature]

COVENANTOR(S)

Print Name/Title

ATTEST:

COMMONWEALTH OF VIRGINIA

CITY/COUNTY OF James City

I hereby certify that on this 13 day of July, 2001, before the subscribed, a Notary Public of the State of Virginia, and for the City/County of James City, aforesaid personally appeared LAWRENCE O. MYERS and did acknowledge the foregoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 13th day of July, 2001.

[Signature]

Notary Public
Robyn L. Sulanowski

My Commission expires:

3/31/05

Approved as to form:

[Signature]
Deputy County Attorney

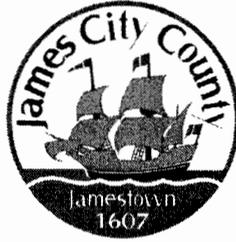
This Declaration of Covenants prepared by:

JAMES H. BENNETT
(Print Name)

PROJECT ENGINEER
(Title)

9701 MILL POND RUN
(Address)

TOANO VA 23168
(City) (State) (Zip)



**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: Stonehouse - Section V-B (Bent Tree Phase 2 and Walnut Creek)
 Structure/BMP Name: BMP #5.2
 Project Location: Stonehouse - Bent Tree
 BMP Location: Behind lot 3 & 4 on Windy Branch Drive
 County Plan No.: JCC Case No. S - 42 - 99

Project Type:	<input checked="" type="checkbox"/> Residential	<input type="checkbox"/> Business	Tax Map/Parcel No.:	<u>(6-4) (1-1)</u>
	<input type="checkbox"/> Commercial	<input type="checkbox"/> Office	BMP ID Code (if known):	<u>WC073</u>
	<input type="checkbox"/> Institutional	<input type="checkbox"/> Industrial	Zoning District:	<u>PUD-R</u>
	<input type="checkbox"/> Public	<input type="checkbox"/> Roadway	Land Use:	<u>Residential</u>
	<input type="checkbox"/> Other _____		Site Area (sf or acres):	<u>20.86</u>

Brief Description of Stormwater Management/BMP Facility: Dry Pond

Nearest Visible Landmark to SWM/BMP Facility: Access road to facility on Windy Branch Drive

Nearest Vertical Ground Control (if known):
 JCC Geodetic Ground Control USGS Temporary Arbitrary Other
 Station Number or Name: 303
 Datum or Reference Elevation: NGVD 1929
 Control Description: NAD 27
 Control Location from Subject Facility: 3.5 miles south

Section 2 – Stormwater Management / BMP Facility Construction Information:

PreConstruction Meeting Held for Construction of SWM/BMP Facility: Yes No Unknown
Approx. Construction Start Date for SWM/BMP Facility: July 2001
Facility Monitored by County Representative during Construction: Yes No Unknown
Name of Site Work Contractor Who Constructed Facility: George Nice & Sons, Inc.
Name of Professional Firm Who Routinely Monitored Construction: _____
Date of Completion for SWM/BMP Facility: October 2002
Date of Record Drawing/Construction Certification Submittal: 11/07/02

(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: Stonehouse Development Company
Mailing Address: 9701 Mill Pond Run
Toano, VA 23168
Business Phone: 757-234-5000 Fax: 757-234-5091
Contact Person: Jerry Moore Title: President

Design Professional: *(Note: Professional Engineer or Certified Land Surveyor responsible for the design and preparation of plans and specifications for the Stormwater Management / BMP facility.)*
Firm Name: AES Consulting Engineers
Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg, VA 23188
Business Phone: 757-253-0040
Fax: 757-220.8994
Responsible Plan Preparer: Marc Bennett
Title: Senior Project Manager
Stonehouse - Development Area One, Phase 1- Section V-B, "Bent Tree" - Phase2 and
Plan Name: Walnut Creek
Firm's Project No. 8877-00
Plan Date: August 21, 2000
Sheet No.'s Applicable to SWM/BMP Facility: 7 / 9 / 10 / _____ / _____

BMP Contractor: *(Note: Site Work Contractor directly responsible for construction of the Stormwater Management / BMP facility.)*
Name: George Nice & Sons, Inc.
Mailing Address: 143 Skimino Road
Williamsburg, VA 23188-2229
Business Phone: (757) 565-2885
Fax: (757) 565-1526
Contact Person: Ray Nice P. E.
Site Foreman/Supervisor: _____
Specialty Subcontractors & Purpose (for BMP Construction Only):

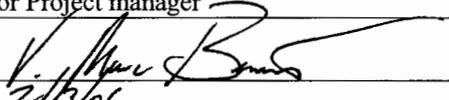
Section 4 – Professional Certifications:

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

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

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

Name: Marc Bennett
Title: Senior Project manager
Signature: 
Date: 2/13/06

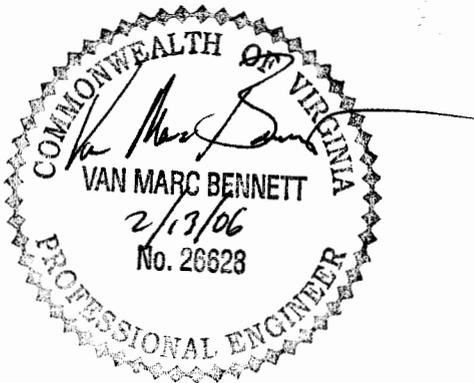
I hereby certify to the best of my knowledge and belief that this record drawing represents the actual condition of the Stormwater Management / BMP facility. The facility appears to conform with the provisions of the approved design plan, specifications and stormwater management plan, except as specifically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

Construction Certification

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

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

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



 (Seal)

Virginia Registered Professional Engineer
Or Certified Land Surveyor

_____ (Seal)

Virginia Registered
Professional Engineer

Section 4 – Professional Certifications:

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

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

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

Name: Marc Bennett
Title: Senior Project manager

Signature: *V. Marc Bennett*
Date: 2/17/06

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

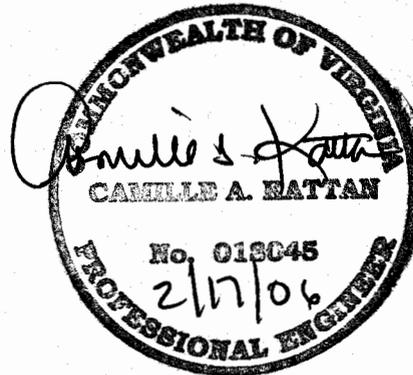
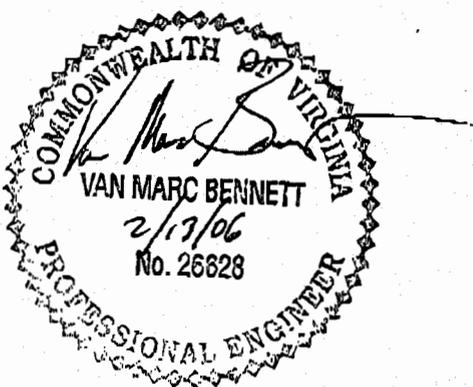
Construction Certification

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

Name: _____
Title: _____

Signature: *Camille A. Hattan*
Date: 2/17/06

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.



V. Marc Bennett (Seal)

Virginia Registered Professional Engineer
Or Certified Land Surveyor

Camille A. Hattan (Seal)

Virginia Registered
Professional Engineer

052030001A
W/ST OF 9923
WALNUT CREEK
LOT 17 SEC 5B

EAST OF CITY
GPIN 0440100024
EAST OF 309 TRIALWOOD
LANE, LOT 4 SEC 5B
WALNUT
CREEK

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

County Plan No.: S-42-99; S-74-00 Amended PH2
Project Name: STONEHOUSE DEV AREA ONE, PH 1 SEC 5-B/Bent Trees & Walnut Creek
Stormwater Management Facility: BMP # 5.2

BMP Phase #: I II III

Information Package Received. Date/By: 12/14/04 AES

Completeness Check: Record Drawing Date/By: 12/14/04 AES; 2/13/06 CERT

Construction Certification Date/By: 2/17/06 ELS

RD/CC Standard Forms (Required for all BMPs after Feb 1st 2001 Only)

Insp/Maint Agreement # / Date: * 010012943 JULY 24 '01 + SW3AL SH 1/M

BMP Maintenance Plan Location: SHEET 9

Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review file.

Yes No Location: Note # 20 sheet 12

Assign County BMP ID Code #: Code: WC073

Preliminary Input/Log into Division's "As-Built Tracking Log"

Add Location to GIS Database Map. Obtain basic site information (GPIN, Owner, Address, etc.)

Preliminary Log into Access Database (BMP ID #, Plan No., GPIN, Project Name, etc.)

Active Project File Review (correspondence, H&H, design computations, etc.)

Initial As-Built File setup (File label, folder, copy plan/details/design information, etc.)

Inspector Check of RD/CC (forward to Inspector using transmittal for cursory review).

Pre-Inspection Drawing Review of Approved Plan (Quick look prior to Field Inspection).

Final Inspection (FI) Performed Date: 3/17/05, 6/5/06

Record Drawing (RD) Review Date: _____

Construction Certification (CC) Review Date: _____

Actions:

No comments.

Comments. Letter Forwarded. Date: _____

Record Drawing (RD)

Construction Certification (CC)

Construction-Related (CR) VERBAL

Site Issues (SI)

Other: _____

Second Submission: _____

Reinspection (if necessary): 5/30/06

Acceptable for SWM Purposes (RD/CC/CR/Other). Ok to proceed with bond release process.

Complete "Surety Request Form": 6/30/06

Check/Clean active file of any remaining material and finish "As-Built" file.

Add to County BMP Inventory/Inspection schedule (Phase I, II or III).

Copy Final Inspection Report into County BMP Inspection Program file.

Obtain Digital Photographs of BMP and save into County BMP Inventory.

Request mylar/reproducible from As-Built plan preparer. 06/02/06 AES ✓ RJD 6-13-06

Complete "As-built Tracking Log"

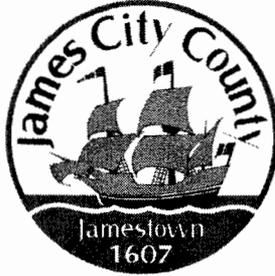
Last check of BMP Access Database (County BMP Inventory).

Add BMP to JCC Hydrology & Hydraulic database (optional).

Add BMP to PRIDE BMP ratings database.

Plan Reviewer: [Signature] Final Sign-Off Date: 06/02/06

*** See separate checklist, if needed.



James City County, Virginia
Environmental Division

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

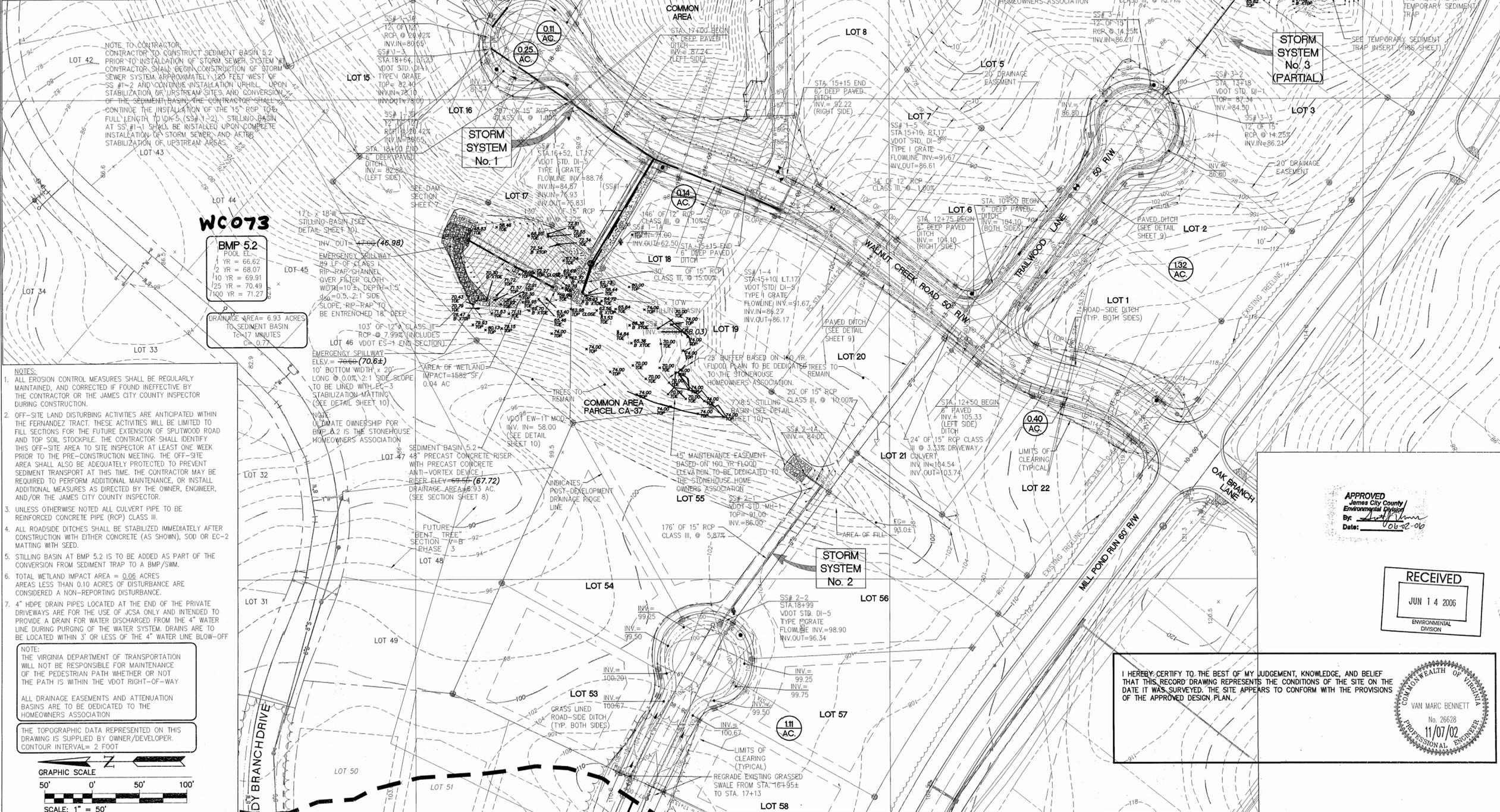
Standard Forms & Instructions

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*Issue Date
February 1, 2001*

ROADWAY CULVERT SIZES FOR LOT DRAINAGE

LOT No.	CULVERT SIZE
1	15"
2	15"
3	15"
4	15"
5	15"
6	15"
7	15"
8	15"
9	15"
10	15"
11	15"
12	15"
13	15"
14	15"
15	15"
16	15"
17	15"
18	15"
19	15"
20	15"
21	15"
23	15"
53	15"
55	15"
56	15"
57	15"
58	15"



- NOTES:**
- ALL EROSION CONTROL MEASURES SHALL BE REGULARLY MAINTAINED, AND CORRECTED IF FOUND INEFFECTIVE BY THE CONTRACTOR OR THE JAMES CITY COUNTY INSPECTOR DURING CONSTRUCTION.
 - OFF-SITE LAND DISTURBING ACTIVITIES ARE ANTICIPATED WITHIN THE FERNANDEZ TRACT. THESE ACTIVITIES WILL BE LIMITED TO FILL SECTIONS FOR THE FUTURE EXTENSION OF SPALWOOD ROAD AND TOP SOIL STOCKPILE. THE CONTRACTOR SHALL IDENTIFY THIS OFF-SITE AREA TO SITE INSPECTOR AT LEAST ONE WEEK PRIOR TO THE PRE-CONSTRUCTION MEETING. THE OFF-SITE AREA SHALL ALSO BE ADEQUATELY PROTECTED TO PREVENT SEDIMENT TRANSPORT AT THIS TIME. THE CONTRACTOR MAY BE REQUIRED TO PERFORM ADDITIONAL MAINTENANCE, OR INSTALL ADDITIONAL MEASURES AS DIRECTED BY THE OWNER, ENGINEER, AND/OR THE JAMES CITY COUNTY INSPECTOR.
 - UNLESS OTHERWISE NOTED ALL CULVERT PIPE TO BE REINFORCED CONCRETE PIPE (RCP) CLASS III.
 - ALL ROADSIDE DITCHES SHALL BE STABILIZED IMMEDIATELY AFTER CONSTRUCTION WITH EITHER CONCRETE (AS SHOWN), SOD OR EC-2 MATTING WITH SEED.
 - STILLING BASIN AT BMP 5.2 IS TO BE ADDED AS PART OF THE CONVERSION FROM SEDIMENT TRAP TO A BMP/SWM.
 - TOTAL WETLAND IMPACT AREA = 0.06 ACRES. AREAS LESS THAN 0.10 ACRES OF DISTURBANCE ARE CONSIDERED A NON-REPORTING DISTURBANCE.
 - 4" HDPE DRAIN PIPES LOCATED AT THE END OF THE PRIVATE DRIVEWAYS ARE FOR THE USE OF JCSA ONLY AND INTENDED TO PROVIDE A DRAIN FOR WATER DISCHARGED FROM THE 4" WATER LINE DURING PURGING OF THE WATER SYSTEM. DRAINS ARE TO BE LOCATED WITHIN 3' OR LESS OF THE 4" WATER LINE BLOW-OFF

NOTE: THE VIRGINIA DEPARTMENT OF TRANSPORTATION WILL NOT BE RESPONSIBLE FOR MAINTENANCE OF THE PEDESTRIAN PATH WHETHER OR NOT THE PATH IS WITHIN THE VDOT RIGHT-OF-WAY

ALL DRAINAGE EASEMENTS AND ATTENUATION BASINS ARE TO BE DEDICATED TO THE HOMEOWNERS ASSOCIATION

THE TOPOGRAPHIC DATA REPRESENTED ON THIS DRAWING IS SUPPLIED BY OWNER/DEVELOPER. CONTOUR INTERVAL = 2 FOOT

GRAPHIC SCALE
 50' 0' 50' 100'
 SCALE: 1" = 50'

APPROVED
 James City County
 Environmental Division
 By: [Signature]
 Date: 06-02-06

RECEIVED
 JUN 14 2006
 ENVIRONMENTAL DIVISION

COMMONWEALTH OF VIRGINIA
 VAN MARC BENNETT
 No. 26628
 11/07/02
 PROFESSIONAL ENGINEER

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

REV.	DATE	BY	REVISION / COMMENT / NOTE
1	11/07/02		BMP 5.2 & BMP 5.3 RECORD DRAWINGS
2	10/23/01		FIELD CHANGE #1
3	7/25/01		REVISED AS PER UCCO COMMENT LETTER DATED 7/18/01
4	6/18/01		REVISED AS PER UCCO COMMENT LETTER DATED 6/12/01
5	5/17/01		REVISED AS PER UCCO COMMENT LETTER DATED 4/29/01 & PER CLIENT
6	1/27/01		REVISED AS PER UCCO COMMENT LETTER DATED 9/27/00

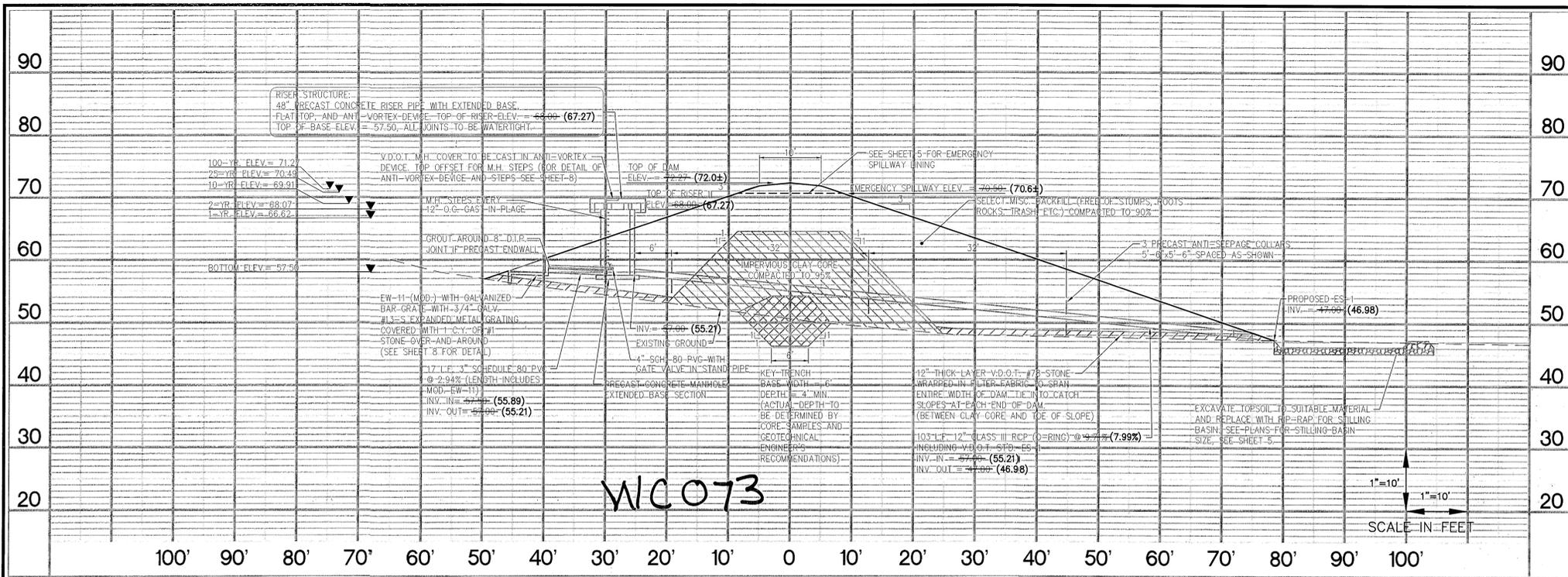
5248 Olde Towne Road, Suite 1
 Williamsburg, Virginia 23188
 (757) 253-0040
 Fax (757) 220-8994



DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
SECTION V-B 'BENT TREE' - PHASE 2
AND WALNUT CREEK
AND WALNUT CREEK
AT STONEHOUSE FOR
STONEHOUSE DEVELOPMENT COMPANY, L.L.C.
 JAMES CITY COUNTY, VIRGINIA

Designed	VMB/JAG	Drawn	RDS
Scale	1"=50'	Date	8/21/00
Project No.	8877-00	Drawing No.	7

S-42-99 WC073, WC074 RECORD DRAWING-11/07/02



SECTION A-A BMP 5.2

- BMP 5.2.85.3
1. THE CONSTRUCTION OF THE CLAY CORE IS TO BE IN ACCORDANCE WITH NOTE 6 OF THE GENERAL NOTES FOR CONSTRUCTION OF STORMWATER BASINS. SEE THIS SHEET.
 2. THE CONSTRUCTION OF THE KEY TRENCH IS TO BE IN ACCORDANCE WITH NOTE 5 OF THE GENERAL NOTES FOR CONSTRUCTION OF STORMWATER BASINS. SEE THIS SHEET.

GENERAL NOTES FOR CONSTRUCTION OF STORMWATER BASINS

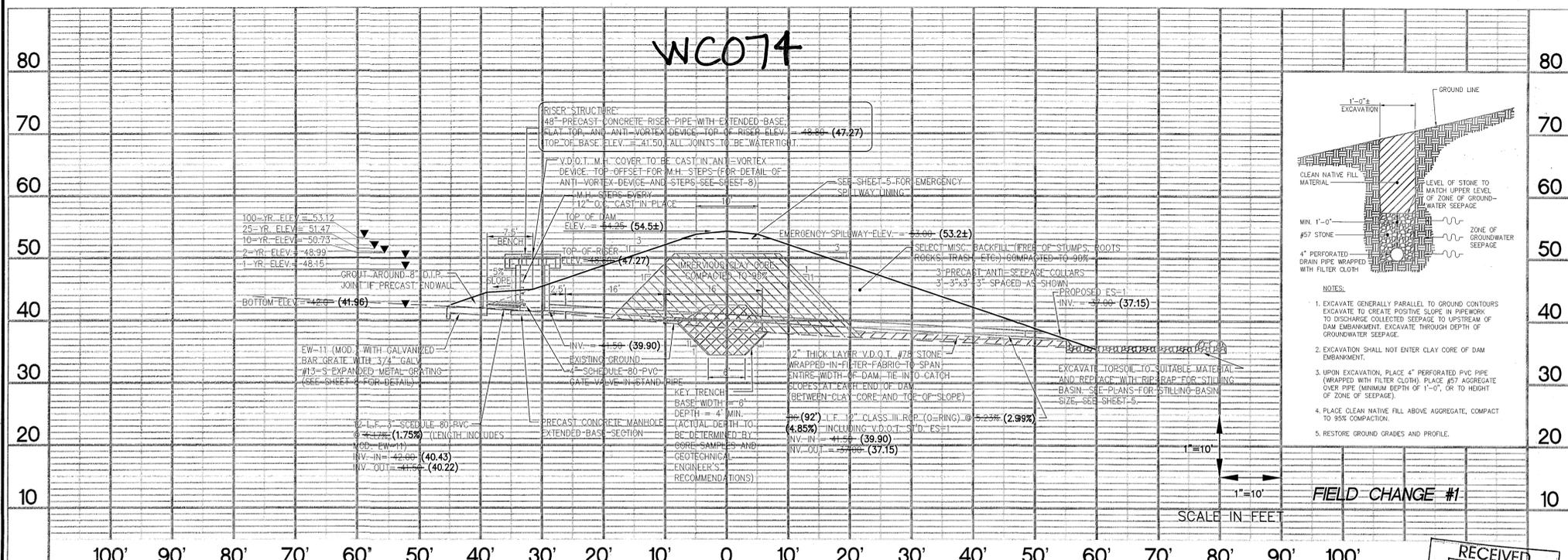
1. THE CONTRACTOR SHALL PROVIDE ALL WORK AND MATERIALS NEEDED TO CONSTRUCT THE STORMWATER BASIN, STORMWATER MANAGEMENT PONDS, BEST MANAGEMENT PRACTICES, SEDIMENT BASINS AND SEDIMENT TRAPS. THE WORK SHALL INCLUDE ALL LABOR, MATERIALS, EQUIPMENT AND MATERIALS NEEDED FOR THE COMPLETION OF GRADING AND EARTHWORK ASSOCIATED WITH THE CONSTRUCTION.
2. THE CONTRACTOR SHALL CONSULT AND PROVIDE FOR THE SERVICES OF A GEOTECHNICAL ENGINEER. THE GEOTECHNICAL ENGINEER SHALL PROVIDE TEST RESULTS ON PLACED DAM MATERIALS, IDENTIFYING SOIL CLASSIFICATION, PERMEABILITY, PLASTICITY INDEX, AND COMPACTION. ALL TESTS SHALL BE IN CONFORMANCE WITH ASTM STANDARDS. THE COST OF THE SERVICES OF THE GEOTECHNICAL ENGINEER SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SATISFACTORY GEOTECHNICAL RESULTS ARE NEEDED PRIOR TO FINAL APPROVAL.
3. ALL INSPECTIONS REQUIRED FOR THE WORK SHALL BE PERFORMED BY A GEOTECHNICAL ENGINEER AT THE EXPENSE OF THE GENERAL CONTRACTOR.
4. ON-SITE EXCAVATED MATERIAL, IF DETERMINED SUITABLE FOR USE IN DAM CONSTRUCTION BY A GEOTECHNICAL ENGINEER, MAY BE USED FOR DAM CONSTRUCTION. SHOULD ADDITIONAL MATERIAL BE REQUIRED, THE CONTRACTOR SHALL IDENTIFY THE NEED FOR MATERIAL TO THE OWNER, AS ADDITIONAL BORROW MATERIAL MAY BE AVAILABLE ON THE STONEHOUSE PROPERTY. ALL EXCAVATED MATERIAL DETERMINED BY THE GEOTECHNICAL ENGINEER TO BE UNSUITABLE SHALL BE DISPOSED OF PROPERLY AT THE CONTRACTOR'S EXPENSE. ALL EXCAVATED MATERIAL NOT REQUIRED FOR BACKFILLING SHALL EITHER BE DEPOSITED ON SITE AND SPREAD BY THE CONTRACTOR, OR SHALL BE DEPOSITED IN AN AREA ON THE STONEHOUSE PROPERTY AS DIRECTED BY THE OWNER. THE CONTRACTOR SHALL PROVIDE PROPER STABILIZATION, AND EROSION AND SEDIMENT CONTROL MEASURES NEEDED TO CONTROL AS PER THE VESCH THIRD EDITION.
5. UNDERCUT FOR THE FOUNDATION OF THE DAM EMBANKMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. THE FOUNDATION SHALL BE BACKFILLED WITH SOILS CLASSIFIED AS SM, SC, OR CL UNDER THE UNIFIED SOIL CLASSIFICATION SYSTEM. SOILS SHALL HAVE A MINIMUM OF 15% BY WEIGHT FINES, HAVING A PLASTICITY INDEX OF 30% AND A PERMEABILITY OF 0.0004 IN/SEC. OR LESS. FILL SHALL BE COMPACTED IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO A DRY DENSITY OF 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). EXCAVATION FOR THE DAM KEY SHALL BE IN ACCORDANCE TO THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. HEIGHT, DEPTH, AND WIDTH OF THE KEY SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. THE KEY SHALL BE FORMED USING SOILS CLASSIFIED AS SC OR CL, WITH A PERMEABILITY OF 0.0004 IN/SEC. OR LESS.
6. THE DAM CORE SHALL BE AS CONSTRUCTED WITH NON-EXPANSIVE SC OR CL CLAYEY MATERIAL WITH PERMEABILITY OF 0.0004 IN/SEC. OR LESS. THE FILL OF THE CORE SHALL BE MADE IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). SIZE, SHAPE, WIDTH, DEPTH, AND HEIGHT OF THE DAM CORE SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. TO COVER THE DAM CORE, A SILTY FINE SAND OR CLAYEY SOIL (SM, SC, OR CL) SHALL BE PLACED. A VEGETATIVE COVER USING VDOT EC-2 EROSION CONTROL BLANKETS SHALL BE PLACED ON DAM SLOPES AND CREST TO PREVENT EROSION.
7. THE STORMWATER MANAGEMENT / BMP FACILITIES SHOWN ON THESE PLANS REQUIRE THE SUBMISSION, REVIEW AND APPROVAL OF RECORD DRAWINGS AND CONSTRUCTION CERTIFICATION PRIOR TO RELEASE OF THE POSTED BOND / SURETY. THE GEOTECHNICAL ENGINEER IS TO ENSURE THAT HIS / HER INSPECTION OF THE SWM / BMP CONSTRUCTION ACTIVITY IS PERFORMED DURING AND FOLLOWING CONSTRUCTION OF THE SWM / BMP IN ACCORDANCE WITH THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION STORMWATER MANAGEMENT / BMP FACILITIES DESIGN GUIDELINES HANDBOOK, DATED AUGUST 30, 2000.
8. THE CONTRACTOR SHALL PROVIDE INTERIM CERTIFICATION OF TEMPORARY SEDIMENT BASIN AT BMP 5.2 IN ACCORDANCE WITH SECTION 5 OF THE JAMES CITY COUNTY EMP, EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT DESIGN GUIDES.

REV	DESCRIPTION	DATE
1	BMP 5.2 RECORD DRAWINGS	7/18/01
2	FIELD CHANGE #1	7/25/01
3	REVISED AS PER JCCO COMMENT LETTER DATED 6/12/01	6/19/01
4	REVISED AS PER JCCO COMMENT LETTER DATED 4/9/01 & PER CLIENT AND PER CLIENT	5/17/01
5	REVISED AS PER JCCO COMMENT LETTER DATED 9/27/00	2/9/01

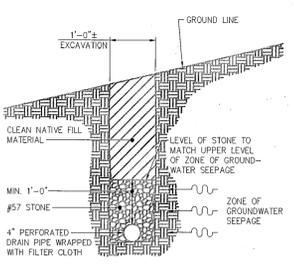
5248 Old Towne Road, Suite 1
 Williamsburg, Virginia 23188
 (757) 259-0040
 Fax (757) 220-8994



BMP 5.2 AND BMP 5.3 CROSS-SECTIONS
 SECTION V-B 'BENT TREE' - PHASE 2
 AND WALNUT CREEK
 AT STONEHOUSE FOR
 STONEHOUSE DEVELOPMENT COMPANY, L.L.C.
 JAMES CITY COUNTY, VIRGINIA



SECTION A-A BMP 5.3



- NOTES:
1. EXCAVATE GENERALLY PARALLEL TO GROUND CONTOURS EXCAVATE TO CREATE POSITIVE SLOPE IN PIPEWORK TO DISCHARGE COLLECTED SEEPAGE TO UPSTREAM OF DAM EMBANKMENT. EXCAVATE THROUGH DEPTH OF GROUNDWATER SEEPAGE.
 2. EXCAVATION SHALL NOT ENTER CLAY CORE OF DAM EMBANKMENT.
 3. UPON EXCAVATION, PLACE 4" PERFORATED PVC PIPE (WRAPPED WITH FILTER CLOTH) PLACE #57 AGGREGATE OVER PIPE (MINIMUM DEPTH OF 1'-0", OR TO HEIGHT OF ZONE OF SEEPAGE).
 4. PLACE CLEAN NATIVE FILL ABOVE AGGREGATE, COMPACT TO 95% COMPACTION.
 5. RESTORE GROUND GRADES AND PROFILE.

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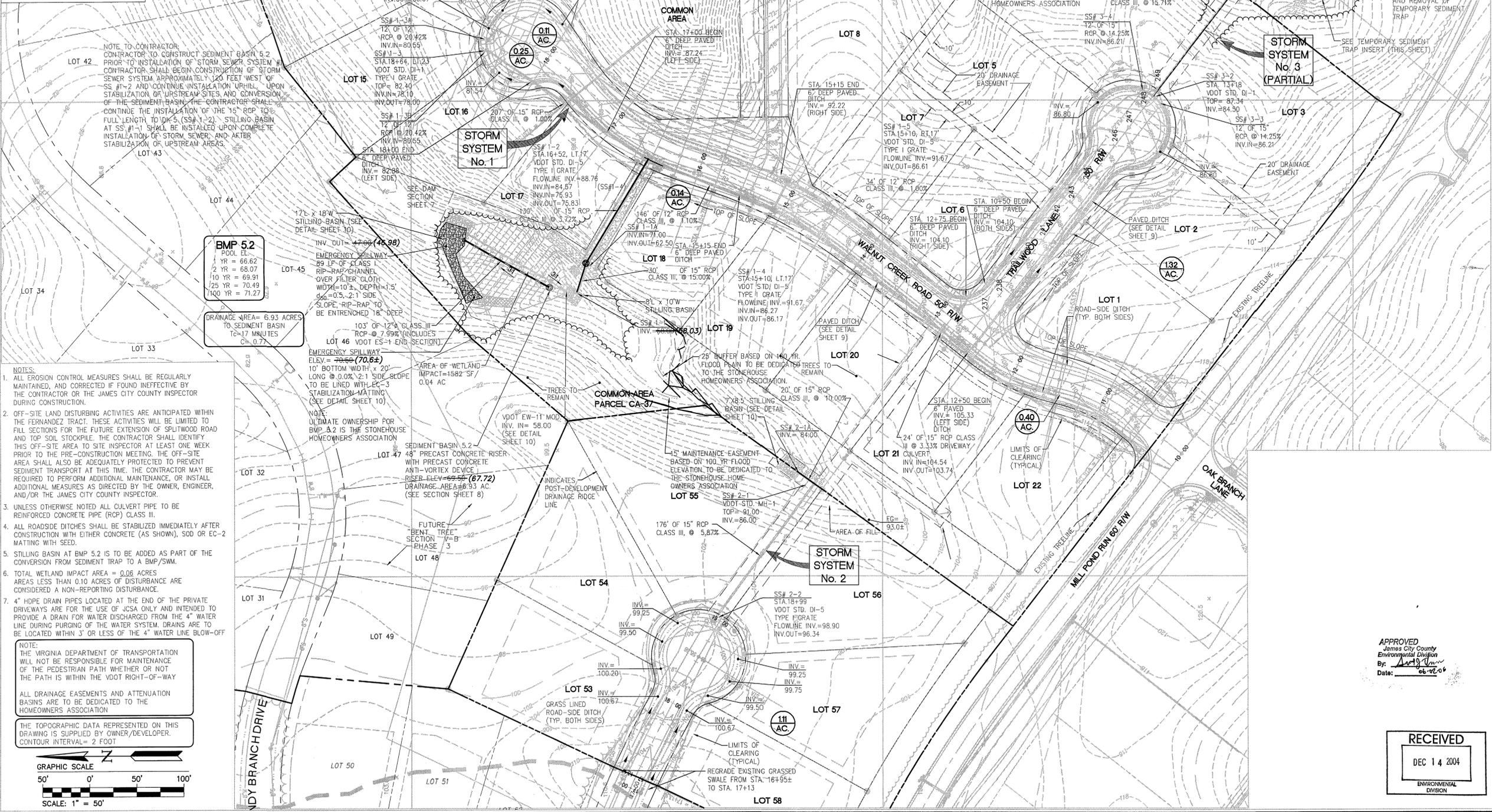
STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

- PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT TO THE FACILITY, SPILLWAYS AND DOWNSTREAM WATERWAYS. FOLLOWING INSTALLATION OF THE FACILITY AND ESTABLISHMENT OF VEGETATION IN DISTURBED AREAS, INSPECTIONS FOR SEDIMENT BUILDUP WILL BE PERFORMED AT LEAST QUARTERLY. IT IS ANTICIPATED THAT UNDER NORMAL CONDITIONS, SEDIMENT REMOVAL FROM THE FACILITY WILL BE REQUIRED ONCE EVERY 12 MONTHS. IF OTHER CONSTRUCTION OR RELATED ACTIVITIES ARE PERFORMED ON UPSLOPE PARCELS, ADEQUATE PROTECTION SHOULD BE PROVIDED AND INSPECTIONS PERFORMED AT LEAST ONCE WEEKLY OF THESE NEWLY DISTURBED AREAS AS WELL AS INSPECTIONS FOR ACCUMULATED SEDIMENTS AT TWO (2) BMP FACILITIES.
- A DESIGNATED REPRESENTATIVE OF THE OWNER WILL INSPECT THE BMP STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING WORKING DAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF CAUSED RAINFALL WITHIN A 24 HOUR PERIOD. ONCE PERFORMED, A REPRESENTATIVE OF THE COUNTY MAY JOINTLY INSPECT THE STRUCTURE. APPROPRIATE ACTION, PERFORMED AT THE COST OF THE OWNER, WILL BE TAKEN TO ENSURE APPROPRIATE MAINTENANCE. KEYS TO LOCKED ACCESS POINTS SHALL BE MADE AVAILABLE TO COUNTY INSPECTION PERSONNEL UPON REQUEST.
- INSPECTION AND MAINTENANCE OF THE FACILITY WILL CONSIST OF THE FOLLOWING ADDITIONAL MEASURES:
1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. SEDIMENT REMOVAL IS REQUIRED USING A RUBBER-WHEELED BACKHOE AT THE SAME TIME, OR AT LEAST ONCE PER YEAR. THE RISER BOTTOM AND OUTLET PIPE SHALL BE CLEANED OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA. SEDIMENT SHALL NOT BE ALLOWED TO ACCUMULATE IN DEPTHS GREATER THAN 1-FOOT. NO SEDIMENT SHALL BE ALLOWED TO ACCUMULATE TO PREVENT THE PROPER FUNCTION OF ANY PIPE OR CULVERT.
 2. PERFORM MAINTENANCE MOWING OF GRASSED AREAS AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT. TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ON ANY PART OF THE GRADED EMBANKMENT.
 3. PERFORM SOIL SAMPLING ON STABILIZED BMP SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.
 4. IN STABILIZED BMP AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACES, LIME, FERTILIZER AND SEED IN ACCORDANCE WITH RECOMMENDATIONS FOR NEW SEEDINGS, AS LISTED IN DAM CONSTRUCTION NOTES, IF VEGETATION COVERS MORE THAN 40% BUT LESS THAN 70% OF SOIL SURFACES, LIME FERTILIZER AND OVERSEED IN ACCORDANCE WITH CURRENT SEEDING RECOMMENDATIONS.
 5. PERFORM QUARTERLY INSPECTIONS OF THE RELEASE STRUCTURES, RISER STRUCTURE AND CREST OF SPILLWAY FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS TO MAINTAIN THE INTEGRITY OF THE STRUCTURE AND PROVIDE AN ATTRACTIVE APPEARANCE. DURING QUARTERLY INSPECTIONS, THE POND DRAIN VALVE USUALLY LEFT IN THE VALVE "CLOSED" POSITION, SHALL BE INSPECTED AND OPERATED THROUGH TWO COMPLETE FULL-OPEN TO FULL-CLOSE TO FULL-OPEN CYCLES.
 6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, ORIFICE/WEIR(S), OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE CONTINUED INTEGRITY OF THE STRUCTURE.
 7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE FACILITY FOR SIGNS OF ANIMAL/RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.
 8. RECORD KEEPING: THE LANDOWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP RESPONSIBLE, ACCURATE WRITTEN RECORDS OF INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.
 9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.

Designed	VMB/RDS	Drawn	RDS
Scale	AS SHOWN	Date	8/21/00
Project No.	8877-00		
Drawing No.	9		

ROADWAY CULVERT SIZES FOR LOT DRAINAGE

LOT No.	CULVERT SIZE
1	15"
2	15"
3	15"
4	15"
5	15"
6	15"
7	15"
8	15"
9	15"
10	15"
11	15"
12	15"
13	15"
14	15"
15	15"
16	15"
17	15"
18	15"
19	15"
20	15"
21	15"
23	15"
54	15"
55	15"
56	15"
57	15"
58	15"



- NOTES:**
1. ALL EROSION CONTROL MEASURES SHALL BE REGULARLY MAINTAINED, AND CORRECTED IF FOUND INEFFECTIVE BY THE CONTRACTOR OR THE JAMES CITY COUNTY INSPECTOR DURING CONSTRUCTION.
 2. OFF-SITE LAND DISTURBING ACTIVITIES ARE ANTICIPATED WITHIN THE FERNANDEZ TRACT. THESE ACTIVITIES WILL BE LIMITED TO FILL SECTIONS FOR THE FUTURE EXTENSION OF SPLITWOOD ROAD AND TOP SOIL STOCKPILE. THE CONTRACTOR SHALL IDENTIFY THIS OFF-SITE AREA TO SITE INSPECTOR AT LEAST ONE WEEK PRIOR TO THE PRE-CONSTRUCTION MEETING. THE OFF-SITE AREA SHALL ALSO BE ADEQUATELY PROTECTED TO PREVENT SEDIMENT TRANSPORT AT THIS TIME. THE CONTRACTOR MAY BE REQUIRED TO PERFORM ADDITIONAL MAINTENANCE, OR INSTALL ADDITIONAL MEASURES AS DIRECTED BY THE OWNER, ENGINEER, AND/OR THE JAMES CITY COUNTY INSPECTOR.
 3. UNLESS OTHERWISE NOTED ALL CULVERT PIPE TO BE REINFORCED CONCRETE PIPE (RCP) CLASS III.
 4. ALL ROADSIDE DITCHES SHALL BE STABILIZED IMMEDIATELY AFTER CONSTRUCTION WITH EITHER CONCRETE (AS SHOWN), SOD OR EC-2 MATTING WITH SEED.
 5. STILLING BASIN AT BMP 5.2 IS TO BE ADDED AS PART OF THE CONVERSION FROM SEDIMENT TRAP TO A BMP/SWM.
 6. TOTAL WETLAND IMPACT AREA = 0.06 ACRES. AREAS LESS THAN 0.10 ACRES OF DISTURBANCE ARE CONSIDERED A NON-REPORTING DISTURBANCE.
 7. 4" HOPE DRAIN PIPES LOCATED AT THE END OF THE PRIVATE DRIVEWAYS ARE FOR THE USE OF JCSA ONLY AND INTENDED TO PROVIDE A DRAIN FOR WATER DISCHARGED FROM THE 4" WATER LINE DURING PURGING OF THE WATER SYSTEM. DRAINS ARE TO BE LOCATED WITHIN 3' OR LESS OF THE 4" WATER LINE BLOW-OFF.

