See also MC033

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: **MC032**

DATE VERIFIED: **November 20, 2012**

QUALITY ASSURANCE TECHNICIAN: **Leah Hardenbergh**

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA

Stormwater Division

MEMORANDUM

Date: March 28, 2012

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

From: Leah Hardenbergh

PO: 110426

Re: Files Approved for Scanning

General File ID or BMP ID:	**MC032 & MC033**
PIN:	**3840100020**
Owner Name (if known):	**IRONBOUND MINI STORAGE** **PALMER CARLETHA R & SH**
Legal Property Description:	**NEW PARCEL A IRONBOUND MINI STORAGE** **LOT 9B WM ALLEN JONE**
Site Address:	**4032 IRONBOUND ROAD** **4010 IRONBOUND ROAD**

(For internal use only):

Box # 2

Agreements (in file as of scan date): Y **Book or Doc #: 980006146/990001711**
p 0135

MC-032 - MC033

Contents for Stormwater Management Facilities As-built Files

Each file is to contain:

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

COPY

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this 20 day of January, 19 99, between Ironbound Road Mini Storage Associates, LC and all successors in interest, hereinafter referred to as the "COVENANTOR(S)," owner(s) of the following property: 4010 Ironbound Road (James City County) Tax Map Parcel No. (38-4) (1-20) (1-25A)

_____, Deed Book ____, Page No. ____ or Instrument No. 980006146, 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 # 990001711
Page 0135
Recorded on 1-26-99

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of this 20 day of January, 1999.

COVENANTOR(S)

Ironbound Road Mini Storage Associates,L

Bernard J. Levey - Manager

ATTEST:

Bert Whitby

Bert Whitby

COVENANTOR(S)

ATTEST:

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF Henrico

I hereby certify that on this 20th day of January, 1999, before the subscribed, a Notary Public of the State of Virginia, and for the County of Henrico, aforesaid personally appeared Bernard J. Levey and did acknowledge the aforegoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 20th day of January, 1999.

Carolyn Lewis

Notary Public

My Commission expires: Embossed Hereon Is My Commonwealth of Virginia Notary Public Seal My Commission Expires March 31, 1999 CAROLYN L. WEEKS

Approved as to form:

Lee P. Rogers

Deputy County Attorney

This Declaration of Covenants prepared by:

Bernard J. Levey
(Print Name)

Manager
(Title)

8513 Staples Mill Road
(Address)

Richmond, Virginia 23228
(City) (State) (Zip)

drainage.pre
Revised 2/97

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of this 20 day of January, 1999.

COVENANTOR(S)

Ironbound Road Mini Storage Associates, L

Bernard J. Levey - Manager

ATTEST:

Bert Whitby

Bert Whitby

COVENANTOR(S)

_____

ATTEST:

_____

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF Henrico

I hereby certify that on this 20th day of January, 1999, before the subscribed, a Notary Public of the State of Virginia, and for the County of Henrico, aforesaid personally appeared Bernard J. Levey and did acknowledge the aforegoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 20th day of January, 1999.

Carolyn L Weeks

Notary Public

My Commission expires: Embossed Hereon Is My Commonwealth of Virginia Notary Public Seal My Commission Expires March 31, 1999 CAROLYN L. WEEKS

Approved as to form:

Lee R. Rogers

Deputy County Attorney

This Declaration of Covenants prepared by:

Bernard J. Levey

Schnabel Engineering

Schnabel Engineering Associates, Inc
609 Industry Drive
Hampton, VA 23661-1316
757-827-7207 • Fax 757-838-0995

S-45-98

June 28, 2000

Mr. Bernard J. Levey
Ironbound Road Associates, L.L.C.
8513 Staples Mill Road
Richmond, Virginia 23228

Subject: Project 993723, Earthwork Observation and Testing of the BMP, Ironbound Mini Storage, Ironbound Road and Ironbound Circle, James City County, Virginia

Dear Mr. Levey:

We have been requested by the contractor, George Nice and Sons, to provide a letter of our observations during the construction of the earth embankment for the site BMP. They have requested this letter in response to a request for information from James City County Codes Compliance.

Subgrades for the BMP embankment were observed by engineering personnel from our office on July 26, 1999. Subgrades for the embankment were tested by probing with a penetrometer at selected locations. The subgrades observed were considered suitable for placement of compacted embankment fill at the grades excavated to by the contractor.

Field density tests for the embankment were performed between July 26 and August 2, 1999. The field density test results indicate relative compaction to at least 95 percent of the maximum dry density per ASTM D-698 except the initial bridge lifts in the key trench, which were compacted to at least 93 percent. Based on the field density test results and our observations during fill placement, we believe that the fill represented by the test results has been substantially compacted in accordance with the project specifications and our recommendations.

We have performed our services in accordance with generally accepted geotechnical engineering practice and make no warranties, either express or implied, as to the professional advice provided under the terms of our agreement and included in this report.

We are pleased to be of service on this project. Please do not hesitate to contact us if you have any questions concerning this report.

Very truly yours,
SCHNABEL ENGINEERING ASSOCIATES, INC.

Michael J. Galli, P.E.
Project Engineer

Gilbert T. Seese, P.E.
Senior Associate

MJG:GTS:kgr

c: Cal Holcombe, AIA

George Nice & Sons (2)
Attn: Cliff Hatfield

No.	DATE	REVISION / COMMENT / NOTE	BY
5	5/00	RECORD DRAWINGS	JFS
4	7/99	REVISED STORM SEWER	HWP
3	1/99	REVISION PER U. S. ARMY CORPS OF ENGINEERS	HWP
2	9/98	REVISION PER JCC REVIEW COMMENTS DATED 8/19/98	HWP
1	7/98	REVISION PER JCC REVIEW COMMENTS DATED 6/2/98	HWP

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

CONSULTING ENGINEERS

COMMONWEALTH OF VIRGINIA — G. ARCHER MARSTON, III — No. 018232 — PROFESSIONAL ENGINEER — 4/11/00

COMMONWEALTH OF VIRGINIA — G. ARCHER MARSTON, III — No. 018232 — PROFESSIONAL ENGINEER — 5/11/00

RECORD DRAWINGS

DRAINAGE AND UTILITY PLAN
IRONBOUND ROAD MINI STORAGE

OWNER/DEVELOPER: BERNARD J. LEVEY

JAMES CITY COUNTY VIRGINIA

Designed	Drawn
HWP	LBA
Scale	Date
1"=30'	4/98
Project No.	
7259-03	
Drawing No.	
7	

GRAPHIC SCALE
30' 0' 30' 60'
SCALE: 1" = 30'

RECORD DRAWINGS MAY 11, 2000

MC032_IRONBOUND_MINI_STORAGE - 009

RECORD DRAWINGS AUGUST 4, 2000

DRAINAGE AND UTILITY PLAN
IRONBOUND ROAD
MINI STORAGE

OWNER/DEVELOPER: BERNARD J. LEVEY

JAMES CITY COUNTY VIRGINIA

Designed	HWP
Drawn	LBA/EAW
Scale	1"=30'
Date	4/98
Project No.	7259-03
Drawing No.	8

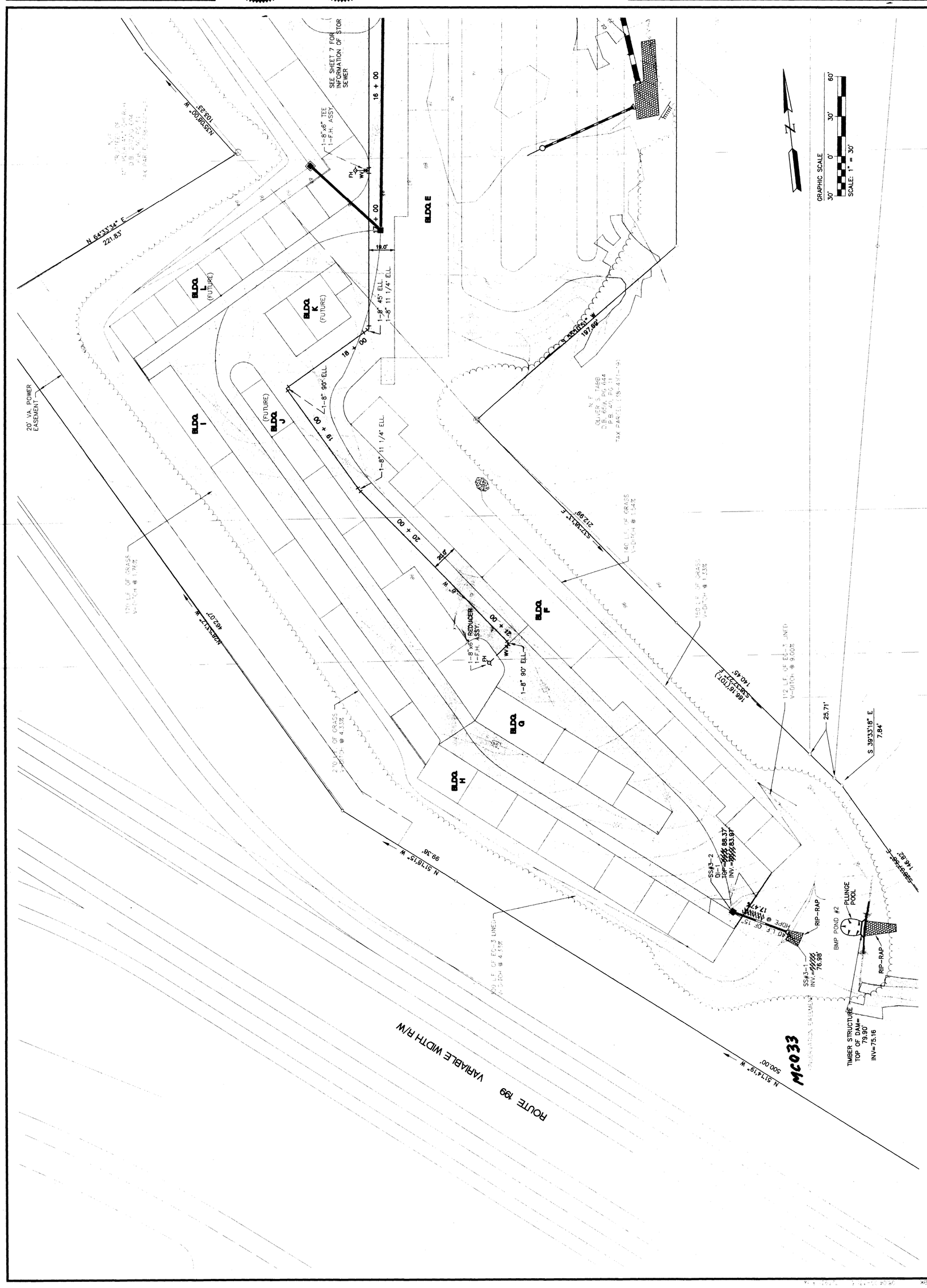
CONSULTING ENGINEERS

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

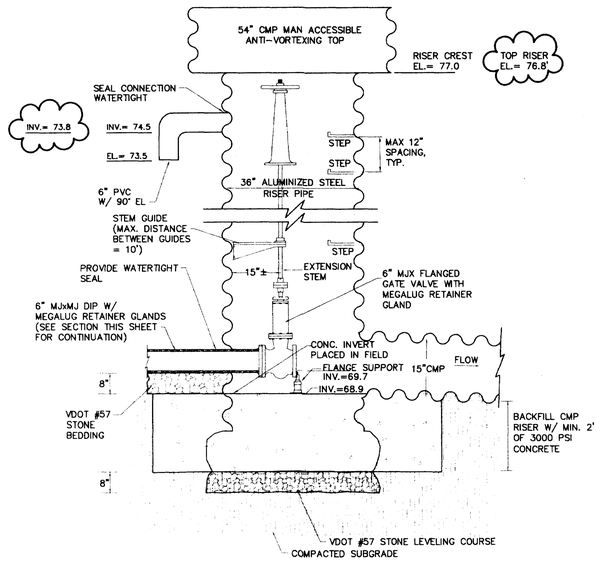
RECORD DRAWINGS

COMMONWEALTH OF VIRGINIA — G. ARCHER MARSTON, III — No. 018232 — PROFESSIONAL ENGINEER

No.	DATE	REVISION / COMMENT / NOTE	BY
1	7/98	REVISION PER JCC REVIEW COMMENTS DATED 6/9/98	HWP
2	9/98	REVISION PER JCC REVIEW COMMENTS DATED 8/19/98	HWP
3	1/99	REVISION PER U. S. ARMY CORPS OF ENGINEERS	HWP
4	5/00	RECORD DRAWINGS	JFS



MC032_IRONBOUND_MINI_STORAGE - 010



CROSS SECTION
PROP. 36" RISER STRUCTURE
WITH ANTI-VORTEXING TOP

NOT TO SCALE

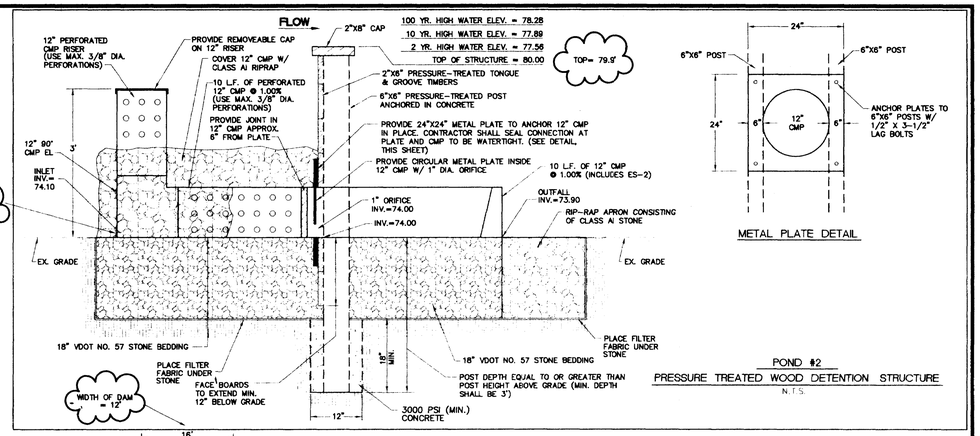
BMP POND MAINTENANCE REQUIREMENTS

1. THE OWNER SHALL BE RESPONSIBLE FOR INSPECTION AND MAINTENANCE OF THE PROPOSED BMP FACILITY.
2. THE POND STRUCTURE SHALL BE PERIODICALLY INSPECTED FOR THE FOLLOWING:
   A. SEEPAGE AND LEAKING OF OUTLET STRUCTURE OR EMBANKMENT (ANNUALLY)
   B. CLOGGING AND BLOCKAGE OF OUTLET SYSTEM (AFTER EACH STORM EVENT/ ONCE PER MONTH)
   C. WOODY GROWTH ON EMBANKMENTS (ANNUALLY)
   D. MOWING OF SIDE SLOPES (AS NECESSARY)
   E. LITTER AND DEBRIS (AFTER EACH STORM EVENT/ONCE PER MONTH)
   F. EXCESS SEDIMENT (SEDIMENT CLEANOUT CYCLE IS TYPICALLY 20 YEARS)
3. IF ANY OF THE ABOVE ITEMS ARE IDENTIFIED AS PROBLEMS DURING INSPECTION CORRECTIVE MAINTENANCE/REPAIR SHOULD OCCUR AS SOON AS POSSIBLE.

MAINTENANCE:

IN GENERAL, ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CHECKED AFTER EACH RAINFALL OR WEEKLY, WHICHEVER IS MOST FREQUENT, AND SHOULD BE CLEANED AND REPAIRED ACCORDING TO THE FOLLOWING SCHEDULE:

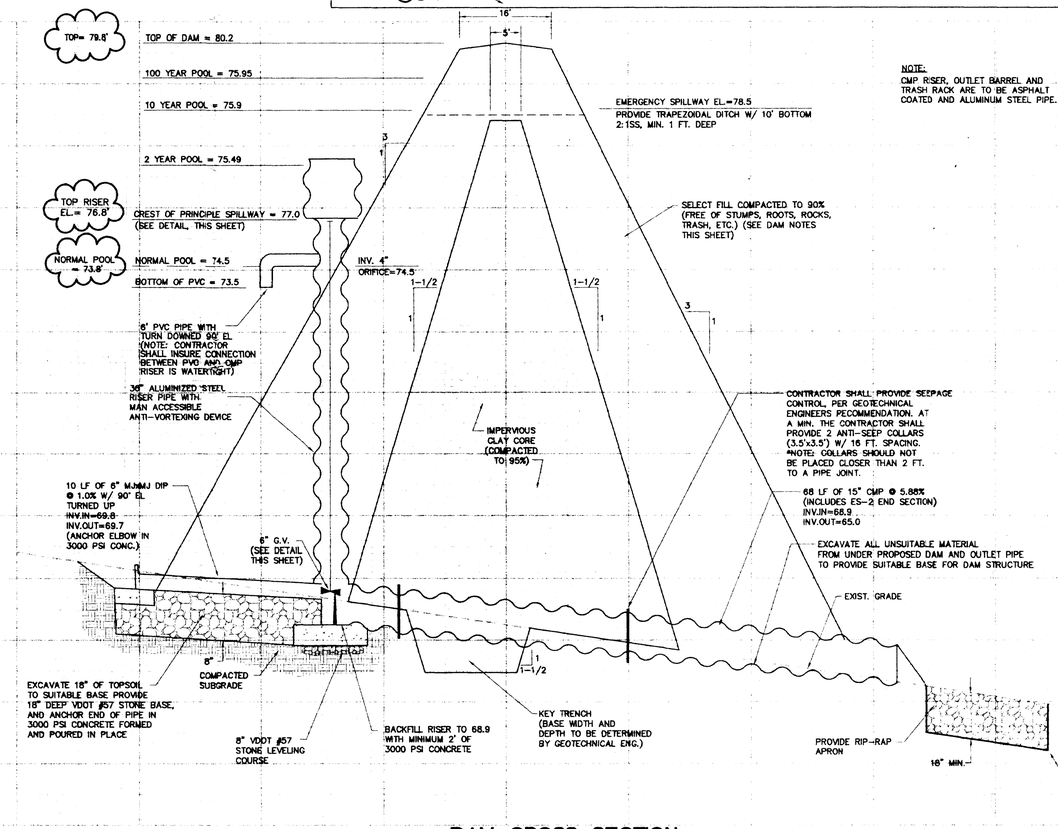
1. THE SEDIMENT TRAPS WILL BE CHECKED REGULARLY FOR SEDIMENT CLEANOUT.
2. EROSION AND SEDIMENT CONTROL WILL BE CHECKED REGULARLY FOR UNDERMINING OR DETERIORATION AND BUILDUP OR CLOGGING WITH SEDIMENT. CORRECTIVE ACTION WILL BE TAKEN IMMEDIATELY.
3. ALL SEEDED AREAS WILL BE CHECKED REGULARLY TO SEE THAT A GOOD STAND IS MAINTAINED. AREAS SHOULD BE FERTILIZED AND RESEEDED AS NEEDED.
4. ALL TEMPORARY EROSION AND SEDIMENT MEASURES SHALL BE DISPOSED OF WITHIN THIRTY (30) DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED AND VEGETATION IS ESTABLISHED.



POND #2
PRESSURE TREATED WOOD DETENTION STRUCTURE

N.T.S.

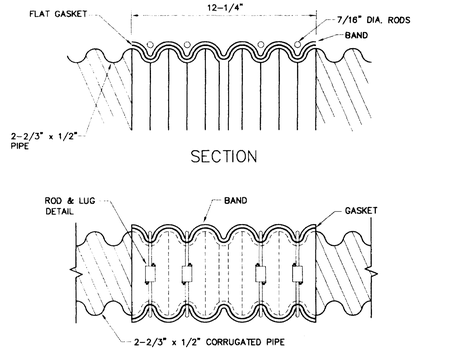
METAL PLATE DETAIL



NOTE:
CMP RISER, OUTLET BARREL AND TRASH RACK ARE TO BE ASPHALT COATED AND ALUMINUM STEEL PIPE.

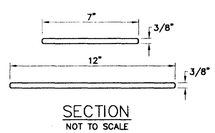
DAM CROSS SECTION
BMP POND #1

NOT TO SCALE



SECTION

NOMINAL PIPE DIA.	GASKET LENGTH
8"	26"
10"	32"
12"	38"
15"	47"
18"	56"
21"	65"
24"	74"
27"	83"
30"	92"
36"	110"
42"	128"
48"	146"
54"	164"
60"	182"
66"	200"
72"	218"
78"	236"
84"	254"
90"	272"
96"	290"



SECTION
NOT TO SCALE

SIDE VIEW

CORRUGATED HUGGER BAND AND FLAT GASKET

NOT TO SCALE

GENERAL NOTES

1. MATERIAL SPECIFICATION: CLOSED CELL NEOPRENE GASKET, ASTM SPECIFICATION D-1056, GRADE 2C3, SKINNED ALL FOUR SIDES, OF ONE-CONSTRUCTION.
2. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.

1. CLEAN THE PIPE END.
2. APPLY A LIBERAL AMOUNT OF LUBRICANT TO THE FIRST TWO ANNULAR CORRUGATIONS ON THE OUTSIDE OF THE PIPE.
3. SNAP THE FLAT GASKET INTO POSITION SUCH THAT THE GASKET COVERS THE FIRST ANNULAR CORRUGATION OR THE RECORRUGATED END. HALF OF THE GASKET WILL BE HANGING OVER THE END OF THE PIPE.
4. FOLD THE REMAINING HALF OF THE GASKET THAT IS EXTENDED OVER THE PIPE END BACK OVER THE SECTION OF THE GASKET POSITIONED ON THE END OF THE PIPE.
5. APPLY A LIBERAL AMOUNT OF LUBRICANT TO THE ENTIRE INNER SURFACE OF THE BAND.
6. PLACE THE BAND INTO POSITION ON THE INSTALLED LENGTH OF PIPE SO THAT THE NEXT LENGTH OF PIPE CAN BE INDEXED CORRECTLY AND THE FLAT GASKET ROLLED OVER THE SECOND PIPE END.
7. APPLY A LIBERAL AMOUNT OF LUBRICANT TO THE END OF THE SECOND LENGTH OF PIPE.
8. PLACE THE SECOND LENGTH OF PIPE INTO POSITION. THE TWO PIPE LENGTHS MUST BE POSITIONED PROPERLY FOR THE GASKET TO FIT OVER, AND THE BAND TO INDEX, ONTO THE SECOND PIPE END.
9. UNFOLD THE GASKET INTO POSITION OVER THE SECOND LENGTH OF PIPE. TAKE CARE TO INSURE THAT THE GASKET FITS OVER THE END OF THE SECOND PIPE SECTION. ALSO, THE BAND MUST BE INDEXED INTO THE PROPER ANNULAR CORRUGATION ON EACH LENGTH OF PIPE.
10. CHECK THE COMPLETE PERIPHERY OF THE PIPE TO INSURE THAT THE GASKET IS CENTERED EVENLY ON THE TWO LENGTHS OF PIPE.
11. SLIDE THE BAND INTO POSITION AND TIGHTEN THE BOLTS. FOR MAXIMUM COMPRESSION OF THE GASKET, THE BAND CORRUGATIONS MUST BE FULLY SEATED INTO THE PROPER CORRUGATION ON EACH PIPE END. THIS WILL INSURE THAT THE PIPE LENGTHS ARE POSITIONED PROPERLY FOR THE GASKET.

