



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.

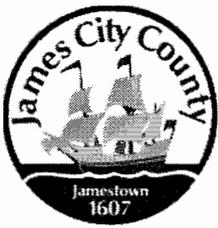
BMP NUMBER: WC044

DATE VERIFIED: January 15, 2013

QUALITY ASSURANCE TECHNICIAN: Leah Hardenbergh

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA



Stormwater Division

MEMORANDUM

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

General File ID or BMP ID: WC044

PIN: 1240100013B

Subdivision, Tract, Business or Owner

Name (if known):

Hankins Industrial Park

Property Description:

Wise Recycling

Site Address:

177 Industrial Blvd

(For internal use only)

Box 22

Drawer: 9

Agreements: (in file as of scan date)

N

Book or Doc#:

Page:

Comments

James City County, Virginia
Environmental Division

Stormwater Management/BMP Facilities
Record Drawing/Construction Certification
Review Tracking Form

GPIN
1240100013B
177 INDUSTRIAL BLVD
M2
4.59 AC.
WALTHAM GROVE II
442 1/2 EAST MAIN ST.
CLAYTON NC 27520

County Plan No.: SP-138-99
Project Name: WISE RECYCLING (HANKINS INDUSTRIAL PARK)
Stormwater Management Facility: WET POND

Phase: I II III

Information Received. Date: 5/30/01 AES MARK RICHARDSON

Administrative Check.

Record Drawing Date: 5/25/01 AES.

Construction Certification Date: 12/10/01 ELS

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

Insp/Maint Agreement Info: YES. I/M # 000013734 RECORDED 7/20/00.

Other:

Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review file.
 Yes No Note/Sheet: Note #19 sheet 9 of 13 (COVER SEAL 3/8/00)

Assign County BMP ID Code Code: WC 044

Log into Division's "As-Built" Tracking Log

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

Preliminary Log into BMP Database (BMP ID #, Site Plan #, GPIN, Project Name)

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

Initial As-Built File setup (label, copies of hydraulics, etc.)

Inspector Check of RD/CC. GEL

Pre-Inspection Drawing Review (Quick look prior to field inspection).

Final Inspection (FI) Date: 8/27/01

Record Drawing (RD) Review Date: 11/07/01

Construction Certification (CC) Review Date: _____

Actions:

No comments.

Comments. Letter Forwarded. Date: Nov 7 2001

Record Drawing (RD)

Construction Certification (CC)

Construction-Related (CR) - INCLUDING SEEPAGE

Site Issues (SI)

Other :

Second Submission: Rep. A by ELS; CC by ELS; POND STILL LEAKS 1/15/02.

Third Submission: sent 2nd letter 1/17/02.

Acceptable for stormwater management facility purposes (RD/CC/CR/Other). Proceed with bond release.

Notify Darryl & Joan of acceptability using email (preferred) or verbal.

Clean active file of all stormwater management related material and finish/establish "As-Built" file.

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

Copy Final Inspection Report into County BMP Inspection Program file.

Digital Photographs obtained.

Add to JCC Hydrology & Hydraulic database (optional).

BMP Certification Information Acceptable

Plan Reviewer: [Signature]

Date: 4.22.02

	<u>DESIGN</u>	<u>ACTUAL</u>
TOD	90.3	89.7
OHw	88.99	88.99
FB	1.31'	0.71'
BARREL	12"	15" AB + F.O.



James City County, Virginia
Environmental Division

Stormwater Management / BMP Facilities
Record Drawing and Construction Certification Forms

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

Section 1 - Site Information:

Project Name: WISE RECYCLING (HANKINS INDUSTRIAL PARK)
Structure/BMP Name: WET POND #1
Project Location: 177 INDUSTRIAL BLVD.
BMP Location: NORTHWEST CORNER OF SITE
County Plan No.: SP - 138 - 99

Project Type: Residential Business Commercial Office Institutional Industrial Public Roadway Other
Tax Map/Parcel No.: (12-4)(1-13B)
BMP ID Code (if known): WC 044
Zoning District: M-2
Land Use: OFFICE/MANUFACTURING
Site Area (sf or acres): 4.59 AC.

Brief Description of Stormwater Management/BMP Facility: WET POND

Nearest Visible Landmark to SWM/BMP Facility: WISE RECYCLING BUILDING TO SOUTH.