NOTE:
THE VIRGINIA DEPARTMENT OF TRANSPORTATION WILL NOT BE RESPONSIBLE FOR MAINTENANCE OF THE PEDESTRIAN PATH WHETHER OR NOT THE PATH IS WITHIN THE VDOT RIGHT-OF-WAY

ALL DRAINAGE EASEMENTS AND ATTENUATION BASINS ARE TO BE DEDICATED TO THE HOMEOWNERS ASSOCIATION

THE TOPOGRAPHIC DATA REPRESENTED ON THIS DRAWING IS SUPPLIED BY OWNER/DEVELOPER. CONTOUR INTERVAL = 2 FOOT

GRAPHIC SCALE
50' 0' 50' 100'
SCALE: 1" = 50'

BMP 5.3

POOL EL	1 YR = 48.21
	2 YR = 48.99
	10 YR = 50.24
	25 YR = 51.48
	100 YR = 53.13

STORM SYSTEM No. 3 (PARTIAL)

7L x 8.5W STILLING BASIN (SEE DETAIL SHEET 8)
TO BE INSTALLED UPON STABILIZATION OF UPSTREAM AREAS AND REMOVAL OF TEMPORARY SEDIMENT TRAP

BMP 5.2

POOL EL	1 YR = 66.62
	2 YR = 68.07
	10 YR = 69.91
	25 YR = 70.49
	100 YR = 71.27

DRAINAGE AREA = 6.93 ACRES TO SEDIMENT BASIN
T_c = 17 MINUTES
C = 0.77

STORM SYSTEM No. 1

17L x 18W STILLING BASIN (SEE DETAIL SHEET 10)

BMP 5.1

POOL EL	1 YR = 65.82
	2 YR = 66.87
	10 YR = 68.71
	25 YR = 69.29
	100 YR = 70.07

STORM SYSTEM No. 2

176" OF 15" RCP CLASS III @ 5.87%

STORM SYSTEM No. 3

103" OF 12" RCP CLASS III @ 7.99% (INCLUDES VDOT ES-1 END SECTION)

STORM SYSTEM No. 1

103" OF 12" RCP CLASS III @ 7.99% (INCLUDES VDOT ES-1 END SECTION)

STORM SYSTEM No. 2

176" OF 15" RCP CLASS III @ 5.87%

STORM SYSTEM No. 3

103" OF 12" RCP CLASS III @ 7.99% (INCLUDES VDOT ES-1 END SECTION)

REV.	DATE	BY	REVISION / COMMENT / NOTE
1	11/07/02		BMP 5.2 & BMP 5.3 RECORD DRAWINGS
2	10/23/01		REVISION AS PER J.C.C.O. COMMENT LETTER DATED 7/9/01
3	7/25/01		REVISION AS PER J.C.C.O. COMMENT LETTER DATED 6/12/01
4	6/18/01		REVISION AS PER J.C.C.O. COMMENT LETTER DATED 4/9/01 & PER CLIENT
5	5/17/01		REVISION AS PER J.C.C.O. COMMENT LETTER DATED 4/9/01 & PER CLIENT
6	2/27/01		REVISION AS PER J.C.C.O. COMMENT LETTER DATED 9/27/00
7			REVISION AND PER CLIENT NOTE
8			REVISION / COMMENT / NOTE

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



CONSULTING ENGINEERS

DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
SECTION V-B 'BENT TREE' - PHASE 2
AND WALNUT CREEK
AT STONEHOUSE DEVELOPMENT COMPANY, L.L.C.
STONEHOUSE DISTRICT, JAMES CITY COUNTY, VIRGINIA

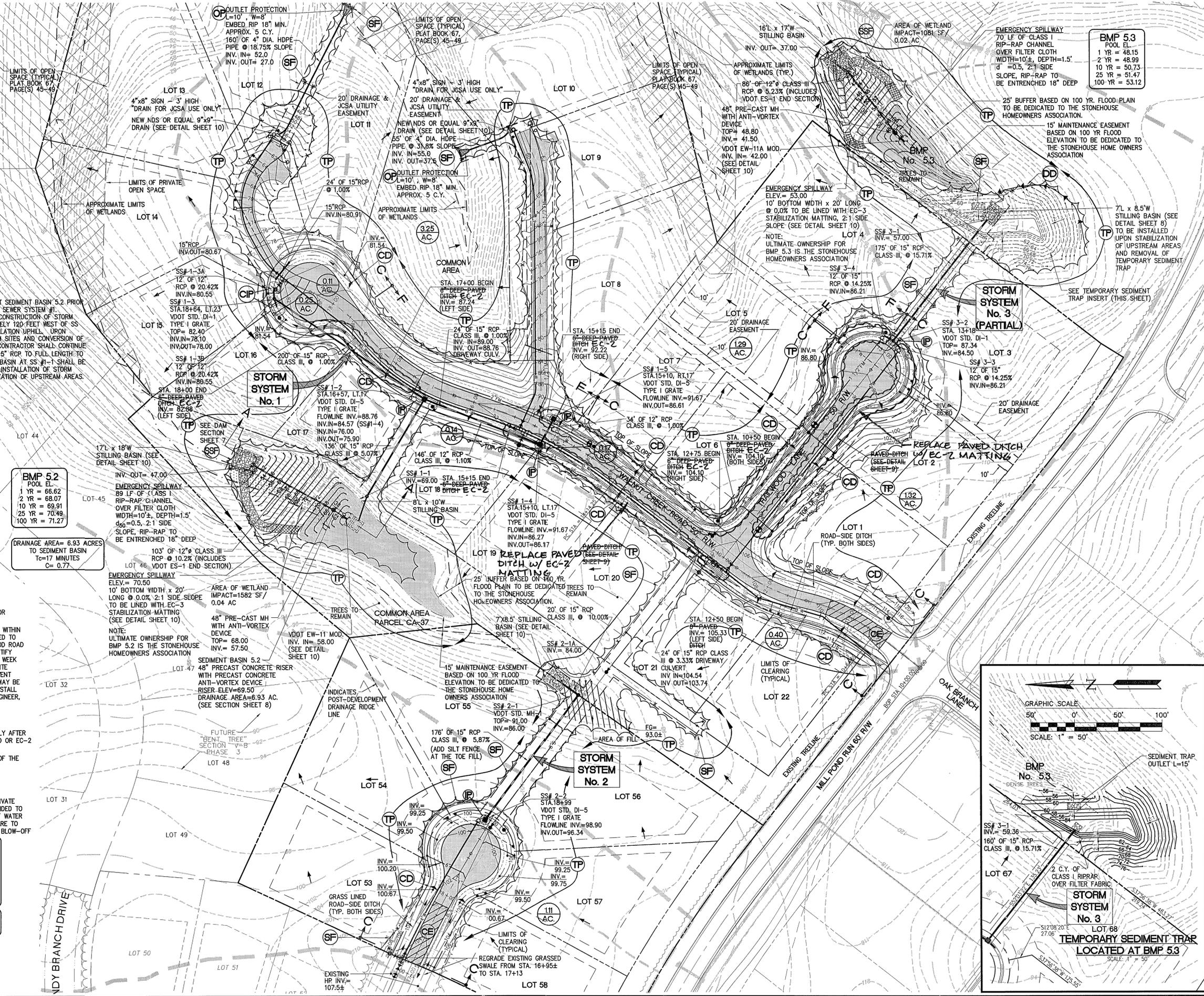
Designed VMB/JAG	Drawn RDS
Scale 1" = 50'	Date 8/21/00
Project No. 8877-00	Drawing No. 7

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ENVIRONMENTAL DIVISION

APPROVED
James City County
Environmental Division
By: *[Signature]*
Date: 06-20-04

ROADWAY CULVERT SIZES FOR LOT DRAINAGE

LOT No.	CULVERT SIZE
1	15"
2	15"
3	15"
4	15"
5	15"
6	15"
7	15"
8	15"
9	15"
10	15"
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BMP 5.2
POOL EL.
1 YR = 66.62
2 YR = 68.07
10 YR = 69.91
25 YR = 70.49
100 YR = 71.27

DRAINAGE AREA = 6.93 ACRES
TO SEDIMENT BASIN
T_c = 17 MINUTES
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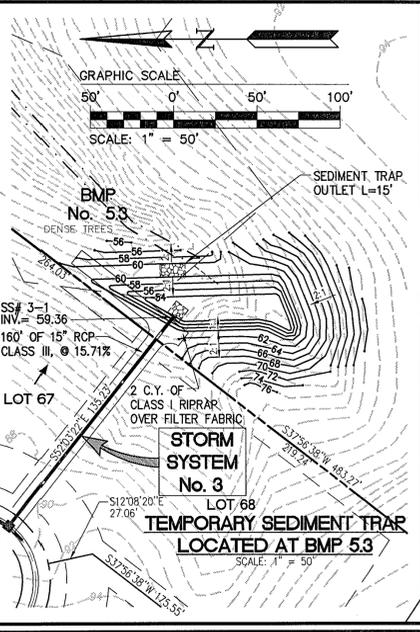
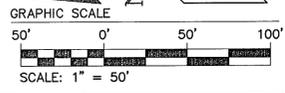
BMP 5.3
POOL EL.
1 YR = 48.15
2 YR = 48.99
10 YR = 50.73
25 YR = 51.47
100 YR = 53.12

- NOTES:**
- ALL EROSION CONTROL MEASURES SHALL BE REGULARLY MAINTAINED, AND CORRECTED IF FOUND INEFFECTIVE BY THE CONTRACTOR OR THE JAMES CITY COUNTY INSPECTOR DURING CONSTRUCTION.
 - OFF-SITE LAND DISTURBING ACTIVITIES ARE ANTICIPATED WITHIN THE FERNANDEZ TRACT. THESE ACTIVITIES WILL BE LIMITED TO FILL SECTIONS FOR THE FUTURE EXTENSION OF SPLITWOOD ROAD AND TOP SOIL STOCKPILE. THE CONTRACTOR SHALL IDENTIFY THIS OFF-SITE AREA TO SITE INSPECTOR AT LEAST ONE WEEK PRIOR TO THE PRE-CONSTRUCTION MEETING. THE OFF-SITE AREA SHALL ALSO BE ADEQUATELY PROTECTED TO PREVENT SEDIMENT TRANSPORT AT THIS TIME. THE CONTRACTOR MAY BE REQUIRED TO PERFORM ADDITIONAL MAINTENANCE, OR INSTALL ADDITIONAL MEASURES AS DIRECTED BY THE OWNER, ENGINEER, AND/OR THE JAMES CITY COUNTY INSPECTOR.
 - UNLESS OTHERWISE NOTED ALL CULVERT PIPE TO BE REINFORCED CONCRETE PIPE (RCP) CLASS III.
 - ALL ROADSIDE DITCHES SHALL BE STABILIZED IMMEDIATELY AFTER CONSTRUCTION WITH EITHER CONCRETE (AS SHOWN), SOD OR EC-2 MATTING WITH SEED.
 - STILLING BASIN AT BMP 5.2 IS TO BE ADDED AS PART OF THE CONVERSION FROM SEDIMENT TRAP TO A BMP/SWM.
 - TOTAL WETLAND IMPACT AREA = 0.06 ACRES AREAS LESS THAN 0.10 ACRES OF DISTURBANCE ARE CONSIDERED A NON-REPORTING DISTURBANCE.
 - 4" HDPE DRAIN PIPES LOCATED AT THE END OF THE PRIVATE DRIVEWAYS ARE FOR THE USE OF JCSA ONLY AND INTENDED TO PROVIDE A DRAIN FOR WATER DISCHARGED FROM THE 4" WATER LINE DURING PURGING OF THE WATER SYSTEM. DRAINS ARE TO BE LOCATED WITHIN 3' OR LESS OF THE 4" WATER LINE BLOW-OFF

NOTE:
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ALL DRAINAGE EASEMENTS AND ATTENUATION BASINS ARE TO BE DEDICATED TO THE HOMEOWNERS ASSOCIATION

THE TOPOGRAPHIC DATA REPRESENTED ON THIS DRAWING IS SUPPLIED BY OWNER/DEVELOPER. CONTOUR INTERVAL = 2 FOOT



NO.	DATE	REVISION / COMMENT / NOTE	BY
1	12/07/01	REVISED AS PER JCCO COMMENT LETTER DATED 7/9/01	VMB
2	12/07/01	REVISED AS PER JCCO COMMENT LETTER DATED 7/9/01	VMB
3	12/07/01	REVISED AS PER JCCO COMMENT LETTER DATED 7/9/01 & PER CLIENT	VMB
4	12/07/01	REVISED AS PER JCCO COMMENT LETTER DATED 9/27/01	VMB

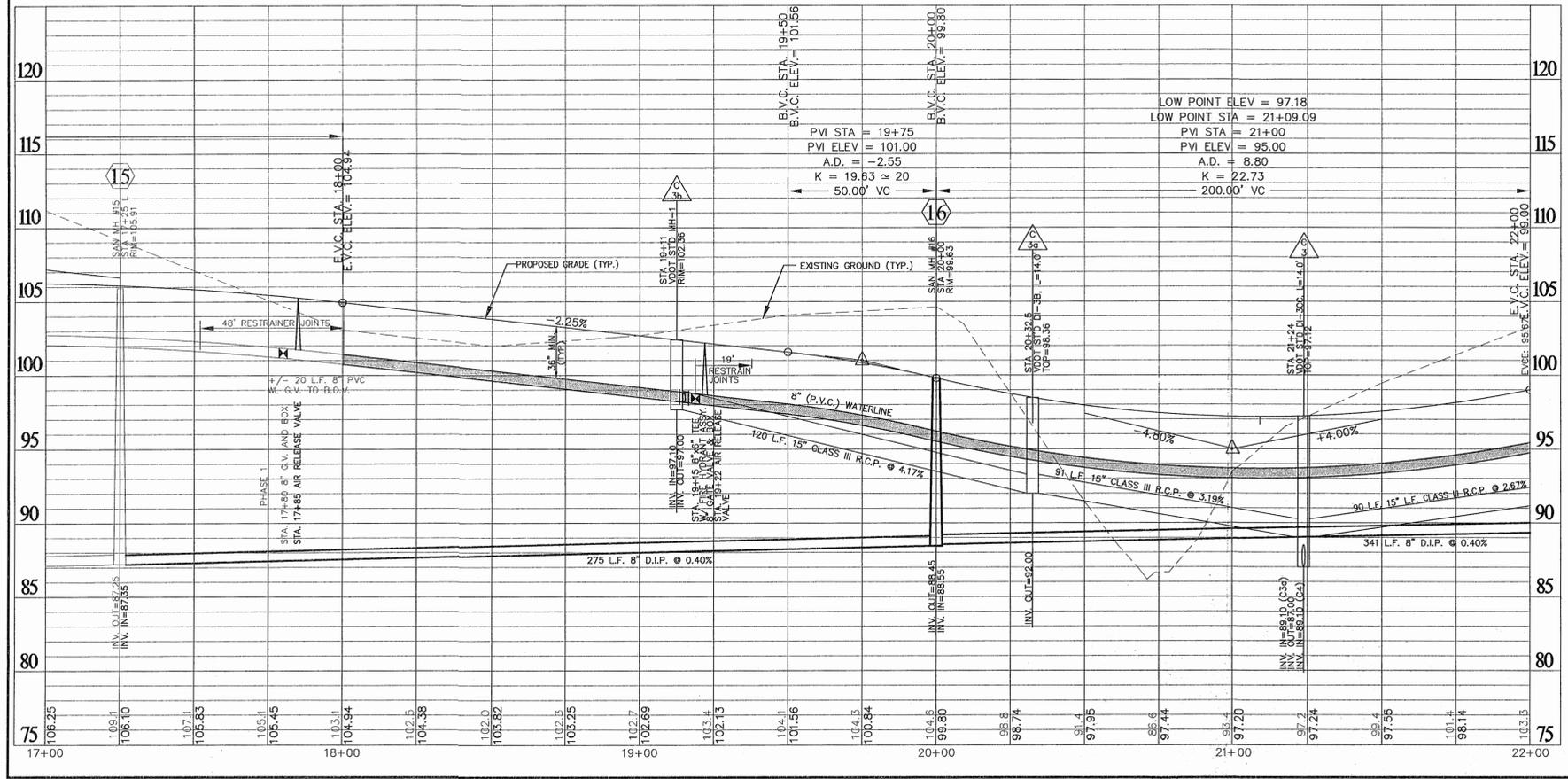
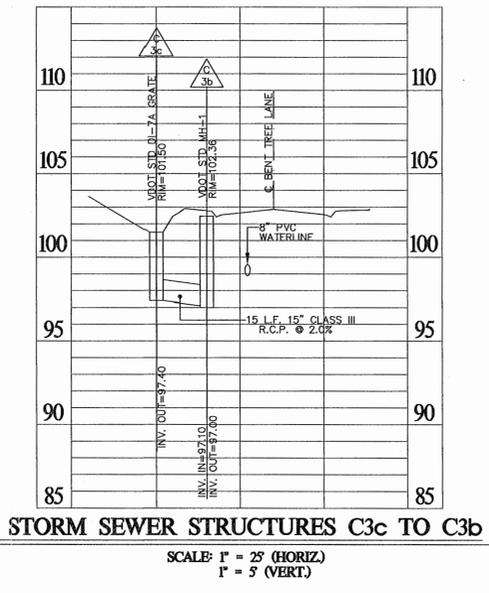
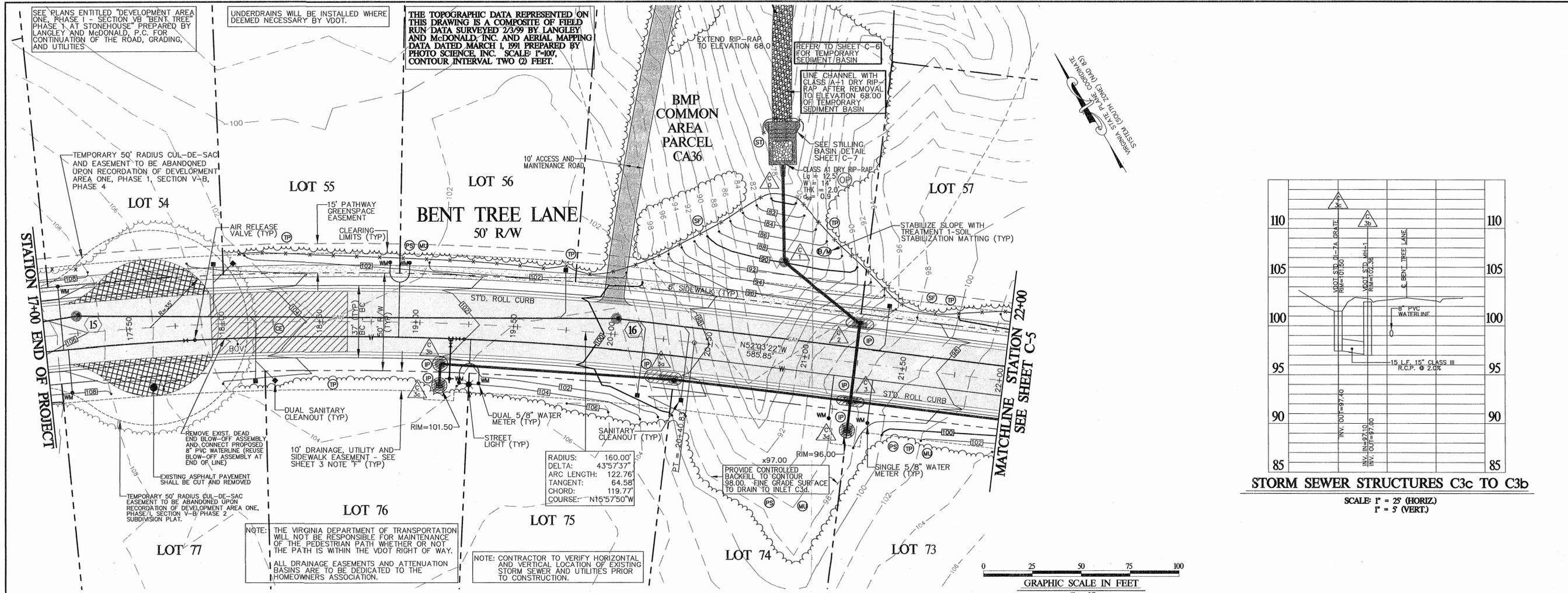


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DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN SECTION V-B 'BENT TREE' - PHASE 2 AND WALNUT CREEK AT STONEHOUSE FOR STONEHOUSE DEVELOPMENT COMPANY, L.L.C.

Designed	VMB/JAG	Drawn	RDS
Scale	1"=50'	Date	8/21/00
Project No.	8877-00	Drawing No.	7



ROADWAY CULVERT SIZES FOR LOT DRAINAGE

LOT No.	CULVERT SIZE
1	15"
2	15"
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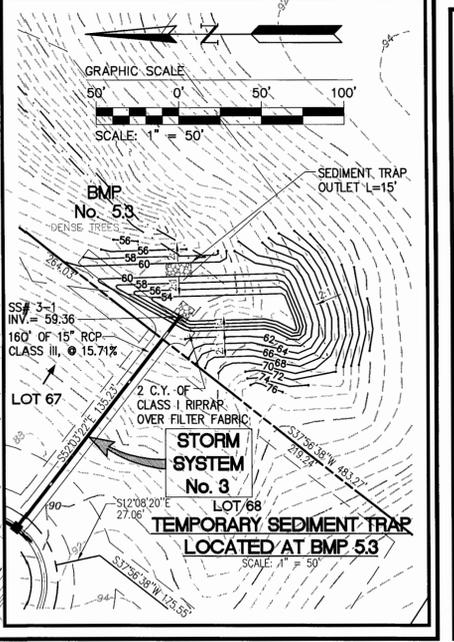
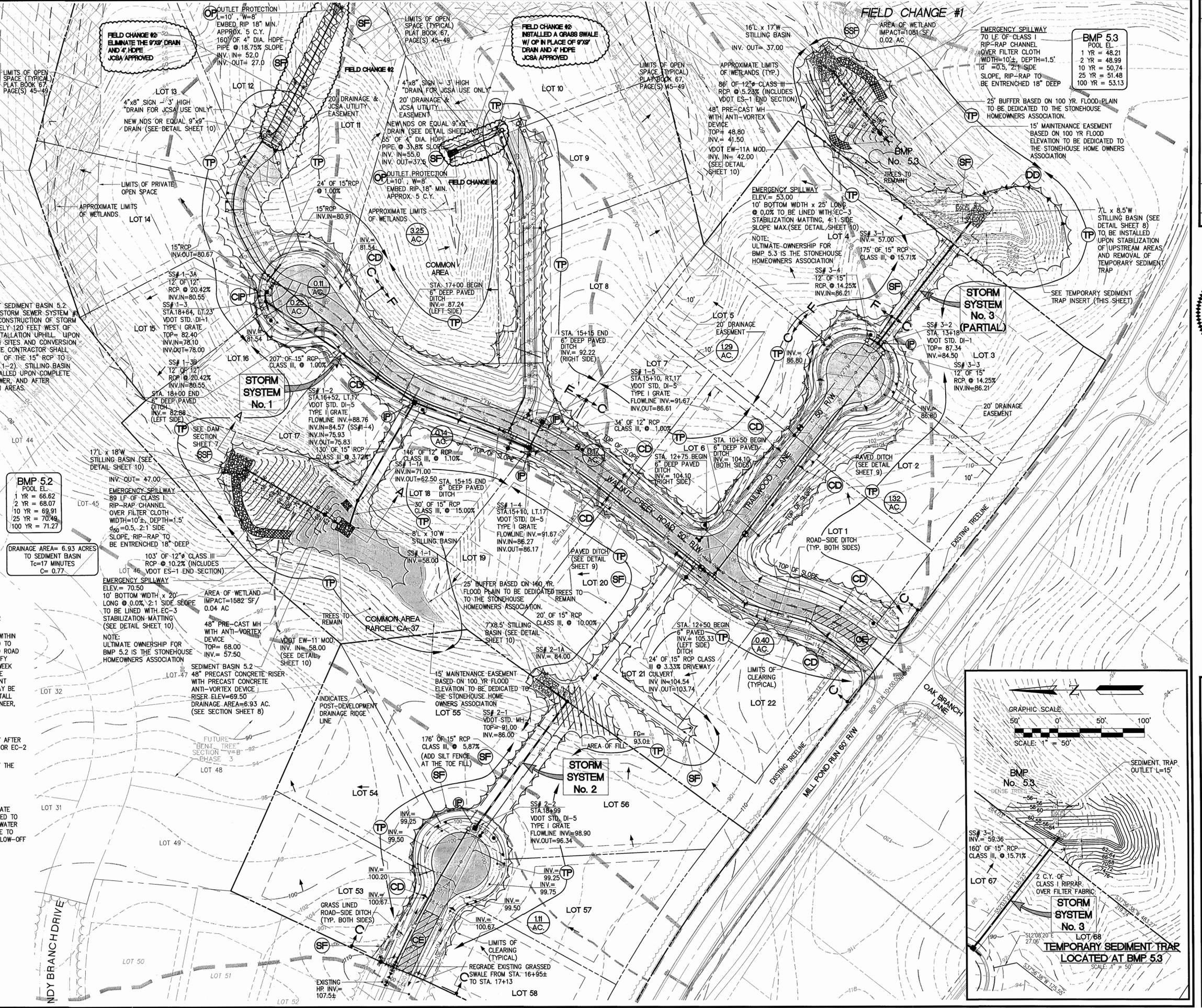
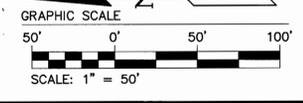
NOTE TO CONTRACTOR: CONTRACTOR TO CONSTRUCT SEDIMENT BASIN 5.2 PRIOR TO INSTALLATION OF STORM SEWER SYSTEM. CONTRACTOR SHALL BEGIN CONSTRUCTION OF STORM SEWER SYSTEM APPROXIMATELY 120 FEET WEST OF SS #1-2 AND CONTINUE INSTALLATION UPHILL UPON STABILIZATION OF UPSTREAM SITES AND CONVERSION OF THE SEDIMENT BASIN. THE CONTRACTOR SHALL CONTINUE THE INSTALLATION OF THE 15" RCP TO FULL LENGTH TO DI-5 (SS#1-2). STILLING BASIN AT SS #1-1 SHALL BE INSTALLED UPON COMPLETE INSTALLATION OF STORM SEWER, AND AFTER STABILIZATION OF UPSTREAM AREAS.

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 - 4" HDPE DRAIN PIPES LOCATED AT THE END OF THE PRIVATE DRIVEWAYS ARE FOR THE USE OF JCSA ONLY AND INTENDED TO PROVIDE A DRAIN FOR WATER DISCHARGED FROM THE 4" WATER LINE DURING PURGING OF THE WATER SYSTEM. DRAINS ARE TO BE LOCATED WITHIN 3' OR LESS OF THE 4" WATER LINE BLOW-OFF.

NOTE: THE VIRGINIA DEPARTMENT OF TRANSPORTATION WILL NOT BE RESPONSIBLE FOR MAINTENANCE OF THE PEDESTRIAN PATH WHETHER OR NOT THE PATH IS WITHIN THE VDOT RIGHT-OF-WAY

ALL DRAINAGE EASEMENTS AND ATTENUATION BASINS ARE TO BE DEDICATED TO THE HOMEOWNERS ASSOCIATION

THE TOPOGRAPHIC DATA REPRESENTED ON THIS DRAWING IS SUPPLIED BY OWNER/DEVELOPER. CONTOUR INTERVAL = 2 FOOT



BMP 5.3

PPOOL EL.	1 YR = 48.21
OVER FILTER CLOTH	2 YR = 48.99
WIDTH=10', DEPTH=1.5'	10 YR = 50.74
1' = 0.5, 2:1 SIDE	25 YR = 51.48
SLOPE, RIP-RAP TO BE ENTRENCHED 18" DEEP	100 YR = 53.13

NO.	DATE	REVISION / COMMENT / NOTE
1	11/07/05	FIELD CHANGE #2
2	11/07/05	FIELD CHANGE #1
3	11/07/05	REVISION AS PER JCCO COMMENT LETTER DATED 7/16/07
4	7/25/07	REVISION AS PER JCCO COMMENT LETTER DATED 6/12/07
5	6/15/07	REVISION AS PER JCCO COMMENT LETTER DATED 4/19/07 & PER CLIENT
6	5/17/07	REVISION AS PER J.C.C.O. COMMENT LETTER DATED 9/27/00
7	2/07/07	REVISION AS PER J.C.C.O. COMMENT LETTER DATED 9/27/00 AND PER CLIENT



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



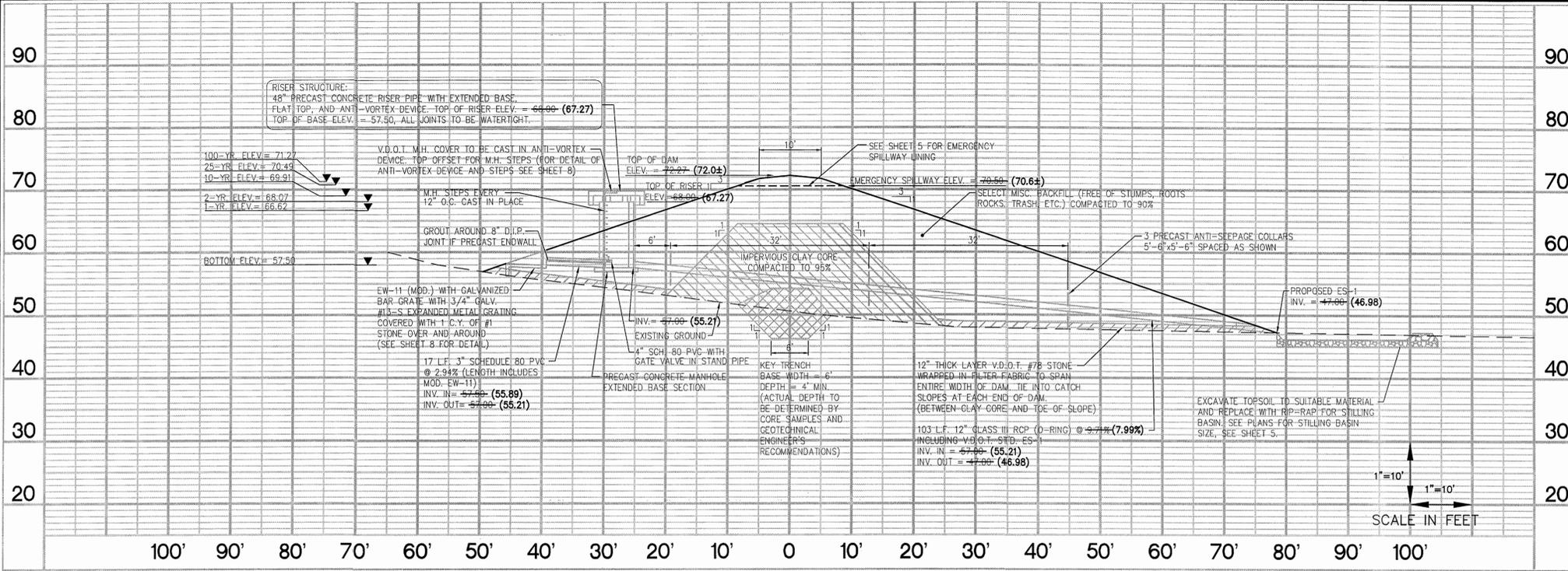
DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
SECTION V-B 'BENT TREE' - PHASE 2
AND WALNUT CREEK
AT STONEHOUSE FOR
STONEHOUSE DEVELOPMENT COMPANY, LLC.

Designed: VMB/JAG
 Scale: 1"=50'
 Drawn: RDS
 Date: 8/21/00
 Project No.: 8877-00
 Drawing No.: 7

GENERAL NOTES FOR CONSTRUCTION OF STORMWATER BASINS

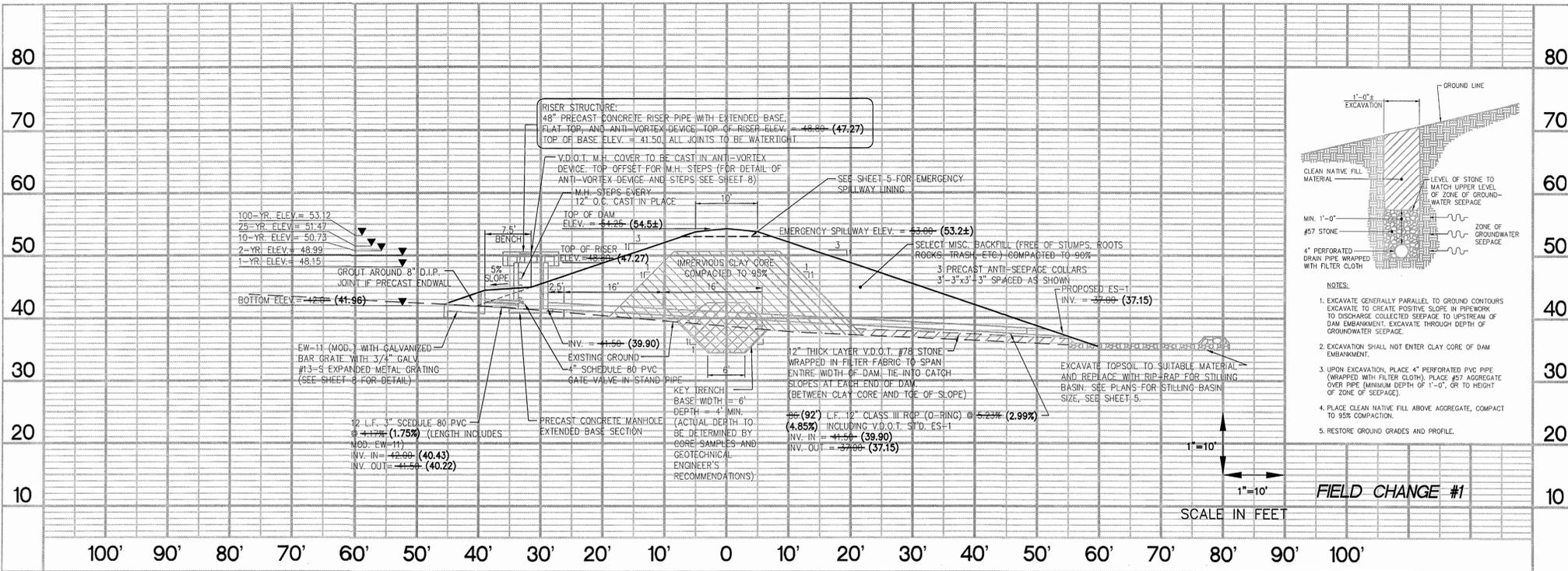
1. THE CONTRACTOR SHALL PROVIDE ALL WORK AND MATERIALS NEEDED TO CONSTRUCT THE STORMWATER BASIN, STORMWATER MANAGEMENT PONDS, BEST MANAGEMENT PRACTICES, SEDIMENT BASINS AND SEDIMENT TRAPS. THE WORK SHALL INCLUDE ALL LABOR, MATERIALS, EQUIPMENT AND MATERIALS NEEDED FOR THE COMPLETION OF GRADING AND EARTHWORK ASSOCIATED WITH THE CONSTRUCTION.
2. THE CONTRACTOR SHALL CONSULT AND PROVIDE FOR THE SERVICES OF A GEOTECHNICAL ENGINEER. THE GEOTECHNICAL ENGINEER SHALL PROVIDE TEST RESULTS ON PLACED DAM MATERIALS, IDENTIFYING SOIL CLASSIFICATION, PERMEABILITY, PLASTICITY INDEX, AND COMPACTION. ALL TESTS SHALL BE IN ACCORDANCE WITH ASTM STANDARDS. THE COST OF THE SERVICES OF THE GEOTECHNICAL ENGINEER SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SATISFACTORY GEOTECHNICAL RESULTS ARE NEEDED PRIOR TO FINAL APPROVAL.
3. ALL INSPECTIONS REQUIRED FOR THE WORK SHALL BE PERFORMED BY A GEOTECHNICAL ENGINEER AT THE EXPENSE OF THE GENERAL CONTRACTOR.
4. ON-SITE EXCAVATED MATERIAL, IF DETERMINED SUITABLE FOR USE IN DAM CONSTRUCTION BY A GEOTECHNICAL ENGINEER, MAY BE USED FOR DAM CONSTRUCTION. SHOULD ADDITIONAL MATERIAL BE REQUIRED, THE CONTRACTOR SHALL IDENTIFY THE NEED FOR MATERIAL TO THE OWNER, AS ADDITIONAL BORROW MATERIAL MAY BE AVAILABLE ON THE STONEHOUSE PROPERTY. ALL EXCAVATED MATERIAL DETERMINED BY THE GEOTECHNICAL ENGINEER TO BE UNSUITABLE SHALL BE DISPOSED OF PROPERLY AT THE CONTRACTOR'S EXPENSE. ALL EXCAVATED MATERIAL NOT REQUIRED FOR BACKFILLING SHALL EITHER BE DEPOSITED ON SITE AND SPREAD BY THE CONTRACTOR, OR SHALL BE DEPOSITED IN AN AREA ON THE STONEHOUSE PROPERTY AS DIRECTED BY THE OWNER. THE CONTRACTOR SHALL PROVIDE PROPER STABILIZATION, AND EROSION AND SEDIMENT CONTROL MEASURES NEEDED TO CONTROL AS PER THE VESCH THIRD EDITION.
5. UNDERCUT FOR THE FOUNDATION OF THE DAM EMBANKMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. THE FOUNDATION SHALL BE BACKFILLED WITH SOILS CLASSIFIED AS SM, SC, OR CL UNDER THE UNIFIED SOIL CLASSIFICATION SYSTEM. SOILS SHALL HAVE A MINIMUM OF 15% BY WEIGHT FINES, HAVING A PLASTICITY INDEX OF 30% AND A PERMEABILITY OF 0.0004 IN./SEC. OR LESS. FILL SHALL BE COMPACTED IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO A DRY DENSITY OF 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). EXCAVATION FOR THE DAM KEY SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. HEIGHT, DEPTH, AND WIDTH OF THE KEY SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. THE KEY SHALL BE FORMED USING SOILS CLASSIFIED AS SC OR CL, WITH A PERMEABILITY OF 0.0004 IN./SEC. OR LESS.
6. THE DAM CORE SHALL BE AS CONSTRUCTED WITH NON-EXPANSIVE SC OR CL CLAYEY MATERIAL WITH PERMEABILITY OF 0.0004 IN./SEC. OR LESS. THE FILL OF THE CORE SHALL BE MADE IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). SIZE, SHAPE, WIDTH, DEPTH, AND HEIGHT OF THE DAM CORE SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. TO COVER THE DAM CORE, A SILTY FINE SAND OR CLAYEY SOIL (SM, SC, OR CL) SHALL BE PLACED. A VEGETATIVE COVER USING VDOT EC-2 EROSION CONTROL BLANKETS SHALL BE PLACED ON DAM SLOPES AND CREST TO PREVENT EROSION.
7. THE STORMWATER MANAGEMENT / BMP FACILITIES SHOWN ON THESE PLANS REQUIRE THE SUBMISSION, REVIEW AND APPROVAL OF RECORD DRAWING(S) AND CONSTRUCTION CERTIFICATION PRIOR TO RELEASE OF THE POSTED BOND / SURETY. THE GEOTECHNICAL ENGINEER IS TO ENSURE THAT HIS / HER INSPECTION OF THE SWM / BMP CONSTRUCTION ACTIVITY IS PERFORMED DURING AND FOLLOWING CONSTRUCTION OF THE SWM / BMP IN ACCORDANCE WITH THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION STORMWATER MANAGEMENT / BMP FACILITIES DESIGN GUIDELINES HANDBOOK, DATED AUGUST 30, 2000.
8. THE CONTRACTOR SHALL PROVIDE INTERIM CERTIFICATION OF TEMPORARY SEDIMENT BASIN AT BMP 5.2 IN ACCORDANCE WITH SECTION 5 OF THE JAMES CITY COUNTY BMP, EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT DESIGN GUIDES.

REV.	DATE	REVISION / COMMENT / NOTE
6	11/07/02	BMP 5.2 & 5.3 RECORD DRAWINGS
5	10/23/01	FIELD CHANGE #1
4	7/25/01	REVISED AS PER A.C.C.O. COMMENT LETTER DATED 7/19/01
3	6/18/01	REVISED AS PER A.C.C.O. COMMENT LETTER DATED 6/7/01
2	5/17/01	REVISED AS PER A.C.C.O. COMMENT LETTER DATED 4/20/01 & PER CLIENT
1	2/9/01	REVISED AS PER A.C.C.O. COMMENT LETTER DATED 9/27/00 AND PER CLIENT

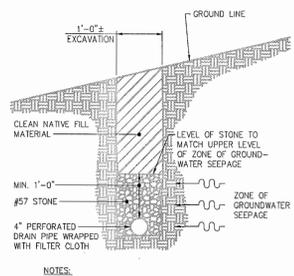


SECTION A-A BMP 5.2

- BMP 5.2 4.3**
1. THE CONSTRUCTION OF THE CLAY CORE IS TO BE IN ACCORDANCE WITH NOTE 6 OF THE GENERAL NOTES FOR CONSTRUCTION OF STORMWATER BASINS. SEE THIS SHEET.
 2. THE CONSTRUCTION OF THE KEY TRENCH IS TO BE IN ACCORDANCE WITH NOTE 5 OF THE GENERAL NOTES FOR CONSTRUCTION OF STORMWATER BASINS. SEE THIS SHEET.



SECTION A-A BMP 5.3



- NOTES:**
1. EXCAVATE GENERALLY PARALLEL TO GROUND CONTOURS EXCAVATE TO CREATE POSITIVE SLOPE IN PREWORK TO DISCHARGE COLLECTED SEEPAGE TO UPSTREAM OF DAM EMBANKMENT. EXCAVATE THROUGH DEPTH OF GROUNDWATER SEEPAGE.
 2. EXCAVATION SHALL NOT ENTER CLAY CORE OF DAM EMBANKMENT.
 3. UPON EXCAVATION, PLACE 4" PERFORATED PVC PIPE (WRAPPED WITH FILTER CLOTH), PLACE #7 AGGREGATE OVER PIPE (MINIMUM DEPTH OF 1'-0" OR TO HEIGHT OF ZONE OF SEEPAGE).
 4. PLACE CLEAN NATIVE FILL ABOVE AGGREGATE, COMPACT TO 95% COMPACTION.
 5. RESTORE GROUND GRADES AND PROFILE.

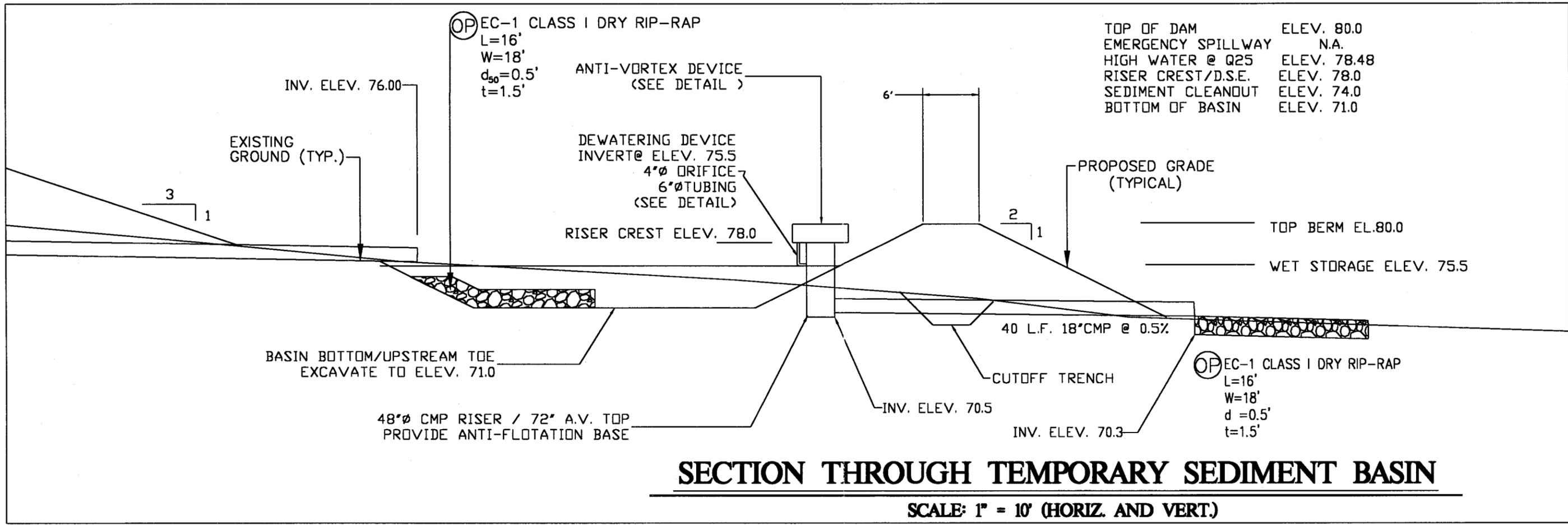
SCALE IN FEET
1"=10'



5248 Olde Towne Road, Suite 11
Williamsburg, Virginia 23188
(757) 253-0040
Fax (757) 220-8894

BMP 5.2 AND BMP 5.3 CROSS-SECTIONS
SECTION V-B 'BENT TREE' - PHASE 2
AND WALNUT CREEK
AT STONEHOUSE FOR
STONEHOUSE DEVELOPMENT COMPANY, L.L.C.
 STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VMB/RDS	RDS
Scale	Date
AS SHOWN	8/21/00
Project No.	8877-00
Drawing No.	9



TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project Bent Tree Phase 2

Basin # SB-1 Location Common Area Parcel CA 30

Total area draining to basin: 4.24 acres. ← ASSUME OK
NO DRAINAGE
MAP PROVIDED.

Basin Volume Design

Wet Storage:

1. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).
67 cu. yds. x 4.24 acres = 284 cu. yds. ✓
2. Available basin volume = 291 cu. yds. at elevation 75.50 (From storage - elevation curve) ✓
3. Excavate 284 cu. yds. to obtain required volume*. ✓

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

4. Available volume before cleanout required.
33 cu. yds. x 4.24 acres = 140 cu. yds.
5. Elevation corresponding to cleanout level = 74.0. ✓
(From Storage - Elevation Curve)
6. Distance from invert of the dewatering orifice to cleanout level = 1.5 ft. ✓
(Min. = 1.0 ft.)
74 to 75.5

Dry Storage:

7. Minimum required volume = 67 cu. yds. x Total Drainage Area (acres).
67 cu. yds. x 4.24 acres = 284 cu. yds. ✓

8. Total available basin volume at crest of riser* = 566 cu. yds. at elevation 78°. (From Storage - Elevation Curve) < 568 REQUIRED BUT CLOSE.

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

9. Diameter of dewatering orifice = 4 in. ← NO COMPS SHOWN.
10. Diameter of flexible tubing = 6 in. (diameter of dewatering orifice plus 2 inches).

Preliminary Design Elevations

11. Crest of Riser = 78° ✓
 Top of Dam = 80° ✓
 Design High Water = _____
 Upstream Toe of Dam = 71° ✓

Basin Shape

$L = 50 \quad A_{wsc} = 2483$

12. Length of Flow / Effective Width = $\frac{L}{We} \approx 1$

If > 2, baffles are not required _____

If < 2, baffles are required ✓

Runoff

$\sum CA = 1.66 \quad I_5 = 5.7? \quad I_2 = 8.2?$

13. $Q_2 = \underline{9.46}$ cfs (From Chapter 5)

14. $Q_{25} = \underline{13.6}$ cfs (From Chapter 5)

$C = \frac{CA}{A} = \frac{1.66}{4.24} = 0.40 \text{ OK?}$
 NO T_c GIVEN FOR 25-YEAR
 $C = 0.40$
 $I_{25} = 8.01$
 $T_c = 5 \text{ MIN.}$

$13.6 = 0.40(I) 4.24$
 $I = 8.01 \text{ IN/HR} \Rightarrow 5 \text{ MIN } T_c \text{ FOR 25 YEAR.}$

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2 = \underline{13.6}$ cfs. (riser and barrel)

Without emergency spillway, required spillway capacity $Q_p = Q_{25} = \underline{13.6}$ cfs. ✓

$Q_{25} = 0.40(7.92) 4.24 = 13.43 \text{ cfs.}$

$Q_{25} = 7.92 \text{ W/HR}$
 $I_2 = 5.64$

16. With emergency spillway:

Assumed available head (h) = NA. ft. (Using Q₂)

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

Without emergency spillway:

Assumed available head (h) = 0.5 ft. (Using Q₂₅)

h = Design High Water Elevation - Crest of Riser Elevation

PLATE 3.14-2
1' MIN REQ'D

73.5
73.0
Q = 13.6

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

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions. ✓

18. Barrel length (l) = 40 ft.

Head (H) on barrel through embankment = 7.48 ft. ?

(From Plate 3.14-7). Q = 15.5 x 1.2 = 18.6 OK ✓

19. Barrel diameter = 18 in. ✓

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

20. Trash rack and anti-vortex device

Diameter = 72 inches. ✓

Height = 21 inches. ✓

16 pipe
HT = 21 inch

(From Table 3.14-D).

Emergency Spillway Design

21. Required spillway capacity Q_e = Q₂₅ - Q_p = NA cfs. ✓

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

(From Table 3.14-C).

Anti-Seep Collar Design

23. Depth of water at principal spillway crest (Y) = 12 ft.
 Slope of upstream face of embankment (Z) = 3:1.
 Slope of principal spillway barrel (S_b) = 10.2 %
 Length of barrel in saturated zone (L_s) = 138 ft.
24. Number of collars required = 3 dimensions = 5.5 FT x 5.5 FT
 (from Plate 3.14-12).

WORST CASE: (69.5-57.5)
 WHEN USED AS SEDIMENT
 BASIN

Final Design Elevations

25. Top of Dam = 72.25
 Design High Water = 71.11
 Emergency Spillway Crest = 70.50
 Principal Spillway Crest = 69.50
 Dewatering Orifice Invert = 67.0
 Cleanout Elevation = 65.1
 Elevation of Upstream Toe of Dam
 or Excavated Bottom of "Wet Storage
 Area" (if excavation was performed) = 58

Pond / BMP Design Data (Add Sheet If Necessary for Multiple Onsite Facilities): Basin 5.2

Check if None Provided: BMP # 5.2 Type: Dry Attenuation Basin - F-2
 Y N * See Below for Pertinent Water Quality Treatment Design Information.