DENOTES RECORD DRAWING INFORMATION AS SUPPLIED BY AES CONSULTING ENGINEERS

DAM CONSTRUCTION NOTES

1. A GEOTECHNICAL SUBSURFACE EXPLORATION AT THE PROPOSED DAM SITE SHALL BE PERFORMED AT THE CONTRACTOR'S EXPENSE. THE GEOTECHNICAL INVESTIGATION WILL DETERMINE KEY TRENCH DEPTH AND WIDTH ACCORDINGLY. PRIOR TO CONSTRUCTION THE GEOTECHNICAL ENGINEER SHALL SUBMIT TO THE ENGINEER, OWNER/CONTRACTOR AND JAMES CITY COUNTY FOR APPROVAL OF HIS/HER RECOMMENDATIONS FOR DAM DESIGN, TRENCH WIDTH, DEPTH, SEEPAGE CONTROL ETC. UPON JCC APPROVAL THESE RECOMMENDATIONS ARE HEREBY MADE A PART OF THE DAM'S CONSTRUCTION SPECIFICATIONS. ADDITIONALLY, THE GEOTECHNICAL ENGINEER WILL ENSURE PROPER MATERIALS AND DAM CONSTRUCTION METHODS ARE USED DURING CONSTRUCTION. AFTER CONSTRUCTION, A PROFESSIONAL GEOTECHNICAL ENGINEER SHALL ALSO SUBMIT A LETTER TO JAMES CITY COUNTY CERTIFYING THAT THE DAM WAS BUILT IN ACCORDANCE WITH THE APPROVED PLANS, SPECIFICATIONS, AND GEOTECHNICAL REPORT.
2. SITE PREPARATION: THE CONTRACTOR SHALL STRIP ALL AREAS OF THE PERMANENT CONSTRUCTION TO REMOVE ALL UNSUITABLE MATERIALS. THE UNSUITABLE MATERIALS TO BE REMOVED BY STRIPPING SHALL INCLUDE ALL TOPSOIL, DEBRIS AND VEGETABLE MATTER, INCLUDING STUMPS AND ROOTS, AND ALL OTHER MATERIALS WHICH MAY BE UNSUITABLE FOR USE IN THE PERMANENT CONSTRUCTION.
3. EMBANKMENT: THE EXPOSED SUB GRADE SOILS SHALL BE CAREFULLY INSPECTED BY THE GEOTECHNICAL ENGINEER. ANY UNSUITABLE MATERIALS THUS EXPOSED SHALL BE REMOVED AND REPLACED WITH A WELL COMPACTED, SUITABLE MATERIAL. DENSITY TESTING, AT THE DISCRETION OF THE GEOTECHNICAL ENGINEER, SHALL BE PERFORMED AT THIS TIME. THE EMBANKMENT SHALL BE KEYED INTO THE UNDISTURBED (EXISTING) SOIL STRATUM. EMBANKMENT SHOULD BE KEYED AS SPECIFIED BY THE GEOTECHNICAL ENGINEER (WIDTH = 6 FT. MINIMUM). THE EMBANKMENT FOUNDATION AND ABUTMENTS SHALL BEAR ON FIRM AND STABLE EXISTING SUB GRADE WHICH HAS BEEN PREPARED SO AS TO REMOVE ALL ORGANIC, LOOSE, AND GENERALLY UNSUITABLE MATERIAL.

   ALL MATERIALS TO BE USED FOR BACK FILL OR COMPACTED FILL SHALL BE INSPECTED AND, IF NECESSARY, TESTED BY THE GEOTECHNICAL ENGINEER IN ACCORDANCE WITH ASTM D2487 PRIOR TO PLACEMENT TO DETERMINE IF THEY ARE SUITABLE FOR THE INTENDED USE.

   THE FILL MATERIAL SHALL BE TAKEN FROM APPROVED BORROW AREAS. IT SHALL BE CLEAN MINERAL SOIL, FREE OF ROOTS, WOOD VEGETATION, OVERSIZED STONES, ROCKS, OR OTHER OBJECTIONABLE MATERIAL. SOILS WHICH ARE APPROVAL FOR THE CONSTRUCTION OF THE IMPERVIOUS CLAY CORE, AS DEFINED BY THE UNIFIED SOIL CLASSIFICATION SYSTEM, ARE CH, INORGANIC CLAYS OF HIGH PLASTICITY; CL, INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELY CLAYS, SANDY CLAYS, SILTY CLAYS; SC, (WITH GEOTECHNICAL ENGINEERS APPROVAL CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES. MATERIALS TO BE USED FOR THE CONSTRUCTION OF THE SHELL SHALL BE SELECT BACK FILL FREE OF STUMPS, ROOTS, ROCKS, TRASH, ETC. AND SHALL BE MORE PERVIOUS THAN THE IMPERVIOUS CLAY CORE. AREAS ON WHICH FILL IS TO BE PLACED SHALL BE SCARIFIED A MINIMUM DEPTH OF 4 INCHES PRIOR TO PLACEMENT OF FILL.

   THE FILL MATERIAL'S MOISTURE CONTENT SHALL BE +3 TO -2 PERCENTAGE POINTS OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D2216 (I.E. IN GENERAL THE FILL MATERIAL SHOULD CONTAIN SUFFICIENT MOISTURE SO THAT IT CAN BE FORMED INTO A BALL WITHOUT CRUMBLING. IF WATER CAN BE SQUEEZED OUT OF THE BALL, IT IS TOO WET FOR PROPER COMPACTION). FILL MATERIAL WILL BE PLACED IN 6 TO 8-INCH CONTINUOUS LAYERS OVER THE ENTIRE LENGTH OF THE FILL. FIRST LIFT ON SUB GRADE MAY BE PLACED AT A DEPTH UP TO 36 INCHES TO BRIDGE SUB GRADE WITH GREATER THAN OPTIMUM MOISTURE CONTENT. COMPACTION, AS NOTED ON PLAN, SHALL BE OBTAINED GENERALLY BY USING A SHEEPSFOOT COMPACTOR. FINISHED GRADES SHALL BE MERGED INTO THE EXISTING GRADES.
4. CUTOFF TRENCH/KEY TRENCH: THE TRENCH SHALL BE EXCAVATED ALONG THE CENTERLINE OF THE DAM. THE WIDTH AND DEPTH SHALL BE AS DETERMINED BY THE GEOTECHNICAL ENGINEER . THE MIN. BOTTOM WIDTH SHALL BE WIDE ENOUGH TO PERMIT OPERATION OF COMPACTION EQUIPMENT. THE SIDE SLOPES SHALL BE NO STEEPER THAN 1:1. COMPACTION REQUIREMENTS SHALL BE THE SAME AS THOSE FOR THE EMBANKMENT. THE TRENCH SHALL BE KEPT DRAINED DURING THE BACKFILLING-COMPACTING OPERATIONS.
5. SEEPAGE CONTROL: THE GEOTECHNICAL ENGINEER SHALL RECOMMEND A SEEPAGE CONTROL METHOD IF ANTI-SEEP COLLARS ARE DEEMED INADEQUATE.
6. PRINCIPAL SPILLWAY: THE BOTTOM OF THE SPILLWAY RISER FOUNDATION BASE EXCAVATION SHALL BE OBSERVED BY THE GEOTECHNICAL ENGINEER TO ENSURE THAT ALL UNSUITABLE AND LOOSE MATERIALS ARE REMOVED AND THAT ACCEPTABLE BEARING CONDITIONS EXIST IN THE FOUNDATION'S BASE.

   ALL JOINTS IN THE PRINCIPAL SPILLWAY STRUCTURE SHALL BE OF WATERTIGHT CONSTRUCTION. PERVIOUS MATERIALS SUCH AS SAND, GRAVEL OR CRUSHED STONE SHALL NOT BE USED AS BACK FILL AROUND THE BARREL. FILL MATERIAL SHALL BE PLACED AROUND THE PIPE IN 4-INCH LAYERS AND COMPACTED BY HAND TO THE SAME DENSITY AS THE EMBANKMENT. A MINIMUM OF TWO FEET OF FILL SHALL BE HAND-COMPACTED OVER THE BARREL BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT.
7. VEGETATIVE STABILIZATION: FINAL VEGETATIVE COVER (STABILIZATION) SHALL CONSIST OF TOP SOILING, LIMING, FERTILIZING, SEEDING, AND MULCHING TO ASSURE A FIRM STAND OF GRASS AS SOON AS PRACTICAL. SEDIMENT BASINS AND OTHER TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED ONLY WHEN STABILIZATION IS COMPLETE. FINAL VEGETAL COVER SHALL BE PROVIDED IN ACCORDANCE WITH THE FOLLOWING:

   TOPSOIL: AT LEAST 2" THICKNESS OBTAINED FROM STOCKPILES ON SITE, FREE OF LARGE DEBRIS.
   LIME: 4,000#/ACRE (90#/1,000 S.F.)
   SEED: KENTUCKY 31 TALL FESCUE 250#/ACRE (6#/1,000 S.F.)
   FERTILIZER: 10/20/10 MIX, 1,000#/ACRE (25#/1,000 S.F.)
   MULCH: STRAW OR HAY (LOCALLY OBTAINED) 4,000#/ACRE (90#/1,000 S.F.)

NO.	DATE	REVISION / COMMENT / NOTE	BY
3	7/99	REVISION PER U.S. ARMY CORPS OF ENGINEERS	HWP
2	9/98	REVISION PER JCC REVIEW COMMENTS DATED 8/19/98	HWP
1	7/98	REVISION PER JCC REVIEW COMMENTS DATED 6/2/98	HWP

COMMONWEALTH OF VIRGINIA — G. ARCHER MARSTON III — No. 018232 — PROFESSIONAL ENGINEER — 4/98

RECORD DRAWINGS

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

CONSULTING ENGINEERS

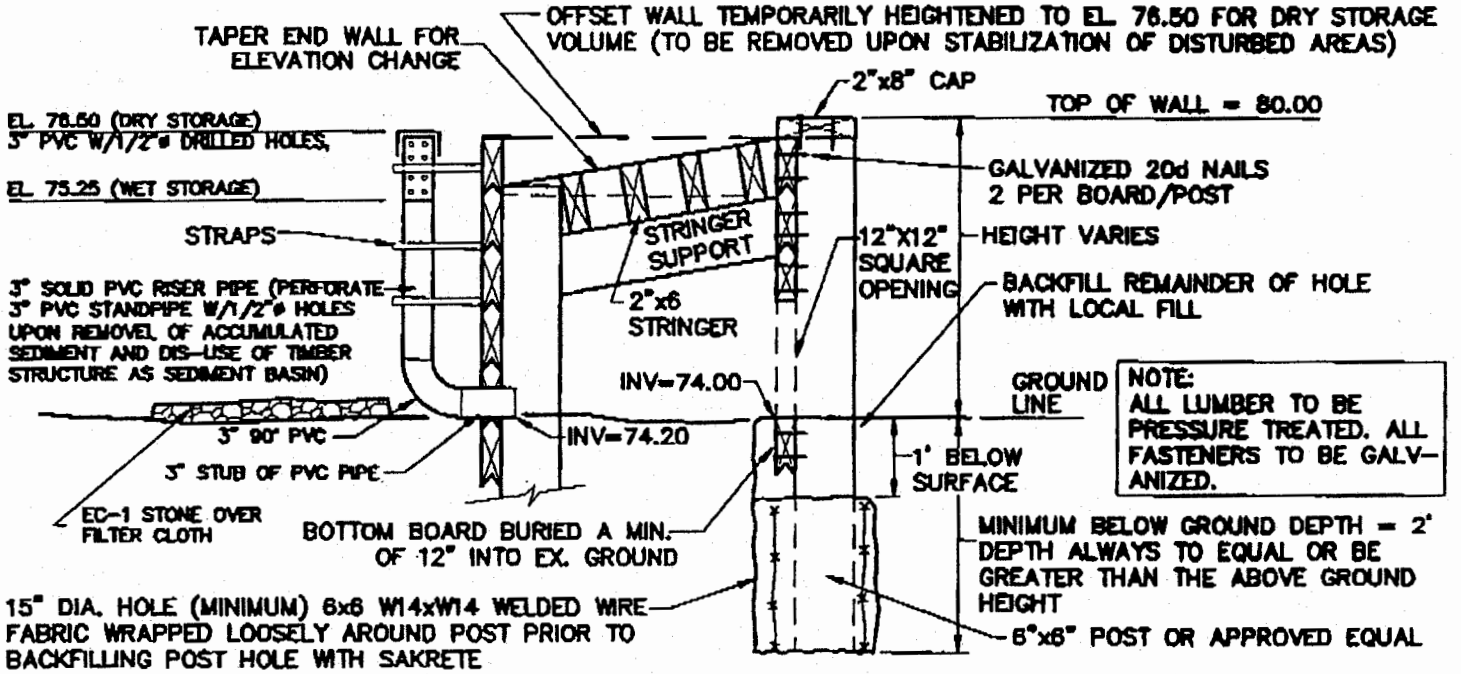
NOTES AND DETAILS
IRONBOUND ROAD MINI STORAGE

OWNER/DEVELOPER: BERNARD J. LEVEY

JAMES CITY COUNTY VIRGINIA

Designed	Drawn
HWP/CAH	EAW
Scale	Date
NONE	4/98
Project No.	
7259-3	
Drawing No.	
14	

RECORD DRAWINGS MAY 11, 2000



SECTION A-A
SCALE: 3/4" = 1'

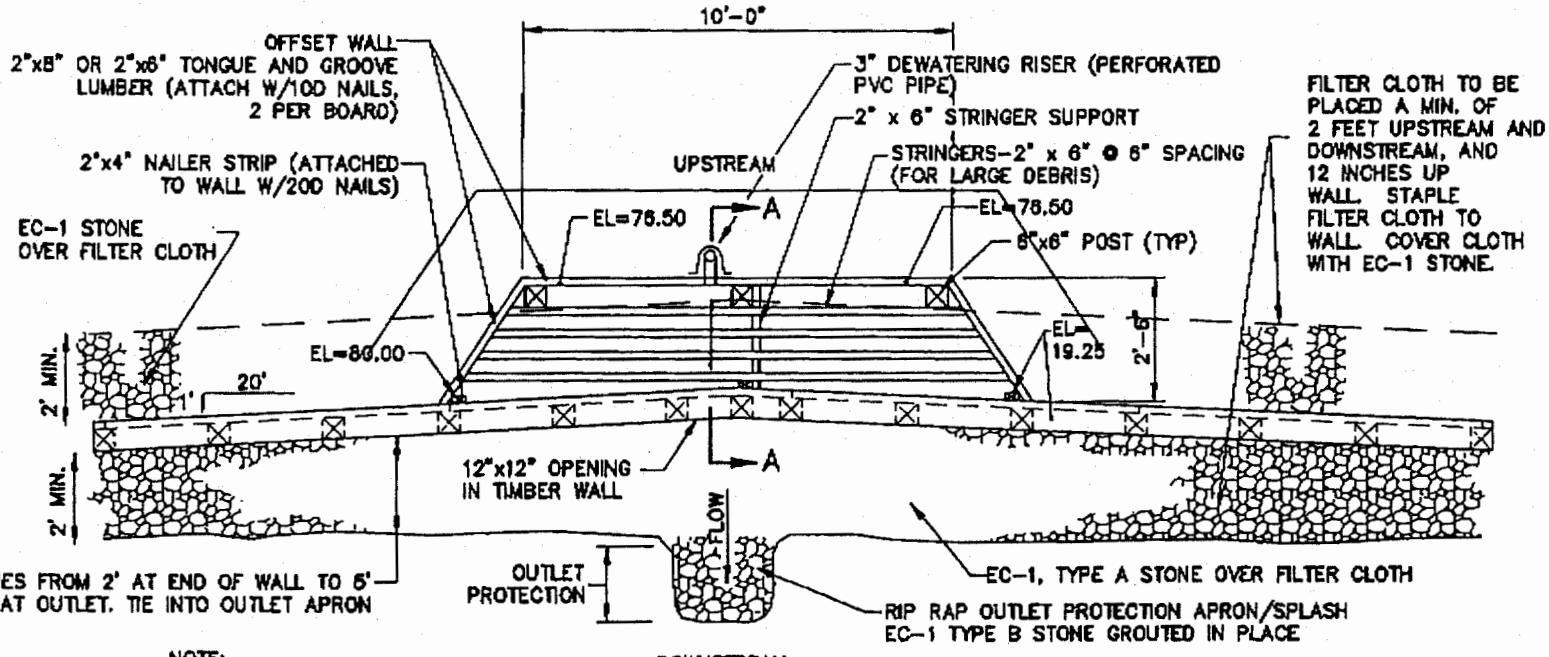
PRESSURE TREATED WOOD DRY DETENTION STRUCTURE

BMP TIMBER STRUCTURE

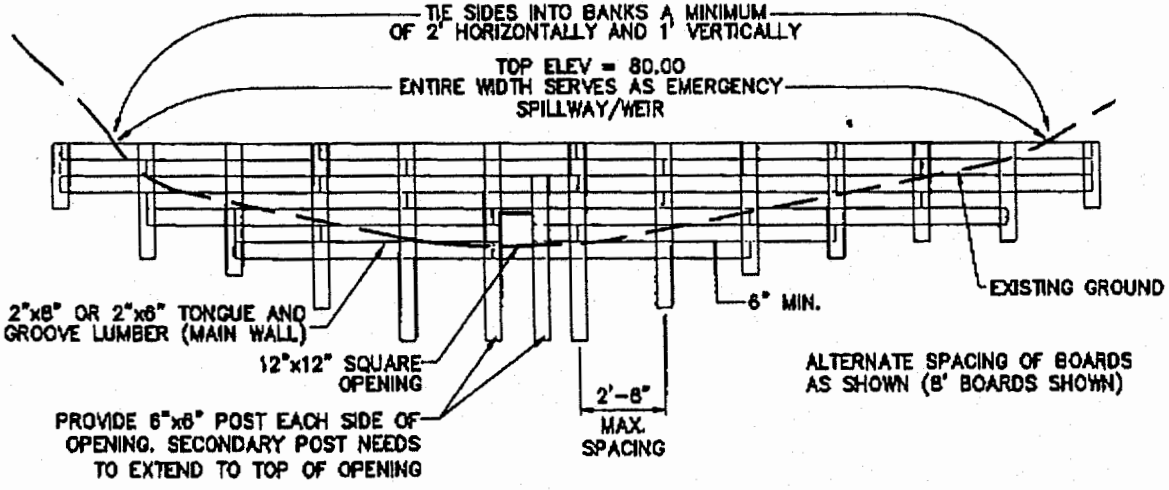
BMP TIMBER STRUCTURE TO INITIALLY FUNCTION AS A TEMPORARY DAM FOR SEDIMENT CONTAINMENT. THE TIMBER STRUCTURE'S MAIN WALL AND OFFSET WALL SHALL BE INITIALLY CONSTRUCTED TO A TOP ELEVATION OF 80.00. A 3" PVC RISER PIPE SHALL BE PERMANENTLY ATTACHED TO THE OFFSITE WALL. THE TOP 1'-3" OF THE 3" RISER PIPE SHALL BE PERFORATED WITH 1/2" DIAMETER HOLES (EVERY 3-4"). THE SEDIMENT CONTAINMENT AREA SHALL HAVE A WET STORAGE VOLUME OF 200 CY (APPROXIMATELY EL 75.25), AND AN ADDITIONAL DRY STORAGE VOLUME OF 200 CY (APPROXIMATELY EL 76.50).
ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN SEDIMENT VOLUME EQUALS 100 CY (APPROXIMATELY EL. 74.65).

UPON STABILIZATION OF UPSTREAM AREAS, ALL ACCUMULATED SEDIMENT SHALL BE REMOVED. THE TOP OF THE UPSTREAM FACE OF THE OFFSET WALL SHALL BE LOWER TO EL 75.25. THE END WALLS OF THE OFFSET WALL SHALL BE TAPERED TO SPECIFIED ELEVATIONS. STRINGERS ARE TO BE PLACED BETWEEN END WALLS OF OFFSET WALL. THE 3" PVC RISER IS TO BE REMOVED AND REPLACED WITH THE PREVIOUSLY APPROVED DETAIL FOR THE PERMANENT FACILITY.

D-WDS-1



PLAN VIEW
SCALE: 1/4" = 1'



UPSTREAM ELEVATION
SCALE: 1/4" = 1'


25.6 AC TO VDOT CULVERT BY PASSES POND
44JC331
TOTAL AREA TO BYPASS POND = 40.1AC
LOCATION OF STILL
POTENTIAL INTERIM BMP
10m CENTER
SAW PIT
SITE 3
POTENTIAL INTERIM
SECTION 10
SECTION 12
12.9 AC TO CULVERT (BYPASSES POND)
3.6 AC OFFSITE
2.0 AC BYPASSES POND
POST DEV DA TO POND
1.8 AC OFFSITE
POND
PRE-DEVELOPMENT
POST DEV. DA TO POND = 10.9 AC (1.7 AC OFFSITE - CHURCH, 1.8 AC OFFSITE - SF)
PRE-DEV = 11.9 AC
LEVEY
IRONBOUND

James City County, Virginia
Environmental Division

Ironbound Road Mini-Storage

BMP Design & Hydrology/Hydraulics

SP-45-98
(APPROVED 3-09-99)

BMP#1 - MC032
BMP#2 - MC033

HYDROLOGIC REPORT FOR

IRONBOUND MINI-STORAGE

POND #1 DESIGN

AES JOB #7259-3

AES CONSULTING ENGINEERS

5248 OLDE TOWNE ROAD

SUITE #1

WILLIAMSBURG, VA. 23188

APRIL 22, 1998

IRONBOUND ROAD SELF STORAGE
#7259-3

4/20/98

BMP POND DESIGN

PRE-DEVELOPMENT DA = 11.9 AC

UNDEVELOPED 7.4 AC → C = 0.2
SF/CHURCH 4.5 AC → C = 0.3 (OFFSITE)

COMPOSITE "C" = 0.25 ←
(FOR DA TO POND)

POST DEVELOPMENT DA: 10.9 AC

DEVELOPED SITE 7.4 AC → C = 0.7
SF/CHURCH 3.5 AC → C = 0.3 (OFFSITE)

COMPOSITE "C" = 0.6 ←
(FOR DA TO POND)

#7259-3 4/20/98

BMP DESIGN (SITE AREA 12.24 AC)

WET VOLUME REQD

DA = 10.9 AC 60% IMPERVIOUS

USE DESIGN TYPE 6 (2.5 V_R) 3PT

NP VOL = 2.5 (½"/AC)(10.9)(R_V)

R_V = 0.05 + (0.009)(60) = 0.59

MIN VOL = 2.5 (½)(10.9)(0.59)(1/12)(43,560) = **29,181 CF** ←

* VOL ACHIEVED AT ELEV. = 74.5 ≈ 46,561 CF > 29,181 CF
46,690 22 4VR - 9PE

DRY STORAGE VOL REQ

DA = 10.9 AC

USE DESIGN 2

IA = 60% imperv of entire DA.