Nearest Vertical Ground Control (if known):
 JCC Geodetic Ground Control USGS Temporary Arbitrary Other
Station Number or Name: 303
Datum or Reference Elevation: NGVD 29 ELEV = 112.57
Control Description: DISK IN CONCRETE
Control Location from Subject Facility: 10.6 mi WEST ± 0.3 mi. NORTH

Section 2 - Stormwater Management / BMP Facility Construction Information:

PreConstruction Meeting Held for Construction of SWM/BMP Facility: Yes No Unknown 8-4-2000
Approx. Construction Start Date for SWM/BMP Facility: 8/4/2000
Facility Monitored by County Representative during Construction: Yes No Unknown
Name of Site Work Contractor Who Constructed Facility: HENDERSON INCORPORATED
Name of Professional Firm Who Routinely Monitored Construction: _____
Date of Completion for SWM/BMP Facility: FALL 2000
Date of Record Drawing/Construction Certification Submittal: 5/24/2001

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

Section 3 - Owner / Designer / Contractor Information:

Owner/Developer: (Note: Site Owner or Applicant responsible for development of the project.)

Name: THE WALTHAM GROUP
Mailing Address: 442 1/2 E. MAIN STREET
CLAYTON NC 27520
Business Phone: 919-553-5400 Fax: _____
Contact Person: _____ Title: _____

Design Professional: (Note: Professional Engineer or Certified Land Surveyor responsible for the design and preparation of plans and specifications for the Stormwater Management / BMP facility.)

Firm Name: AES CONSULTING ENGINEERS
Mailing Address: 5248 OLDE TOWNE RD. SUITE 1
WILLIAMSBURG, VA 23188
Business Phone: (757) 253-0040
Fax: (757) 220-8994
Responsible Plan Preparer: _____
Title: _____
Plan Name: WISE RECYCLING
Firm's Project No. 8850
Plan Date: _____
Sheet No.'s Applicable to SWM/BMP Facility: 1 / 3 / 10 / / _____

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

Name: HENDERSON INCORPORATED GENERAL CONTRACTORS
Mailing Address: P.O. Box BM-5800 MOORETOWN ROAD
WILLIAMSBURG, VA 23187
Business Phone: (757) 565-1090
Fax: (757) 564-9120
Contact Person: TONY GREGORY
Site Foreman/Supervisor: _____
Specialty Subcontractors & Purpose (for BMP Construction Only): _____

Donna Chapman - Secretary

Section 4 - Professional Certifications:

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

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: AES CONSULTING ENGINEERS
 Mailing Address: 5248 OLDE TOWNE ROAD
SUITE 1, WILLIAMSBURG, VIRGINIA 23188
 Business Phone: (757) 253-0040
 Fax: (757) 220-8994

Name: _____
 Title: _____

Signature: _____
 Date: _____

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

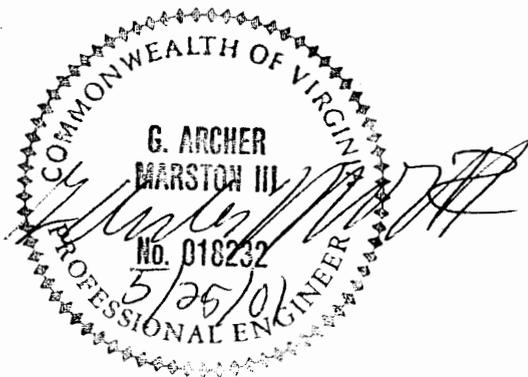
Construction Certification

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

Name: _____
 Title: _____

Signature: _____
 Date: _____

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



 (Seal)
 Virginia Registered Professional Engineer
 or Certified Land Surveyor

 (Seal)
 Virginia Registered
 Professional Engineer



ENGINEERING CONSULTING SERVICES, LTD.
Geotechnical • Construction Materials • Environmental

March 21, 2002

Mr. Bill Strack
Henderson, Inc.
P. O. Box BM
Williamsburg, Virginia 23187

FCS Project No. 04:4184-A

Reference: Stormwater Management Facility - Wet Pond
Wise Recycling - Hankins Industrial Park
Richmond Road
Toano, Virginia

Dear Mr. Strack:

Engineering Consulting Services, Ltd. has observed the reconstruction of the center section of the BMP dam and the above referenced site. Based on previous observations by the James City County (JCC) Development Management Division and by ECS, Ltd. personnel, we observed that the dam was "leaking". Upon further evaluation, which consisted of test pits along the spillway pipe, we observed that the spillway pipe was placed on a bed of open-graded stone. Also, we could observe water entering the spillway pipe from the riser structure, yet did not observe any water exiting the spillway pipe. Instead, we observed water flowing out of the slope below the spillway pipe elevation. The contractor elected to remove the RCP spillway pipe and stone material, reset it, and backfill the area with compacted structural fill.