Top of Facility El. 72.27
 Design High Water El. 71.27
 Emergency Spillway (E.S.) Crest El. 70.5 BW: 10 SS: 2:1
 FreeBoard 1.0 1 ft. or > with E.S.
 Acceptable Not Acceptable. 2 ft. or > w/o E.S.
 Principal Spillway (Riser) Crest El. 68.0 Size/Type: 48" Concrete
 Principal Spillway Crest 1 ft. below crest of emergency spillway. Yes No N/A
 Stage-Storage Curve or Data
 Outlet Rating Curve or Table (Discharge Structure Rating)
 1-year design storm El. 66.62 or Volume 23,517 ft³
 1-year, 24 hour detention criteria for Stream Channel Protection. Yes No N/A
 Extended Detention Provided (Min. 24 hours) Yes No N/A
 Normal/Permanent Pool El. N/A
 Orifice/Weir #1 (highest El.) El. 58.0 Type: 3" Ø PVC
 Orifice/Weir #2 El. _____ Type: _____
 Orifice/Weir #3 El. _____ Type: _____
 Orifice/Weir #4 El. _____ Type: _____
 Orifice/Weir #5 (lowest El.) El. _____ Type: _____
 Low Flow Orifice (ExDet, CPv) El. _____ Type: _____
 Pond Drain w/ Valve El. 58 Type: Gate Valve
 Pond Bottom El. 58 Riser Height: 10.5'
 Steps or Access Provided (for over 4 ft. depth) N/A
 Riser Base Bottom El. _____ Type: _____
 Core Trench N/A
 Anti-Seep Collars or other acceptable Seepage Control Method. N/A
 Principal Spillway Anti-Vortex Device and Trash Rack. Type: Concrete
 Low Flow Orifice Cage-Type Trash Rack. Type: Mod EW-11
 Outlet Barrel: Type/Class: III O-Ring Size: 12"
 Inv. U/S: 58 57.5 Inv D/S: 47.0
 Slope: 10.2 Length: 103 (ft.)
 Flared End Section. Matches Outlet Barrel material type.
 Outlet Protection.
 Standard riprap outlet protection (OP) Type: STILLING BASIN
 Special Dissipator Structure (SDS) Type: _____
 Sediment / Cleanout Elevation El. _____ or Depth _____
 Adequate Channel Downstream of BMP: 1-year, 24-hour, or MS # 19 criteria.

Sketch or Notes, If Necessary:

Attenuation basin only, water quality provided in Richardson Mill Pond

N/A

* WQV Design Information.

Imperv. Area	_____
WQTV	_____
Vol. Required	_____
Vol. Provided	_____

Sediment Trap & Basins

Temporary Sediment Trap # 1 _____ DA = _____ < 3 acres
 Temporary Sediment Trap # 2 _____ DA = _____ < 3 acres
 Temporary Sediment Basin # 1 _____ DA = 6.76 (6.93) BMP # 5.2 convert.
 Temporary Sediment Basin # 2 _____ DA = _____ BMP # _____ convert.

E&SC Plan Comments: Good plan overall - can should change grates on EW-11

VB SYS."C" DRAINED AREA = 4.24 acres

WS / DS VOLUME REQD = 284 c.y.

	L _{TOP}	B _{TOP}	AREA _{TOP}	Z : 1	D _{EXC} / H _o	L _{BOTTOM}	B _{BOTTOM}	AREA _{BTM}	VOLUME PROVIDED	
									trapezoid	conic
WET STORAGE :	50	50	2500	2	4.5	32	32	1024	294	285
DRY STORAGE :	65	65	4225	3	2.5	50	50	2500	311	308

WET STORAGE SURFACE / GRATE ELEV. : 76.00
 BOTTOM ELEV. : 71.50
 DRY STORAGE SURFACE ELEV. : 78.50
 EMBANKMENT TOP ELEV. : 80.00

WEIR LENGTH REQD., L_{OUTLET} = 26 feet
 H = 4 feet
 W = 4 feet

ESTIMATED POND FULL DRAWDOWN

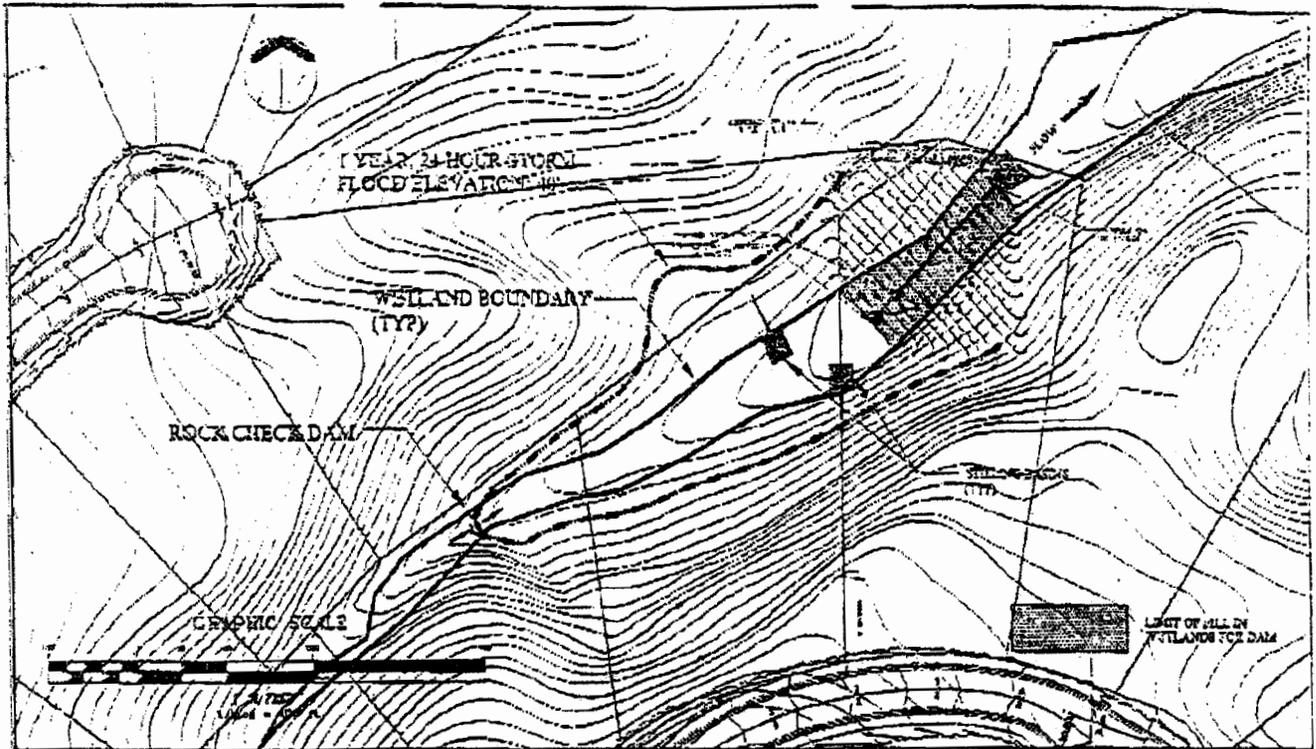
TEMPORARY SEDIMENT BASIN 5B 2

DORIFICE = 4 inches

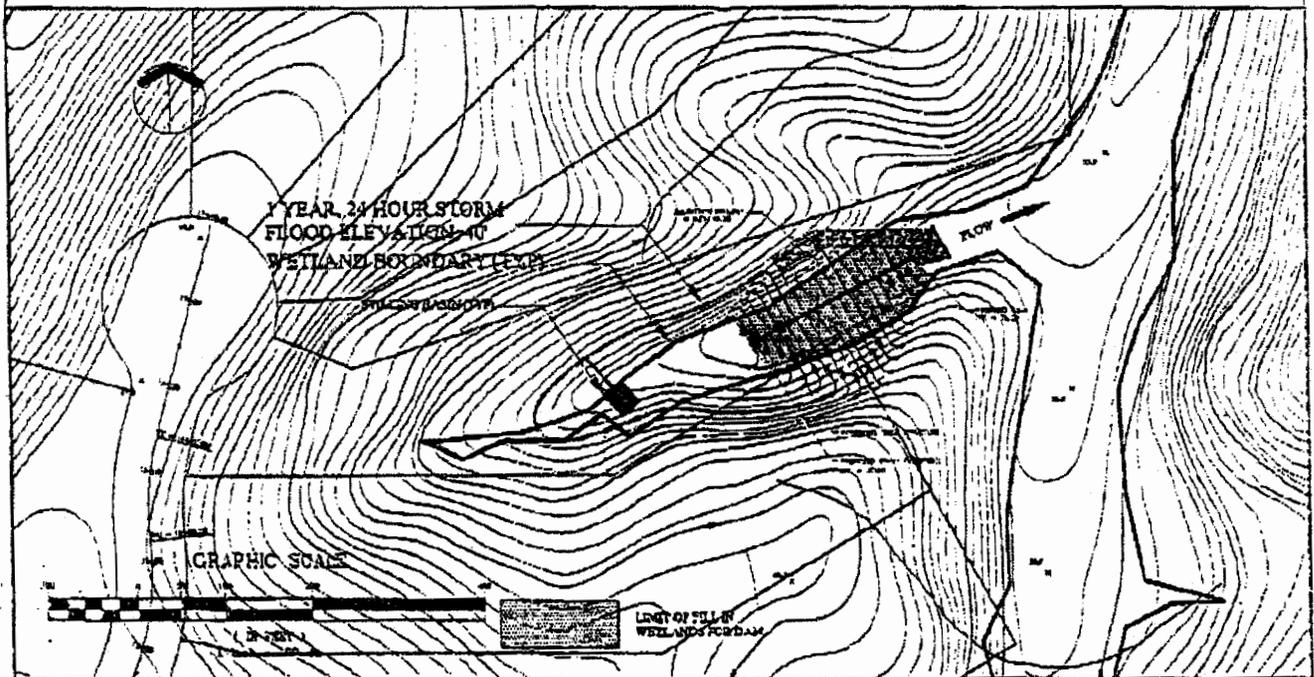
W.S.E. (feet)	AREA s.f.	INC. VOL c.f.	STORAGE c.f	H_{AVG} ft.	Q_{AVG} cfs	dT hours		STORAGE c.y.
80.00	4375	7842	23101	3.50	0.7672			856
78.00	3467	6127	15259	1.50	0.4852	3.5	DSE	565
76.00	2660	4614	9132	0.25	0.1213	10.6		
75.50	2483.5	3328	7846				WSE	291
74.00	1954	3302	4518					167
72.00	1348	1216	1216					45
71.00	1083							0

DRAW DOWN TIME = 14.1

NO SS CURVE.



PLAN VIEW DAM II SCALE: 1" = 100'



PLAN VIEW DAM III SCALE: 1" = 100'

PURPOSE:

DATUM: NAD 1983

ADJACENT PROPERTY OWNERS

- 1.
- 2.
- 3.
- 4.
- 5.

PLAN VIEW

PHASE I, SECTION VB
DAMS II AND III



Langley and McDonald

A Wheland Company
ENGINEERS - PLANNERS - SURVEYORS
CONSULTANTS - PROFESSIONAL CORPORATION
Virginia Beach and Williamsburg, Virginia

DN: Un-named Tributaries

AT: Ware Creek

CITY/COUNTY: James City County

APPLICATION BY: Stonehouse L.L.C.

SCALE: 1" = 100'

DATE: JAN 27, 1999

SHEET 5 OF 5

JUN 15 01 11:32 AM '02 P.07

ID:7572345111

Dom Land Mgmt Co.

7/6/01

Drainage Calculations

for



STONEHOUSE,
VIRGINIA
Live where the future is wide open.

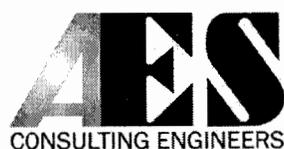
James City County, Virginia

Prepared for

Stonehouse Development Company, L.L.C.

June 2001

Prepared by



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

BMP 5.2 +
5.3
WC 073
WC 074
5-42-99

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	136.0	0.34	1.38	0.85	0.29	1.13	5.0	6.2	6.8	7.73	14.55	9.26	15	5.07	75.90	69.00	77.00	69.66	88.76	69.00	SS1-1 to SS1-
2	1	200.0	0.23	0.59	0.85	0.20	0.48	5.0	5.1	7.1	3.44	6.46	3.66	15	1.00	78.00	76.00	78.74	77.71	82.40	88.76	SS1-2 - SS1-✓
3	1	146.0	0.14	0.31	0.85	0.12	0.26	5.0	5.2	7.1	1.86	3.73	4.34	12	1.10	86.17	84.57	86.75	85.07	91.67	88.76	SS1-3 - SS1-
4	3	34.0	0.17	0.17	0.85	0.14	0.14	5.0	5.0	7.1	1.03	3.56	2.43	12	1.00	86.61	86.27	87.04	86.99	91.67	91.67	SS1-4 SS1-5
5	2	12.0	0.11	0.11	0.80	0.09	0.09	5.0	5.0	7.1	0.63	16.09	1.76	12	20.42	80.55	78.10	80.89	79.06	0.00	82.40	SS1-3 TO SS1
6	2	12.0	0.25	0.25	0.80	0.20	0.20	5.0	5.0	7.1	1.43	16.09	2.71	12	20.42	80.55	78.10	81.06	79.06	0.00	82.40	SS1-3 TO SS1

Project File: 88771R2.stm

I-D-F File: JCCstormsewer.IDF

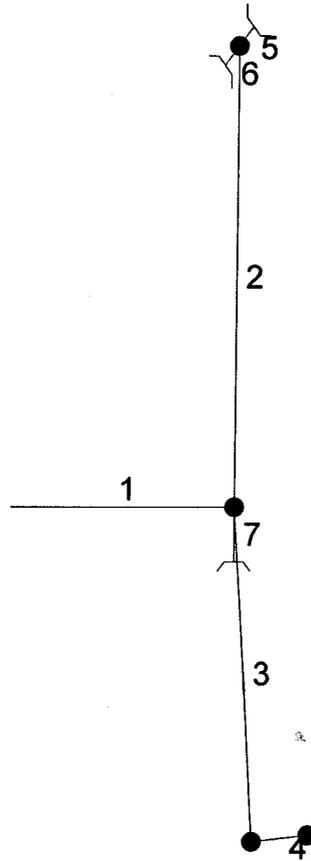
Total number of lines: 7

Run Date: 05-04-2001

NOTES: Intensity = $143.72 / (Tc + 19.20)^{0.94}$; Return period = 10 Yrs. ; Initial tailwater elevation = 69.66 (ft)

Walnut Creek Project No. 8877-00

Walnut Creek Road



Project file: 88771R2.stm

IDF file: JCCstormsewer.IDF

No. Lines: 7

05-04-2001

System 1

Hydraflow Storm Sewer Tabulation

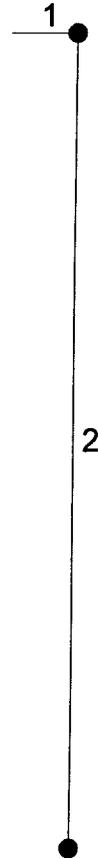
Bent Tree Phase 2

Bent Tree Lane

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	20.0	0.00	1.11	0.00	0.00	0.78	5.0	16.0	5.0	3.89	20.42	7.66	15	10.00	86.00	84.00	87.43	84.38	91.00	85.25	SS2-1A / SS2-
2	1	176.0	1.11	1.11	0.70	0.78	0.78	15.0	15.0	5.1	4.00	15.65	4.04	15	5.87	96.34	86.00	97.14	87.58	98.90	91.00	SS2-1 / SS2-
Project File: 88772R2.stm								I-D-F File: New JCC.IDF						Total number of lines: 2				Run Date: 05-07-2001				
NOTES: Intensity = $143.72 / (Tc + 19.20)^{0.94}$; Return period = 10 Yrs. ; Initial tailwater elevation = 84.38 (ft)																						

Bent Tree Phase 2 Project No. 8877-00

Bent Tree Lane



Project file: 88772R2.stm

IDF file: New JCC.IDF

No. Lines: 2

05-07-2001

System 2

Hydraflow Storm Sewer Tabulation Walnut Creek

Trailwood Lane

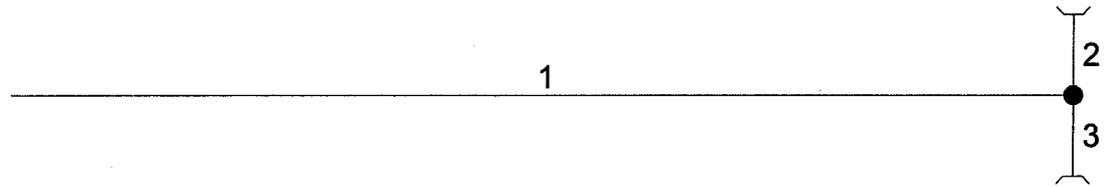
Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	175.0	1.32	1.89	0.65	0.86	1.23	5.0	5.1	7.1	8.73	25.60	13.14	15	15.71	84.50	57.00	85.65	57.50	86.93	58.25	SS3-1 SS3-2
2	1	12.0	0.47	0.47	0.65	0.31	0.31	5.0	5.0	7.1	2.18	24.38	2.80	15	14.25	86.21	84.50	86.80	86.50	87.34	86.93	SS2-2 SS2-3
3	1	12.0	0.10	0.10	0.65	0.06	0.06	5.0	5.0	7.1	0.46	24.38	1.35	15	14.25	86.21	84.50	86.48	86.50	87.34	86.93	SS2-2 SS2-4

Project File: 887703R1.stm I-D-F File: New JCC.IDF Total number of lines: 3 Run Date: 05-16-2001

NOTES: Intensity = $143.72 / (Tc + 19.20)^{0.94}$; Return period = 10 Yrs. ; Initial tailwater elevation = 57.50 (ft)

Walnut Creek Project No. 8877-00

Trail Wood Lane



Project file: 887703.stm

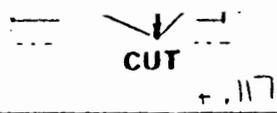
IDF file: New JCC.IDF

No. Lines: 3

05-04-2001

System 3

R SIDE
WALNUT CREEK



PROJECT BEST TREE PHASE 1
BY JAG DATE 3/26/01

STA. TO STA.		FLOW	C	A	C A		Tc	I ₂	Q ₂	C of F	Slope FI-FI	ALLOW VEL	EARTH		Protective		Lining		I ₁₀	Q ₁₀	DEP.	REMARKS
					n=.03	n=.05							n=.015									
					VEL.	Qn							VEL.	DEP.	Qn	DEP.						
10+00	11+00	↓	.65	.054	.035	—	5	5.5	.19	C	.035				1.5	2"			8	.28	3"	GRASS (LOW FLOW)
11+00	12+00	↓	.65	.058	.038	.073	5	5.5	.40	↓	.023				1.5	3.5"			8	.58	4"	GRASS
12+00	12+50	↓	.65	.074	.044	.117	5	5.5	.64		.024				1.9	4"			8	.94	4.5"	GRASS
12+80	14+00	↓	.65	.059	.038	—	5	5.5	.19		.053				/	/			8	.30	2"	TO TRAIL WOOD LANE CONC (Slope > 3%)
14+00	14+50	↓	.65	.029	.019	.057	5	5.5	.31		.065				/	/			8	.46	2"	CONC (Slope > 3%)
14+50	15+10	↓	.65	.029	.019	.069	5	5.5	.10		.05				/	/			8	.15	2"	CONC. (Slope > 3%)
15+10	15+75	↓	.65	.043	.028	—	5	5.5	.26		.022				1.2	3"			8	.38	4"	DISCHARGE TO DI-5 GRASS PEND DITCH
18+00	18+64	↓	.85	.084	.071	—	5	5.5	.39	F	.02				1.4	4"			8	.57	4"	GRASS

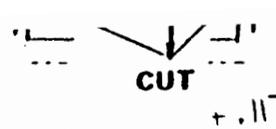
L SIDE
WALNUT CREEK



STA. TO STA.		FLOW	C	A	C A		Tc	I ₂	Q ₂	C or F	Slope FI-FI	ALLOW VEL	Earth	Protective			Lining		I ₁₀	Q ₁₀	DEP.	REMARKS
n=.03	VEL.				n=.05								n=.015									
					Qn	VEL.							DEP.	Qn	DEP.							
10+00	11+00	↓	.65	.054	.035	-	5	5.5	.19	C	.035			1.5	2"		8	.28	3"	GRASS (LOW FLOW)		
11+00	12+00	↓	.65	.056	.036	.071	5	5.5	.39	↓	.023			1.5	3.5"		8	.58	4"	GRASS		
12+00	12+50	↓	.65	.029	.019	.090	5	5.5	.49		.024			1.8	4"		8	.72	4"	GRASS		
12+50	13+00	↓	.65	.029	.019	.101	5	5.5	.60		.039			/	/		8	.81	3"	CONC (Slope > 3%)		
13+00	14+00	↓	.65	.058	.038	.139	5	5.5	.76		.058			/	/		8	1.11	3"	CONC (Slope > 3%)		
14+00	14+50	↓	.65	.028	.018	.157	5	5.5			.065			/	/		8	1.26	3"	CONC (Slope > 3%)		
14+50	15+00	↓	.65	.028	.018	-	5	5.5	.10		.049			1.4	< 2"		8	.14	2"	CONC (Slope > 3%)		
→ DISCHARGE TO DI-5																						
15+00	16+00	↓	.55	.091	.050	.068	5	5.5	.37		.020			1.4	3.5"		8	.54	4"	GRASS		
16+00	16+50	↓	.50	.085	.042	.110	5	5.5	.60		.022			1.5	4"		8	.88	5"	GRASS		
→ DISCHARGE TO DI-5																						
16+50	17+00	↓	.60	.05	.03	-	5	5.5	.16		.03			1.4	2.5"		8	.24	3"	GRASS		
17+00	18+00	↓	.60	.105	.063	.093	5	5.5	.51		.04			/	/		8	.74	3"	CONC (Slope > 3%)		
18+00	18+64	↓	.85	.08	.068	.161	5	5.5	.88		.02			1.8	5"		8	1.29	6"	GRASS		

L+R SIDE

Bent Tree



PROJECT BENT TREE PHASE II
 BY JAG DATE 1/19/01

STA. TO STA.		FLOW	C	A	C A		Tc	I ₂	Q ₂	C or F	Slope FI-FI	ALLOW VEL	Earth	Protective			Lining		I ₁₀	Q ₁₀	DEP.	REMARKS
					n=.03	n=.05							n=.015									
					INCR.	ACC.							VEL.	Qn	VEL.	DEP.	Qn	DEP.				
(R) 17+00	18+00	↓	.50	.177	.089	-	5	5.5	.49		.024				1.5	4"			8	.71	4.5"	GRASS
18+00	18+XX	↓	.45	.777	.350	.439	10	4.5	1.98		.01				1.6	8"			6	2.63	8.5"	GRASS
2-27 17+00	18+00	↓	.65	.058	.038	-	5	5.5	.21		.024				1.2	3"			8	.30	3"	GRASS
18+00	18+XX	↓	.85	.097	.082	.12	5	5.5	.66		.01				1.2	4"			8	.96	6"	GRASS

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project BENT TREE - PHASE 2

Basin # 5-2 Location BEHIND LOT 58

Total area draining to basin: 6.93 acres.

Basin Volume Design

Wet Storage:

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

67 cu. yds. x 6.93 acres = 464 cu. yds.

2. Available basin volume = 464 cu. yds. at elevation 67.00. (From storage - elevation curve)

3. Excavate 0 cu. yds. to obtain required volume*.

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

4. Available volume before cleanout required.

33 cu. yds. x 6.93 acres = 229 cu. yds.

5. Elevation corresponding to cleanout level = 65.1.

(From Storage - Elevation Curve)

6. Distance from invert of the dewatering orifice to cleanout level = 1.9 ft. (Min. = 1.0 ft.)

Dry Storage:

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

67 cu. yds. x 6.93 acres = 464 cu. yds.

8. Total available basin volume at crest of riser* = 929 cu. yds. at elevation 69.3. (From Storage - Elevation Curve)

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

9. Diameter of dewatering orifice = 5 in. [USE 4" B/C 5" PVC
NOT AVAILABLE]
10. Diameter of flexible tubing = 6 in. (diameter of dewatering orifice plus 2 inches).

Preliminary Design Elevations

11. Crest of Riser = 69.50
Top of Dam = 72.25
Design High Water = 71.13
Upstream Toe of Dam = 58

Basin Shape

12. $\frac{\text{Length of Flow}}{\text{Effective Width}} = \frac{L}{We} = \frac{266}{A/266} = \frac{266}{5157/266} = 13.7$

If > 2 , baffles are not required BAFFLES NOT REQUIRED

If < 2 , baffles are required _____

Runoff

13. $Q_2 = \underline{14.16}$ cfs (From Chapter 5)
14. $Q_{25} = \underline{38.23}$ cfs (From Chapter 5)

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2 = \underline{14.16}$ cfs. (riser and barrel)

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

16. With emergency spillway:

Assumed available head (h) = 1.0 ft. (Using Q₂)

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

Without emergency spillway:

Assumed available head (h) = NA ft. (Using Q₂₅)

h = Design High Water Elevation - Crest of Riser Elevation

17. Riser diameter (D_r) = 48 in. Actual head (h) = 1 ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = 103 ft.

Head (H) on barrel through embankment = 21 ft.

(From Plate 3.14-7).

19. Barrel diameter = 12 in.

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

20. Trash rack and anti-vortex device

Diameter = 84 inches.

Height = 24 inches.

~~(From Table 3.14-D).~~

PRE-CAST CONCRETE

Emergency Spillway Design

21. Required spillway capacity Q_e = ^{28.0 - 13.5} Q₂₅ - Q_p = 14.5 cfs.

22. Bottom width (b) = 10.0 ft.; the slope of the exit channel (s) = 0.253 ft./foot; and the minimum length of the exit channel (x) = 96 ft.

~~(From Table 3.14-C).~~

RIP-RAP CHANNEL

Hydrograph Plot

TEMPORARY SEDIMENT BASIN 5.2

English

Hyd. No. 30

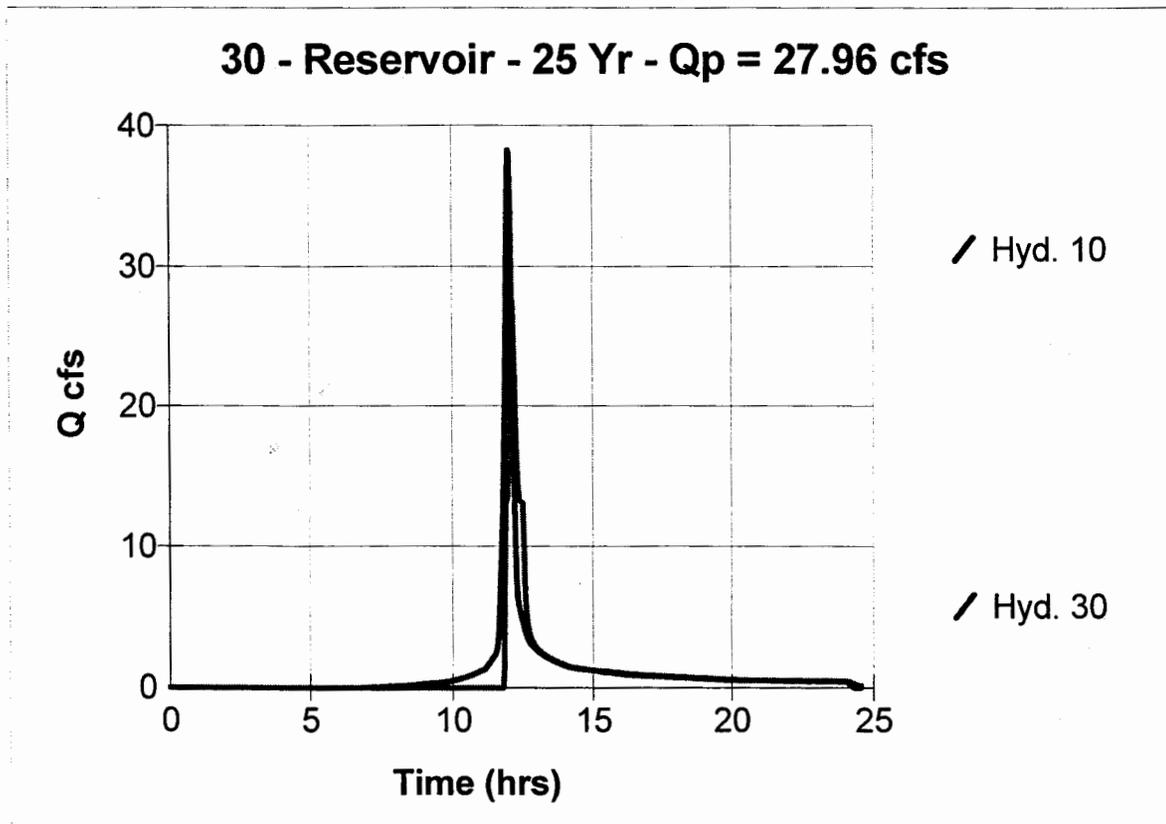
Sediment Basin BMP 5.2

Hydrograph type = Reservoir
Storm frequency = 25 yrs
Inflow hyd. No. = 10
Max. Elevation = 71.11 ft

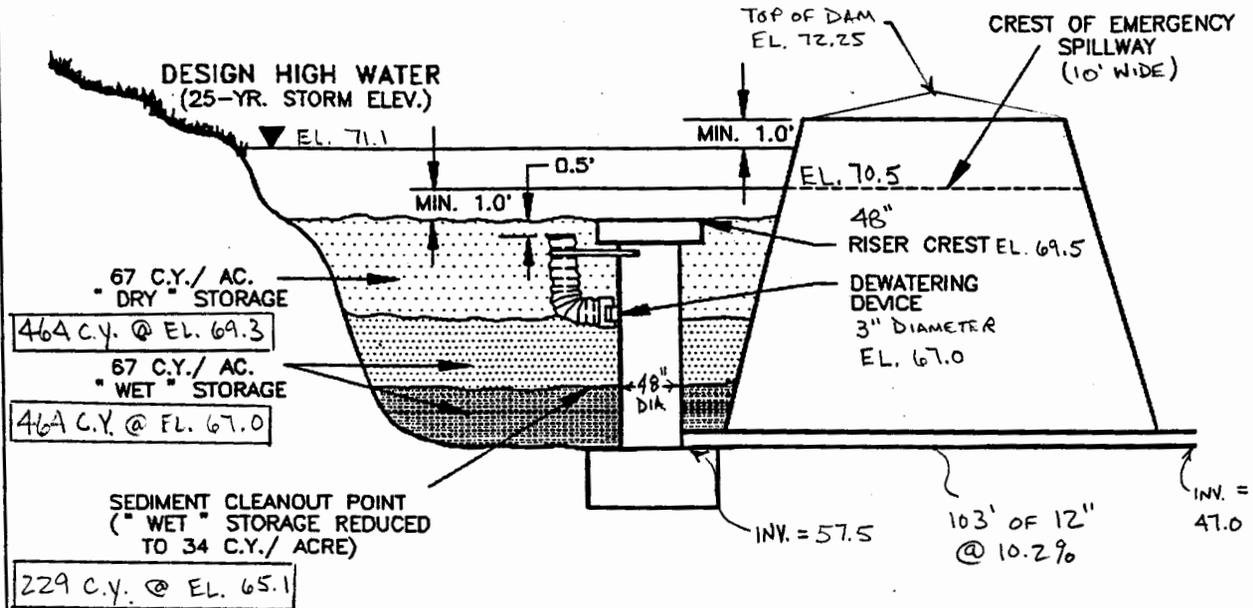
Peak discharge = 27.96 cfs
Time interval = 2 min
Reservoir name = Sediment Basin
Max. Storage = 29,592 cuft

Storage Indication method used.

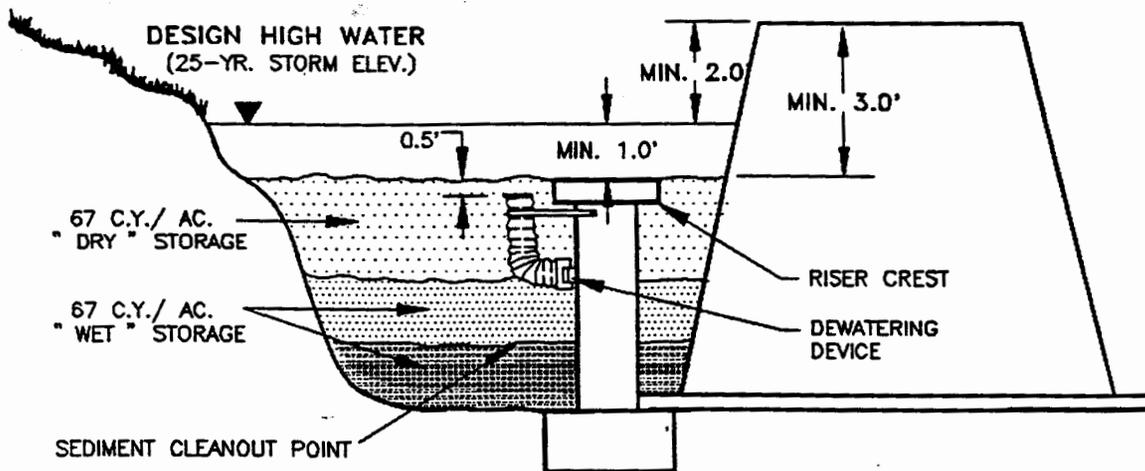
Total Volume = 85,217 cuft



SEDIMENT BASIN SCHEMATIC ELEVATIONS

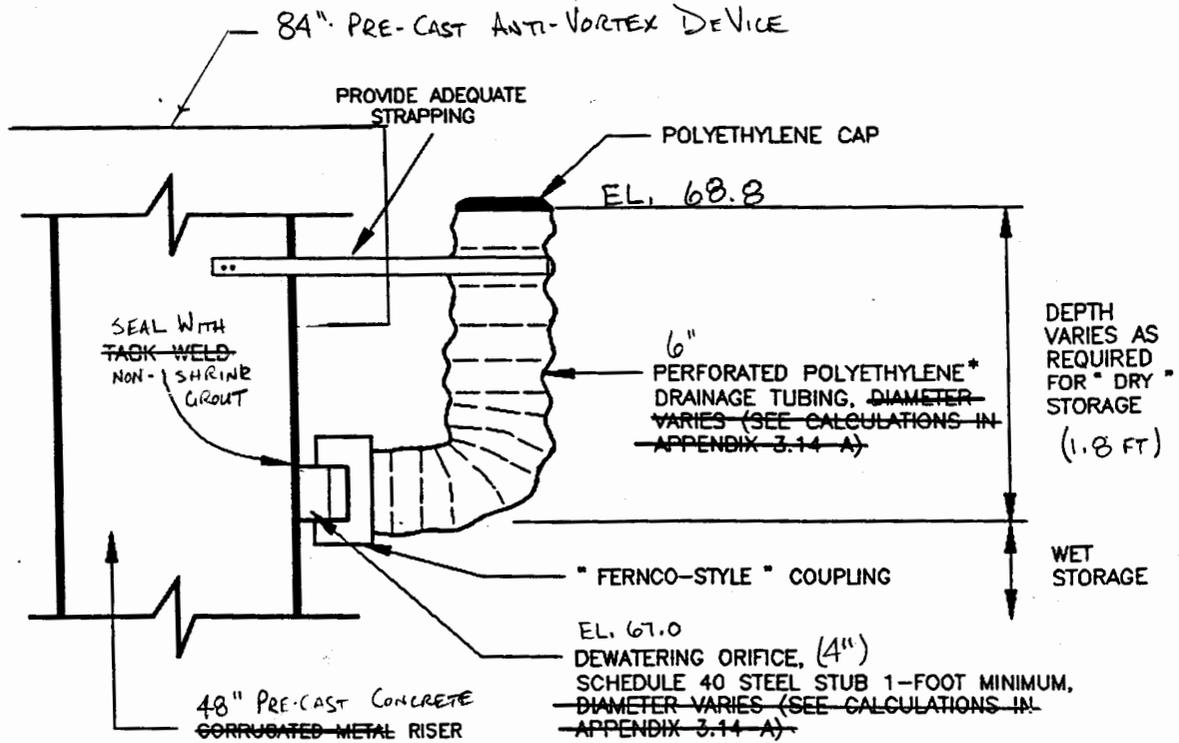


DESIGN ELEVATIONS WITH EMERGENCY SPILLWAY



DESIGN ELEVATIONS WITHOUT EMERGENCY SPILLWAY (RISER PASSES 25-YR. EVENT)

RECOMMENDED DEWATERING SYSTEM FOR SEDIMENT BASINS



NOTE: WITH CONCRETE RISER, USE PVC SCHEDULE 40 STUB FOR DEWATERING ORIFICE

* DRAINAGE TUBING SHALL COMPLY WITH ASTM F667 AND AASHTO M294

STONEHOUSE - BENT TREE - PHASE II / WALNUT CREEK
TEMPORARY SEDIMENT BASIN 5.2

Calculation of Diameter of Dewatering Orifice for Sediment Basin

Stonehouse

Bent Tree, Phase 2

AES Project Number 8877-00

August 2, 2000

Using the equation,

$$\text{Diameter of Dewatering Orifice} = 2 * (Q / ((64.32 * (h / 2))^{(1/2)} * 0.6 * 3.14))^{(1/2)}$$

where, Q equals volumetric flowrate through orifice needed for 6-hour drawdown , in cfs

h equals Average Head, in feet

$$h = \frac{\text{Elevation of crest of riser} - \text{Elevation of Wet storage volume}}{2}$$

$$h = \frac{69.5 - 67.0}{2} = 1.25 \text{ feet}$$

$$Q = \text{Total Dry Storage} / 21,600 \text{ seconds}$$

$$\text{Total Dry Storage for sediment basin} = 464 \text{ cubic yards, or } 12,528 \text{ cubic feet}$$

$$Q = 0.6 \text{ cfs}$$

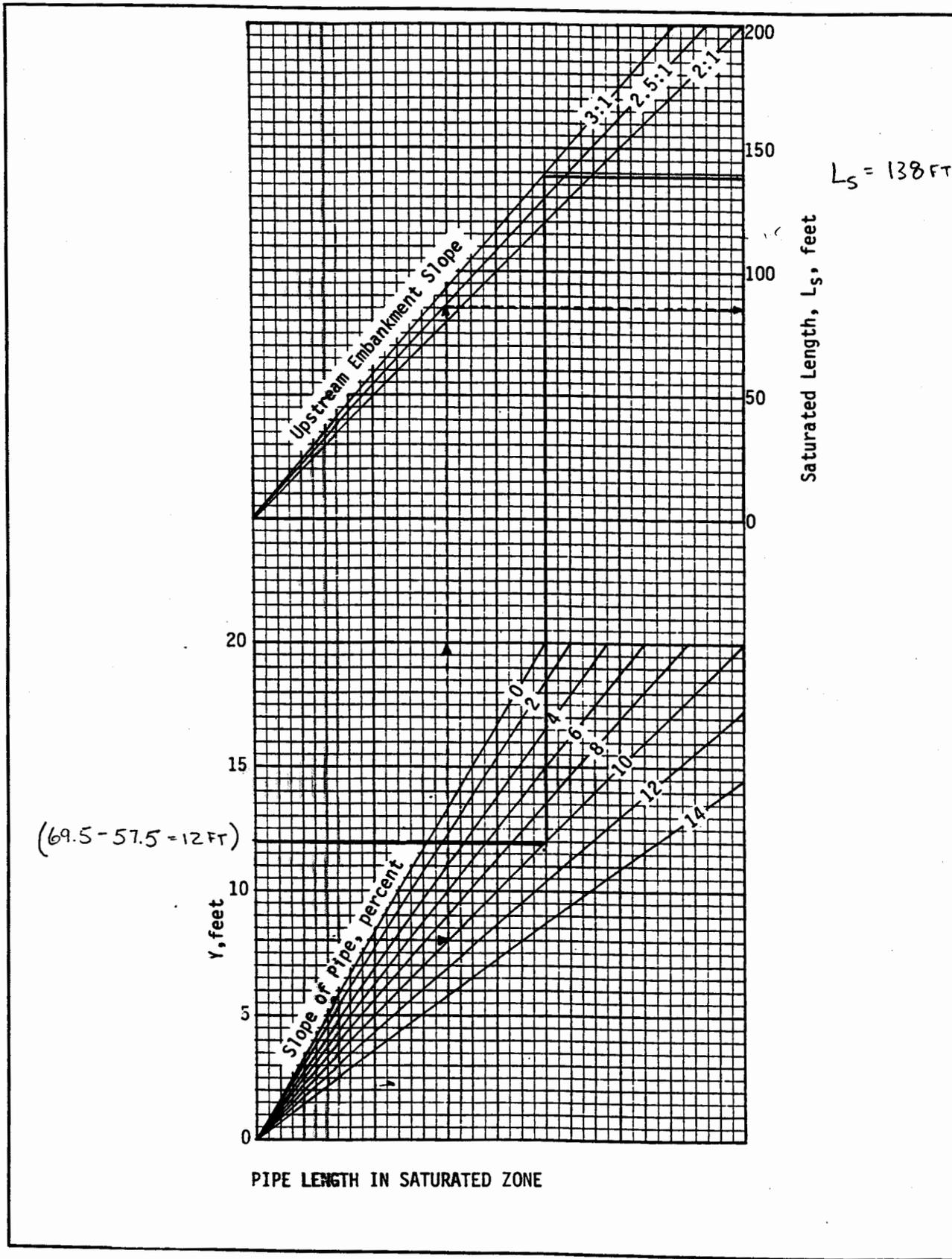
So,

$$\text{Diameter of Orifice} = 0.4 \text{ feet, or } 5 \text{ inches}$$

STONEHOUSE - BENT TREE
 PHASE 2/WALNUT CREEK
 TEMPORARY SEDIMENT BASIN 5.2

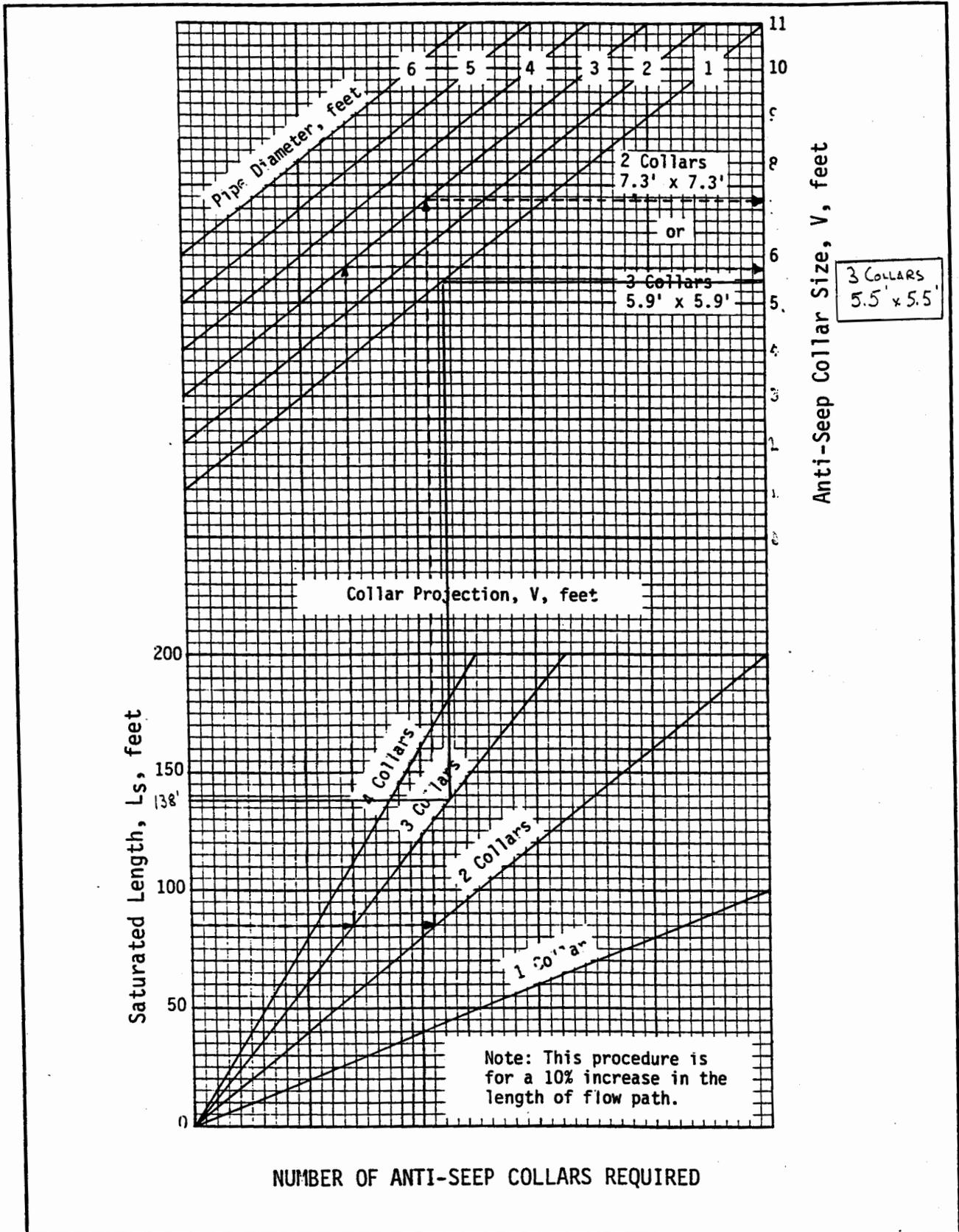
1992

3.14



Source: USDA-SCS

Plate 3.14-11



Source: USDA-SCS

Plate 3.14-12

Anti-Seep Collar Design

23. Depth of water at principal spillway crest (Y) = 7 ft. NOT REQUIRED
 Slope of upstream face of embankment (Z) = 2 :1.
 Slope of principal spillway barrel (S_b) = .5 %
 Length of barrel in saturated zone (L_s) = _____ ft.
24. Number of collars required = _____ dimensions = _____
 (from Plate 3.14-12).

Final Design Elevations

25. Top of Dam = 80 ✓
 Design High Water = 78.48 ✓
 Emergency Spillway Crest = N.A.
 Principal Spillway Crest = 78.0 ✓
 Dewatering Orifice Invert = 75.5 ✓
 Cleanout Elevation = 74.0 ✓
 Elevation of Upstream Toe of Dam
 or Excavated Bottom of "Wet Storage
 Area" (if excavation was performed) = 71.0

78.48
 + 2.00 FB
 80.48 MIN TOP DAM

RC = 78.0
 + 3.0
 81.0 MIN TOP DAM

FACILITY NOT
 IN ACCORDANCE
 WITH MIN STD
 3.14,
 PLATE 3.14-2
 FOR WITHOUT
 EMERG. SPILLWAYS

STONEHOUSE - BENT TREE - PHASE II / WALNUT CREEK
TEMPORARY SEDIMENT BASIN 5.2

STONEHOUSE, SECTION VB
BENT TREE, PHASE 2
SWM / BMP 5.2 BOUYANCE CALCULATIONS
August 18, 2000

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

ELEVATION OF RISER CREST = 69.5
ELEVATION OF INVERT OF RISER = 57.5
(AFTER GROUTING)
INSIDE DIAMETER OF RISER = 4 feet
OUTSIDE DIAMETER OF RISER = 5 feet

WEIGHT OF WATER DISPLACED BY AIR

Weight of water displaced by air = Weight of water per cu. Ft. * 3.14 * (Diameter of riser / 2)² * (El. Of Riser
Crest - El. Of riser invert)
Weight of water displaced by air = 9,405 lbs.