MIN DET. VOL = (½")(10.9)(1/12)(43,560)(0.60) = **11,870 CF** ←

* VOL ACHIEVED AT ELEV = 77.0 ≈ 39,579 CF ABOVE 74.5 > 11,870 CF ✓

→ SIZE ORIFICE

6-12 HR DETENTION 9 HRS = 32,400 SEC

Q = 39,579 CF / 32,400 SEC = 1.22 CFS

$Q = KA_o\sqrt{2g\Delta h}$ $\Delta h = 2.5/2 = 1.25$

$1.22 = 0.73A\sqrt{(64.4)(1.25)} = 6.55A$

$A = 0.19\ ft^2 = \pi r^2$

$r = 0.24$ ft $r = 2.9$ in

→ min dia = 6"

*** USE 6" ORIFICE**

Select GRAPH1.EXE

STAGE / STORAGE TABLE

1. RESERVOIR No = 1. 2. RESERVOIR NAME = TOTAL STORAG
3. S = Ks * Z^b
Ks = 0..... b = 0.....
START ELEV = 0..... INCREMENT = 0...

	STAGE ft	ELEVATION ft	CO AREA sq ft	INC STORAGE cu ft	TOT STORAGE cu ft
4	0.00	69.00.	0.....	0	0
5	1.00	70.00.	5904....	2952	2952
6	3.00	72.00.	9040....	14944	17896
7	5.00	74.00.	12471...	21511	39407
8	7.00	76.00.	16145...	28616	68023
9	9.00	78.00.	20089...	36234	104257
10	11.00	80.00.	24273...	44362	148619
11	0.00	0.00.	0.....	0	0
12	0.00	0.00.	0.....	0	0
13	0.00	0.00.	0.....	0	0
14	0.00	0.00.	0.....	0	0

Select GRAPH1.EXE

STAGE / STORAGE TABLE

1. RESERVOIR No = 2. 2. RESERVOIR NAME = POND.....
3. S = Ks * Z^b
Ks = 0..... b = 0.....
START ELEV = 0..... INCREMENT = 0...

	STAGE ft	ELEVATION ft	CO AREA sq ft	INC STORAGE cu ft	TOT STORAGE cu ft
4	0.00	70.00.	0.....	0	0
5	4.49	74.49.	.0000001	0	0
6	5.00	75.00.	14308...	3648	3648
7	6.00	76.00.	16145...	15226	18874
8	8.00	78.00.	20089...	36234	55108
9	10.00	80.00.	24273...	44362	99470
10	0.00	0.00.	0.....	0	0
11	0.00	0.00.	0.....	0	0
12	0.00	0.00.	0.....	0	0
13	0.00	0.00.	0.....	0	0
14	0.00	0.00.	0.....	0	0

Select GRAPH1.EXE

OUTLET STRUCTURES

CULVERT STRUC A. Q=CoA[2gh/k]^.5

1. WIDTH (in) = 15.
2. HEIGHT (in) = 15.
3. No. BARRELS = 1..
4. INVERT ELEV. = 70.....
5. Co = 0.60
6. CULVERT LENGTH (ft) = 110.
7. CULVERT SLOPE (%) = 3.55
8. MANNING'S N-VALUE = .013

WEIR STRUCTURE A. Q=CwLH^EXP

18. CREST LENGTH (ft) = 7.07...
19. CREST ELEVATION = 77.....
20. Cw = 3.00
21. EXP = 1.50
22. MULTI-STAGE OPTION ? (Y/N) Y

CULVERT STRUC B. Q=CoA[2gh/k]^.5

9. WIDTH (in) = 4..
10. HEIGHT (in) = 4..
11. No. BARRELS = 1..
12. INVERT ELEV. = 74.5.....
13. Co = 0.60
14. CULVERT LENGTH (ft) = 0...
15. CULVERT SLOPE (%) = 0...
16. MANNING'S N-VALUE = .013
17. MULTI-STAGE OPTION ? (Y/N) Y

WEIR STRUCTURE B. Q=CwLH^EXP

23. CREST LENGTH (ft) = 10.....
24. CREST ELEVATION = 78.5...
25. Cw = 3.00
26. EXP = 1.50
27. MULTI-STAGE OPTION ? (Y/N) N

HYDROLOGIC REPORT

2 YR PRE.....
.....
.....

Hyd. No. 1

Hydrograph type	= RATIONAL	Peak discharge	= 11.83 cfs
Storm frequency	= 2 yr	Time interval	= 1 min
Time of conc.	= 12 min	Intensity	= 3.98 in/hr
Runoff coeff.	= .25	Basin area	= 11.9 ac

HYDROGRAPH DISCHARGE TABLE

TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfS)	
0.02	0.99	0.03	1.97	0.05	2.96	0.07	3.94
0.08	4.93	0.10	5.91	0.12	6.90	0.13	7.88
0.15	8.87	0.17	9.85	0.18	10.84	0.20	11.83
0.22	10.84	0.23	9.85	0.25	8.87	0.27	7.88
0.28	6.90	0.30	5.91	0.32	4.93	0.33	3.94
0.35	2.96	0.37	1.97	0.38	0.99	0.40	0.00

HYDROLOGIC REPORT

2 YR POST.....
.....
.....

Hyd. No. 3

Hydrograph type	= RATIONAL	Peak discharge	= 37.26 cfs
Storm frequency	= 2 yr	Time interval	= 1 min
Time of conc.	= 5 min low	Intensity	= 5.70 in/hr
Runoff coeff.	= .6	Basin area	= 10.9 ac

HYDROGRAPH DISCHARGE TABLE

TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfS)	
0.02	7.45	0.03	14.90	0.05	22.36	0.07	29.81
0.08	37.26	0.10	29.81	0.12	22.36	0.13	14.90
0.15	7.45	0.17	0.00	0.18	0.00	0.20	0.00

HYDROLOGIC REPORT

2 YR POST ROUTED.....

.....

.....

Hyd. No. 4

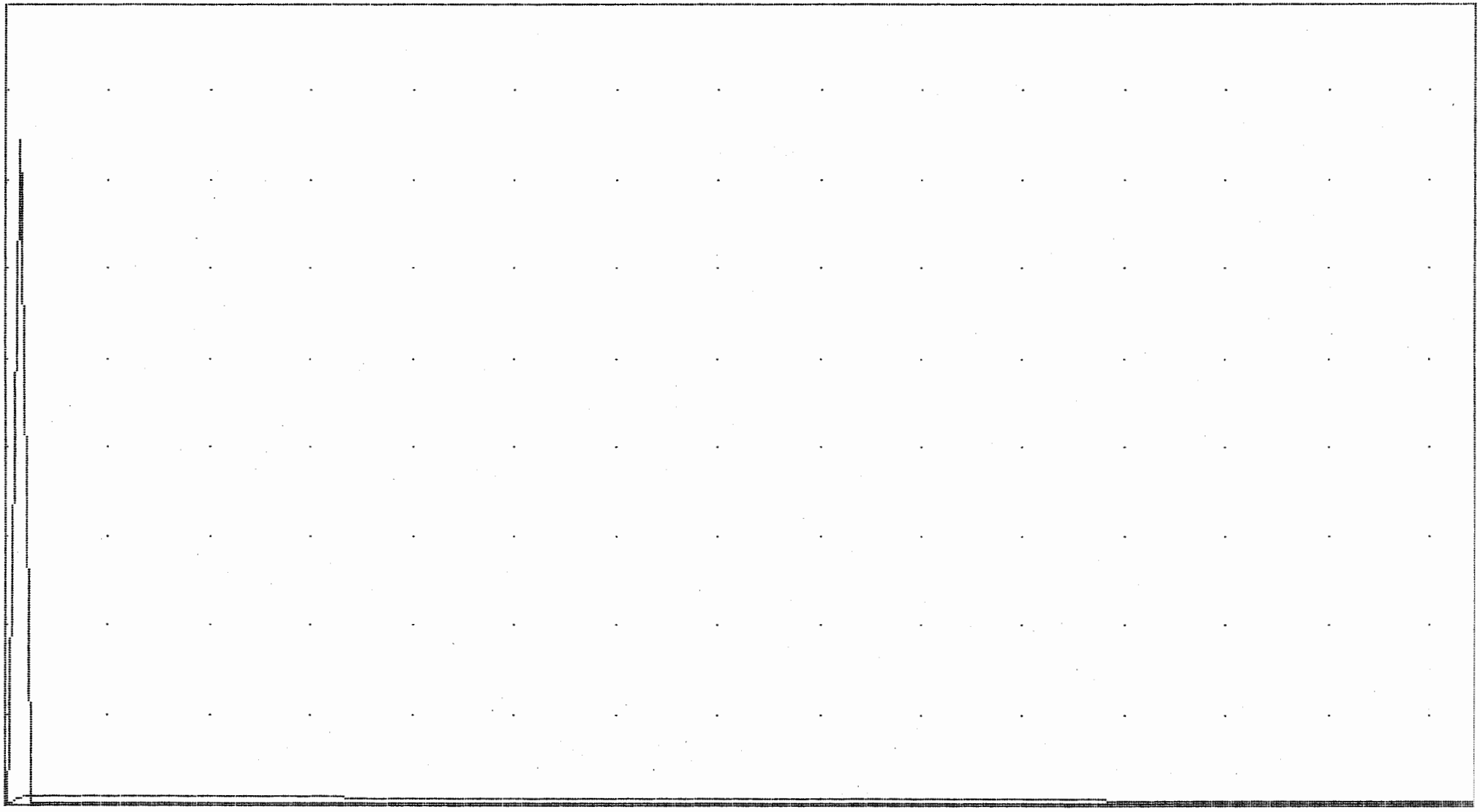
Hydrograph type = RESERVOIR ROUTE Peak discharge = 0.38 cfs
Storm frequency = 2 yr Time interval = 1 min
Inflow hyd. no. = 3 Reservoir no. = 2

HYDROGRAPH DISCHARGE TABLE

TIME hrs	INFLOW (i) cfs	INFLOW (j) cfs	2S/dt-O (i) cfs	2S/dt+O (j) cfs	OUTFLOW cfs
0.02	7.45	14.90	7.45	7.45	0.00
0.03	14.90	22.36	29.72	29.80	0.04
0.05	22.36	29.81	66.70	66.98	0.14
0.07	29.81	37.26	118.40	118.86	0.23
0.08	37.26	29.81	184.90	185.47	0.28
0.10	29.81	22.36	251.32	251.97	0.32
0.12	22.36	14.90	302.79	303.48	0.35
0.13	14.90	7.45	339.31	340.05	0.37
0.15	7.45	0.00	360.91	361.67	0.38

Maximum outflow (cfs) = 0.38 - ok
Maximum storage (cu ft) = 11040
Maximum elevation (ft) = 75.49

Qp = 0.4 RESERVOIR ROUTE 2 Yr

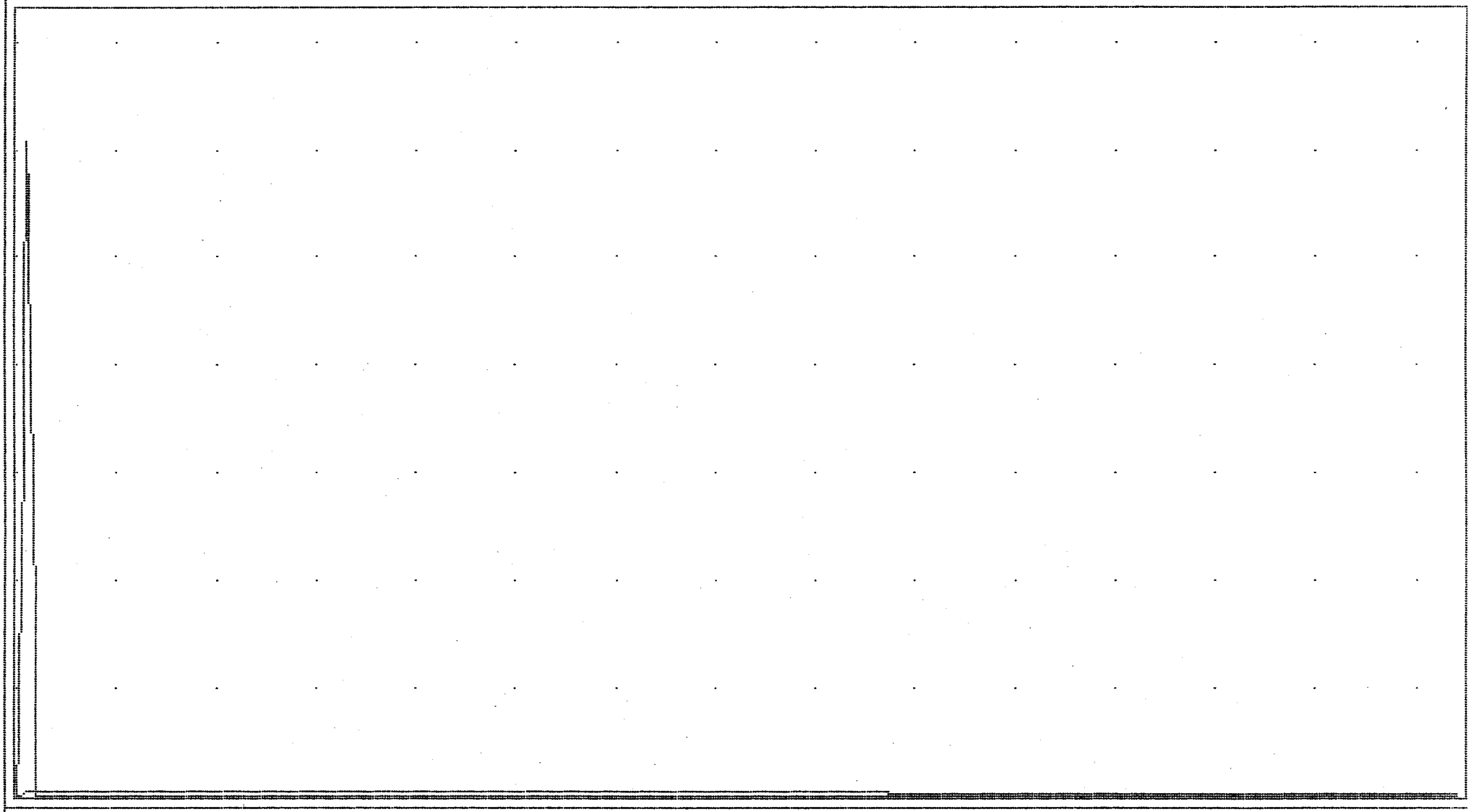


HGU = 43 min 4 VGU = 5.0 cfs

MAX STORAGE = 11040

MAX ELEVATION = 75.49

Qp = 0.5 RESERVOIR ROUTE 100 Yr



HGU = 50 min 10 VGU = 10.0 cfs

MAX STORAGE = 18065

MAX ELEVATION = 75.95

HYDROLOGIC REPORT FOR

IRONBOUND RD MINI STORAGE

DRY POND #2

AES JOB #7259-3

AES CONSULTING ENGINEERS

5248 OLDE TOWNE ROAD
SUITE #1
WILLIAMSBURG, VA. 23188

APRIL 22,1998

IRONBOUND MINI STORAGE #7259-3 4/22/98 MWP

OLY POND #2
DESIGN TYPE 3

D.A. = 2.96 Ac

1.96 Ac @ 0.25
1.00 Ac @ 0.70

$$\frac{(1.96)(.25) + (1.00)(.70)}{2.96} = \underline{0.40}$$

DESIGN 3 → 1" OVER D.A. $V_o = .05 + (.009)(.40) = 0.91$

$$(1') \left(\tfrac{1}{12}'\right)(2.96 Ac)(43{,}560 SF/Ac)(0.91) = \underline{4405 CF} \checkmark$$

OBTAIN FOR 24 HRS → 86,400 SEC

$$\frac{4405 CF}{86{,}400 SEC} = 0.05 CFS$$

SIZE ORIFICE:

$$q = 0.6 a \sqrt{2gh} \qquad h = 3' \qquad g = 32.2 FT/SEC^2$$

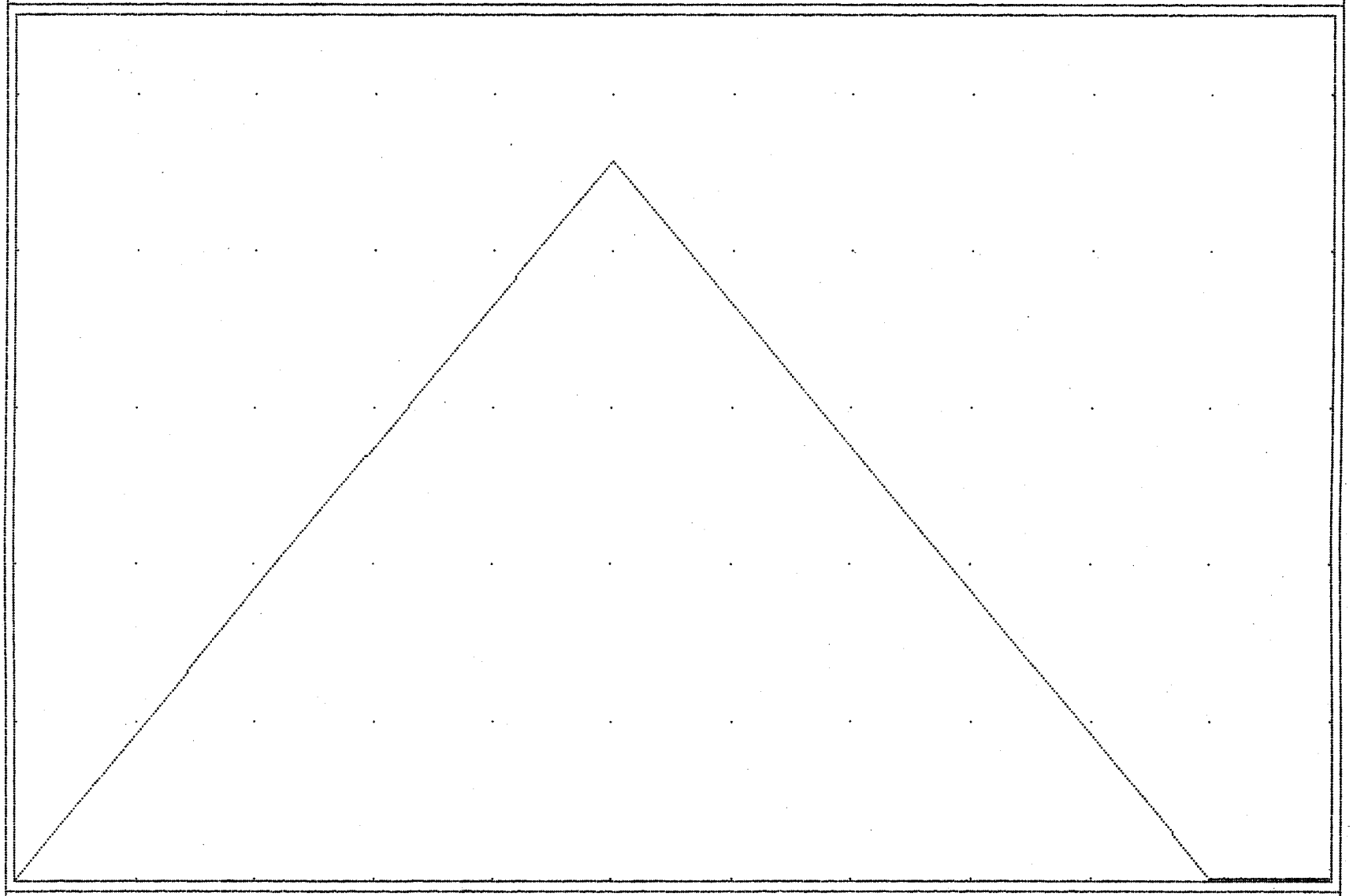
$$0.05 = 0.6 a \sqrt{2(32.2)(3)}$$

$$0.05 = 8.34 a \qquad a = .0060 \qquad a = \frac{\pi d^2}{4}$$

$$.0060 = \frac{\pi d^2}{4} \qquad d = 0.0874 FT \Rightarrow 1.05 IN$$

USE 1" ORIFICE

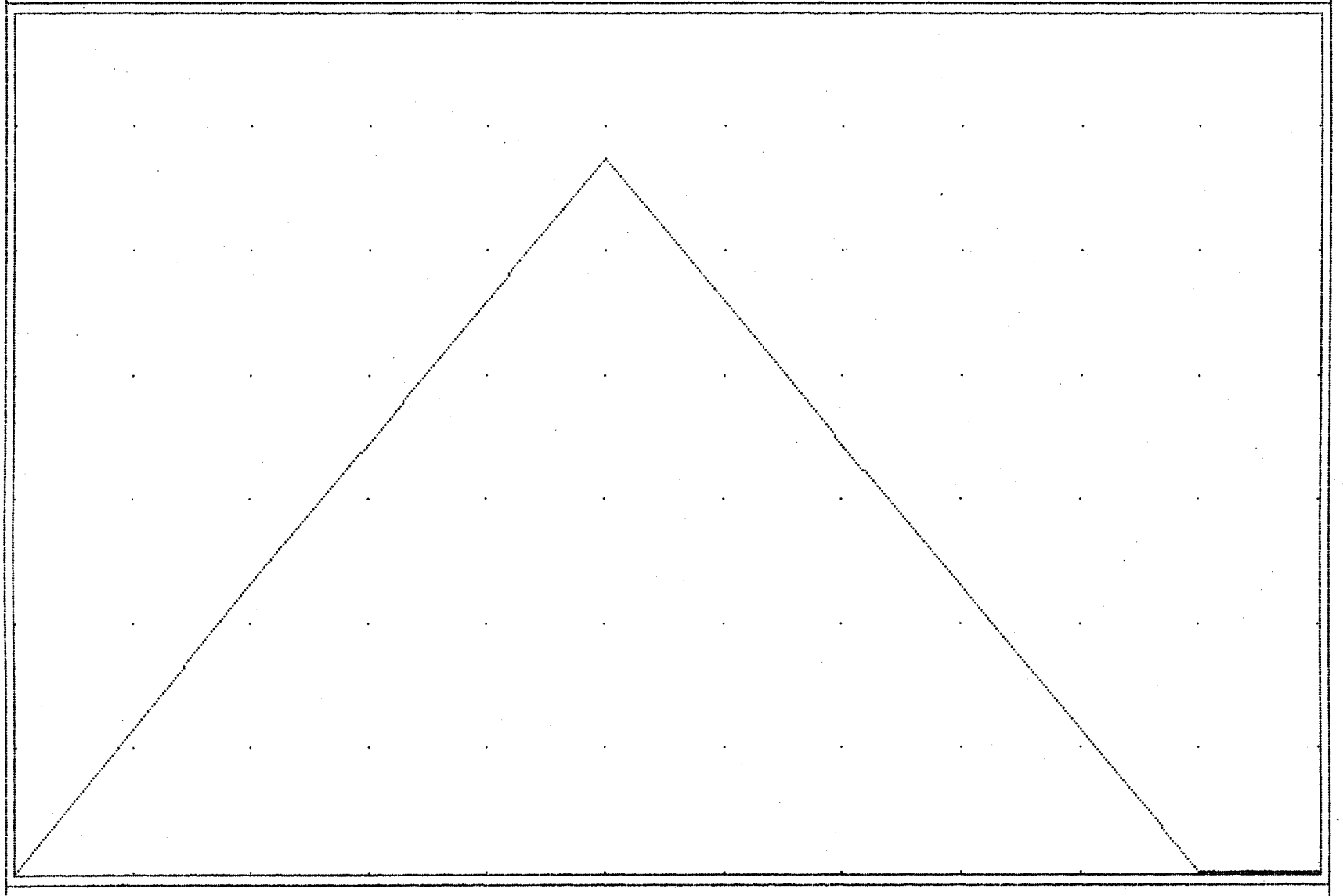
Qp = 2.3 RATIONAL 2 Yr



HGU = 4 min 1 VGU = 0.5 cfs

VOL = (cuft/acft) = 2748 / 0.063

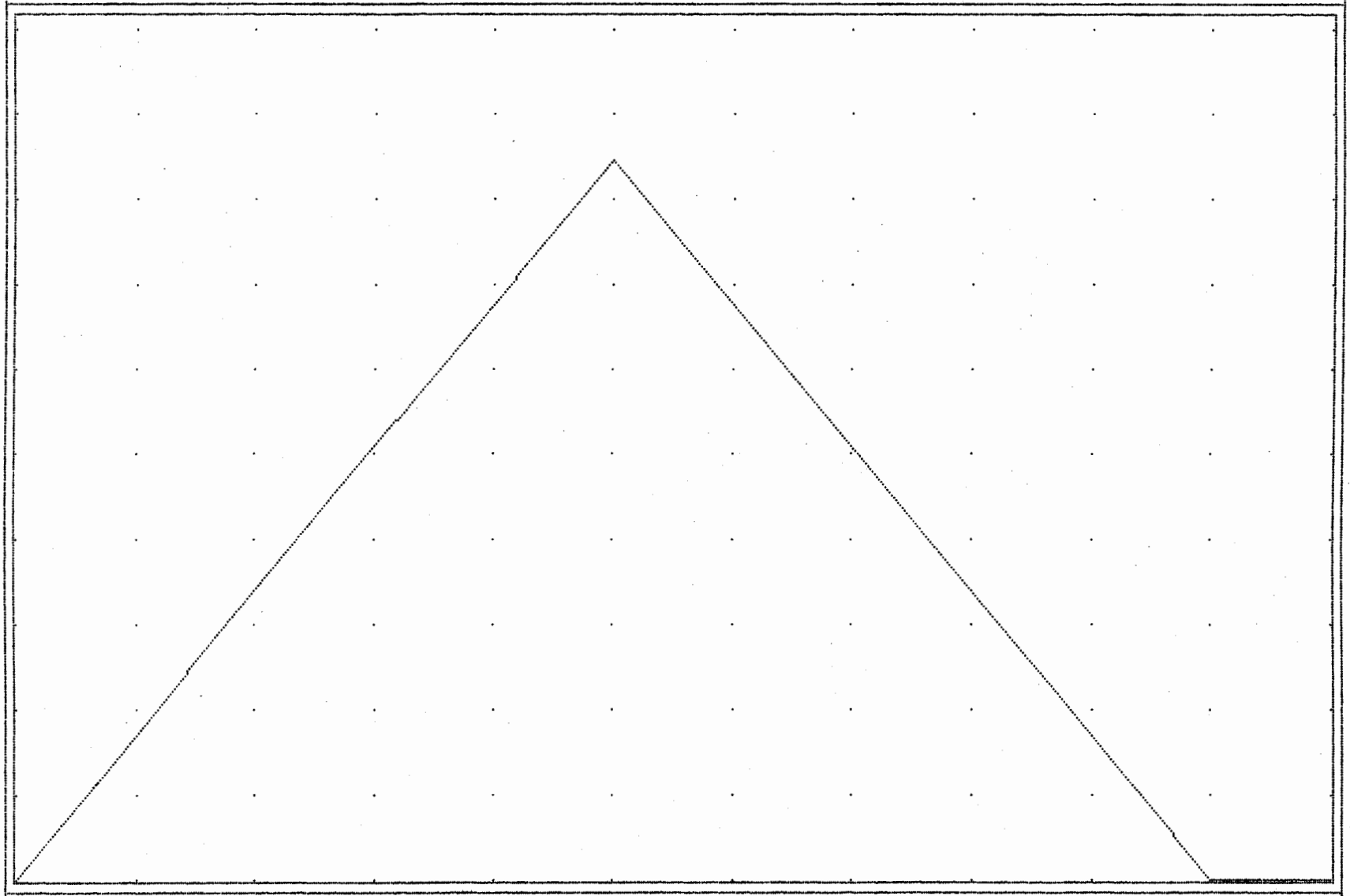
Qp = 2.9 RATIONAL 10 Yr



HGU = 4 min 3 VGU = 0.5 cfs

VOL = (cuft/acft) = 3446 / 0.079

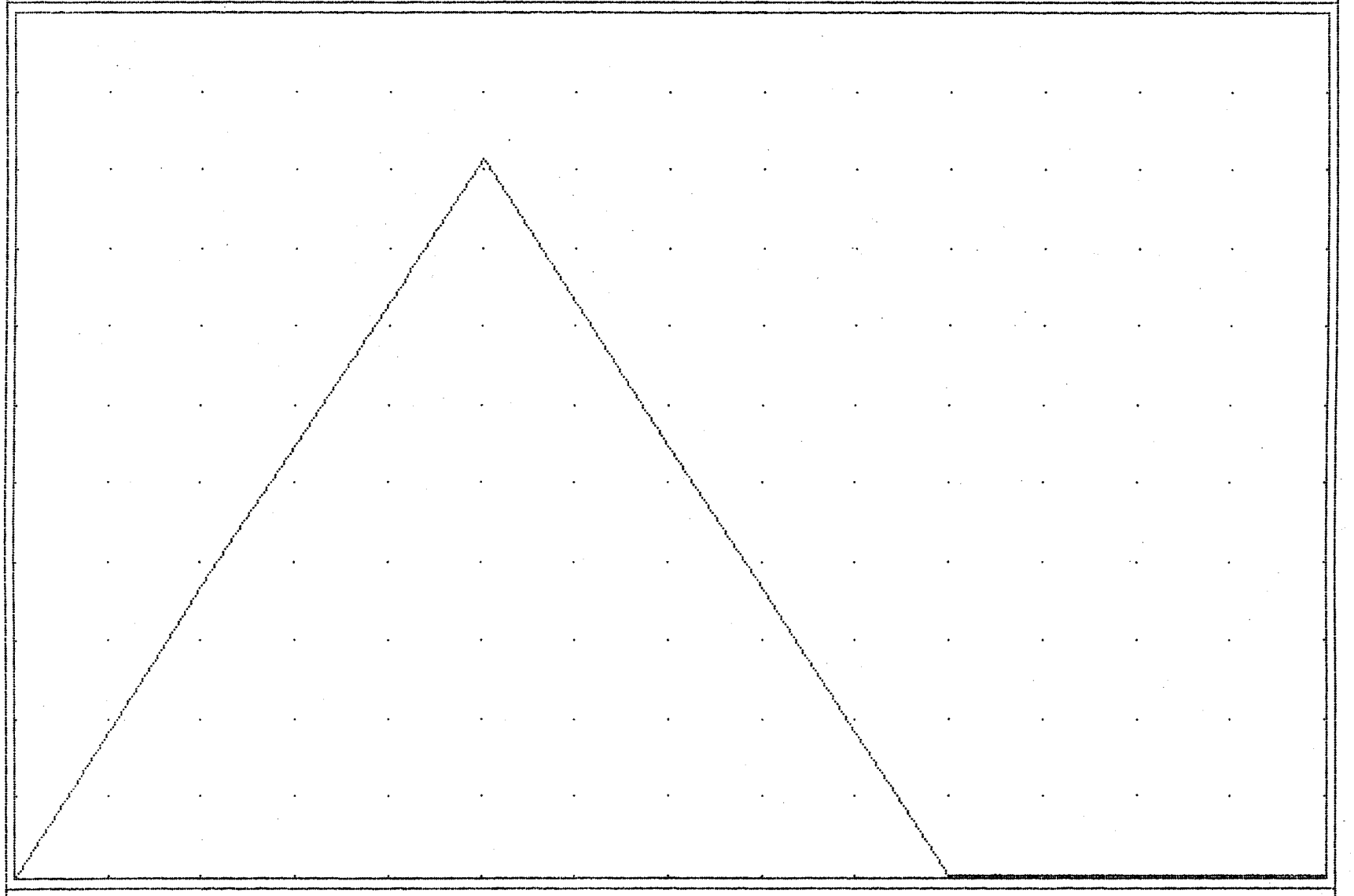
Qp = 4.2 RATIONAL 100 Yr



HGU = 4 min 5 VGU = 0.5 cfs

VOL = (cuft/acft) = 5072 / 0.116

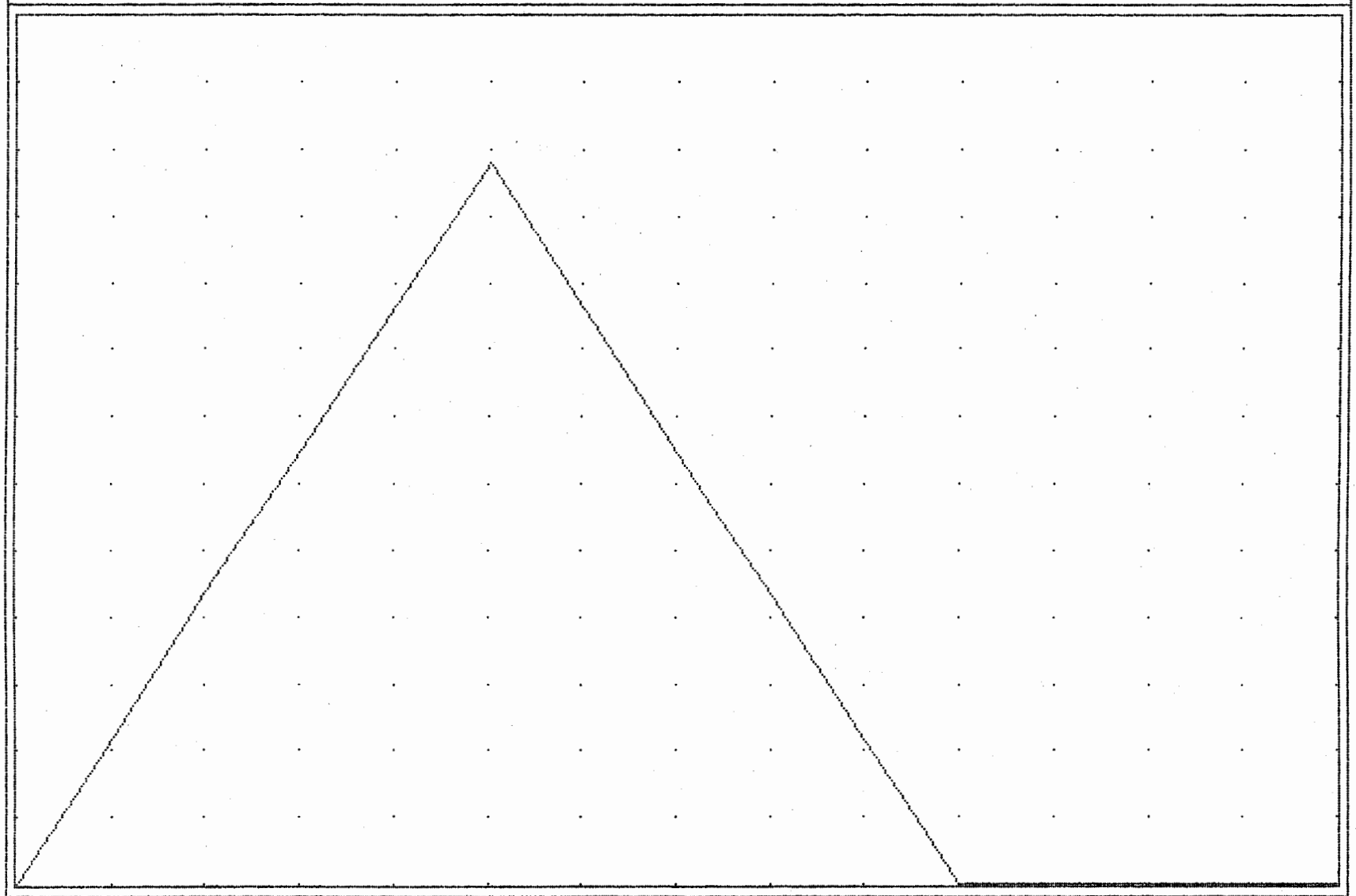
Qp = 9.1 RATIONAL 2 Yr



HGU = 1 min 2 VGU = 1.0 cfs

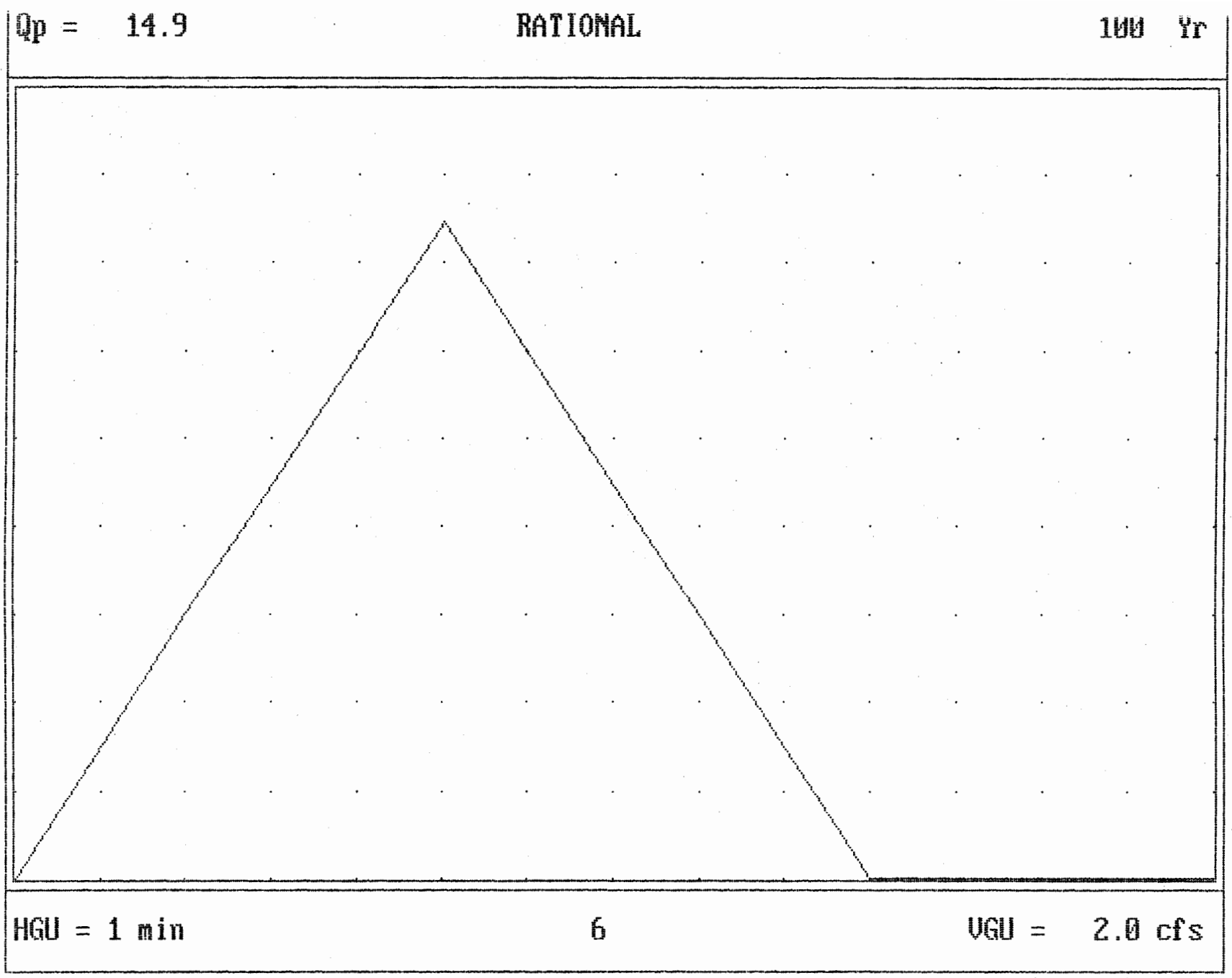
VOL = (cuft/acft) = 2745 / 0.063

Qp = 10.8 RATIONAL 10 Yr



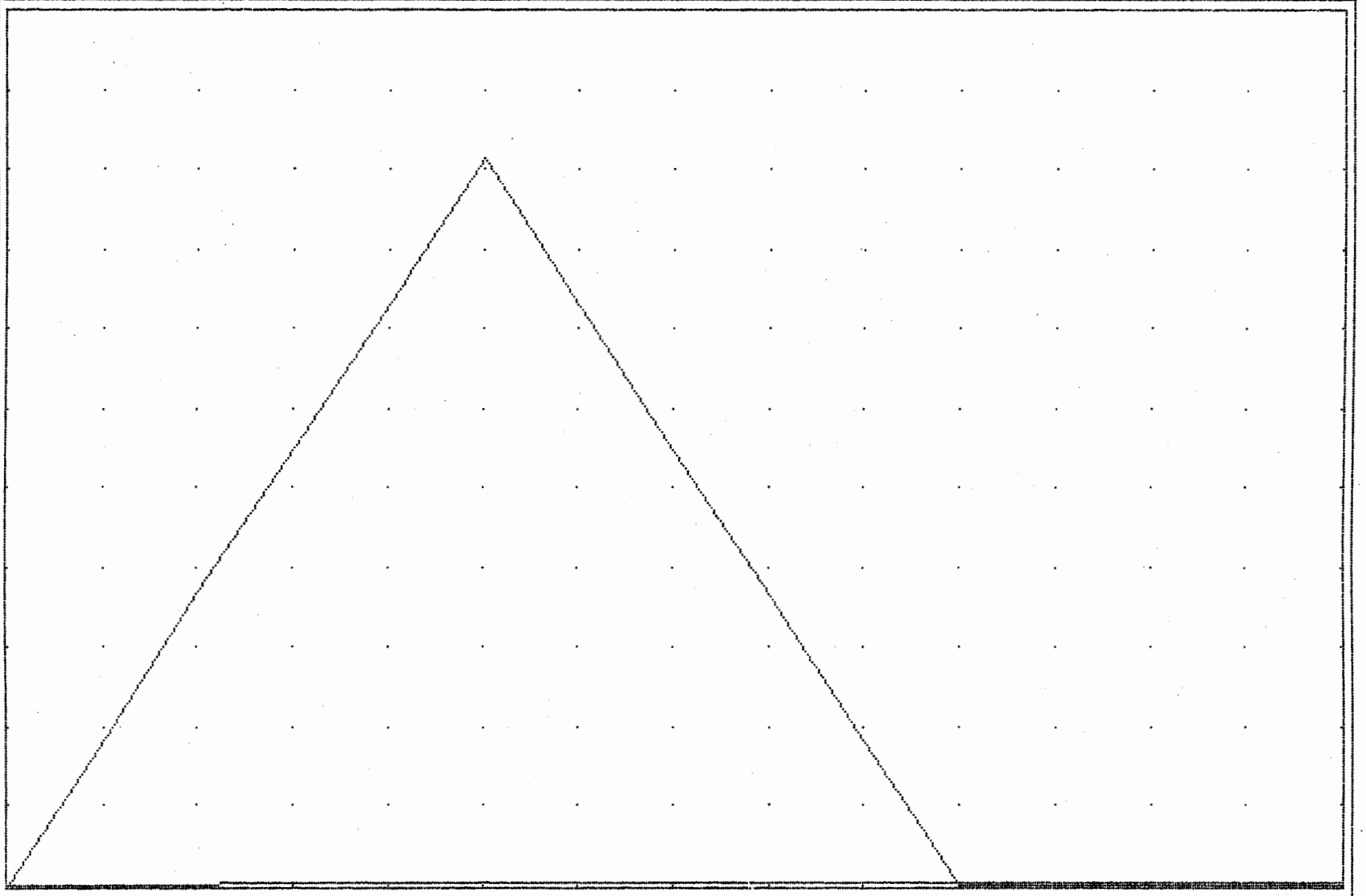
HGU = 1 min 4 VGU = 1.0 cfs

VOL = (cuft/acft) = 3243 / 0.074



VOL = (cuft/acft) = 4480 / 0.103

Qp = 0.0 RESERVOIR ROUTE 2 Yr



HGU = 1 min 9 VGU = 1.0 cfs

MAX STORAGE = 2733

MAX ELEVATION = 77.56

HYDROLOGIC REPORT

Hyd. No. 9

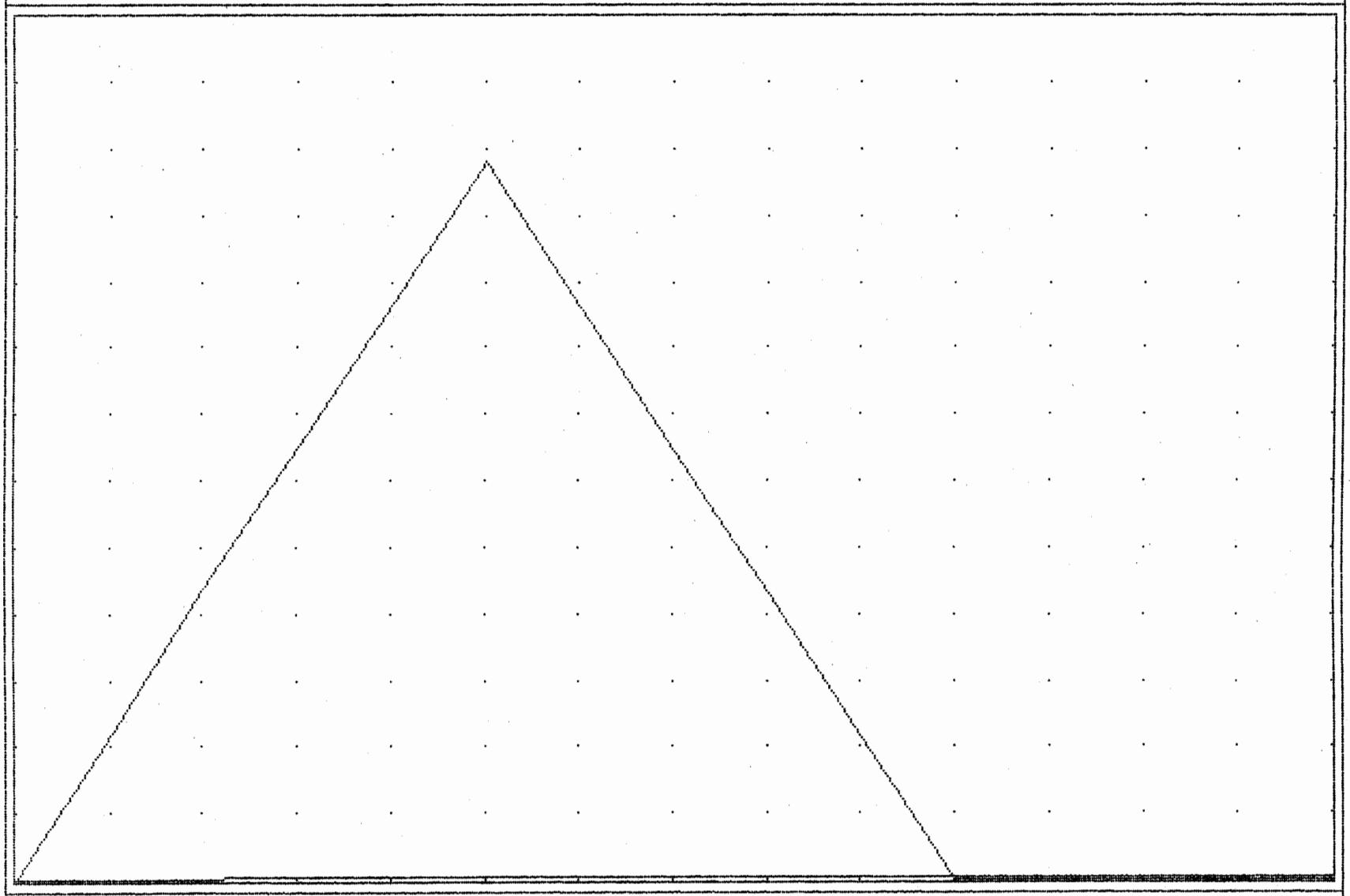
Hydrograph type = RESERVOIR ROUTE Peak discharge = 0.03 cfs
Storm frequency = 2 yr Time interval = 1 min
Inflow hyd. no. = 2 Reservoir no. = 1

HYDROGRAPH DISCHARGE TABLE

TIME hrs	INFLOW (i) cfs	INFLOW (j) cfs	2S/dt-O (i) cfs	2S/dt+O (j) cfs	OUTFLOW cfs
0.02	1.83	3.66	1.82	1.83	0.01
0.04	3.66	5.49	7.28	7.30	0.01
0.05	5.49	7.32	16.40	16.43	0.02
0.07	7.32	9.15	29.15	29.19	0.02
0.08	9.15	7.32	45.58	45.62	0.02
0.10	7.32	5.49	62.00	62.05	0.02
0.12	5.49	3.66	74.76	74.81	0.02
0.13	3.66	1.83	83.85	83.91	0.03
0.15	1.83	0.00	89.29	89.34	0.03

Maximum outflow (cfs) = 0.03
Maximum storage (cu ft) = 2734
Maximum elevation (ft) = 77.56

Qp = 0.0 RESERVOIR ROUTE 10 Yr



HGU = 1 min 11 VGU = 1.0 cfs

MAX STORAGE = 3230

MAX ELEVATION = 77.89

HYDROLOGIC REPORT

Hyd. No. 11

Hydrograph type = RESERVOIR ROUTE
Storm frequency = 10 yr
Inflow hyd. no. = 4

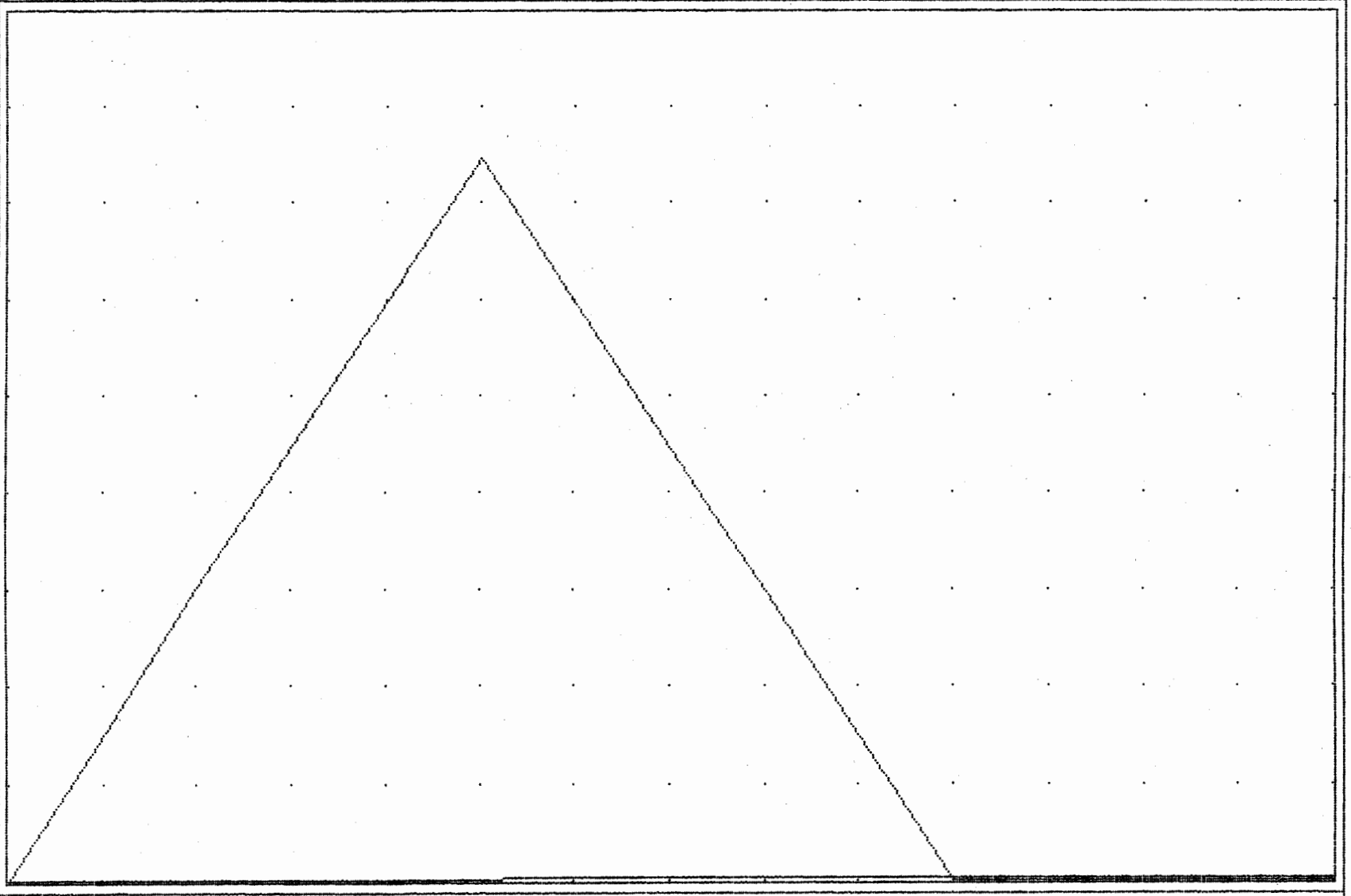
Peak discharge = 0.03 cfs
Time interval = 1 min
Reservoir no. = 1

HYDROGRAPH DISCHARGE TABLE

TIME hrs	INFLOW (i) cfs	INFLOW (j) cfs	2S/dt-O (i) cfs	2S/dt+O (j) cfs	OUTFLOW cfs
0.02	2.16	4.32	2.15	2.16	0.01
0.03	4.32	6.49	8.60	8.63	0.02
0.05	6.49	8.65	19.37	19.41	0.02
0.07	8.65	10.81	34.46	34.50	0.02
0.08	10.81	8.65	53.87	53.92	0.02
0.10	8.65	6.49	73.28	73.33	0.02
0.12	6.49	4.32	88.36	88.41	0.02
0.13	4.32	2.16	99.12	99.17	0.02
0.15	2.16	0.00	105.55	105.60	0.02

Maximum outflow (cfs) = 0.03
Maximum storage (cu ft) = 3230
Maximum elevation (ft) = 77.89

Qp = 0.0 RESERVOIR ROUTE 100 Yr



HGU = 1 min 13 VGU = 2.0 cfs

MAX STORAGE = 4466

MAX ELEVATION = 78.28

HYDROLOGIC REPORT

Hyd. No. 13

Hydrograph type = RESERVOIR ROUTE
Storm frequency = 100 yr
Inflow hyd. no. = 6

Peak discharge = 0.03 cfs
Time interval = 1 min
Reservoir no. = 1

HYDROGRAPH DISCHARGE TABLE

TIME hrs	INFLOW (i) cfs	INFLOW (j) cfs	2S/dt-O (i) cfs	2S/dt+O (j) cfs	OUTFLOW cfs
0.02	2.99	5.97	2.97	2.99	0.01
0.03	5.97	8.96	11.89	11.93	0.02
0.05	8.96	11.95	26.78	26.82	0.03
0.07	11.95	14.93	47.64	47.69	0.03
0.08	14.93	11.95	74.47	74.52	0.02
0.10	11.95	8.96	101.29	101.35	0.03
0.12	8.96	5.97	122.14	122.20	0.03
0.13	5.97	2.99	137.02	137.08	0.03
0.15	2.99	0.00	145.92	145.98	0.03

Maximum outflow (cfs) = 0.03
Maximum storage (cu ft) = 4466
Maximum elevation (ft) = 78.28

```
 Option 1                          STAGE / STORAGE TABLE                          R to res
IMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
: 1. RESERVOIR No = 1.     2. RESERVOIR NAME = POND 2.....
: 3. S = Ks * Z^b
:      Ks = 0.............    b = 0.........
:      START ELEV = 0.....    INCREMENT = 0...
:
:      STAGE       ELEVATION       CO AREA        INC STORAGE       TOT STORAGE
:      ft          ft              sq ft          cu ft             cu ft
:
:   4     0.00          74.00.      0.......              0                 0
:   5     2.00          76.00.      400.....            400               400
:   6     4.00          78.00.      2600....           3000              3400
:   7     6.00          80.00.      4905....           7505             10905
:   8     0.00           0.00.      0.......              0                 0
:   9     0.00           0.00.      0.......              0                 0
:  10     0.00           0.00.      0.......              0                 0
:  11     0.00           0.00.      0.......              0                 0
:  12     0.00           0.00.      0.......              0                 0
:  13     0.00           0.00.      0.......              0                 0
:  14     0.00           0.00.      0.......              0                 0
:
HMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
Change item number: 0                                                        DY to cc

 Reservoir No. 1                        OUTLET STRUCTURES
IMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
: CULVERT STRUC  A. Q=CoA[2gh/k]^.5    CULVERT STRUC  B. Q=CoA[2gh/k]^.5
:
: 1. WIDTH  (in)     = 1..              9. WIDTH  (in)     = 0..
: 2. HEIGHT (in)     = 1..             10. HEIGHT (in)     = 0..
: 3. No. BARRELS     = 1..             11. No. BARRELS     = 0..
: 4. INVERT ELEV.    = 74.......       12. INVERT ELEV.    = 0........
: 5. Co = 0.60                         13. Co = 0.60
: 6. CULVERT LENGTH (ft) = 10..        14. CULVERT LENGTH (ft) = 0...
: 7. CULVERT SLOPE (%)   = 1...        15. CULVERT SLOPE (%)   = 0...
: 8. MANNING'S N-VALUE   = .013        16. MANNING'S N-VALUE   = .013
:                                      17. MULTI-STAGE OPTION ? (Y/N) N
: WEIR STRUCTURE A.       Q=CwLH^EXP   WEIR STRUCTURE B.       Q=CwLH^EXP
:
: 18. CREST LENGTH (ft)  = 0......     23. CREST LENGTH (ft)  = 0......
: 19. CREST ELEVATION    = 0......     24. CREST ELEVATION    = 0......
: 20. Cw = 3.00                        25. Cw = 3.00