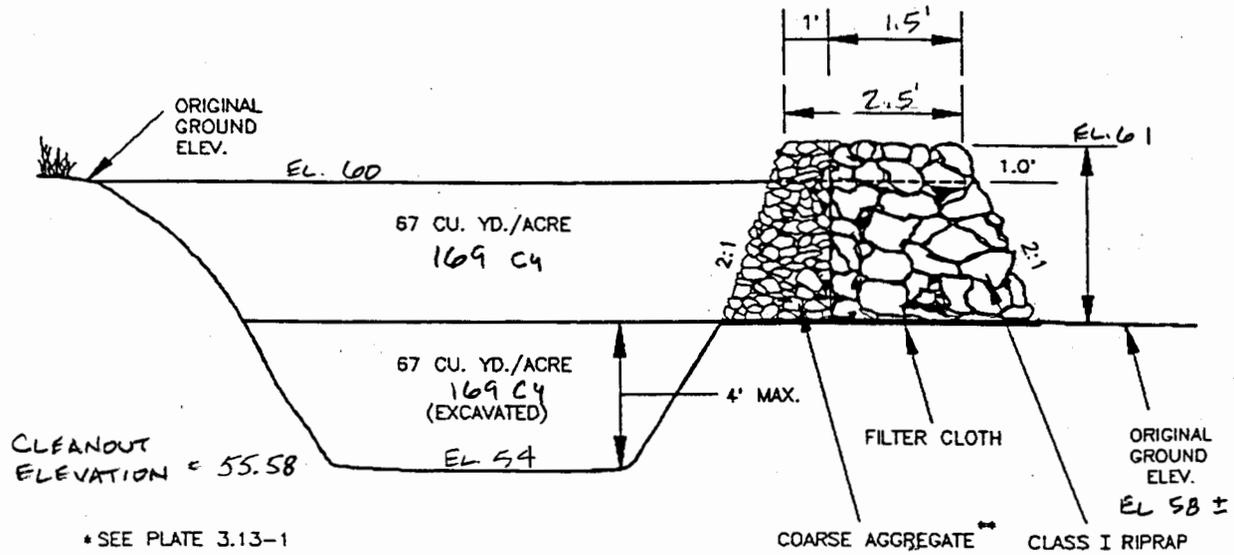
WEIGHT OF PRINCIPAL SPILLWAY / RISER

Weight of concrete of riser = (Weight of concrete per cu. Ft. * 3.14 * (Outside diameter of riser / 2)² * (El. Of Riser
Crest - El. Of riser invert)) - (Weight of concrete per cu. Ft. * 3.14 * (Inside diameter of
riser / 2)² * (El. Of Riser Crest - El. Of riser invert))
Weight of Concrete Riser = 12,717 lbs.
Weight of Anti-vortex = 8,540 lbs.
Weight of Extend Base Only = 955 lbs.
Total Weight of Riser = 22,212 lbs.

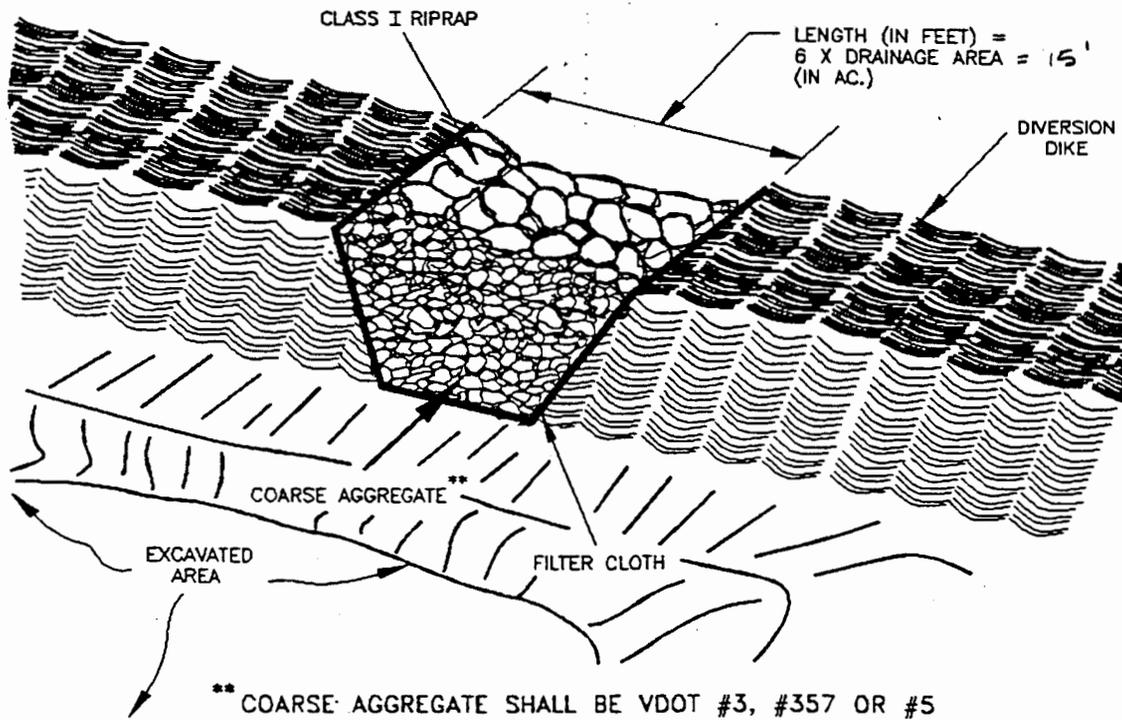
Total Weight of Riser > 1.25 x Weight of Water Displaced, I.e. Will not float !

TEMPORARY SEDIMENT TRAP

DRAINAGE AREA = 2.52 AC



CROSS SECTION OF OUTLET



OUTLET (PERSPECTIVE VIEW)

**CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR BMP / SWM 5.2
STONEHOUSE, SECTION VB, PHASE 2
AES Project No.: 8877-00
July 28, 2000**

I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN

- A. Pre-Development Drainage Area to Point of Concern = 6.76 Acres
 B. Pre-development Land Use, Soil Classification and Calculation of Composite Curve Number

Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1) 10-B Craven Fine Sandy Loam	C	Wooded	0.24	74	18
2) 11-C Craven-Uchee	C	Wooded	2.26	74	167
3) 15-F Emporia Complex	C	Wooded	1.98	74	147
4) 25-B Norfolk Fine Sandy Loam	B	Wooded	2.28	60	137
5)					
Totals =			6.76		468
Composite CN =					69

C. Pre-Development Time of Concentration Calculations

- 1) Overland Flow (maximum 300 feet)
 - Surface description (table 5-7) mainly wooded
 - Manning's roughness coefficient, n (table 5-7) 0.4
 - Length of overland flow, L 200 Feet
 - 2-year 24-hour rainfall, P2 3.6 inches
 - Average slope of overland flow, s 0.04 feet per foot
 - Travel time, $T_t = (0.007 \cdot (n \cdot L)^{0.8}) / (P_2^{0.5} \cdot s^{0.4})$ 0.45 hours

 - 2) Shallow concentrated flow (maximum 300 feet)
 - Surface description, paved or unpaved unpaved, wooded
 - Length of shallow concentrated flow, L 200 Feet
 - Average slope of shallow concentrated flow, s 0.07 feet per foot
 - Average velocity, v 1.0 feet per second
 - Travel time, $T_t = L / (3600 \cdot v)$ 0.06 hours

 - 3) Channel or Pipe Flow
 - Length of channel flow, L 475 Feet
 - Average velocity of channel flow, v 2.5 feet per second
 - Travel time, $T_t = L / (3600 \cdot v)$ 0.05 hours
- Total Time of Concentration = 0.55 hours
or 33 minutes

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

- A. Post-Development Drainage Area to Point of Concern = 6.93 Acres
 B. Post-development Land Use, Soil Classification and Calculation of Composite Curve Number

Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1) 10-B Craven Fine Sandy Loam	C	Residential - 1/2 acre lots	1.56	80	125
2) 10-B Craven Fine Sandy Loam	C	Open Space/Wooded	0.09	76	7
3) 10-B Craven Fine Sandy Loam	C	Right-of-Way	0.28	92	26
4) 11-C Craven-Uchee	C	Residential - 1/2 acre lots	1.65	80	132
5) 11-C Craven-Uchee	C	Right-of-Way	1.09	92	100
6) 15-F Emporia Complex	C	Residential - 1/2 acre lots	0.23	80	18
7) 15-F Emporia Complex	C	Open Space/Wooded	0.87	76	66
8) 15-F Emporia Complex	C	Right-of-Way	0.05	92	5
9) 15-F Emporia Complex	C	BMP Surface	0.23	100	23
10) 25-B Norfolk Fine Sandy Loam	B	Residential - 1/2 acre lots	0.58	60	35
11) 25-B Norfolk Fine Sandy Loam	B	Open Space/Wooded	0.24	60	14
11) 25-B Norfolk Fine Sandy Loam	B	Right-of-Way	0.06	89	5
Total Adjusted CN =			6.93		537
Composite CN =					77

C. Post-Development Time of Concentration Calculations

- | | |
|--|---|
| <p>1) Overland Flow (maximum 300 feet)
 Surface description (table 5-7)
 Manning's roughness coefficient, n (table 5-7)
 Length of overland flow, L
 25-year 24-hour rainfall, P25
 Average slope of overland flow, s
 Travel time, $T_t = (0.007 * (n * L)^{0.8}) / (P^{2 * 0.5 * s^{0.4}})$</p> | <p>residential
 0.2
 200 Feet
 6.5 inches
 0.04 feet per foot
 0.19 hours</p> |
| <p>2) Shallow concentrated flow (maximum 300 feet)
 Surface description, paved or unpaved
 Length of shallow concentrated flow, L
 Average slope of shallow concentrated flow, s
 Average velocity, v
 Travel time, $T_t = L / (3600 * v)$</p> | <p>unpaved
 200 Feet
 0.07 feet per foot
 1.00 feet per second
 0.06 hours</p> |
| <p>3) Channel or Pipe Flow
 Length of channel flow, L
 Average velocity of channel flow, v
 Travel time, $T_t = L / (3600 * v)$</p> | <p>475 Feet
 3 feet per second
 0.04 hours</p> |
| <p>Total Time of Concentration =</p> | |
| | <p>0.29 hours
 or
 17 minutes</p> |

III. PROPOSED ESTIMATED POND(S) VOLUME ABOVE NORMAL POOL BY ELEVATION

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
58.0		35	0			
60.0	2.0	269	304	11	304	11
62.0	2.0	736	1005	37	1309	48
64.0	2.0	1581	2317	86	3626	134
66.0	2.0	3089	4670	173	8296	307
68.0	2.0	5157	8246	305	16542	613
70.0	2.0	8430	13587	503	30129	1116
72.0	2.0	12110	20540	761	50669	1877
74.0	2.0	15855	27965	1036	78634	2912

IV. DETERMINING RELEASE RATE OF 1-YEAR, 24-HOUR DETAINED FOR 24 HOURS FOR STREAM CHANNEL PROTECTION

Volume of 1-Year, 24-Hour Storm (based upon Hydrograph #1) = 23,517 cubic feet

Elevation of water surface associated with 1-Year, 24-Hour Storm Volume = 69.0

Elevation of Release Inlet for Channel Protection = 58.0

Average Head, in feet, on Release Inlet = 5.5

Average Release Rate Calculation $\frac{23,517 \text{ cubic feet}}{(24 \text{ hours} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/minute})} = 0.3 \text{ cfs}$

Calculation of Size of Release Inlet

Diameter of Release Inlet = $2 * (Q / ((64.32 * (h / 2))^{(1/2)} * 0.6 * 3.14)))^{(1/2)}$
 where, Q equals Average Release Rate, in cfs
 h equals Average Head, in feet

Diameter of Release Inlet = 0.20 feet, or 3 inches

Hydrograph Summary Report

BMP S.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	4.9	2	734	23,701	2	—	—	—	Pre-Development 2-
2	SCS Runoff	14.5	2	734	63,539	10	—	—	—	Pre-Development 10
3	SCS Runoff	17.2	2	734	75,241	25	—	—	—	Pre-Development 25
4	SCS Runoff	21.0	2	734	91,398	50	—	—	—	Pre-Development 50
5	SCS Runoff	25.0	2	732	108,069	100	—	—	—	Pre-Development 100
7	SCS Runoff	7.2	2	726	23,517	1	—	—	—	Post-Development 1
8	SCS Runoff	14.2	2	722	37,110	2	—	—	—	Post-Development 2
9	SCS Runoff	33.1	2	720	85,740	10	—	—	—	Post-Development 10
10	SCS Runoff	38.2	2	720	99,375	25	—	—	—	Post-Development 25
11	SCS Runoff	45.2	2	720	117,932	50	—	—	—	Post-Development 50
12	SCS Runoff	52.2	2	720	136,827	100	—	—	—	Post-Development 100
18	Reservoir	0.5	2	826	23,517	1	7	66.62	10,861	Post-Dev. 1-yr Rou
19	Reservoir	<u>1.7</u>	2	754	37,110	2	8	68.07	16,989	Post-Dev. 2-yr Rou
20	Reservoir	<u>13.1</u>	2	732	85,740	10	9	69.91	29,539	Post-Dev. 10-yr Ro
21	Reservoir	13.8	2	732	99,375	25	10	70.49	35,128	Post-Dev. 25-yr Ro
22	Reservoir	23.3	2	730	117,932	50	11	70.97	40,052	Post-Dev. 50-yr Ro
23	Reservoir	34.0	2	728	136,827	100	12	<u>71.27</u>	43,127	Post-Dev. 100-yr R
30	Reservoir	28.0	2	726	85,217	25	10	<u>71.11</u>	29,592	Sediment Basin BMP /

Proj. file: 887752.gpw

IDF file: Jcc.IDF

Run date: 08-03-2000

Hydrograph Plot

BMP 5,2

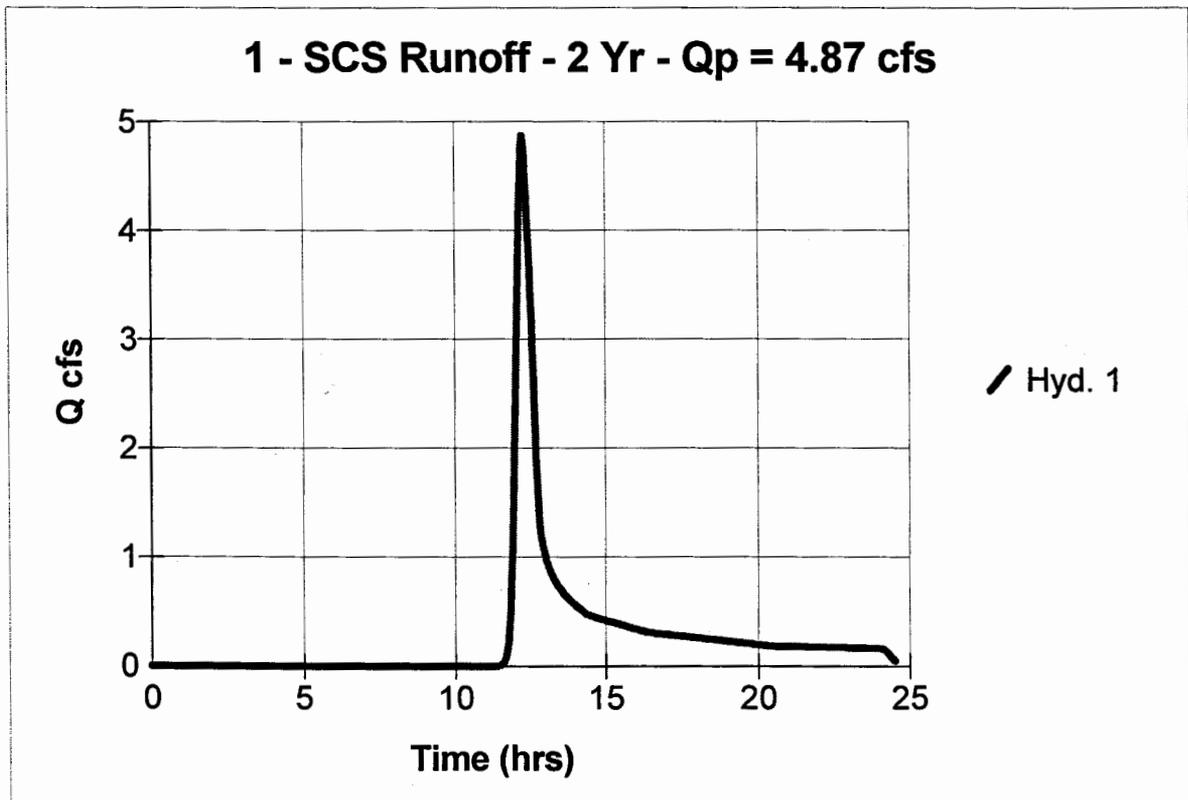
English

Hyd. No. 1

Pre-Development 2-yr Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 4.87 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 6.76 ac	Curve number	= 69
Basin Slope	= 6.0 %	Hydraulic length	= 875 ft
Tc method	= USER	Time of conc. (Tc)	= 33 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 23,701 cuft



SENT 12EE / WALNUT
PHASE 2 / CREEK

Hydrograph Plot

BMP 5.2

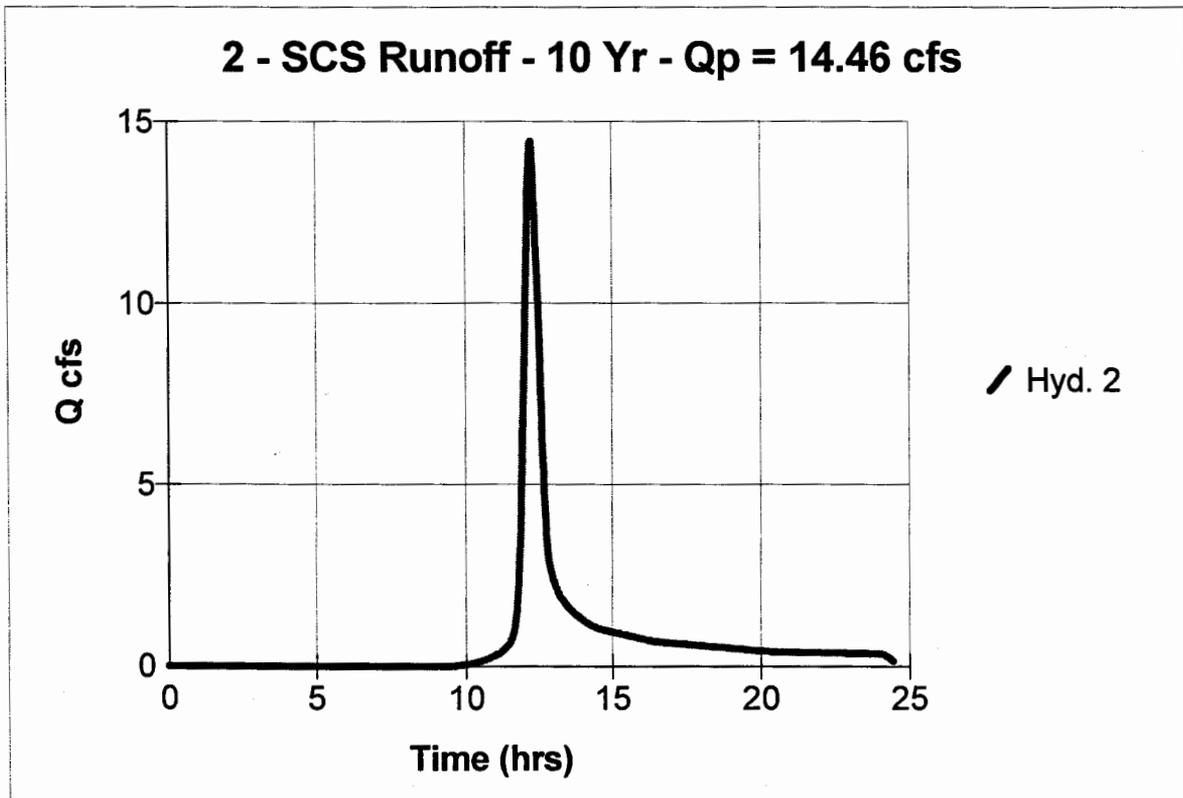
English

Hyd. No. 2

Pre-Development 10-yr Runoff

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.46 cfs
Storm frequency	=	10 yrs	Time interval	=	2 min
Drainage area	=	6.76 ac	Curve number	=	69
Basin Slope	=	6.0 %	Hydraulic length	=	875 ft
Tc method	=	USER	Time of conc. (Tc)	=	33 min
Total precip.	=	5.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

Total Volume = 63,539 cuft



BENT CREEK / WALNUT
PHASE 2 / CREEK

Hydrograph Plot

BMP 5.2

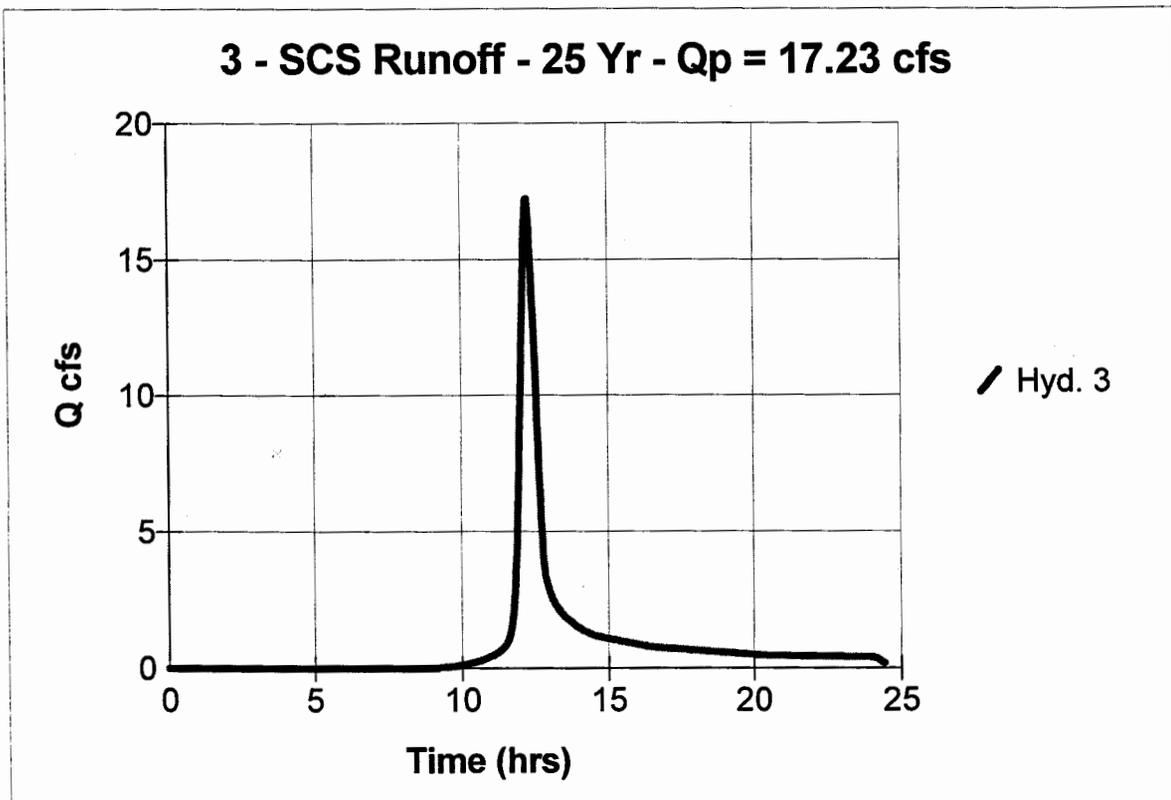
English

Hyd. No. 3

Pre-Development 25-yr Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 17.23 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 6.76 ac	Curve number	= 69
Basin Slope	= 6.0 %	Hydraulic length	= 875 ft
Tc method	= USER	Time of conc. (Tc)	= 33 min
Total precip.	= 6.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 75,241 cuft



BENT TREE / WALNUT
PHASE 2 / CREEK

Hydrograph Plot

BMP 5.2

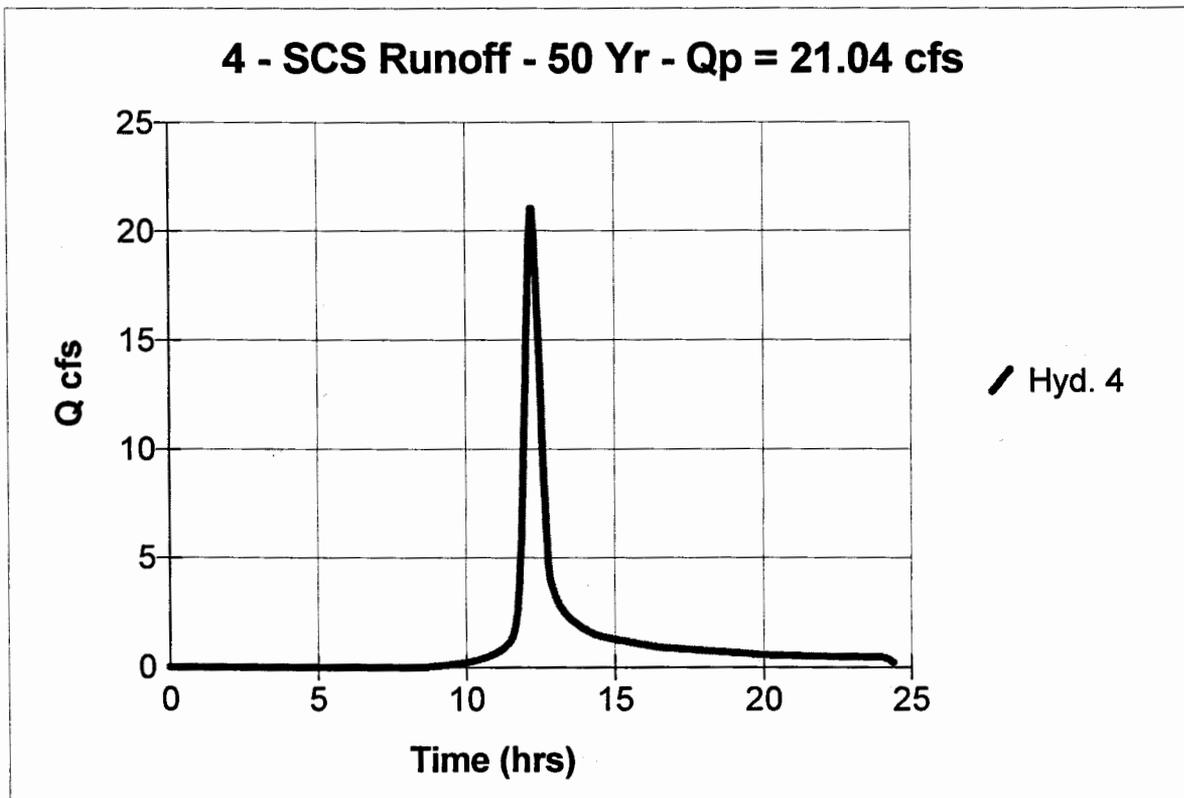
English

Hyd. No. 4

Pre-Development 50-yr Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 21.04 cfs
Storm frequency	= 50 yrs	Time interval	= 2 min
Drainage area	= 6.76 ac	Curve number	= 69
Basin Slope	= 6.0 %	Hydraulic length	= 875 ft
Tc method	= USER	Time of conc. (Tc)	= 33 min
Total precip.	= 7.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 91,398 cuft



Hydrograph Plot

BMP 5.2

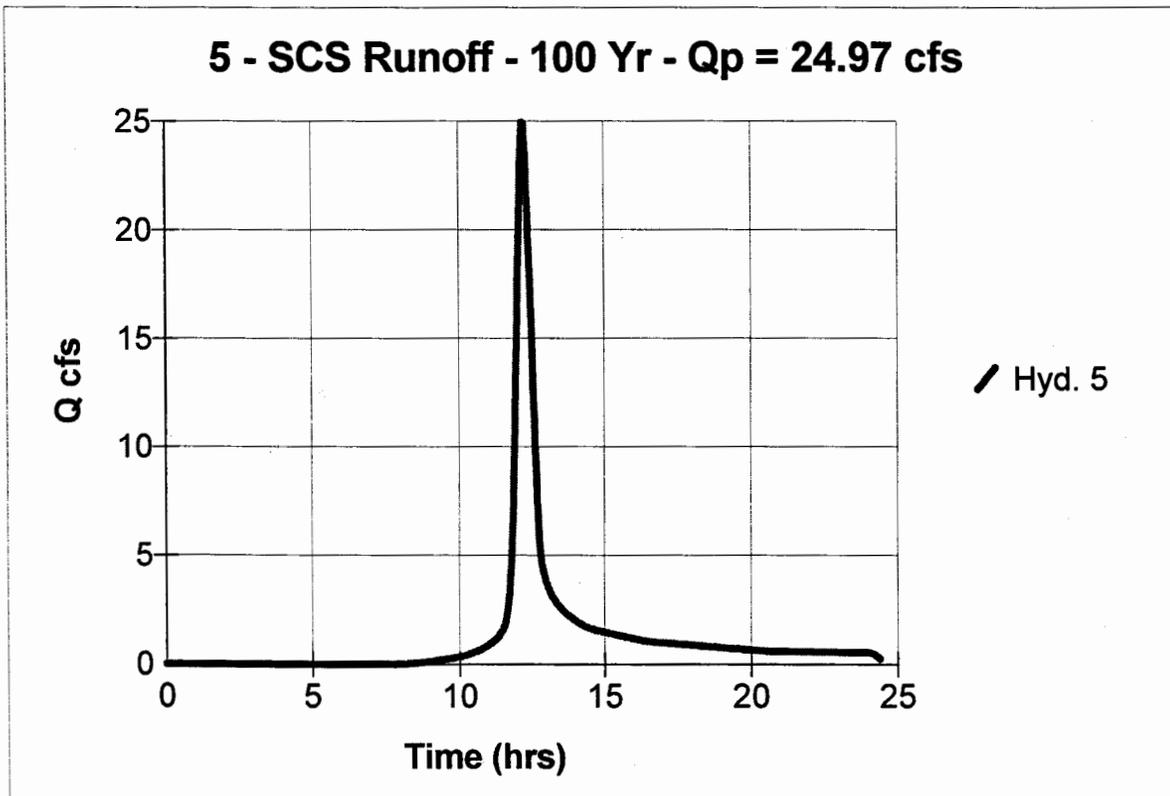
English

Hyd. No. 5

Pre-Development 100-yr Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 24.97 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 6.76 ac	Curve number	= 69
Basin Slope	= 6.0 %	Hydraulic length	= 875 ft
Tc method	= USER	Time of conc. (Tc)	= 33 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 108,069 cuft



Hydrograph Plot

BMP 5.2

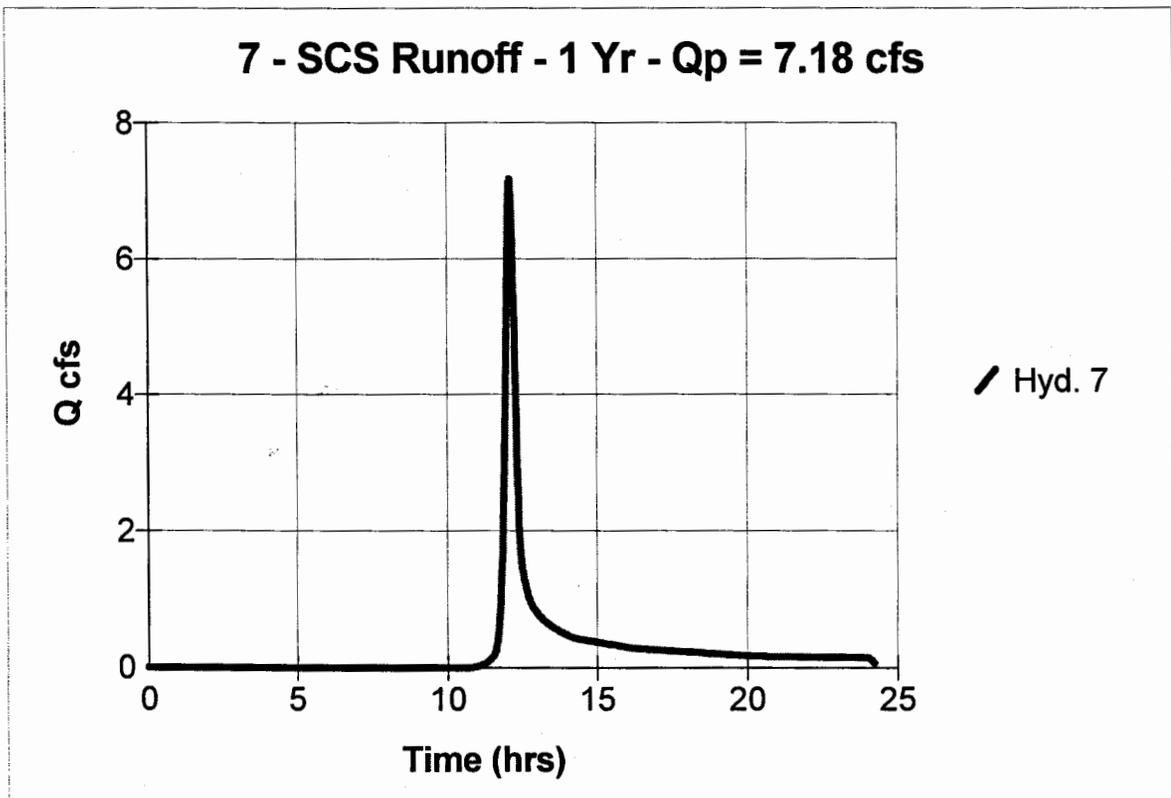
English

Hyd. No. 7

Post-Development 1-YR Runoff

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.18 cfs
Storm frequency	=	1 yrs	Time interval	=	2 min
Drainage area	=	6.93 ac	Curve number	=	77
Basin Slope	=	6.0 %	Hydraulic length	=	875 ft
Tc method	=	USER	Time of conc. (Tc)	=	17 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

Total Volume = 23,517 cuft



DENT CREEK / WALNUT
PHASE 2 / CREEK

Hydrograph Plot

BMP 5.2

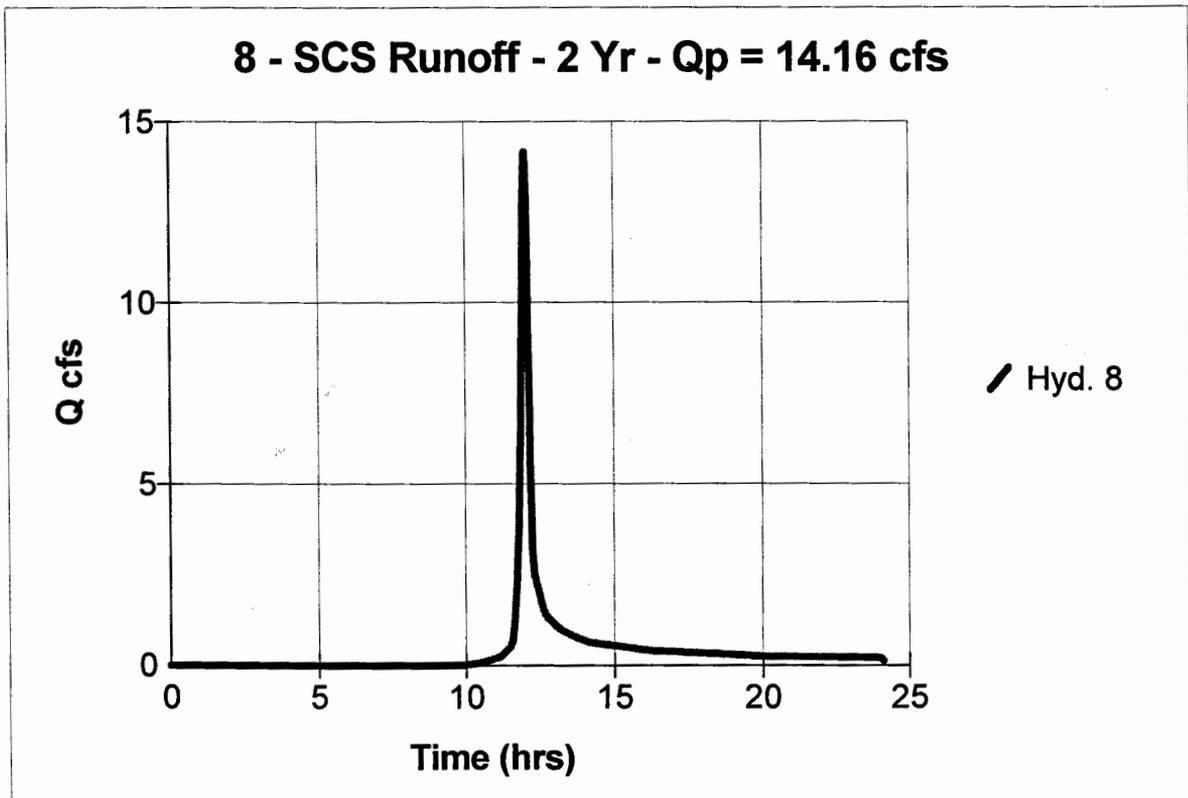
English

Hyd. No. 8

Post-Development 2-yr Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 14.16 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 6.93 ac	Curve number	= 77
Basin Slope	= 6.0 %	Hydraulic length	= 875 ft
Tc method	= USER	Time of conc. (Tc)	= 13 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 37,110 cuft



BENT CREEK / WALNUT
PHASE 2 / CREEK

Hydrograph Plot

BMP 5.2

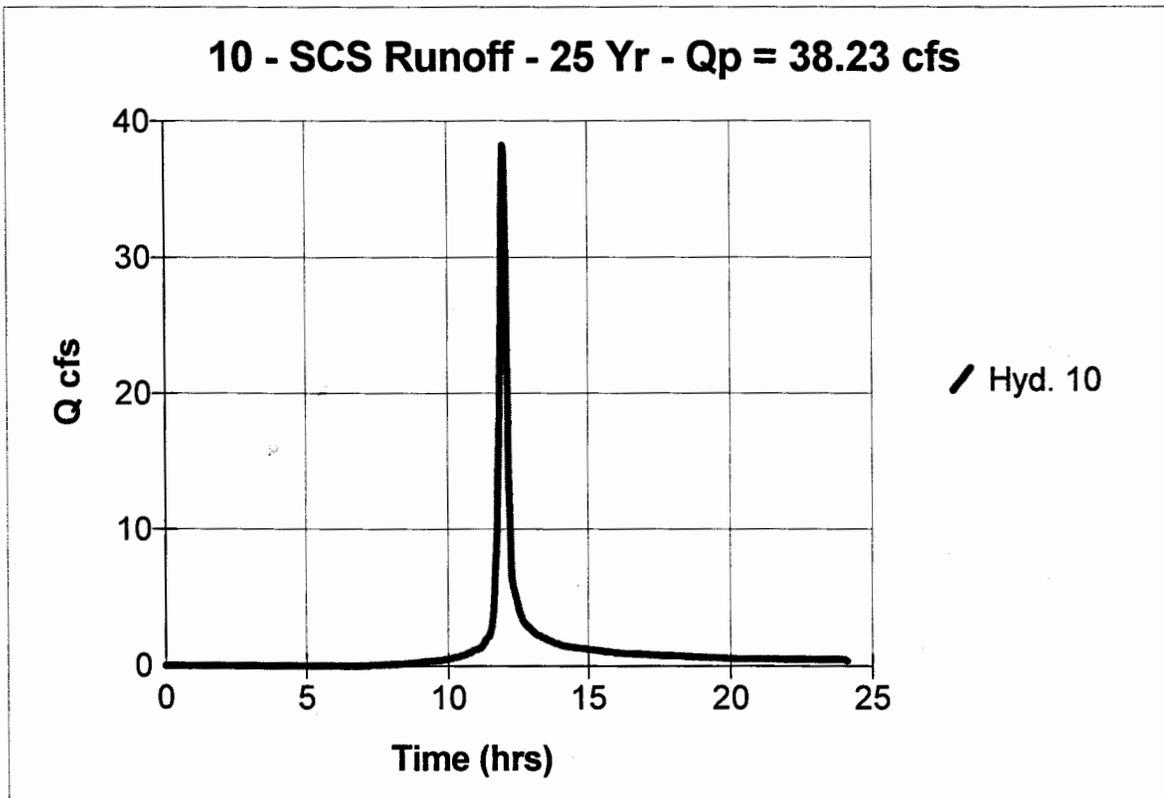
English

Hyd. No. 10

Post-Development 25-yr Runoff

Hydrograph type	=	SCS Runoff	Peak discharge	=	38.23 cfs
Storm frequency	=	25 yrs	Time interval	=	2 min
Drainage area	=	6.93 ac	Curve number	=	77
Basin Slope	=	6.0 %	Hydraulic length	=	875 ft
Tc method	=	USER	Time of conc. (Tc)	=	13 min
Total precip.	=	6.40 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

Total Volume = 99,375 cuft



BENT CREEK / WALNUT
PHASE 2 / CREEK

Hydrograph Plot

BMP 5.2

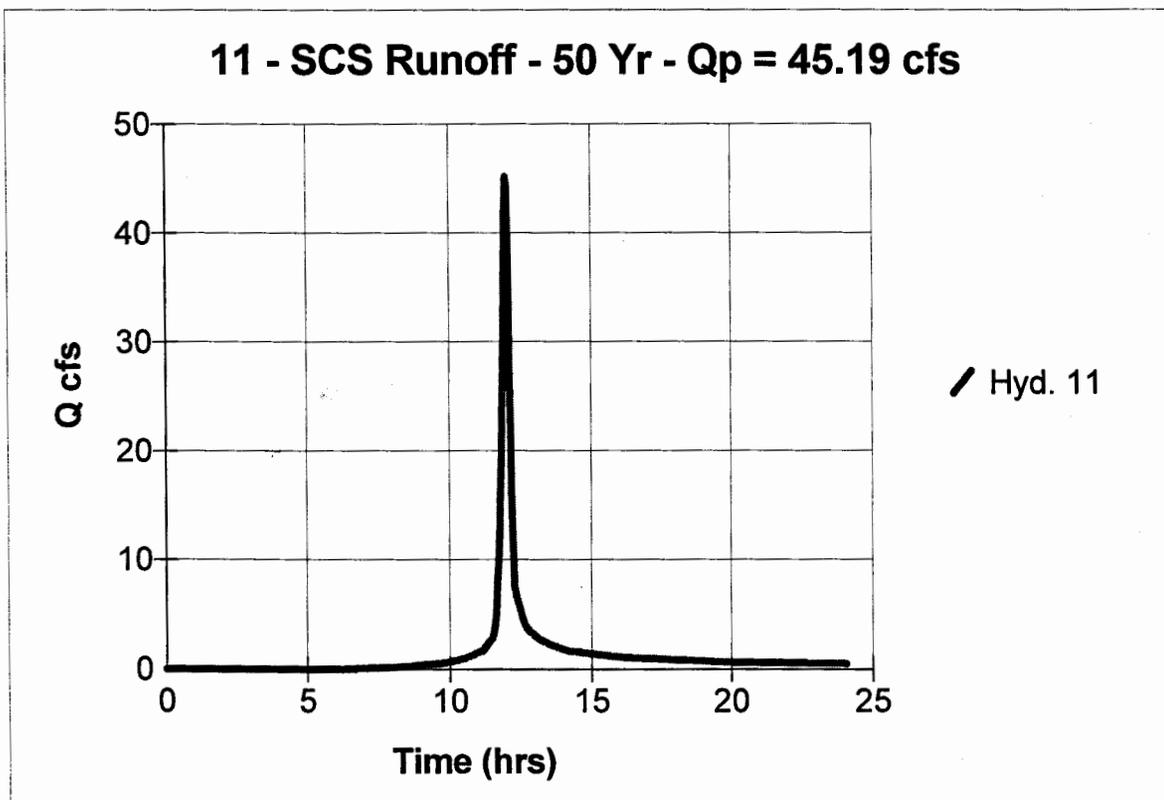
English

Hyd. No. 11

Post-Development 50-yr Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 45.19 cfs
Storm frequency	= 50 yrs	Time interval	= 2 min
Drainage area	= 6.93 ac	Curve number	= 77
Basin Slope	= 6.0 %	Hydraulic length	= 875 ft
Tc method	= USER	Time of conc. (Tc)	= 13 min
Total precip.	= 7.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 117,932 cuft



Hydrograph Plot

BMP 5.2

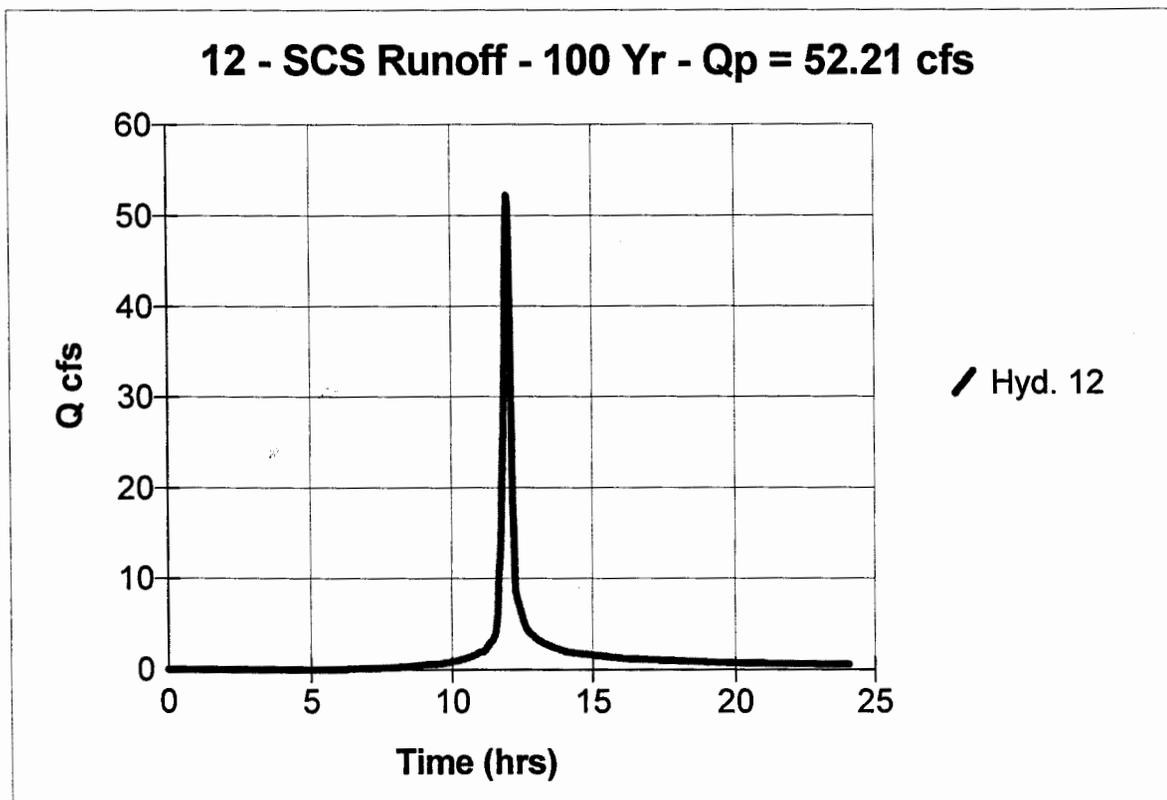
English

Hyd. No. 12

Post-Development 100-yr Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 52.21 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 6.93 ac	Curve number	= 77
Basin Slope	= 6.0 %	Hydraulic length	= 875 ft
Tc method	= USER	Time of conc. (Tc)	= 13 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 136,827 cuft



Reservoir Report

Reservoir No. 1 - BMP 5.2

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	58.00	35	0	0
2.00	60.00	269	304	304
4.00	62.00	736	1,005	1,309
6.00	64.00	1,581	2,317	3,626
8.00	66.00	3,089	4,670	8,296
10.00	68.00	5,157	8,246	16,542
12.00	70.00	8,430	13,587	30,129
14.00	72.00	12,110	20,540	50,669
16.00	74.00	15,855	27,965	78,634

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 12.0	3.0	0.0	0.0
Span in	= 12.0	3.0	0.0	0.0
No. Barrels	= 1	1	0	0
Invert El. ft	= 57.50	58.00	0.00	0.00
Length ft	= 103.0	17.0	0.0	0.0
Slope %	= 10.20	2.90	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= ---	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 12.6	10.0	0.0	0.0
Crest El. ft	= 68.00	70.50	0.00	0.00
Weir Coeff.	= 3.00	3.00	0.00	0.00
Eqn. Exp.	= 1.50	1.50	0.00	0.00
Multi-Stage	= Yes	No	No	No
Tailwater Elevation	= 47.80 ft			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0	58.00	0.99	0.00	---	---	0.00	0.00	---	---	0.00
2.00	304	60.00	5.35	0.27	---	---	0.00	0.00	---	---	0.27
4.00	1,309	62.00	7.56	0.37	---	---	0.00	0.00	---	---	0.37
6.00	3,626	64.00	9.26	0.45	---	---	0.00	0.00	---	---	0.45
8.00	8,296	66.00	10.69	0.51	---	---	0.00	0.00	---	---	0.51
10.00	16,542	68.00	11.96	0.57	---	---	0.00	0.00	---	---	0.57
12.00	30,129	70.00	13.10	0.00	---	---	106.91	0.00	---	---	13.10
14.00	50,669	72.00	14.15	0.00	---	---	302.40	55.11	---	---	69.26
16.00	78,634	74.00	14.84	0.00	---	---	555.54	196.44	---	---	211.28

CULVERT A - 12" BARREL OUTLET (THRU DAM)
 CULVERT B - 3" CHANNEL PROTECTION OUTLET
 WEIR A - 48" DIAMETER RISER / PRIMARY SPILLWAY
 WEIR B - 10' WIDE EMERGENCY SPILLWAY

Hydrograph Plot

BMP 5.2

English

Hyd. No. 18

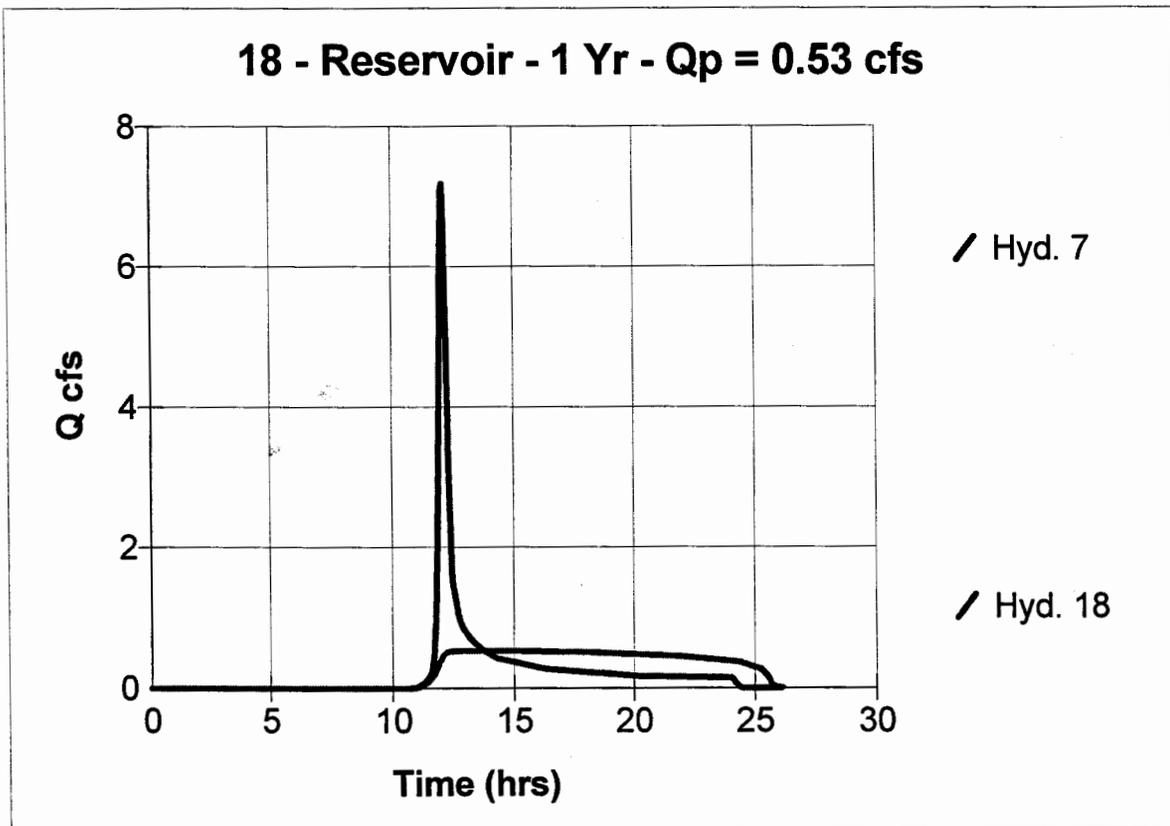
Post-Dev. 1-yr Routed

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Inflow hyd. No. = 7
Max. Elevation = 66.62 ft

Peak discharge = 0.53 cfs
Time interval = 2 min
Reservoir name = BMP 5.2
Max. Storage = 10,861 cuft

Storage indication method used.

Total Volume = 23,517 cuft



STONEHOUSE - BENT TREE
PHASE 2/WALNUT CREEK

Hydrograph Plot

BMP 5.2

English

Hyd. No. 19

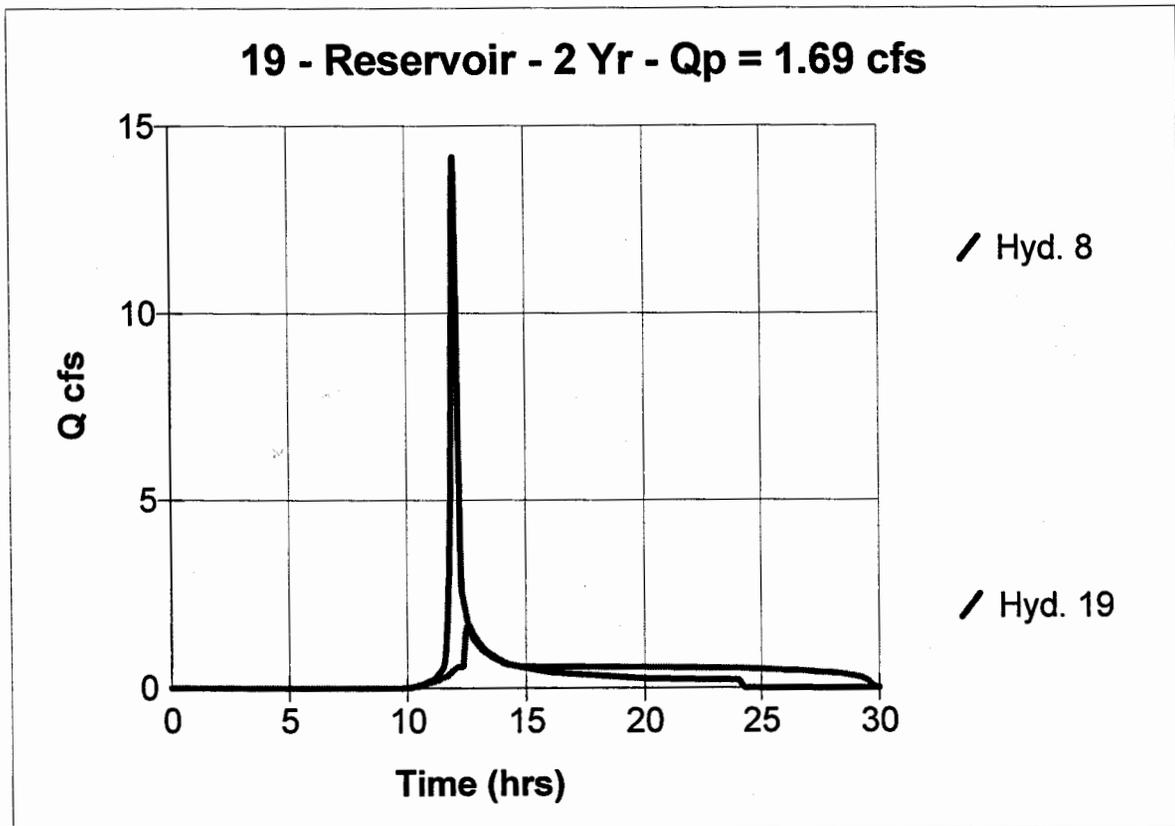
Post-Dev. 2-yr Routed

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Inflow hyd. No. = 8
Max. Elevation = 68.07 ft

Peak discharge = 1.69 cfs
Time interval = 2 min
Reservoir name = BMP 5.2
Max. Storage = 16,989 cuft

Storage Indication method used.

Total Volume = 37,110 cuft



STONEHOUSE - BENT TREE
PHASE 2 / WALNUT CREEK

Hydrograph Plot

BMP 5.2

English

Hyd. No. 20

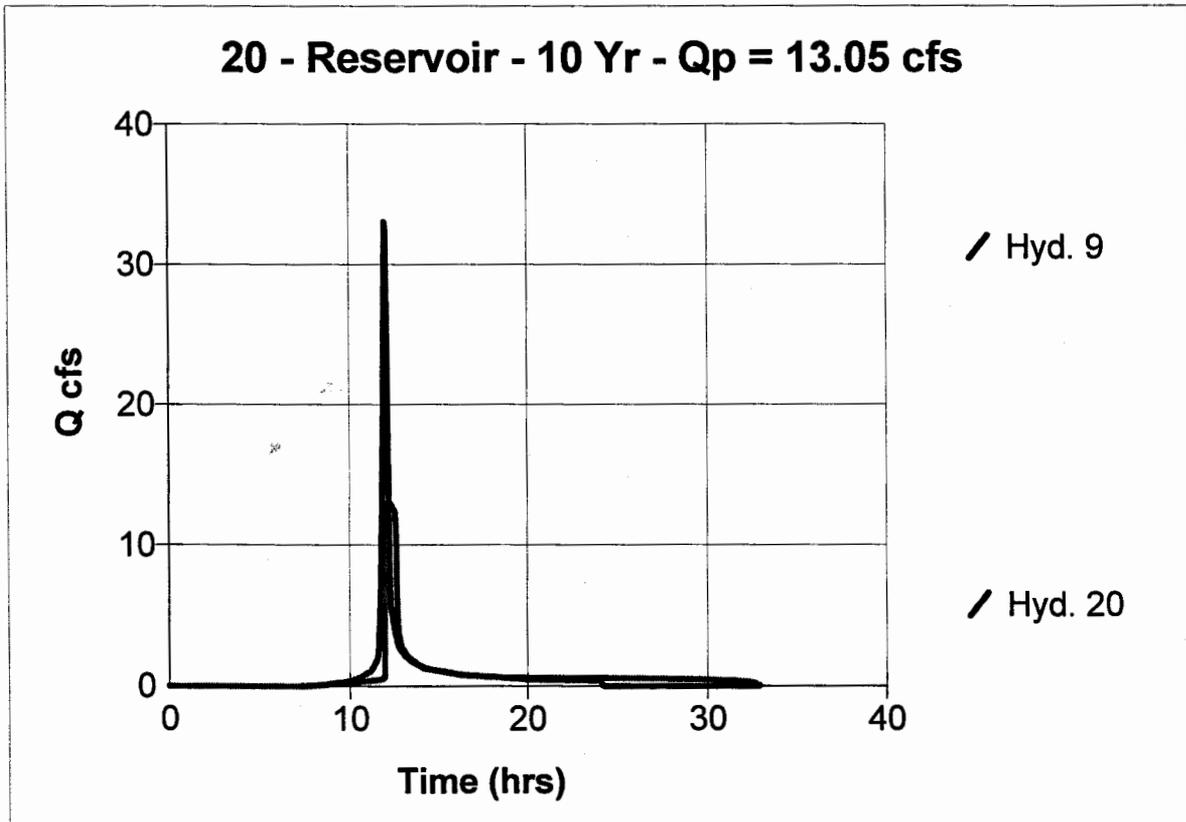
Post-Dev. 10-yr Routed

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 9
Max. Elevation = 69.91 ft

Peak discharge = 13.05 cfs
Time interval = 2 min
Reservoir name = BMP 5.2
Max. Storage = 29,539 cuft

Storage Indication method used.

Total Volume = 85,740 cuft



STONEHOUSE - BENT TREE
PHASE 2/WALNUT CREEK

Hydrograph Plot

BMP 5.2

English

Hyd. No. 21

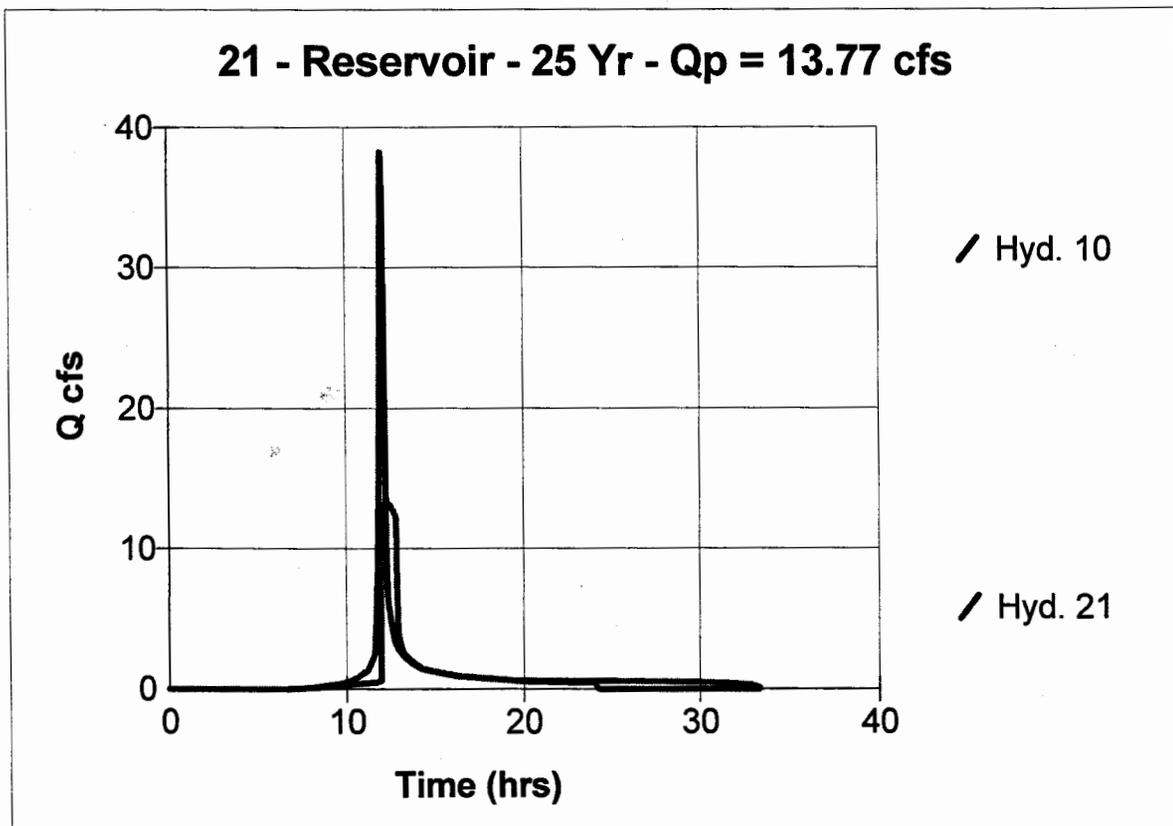
Post-Dev. 25-yr Routed

Hydrograph type = Reservoir
Storm frequency = 25 yrs
Inflow hyd. No. = 10
Max. Elevation = 70.49 ft

Peak discharge = 13.77 cfs
Time interval = 2 min
Reservoir name = BMP 5.2
Max. Storage = 35,128 cuft

Storage Indication method used.

Total Volume = 99,375 cuft



STONEHOUSE - BENT TREE
PHASE 2/WALNUT CREEK

Hydrograph Plot

BMP 5.2

English

Hyd. No. 22

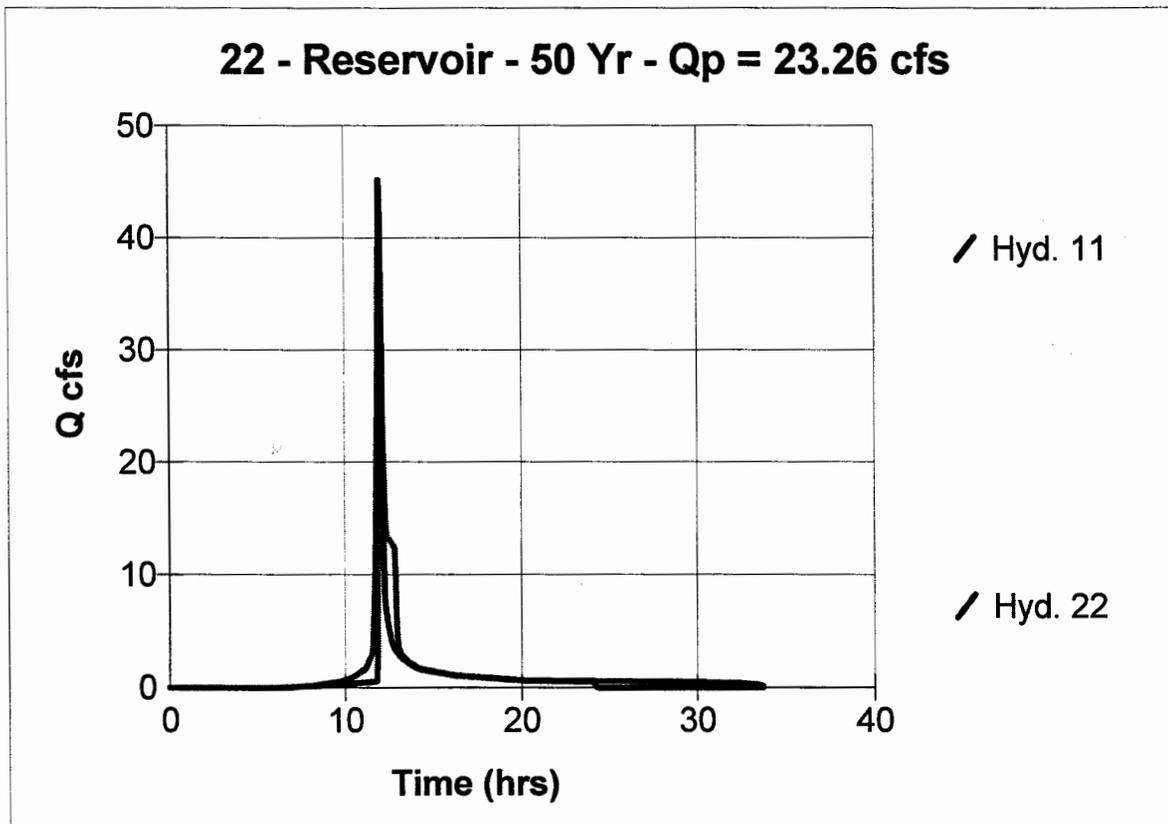
Post-Dev. 50-yr Routed

Hydrograph type = Reservoir
Storm frequency = 50 yrs
Inflow hyd. No. = 11
Max. Elevation = 70.97 ft

Peak discharge = 23.26 cfs
Time interval = 2 min
Reservoir name = BMP 5.2
Max. Storage = 40,052 cuft

Storage Indication method used.

Total Volume = 117,932 cuft



STONE HOUSE - BENT TREE
PHASE 2/WALNUT CREEK

Hydrograph Plot

BMP 5.2

English

Hyd. No. 23

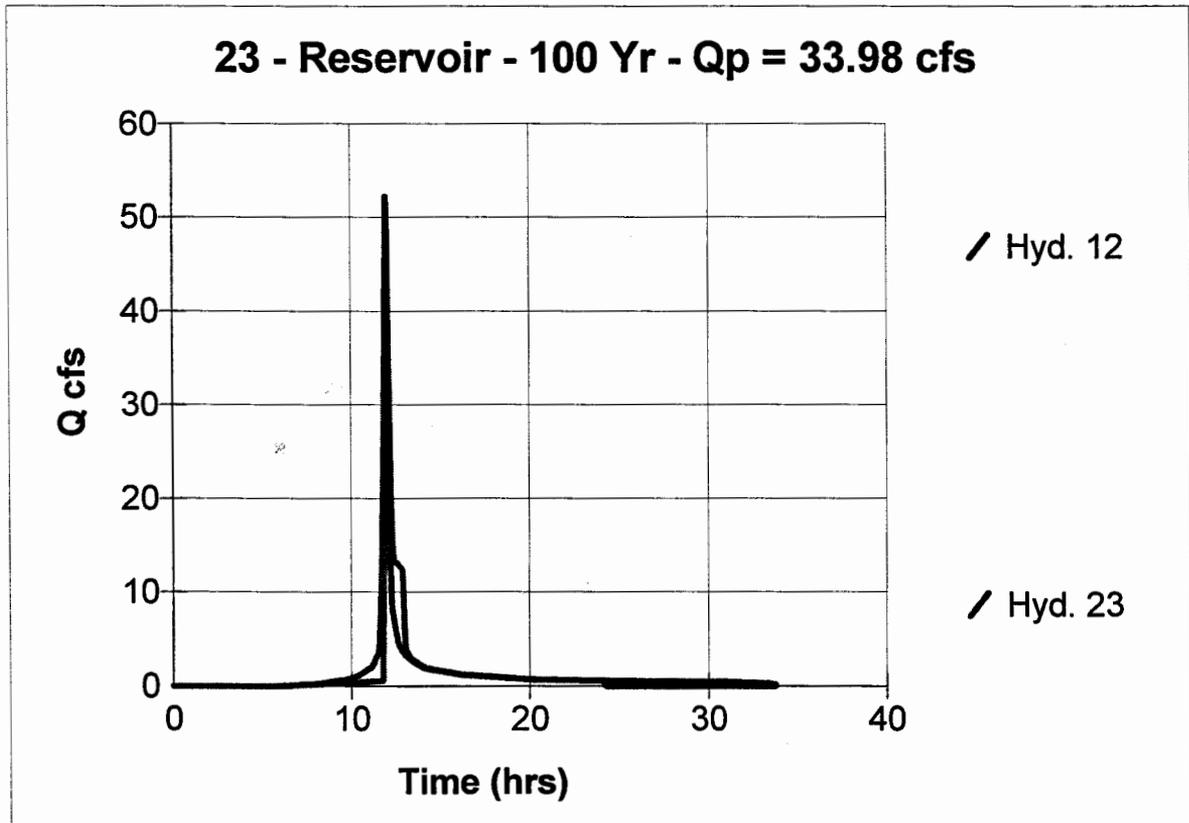
Post-Dev. 100-yr Route

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 12
Max. Elevation = 71.27 ft

Peak discharge = 33.98 cfs
Time interval = 2 min
Reservoir name = BMP 5.2
Max. Storage = 43,127 cuft

Storage Indication method used.

Total Volume = 136,827 cuft



Reservoir Report

BMP 5.3

English

Reservoir No. 1 - BMP 5.3

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	42.00	103	0	0
2.00	44.00	492	595	595
4.00	46.00	1,137	1,629	2,224
6.00	48.00	1,963	3,100	5,324
8.00	50.00	3,022	4,985	10,309
10.00	52.00	4,447	7,469	17,778
12.00	54.00	6,365	10,812	28,590

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 12.0	3.0	0.0	0.0
Span in	= 12.0	3.0	0.0	0.0
No. Barrels	= 1	1	0	0
Invert El. ft	= 41.50	42.00	0.00	0.00
Length ft	= 86.0	12.0	0.0	0.0
Slope %	= 5.23	4.20	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= ---	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 12.6	10.0	0.0	0.0
Crest El. ft	= 48.80	53.00	0.00	0.00
Weir Coeff.	= 3.00	3.00	0.00	0.00
Eqn. Exp.	= 1.50	1.50	0.00	0.00
Multi-Stage	= Yes	No	No	No

Tailwater Elevation = 38.70 ft

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0	42.00	0.99	0.00	---	---	0.00	0.00	---	---	0.00
2.00	595	44.00	5.35	0.30	---	---	0.00	0.00	---	---	0.30
4.00	2,224	46.00	7.56	0.41	---	---	0.00	0.00	---	---	0.41
6.00	5,324	48.00	9.26	0.50	---	---	0.00	0.00	---	---	0.50
8.00	10,309	50.00	10.38	0.00	---	---	49.69	0.00	---	---	10.38
10.00	17,778	52.00	11.26	0.00	---	---	216.38	0.00	---	---	11.26
12.00	28,590	54.00	12.08	0.00	---	---	448.23	30.00	---	---	42.08

CULVERT A - 12" BARREL OUTLET (THRU DAM)
 CULVERT B - 3" CHANNEL PROTECTION OUTLET
 WEIR A - 48" DIAMETER RISER / PRINCIPAL SPILLWAY
 WEIR B - 10' WIDE EMERGENCY SPILLWAY

STONEHOUSE - WALNUT CREEK
PHASE 2 / WALNUT CREEK

Hydrograph Plot

BMP 5.3

English

Hyd. No. 18

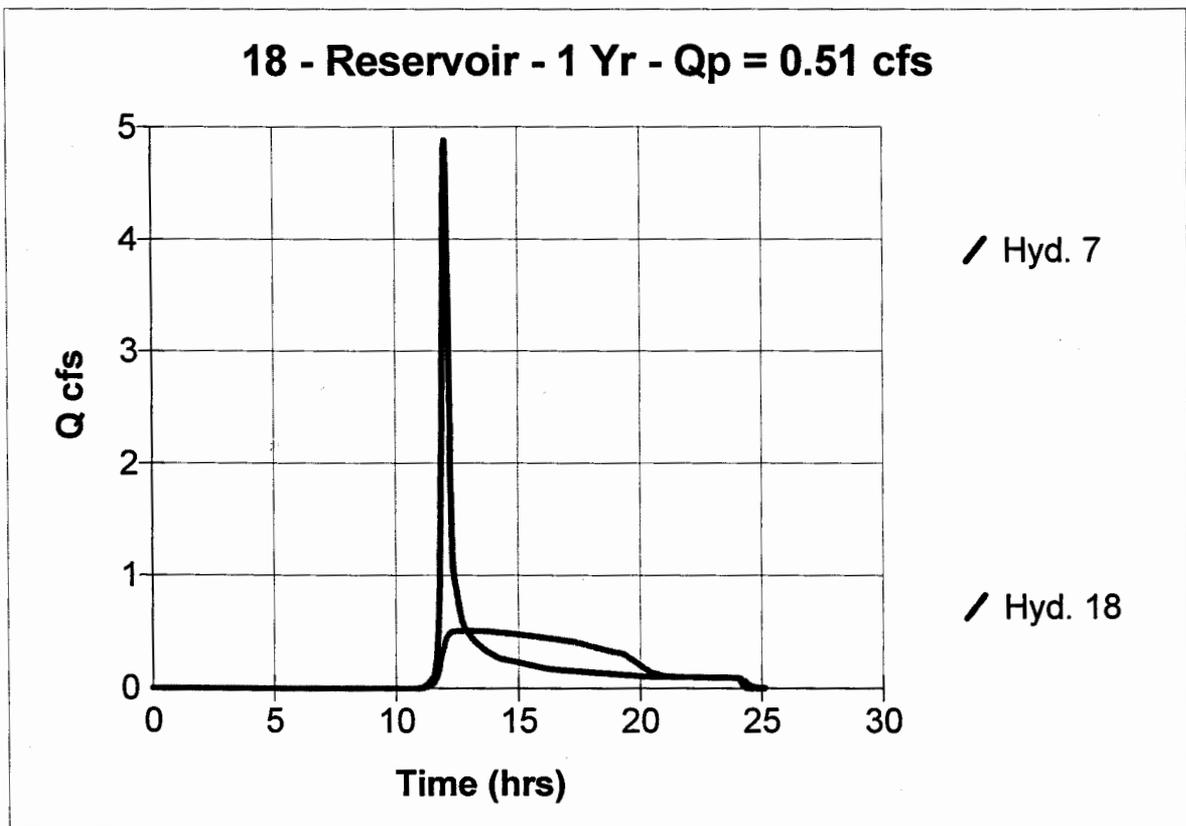
Post-Dev. 1-yr Routed

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Inflow hyd. No. = 7
Max. Elevation = 48.15 ft

Peak discharge = 0.51 cfs
Time interval = 2 min
Reservoir name = BMP 5.3
Max. Storage = 5,699 cuft

Storage Indication method used.

Total Volume = 14,341 cuft



Hydrograph Plot

BMP 5.3

English

Hyd. No. 19

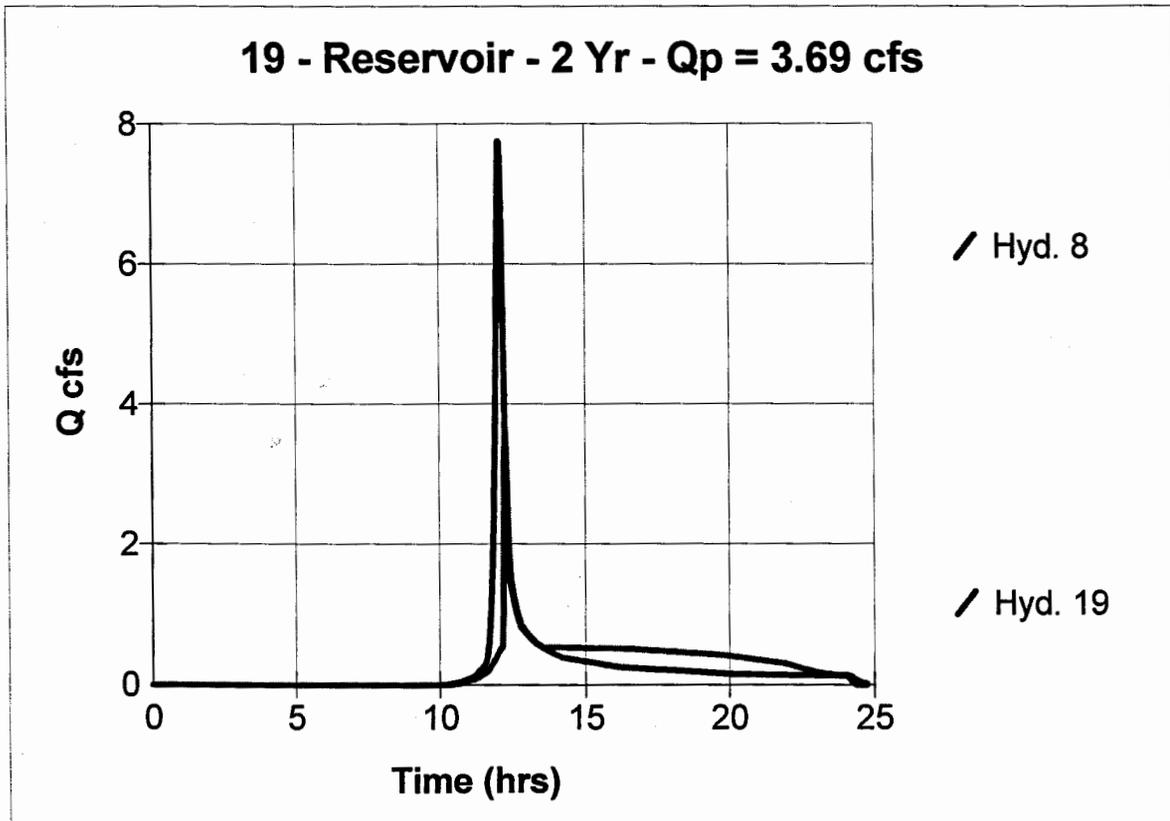
Post-Dev. 2-yr Routed

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Inflow hyd. No. = 8
Max. Elevation = 48.99 ft

Peak discharge = 3.69 cfs
Time interval = 2 min
Reservoir name = BMP 5.3
Max. Storage = 7,782 cuft

Storage Indication method used.

Total Volume = 22,180 cuft



STONEHOUSE - DENI 11/12
PHASE 2/WALNUT CREEK

Hydrograph Plot

BMP 5.3

English

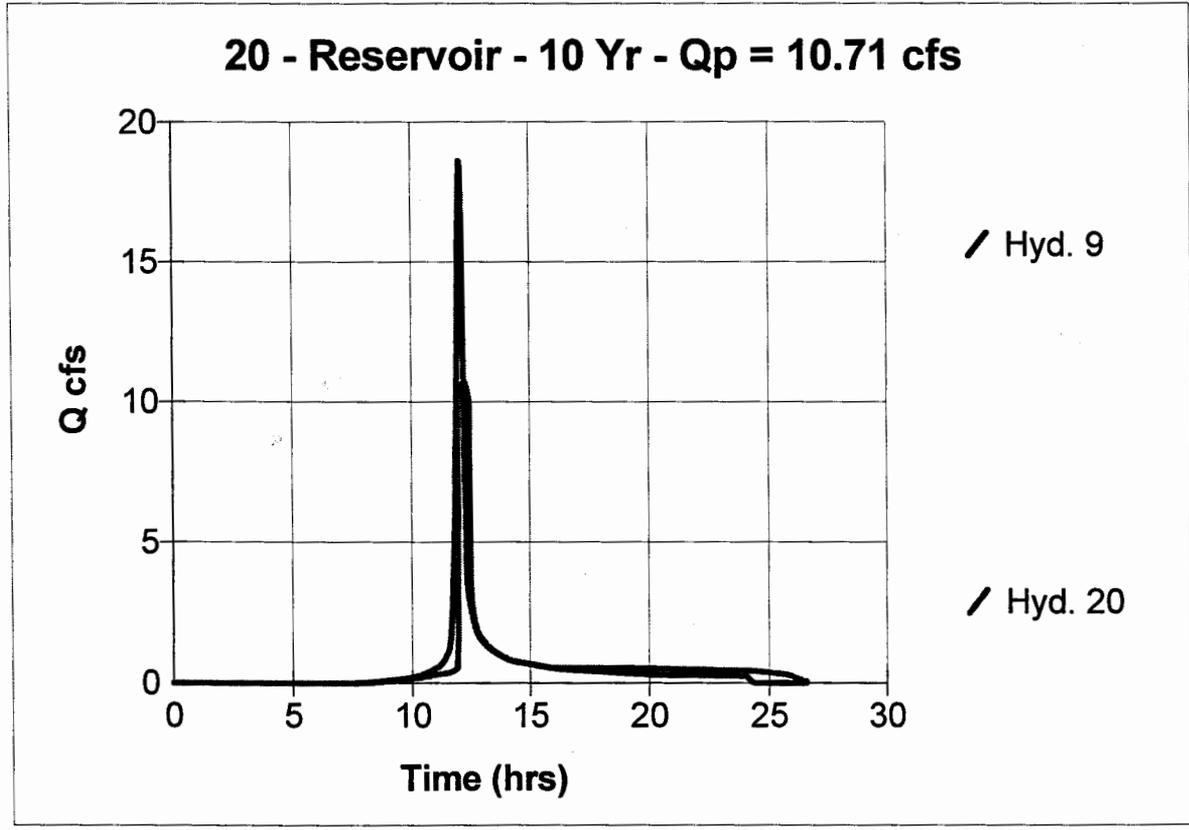
Hyd. No. 20

Post-Dev. 10-yr Routed

Hydrograph type	= Reservoir	Peak discharge	= 10.71 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Inflow hyd. No.	= 9	Reservoir name	= BMP 5.3
Max. Elevation	= 50.73 ft	Max. Storage	= 13,035 cuft

Storage Indication method used.

Total Volume = 52,118 cuft



STONEHOUSE DEV AREA ONE
PHASE 2/WALNUT CREEK

Hydrograph Plot

BMP 5.3

English

Hyd. No. 21

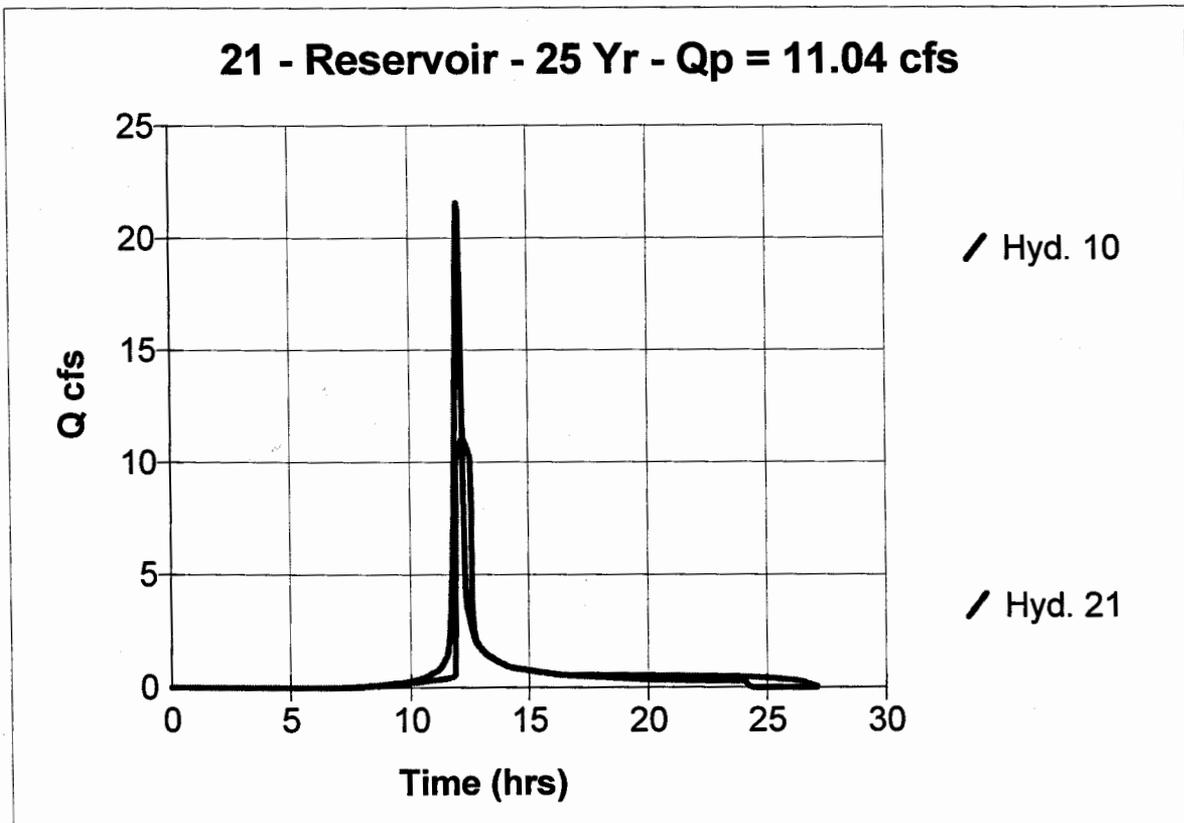
Post-Dev. 25-yr Routed

Hydrograph type = Reservoir
Storm frequency = 25 yrs
Inflow hyd. No. = 10
Max. Elevation = 51.47 ft

Peak discharge = 11.04 cfs
Time interval = 2 min
Reservoir name = BMP 5.3
Max. Storage = 15,805 cuft

Storage indication method used.

Total Volume = 60,557 cuft



STONEHOUSE DEV. AREA ONE
PHASE 2/WALNUT CREEK

Hydrograph Plot

BMP 5.3

English

Hyd. No. 22

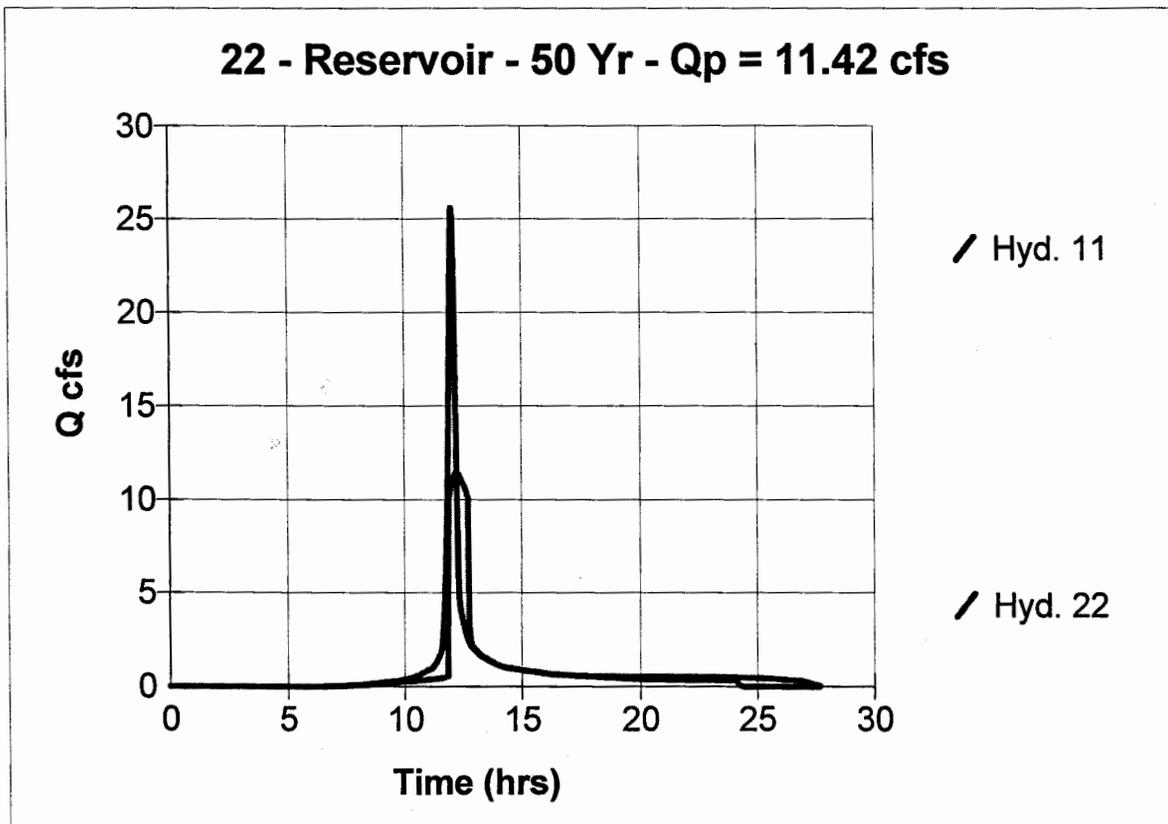
Post-Dev. 50-yr Routed

Hydrograph type = Reservoir
Storm frequency = 50 yrs
Inflow hyd. No. = 11
Max. Elevation = 52.38 ft

Peak discharge = 11.42 cfs
Time interval = 2 min
Reservoir name = BMP 5.3
Max. Storage = 19,834 cuft

Storage Indication method used.

Total Volume = 72,060 cuft



STONEHOUSE - DEV AREA ONE
PHASE 2 / WALNUT CREEK

Hydrograph Plot

BMP 5.3

English

Hyd. No. 23

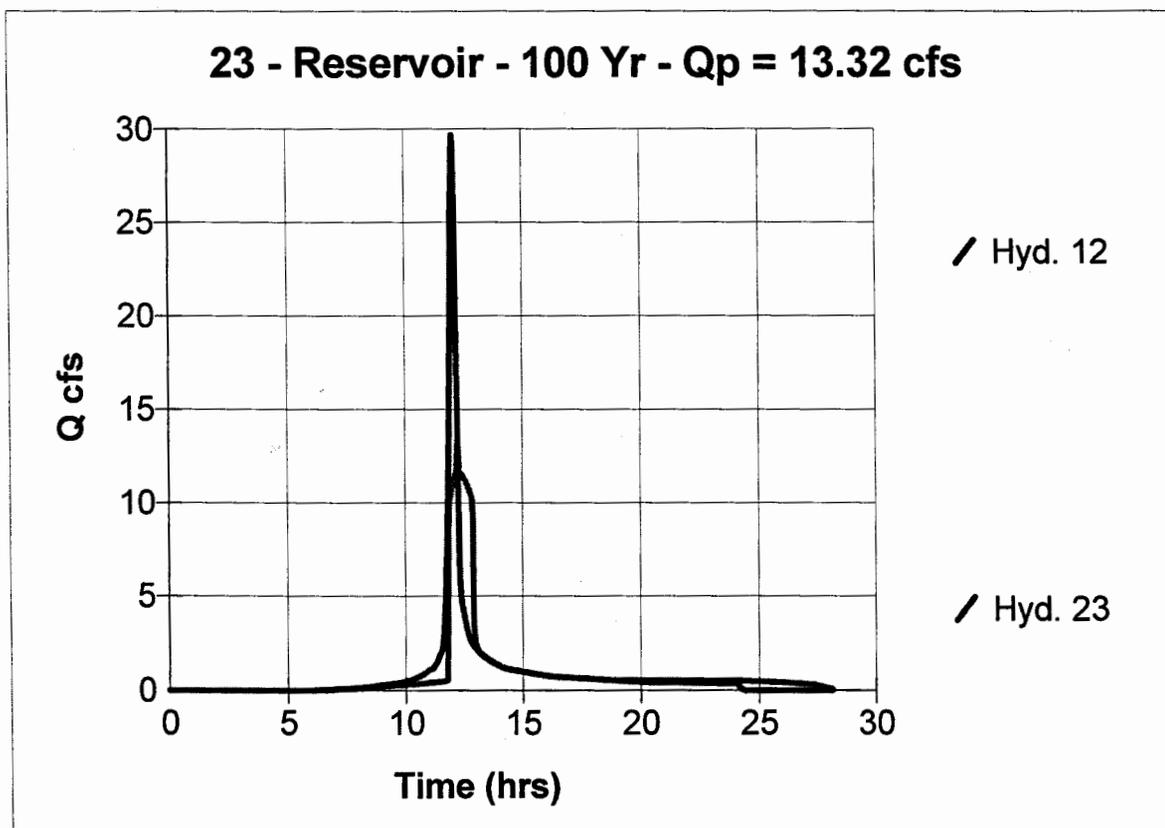
Post-Dev. 100-yr Routed

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 12
Max. Elevation = 53.12 ft

Peak discharge = 13.32 cfs
Time interval = 2 min
Reservoir name = BMP 5.3
Max. Storage = 23,827 cuft

Storage Indication method used.