: 21. EXP = 1.50                       26. EXP = 1.50
: 22. MULTI-STAGE OPTION ? (Y/N) N     27. MULTI-STAGE OPTION ? (Y/N) N
:
HMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
Change item number: 0                                                        DY to cc
```

LD-269
Rev 3-83

Project: IRONBOUND MINI-STORAGE

Plan Sheet No. ____ Designer ____ Sheet ____ of ____

Rev. Date: ____ Date ____

HYDROLOGICAL DATA:

D.A. = 12.9 AC.

$Q = QSD \quad I_{10} =$

$T_c = 10 \text{ min}$

$Q = 0.50(5.5)12.9$

Q_{10}

AHW Controls

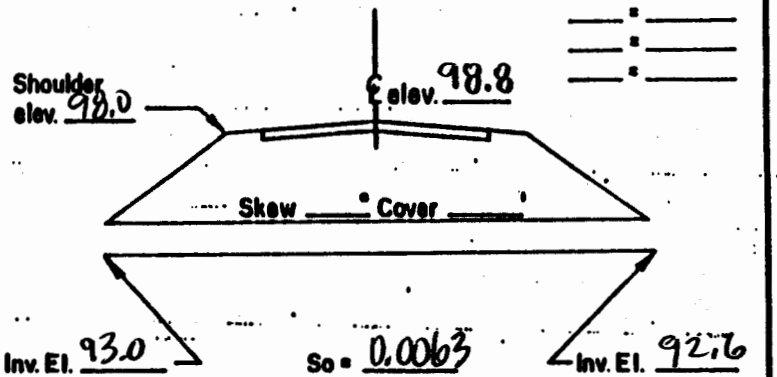
100 yr. Flood plain ____ elev. ____

Design AHW depth ____ elev. ____

Structures ____ elev. ____

STATION ____

freq. TW elev.



DISCHARGES USED

Q 10 = 36 CFS

Q ____ = ____ CFS

Q ____ = ____ CFS

Q ____ = ____ CFS

Q ____ = ____ CFS

RISK ASSESSMENT ADT ____

Detours Available ____, Length ____

Overtopping Stage ____

Flood Plain Management ____

Criteria and Significant Impact ____

240 A

CULVERT TYPE & SIZE	Q	Q/B	HEADWATER COMPUTATIONS									CONT. HW. ELEV.	OUTLET VELOCITY		End Treat.	COMMENTS
			INLET CONT.		OUTLET CONTROL											
			HW/D	HW	Ke	dc	$\frac{dc+D}{2}$	ho	H	LSo	HW		C.M.	Smooth		
42" RCP	36	.	0.75	2.6	0.5	1.9	2.7	2.7	0.2	0.4	2.4	2.6				INLET CONTROLS HW ELEV OK ✓

Design Flood Exceed. Prob. ____ Elev. ____

Overtop Flood Exceed Prob. ____ Elev ____

HYDRAULIC REPORT FOR

IRONBOUND RD MINI-STORAGE

SYSTEM #1

AES JOB #7259-3

AES CONSULTING ENGINEERS

5248 OLDE TOWNE ROAD

SUITE #1

WILLIAMSBURG, VA. 23188

APRIL 22, 1998

Return Period = 10 Yrs
Rainfall file: JCC

Run Date: 04-22-1998
File: 7259-31.ST3

LINE 1 / Q = 27.77 / HT = 24 / WID = 24 / N = .011 / L = 40 / JLC = 1

SS#1-2 TO SS#1-1 / Outfall

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	77.00	24.00	70.00	8.84	78.21	0.00	-2	3.14
UPSTRM	77.43	24.00	71.50	8.84	78.65	0.00	7.5	3.14

Drainage area (ac)	= 0.00	Slope of invert (%)	= 3.7500
Runoff coefficient	= 0.00	Slope energy grade line (%)	= 1.0793
Time of conc (min)	= 16.48	Critical depth (in)	= 22.28
Inlet time (min)	= 0.00	Natural ground elev. (ft)	= 81.00
Intensity (in/hr)	= 4.80	Upstream surcharge (ft)	= 3.93
Cumulative C*A	= 5.78	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 27.77	Line capacity (cfs)	= 51.76
Q catchment (cfs)	= 0.00	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 35.79	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 35.79	Ponding width (ft)	= N/A

LINE 2 / Q = 3.72 / HT = 15 / WID = 15 / N = .011 / L = 45 / JLC = 1

SS#1-2A TO SS#1-2 / DNLN = 1

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	78.65	15.00	75.50	3.03	78.79	0.00	4.25	1.23
UPSTRM	78.89	15.00	76.00	3.03	79.04	0.00	1.75	1.23

Drainage area (ac)	= 1.60 -v, 1.8	Slope of invert (%)	= 1.1111
Runoff coefficient	= 0.40	Slope energy grade line (%)	= 0.5535
Time of conc (min)	= 10.00	Critical depth (in)	= 9.26
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 79.00
Intensity (in/hr)	= 5.81	Upstream surcharge (ft)	= 1.64
Cumulative C*A	= 0.64	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 3.72	Line capacity (cfs)	= 8.04
Q catchment (cfs)	= 3.72	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 0.00	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 3.72	Ponding width (ft)	= N/A

LINE 3 / Q = 24.78 / HT = 24 / WID = 24 / N = .011 / L = 64 / JLC = .9

SS#1-3 TO SS#1-2 / DNLN = 1

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	78.65	24.00	71.50	7.89	79.61	0.00	7.5	3.14
UPSTRM	79.20	24.00	74.20	7.89	80.16	0.00	8.3	3.14

Drainage area (ac)	= 0.46	Slope of invert (%)	= 4.2187
Runoff coefficient	= 0.90	Slope energy grade line (%)	= 0.8595
Time of conc (min)	= 16.34	Critical depth (in)	= 21.61
Inlet time (min)	= 5.00	Natural ground elev. (ft)	= 84.50
Intensity (in/hr)	= 4.82	Upstream surcharge (ft)	= 3.00
Cumulative C*A	= 5.14	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 24.78	Line capacity (cfs)	= 54.90
Q catchment (cfs)	= 2.90	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 29.18	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 32.07	Ponding width (ft)	= N/A

LINE 4 / Q = 22.87 / HT = 24 / WID = 24 / N = .011 / L = 61 / JLC = .8

SS#1-4 TO SS#1-3 / DNLN = 3

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	80.07	24.00	74.20	7.28	80.89	0.00	8.3	3.14
UPSTRM	80.51	24.00	75.00	7.28	81.33	0.00	7.4	3.14

Drainage area (ac)	= 0.52	Slope of invert (%)	= 1.3115
Runoff coefficient	= 0.90	Slope energy grade line (%)	= 0.7320
Time of conc (min)	= 16.20	Critical depth (in)	= 20.32
Inlet time (min)	= 5.00	Natural ground elev. (ft)	= 84.40
Intensity (in/hr)	= 4.84	Upstream surcharge (ft)	= 3.51
Cumulative C*A	= 4.72	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 22.87	Line capacity (cfs)	= 30.61
Q catchment (cfs)	= 3.27	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 25.90	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 29.18	Ponding width (ft)	= N/A

LINE 5 / Q = 20.71 / HT = 24 / WID = 24 / N = .011 / L = 82 / JLC = .8

SS#1-5 TO SS#1-4 / DNLN = 4

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	81.17	24.00	75.00	6.59	81.85	0.00	7.4	3.14
UPSTRM	81.66	24.00	76.00	6.59	82.34	0.00	6	3.14

Drainage area (ac)	= 2.29	Slope of invert (%)	= 1.2195
Runoff coefficient	= 0.90	Slope energy grade line (%)	= 0.6006
Time of conc (min)	= 15.99	Critical depth (in)	= 19.34
Inlet time (min)	= 7.00	Natural ground elev. (ft)	= 84.00
Intensity (in/hr)	= 4.87	Upstream surcharge (ft)	= 3.66
Cumulative C*A	= 4.26 ✓	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 20.71	Line capacity (cfs)	= 29.52
Q catchment (cfs)	= 13.31	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 12.59	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 25.90	Ponding width (ft)	= N/A

LINE 6 / Q = 10.87 / HT = 18 / WID = 18 / N = .011 / L = 235 / JLC = 1

SS#1-6 TO SS#1-5 / DNLN = 5

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	82.20	18.00	76.00	6.15	82.79	0.00	6.5	1.77
UPSTRM	84.01	18.00	81.20	6.15	84.59	0.00	3.5	1.77

Drainage area (ac)	= 1.23 ✓	Slope of invert (%)	= 2.2128
Runoff coefficient	= 0.90	Slope energy grade line (%)	= 0.7670
Time of conc (min)	= 15.36	Critical depth (in)	= 15.09
Inlet time (min)	= 7.00	Natural ground elev. (ft)	= 86.20
Intensity (in/hr)	= 4.95	Upstream surcharge (ft)	= 1.31
Cumulative C*A	= 2.20 ✓	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 10.87	Line capacity (cfs)	= 18.46
Q catchment (cfs)	= 7.15	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 5.44	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 12.59	Ponding width (ft)	= N/A

LINE 7 / Q = 5.44 / HT = 18 / WID = 18 / N = .011 / L = 66 / JLC = 1

SS#1-7 TO SS#1-6 / DNLN = 6

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	84.59	18.00	81.20	3.08	84.74	0.00	3.5	1.77
UPSTRM	84.87	18.00	82.50	3.08	85.01	0.00	1	1.77

Drainage area (ac)	= 3.63	Slope of invert (%)	= 1.9697
Runoff coefficient	= 0.30	Slope energy grade line (%)	= 0.1923
Time of conc (min)	= 15.00	Critical depth (in)	= 10.68
Inlet time (min)	= 15.00	Natural ground elev. (ft)	= 85.00
Intensity (in/hr)	= 5.00	Upstream surcharge (ft)	= 0.87
Cumulative C*A	= 1.09	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 5.44	Line capacity (cfs)	= 17.42
Q catchment (cfs)	= 5.44	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 0.00	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 5.44	Ponding width (ft)	= N/A

HYDRAULIC REPORT FOR

IRONBOUND MINI-STORAGE

SYSTEM #2

AES JOB #7259-3

AES CONSULTING ENGINEERS

5248 OLDE TOWNE ROAD

SUITE #1

WILLIAMSBURG, VA. 23188

REVISED: 7/30/98

Return Period = 10 Yrs
Rainfall file: JCC

Run Date: 08-03-1998
File: 7259-32.ST3

LINE 1 / Q = 97.48 / HT = 42 / WID = 42 / N = .011 / L = 88 / JLC = 1

SS#2-2 TO SS#2-1 / Outfall

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	67.54	18.47	66.00	23.93	76.43	41.69	-4.5	4.07
UPSTRM	71.54	18.47	70.00	23.93	80.43	41.69	4.5	4.07

Drainage area (ac)	= 0.00	Slope of invert (%)	= 4.5455
Runoff coefficient	= 0.00	Slope energy grade line (%)	= 4.5455
Time of conc (min)	= 16.02	Critical depth (in)	= 37.17
Inlet time (min)	= 0.00	Natural ground elev. (ft)	= 78.00
Intensity (in/hr)	= 4.86	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 20.05	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 97.48	Line capacity (cfs)	= 253.50
Q catchment (cfs)	= 0.00	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 100.19	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 100.19	Ponding width (ft)	= N/A

Note: Normal depth assumed

LINE 2 / Q = 97.78 / HT = 42 / WID = 42 / N = .011 / L = 70 / JLC = 1

SS#2-3 TO SS#2-2 / DNLN = 1

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	80.43	42.00	70.00	10.16	82.03	0.00	4.5	9.62
UPSTRM	80.90	42.00	74.50	10.16	82.51	0.00	3	9.62

Drainage area (ac)	= 0.00	Slope of invert (%)	= 6.4286
Runoff coefficient	= 0.00	Slope energy grade line (%)	= 0.6764
Time of conc (min)	= 15.91	Critical depth (in)	= 37.17
Inlet time (min)	= 0.00	Natural ground elev. (ft)	= 81.00
Intensity (in/hr)	= 4.88	Upstream surcharge (ft)	= 2.90
Cumulative C*A	= 20.05	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 97.78	Line capacity (cfs)	= 301.47
Q catchment (cfs)	= 0.00	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 100.19	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 100.19	Ponding width (ft)	= N/A

LINE 3 / Q = 98.46 / HT = 42 / WID = 42 / N = .011 / L = 160 / JLC = 1

SS#2-4 TO SS#2-3 / DNLN = 2

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	82.51	42.00	74.50	10.24	84.13	0.00	3	9.62
UPSTRM	83.60	42.00	79.00	10.23	85.23	0.00	2.5	9.62

Drainage area (ac)	= 0.00	Slope of invert (%)	= 2.8125
Runoff coefficient	= 0.00	Slope energy grade line (%)	= 0.6858
Time of conc (min)	= 15.65	Critical depth (in)	= 37.17
Inlet time (min)	= 0.00	Natural ground elev. (ft)	= 85.00
Intensity (in/hr)	= 4.91	Upstream surcharge (ft)	= 1.10
Cumulative C*A	= 20.05	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 98.46	Line capacity (cfs)	= 199.40
Q catchment (cfs)	= 0.00	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 100.19	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 100.19	Ponding width (ft)	= N/A

LINE 4 / Q = 99.95 / HT = 42 / WID = 42 / N = .011 / L = 348 / JLC = .75

SS#2-5 TO SS#2-4 / DNLN = 3

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	85.23	42.00	79.00	10.39	86.91	0.00	2.5	9.62
UPSTRM	87.69	42.00	82.50	10.39	89.37	0.00	1.19	9.62

Drainage area (ac)	= 0.00	Slope of invert (%)	= 1.0057
Runoff coefficient	= 0.00	Slope energy grade line (%)	= 0.7068
Time of conc (min)	= 15.09	Critical depth (in)	= 37.17
Inlet time (min)	= 0.00	Natural ground elev. (ft)	= 87.20
Intensity (in/hr)	= 4.98	Upstream surcharge (ft)	= 1.69
Cumulative C*A	= 20.05	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 99.95	Line capacity (cfs)	= 119.24
Q catchment (cfs)	= 0.00	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 100.19	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 100.19	Ponding width (ft)	= N/A

LINE 5 / Q =100.19 / HT = 42 / WID = 42 / N = .011 / L = 56 / JLC = 1

SS#2-6 TO SS#2-5 / DNLN = 4

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	88.95	42.00	82.50	10.42	90.63	0.00	1.19	9.62
UPSTRM	91.03	42.00	85.75	10.41	92.71	0.00	1.25	9.62

Drainage area (ac)	= 40.10	Slope of invert (%)	= 5.8036
Runoff coefficient	= 0.50	Slope energy grade line (%)	= 0.7102
Time of conc (min)	= 15.00	Critical depth (in)	= 37.82
Inlet time (min)	= 15.00	Natural ground elev. (ft)	= 90.50
Intensity (in/hr)	= 5.00	Upstream surcharge (ft)	= 1.78
Cumulative C*A	= 20.05	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 100.19	Line capacity (cfs)	= 286.44
Q catchment (cfs)	= 100.19	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 0.00	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 100.19	Ponding width (ft)	= N/A

HYDRAULIC REPORT FOR

IRONBOUND RD MINI STORAGE

SYSTEM #3

AES JOB #7259-3

AES CONSULTING ENGINEERS

5248 OLDE TOWNE ROAD

SUITE #1

WILLIAMSBURG, VA. 23188

APRIL 22,1998

Return Period = 10 Yrs
Rainfall file: JCCN

Run Date: 04-22-1998
File: SYSTEM3.ST3

LINE 1 / Q = 3.27 / HT = 15 / WID = 15 / N = .013 / L = 40 / JLC = .9

SS#3-1 SS#3-2 / Outfall

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	79.31	3.77	79.00	13.54	82.16	13.01	-1.25	0.24
UPSTRM	87.87	3.77	85.00	13.54	90.72	13.01	3.25	0.24

Drainage area (ac)	= 0.67	Slope of invert (%)	=15.0000
Runoff coefficient	= 0.70	Slope energy grade line (%)	=15.0000
Time of conc (min)	= 5.00	Critical depth (in)	= 8.68
Inlet time (min)	= 5.00	Natural ground elev. (ft)	= 89.50
Intensity (in/hr)	= 6.97	Upstream surcharge (ft)	= 1.62
Cumulative C*A	= 0.47	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 3.27	Line capacity (cfs)	= 25.01
Q catchment (cfs)	= 3.27	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 0.00	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 3.27	Ponding width (ft)	= N/A

Note: Normal depth assumed

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project IRONBOUND MINI-STORAGE (#7259-3)

Basin # 1 Location _____

Total area draining to basin: 10.87 acres.

Basin Volume Design

Wet Storage:

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

   67 cu. yds. x 10.87 acres = 728 cu. yds. (19,664 CF)

2. Available basin volume = 1724 cu. yds. at elevation 74.5. (From storage - elevation curve) (46,560 CF)

3. Excavate 637 cu. yds. to obtain required volume*.

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

4. Available volume before cleanout required.

   33 cu. yds. x 10.87 acres = 359 cu. yds. (9685 CF)

5. Elevation corresponding to cleanout level = 70.9.

   (From Storage - Elevation Curve)

6. Distance from invert of the dewatering orifice to cleanout level = 3.6 ft. (Min. = 1.0 ft.)

1724 CU YDS > 1456 CU. YDS

Dry Storage: (NOT REQ'D, NP > WET & DRY STORAGE COMBINED)

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

   67 cu. yds. x — acres = — cu. yds.

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

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

9. Diameter of dewatering orifice = ~ in.

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

Preliminary Design Elevations

11. Crest of Riser = 77.0

Top of Dam = 80.0

Design High Water = 76.1

Upstream Toe of Dam = 70.0

Basin Shape

12. Length of Flow / Effective Width — L / We = 160 / 80 = 2

If > 2, baffles are not required ✓

If < 2, baffles are required _____

Runoff

13. Q_2 = 50.4 cfs (From Chapter 5)

14. Q_{25} = 70.1 cfs (From Chapter 5)

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2$ = 50.4 cfs. (riser and barrel)

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

16. With emergency spillway:

Assumed available head (h) = 1.5 ft. (Using Q_2)

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

Without emergency spillway:

Assumed available head (h) = — ft. (Using Q_{25})

h = Design High Water Elevation - Crest of Riser Elevation

17. Riser diameter (D_r) = 36 in. Actual head (h) = 0 ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = 68 ft.

Head (H) on barrel through embankment = 6 ft.

(From Plate 3.14-7).

19. Barrel diameter = 15 in.

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

20. Trash rack and anti-vortex device

Diameter = 54 inches.

Height = 17 inches.

(From Table 3.14-D).

Emergency Spillway Design

21. Required spillway capacity $Q_e = Q_{25} - Q_p$ = 0 cfs.

22. Bottom width (b) = 10 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) = 4.5 ft.

Slope of upstream face of embankment (Z) = 3 :1.

Slope of principal spillway barrel (S_b) = 5.88 %

Length of barrel in saturated zone (L_s) = 36 ft.

24. Number of collars required = 2 dimensions = 3.5' x 3.5' (16' SPACING)

(from Plate 3.14-12).

Final Design Elevations

25. Top of Dam = 80.0

Design High Water = 76.1

Emergency Spillway Crest = 78.5

Principal Spillway Crest = 77.0

Dewatering Orifice Invert = N/A

Cleanout Elevation = 70.9

Elevation of Upstream Toe of Dam or Excavated Bottom of "Wet Storage Area" (if excavation was performed) = 70.0

NOTE: TRAP #2

REQ'D 2.96 ac x 67 cu YDS/ac = 198 cu YDS (5355 CF)

WET & DRY ⇒ 396 cu. YDS (10,710 CF)

PROVIDED $\frac{100' \times 90'}{2} \times 2.5 \Rightarrow 11,250$ CF

11,250 > 10,710 OK

ROADSIDE DITCH DESIGN

PROJECT IRONBOUND MINI-STORAGE
DATE 9/4/98
PROJ# 7259-E

TC = 10 MIN I_{10} = 6.0 IN/HR I_2 = 4.5 IN/HR C = 0.45

NAME OF STREET —

FROM STATION (DIRECTION	TO STATION OF FLOW)	LEFT OR RIGHT	A AC	Q_2= CI_2A CFS	CUMULA Q_2 CFS	AVG SLOPE FT/FT	ACTUAL VEL_2 FPS	ALLOW VEL_2 FPS	LINING TYPE	Q_{10}= $CI_{10}A$ CFS	CUM Q_{10} CFS	ACT VEL_{10} FPS	DEPTH OF $FLOW_{10}$ IN.	REMARKS	
BEHIND BLDG F			0.11	0.22	0.22	.0133	1.10		GRASS	0.29	0.29	1.25	3.6"	GRASS V-DITCH	3:1 SS
			0.23	0.47	0.69	.090	2.90		SC-3	0.63	0.92	3.20	3.9"	SC-3 LINED	
BEHIND			0.66	1.74	1.74	.0433	2.80		GRASS	2.32	2.32	3.30	6.0"	GRASS V-DITCH	3:1 SS
BLDG G			0.76	1.54	3.28	.0433	3.50		SC-3	2.05	4.37	3.90	7.6"	SC-3 LINED	

IRONBOUND MINI-STORAGE
#7259-3

TABLE 3

WORKSHEET FOR BMP POINT SYSTEM

A. STRUCTURAL BMP POINT ALLOCATION

	BMP	BMP Points		Fraction of Site Served by BMP		Weighted BMP Points
POND #1 COMBINATION	DESIGN #6 (WET) / DESIGN #2 (EXT. DET)	10	x	9.45/12.4 = 0.762	=	7.62
POND #2	DESIGN #	6	x	2.96/12.4 = 0.149	=	1.43
			x		=	
			x		=	

TOTAL WEIGHTED STRUCTURAL BMP POINTS: _____

B. NATURAL OPEN SPACE CREDIT

Fraction of Site		Natural Open Space Credit (0.1 per 1%)		Points for Natural Open Space
1.24/12.4 = 9.76%	x	9.76(0.1) = 0.976	=	0.976

C. TOTAL WEIGHTED POINTS

Structural BMP Points	+	Natural Open Space Points	=	TOTAL
9.05	+	0.976	=	10.0371 0 ✓

DA TO POND #1 = 10.9

7.4 AC ON-SITE @ 0.6

1.7 AC OFFSITE @ 0.3
EQ OFFSITE = 0.85 AC

1.8 AC OFFSITE @ 0.4
EQ OFFSITE = 1.2 AC

RECEIVED JUL 3 2000

Schnabel Engineering

Schnabel Engineering Associates, Inc.
609 Industry Drive
Hampton, VA 23661-1316
757-827-7207 • Fax 757-838-0995

7-5-00 12:30

MR D. Cook → 1-757-259-4032

June 28, 2000

Mr. Bernard J. Levey
Ironbound Road Associates, L.L.C.
8513 Staples Mill Road
Richmond, Virginia 23228

Subject: Project 993723, Earthwork Observation and Testing of the BMP, Ironbound Mini Storage, Ironbound Road and Ironbound Circle, James City County, Virginia

Dear Mr. Levey:

We have been requested by the contractor, George Nice and Sons to provide a letter of our observations during the construction of the earth embankment for the site BMP. They have requested this letter in response to a request for information from James City County Codes Compliance.

Subgrades for the BMP embankment were observed by engineering personnel from our office on July 26, 1999. Subgrades for the embankment were tested by probing with a penetrometer at selected locations. The subgrades observed were considered suitable for placement of compacted embankment fill at the grades excavated to by the contractor.

Field density tests for the embankment were performed between July 26 and August 2, 1999. The field density test results indicate relative compaction to at least 95 percent of the maximum dry density per ASTM D-698 except the initial bridge lifts in the key trench, which were compacted to at least 93 percent. Based on the field density test results and our observations

during fill placement, we believe that the fill represented by the test results has been substantially compacted in accordance with the project specifications and our recommendations.

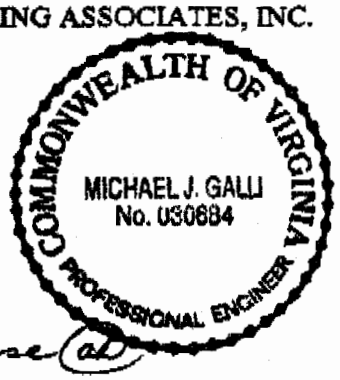
We have performed our services in accordance with generally accepted geotechnical engineering practice and make no warranties, either express or implied, as to the professional advice provided under the terms of our agreement and included in this report.

We are pleased to be of service on this project. Please do not hesitate to contact us if you have any questions concerning this report.

Very truly yours,
SCHNABEL ENGINEERING ASSOCIATES, INC.

M. J. Galli

Michael J. Galli, P.E.
Project Engineer



Gilbert T. Seese

Gilbert T. Seese, P.E.
Senior Associate

MJG:GTS:kgr

c: Cal Holcombe, AIA

George Nice & Sons (2)
Attn: Cliff Hatfield

DEVELOPMENT MANAGEMENT

101-E MOUNTS BAY ROAD, P.O. BOX 8784, WILLIAMSBURG, VIRGINIA 23187-8784
(757) 253-6671 Fax: (757) 253-6850 E-MAIL: devtman@james-city.va.us

CODE COMPLIANCE
(757) 253-6626
codecomp@james-city.va.us

ENVIRONMENTAL DIVISION
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PLANNING
(757) 253-6685
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COUNTY ENGINEER
(757) 253-6678

INTEGRATED PEST MANAGEMENT
(757) 253-2620

June 22, 2000

AES Consulting Engineers
5428 Olde Towne Road, Suite 1
Williamsburg, Va. 23188
Attn: Mr. Frank Sluss

Re: Ironbound Mini-Storage (Plan No. SP-45-98)
Ironbound Road
Stormwater Management/BMP Facilities # 1 & # 2
(MC 032) & (MC033)

Dear Mr. Sluss:

The Environmental Division has reviewed record drawings submitted to our office for the above referenced project. The record drawings dated May 2000 provide as-built information for two (2) stormwater management/BMP detention facilities located in the south portion of the site and their associated onsite storm drainage systems. The two facilities consist of a wet pond (Pond # 1) and a dry-type detention pond (BMP Pond # 2).

Based on our review of the drawings and a concurrent field observation, the following items must be addressed prior to release of the developer's surety instrument for the stormwater management/BMP facilities:

1. In accordance with the Sheet 13, Note # 18 of the approved plan, construction certifications for the BMP's were not provided. This is especially important for the Wet Pond # 1 which has an engineered embankment.

2. Add Sheet # 14 of the approved design plan set, annotated as necessary, to the record drawing set. This sheet shows specific profiles and details relative to the two facilities and maintenance requirements for the facilities.

3. Wet Pond # 1. The as-built elevation of 66.26 for the pond barrel outlet (end section) would result in an as-built pond barrel slope different from that of the approved design plan (4.26 percent). Make this correction on the record drawings as necessary.

4. BMP # 2 is a timber crib wall dry-type detention facility. Based on our field observation, standing water was present in the bottom of the facility. This is indicative of sediment or debris accumulations around the water quality control orifice. The orifice for this structure is a 1 inch size opening through the timber crib wall. The orifice has an upstream protection appurtenance consisting of a 12 inch perforated riser, 12 inch perforated barrel and a Class A1 riprap/VDOT No. 57 stone filter. Sediment and debris must be removed and the water quality control orifice

mechanism cleaned and/or replaced prior to acceptance.

5. A professional seal and signature is required on each of the record drawing plan sheets to match that of the record drawing status indicated in the revision blocks (date May 2000).

Please contact me at 757-253-6639 if you have any further comments or questions relative to record drawing or construction certification requirements for these facilities.

Sincerely,

Scott J. Thomas, P.E.
Civil Engineer
Environmental Division

G:\SWMProg\AsBuilts\SP-45-98.cert

WILLIAMSBURG
ENVIRONMENTAL
GROUP, INC.

Environmental Consultants

November 17, 2000

Mr. Wayland N. Bass
James City County
P.O. Box 8784
Williamsburg, Virginia 23187-8784

Re: Ironbound Road Mini Storage BMP Vegetation Monitoring – 2000
James City County, Virginia
(USACE Project Number: 98-5480)

Dear Mr. Bass:

This correspondence provides the first report in a five-year wetland monitoring study of the Ironbound Road Mini Storage Site, performed by Williamsburg Environmental Group, Inc. (WEG). The approximately 12-acre site is located south of Route 615, and west of the intersection of Route 615 and Route 616.

The monitoring activities associated with this project were performed in accordance with the special conditions of the authorization (USACE Project Number: 98-5480) issued by your office and dated February 16, 1999. This report details the vegetation monitoring results obtained during an August 21, 2000 site visit.

Permit Requirements

On February 16, 1999, the Corps issued a Nationwide Permit (NWP) #26 verification (98-5480) to Bernard S. Levey authorizing placement of fill into 0.97-acres of non-tidal, headwater wetlands. The permit was conditioned to require attenuation of surface runoff from and around the property, a contribution to the Virginia Wetlands Restoration Fund, and monitoring wetlands immediately downstream of the project site, including transplanted individuals of least trillium (*Trillium pusillum* var *virginianum*) and New Jersey rush (*Juncus caesariensis*) for a period of five (5) years. Additionally, the permit conditions require the applicant to install a toe seep through the BMP dam. A permanent monitoring station was established by WEG immediately downstream of the existing BMP in order to assess the post-construction plant community composition and dominance. The monitoring station will also be used as a permanent photographic station.

Monitoring Methods

A representative sample plot located approximately fifty-five (55) feet downstream from the BMP dam was chosen, and a one inch PVC pipe was installed to mark the center of the plot. A 30-foot radius plot was marked off using red flags. Three random points

were then chosen within the plot and marked with wooden stakes. A woody species stem count was conducted within the primary plot (30-foot radius), and at each of the three secondary plots percent cover in the herbaceous layer was estimated within a one meter square quadrat. In addition, canopy coverage in the overstory was measured using a densiometer, which is expressed as an average of four densiometer readings taken from four directions (north, south, east, west) at the center of the 30-foot radius plot. density was calculated using a canopy densiometer. Finally, diameter at breast height (dbh) was obtained for all canopy species within the primary plot using a conventional dbh tape.

Monitoring Results

WEG visited the site at peak growing season (August 21) during the 2000 sampling season. The vegetation data are provided in Tables 1 through 3 (attachment). Photo-documentation of the pre-construction condition (January 1998) and current condition (August 2000) are provided as an attachment. The following paragraphs summarize our findings at the site during the first-year of monitoring efforts.