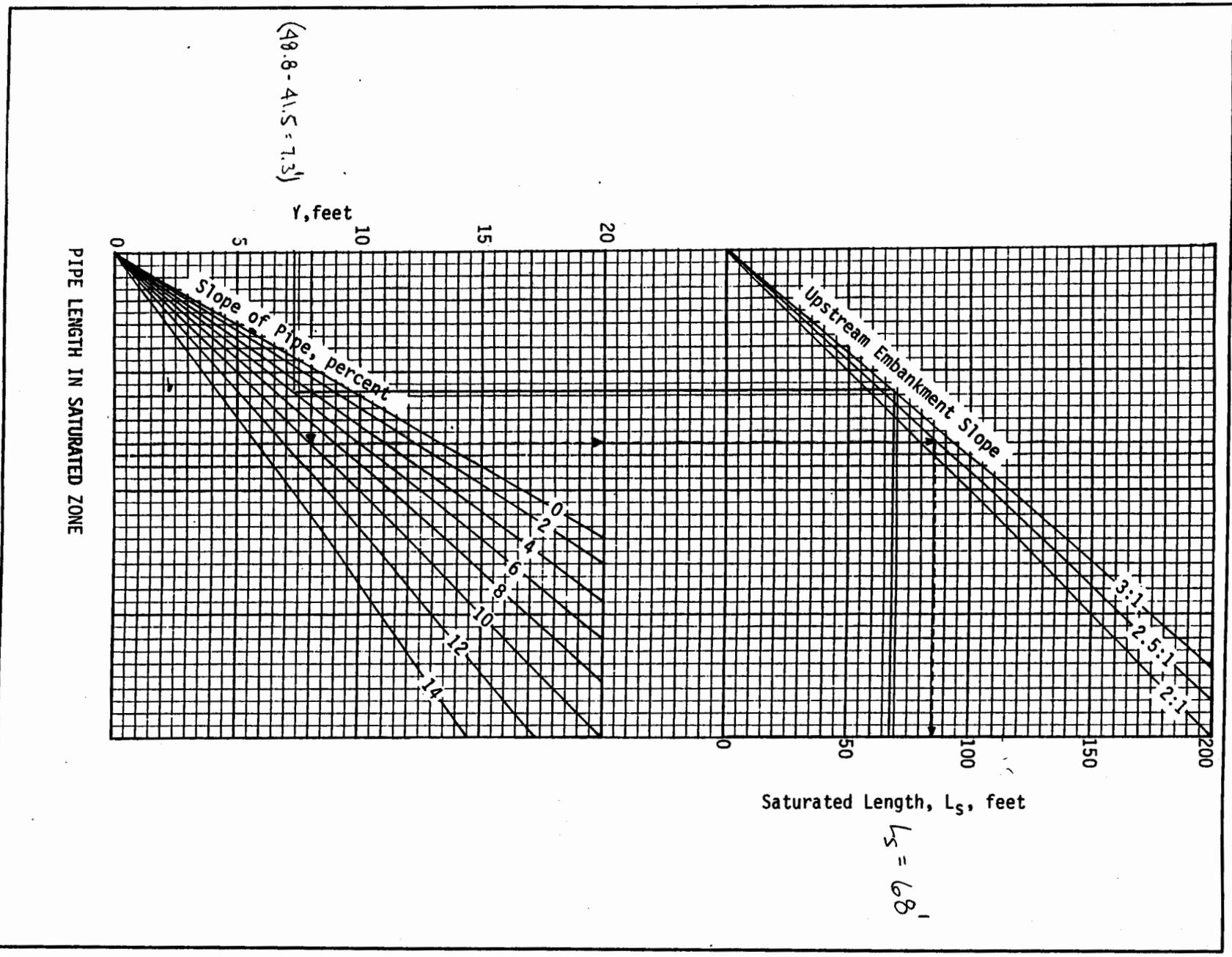
Total Volume = 83,791 cuft



1992

STONEHOUSE - BENT TREE
PHASE 2/WAVER CREEK
SMU/BMP S.3

3.14



Source: USDA-SCS

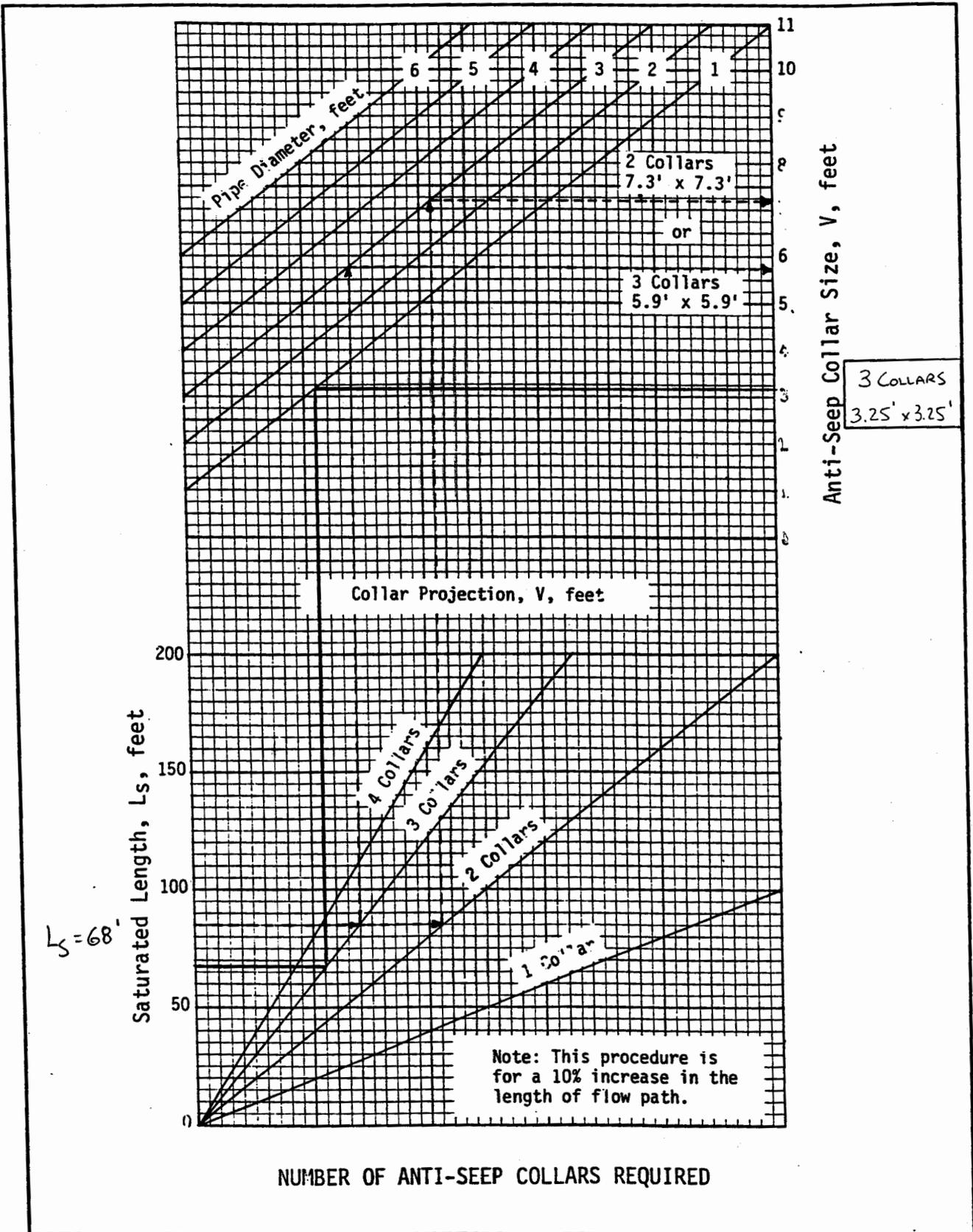
Plate 3.14-11

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STONEHOUSE - BENT TREE
 PHASE 2/WALNUT CREEK
 SWM / BMP S.3

1992

3.14



Source: USDA-SCS

Plate 3.14-12

STONEHOUSE, SECTION VB
BENT TREE, PHASE 2
SWM / BMP 5.3 BOUYANCE CALCULATIONS
August 18, 2000

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

ELEVATION OF RISER CREST = 48.8
ELEVATION OF INVERT OF RISER = 41.5
(AFTER GROUTING)
INSIDE DIAMETER OF RISER = 4 feet
OUTSIDE DIAMETER OF RISER = 5 feet

WEIGHT OF WATER DISPLACED BY AIR

Weight of water displaced by air = Weight of water per cu. Ft. * 3.14 * (Diameter of riser / 2)² * (El. Of Riser
Crest - El. Of riser invert)

Weight of water displaced by air = 5,721 lbs.

WEIGHT OF PRINCIPAL SPILLWAY / RISER

Weight of concrete of riser = (Weight of concrete per cu. Ft. * 3.14 * (Outside diameter of riser / 2)² * (El. Of Riser
Crest - El. Of riser invert)) - (Weight of concrete per cu. Ft. * 3.14 * (Inside diameter of
riser / 2)² * (El. Of Riser Crest - El. Of riser invert))

Weight of Concrete Riser = 7,736 lbs.

Weight of Anti-vortex = 8,540 lbs.

Weight of Extend Base Only = 955 lbs.

Total Weight of Riser = 17,231 lbs.

Total Weight of Riser > 1.25 x Weight of Water Displaced, I.e. Will not float !

STONEHOUSE - BENT TREE - PHASE II / WALNUT CREEK
SWM/BMP 5.2

STONEHOUSE, SECTION VB
BENT TREE, PHASE 2
SWM / BMP 5.2 BOUYANCE CALCULATIONS
August 18, 2000

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

ELEVATION OF RISER CREST = 69.5
ELEVATION OF INVERT OF RISER = 57.5
(AFTER GROUTING)
INSIDE DIAMETER OF RISER = 4 feet
OUTSIDE DIAMETER OF RISER = 5 feet

WEIGHT OF WATER DISPLACED BY AIR

Weight of water displaced by air = Weight of water per cu. Ft. * 3.14 * (Diameter of riser / 2)² * (El. Of Riser
Crest - El. Of riser invert)

Weight of water displaced by air = 9,405 lbs.

WEIGHT OF PRINCIPAL SPILLWAY / RISER

Weight of concrete of riser = (Weight of concrete per cu. Ft. * 3.14 * (Outside diameter of riser / 2)² * (El. Of Riser
Crest - El. Of riser invert)) - (Weight of concrete per cu. Ft. * 3.14 * (Inside diameter of
riser / 2)² * (El. Of Riser Crest - El. Of riser invert))

Weight of Concrete Riser = 12,717 lbs.

Weight of Anti-vortex = 8,540 lbs.

Weight of Extend Base Only = 955 lbs.

Total Weight of Riser = 22,212 lbs.

Total Weight of Riser > 1.25 x Weight of Water Displaced, I.e. Will not float !

**CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR BMP / SWM 5.3
STONEHOUSE, SECTION VB, PHASE 2
AES Project No.: 8877-00
August 2, 2000**

I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN

- A. Pre-Development Drainage Area to Point of Concern = 4.11 Acres
 B. Pre-development Land Use, Soil Classification and Calculation of Composite Curve Number

	<u>Soil Type</u>	<u>Soil Hydrologic Group</u>	<u>Pre-Development Land Use</u>	<u>Area of Land Use (in Acres)</u>	<u>Curve Number for Land Use (CN)</u>	<u>Adjusted (CN)</u>
1)	11-C Craven-Uchee	C	Wooded	1.45	74	107
2)	15-F Emporia Complex	C	Wooded	2.17	74	161
3)	25-B Norfolk Fine Sandy Loam	B	Wooded	0.49	60	29
Totals =				4.11		297
Composite CN =						72

C. Pre-Development Time of Concentration Calculations

1)	Overland Flow (maximum 300 feet) Surface description (table 5-7) Manning's roughness coefficient, n (table 5-7) Length of overland flow, L 2-year 24-hour rainfall, P2 Average slope of overland flow, s Travel time, $Tt = (0.007 * (n * L)^{0.8}) / (P2^{0.5} * s^{0.4})$		mainly wooded 0.4 200 Feet 3.6 inches 0.06 feet per foot 0.38 hours
2)	Shallow concentrated flow (maximum 300 feet) Surface description, paved or unpaved Length of shallow concentrated flow, L Average slope of shallow concentrated flow, s Average velocity, v Travel time, $Tt = L / (3600 * v)$		unpaved, wooded 200 Feet 0.165 feet per foot 0.5 feet per second 0.11 hours
3)	Channel or Pipe Flow Length of channel flow, L Average velocity of channel flow, v Travel time, $Tt = L / (3600 * v)$		270 Feet 2.5 feet per second 0.03 hours
Total Time of Concentration =			0.52 hours or 31 minutes

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

- A. Post-Development Drainage Area to Point of Concern = 4.59 Acres
 B. Post-development Land Use, Soil Classification and Calculation of Composite Curve Number

	<u>Soil Type</u>	<u>Soil Hydrologic Group</u>	<u>Post-Development Land Use</u>	<u>Area of Land Use (in Acres)</u>	<u>Curve Number for Land Use (CN)</u>	<u>Adjusted (CN)</u>
1)	11-C Craven-Uchee	C	Residential - 1/2 acre lots	2.01	80	161
2)	11-C Craven-Uchee	C	Open Space/Wooded	0.22	76	17
3)	11-C Craven-Uchee	C	Right-of-Way	0.45	92	41
4)	15-F Emporia Complex	C	Residential - 1/2 acre lots	0.51	80	41
5)	15-F Emporia Complex	C	Open Space/Wooded	0.77	76	59
7)	15-F Emporia Complex	C	BMP Surface	0.10	100	10
8)	25-B Norfolk Fine Sandy Loam	B	Residential - 1/2 acre lots	0.31	60	19
9)	25-B Norfolk Fine Sandy Loam	B	Open Space/Wooded	0.15	60	9
10)	25-B Norfolk Fine Sandy Loam	B	Right-of-Way	0.07	89	6
Total Adjusted CN =				4.59		347
Composite CN =						76

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)	
Surface description (table 5-7)	residential
Manning's roughness coefficient, n (table 5-7)	0.2
Length of overland flow, L	200 Feet
25-year 24-hour rainfall, P25	6.5 inches
Average slope of overland flow, s	0.06 feet per foot
Travel time, $T_t = (0.007 * (n * L)^{0.8}) / (P^{2.0} * s^{0.4})$	0.16 hours
2) Shallow concentrated flow (maximum 300 feet)	
Surface description, paved or unpaved	unpaved
Length of shallow concentrated flow, L	200 Feet
Average slope of shallow concentrated flow, s	0.165 feet per foot
Average velocity, v	0.75 feet per second
Travel time, $T_t = L / (3600 * v)$	0.07 hours
3) Channel or Pipe Flow	
Length of channel flow, L	270 Feet
Average velocity of channel flow, v	3 feet per second
Travel time, $T_t = L / (3600 * v)$	0.03 hours
Total Time of Concentration =	0.26 hours
	or 16 minutes

III. PROPOSED ESTIMATED POND(S) VOLUME ABOVE NORMAL POOL BY ELEVATION

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
60.0		633.333	0			
62.0	2.0	1633.3333	2266.6663	84	2266.666	84
64.0	2.0	2800	4433.3333	164	6700	248
48.0	-16.0	1963	-38104	-1411	-31404	-1163
50.0	2.0	3022	4985	185	-26419	-978
52.0	2.0	4447	7469	277	-18950	-702
54.0	2.0	6365	10812	400	-8138	-301

IV. DETERMINING RELEASE RATE OF 1-YEAR, 24-HOUR DETAINED FOR 24 HOURS FOR STREAM CHANNEL PROTECTION

Volume of 1-Year, 24-Hour Storm (based upon Hydrograph #1) =	14,341 cubic feet
Elevation of water surface associated with 1-Year, 24-Hour Storm Vol	48.1
Elevation of Release Inlet for Channel Protection =	42.0
Average Head, in feet, on Release Inlet =	3.1
Average Release Rate Calculation	$\frac{14,341 \text{ cubic feet}}{(24 \text{ hours} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/minute})} = 0.2 \text{ cfs}$
Calculation of Size of Release Inlet	

Diameter of Release Inlet = $2 * (Q / ((64.32 * (h / 2))^{1/2} * 0.6 * 3.14))^{1/2}$
 where, Q equals Average Release Rate, in cfs
 h equals Average Head, in feet

Diameter of Release Inlet = 0.20 feet, or 3 inches

Hydrograph Summary Report

BMP 5.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description	
1	SCS Runoff	3.6	2	734	16,932	2	---	---	---	Pre-Development 2-	
2	SCS Runoff	9.1	2	734	39,991	10	---	---	---	Pre-Development 10	
3	SCS Runoff	11.6	2	734	50,203	25	---	---	---	Pre-Development 25	
4	SCS Runoff	14.0	2	732	60,424	50	---	---	---	Pre-Development 50	
5	SCS Runoff	16.4	2	732	70,913	100	---	---	---	Pre-Development 10	
7	SCS Runoff	4.9	2	724	14,341	1	---	---	---	Post-Development 1	
8	SCS Runoff	7.8	2	722	22,180	2	---	---	---	Post-Development 2	
9	SCS Runoff	18.6	2	722	52,118	10	---	---	---	Post-Development 1	
10	SCS Runoff	21.6	2	722	60,557	25	---	---	---	Post-Development 2	
11	SCS Runoff	25.6	2	722	72,061	50	---	---	---	Post-Development 5	
12	SCS Runoff	29.7	2	722	83,791	100	---	---	---	Post-Development 1	
18	Reservoir	0.5	2	774	14,341	1	7	48.15	5,699	Post-Dev. 1-yr Rou	
19	Reservoir	3.7	2	734	22,180	2	8	48.99	7,782	Post-Dev. 2-yr Rou	
20	Reservoir	10.7	2	732	52,118	10	9	50.73	13,035	Post-Dev. 10-yr Ro	
21	Reservoir	11.0	2	732	60,557	25	10	51.47	15,805	Post-Dev. 25-yr Ro	
22	Reservoir	11.4	2	734	72,060	50	11	52.38	19,834	Post-Dev. 50-yr Ro	
23	Reservoir	13.3	2	734	83,791	100	12	53.12	23,827	Post-Dev. 100-yr R	
Proj. file: 887753.gpw				IDF file: Jcc.IDF				Run date: 08-03-2000			

BENT TREE / WALNUT
PHASE 2 / CREEK

Hydrograph Plot

BMP S.3

English

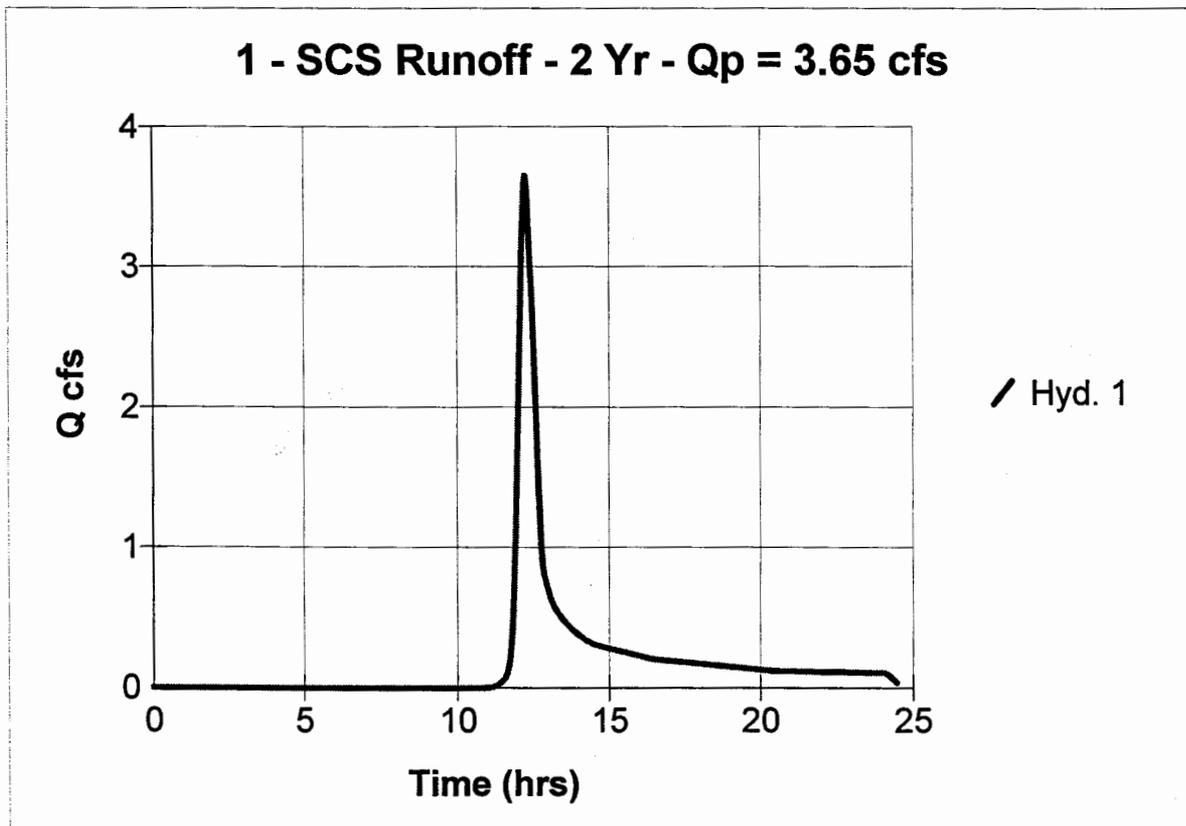
Hyd. No. 1

Pre-Development 2-yr Runoff

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 4.11 ac
Basin Slope = 6.0 %
Tc method = USER
Total precip. = 3.50 in
Storm duration = 24 hrs

Peak discharge = 3.65 cfs
Time interval = 2 min
Curve number = 72
Hydraulic length = 670 ft
Time of conc. (Tc) = 31 min
Distribution = Type II
Shape factor = 484

Total Volume = 16,932 cuft



BENT TREE / WALNUT
PHASE 2 / CREEK

Hydrograph Plot

BMP 5.3

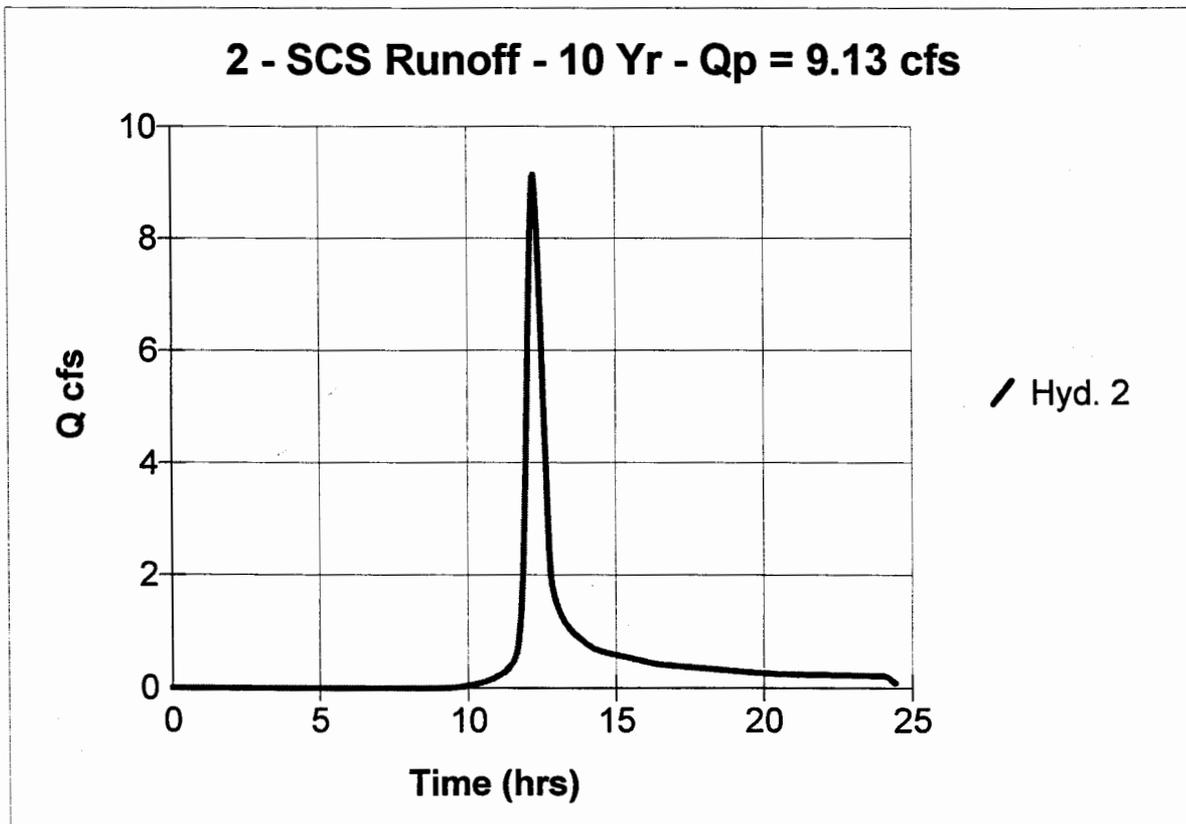
English

Hyd. No. 2

Pre-Development 10-yr Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 9.13 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Drainage area	= 4.11 ac	Curve number	= 70
Basin Slope	= 6.0 %	Hydraulic length	= 670 ft
Tc method	= USER	Time of conc. (Tc)	= 31 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 39,991 cuft



Hydrograph Plot

BMP 5.3

English

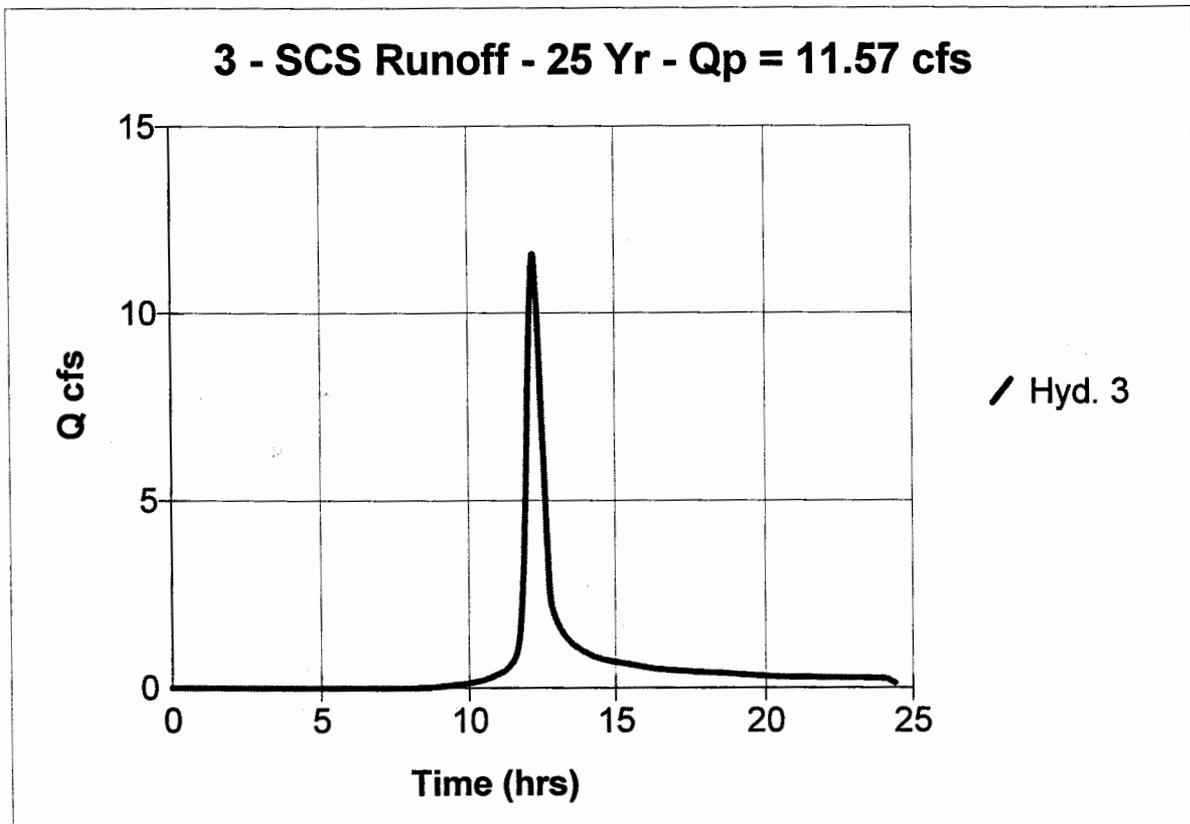
Hyd. No. 3

Pre-Development 25-yr Runoff

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Drainage area = 4.11 ac
Basin Slope = 6.0 %
Tc method = USER
Total precip. = 6.40 in
Storm duration = 24 hrs

Peak discharge = 11.57 cfs
Time interval = 2 min
Curve number = 72
Hydraulic length = 670 ft
Time of conc. (Tc) = 31 min
Distribution = Type II
Shape factor = 484

Total Volume = 50,203 cuft



DENI TREE / WALNUT
PHASE 2 / CREEK

Hydrograph Plot

BMP 5.3

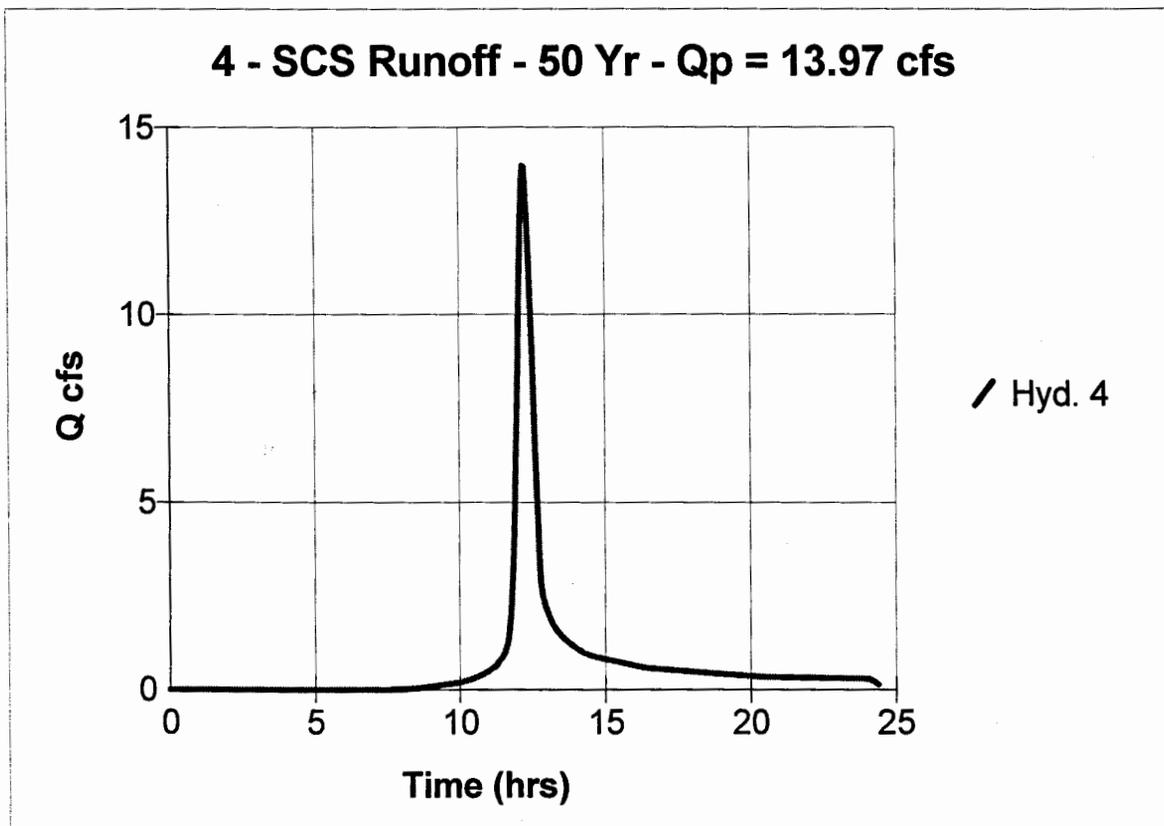
English

Hyd. No. 4

Pre-Development 50-yr Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 13.97 cfs
Storm frequency	= 50 yrs	Time interval	= 2 min
Drainage area	= 4.11 ac	Curve number	= 72
Basin Slope	= 6.0 %	Hydraulic length	= 670 ft
Tc method	= USER	Time of conc. (Tc)	= 31 min
Total precip.	= 7.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 60,424 cuft



Hydrograph Plot

BMP 5.3

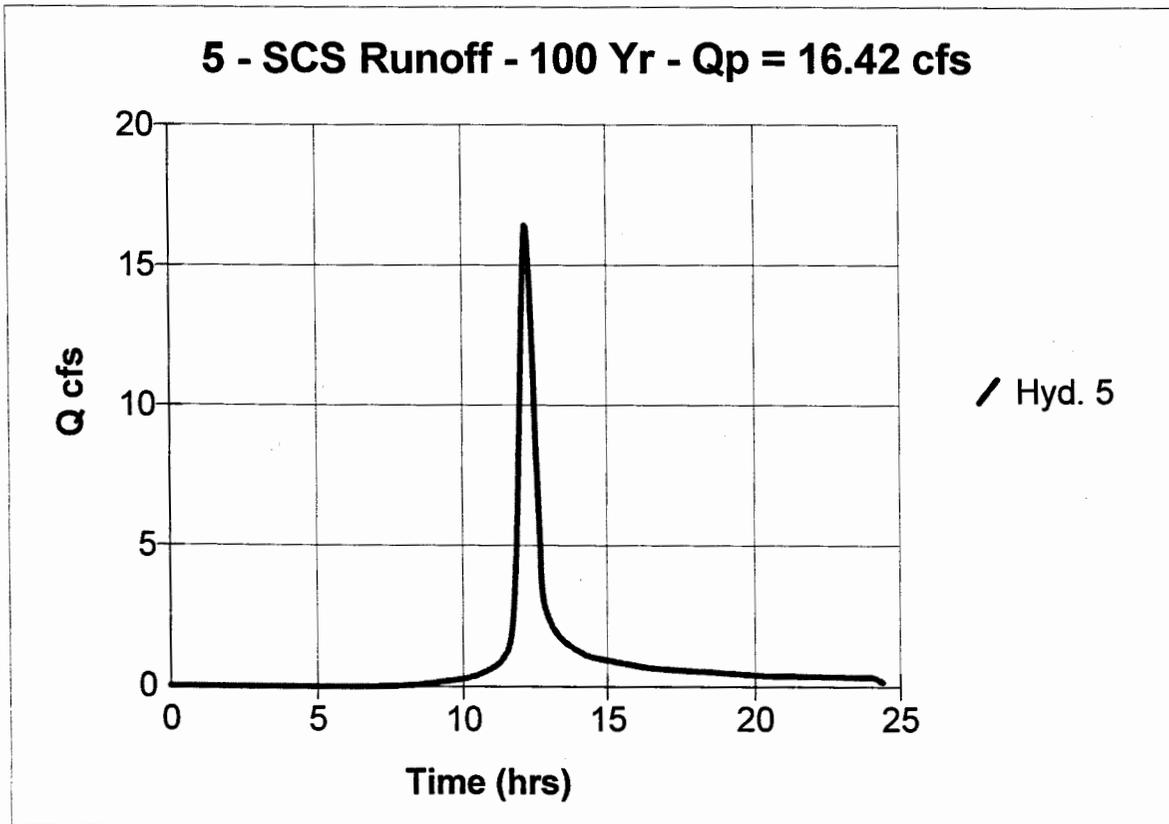
English

Hyd. No. 5

Pre-Development 100-yr Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 16.42 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 4.11 ac	Curve number	= 72
Basin Slope	= 6.0 %	Hydraulic length	= 670 ft
Tc method	= USER	Time of conc. (Tc)	= 31 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 70,913 cuft



DEN I CREEK / WALNUT
PHASE 2 / CREEK

Hydrograph Plot

BMP 5.3

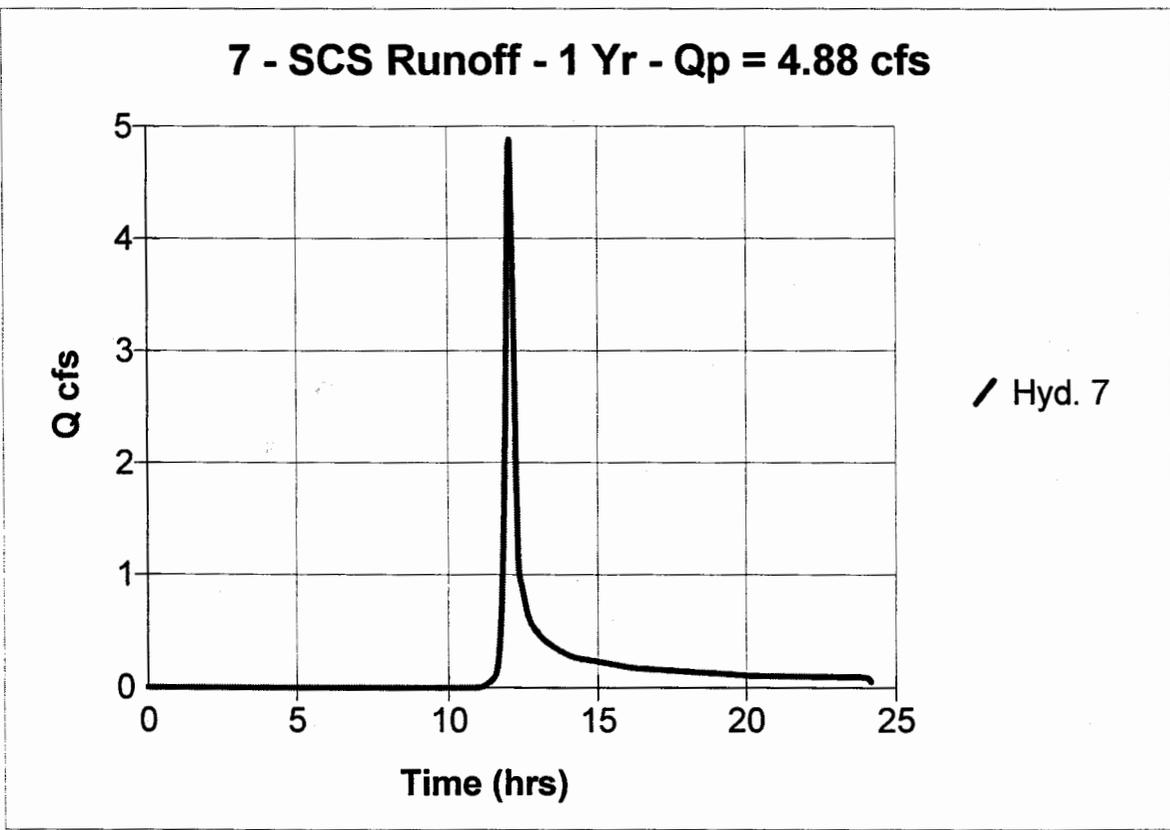
English

Hyd. No. 7

Post-Development 1-YR Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 4.88 cfs
Storm frequency	= 1 yrs	Time interval	= 2 min
Drainage area	= 4.59 ac	Curve number	= 76
Basin Slope	= 6.0 %	Hydraulic length	= 670 ft
Tc method	= USER	Time of conc. (Tc)	= 16 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 14,341 cuft



BENT CREEK / WALKER
PHASE 2 / CREEK

Hydrograph Plot

BMP 5.3

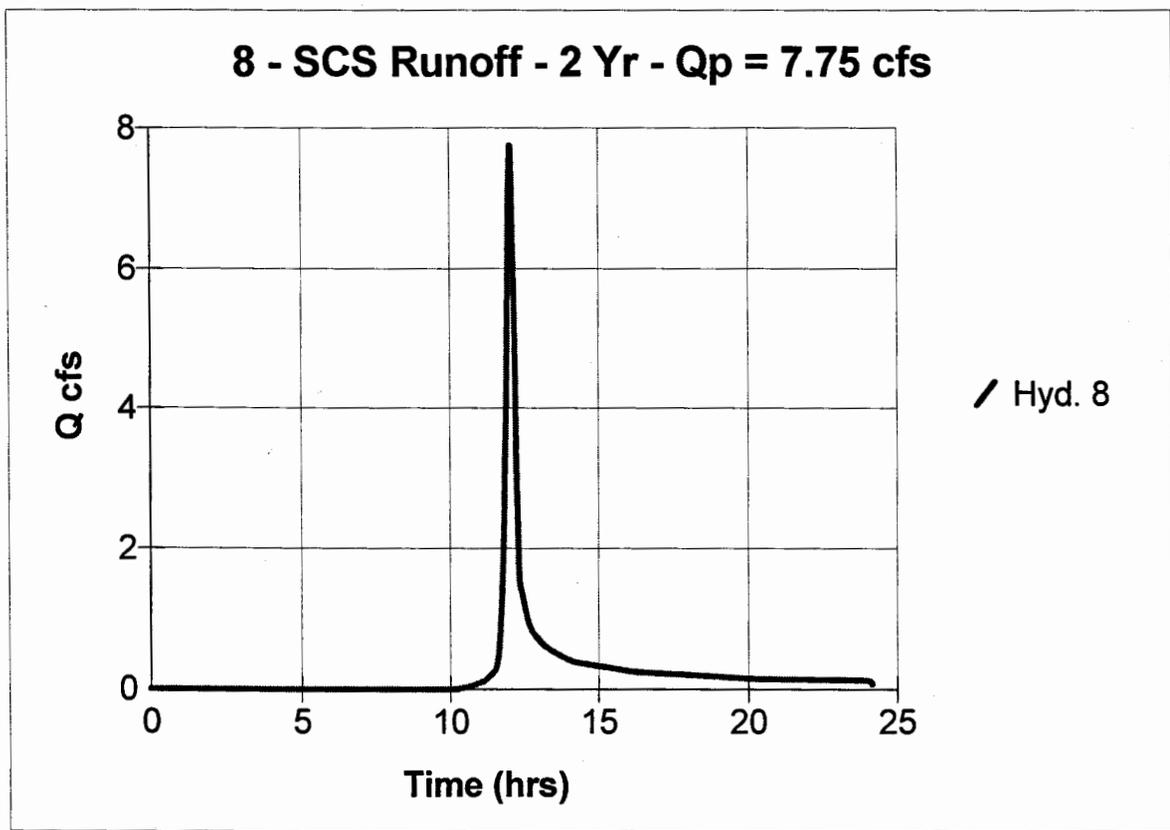
English

Hyd. No. 8

Post-Development 2-yr Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 7.75 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 4.59 ac	Curve number	= 76
Basin Slope	= 6.0 %	Hydraulic length	= 670 ft
Tc method	= USER	Time of conc. (Tc)	= 16 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 22,180 cuft



DENT CREEK / WALNUT
PHASE 2 / CREEK
Hydrograph Plot

BMP 5.3

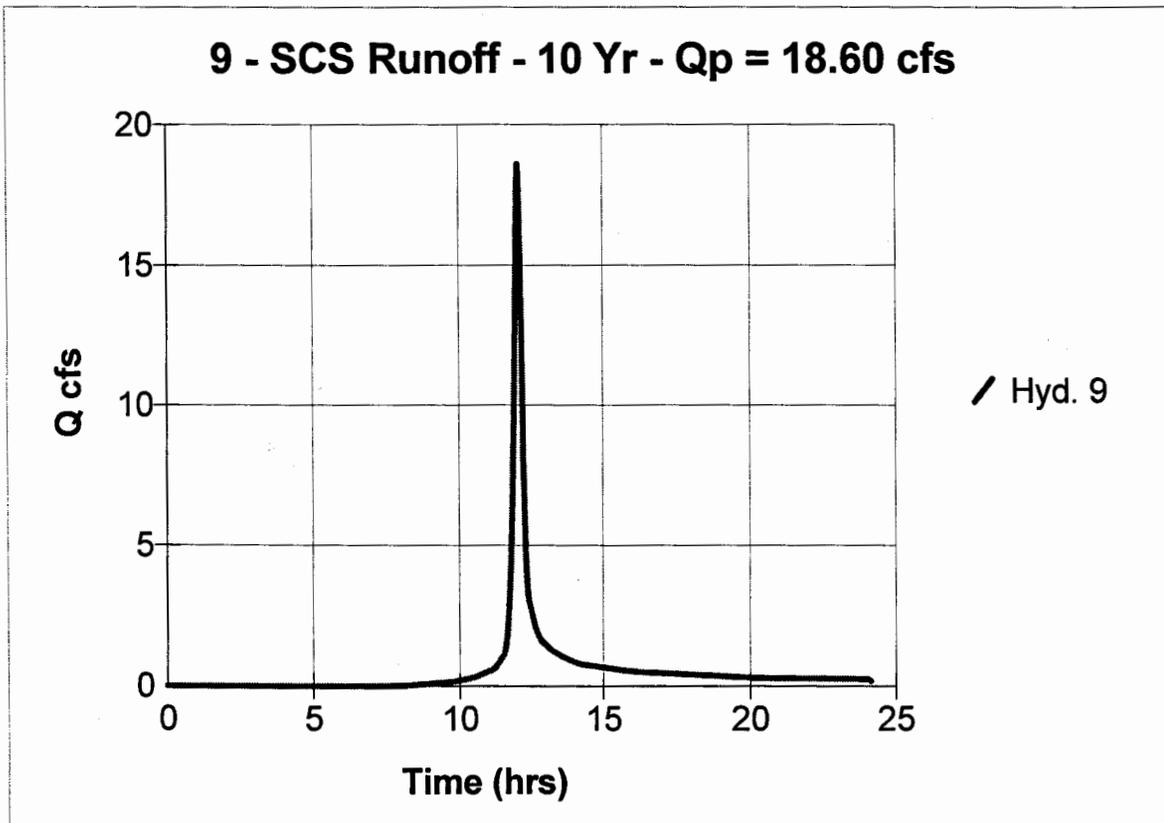
English

Hyd. No. 9

Post-Development 10-yr Runoff

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.60 cfs
Storm frequency	=	10 yrs	Time interval	=	2 min
Drainage area	=	4.59 ac	Curve number	=	76
Basin Slope	=	6.0 %	Hydraulic length	=	670 ft
Tc method	=	USER	Time of conc. (Tc)	=	16 min
Total precip.	=	5.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

Total Volume = 52,118 cuft



Hydrograph Plot

BMP 5.3

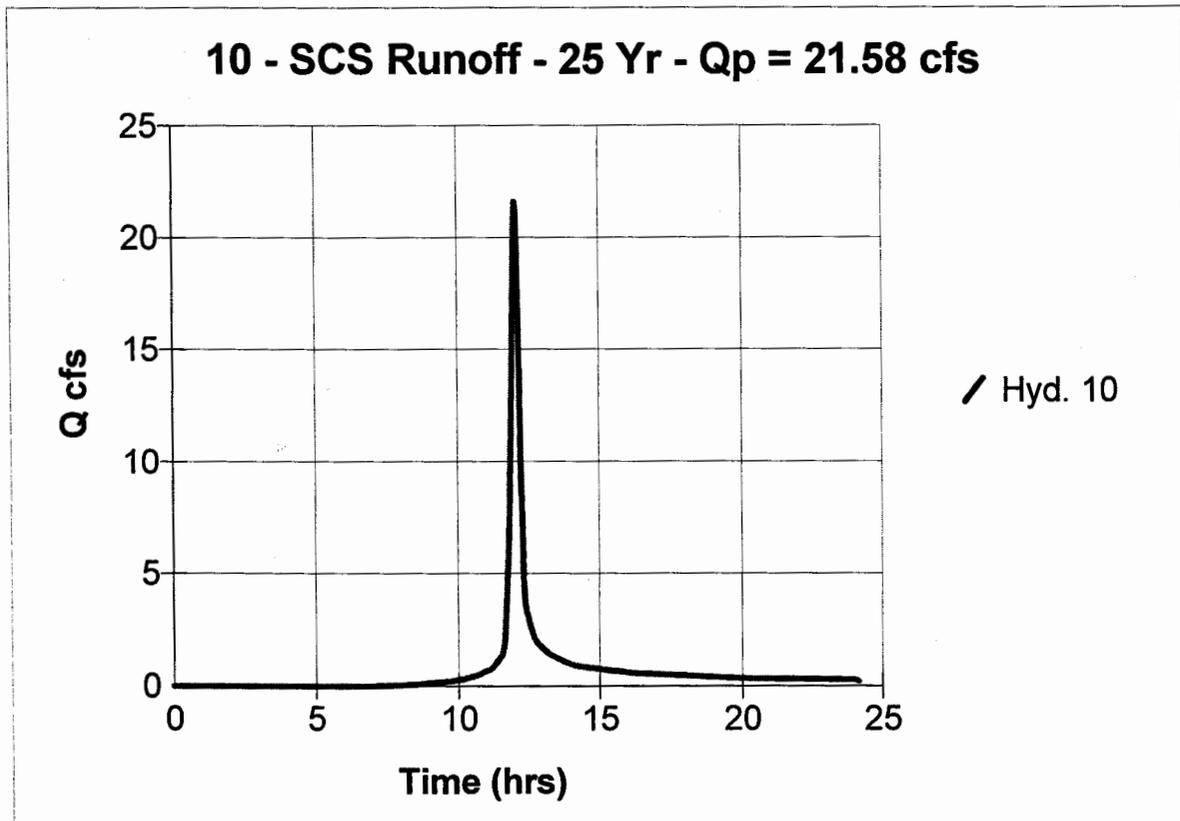
English

Hyd. No. 10

Post-Development 25-yr Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 21.58 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 4.59 ac	Curve number	= 76
Basin Slope	= 6.0 %	Hydraulic length	= 670 ft
Tc method	= USER	Time of conc. (Tc)	= 16 min
Total precip.	= 6.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 60,557 cuft