Ironbound Road Mini Storage Site

Based on the data collected in August 2000, the condition of the wetland area below the dam site is characterized by a predominantly hardwood community consisting of four well-developed strata (canopy, subcanopy, shrub, herbaceous). Densiometer readings from the centerpoint of the permanent sampling plot indicate that overstory (canopy, subcanopy) provided 96% cover with isolated canopy gaps. The understory was characterized by an open shrub and somewhat open herbaceous layer. Coverage estimates from the three random one-meter square quadrats ranged from 26.5% to 94% (Table 1), with common species such as microstegium (*Microstegium vimineum*) and sensitive fern (*Onoclea sensibilis*). Woody stem counts indicate a total of 88 stems within the 30-foot radius plot (Table 2), with red maple (*Acer rubrum*) and paw paw (*Asimina triloba*) as co-dominants. Diameter at breast height (dbh) measurements of individual canopy trees are presented in Table 3.

Wetland hydrology indicators within the permanent monitoring station were also noted during the August 21, 2000 site visit. Saturation to the soil surface, crayfish burrows, sediment deposits, water stained leaf-litter, and scattered driftlines were documented. Surface soil saturation was also documented at the base on the BMP dam.

Graylin Woods Transplantation Site

On July 24, 1998, WEG assisted Dr. Donna Ware, Curator of the Herbarium at the College of William and Mary, in relocating several rare plant species from the site to the Graylin Woods Subdivision in the Mill Creek drainage basin. Among the plants relocated were the Virginia least trillium (*Trillium pusillum* var. *virginianum*) and turk's-cap lily (*Lilium superbum*). New Jersey rush (*Juncus caesariensis*), another species of

concern, was not found on the site during the relocation effort. However, a plot of soil was removed and relocated from a point on the site where the plant had been historically identified and marked. This was done in an attempt to salvage any New Jersey rush seeds that may have been present and viable in the seedbank.

The Virginia least trillium transplantation site has been monitored over the past two growing seasons by an associate of Dr. Ware (Ms. Carolyn Will). Based on recent communication with Dr. Ware, a noticeable increase in Virginia least trillium population density has been documented over the two-year period. Dr. Ware has also informed us that the population increases have included an increase in the number of mature individuals (three leaves) as well as juveniles (one leaf). In addition, some flowering specimens were observed in 2000.

Conclusions

The vegetation monitoring data collected on the Ironbound Mini Storage site and presented in this report will be used as a baseline for comparison during future monitoring events as required in the Corps permit. In particular, the condition of the understory is viewed as an important factor in the overall analysis of the community, given that herbaceous and scrub/shrub colonizers often provide the best indicator of current conditions and community shifts. Additionally, indicators of stress or mortality among trees in the overstory that might indicate changes in the hydrologic regime will be documented.

Data collected by Dr. Donna Ware and associates on the Graylin Woods Transplantation site have indicated that the Virginia least trillium transplantation that occurred in 1998 was successful, with an increase in juvenile and mature individuals over the past two growing seasons.

If you have any questions regarding the results of this study, please feel free to call at your convenience.

Sincerely,

Douglas A. DeBerry
Senior Ecologist

attachments

Table 1. Vegetation Cover Plots- Ironbound Road

Plot 1 Scientific Name	Common Name	IND	% cover
Acer rubrum	Red Maple	FAC	0.5
Parthenocissus quinquefolia	Virginia Creeper	FACU	3
Chasmanthium laxum	Long-leaf Spikegrass	FAC	3
Impatiens capensis	Touch-Me-Not	FACW	0.5
Onoclea sensibilis	Sensitive Fern	FACW	10
Mitchella repens	Partridge Berry	FACU	10
Panicum dichotomiflorum	Fall Panicum	FACW-	3
Arisaema triphyllum	Jack in the Pulpit	FACW-	0.5
Rotala ramosior	Lowland Rotala	OBL	0.5
Microstegium vimineum	Microstegium	FAC	20
		Total Coverage:	**31**

Plot 2 Scientific Name	Common Name	IND	% cover
Acer rubrum	Red Maple	FAC	0.5
Parthenocissus quinquefolia	Virginia Creeper	FACU	0.5
Chasmanthium laxum	Long-leaf Spikegrass	FAC	3
Onoclea sensibilis	Sensitive Fern	FACW	20
Mitchella repens	Partridge Berry	FACU	3
Arisaema triphyllum	Jack in the Pulpit	FACW-	0.5
Microstegium vimineum	Microstegium	FAC	37.5
Ilex opaca	American Holly	FACU+	3
Carpinus caroliniana	Ironwood	FAC	3
Lindera benzoin	Spicebush	FACW-	10
Asimina triloba	Pawpaw	FACU+	3
Hydrocotyl umbellata	Penny Wort	OBL	10
		Total Coverage:	**94**

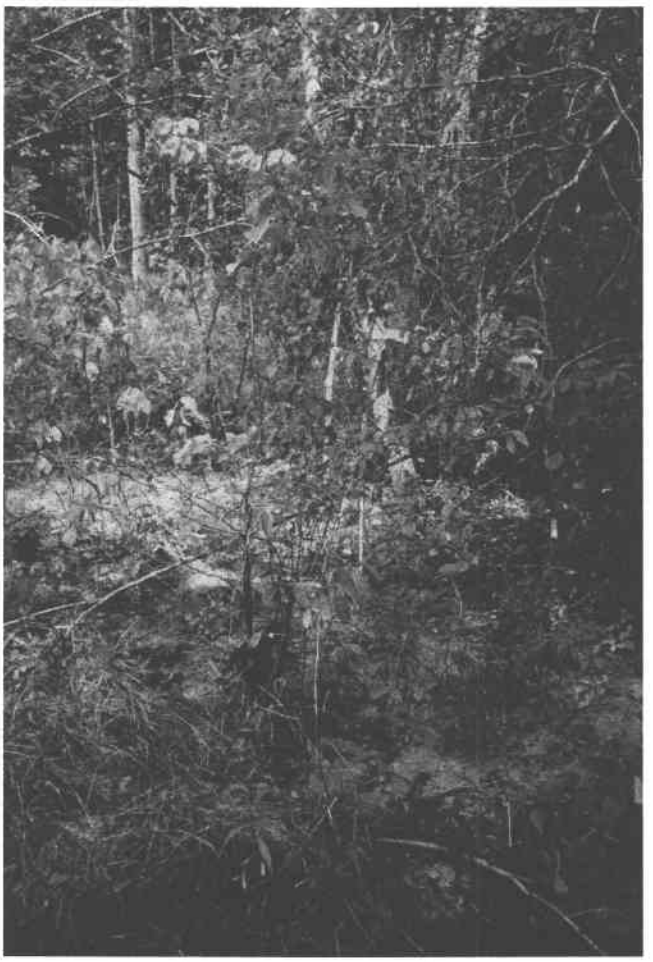
Plot 3 Scientific Name	Common Name	IND	% cover
Acer rubrum	Red Maple	FAC	0.5
Chasmanthium laxum	Long-leaf Spikegrass	FAC	3
Onoclea sensibilis	Sensitive Fern	FACW	10
Carpinus caroliniana	Ironwood	FAC	3
Smilax rotundifolia	Greenbrier	FAC	10
		Total Coverage:	**26.5**

Table 2. Woody Stem Count - Ironbound Road

Scientific Name	Common Name	IND	# in plot
Acer rubrum	Red Maple	FAC	36
Fraxinus pennsylvanica	Green Ash	FACW	4
Liquidambar styraciflua	Sweetgum	FAC	2
Ilex opaca	American Holly	FACU+	4
Vaccinium corymbosum	Highbush Blueberry	FACW-	3
Asimina triloba	Pawpaw	FACU+	25
Carya tomentosa	Mockernut Hickory	NI	1
Diospyros virginiana	Persimmon	FAC-	1
Carpinus caroliniana	Ironwood	FAC	5
Magnolia virginiana	Sweet Bay	FACW+	5
Alnus serrulata	Tag Alder	OBL	2
		Total Woody Stems In Plot:	**88**

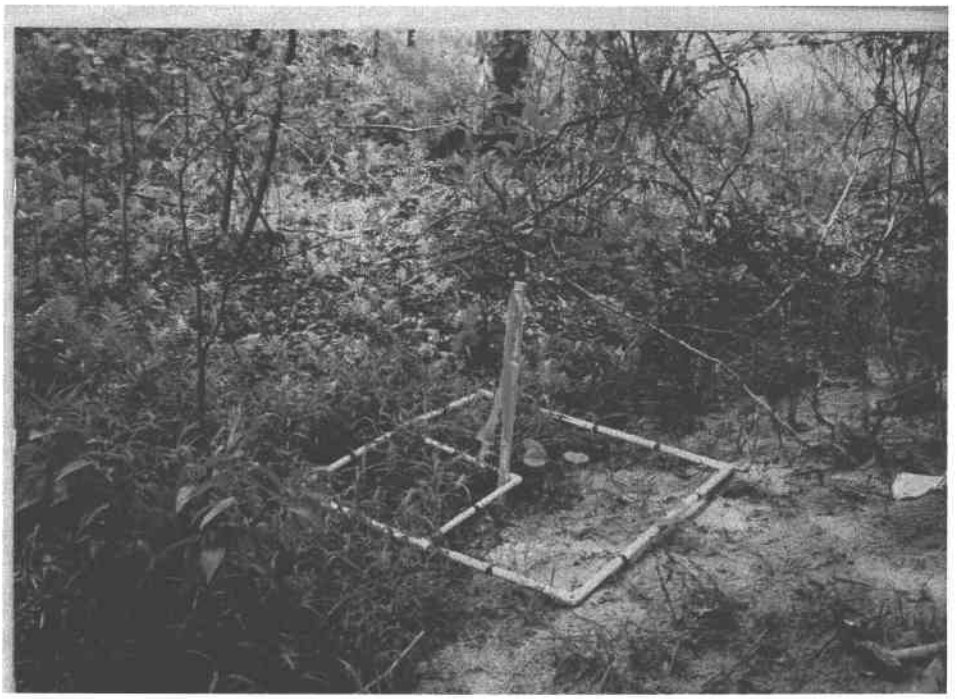
Table 3. Diameter at Breast Height (dbh) - Ironbound Road

Scientific Name	Common Name	IND	dbh (in)
Acer rubrum	Red Maple	FAC	6.40
Acer rubrum	Red Maple	FAC	7.10
Fraxinus pennsylvanica	Green Ash	FACW	10.00
Fraxinus pennsylvanica	Green Ash	FACW	9.10
Fraxinus pennsylvanica	Green Ash	FACW	6.20
Asimina triloba	Pawpaw	FACU+	3.40
Liquidambar styraciflua	Sweetgum	FAC	16.40
Liquidambar styraciflua	Sweetgum	FAC	12.50
Liquidambar styraciflua	Sweetgum	FAC	5.10
Diospyros virginiana	Persimmon	FAC-	6.75



Photograph 1: Center of permanent monitoring plot (August 2000).

Photograph 2: Representative view of plot looking downstream (August 2000).



Photograph 3: Random, one-meter square cover plot within the permanent 30-foot radius plot.

Photograph 4: View from the plot looking upstream at the BMP dam location (August 2000).

WILLIAMSBURG ENVIRONMENTAL GROUP, INC.
Environmental Consultants

December 14, 2004

Mr. Wayland N. Bass
James City County
P.O. Box 8784
Williamsburg, Virginia 23187-8784

Re: Ironbound Road Mini Storage BMP Vegetation Monitoring – 2004
James City County, Virginia
(USACE Project Number: 98-5480)
WEG Job # 1111

Dear Mr. Bass:

This correspondence provides the fifth and final report in a five-year wetland monitoring study of the Ironbound Road Mini Storage Site, performed by Williamsburg Environmental Group, Inc. (WEG). The approximately 12-acre site is located south of Route 615 and west of the intersection of Route 615 and Route 616.

The monitoring activities associated with this project were performed in accordance with the special conditions of the authorization (USACE Project Number: 98-5480) issued by the U.S. Army Corps of Engineers and dated February 16, 1999. This report details the vegetation monitoring results obtained during an October 7, 2004 site visit.

Permit Requirements

On February 16, 1999, the Corps issued a Nationwide Permit (NWP) #26 verification to Bernard S. Levey authorizing placement of fill into 0.97-acres of non-tidal, headwater wetlands. The permit was conditioned to require attenuation of surface runoff from and around the property, a contribution to the Virginia Wetlands Restoration Fund, and monitoring wetlands immediately downstream of the project site, including transplanted individuals of Virginia least trillium (*Trillium pusillum* var. *virginianum*) and New Jersey rush (*Juncus caesariensis*) for a period of five (5) years. Additionally, the permit conditions require the applicant to install a toe seep through the BMP dam. A permanent monitoring station was established by WEG immediately downstream of the existing BMP in order to assess the post-construction plant community composition and dominance. The monitoring station was also used as a permanent photographic station.

Monitoring Methods

A representative sample plot located approximately fifty-five (55) feet downstream from the BMP dam was chosen, and a one-inch PVC pipe was installed to mark the center of the plot. A 37.5-foot radius was marked off using orange flags. Three random points

were then chosen within the plot and marked with wooden stakes. A woody species stem count was conducted within the primary plot (37.5-foot radius), and herbaceous layer percent cover was estimated within a 1-m^2 quadrat at each secondary cover plot. Canopy coverage in the overstory was measured using a densiometer, which is expressed as an average of four canopy-closure readings taken from four directions (north, south, east, west) at the center of the 37.5-foot radius plot. Additionally, a Sorenson Similarity Index (SI) was calculated between 2004 and 2000 stem density data, to analyze potential community changes over time. The index formula is as follows: 2A / B+C, where A is the number of species two years have in common, B is the number of total species in the first year, and C is the number in the second year (Mueller-Dombois and Ellenburg 1974). If an index value above 0.50 is observed, the two communities are considered similar.

Monitoring Results

WEG visited the site during the 2004-sampling season. The vegetation data are provided in Tables 1-3 (attachment). Photo-documentation of the current condition (October 2004) is provided as an attachment. The following paragraphs summarize our findings at the site during the fifth year of monitoring efforts.

Ironbound Road Mini Storage Site

Based on the data collected on October 7, 2004 the condition of the wetland area below the dam site is characterized by a predominantly hardwood community consisting of four well-developed strata (canopy, subcanopy, shrub, herbaceous). Densiometer readings from the centerpoint of the permanent sampling plot indicate that overstory (canopy, subcanopy) provided 90% cover with isolated canopy gaps. An open shrub and somewhat open herbaceous layer characterized the understory. Coverage estimates from the three secondary plots ranged from 112.5 to 79.5% (Table 1). Prevalence Index values for the secondary plots averaged 2.23 for the 2004 growing season, while in 2000 there was a PI average of 2.72 (Table 3). Common herbaceous species encountered include Lizard's tail (*Saururus cernus)*, netted chainfern (*Woodwardia areolata*), and Napalese browntop (*Microstegium vimineum)*. Woody stem counts (Table 2) totaled 253 stems within the 37.5-foot radius plot (1/10 acre). A SI value of 0.64 was calculated when comparing data from 2000 to 2004, indicating no significant shifts in community structure over the five-year study period (Table 2). Common wetland woody species include spicebush (*Lindera benzoin*), tag alder (*Alnus serrulata*), and sweet pepperbush (*Clethra alnifolia*).

Graylin Woods Transplantation Site

On July 24, 1998, WEG assisted Dr. Donna Ware, former Curator of the Herbarium at the College of William and Mary, in relocating several rare plant species from the site to the Graylin Woods Subdivision in the Mill Creek drainage basin. Among the plants relocated were the Virginia least trillium (*Trillium pusillum* var. *virginianum*) and turk's-

cap lily (*Lilium superbum*). New Jersey rush (*Juncus caesariensis*), another species of concern, was not found on the site during the relocation effort. However, a plot of soil was removed and relocated from a point on the site where the plant had been historically identified and marked. This was done in an attempt to salvage any New Jersey rush seeds that may have been present and viable in the seedbank. Ms. Carolyn Will has monitored the Virginia least trillium transplantation site over the past four growing seasons. Based on recent communication with Ms. Will, the transplantation site was affected by Hurricane Isabel in 2003, leaving several trees uprooted. This has disturbed the soil conditions to some degree, which in turn has negatively affected the transplants. Ms. Will also cites deer depredation as a concern. Based on her 2004 data, the site supports three large and six smaller Virginia least trillium individuals. Turk's cap lily was also present, although the lily have been severely impacted by deer grazing. Ms. Will has erected deer exclosures to help with the problem and perhaps stabilize the transplant colony so that recovery may be accommodated.

Conclusions

The results for the 2004 vegetation monitoring, in addition to the previous four years, do not indicate any major changes in community structure over the five year monitoring study. Data collected by Ms. Carolyn Will on the Graylin Woods Transplantation site have indicated that, due to natural disturbances, the Virginia least trillium and turk's cap lily transplants have declined in numbers since the 2000-2001 growing seasons. Deer exclosures have been placed around individuals to hopefully alleviate predation as a disturbance factor.

If you have any questions regarding the results of this study, please feel free to call at your convenience.

Sincerely,

Keith R. Goodwin

Keith R. Goodwin
Ecologist II

Enclosures

Reference

Mueller-Dombois, D., and H. Ellenburg. 1974. Aims and methods of vegetation ecology. John Wiley and Sons, New York, New York.

Table 1. Herbaceous Cover Summary Data

IRONBOUND MINI-STORAGE

2004 GROWING SEASON

Scientific Name	Common Name	IND	1	2	3
Acer rubrum	MAPLE,RED	FAC	0.5		3.0
Alnus serrulata	ALDER,BROOK-SIDE	OBL		10.0	
Dichanthelium dichotomum	WITCHGRASS,CYPRESS	FAC	3.0		
Fraxinus pennsylvanica	ASH,GREEN	FACW	3.0		
Glyceria striata	GRASS,FOWL MANNA	OBL	20.0	3.0	
Itea virginica	WILLOW,VIRGINIA	OBL	3.0		
Lindera benzoin	SPICEBUSH,NORTHERN	FACW-		20.0	0.5
Lonicera japonica	HONEYSUCKLE,JAPANESE	FAC-	10.0	3.0	3.0
Microstegium vimineum	BROWNTOP, NAPALESE	FAC	20.0	37.5	37.5
Rosa palustris	ROSE,SWAMP	OBL	10.0		
Saururus cernuus	TAIL,LIZARD'S	OBL			3.0
Senecio aureus	RAGWORT,GOLDEN	FACW		10.0	
Smilax rotundifolia	GREENBRIER,COMMON	FAC			3.0
Woodwardia areolata	CHAINFERN,NETTED	FACW+	10.0	3.0	62.5
	Total Percent Coverage:		**79.5**	**86.5**	**112.5**
	Prevalence Index:		**2.00**	**2.45**	**2.23**
	Average Prevalence Index:			**2.23**	

Table 2.
Woody Stem Comparison of 2000 to 2004

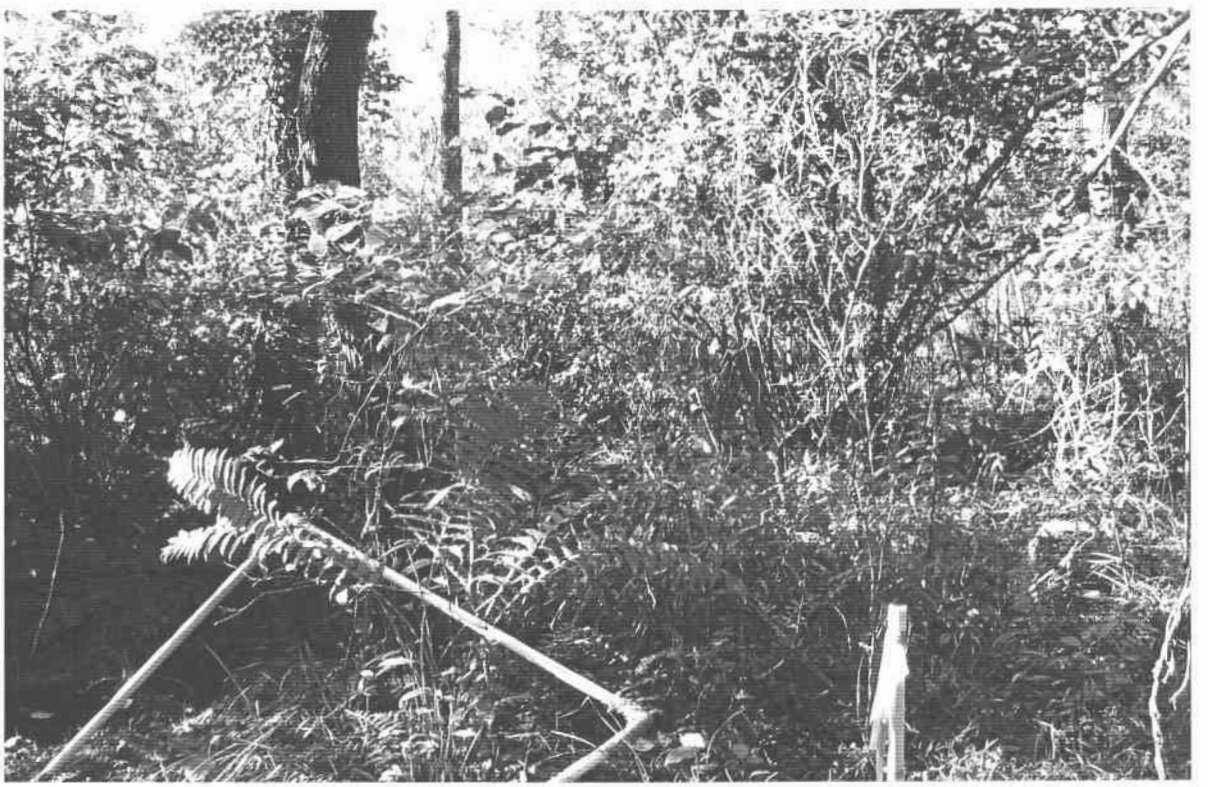
		Stem Counts	
Scientific name	**Common name**	**2004**	**2000**
Acer rubrum	Red maple	3	36
Alnus serrulata	Tag alder	47	2
Asimina triloba	Pawpaw	50	25
Clethra alnifolia	Sweet pepperbush	43	
Carpinus caroliniana	Ironwood		5
Carya tomentosa	Mockernut hickory		1
Diospyros virginiana	Persimmon	1	1
Euonymus americanus	Strawberry bush	1	
Fraxinus pennsylvanica	Green Ash	16	4
Ilex opaca	American holly	14	4
Ilex verticillata	Winterberry	1	
Itea virginica	Sweet spires	2	
Lindera benzoin	Spicebush	32	
Liquidambar styraciflua	Sweetgum	2	2
Magnolia virginiana	Sweet bay	6	5
Rosa multiflora	Multiflora rose	1	
Salix nigra	Black willow	20	
Ulmus americana	American elm	5	
Vaccinium corymbosum	Highbush blueberry	9	3
Total Woody Stems in Plot:		253	88
***Sorenson Similarity Index (2004 - 2000):**		0.64	

*Sorensen Index= 2a / b+c, where a= # spp. in common, b= # spp. in 2004, c= # spp. in 2000.

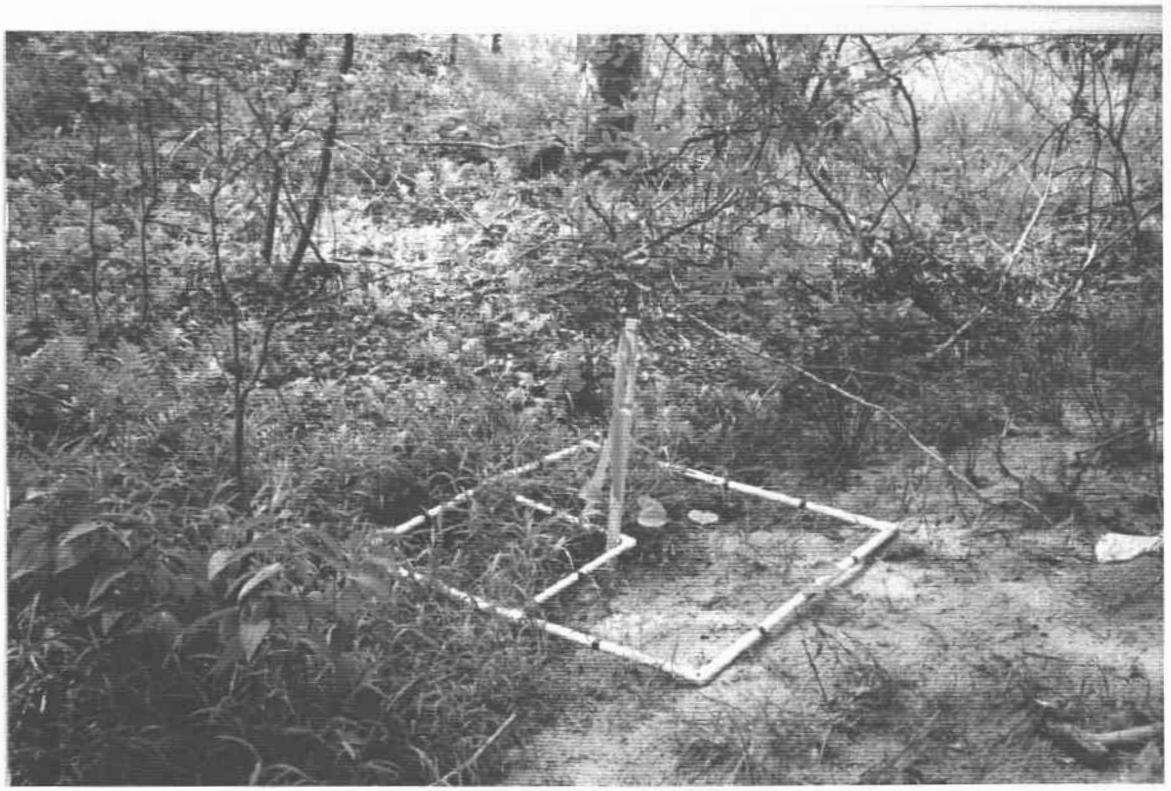
Table 3.
2000 Herbaceous Coverage Estimates

Scientific Name	Common Name	IND	1	2	3
Acer rubrum	Red Maple	FAC	0.5	0.5	0.5
Arisaema triphyllum	Jack in the Pulpit	FACW-	0.5	0.5	
Asimina triloba	Pawpaw	FACU+		3	
Carpinus caroliniana	Ironwood	FAC		3	3
Chasmanthium laxum	Long-leaf Spikegrass	FAC	3	3	3
Dichanthelium dichotomiflorum	Fall Panicum	FACW-	3		
Hydrocotyl umbellata	Pennywort	OBL		10	
Ilex opaca	American Holly	FACU+		3	
Impatiens capensis	Touch-Me-Not	FACW	0.5		
Lindera benzoin	Spicebush	FACW-		10	
Microstegium vimineum	Nepalese Browntop	FAC	20	37.5	
Mitchella repens	Partrigeberry	FACU	10	3	
Onoclea sensibilis	Sensitive Fern	FACW	10	20	10
Parthenocissus quinquefolia	Virginia Creeper	FACU	3	0.5	
Rotala ramosior	Lowland Rotola	OBL	0.5		
Smilax rotundifolia	Greenbrier	FAC			10
		Total Percent Coverage:	**51**	**94**	**26.5**
		Prevalence Index:	**2.98**	**2.58**	**2.62**
		Average Prevalence Index:		**2.72**	

Photograph 1. View looking down stream from BMP dam (October 2004).



Photograph 2. View looking upstream towards BMP dam (October 2004).



Photograph 3. Random, one-meter square cover plot within the permanent 30-foot radius plot (August 2000).

Photograph 4. View looking upstream towards BMP dam (August 2000).

FILE -

RECEIVED FEB [illegible]

The Nature Conservancy®
Saving the Last Great Places

Matthew Maxwell
1-757-253-4850

Boston Satellite Office
201 Devonshire Street, 5th Floor
Boston, Massachusetts 02110-1402
TEL 617 542-1908
FAX 617 482-5866

International Headquarters
4245 North Fairfax Drive
Suite 100
Arlington, Virginia 22203-1606
TEL 703 841-5300
FAX 703 841-1283
www.tnc.org

2-25-99

February 22, 1999

SP-45-98

Mr. Bernard J. Levey
8513 Staples Mill Road
Richmond, VA 23228

RE: Virginia Wetlands Restoration Project 98-5480
Ironbound Road Mini Storage

Dear Mr. Levey:

This letter is to confirm that we have received Mini Storage Special – Ironbound Road Mini Storage check No. 1602 in the amount of $77,300 related to the above-referenced project. We have credited these funds to the Virginia Wetlands Restoration Trust Fund account.

Thank you for your help.

Sincerely,

Philip Tabas /kls

Philip Tabas
Vice President
Director of Land Protection/Attorney
Eastern Region

PT:kls

cc: Greg Culpepper, Army Corps of Engineers
VAFO

U.S. Army Corps of Engineers
Norfolk District, Southern Virginia Regulatory Section
803 Front Street
Norfolk, Virginia 23510

February 16, 1999

Project Number: 98-5480

Waterway: Mill Creek

1. Participant:
Ironbound Road Mini Storage
c/o Mr. Bernard S. Levey
8513 Staples Mill Road
Richmond, VA 23228

2. Authorized Agent:
Williamsburg Environmental Group, Inc.
c/o Mr. Charles R. Roadley, Jr.
3000 Easter Circle
Williamsburg, VA 23188

3. Address of Job Site:
An approximately 12-acre undeveloped parcel fronting on the south side of SR 615, and located approximately 0.45 miles west of the intersection of SR 615 and SR 616 in James City County, Virginia.

4. Project Description:
Construction of the Ironbound Road Mini Storage facility as depicted on the project drawing entitled *Wetland Impact Map, Ironbound Road Mini Storage, James City County, Virginia* dated July 20, 1998 by Williamsburg Environmental Group, Inc. (last revision date of October 09, 1998). The proposed plan of development would result in the loss of approximately 0.97 acres of forested, non-tidal, headwater wetlands. The applicant will compensate for the unavoidable wetland impacts by taking measures to attenuate surface runoff flows from and around the property, and by making a contribution to the Virginia Wetlands Restoration Fund.

5. Findings

This is regarding your request to perform work in the waters of the United States, as described in part 4 above. This activity has been reviewed and found to satisfy the criteria contained in the Corps Nationwide Permit (26), attached. (The Corps Nationwide Permits were published in the Federal Register (61 FR 65874) on December 13, 1996 and the regulations governing their use can be found in 33 CFR 330 published in Volume 56, Number 226 of the Federal Register dated November 22, 1991.)

Provided the following special conditions and the enclosed conditions are met, an individual Department of the Army Permit will not be required. In addition, the Virginia Department of Environmental Quality has waived 401 certification for Nationwide Permit Number 26 for less than 1 acre of wetland impacts. However, a permit may be required from the Virginia Marine Resources Commission, and/or your local wetlands board, and this verification is not valid until you obtain their approval, if necessary. You may contact the Virginia Marine Resources Commission at (757) 247-2200 for further information concerning their permit requirements.

Special Conditions:

1. Flow attenuation: The current plan of development proposes a common outfall point for the onsite stormwater management pond (SWMP) that will treat stormwater generated on the project site and an outfall for a new 42-inch pipe which conveys offsite stormwater from the contributing watershed through the project site (i.e., these flows would bypass the new onsite SWMP). To address our concerns regarding additional secondary impacts to downstream waters of the U.S. as a result of this method of handling onsite and offsite stormwater, the applicant will install a flow attenuation device to be used in combination with a level spreader as generally depicted on the attached drawings which we received from WEG on January 16, 1999 (copies attached). Per WEG, the anticipated cost of design and construction of this flow attenuation device is approximately $10,000. For this particular project we are considering use of the flow attenuation device as a mitigation measure to reduce the likelihood of additional wetland impacts; therefore, the estimated cost of implementing this measure has been subtracted from the Virginia Wetland Restoration Trust Fund contribution rate for this project (see Special Condition #2 below)

2. Use of Virginia Wetland Restoration Trust Fund (VWRTF): In lieu of the loss of 0.97 acres of headwater wetlands due to construction, you have proposed (via letter from WEG dated January 15, 1999) the use of the VWRTF (at a 2:1 compensation ratio for non-tidal forested wetland impacts this would require 1.94 acres of wetland compensation). The VWRTF contribution rate for this project has been determined to be $45,000/acre of wetlands to be created. Using the stipulated contribution rate, the applicant would be required to make a $87,300 contribution; however, in this particular case we have agreed to subtract the cost of the flow attenuation device as described in Special Condition #1 above ($10,000). Therefore, the total VWRTF contribution would be $77,300. **This permit is not valid until the Corps receives proof that you have placed $77,300 with the VWRTF in care of The Nature Conservancy with the expressed intent that the money be used for creation/restoration of wetlands within the Commonwealth of Virginia.** Funds may be sent to: Mr. Phil Tabas, The Nature Conservancy, 5th Floor, 201 Devonshire Street, Boston Mass 02110-1402.

3. Monitoring requirement: On December 31, 1998 WEG provided our office with a copy of a proffer that requires the applicant to pay $6000 to James City County to fund a five (5) year monitoring study of wetlands immediately downstream of the project site and transplanted individuals of Virginia least trillium (*Trillium pusillum* var *virginianum*) and New Jersey rush (*Juncus caesariensis*).

The proffer specifies that this monitoring effort is to be conducted by a qualified environmental consultant. The Corps accepts your offer to include this same monitoring requirement as a special condition of this permit, **and no work in waters of the U.S. is authorized until baseline conditions of the downstream waters of the U.S. (including vegetated wetlands) are properly documented.** A copy of the completed monitoring study must be sent to our office for our records. Our office is more than willing to provide input into parameters that we would like to see monitored over the 5-year study period.

4. Stormwater management dam: Some of the wetlands to be impacted are seepage groundwater discharge areas, which are important because they support base flows to downslope waters of the U.S. (including vegetated wetlands). To minimize secondary impacts to downstream waters (e.g., deprivation of sustaining hydrology), the applicant will install a toe seep through the BMP dam to a level spreader which will be set at a suitable elevation to better ensure continuous discharge to support downstream base flows.

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

If you should decide to modify any aspect of your proposal which would change the primary or secondary impacts to waters of the United States (including vegetated wetlands), you must first apply for and be granted a permit modification.

This verification is valid until September 15, 1999 or for two (2) years, whichever comes first unless the Norfolk District Engineer uses discretionary authority to modify, suspend or revoke this verification. The Chief of Engineers will periodically review the nationwide permits and their conditions and will decide to either modify, reissue or revoke the permits. If the nationwide permit(s) verified in this letter are reissued without modification or if your activity complies with any subsequent nationwide permit, the expiration date of this verification will not change. However, if the nationwide permit(s) verified in the letter are modified or revoked so that the activity listed above would no longer be authorized and you have commenced or are under contract to commence the work, you will have twelve months from the date of that permit change to complete the activity. Activities completed under the authorization of a nationwide permit which was in effect at the time the activity was completed continue to be authorized by that nationwide permit.

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

6. Corps Contact: David Knepper at (757) 441-7488.

R. Harold Jones
Chief, Southern Virginia Regulatory Section

NAO FL 13 REVISED DEC 90

1602

MINI STORAGE SPECIAL -- Ironbound Road Mini Storage
8513 STAPLES MILL ROAD
RICHMOND, VA. 23228

68-25/510 47

DATE February 19, 1999

PAY TO THE ORDER OF Virginia Wetland Restoration Trust Fund $**77,300.00

Seventy-seven thousand three hundred and no/100---------- DOLLARS

Central Fidelity
Central Fidelity National Bank
Richmond, Virginia 23219

FOR CORPS Permit Number 98-5480

⑈00001602⑈ ⑆051000253⑆ 79117195 70⑈

Scott Thomas

From: Scott Thomas
Sent: Thursday, June 06, 2002 1:55 PM
To: Jill Schmidle
Subject: Ironbound Road Mini-Stor Amend

Jill

As a follow up to today DMT, I look into the hydrology and BMP design for the site. It appears BMP # 1 (County BMP ID Code: MC 032) which is the larger wet pond on the site was designed for a 10.9 acre drainage area of which 7.4 acres is onsite and at an impervious cover of 60%. Therefore, it would appear the expansion area in the northwest corner of the site was already anticipated in the design of the BMP.

Therefore, the area was covered under previous approval under SP-45-98. As the plan was 1998 and our manual was implemented in 2000, we would still need to look at the plan to see how the BMP is functioning and whether any upgrades would be warranted.

When we would get to the plan of development stage, or concept plan stage, I would also suggest to the owner/plan preparer (but really couldn't force the issue) to get them to use alternate paving material to attempt to limit the amount of impervious cover and promote infiltration consistent with our Ches Bay ordinance. As this is not a typical travelway/parking area like most business and commercial uses a more permeable type application could be effectively used to enhance water quality and AESTHETICS. There are several commercially available products out there that specialize in this type of application and it is not unusual for us (ENV DIV) to promote and "suggest" this feature for applications like overflow parking, emergency access, seasonal parking, firelanes, event parking, BMP access, etc. where a load bearing structure is needed for traffic but due to parking and travel frequency, a permeable type surface could be used and an impervious surface is not mandatory.

I believe this would be a perfect application for those types of products and should not be overlooked from the stormwater and planning/zoning perspective. Cost may be a factor, but I would think a reduced section with this type of product would be competive to a thicker excavated section with a geotextile lining and 4-6 inches of stone and would not be as much of an impact visually.

If you are interest, the following website is a sample of what I am talking about. There are some pictures of interest.

http://www.invisiblestructures.com/GP2/grasspave.htm

Scott J. Thomas, P.E.
James City County
Environmental Division

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

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

LETTER OF TRANSMITTAL

TO JCC
ENVIRONMENTAL DIVISION

DATE	JOB NO.
7/12/00	7259-3

ATTENTION: SCOTT THOMAS

RE: IRONBOUND MINI-STORAGE
S-45-98

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		2 SH.	CERTIFICATION LETTER FROM ENGINEER ON O&M.

THESE ARE TRANSMITTED as checked below:

☒ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval

☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution

☒ As requested ☐ Returned for corrections ☐ Return _____ corrected prints

☐ For review and comment ☐ _____

☐ FOR BIDS DUE _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS

COPY TO _____ SIGNED: Neal W. L.

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

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

LETTER OF TRANSMITTAL

TO JCC Environmental

DATE	JOB NO.
8/4/00	7259-03

ATTENTION: Scott Thomas

RE: Ironbound Mini Storage
Stormwater As-built

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	8/4/00	8	24 x 36" Mylar Drainage and Utility Plan
1	8/4/00	8	24 x 36" Blueline Drainage and Utility Plan

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☐ For review and comment ☐ _____

☐ FOR BIDS DUE _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS

Revised As-built Plans per conversation with Howard Price.

Thank You

COPY TO _____ SIGNED: _____

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

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

LETTER OF TRANSMITTAL

TO JAMES CITY COUNTY
ENVIRONMENTAL DIVISION

DATE	JOB NO.
6/26/2000	7804

ATTENTION SCOTT THOMAS

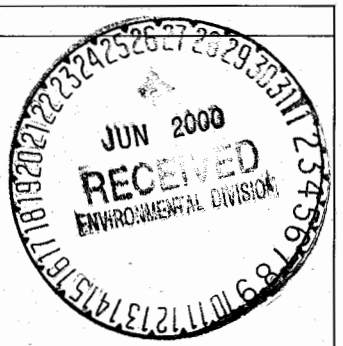
RE: IRON Bound Mini Storage

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
		(3)	ORIGINAL MYLARS
		(1)	SET OF BLUEPRINTS



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☐ For review and comment ☐ _____

☐ FOR BIDS DUE _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS

If you have any questions please call 253-0040.

Thank you,

Frank Sluss

COPY TO _____ SIGNED: _____

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

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

LETTER OF TRANSMITTAL

DATE	JOB NO.
5/12/2000	7259-03

ATTENTION

RE: AS-BUILTS IRONBOUND MINI-STORAGE SP-45-98

TO DARRYL COOK (ENVIRONMENTAL SERVICES)

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
(2)			DRAINAGE AND UTILITY AS-BUILTS IRONBOUND MINI-STORAGE

MAY 2000 RECEIVED ENVIRONMENTAL DIVISION

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☒ As requested ☐ Returned for corrections ☐ Return _____ corrected prints

☐ For review and comment ☐ _____

☐ FOR BIDS DUE _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS

IF YOU HAVE ANY QUESTIONS PLEASE CALL FRANK SIUSS OR HOWARD PRICE @ 253-0040.

Thank you.

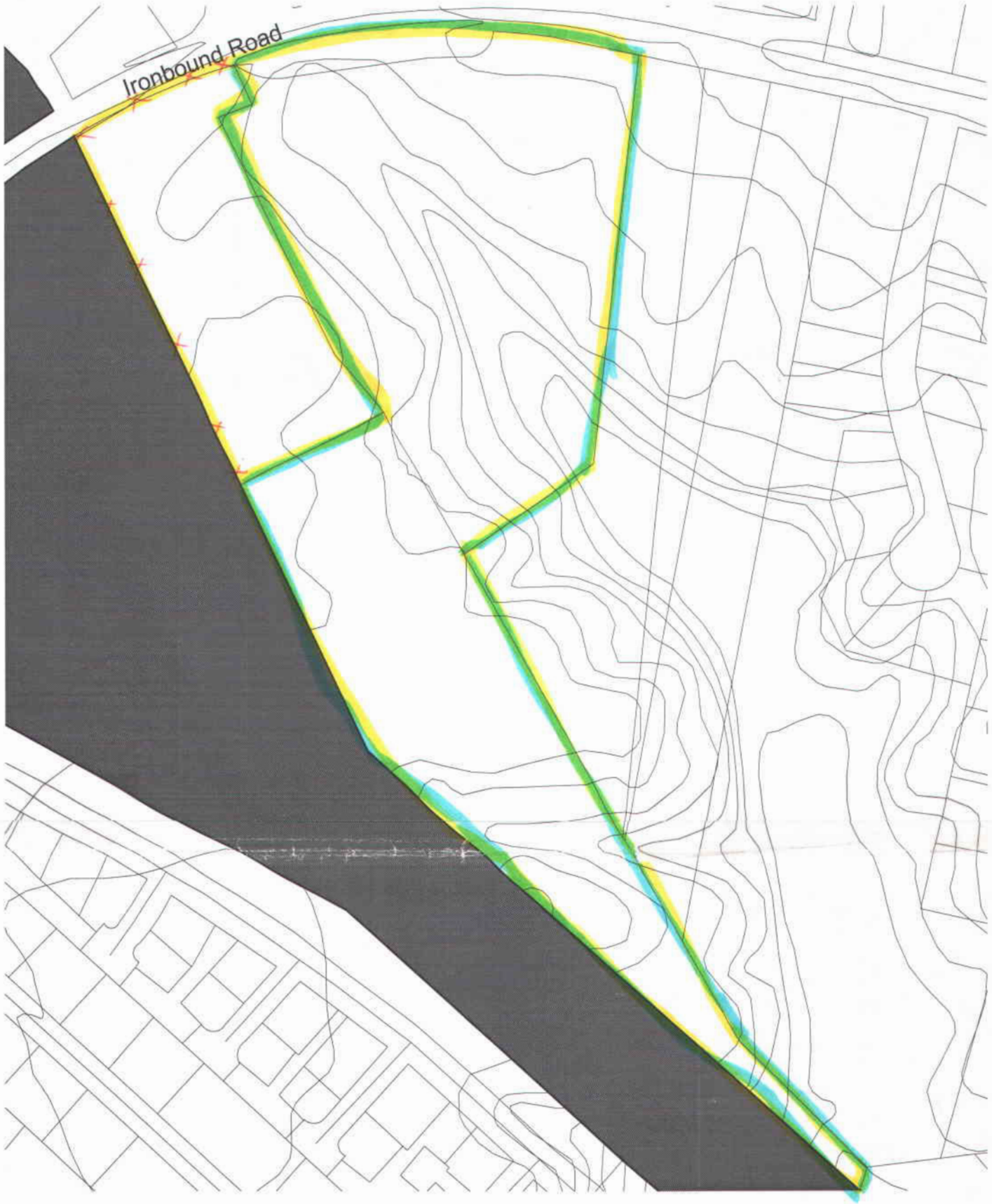
Frank S

MAY 19 2000

COPY TO JCSA SIGNED: _____

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

Ironbound Road Self Storage



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IRONBOUND ROAD MINI STORAGE

Ironbound Road Mini Storage

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564-0195

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- MONTH TO MONTH LEASES
- RESIDENT MANAGERS
- ALL UNITS - GROUND LEVEL
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- ANTIQUES, HEIRLOOMS
- CARS, TRAILERS, RV'S & BOATS
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- HOMEOWNERS, APARTMENT DWELLERS
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