DENT 12EE / WALNUT
PHASE 2 / CREEK

Hydrograph Plot

BMP 5.3

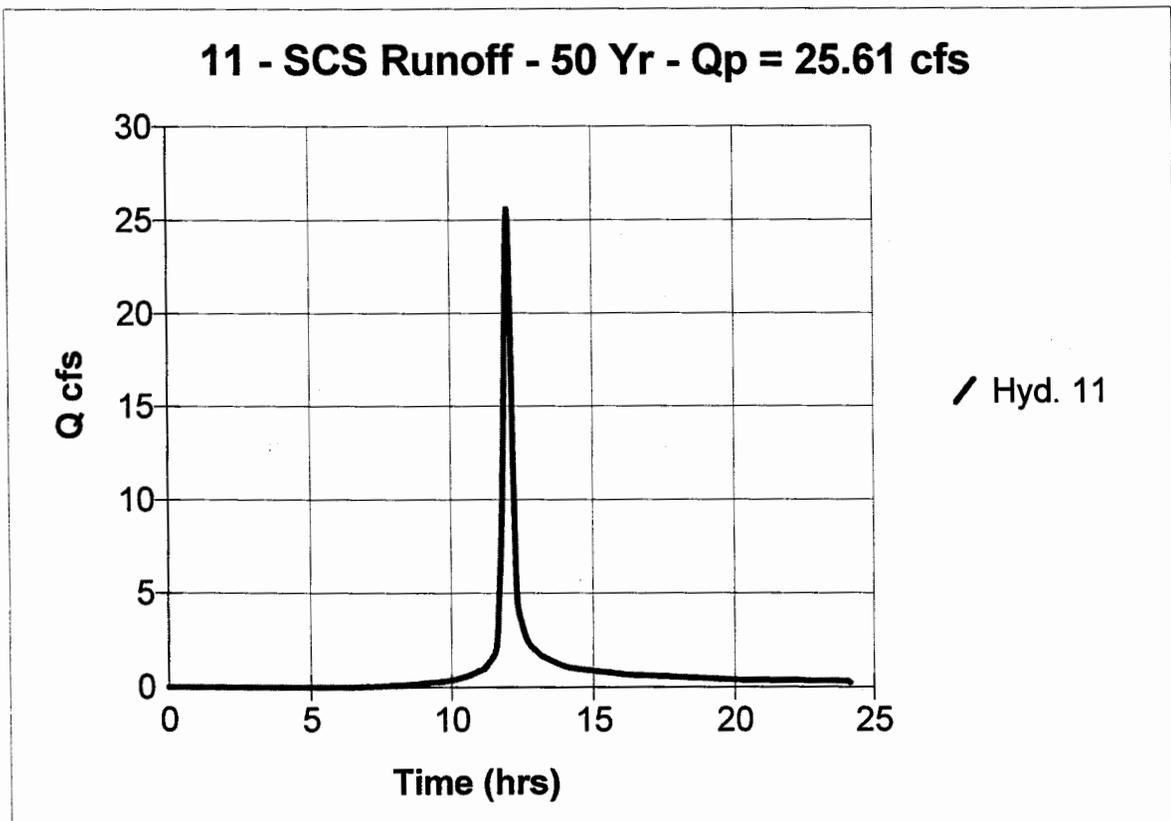
English

Hyd. No. 11

Post-Development 50-yr Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 25.61 cfs
Storm frequency	= 50 yrs	Time interval	= 2 min
Drainage area	= 4.59 ac	Curve number	= 76
Basin Slope	= 6.0 %	Hydraulic length	= 670 ft
Tc method	= USER	Time of conc. (Tc)	= 16 min
Total precip.	= 7.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 72,061 cuft



DEN: TREE / WALNUT
PHASE 2 / CREEK

Hydrograph Plot

BMP 5.3

English

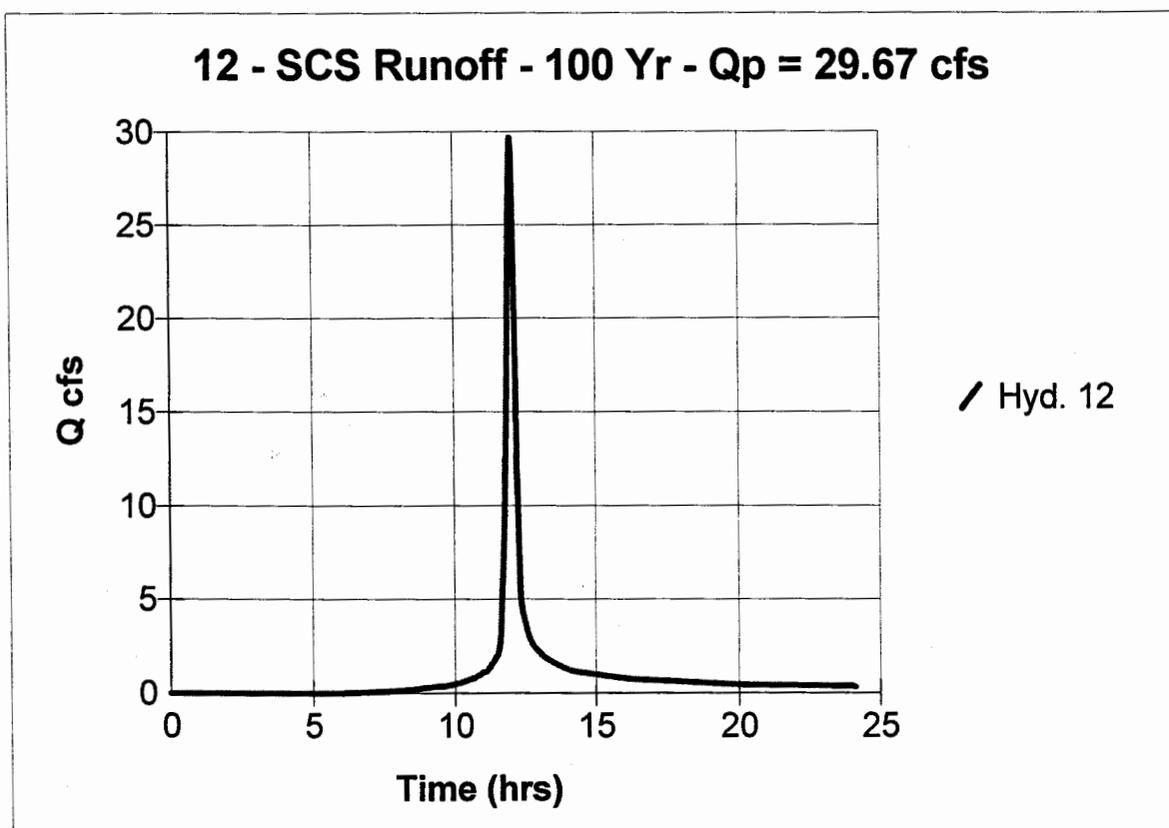
Hyd. No. 12

Post-Development 100-yr Runoff

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 4.59 ac
Basin Slope = 6.0 %
Tc method = USER
Total precip. = 8.00 in
Storm duration = 24 hrs

Peak discharge = 29.67 cfs
Time interval = 2 min
Curve number = 76
Hydraulic length = 670 ft
Time of conc. (Tc) = 16 min
Distribution = Type II
Shape factor = 484

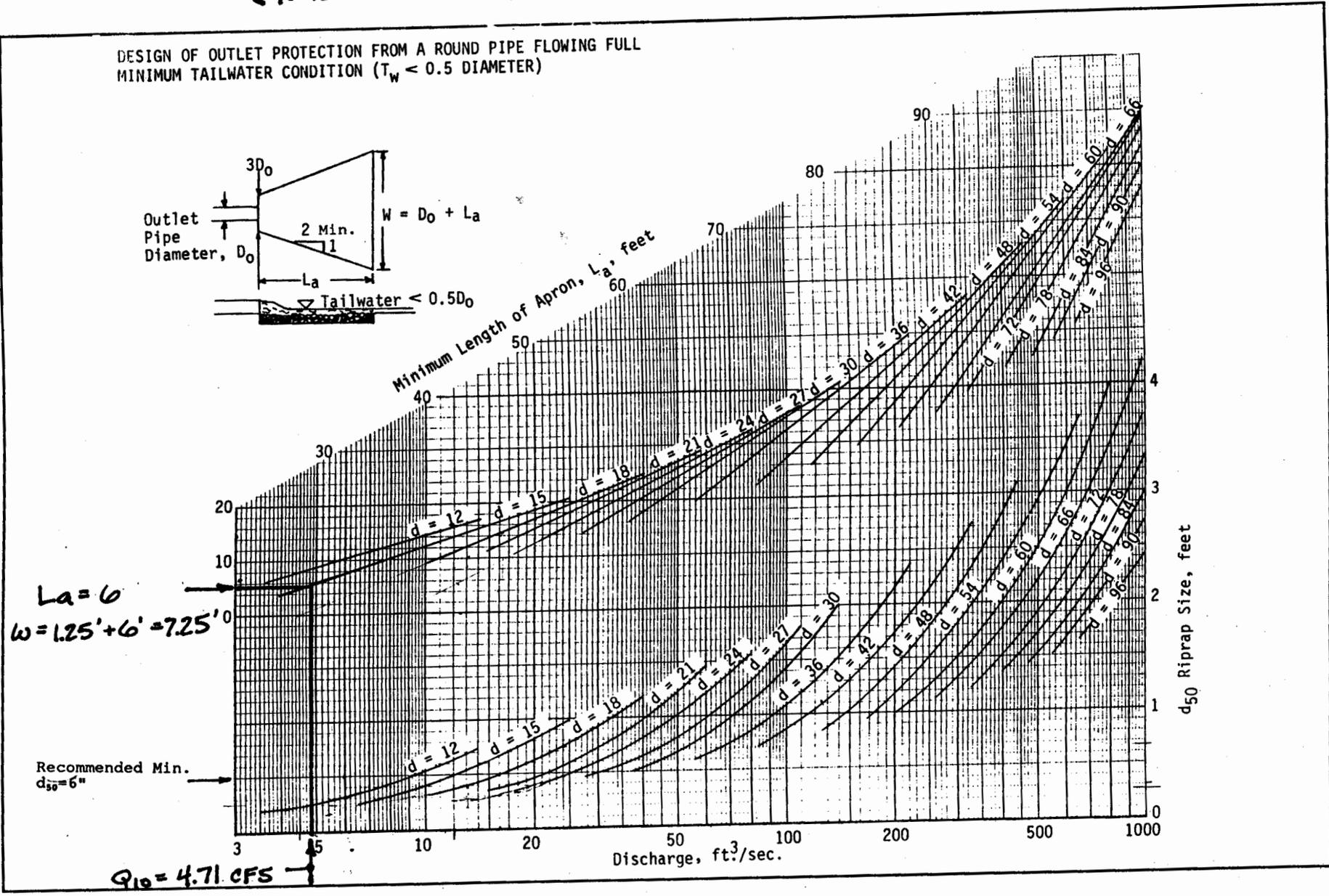
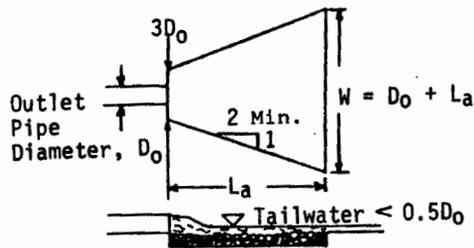
Total Volume = 83,791 cuft



STONEHOUSE DEV. AREA ONE - Walnut Creek
 AES PROJECT No. 8877
 STILL BASIN SIZING FOR SS#1
 (WALNUT CREEK ROAD)

Source: USDA-SCS

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
 MINIMUM TAILWATER CONDITION ($T_w < 0.5$ DIAMETER)



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Plate 3.18-3

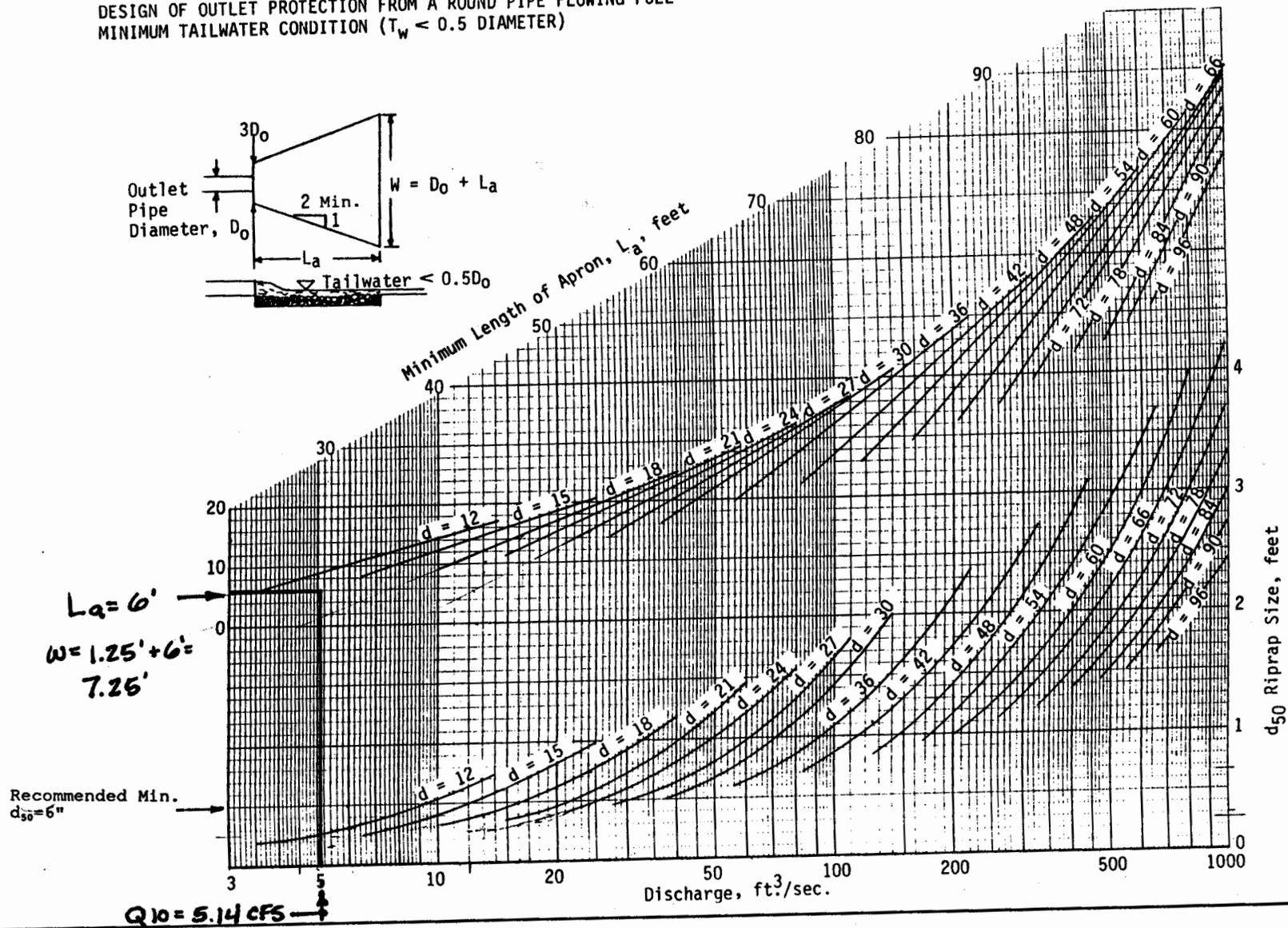
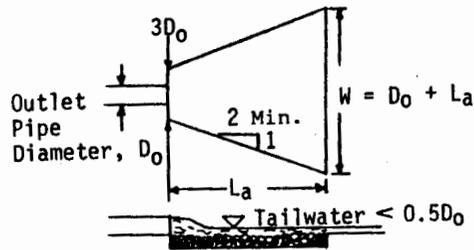
1992

3.18

STONEHOUSE BENT TREE - PHASE II / WALNUT CREEK AES PROJECT No. 8877 STILL BASIN SIZING FOR SS#2 (BENT TREE LANE)

Source: USDA-SCS

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
MINIMUM TAILWATER CONDITION ($T_w < 0.5$ DIAMETER)



1992

III - 164

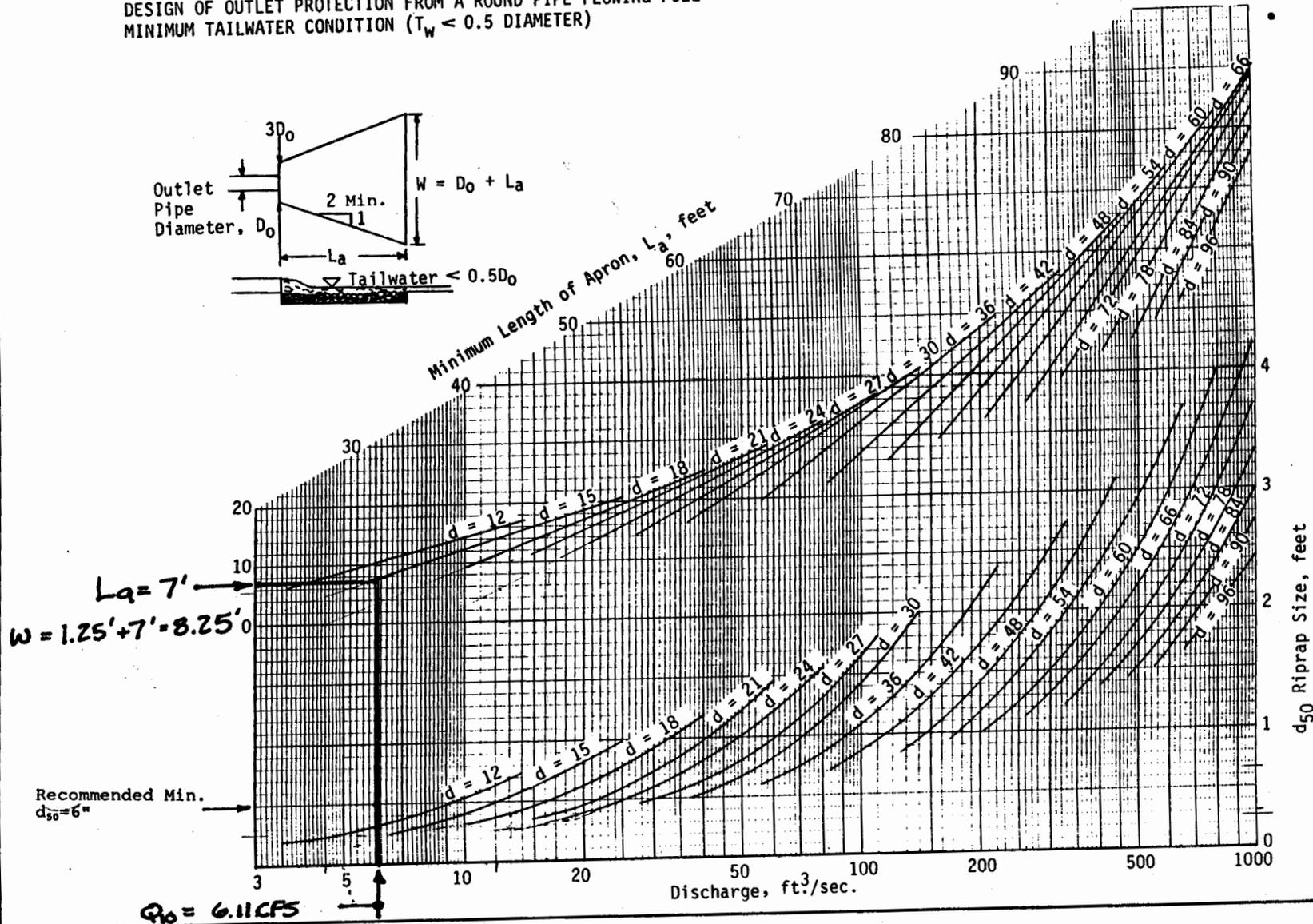
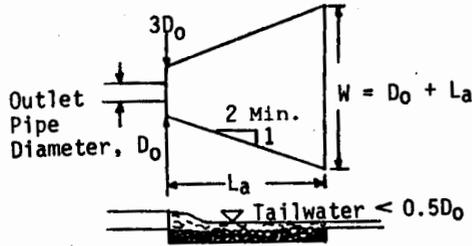
Plate 3.18-3

3.18

STONEHOUSE DEN TREE-PHASE 2, WALNUT CREEK
 AES PROJECT No. 8877
 STILL. BASIN SIZING FOR SS#3
 (TRAIL WOOD LANE)

Source: USDA-SCS

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
 MINIMUM TAILWATER CONDITION ($T_w < 0.5$ DIAMETER)



III - 164

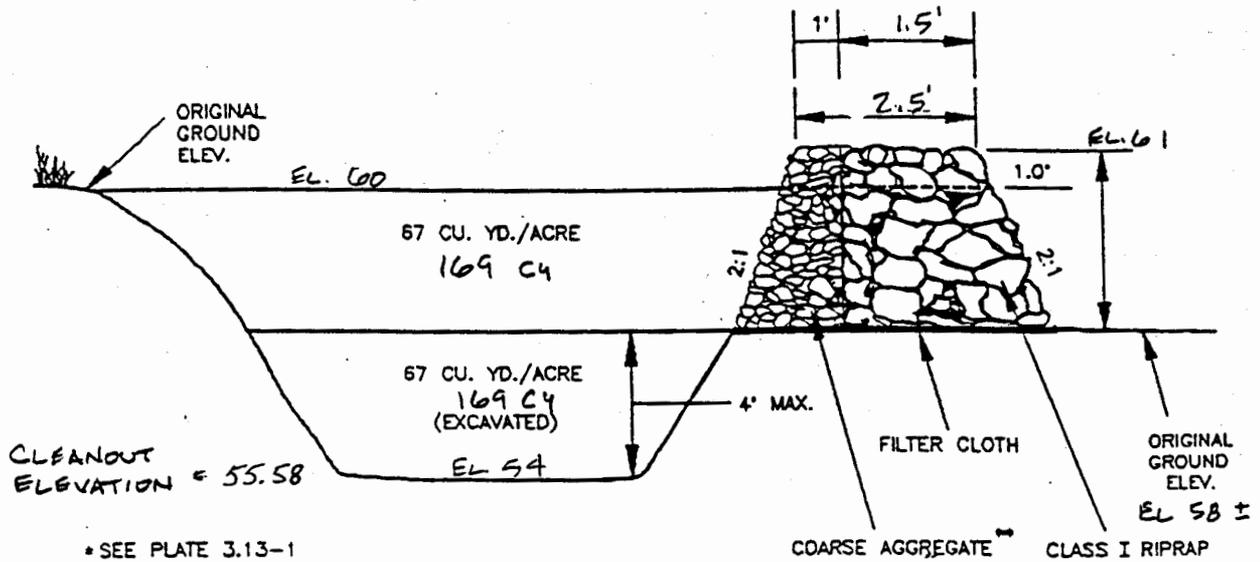
Plate 3.18-3

1992

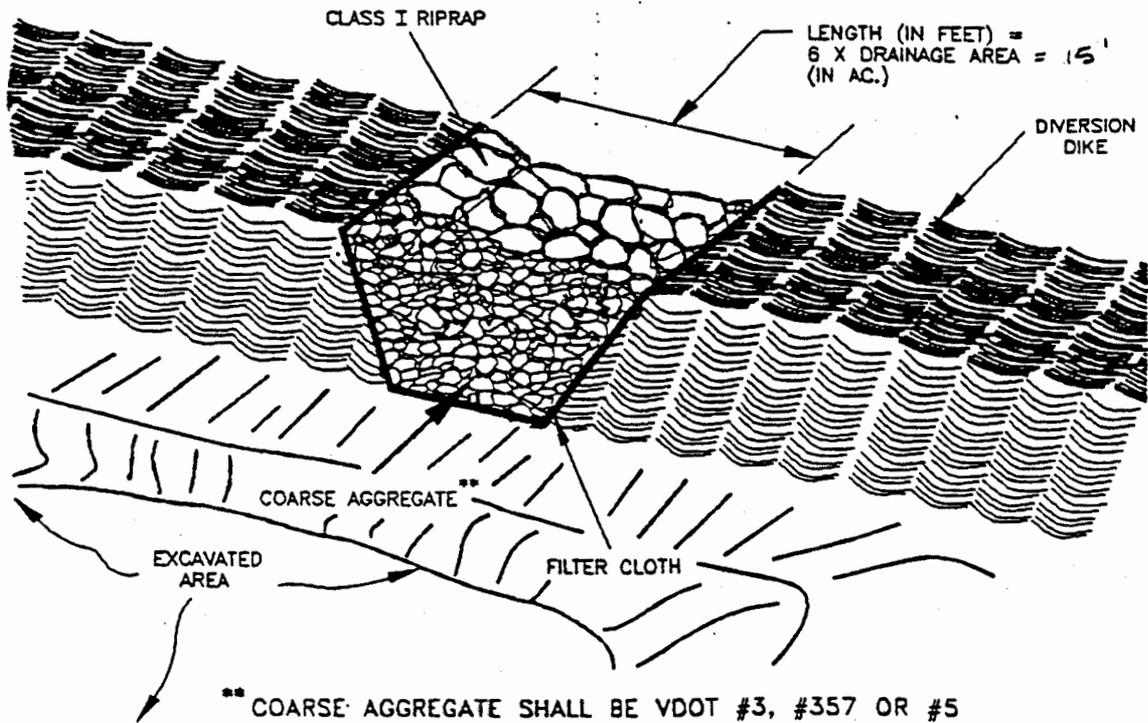
3.18

TEMPORARY SEDIMENT TRAP

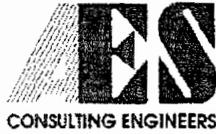
DRAINAGE AREA = 2.52 AC



CROSS SECTION OF OUTLET



OUTLET (PERSPECTIVE VIEW)



AES Consulting Engineers Fax Memorandum

5248 Olde Towne Road, Suite 1 • Williamsburg, Virginia 23188
 Telephone: (757) 253-0040 • Facsimile: (757) 220-8994 • Email: aes@aesva.com

To: SCOTT THOMAS, P.E.	Org./Firm: JCE ENV. DIV.
Fax Number: 259-4032	Date: JAN 10, 2002
From: RICK SMITH	Pages Including Cover Page: 5
cc:	cc Fax Number:
Subject:	

- Urgent
 For Review
 Please Comment
 Please Reply

Comments:

SCOTT,

AS I PROMISED! HERE ARE COPIES OF THE REVISED DITCH CALCULATIONS FOR WALNUT CREEK AND SPLITWOOD TRAIL FOR VERIFICATION TO ELIMINATE THE PAVED SWALE, THANKS FOR YOUR HELP ON THIS MATTER.

RICK SMITH

Confidentiality Note: The documents accompanying this fax may contain confidential information. This information is intended only for the use of the individual or entity named on the transmission sheet. If you are not the intended recipient, you are hereby notified that any disclosure, copying, distribution, or the taking of any action in reliance on the contents of this faxed information is strictly prohibited, and that the documents should be returned to AES Consulting Engineers. If you have received this fax in error, please notify us by telephone immediately at the number above so that we can arrange for the return of the original document at no cost to you.

CREEK LANE
SIDE

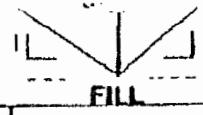


CUT

+.117



MED.



FILL

PROJECT ^{WALTON WAGON} BENT TREE PHASE II
BY JAG DATE 3/26/01

REVISED 1/4/02 RDS

TA. TO STA.	FLOW	C	A	C A		Tc	I ₂	Q ₂	C or F	Slope Ft-Ft	ALLOW VEL	Protective		Lining		I ₁₀	Q ₁₀	DEP	REMARKS		
				INCR.	ACC.							n=.03	n=.05	n=.015							
												VEL	Qn	VEL	DEP	Qn	DEP				
-00	11+00	.65	.054	.035	-	5	5.5	.19	C	.035				1.5	2"			8	.28	3"	GRASS (LOW FLOW)
100	12+00	.65	.056	.036	.071	5	5.5	.39		.023				1.5	3.5"			8	.58	4"	GRASS
100	12+50	.65	.029	.019	.090	5	5.5	.49		.024				1.8	4"			8	.72	4"	GRASS
50	13+00	.65	.029	.019	.101	5	5.5	.60		.039				2.1	4"			8	.81	3"	CONC (Slope > 3%)
00	14+00	.65	.058	.038	.139	5	5.5	.76		.055				2.2	3.5"			8	1.11	3"	CONC (Slope > 3%)
100	14+50	.65	.028	.018	.157	5	5.5	0.96		.065				2.7	4"			8	1.26	3"	CONC (Slope > 3%)
10	15+00	.65	.028	.018	-	5	5.5	.10		.049				1.4	<2"			8	.14	2"	CONC (Slope > 3%)
																					→ DISCHARGE TO DI-5
00	16+00	.55	.091	.050	.068	5	5.5	.37		.020				1.4	3.5"			8	.54	4"	GRASS
00	16+50	.50	.085	.042	.110	5	5.5	.60		.022				1.5	4"			8	.88	5"	GRASS
																					→ DISCHARGE TO DI-5
50	17+00	.60	.05	.03	-	5	5.5	.16		.03				1.4	2.5"			8	.24	3"	GRASS
00	18+00	.60	.105	.063	.093	5	5.5	.51		.04				/	/			8	.74	3"	CONC (Slope > 3%)
00	18+64	.85	.08	.068	.161	5	5.5	.88		.02				1.8	5"			8	1.29	6"	GRASS

JAN-10-2002 10:25

RES CONSULTING ENGINEERS

757 220 8994

P.02

NEW LANE
R SIDE



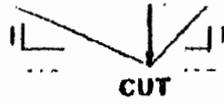
PROJECT BENT TREE PHASE II
BY JAG DATE 3/26/01

REVISED 1/4/02 RDS

STA. TO STA.		FLOW	C	A	C A		Tc	I ₂	Q ₂	C or F	Slope F1-F1	ALLOW VEL	Earth			Protective		Lining		I ₁₀	Q ₁₀	DEP.	REMARKS
					INCR.	ACC.							n=.03	n=.05		n=.015							
					VEL.	Q _n							VEL.	DEP.	Q _n	DEP.							
10+00	11+00	↓	.65	.054	.035	—	5	5.5	.19	C	.035			1.5	2"			8	.28	3"	GRASS (LOW FLOW)		
11+00	12+00	↓	.65	.058	.038	.073	5	5.5	.40	↓	.023			1.5	3.5"			8	.58	4"	GRASS		
12+00	12+50	↓	.65	.074	.044	.117	5	5.5	.64		.024			1.9	4"			8	.94	4.5"	GRASS		
13+80	14+00	↓	.65	.059	.038	—	5	5.5	.19		.053			1.8	2.5"			8	.30	2"	CONC (Slope > 3%) TO TRAIL Wood LANE		
14+00	14+50	↓	.65	.029	.019	.057	5	5.5	.31		.065			2.2	2.6"			8	.46	2"	CONC (Slope > 3%)		
14+50	15+10	↓	.65	.029	.019	.069	5	5.5	.10		.05			1.6	2"			8	.15	2"	CONC. (Slope > 3%) DISCHARGE TO DE-S		
15+10	15+75	↓	.65	.043	.028	—	5	5.5	.26		.022			1.2	3"			8	.38	4"	GRASS POND DITCH		
18+00	18+64	↓	.65	.084	.071	—	5	5.5	.39	F	.02			1.4	4"			8	.57	4"	GRASS		

JAN-10-2002 10:27
 RES CONSULTING ENGINEERS
 757 220 8994 P. 03

02 LANE
R SIDE



CUT

+ .117



MED.



FILL

PROJECT WALNUT CREEK
BENT TREE PHASE II
BY JMG DATE 1/19/01

REVISED 1/4/02 RDS

STA. TO STA.	FLOW	C	A	C A		Tc	I ₂	Q ₂	C or F	Slope F1-F1	ALLOW VEL	Earth n=.03		Protective n=.05		Lining n=.015		I ₁₀	Q ₁₀	DEP	REMARKS
				INCR.	ACC.							Qn	VEL.	DEP.	Qn	DEP.					
+00	10+50	.6	.055	.033	.15	5	5.5	.75		.03				2.0	4"			8	1.2	5"	GRASS
+50	11+00	.55	.076	.042	.192	5	5.5	1.06		.07				2.5	3.5			8	1.54	3"	CONC. (Slope > 3%)
+00	12+00	.55	.309	.173	.365	5	5.5	2.0		.066				3.5	5.5"			8	2.92	4"	CONC. (Slope > 3%)
+00	13+XX	.50	.467	.234	.599	5	5.5	3.3		.074				3.8	6.5"			8	4.8	4.5"	CONC. (Slope > 3%)
TOTAL P.05																					

JAN-10-2002 10:30

RES CONSULTING ENGINEERS

757 220 8994

P.05



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

REPLY TO
ATTENTION OF:

May 13, 1999



Southern Virginia Regulatory Section
94-0816-16 (Ware Creek)
(L&M No. 1960038-009.30)

Stonehouse, Inc./Stonehouse L.L.C.
c/o Mr. James Franklin
P.O. Drawer 759
Toano, Virginia 23168

Dear Mr. Franklin:

This letter is in reference to the proposed impacts associated with work that will occur in 1999, in Development Area One at the Stonehouse Development in James City County, Virginia. Stonehouse L.L.C. proposes to install a road crossing and three stormwater management facilities that will service the Sections V-A and V-B in Phase One. A total of 1.1 acres of non-tidal, vegetated wetlands and waters of the United States will be impacted by the project as proposed. An additional 0.58 acres of wetlands will be temporarily inundated by the proposed facilities. In accordance with your request of February 1, 1999, your Department of the Army Permit, issued on December 16, 1994, is hereby modified to allow for the proposed impacts to wetlands and waters of the United States, as shown on the enclosed drawings Sheets 2-5 dated January 27, 1999. All other conditions of the original permit remain unchanged. Please be advised that all conditions of the original and modified Virginia Water Protection Permit become conditions of this authorization.

The applicant proposes to create/enhance 2.07 acres of wetlands as compensatory mitigation. The mitigation for the impacts associated with this permitted action and previous modifications to the permit will be completed at the Brookshire Road Site, which has been constructed.

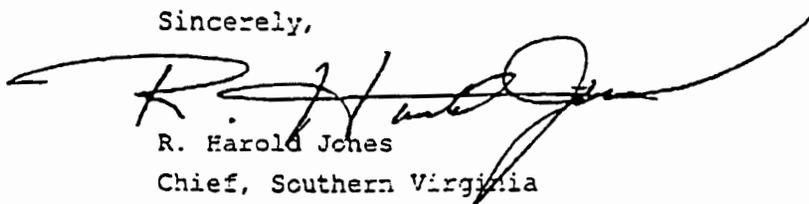
As a special condition of this modification, you will be required to monitor the areas upstream of the stormwater management facilities for a period of five years. The monitoring is required to document the species composition in the areas upstream of the proposed dams for the stormwater management facilities. Permanent monitoring stations should be established prior to construction, so that the same areas can be monitored over the five-

year period. Data sheets and photos will be required every other growing season during the five-year period. If a substantial change in the wetland community is found, mitigation for wetland impacts may be required.

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

Please obtain all necessary State and Local authorizations for the proposed work. Should you need further assistance or have any questions, please contact Melissa Smith at (757) 441-7489.

Sincerely,



R. Harold Jones
Chief, Southern Virginia
Regulatory Section

Copies Furnished:

Environmental Protection Agency, Reston
National Marine Fisheries Service, Oxford
U. S. Fish and Wildlife Service, Gloucester
Virginia Department of Environmental Quality, Virginia Beach
Mr. John Lowenthal, Langley & McDonald

Scott Thomas

From: Das, Prakriti K [PK.Das@VirginiaDOT.org]
Sent: Tuesday, January 08, 2002 1:57 PM
To: Scott Thomas (E-mail)
Subject: EC matting



EC-2 VDOT
Approved List.doc

Scott,

VDOT goes by the VA Erosion & Sediment Control Handbook and specifies paved ditches when the 2-year storm velocity is greater than 10 fps. Attached is a list of approved mattings.

P.K. DAS, P.E.
TRANSPORTATION Engineer
WILLIAMSBURG RESIDENCY
757-253-5143 (phone)
757-253-4556 (fax)
<<...OLE_Obj...>>

<<EC-2 VDOT Approved List.doc>>

VIRGINIA DEPARTMENT OF TRANSPORTATION
ST'D. EC-2 EROSION CONTROL BLANKETS
APPROVED LIST (REV. 3/7/97)

(VELOCITY 2.5 - 4.0 f.p.s.)

Curlex
American Excelsior Company
P.O.Box 5067
Arlington, Tx.76011

Anti-Wash/Geojute
Belton Industries
8613 Roswell Road, Suite 200
Atlanta, Ga. 30350

Dekowe 700
Dekowe 900
Belton Industries
Hambry Road
Belton, South Carolina 29627

X-Cel Permatat 100,
X-Cel Regular, and X-Cel Superior
PPS Packaging Co.
P.O.Box 427
Fowler, CA. 93625-0427

Poplar Excelsior Stitched Blanket
Winters St'd. & H. V. Straw Blankets
Winters Excelsior Company, Inc.
P. O. Box 39, Hwy 21
McWilliams, Alabama 36753

Jute Mesh
Bemis Brothers Bag Company
St. Louis, Mo.

Jute Mesh
Ludlow Manufacturing & Sales Co.
Needham Heights 94, Ma.

Jute Mesh
Belting Bagging Company
Belton, South Carolina

Ridgegrow Excel. Eros. Cont. Blanket
Ridgegrow Wood Products
P.O.Box 812
Somerset, Ky. 42501

JMD Jute Mesh
JMD Manufacturing
5401 Progress Blvd.
Bethel Park, PA. 15102

North American Green S-75
North American Green SC-150
North American Green C-125
North American Green, Inc.
Evansville, Indiana 47711

Verdyol Standard ERO-MAT
Verdyol High Vel. ERO-MAT
Verdyol Excelsior Standard
Verdyol Excelsior High Vel.
Verdyol Xtra Standard
Verdyol Xtra High Velocity
Verdyol Alabama, Inc.
P.O.Box 605
105 Miles Pkwy.
Pell City, AL. 35125

Soil Saver Heavy Jute Mesh
Jim Walls Company
Commerce Plaza, Suite 109
12820 Hillcrest Road
Dallas, Texas 75230

BonTerra S-1, S-2, CS-2, & C-2
BonTerra America
P. O. Box 9485
Moscow, Odaho 83843

Jute Mesh
B & M Packaging Co., Inc.
11515 Granite Street 28273
P.O.Box 411007
Charlotte, N. C. 28241-1007

Earthlock
ECS Products, Inc.
9015 Energy Lane
Northport, Alabama 35406

Standard Excelsior Blanket
Standard Straw Mat
High Velocity Excelsior Blanket
High Velocity Straw Mat
Erosion Control Systems, Inc.
9015 Energy Lane
Northport, Alabama 35476
(205)333-3080

BioD-Mat 70 & BioD Mat 90
Rolanka International, Inc.
6476 Mill Court
Morrows, Georgia 30260
(404)961-0331

Greenfix WS052 Straw Mat
Greenfix America
P. O. Box 23310
Santa Barbara, California 93121
(619)344-6700

§244.02 (k)(2) Soil retention mats shall consist of a machine-produced mat of wood fibers, wood excelsior, or manmade fiber that shall intertwine or interlock. Matting shall be nontoxic to vegetation and germination of seed and shall not be injurious to the unprotected skin of the human body.

Mats shall be of consistent thickness, with fiber evenly distributed over its entire area, and covered on the top and bottom side with netting having a high web strength or covered on the top side with netting having a high web strength and machine sown on maximum 5.08 cm centers along the longitudinal axis of the material. Netting shall be entwined with the mat for maximum strength and ease of handling.

Memorandum

DATE: June 22, 2001

TO: Melissa Nash, U.S. Army Corps of Engineers (Norfolk)
Darryl Cook, James City County Environmental Division
Jim Bennett, Stonehouse Development Company

FROM: Marc Bennett

SUBJECT: Stonehouse, Bent Tree Subdivisions

On May 13, 1999, the U.S. Army Corps of Engineers issued a modification to a permit issued on December 16, 1994. This modification permitted a total impact of 1.1 acres of non-tidal vegetated wetlands and waters of the United States, and an additional impact of 0.58 acres of wetlands to be temporarily inundated by the proposed facilities of a road crossing and three stormwater management facilities servicing the Sections of V-A and V-B in Phase One of the Stonehouse Development. The permit also acknowledged the applicants intent to create/enhance 2.07 acres of wetlands as compensatory mitigation, and to require monitor of upstream areas of the stormwater management facilities for a period of five years.

The current plan of development for the Sections of V-A and V-B proposes a road crossing and four stormwater management facilities. The proposed roadway crossing is located in the same area as shown on the current permit, as is one of the stormwater management facilities. The three other proposed stormwater management facilities are located in headwaters of the original permit locations.

Staff at AES Consulting Engineers was requested to measure areas of impacts for the currently planned roadway and stormwater management facility locations. Our measurements are based upon current plans of development and record information of wetland locations. Our measurements indicate that under the current plan of development 0.46 acres of non-tidal vegetated wetlands and waters of the United States are permanently impacted, and an additional 0.46 acres of non-tidal wetlands are temporarily inundated by the four proposed stormwater management facilities. With the current plan, a net reduction of 0.64 acres of permanent impacts and 0.12 acres of temporary inundated wetlands are realized.

Additionally, AES staff researched historically significant sites in the area of the proposed development. Our research reviewed "A Phase 1 Archeological Survey of the Proposed Stonehouse Development, James City and New Kent Counties, Virginia," (prepared July 6, 1988, by the Virginia Archeological Services, Inc.), and "A Phase 1 Archeological Survey of the Proposed Ware Creek Reservoir, James City and New Kent Counties, Virginia," (a final report prepared October 24, 1986, for James City County by Robert R. Hunter, Jr., and Patricia I. Kandle). Based upon these reports, no significant sites are found in the proposed area of development identified in the permits.



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

Williamsburg Environmental Group was requested to have staff survey the development area for threatened small whorled pogonias in the development area. This survey was conducted on June 21, 2001. Results (see memorandum attached) were that no small whorled pogonias were found, and the habitat of the development area to support the species is poor.

With this knowledge in hand, it is hoped that a further modification to the current permit can be quickly prepared. Verbal acknowledgement to all parties of the modification will greatly help the process.

As the current situation has greatly impacted the time and effort resources of all parties involved, please know that the efforts are sincerely appreciated.

S:\Jobs\8876\00\Wordproc\Document\887600118.vmb.doc

AES CONSULTING ENGINEERS

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

LETTER OF TRANSMITTAL

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

DATE JAN 4, 2002	JOB NO. 8877-00
ATTENTION SCOTT THOMAS P.E.	
RE: BENT TREE PHASE 2 ; WALNUT CREEK S-074-00	

TO JAMES CITY COUNTY
ENVIRONMENTAL DEPT.

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

Shop drawings Prints Plans Samples Specifications

Copy of letter Change order _____



COPIES	DATE	NO.	DESCRIPTION
1	JAN. 4	7	RED LINE MARK-UP OF SHEET

DARRYL, this drainage I think your review. I not plan was your review. He did not called PK BAS, He did not type for swales. say there was any change for in the VDOT regulation ditch comp's originally I looked at the ditch they originally cause file & it looks like they think we went with paved comp's I think we they didn't do. comp's need to support this change.

What do you think? I put in a call to Bennett to discuss.

OK Scott

THESE ARE TRANSMITTED as checked below:

For approval Approved as submitted Resubmit _____ copies for approval

For your use Approved as noted Submit _____ copies for distribution

As requested Returned for corrections Return _____ corrected prints

For review and comment _____

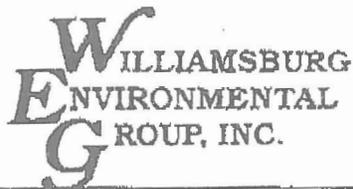
FOR BIDS DUE _____ PRINTS RETURNED AFTER LOAN TO US

REMARKS

SCOTT,

WITH NEW REGULATIONS FROM VDOT CONCERNING PAVED DITCHES? AND ACCEPTABLE VELOCITIES FOR EARTH, EC-4/MATTING, WE HAVE DETERMINED THAT PAVED SWALE CAN BE ELIMINATED FROM WALNUT CREEK. THESE TWO ROADS ARE NOW LINED W/EC-2 MATTING

COPY TO FILE ; RAY NICE SIGNED: [Signature]



*Environmental Consultants***MEMORANDUM**

June 22, 2001

To: Marc Bennett

Fr: Doug DeBerry *DD*

Re: Stonehouse Section V-B "Beet Tree" - Phases 1, 2, and 3 and Walnut Creek
Surveys for Small Whorled Pogonia (*Isotria medeoloides*)

This correspondence will summarize the results of recent surveys for the federally-listed "Threatened" small whorled pogonia (*Isotria medeoloides* (Pursh) Rafinesque) on the above-referenced sections of the Stonehouse Development in James City County, Virginia. The methods utilized during this study have been approved by the U. S. Fish and Wildlife Service (FWS) and are described in an attachment. The site visit was performed on June 21, 2001.

No individuals of small whorled pogonia were found within the survey areas, which included wetland impact areas and adjacent slopes associated with the following: 1) proposed Splitwood Road crossing; 2) BMP 5.1, area of temporary and permanent impact; 3) BMP 5.2, area of temporary and permanent impact; 4) BMP 5.3, area of temporary and permanent impact; and 5) BMP 5.4, area of temporary and permanent impact.

The habitat may be characterized as poor throughout the surveyed areas. At each location, slopes with suitable orientation (north to east facing) retain a severe gradient which is a poor habitat condition for the target species. One effect of a steeply sloping gradient is the inability of the slope to retain detritus, which is otherwise important in developing the appropriate substrate condition for the small whorled pogonia. In addition, these slopes are dominated by mountain laurel (*Kalmia latifolia*) and American holly (*Ilex opaca*), two evergreen, highly competitive shrubs or small trees that crowd the subcanopy and understory strata. The dominance of these species is likely preclusive to the small whorled pogonia, which usually exploits a more open understory habitat. Finally, the wetland areas surveyed retain a seasonal high water table, which is a condition not favorable for the small whorled pogonia.

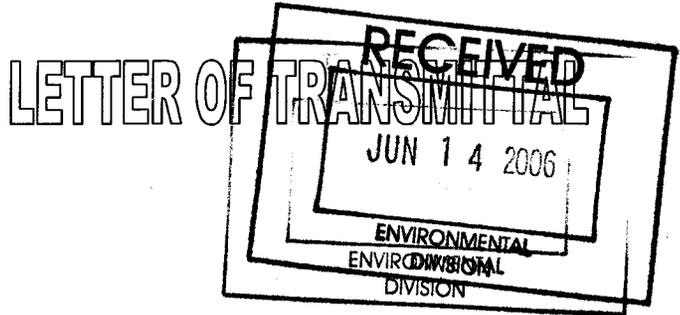
If you have any questions or require additional information, please feel free to call at your convenience.

3000 Easter Circle • Williamsburg, Virginia 23188 • (757) 220-6869 • FAX (757) 229-4507

TOTAL P.04

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

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



ATTN: **Scott Thomas**

CO.: James City County

Address: Environmental

cc: _____

DATE 06/13/06	JOB NO. 8877-00
FROM: Victoria Bains	
RE Stonehouse Bent Tree Phase 2	

WE ARE SENDING YOU THE FOLLOWING ITEMS:

- Attached
 Under separate cover via

- Original(s) Print(s) Plan(s) Specification(s) Change Order
 Copy of letter(s) Other:

COPIES	DATE	No. of Pages	DESCRIPTION
1	11/07/02	2	Mylar BMP Record Drawings # 5.2 & #5.3 (plan & section sheet)
1	11/07/02	2	Paper Copy BMP Record Drawings # 5.2 & #5.3 (plan & section sheet)

THESE ARE TRANSMITTED as checked below:

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

REMARKS:

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

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

LETTER OF TRANSMITTAL

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

ATTN: **Scott Thomas**

CO.: **James City County**

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

cc: **file**

DATE 12/14/04	JOB NO. 8877
FROM: Tory Bains	
RE BMP As-Builts Bent Tree Phase II Stonehouse	

WE ARE SENDING YOU THE FOLLOWING ITEMS:

- Attached
 Under separate cover via

- Original(s) Print(s) Plan(s) Specification(s) Change Order
 Copy of letter(s) Other:

COPIES	DATE	No. of Pages	DESCRIPTION
1	11/07/02	2	BMP 5.2 (WC 073)
1	11/07/02	2	BMP 5.3 (WC 074)

RECEIVED

DEC 14 2004

ENVIRONMENTAL
DIVISION

THESE ARE TRANSMITTED as checked below:

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

REMARKS:

If you have any questions or concerns please contact me. Thank you.

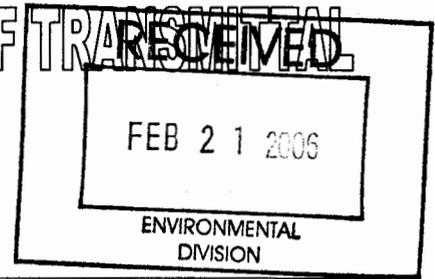
Tory

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

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

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

LETTER OF TRANSMITTAL



ATTN: **Scott Thomas**

CO.: JCC Environmental

Address:

cc:

file

DATE 2/21/06	JOB NO. 8876-00, 8877-00, & 8878-00
FROM: Victoria Bains	
RE Bent Tree Phase 1, Bent Tree Phase 2 & Walnut Creek, and Bent Tree Phase 3	

WE ARE SENDING YOU THE FOLLOWING ITEMS:

- Attached
 Under separate cover via

- Original(s) Print(s) Plan(s) Specification(s) Change Order
 Copy of letter(s) Other: Record Drawing and Construction Certification

COPIES	DATE	No. of Pages	DESCRIPTION
1		5	Record Drawing and Construction Certifications for BMP #5.1
1		5	Record Drawing and Construction Certifications for BMP #5.2
1		5	Record Drawing and Construction Certifications for BMP #5.3
1		5	Record Drawing and Construction Certifications for BMP #5.4

THESE ARE TRANSMITTED as checked below:

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

REMARKS:

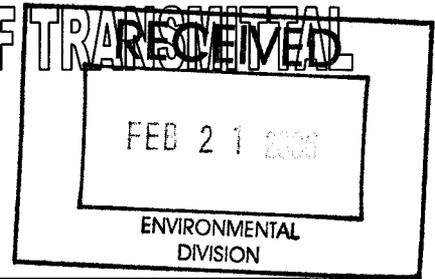
Scott, Please let me know when you have made the final inspection and that the bonds are being released. Thank you.
 Tory

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

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

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

LETTER OF TRANSMITTAL



ATTN: **Scott Thomas**

CO.: JCC Environmental

Address: _____

cc: file

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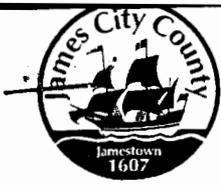
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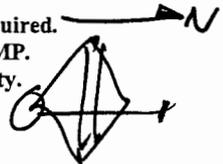


**James City County Environmental Division
Stormwater Management / BMP Inspection Report
Detention and Retention Pond Facilities**

County BMP ID Code (if known): WC 073 Reinspect 5/30/06-O.K.
 Name of Facility: Stonehouse Bentree BMP #5.2 BMP No.: _____ of _____ Date: 1/13/04
 Location: Windy Branch near Lot 3/4
 Name of Owner: Stonehouse Dev LLC
 Name of Inspector: St Thomas, Tom Bains AES
 Type of Facility: Dry Pond
 Weather Conditions: _____ Type: Final Inspection County BMP Inspection Program Owner Inspection

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

- O.K. - The item checked is in adequate condition and the maintenance program is currently satisfactory. No action required.
- Routine - The item checked requires attention, but does not present an immediate threat to the function/integrity of the BMP.
- Urgent - The item checked requires immediate attention to keep the BMP operational and to prevent damage to the facility.



Provide an explanation and details in the comment column, if routine or urgent are marked.

Facility Item	O.K.	Routine	Urgent	Comments
Embankments and Side Slopes: <u>10' W EARTH DAM; 2.5H:1V; 20-25' HIGH</u>				
Grass Height	✓			<u>Grass + new mulched</u>
Vegetation Condition	✓			
Tree Growth	✓	<u>None</u>		<u>About 30 Bayberries on U/S +</u>
Erosion	✓			<u>On slope. No problem</u>
Trash & Debris	✓			
Seepage	✓			
Fencing or Benches				
Interior Landscaping/Planted Areas: <input checked="" type="checkbox"/> None <input type="checkbox"/> Constructed Wetland/Shallow Marsh <input type="checkbox"/> Naturally Established Vegetation				
Vegetated Conditions	✓			<u>clean, interior area in</u>
Trash & Debris		✓		<u>ravine</u>
Floating Material		✓		
Erosion	✓			<u>const trash + debris from</u>
Sediment	✓			<u>SF const.</u>
Dead Plant	✓			
Aesthetics	✓			
Other	✓			
Notes:	<u>Trucks Road + SF</u>			

Key Item	O.K.	Routine	Urgent	Comments
Pools: <input type="checkbox"/> Permanent Pool (Retention Basin) <input type="checkbox"/> Shallow Marsh (Detention Basin) <input checked="" type="checkbox"/> None, Dry (Detention Basin)				
Shoreline Erosion	✓			Was TSB, High water on
Algae	✓			
Trash & Debris		✓		Const trash
Sediment	✓			
Aesthetics	✓			
Other	✓			
Inflows (Describe Types/Locations): Natural Ravine + 15" RCP FROM EAST				
Condition of Structure	✓			
Erosion		✓		Clean outfall of 1-2'
Trash and Debris	✓			Sediment. Restore OP at
Sediment		✓		15" outfall
Outlet Protection		✓		
Other	✓			
Principal Flow Control Structure - Riser, Intake, etc. (Describe Type): RCP 48" W/CAP; 8-10' HIGH ASTM A278				
Condition of Structure	✓			EW-71 LFO w/ screen + 2-
Corrosion	✓			2" ORIF
Trash and Debris	✓	✓		CLEAN LFO. SCREEN 4" ORIF @ 5' HIGH
Sediment	✓			
Vegetation	✓			(could not observe inside riser
Other	✓			too high to climb onto.)
Principal Outlet Structure - Barrel, Conduit, etc. : 12" RCP W/ EG-1; CLASS I STILL BASIN 30x30				
Condition of Structure	✓			
Settlement	✓			
Trash & Debris		✓		REMOVE D/S SF + SF FROM
Erosion/Sediment	✓			OUTLET PIPE
Outlet Protection				Good condition
Other				
Emergency Spillway (Overflow): 15' WIDE; GRASS TO RIPRAP ON D/S SLOPE				
Vegetation	✓			GRASS, NEW MULCH
Lining	✓			
Erosion		✓		Fix erosion on west ss
Trash & Debris		✓		
Other				
Notes:				

	O.K.	Routine	Urgent	Comments
Source Type Conditions:				
Mosquito Breeding	✓			
Animal Burrows	✓			
Graffiti	✓			
Other				
Surrounding Perimeter Conditions: <i>N - Wooded Ravine; E-W SF; South - Wood</i>				
Land Uses	✓			
Vegetation	✓			
Trash & Debris		✓		<i>Trash & Debris From SF Lot</i>
Aesthetics	✓			
Access /Maintenance Roads or Paths	✓			<i>EASY from Road</i>
Other				

Remarks:

Overall Environmental Division Internal Rating: 3

5/30/06 SFT

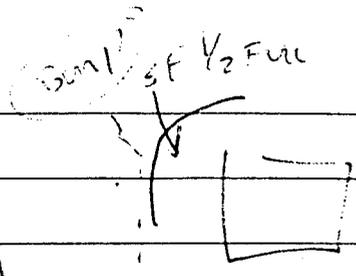
Signature: *[Signature]*
 Title: *Senior Eng ENV DIV*

Date: *1/13/05*

3/17/05

WC 073 - Reinspect ok.

EARL - MIKE WADDE
3112 WINDY BRANCH
Lot 3. Pin # 04-1595



WC 077 - oil put in container to
wash sediment to BMP.

WC 071 - Looks OK!

WC 069 Bio BMP where Cow's Drain too
Close of from main.

JLD RV 12" pipe outlet totally clogged
Remove SF
Fix RUC in sump next to 12"

Date Record Created:

Created By:

WS_BMPNO:

WC073

Print Record

**PRINTED ON
Friday, March 12, 2010
9:45:09 AM**

WATERSHED WC
BMP ID NO 073
PLAN NO S-42-99
TAX PARCEL (5-2)(3-1A)
PIN NO 0520300001A
CONSTRUCTION DATE 10/1/2002
PROJECT NAME SH Bent Tree 5B PH 2 & Walnut Creek
FACILITY LOCATION West of 9923 Walnut Creek Lot 17
CITY-STATE Toano, VA 23168
CURRENT OWNER Stonehouse Dev Com LLC
OWNER ADDRESS 9701 Mill Pond Run
OWNER ADDRESS 2
CITY-STATE-ZIP CODE Toano, VA 23168
OWNER PHONE 234-5000
MAINT AGREEMENT Yes
EMERG ACTION PLAN No

MAINTENANCE PLAN

Yes
SITE AREA acre 20.86
LAND USE Res Plan Unit Dev
old BMP TYP Dry Pond
JCC BMP CODE F2 Dry ED with forebay
POINT VALUE 0

SVC DRAIN AREA acres 6.93

SERVICE AREA DESCR SF Lots & Roadways

IMPERV AREA acres 0.00

RECV STREAM UT of Ware Creek

EXT DET-WQ-CTRL No

WTR QUAL VOL acre-ft 0

CHAN PROT CTRL Yes

CHAN PROT VOL acre-ft 0.54

SW/FLOOD CONTROL Yes

GEOTECH REPORT No

CTRL STRUC DESC RCP Riser

CTRL STRUC SIZE inches 48

OTLT BARRL DESC RCP Barrel

OTLT BARRL SIZE inch 12

EMERG SPILLWAY Yes

DESIGN HW ELEV 71.27

PERM POOL ELEV na

2-YR OUTFLOW cfs 1.70

10-YR OUTFLOW cfs 13.10

REC DRAWING Yes

CONSTR CERTIF Yes

LAST INSP DATE 6/30/2006

Inspected by:

INTERNAL RATING 3

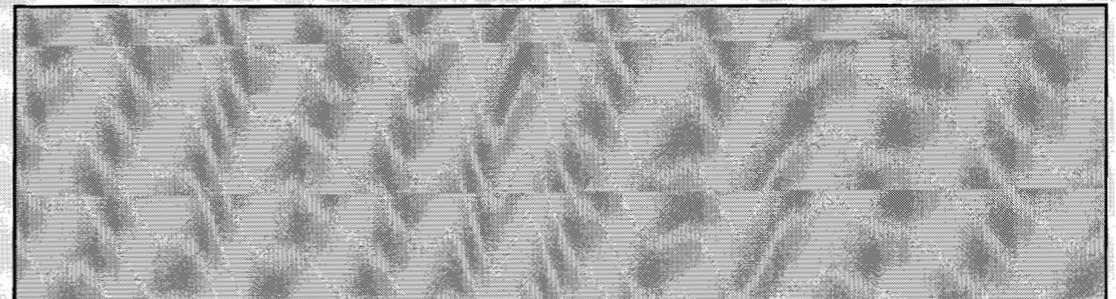
MISC/COMMENTS

BMP # 5.2, amend S-74-00

Get Last BMP No

Return to Menu

Additional Comments:



ENVIRONMENTAL DIVISION COMMENTS
STONEHOUSE, SECTION V-B, BENT TREE, PHASE 2
SITE PLAN NO. SP - 42 - 99
September 13, 2000

MDW/DEC

1. A Land Disturbing Permit and Siltation Agreement, with surety, are required for this project.
2. A Subdivision Agreement, with surety, shall be executed with the County prior to recordation of lots.
3. Water and sewer inspection fees must be paid prior to the issuance of a Land Disturbing Permit.
4. An Inspection/Maintenance Agreement shall be executed with the county for the BMP facility for this project.
5. Record drawings must be provided for the detention basin on completion. Also, a note shall be provided on the plan stating that upon completion, the construction of the dam will be certified by a professional engineer who has inspected the structure during construction.
6. A streetlight rental fee for 6 lights must be paid prior to the recordation of the subdivision plat.
- NA 7. Move the streetlight opposite of lot 58 and the common open space to the north of lot 58 and the storm pipe.
8. Show the approved wetland impact areas.
9. Provide and label the limits of cut and fill slopes on the plan.
10. Show the limit of the 100-year floodplain or state that there are none on the plan.
11. The information related to the 25% and steeper slopes shown on the environmental inventory sheet (sheet 3) is not clearly presented. Please designate the limits of 25% slopes so that it is easier to determine their extent and the impacts to the lots. *- eliminate lot 12
reduce buildable area on lot 16*
12. Sequence of construction.
 - (A) Note 1. Clear perimeter, then install silt fence and tree protection.
 - (B) Note 3 is conflicting, cannot construction basin prior to clearing and grading of the roads and yet use the earth from the grading of the roads to build the embankment.
 - (C) Note 6. Where is the topsoil stockpile going and how will it be controlled.
13. Note 13. Add "after obtaining JCC Environmental Division approval," to the beginning of note.
13. Emergency spillway riprap shall be entrenched, not placed at grade.
14. Identify any off-site land disturbing areas required with proper erosion control measures.
15. Due to the size and nature of this project, provide a clearer phasing plan and sequence of construction on the plan.
16. Modify the silt fence in the following locations to SSF, super silt fence, which is wire

reinforced:

- A. Below the Winter Wood cul-de-sac - *fill gone*
- B. Below both BMP facilities

- ✓17. Modify clearing limits and silt fence locations around storm drain outfall structure 2-1.
- ✓18. Remove the note stating that the paved ditch begins at station 17+50 on the right side of Winter Wood Lane. Another note correctly states that the paved ditch begins at station 16+80.
- ✓19. Stilling basin at storm drain structure 1 needs to be installed as part of the conversion from sediment basin to BMP.
- ✓20. Provide super silt fence around stilling basin at culvert 2. Modify clearing limits for the stilling basin construction.
- ✓21. The calculations state that 2-18" culverts are to be provided at station 20+78 on Bent Tree Lane while the plan shows only one pipe. Please correct.
- ✓22. Provide 20 foot drainage easements between the following lots: 64/65/66, 69/70 and 73/74.
- ✓23. Provide a note on sheet 5 that all roadside ditches shall be stabilized immediately after construction with either concrete (where shown), sod or EC-2 matting and seed.
- ✓24. Note for the permanent road access on right side of sheet 5 is not readable.
- ✓25. Provide a diversion dike along northern edge of upper clearing limits of access road to BMP 5.3 to divert clean runoff around the disturbed area. Diversion dike to be installed prior to clearing operations for the BMP commence. Diversion dike to be removed after complete stabilization has been achieved. Provide diversion dike detail. Adjust clearing limits to provide adequate slope on the diversion dike.
- ✓26. Modify clearing limits on stilling basin for BMP 5.3
- ✓27. Lots 66, 67 and 68 have major swales running through the middle of the buildable area. Explain how this will not become a problem for the single family house builders and future homeowners.
- ✓28. Modify the note to contractors on sheet 5. Change "and removal of sediment basin" to "conversion of sediment basin."
- ✓29. Modify note #18 on Sheet 10 to state that sediment basins and traps must remain in place and function until 75 percent of affected lots have been sold to a third party (unrelated to the developer) for the construction of homes; or construction has been completed and soil stabilized on 60 percent of the affected lots. A bulk sale of the lots to another builder would not satisfy this provision.
- ✓30. General Notes for Construction of Stormwater Basins.
 - A. Note 2. Need geotech study results prior to final plan approval.
 - B. Note 4. Add statement about the proper stabilization, and erosion and sediment control measures needed to control as per the VESCH.
- ✓31. Modify the EW-11 grate to use the one designated as an EW-11A.

32. Add a note on both BMP sections on the clay core referencing note 6 of the General Notes for Construction of Stormwater Basins. Add this note to the sediment basin section.
33. Add a note on both BMP sections on the key trench referencing note 5 of the General Notes for Construction of Stormwater Basins. Add this note to the sediment basin section.
34. Temporary sediment trap detail. Provide cleanout elevation.
35. Dewatering detail. The depth of the flexible pipe does not vary, modify note accordingly.
36. Provide conservation easements for all Natural Open Space areas shown for this section.
37. Specify the size of stone to be used for the stilling basins in accordance with Spec 3.19 of the third edition of the Virginia Erosion Control Handbook (VESCH).
38. Reorient the stilling basin at the end of system #3 to be perpendicular to the line of the pipe.
39. A turnaround needs to be provided at the end of the access road to BMP #5.2.
40. Reduce the limit of clearing in the bottom of basin 5.2 to elevation 68 to preserve more trees.

The Association at Stonehouse, Inc.

May 14, 2012

James City County
Stormwater Management Division
101 Mounts Bay Rd.
PO Box 8784
Williamsburg VA 23187-8784
Attn: Mr. Patrick T. Menichino

Subject: 2010 Stormwater Management Facility (BMP) Inspection Findings

References: (a) JCC/Stormwater Division, six letters addressing BMPs WC040, WC041, WC071, WC073, WC079, WC080, all dated 3 April 2012.
(b) JCC/Stormwater Division, six letters addressing BMPs WC025, WC041, WEC071, WC073, WC080, all dated February 2013.

Mr. Menichino,

Please let me take a few minutes to bring you up to date on the actions we have taken to close the referenced inspection findings. Your letters and previous visit to assist our Grounds and Maintenance Committee were most helpful and resulted in the following actions and long-term commitments:

- A self-inspection and inventory of all components for the 21 BMPs was completed in 2012;
- Our BMP maintenance contract has been completely rewritten and competed to address more thorough maintenance of all BMP components. The new contract was just awarded on 8 May 2013; and
- We are now in the process of updating our Reserve Study to include all BMP components for long-term planning and replacement.

Through volunteer and contracted actions, we have addressed all of the open inspection findings. Our volunteers have cut and stacked well over 1,200 small to medium sized trees that were growing on the dams and in the spillways. Other findings have been addressed through contract actions. I believe that we now have the best and most proactive BMP maintenance program of any community in James City County.

More specific information concerning our corrective actions for each of the open findings are as follows:

1. BMP WC025, 9330 Fieldstone Parkway, 1/7/2010. This inspection finding addressed a "vegetated filter strip" BMP on Fieldstone Parkway.



Conflict in Finding: BMP WC025 is located on Mill Pond Run and is a detention pond. Additionally, BMP WC081 is located at 9330 Fieldstone Parkway and we have been notified by the James City County Environmental Division that it will be extensively rebuilt when Land Bay 3 is developed. *COORDINATE W/ERP + SITE PLANS*

2. BMP WC040, Hollow Oak Drive, 1/14/2010. This finding addressed erosion at the inlet discharge point.

Corrective Actions: The Association contracted major work with heavy machinery to correct this problem in 2011. Additionally, trees and wooded vegetation were cleared from the dam top and sides, spillway channel, and outflow basin areas in 2013 to bring this BMP within acceptable standards.

3. BMP WC041, Oak Branch Drive, 1/12/2010. This finding addressed problems at the inlet discharge pipe to include erosion, excessive sediment, and separation at the top of flared end-section of discharge pipe. It also addressed erosion at outlet discharge pipe and debris and trees around the outlet.

Corrective Actions: Routine quarterly maintenance cleared debris and unblocked outlet discharge points. In 2013, all trees and wooded vegetation were cut and removed from the dam top and sides, around the inlet discharge pipe, the overflow spillway, and the outlet settlement basin. On 8 May 2013, a contract work order was approved to remove sediment from the inlet discharge pipe settlement basin and to repair the separation of the flared outlet discharge pipe. These repairs are scheduled to be accomplished before the end of May 2013 to bring this BMP within acceptable standards.

4. BMP WC071, Longwood Drive, 1/11/2010. This finding addressed subsidence around the principal spillway.

⇒ Corrective Actions: On 7 May 2013, Mr. William Cain, the Chief Civil Engineer for James City County, inspected the principal spillway riser and advised that it could be repaired from the inside by application of an elastic polymer based grout to seal the minor opening at the top of the outlet discharge pipe where it joins to the vertical riser. He further advised that the eroded area behind the principal spillway riser can then be simply back-filled with a clay based soil. The Association will issue contract work orders to accomplish this work prior to 31 May 2013. Additional actions accomplished in 2013 included cutting and removing all trees and wooded vegetation from the dam tops and sides, overflow spillway channel, and around the outlet discharge settlement basin. The above actions will bring this BMP within acceptable standards by the end of May 2013.

5. BMP WC073, Windy Branch Drive, 1/11/2010. This finding addressed erosion and debris at the inlet discharge point, a blocked outlet structure and channel, removal of trash and debris, and removal of woody vegetation from embankments and spillways.

Corrective Actions: Routine quarterly maintenance has removed trash and debris. In 2013, all trees and wooded vegetation were cut and removed from the dam top and sides, emergency spillways, and inlet settlement basins. On 8 May 2013, a contract work order was approved to remove two large fallen trees that are blocking access to the

outflow discharge pipe and settlement basin at the base of the dam. This work is scheduled to be accomplished prior to the end of May 2013. These collective corrective actions will bring this BMP within acceptable standards by the end of May 2013.

6. BMP WC079, Splitwood Road, 1/8/2010. These findings included erosion at the inlet discharge point, excessive accumulation of sediment in the pond basin, reestablishment of ground cover in the basin bottom and side slopes, lack of routine maintenance, excessive debris, and areas of erosion or slippage on side slopes.

Corrective Actions: In 2011, the developer addressed and repaired the majority of these problems. In 2012, the Association contracted for additional repair of erosion based slippage of riprap on side slopes, rebuilding of inlet settlement basins, and reestablishment of ground cover on the slopes. In 2013, all wooded vegetation and trees were cut and removed from the dam top and sides, spillway channels, and around the outlet discharge settlement basin. These actions have brought this BMP to acceptable standards.

7. BMP WC080, E. Cork Road, 1/8/10. These findings included erosion along inlet pipes and flared end sections, realignment of flared end section of inlet adjacent to emergency spillway, and sink holes adjacent to the outlet pipe.

Corrective Actions: On 8 May 2013, a contract work order was approved to correct for erosion in and around all inlet discharge points, the riprap channel in the pond basin, and to correct for the erosion/sink holes at the outlet discharge point. Additionally, in 2013 all trees and wooded vegetation were cut and removed from the dam top and sides, emergency spillways, and outlet discharge areas. These actions will bring this BMP within acceptable standards by the end of May 2013.

Note: The James City County Environmental Division advises that the inlet discharge pipe adjacent to the emergency spillway is in accordance with their approved construction plans and there is no need for the Association to realign the flared end section.

From the Association's viewpoint, the above actions have addressed all open inspection findings necessary to bring these BMPs back to acceptable standards. Please accept our apologies for the extended time frame in responding to the inspection findings and let me know if you have questions or need additional information.

Sincerely,



Ellen Clark, CMCA, AMS, PCAM
Association Manager



JAMES RIVER
LANDSCAPE MANAGEMENT

THIS IS NOT AN INVOICE

JAMES RIVER GROUNDS MANAGEMENT, INC.
4614 ROCHAMBEAU DRIVE
WILLIAMSBURG, VA 23188
(757) 566-1800 FAX (757) 566-4334

COPY

TO: THE ASSOCIATION AT STONEHOUSE, INC PROPERTY: STONEHOUSE (BMP WC 73) 9701 MILL POND ROAD TOANO, VA 28168	QUOTE#: DATE: 4/8/2013 TERMS:
--	--

QTY/ HOURS	ITEM / DESCRIPTION	CHARGE	TOTAL CHARGE
---------------	--------------------	--------	-----------------

SCOPE OF WORK INCLUDES THE FOLLOWING TO BE COMPLETED AT BMP WC 73.
 REMOVAL OF FALLEN OAK TREE FROM THE BACKSIDE OF DAM TO CLEAR OUTFLOW.
 TREE WILL BE CUT BACK 8-10 FROM UP-ROOTED STUMP

LABOR / SITE PREP:	\$600.00	\$600.00
--------------------	----------	----------

ALL DEBRIS WILL BE CHIPPED ON SITE AND DISPURSED

SUBTOTAL:	\$600.00
VA TAX:	\$0.00

APPROVED BY & DATE:
5/13/13
AUTHORIZED SIGNATURE
THIS QUOTE IS VALID FOR 30 DAYS.

TOTAL DUE	\$600.00
-----------	----------

WARRANTY: We will replace one-time any plant 90 days from the date of installation. We are not obligated to replace any plant that dies as a result of improper care, drought, freezing, vandalism, theft, poor drainage, inadequate irrigation, or neglect. Sod carries no warranty but is guaranteed to be of good quality. Transplanted material carries no warranty. Annual plantings carry no warranty.
 **By executing this quote I hereby agree (1) to pay interest on any past due amount at a rate of 18 percent (18%) per annum (1.5 percent per month of the outstanding balance); and (2) to pay all costs and expenses, including court costs and reasonable attorneys' fees, incurred in the collection of any past due amount.



THIS IS NOT AN INVOICE

JAMES RIVER GROUNDS MANAGEMENT, INC.
4614 ROCHAMBEAU DRIVE
WILLIAMSBURG, VA 23188
(757) 566-1800 FAX (757) 566-4334

COPY

TO: THE ASSOCIATION AT STONEHOUSE, INC PROPERTY: STONEHOUSE (BMP WC 80) 9701 MILL POND ROAD TOANO, VA 23168	QUOTE#: DATE: 4/8/2013 TERMS:
--	--

QTY/ HOURS	ITEM / DESCRIPTION	CHARGE	TOTAL CHARGE
---------------	--------------------	--------	-----------------

SCOPE OF WORK INCLUDES THE FOLLOWING TO BE COMPLETED AT BMP WC 80.
 ADDTION OF CLASS A RIP RAP STONE AROUND RIGHT SIDE OF UPPER OUTFLOW PIPE AND ERODED AREAS ALONG THE MAIN DRIAN FLOW THROUGHOUT THE BOTTOM CENTER OF BASIN FLOOR.

MATERIALS:

3 TONS OF CLASS A RIP-RAP (GREY)	\$55.70 P/T	\$167.10
------------------------------------	-------------	----------

LABOR / SITE PREP:

(INCLUDES TRACT SKIDSTEER)	\$385.00	\$385.00
----------------------------	----------	----------

SUBTOTAL: \$552.10

VA TAX: \$8.35

APPROVED BY & DATE: 5/13/13 AUTHORIZED SIGNATURE
THIS QUOTE IS VALID FOR 30 DAYS.

TOTAL DUE \$560.45

WARRANTY: We will replace one-time any plant 90 days from the date of installation. We are not obligated to replace any plant that dies as a result of improper care, drought, freezing, vandalism, theft, poor drainage, inadequate irrigation, or neglect. Sod carries no warranty but is guaranteed to be of good quality. Transplanted material carries no warranty. Annual plantings carry no warranty.
 **By executing this quote I hereby agree (1) to pay interest on any past due amount at a rate of 18 percent (18%) per annum (1.5 percent per month of the outstanding balance); and (2) to pay all costs and expenses, including court costs and reasonable attorneys' fees, incurred in the collection of any past due amount.

THIS IS NOT AN INVOICE



JAMES RIVER GROUNDS MANAGEMENT, INC.
4614 ROCHAMBEAU DRIVE
WILLIAMSBURG, VA 23188
(757) 566-1800 FAX (757) 566-4334

COPY

TO: THE ASSOCIATION AT STONEHOUSE, INC	QUOTE#:
PROPERTY STONEHOUSE (BMP WC 41) 9701 MILL POND ROAD TOANO, VA 23168	DATE 4/8/2013
	TERMS:

QTY/ HOURS	ITEM / DESCRIPTION	CHARGE	TOTAL CHARGE
---------------	--------------------	--------	-----------------

SCOPE OF WORK INCLUDES THE FOLLOWING TO BE COMPLETED
AT BMP WC 41.
REMOVAL OF SEDIMENT FROM OUTFLOW COLLECTION BASIN, THE SEDIMENT WILL
DISPURSED ON THE DOWN SIDE OF DAM.
EXCAVATING SECTION ABOVE OUTFLOW PIPE TO INSTALL GEO-TEXTILE FABRIC
AND 57 STONE TO KEEP FUTURE SEDIMENT FROM ENTERING CRACK IN THE
LAST CONNECTION.

LABOR / SITE PREP: (INCLUDES MINI EXCAVATOR)	\$590.00	\$590.00
---	----------	----------

MATERIALS:		
1 GEO TEXTILE FABRIC	\$15.00 P/P	\$15.00
0.5 YARD OF 57 STONE (1-2" GREY)	\$38.50 P/Y	\$19.25

SUBTOTAL: \$624.25

VA TAX: \$1.71

TOTAL DUE \$625.96

APPROVED BY & DATE:

[Signature] 5/13/13
AUTHORIZED SIGNATURE

THIS QUOTE IS VALID FOR 30 DAYS.

WARRANTY: We will replace one-time any plant 90 days from the date of installation.
We are not obligated to replace any plant that dies as a result of improper care, drought, freezing, vandalism, theft,
poor drainage, inadequate irrigation, or neglect. Sod carries no warranty but is guaranteed to be of good quality.
Transplanted material carries no warranty. Annual plantings carry no warranty.
**By executing this quote I hereby agree (1) to pay interest on any past due amount at a rate of 18 percent (18%) per
annum (1.5 percent per month of the outstanding balance); and (2) to pay all costs and expenses, including court costs
and reasonable attorneys' fees, incurred in the collection of any past due amount.



REQUEST FOR PROPOSALS
Stormwater Detention Pond (BMP) Maintenance

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This Request for Proposals (RFP) is issued by The Association at Stonehouse, Inc., and is for professional maintenance service of specified Stormwater Detention Ponds (BMPs) located in the common areas owned and maintained by The Association at Stonehouse for its resident membership.

Response to this RFP is requested no later than 4-9-13. Replies to and questions about this RFP should be forwarded to:

The Association at Stonehouse, Inc.
9701 Mill Pond Run
Toano, VA 23168
Tel: 757- 566-0128
Fax: 757- 566-1198
Email: manager@mpstonehouse.com

Contractor bids are requested for the services specified in the following pages for the remainder of base calendar year January 1 - December 31, 2013, with two contract option years that may be exercised by the Association for calendar years 2014 and 2015.

Contractor bids shall clearly identify costs for each major area of work specified in Exhibit A.

This RFP includes the following information:

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Exhibit C, Site Plan Identifying all BMP Locations.....	Page 10

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STORMWATER DETENTION POND (BMP) MAINTENANCE CONTRACT
BY AND BETWEEN _____ AND
THE ASSOCIATION AT STONEHOUSE, INC.

This Stormwater Detention Pond (BMP) Maintenance Contract ("Agreement") dated 4-9-13, 2013 between JAMES RIVER CROWDS MGMT. a Virginia Corporation (also referred to herein as "Contractor"), and The Association at Stonehouse, Inc. a Virginia non-stock corporation (also referred to herein as "Association") provides:

Recitals

Association desires to hire and engage Contractor to provide certain maintenance services in the Association's common areas as more particularly set forth in the attached specifications described as Exhibits A, B, and C which exhibits are expressly incorporated herein by reference and made a part hereof.

Terms and Conditions

Now, therefore, in consideration of the terms and conditions herein contained and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Contractor and Association agree as follows:

1. Contractor agrees to perform the services outlined in Exhibit A attached hereto. The relationship between Contractor and Association is that of an independent site support services contractor and not a partner, joint venture, employer, etc. Contractor shall be responsible for the selection and supervision of its employees, the payment of all their payroll taxes, insurance benefits and workman's compensation associated therewith. All employees and subcontractors hired by the Contractor shall be lawfully entitled to work in the United States. Contractor shall be fully liable for and hereby indemnifies and agrees to hold harmless the Association, its Board of Directors, agents and unit owners from any and all violations of federal immigration laws as the result of the immigration status of any of its subcontractors or employees.

2. Contractor shall be compensated for services rendered in accordance with the Remuneration Schedule and in accordance with the other provisions of this Agreement. Association reserves the right to offset against any payment made to Contractor any expenses incurred by the Association in performing any of the Contractor's obligations hereunder should Contractor fail to perform such obligations.

3. Association may direct Contractor to perform additional service for which Association shall bear all expenses. Contractor shall not incur any such additional expense without the prior written approval of the Association. The parties shall sign written agreements specifying the work and listing all costs of any additional services requested or required by the Association.

4. Contractor hereby indemnifies and holds Association, its directors, employees, agents or assigns harmless from all liability, damages, causes of actions, suit or judgment arising from injury to persons or property on the site, which may arise from a breach of this Agreement by Contractor or any negligent or intentional act of Contractor or its agents, subcontractors or employees. The provisions of this Section shall survive the expiration or termination of this Agreement.

5. Contractor's Insurance, Licenses and Permits. At the time the Contract is executed, the Contractor must produce proof of insurance coverage as follows:

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- a. Certificate of Liability Insurance providing:
 - 1) Property damage in an amount equal to or more than \$500,000.00 minimum;
 - 2) Bodily injury with a limit of not less than \$1 million for each person and for each accident;
 - 3) If motor vehicles are used, automobile (or truck) bodily injury with a limit of not less than \$1 million for each accident and property damage liability with a limit of not less than \$500,000.00 for each accident;
 - b. Workmen's Compensation insurance for all employees on Association property; and
 - c. The Association at Stonehouse and its managing agent shall be named as additional insured on all the above policies.
 - d. In addition to the above required insurance, the Contractor shall, at a minimum, maintain and provide proof of the following: State of Virginia Class A Contractors License, Business License, Business Pesticide License with Insurance, and Virginia Registered Commercial Applicators License.
 - e. Contractor shall maintain the insurance set forth and described above during the term of this agreement. Failure to maintain the required insurance, licenses and/or permits will result in immediate termination of the Contract.

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6. Contractor shall be liable for damages to any person or property while performing duties as outlined in Exhibit A, attached hereto.

7. Contract oversight and point of contact for all Contractor inquiries is through the Association Manager for the Board of Directors (BOD). The Association Manager may appoint a Contract Officer Representative (COR) to perform inspection and acceptance of Contractor's work.

8. This Agreement may be terminated at the discretion of the Association upon thirty (30) days written notice to the Contractor without any further obligation or liability hereunder, except as otherwise expressly provided for herein. Upon such termination, Contractor shall only be entitled to receive such remuneration as it would otherwise be entitled to receive hereunder through the date of termination.

9. In addition to any other rights it might have under this Agreement, the Association may withhold any amounts due Contractor under this Agreement which the Association deems necessary to reimburse the Association for any costs or liabilities incurred by the Association as the result of the Contractor's actions or omissions, or failure to fairly perform any or all service obligations in a satisfactory manner. Appropriate adjustments to these withholdings shall be made when the exact amounts owed by the Contractor are determined by the Association Manager.

10. A waiver by the Association of any breach of any term or condition hereof shall not be deemed a waiver of any other, or subsequent breach. In the event of a breach of this Agreement by Contractor, the Association shall have the right to pursue its legal remedies and the right to terminate the Agreement. In the event either party to this Agreement is required to file a legal action due to a breach hereof, the costs of the action, including, but not limited to, reasonable attorney's fees as determined by the Court shall be paid to the prevailing party.

11. This Agreement shall be interpreted and enforced in accordance with the laws of the Commonwealth of Virginia. Both parties hereto expressly agree that if legal action is required to interpret or enforce this Agreement, said action shall be filed in the appropriate court in James City County, Virginia.

44 12. In the event that any part or provision of this Agreement shall be adjudged unlawful or
45 unenforceable under Virginia law, any lawful intent of the provision and the remainder of this Agreement
46 shall nonetheless survive and remain in full force and effect.

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48 13. Contractor shall ensure all employees and subcontractors while on Association Common Areas are
49 in uniform, i.e., hat and shirt clearly marked with company logo, and present a neat and orderly appearance
50 at all times.

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52 14. Contractor shall use due care, skill and diligence in the performance of its obligations under this
53 Agreement. All services and work to be performed under this Agreement shall be performed in accordance
54 with accepted standards of the profession or trade.

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56 15. This Agreement may not be assigned by Contractor without the prior written approval of the
57 Association, which approval can be withheld in the Association's sole discretion.

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59 16. Each of the undersigned, by evidence of their signature thereto, affirms that it has the authority to
60 bind their respective party to this Agreement.

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62 17. Notices allowed or required pursuant to this Agreement shall be either hand delivered or sent by
63 United States mail, postage paid, to the addresses of the parties set forth below:

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65 a. To the Association: The Association at Stonehouse, Inc.
66 9701 Mill Pond Run
67 Toano, Virginia 23168
68 Attn: Association Manager

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70 b. To the Contractor: JAMES RIVER GROUNDS MANAGEMENT
71 4614 ROCHAMBEAU DRIVE
72 WILLIAMSBURG, VA 23188
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75 18. This Agreement may not be amended except by a written document signed by both parties.

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77 19. The Parties hereto agree to keep the terms, conditions, and remuneration for this Agreement
78 confidential.

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80 20. This Agreement shall not automatically renew itself without the express written consent of the
81 Association.

Remuneration Schedule

This contract is for the base year 2013, with two option years 2014 & 2015.

For the base contract period beginning MAY, 2013 and ending December 31, 2013, Association shall pay Contractor an annual fee of: \$ # 11,865.00 in equal monthly payments of \$ 988.75.

For the option contract period beginning January 1, 2014 and ending December 31, 2014, Association shall pay Contractor an annual fee of: \$ ~~15,876.00~~ 15,180.00 in equal monthly payments of \$ ~~1318.00~~ 1265.00 *PR*

For the option contract period beginning January 1, 2015 and ending December 31, 2015, Association shall pay Contractor an annual fee of: \$ ~~15,876.00~~ 14,868.00 in equal monthly payments of \$ ~~1318.00~~ 1239.00 *PR*

Payment shall be due within thirty (30) days of receipt of written request for payment thereof, which payment shall be subject to the terms and conditions of the Agreement.

The Association shall provide Contractor written notice sixty (60) days prior to the end of the contract period if it wants to exercise the above option contract periods.

Contractor: [Signature]

By: DALE C. O'CONNELL
BRANCH MANAGER

Date: 4-9-13

The Association at Stonehouse, Inc.

By: [Signature]

Date: 5-13-13

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41 **1. STATEMENT OF WORK**

42 This Statement of Work (SOW) is issued by the Association at Stonehouse, Inc. and is specifically for the
43 maintenance of all stormwater detention ponds (BMPs) located in the common areas of the Mill Pond at
44 Stonehouse community.
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47 **A. Background.** The Association owns and is responsible for the maintenance of twenty-one (21) dry
48 stormwater detention pond BMPs. Fifteen (15) of these BMPs are built around earth berm dams, two (2)
49 BMPs have concrete block dams, and four (4) BMPs have timber dams. The structural components of each
50 BMP are as delineated in Exhibit B. The locations of all BMPs are as delineated in Exhibit C.
51

52 **B. Objectives.**

- 53 1. The Association's objectives are to ensure all twenty-one (21) BMPs meet requirements of the
54 Chesapeake Bay Preservation ordinances of the Code of James City County, Virginia; and
55 2. The objective of this contract is to provide routine quarterly maintenance for all components of
56 each BMP, to include, but not be limited to, the pond basin, dam tops and sides, all inlet and
57 outlet structures, drain boxes and grates, overflow spillways, riprap protected channels and
58 settlement basins.
59

60 **2. SCOPE OF WORK**

61 **A. General Contract Requirements.** The Contractor shall:

- 62 1. Maintain the twenty-one (21) BMPs year round with maintenance accomplished on a quarterly
63 basis;
64 2. Provide all materials, labor and equipment required to complete all aspects of BMP maintenance
65 work at each maintenance visit;
66 3. Ensure a response time of 48 hours for any BMP problem related to this contract;
67 4. Provide the Association with consultation upon request to assist in resolving problems associated
68 with BMPs at no additional cost;
69 5. Notify the Association Manager one week prior to all maintenance visits and when the work is
70 done; and
71 6. Provide written quarterly status reports to the Association Manager of work accomplished during
72 each maintenance visit. The reports shall include problems encountered, changes required, and/or
73 additional work recommended.
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76 **B. Personnel.** The Contractor shall:

- 77 1. Provide the personnel necessary to service and maintain the BMPs;
78 2. Provide dedicated on-site supervision of its employees during all visits to Stonehouse to clearly
79 assign and review all work accomplished to ensure Association property is maintained in a
80 consistent and professional manner;
81 3. Provide training for on-site employees to include maintenance and equipment operation
82 procedures which are specific to the common areas, instructions and necessary certifications
83 concerning BMP maintenance and chemical applications, and the professional conduct and
84 courtesy expected of all employees at all times when working on Association property;

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4. Ensure all work is performed in a manner that meets applicable OSHA regulations and is safe to its operators, residents, guests, and any pedestrian or vehicle in close proximity to operational machinery;
 5. Ensure the On-site Supervisor meets with the Association Manager on a quarterly basis to tour the BMPs and/or discuss maintenance issues or problems encountered. Additional meetings may be called at any time by the Association Manager on an as-needed basis; and
 6. In the performance of the work, the Contractor and its employees shall comply with all applicable state and county laws, statues, regulations and instructions issued that pertain to maintenance of stormwater detention ponds, to include all applicable environmental, safety, and security requirements issued by governmental officials, regulatory agencies, law enforcement officials, security guards, etc.

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3. BMP MANAGEMENT & MAINTENANCE REQUIREMENTS

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The Contractor shall provide maintenance services to meet the following specifications:

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A. Control of Vegetation and Wooded Growth.

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1. Grasses. The Contractor shall mow or use sting cutters (weed eaters) at each visit to maintain grasses and vegetation on dam tops and sides at an 8-inch height. Grasses and vegetation shall be removed from all riprap structures.
 2. Pine Saplings. Pine saplings shall be cut and removed at each visit from all areas of the BMP, to include the pond basin, dam top and sides, and all riprap structures.
 3. Other Wooded Vegetation. Trees and brush shall be cut and removed from the dam top and sides, overflow spillway channels, and all riprap structures.
 4. Removal of Cut Wooded Vegetation. Cut pine saplings and other wooded vegetation shall be removed from Association property at each visit. Use of wood chippers to dispose of cut brush and trees shall require the Association Manager's approval on a case-by-case basis.

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B. Cleaning & Sediment Control.

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1. Pond Basins. Loose wooded debris, water-carried tree limbs and trunks, and trash shall be removed from all cleared areas within the pond basin.
 2. Concrete Drain Boxes & Grates. Drain boxes and grates shall be cleaned out at each visit to remove all sediment and debris to ensure proper drainage.
 3. Inlet and Outlet Settlement Basins. Sediment and debris shall be removed at each visit from all riprap settlement basins.
 4. Riprap Channels and Overflow Spillways. Sediment and debris shall be cleared at each visit from all riprap channels and overflow spillways.
 5. Sediment Disposal. Sediment removed during cleaning shall be discarded on the outlet side of the dam well away from the outlet and overflow spillway channels.

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C. Clean-Up and Trash Removal.

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1. Trash & Wooded Debris Removal. Trash shall be removed at each visit from all areas and structures within each BMP. Loose wooded debris, to include tree limbs and trunks, that are blocking drain grates, settlement basins, or drainage channels shall be removed at each visit.
 2. Trash & Wooded Debris Disposal. Trash and wooded debris shall be removed from Association Property at each visit.

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4. ADDITIONAL SERVICES AND OBLIGATIONS

A. Additional Work Cost Estimates. If required by the Association Manager, the Contractor shall provide cost estimates for additional work to bring the BMPs into acceptable norms, and for the following additional work:

1. Removal of trees that have fallen into BMPs.
2. Removal of illegal trash dumping (appliances, etc.).
3. Repair of damaged BMP components.
4. Clean-up of debris resulting from hurricanes, tropical storms, etc..
5. Removal of excessive sediment.

B. Property Damage. The Contractor shall assume liability for any property damaged by trimmers, edgers or other equipment operated by the Contractor - including, but not limited to, fences, irrigation systems, plants, shrubs, flowers, windows, signs, structures, lamp posts or automobiles. Damage to these items shall be the responsibility of the contractor to repair or replace. The Association Manager shall be the determining party as to responsibility for repairs/replacement.

C. Contractor Product Compliance. The Contractor shall warranty that all BMP maintenance products, procedures, and methods of application used in performance of this Agreement comply in all respects with Federal, State, and local laws, ordinances, regulations, and manufacturer's instructions.

D. Complaints and Verbal Abuse. The Contractor shall ensure that all complaints made to the Contractor or its employees by community residents shall be handled professionally and diplomatically with instructions that the complaint should be addressed to the Association Manager. All incidents of verbal abuse by community residents toward Contractor or its employees shall immediately be reported to the Association Manager.

E. Threats to Health and Safety. The Contractor shall immediately report any condition that is or may be threatening to the health and/or safety of any person to the Association Manager.