Personnel from our office observed the removal of the spillway pipe and stone material. The subgrades for the new pipe were observed to be firm and stable and considered suitable for placement of the pipe. Once the pipe was set, the joints were grouted and then the excavation was backfilled to grade with compacted structural fill. Density test results and our observations during the reconstruction of the spillway pipe were submitted in interim reports.

Engineering personnel visited the site March 14 and March 21, 2002 to observe the condition of the dam after several days of rain had occurred. The water level of the pond was observed to be at the top of the riser structure and flowing into the spillway pipe. Water was then observed exiting the spillway pipe and flowing down slope. It is our opinion that the dam repair was successful in eliminating the seepage problem as previously identified.

108 Ingram Road, Unit 1, Williamsburg, Virginia 23188 • (757) 229-6677 • Fax (757) 229-9978

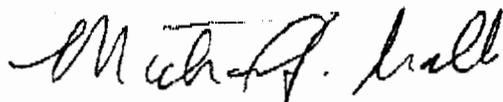
Offices: Richmond, VA • Chesapeake, VA • Washington, D.C. • Williamsburg, VA • Roanoke, VA • Fredericksburg, VA • Danville, VA • Winchester, VA
Aberdeen, MD • Baltimore, MD • Frederick, MD • Research Triangle Park, NC • Wilmington, NC • Charlotte, NC • Greensboro, NC • Greenville, SC • Atlanta, GA

Wise Recycling
ECS Project No. 04:4184-A
Page 2

We appreciated being of service to you on this project. If you should have any questions regarding the information and recommendations contained in this report or if we can be of any further assistance, please contact our office.

Respectfully,

ENGINEERING CONSULTING SERVICES, LTD.



Michael J. Galli, P.E.
Project Manager

MJG/lev/4184-AFinal.doc



December 10, 2001

Mr. Bill Strack
Henderson, Inc.
P.O. Box BM
Williamsburg, Virginia 23187

ECS Project No. 04:4184-A

Re: Wise Recycling
Industrial Boulevard
Toano, Virginia

Dear Bill,

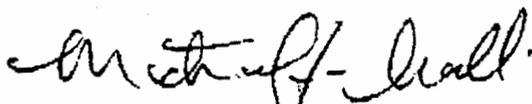
Engineering Consulting Services, Ltd. has provided earthwork observation and construction materials testing during the construction of the new Wise Recycling Facility located on Industrial Boulevard in Toano, Virginia. ECS, Ltd. personnel provided special inspection services (Agent 2) during the construction of the building, and earthwork observation and testing services during the construction of the associated parking lot, drive lanes, and BMP.

Daily field reports, dated August 16, 2000 through November 29, 2001, have been submitted and are considered an integral part of this project. Any deficiencies observed were noted on the daily reports and the appropriate corrective action was taken by the contractor. Based on our scope of services and the inspections that we were requested to perform at the time of construction, it is our conclusion that the earthwork portion of this project has been completed in accordance with the project plans and specifications as we understand them.

We appreciate having been of service to you during this project. If you should have any questions regarding the information and conclusions contained in this report or if we can be of any further assistance, please contact our office.

Respectfully,

ENGINEERING CONSULTING SERVICES, LTD.



Michael J. Galli, P.E.
Williamsburg Branch Manager



Copies: (3) Henderson, Inc. (Mr. Bill Strack)

I:\letters/mjg/4184-Afinal.doc

Certification Documents

- **Record Drawing**
- **Construction Certification of Original Dam Work**
- **Field Inspection**
- **County letters**
- **Dam Repair Plan # 1 (collars)**
- **Dam Repair Plan # 2 (barrel)**
- **Certification of Repairs**

Wise Recycling

SP-138-99

WC 044

PAT OR GERRY??

Record Drawing/Construction Certification Submittal for a BMP Facility

Date: June 4, 2001

- Inspector:
- Pat Menichino
 - Gerry Lewis
 - Beth Davis
 - Mike Woolson
 - Other: _____

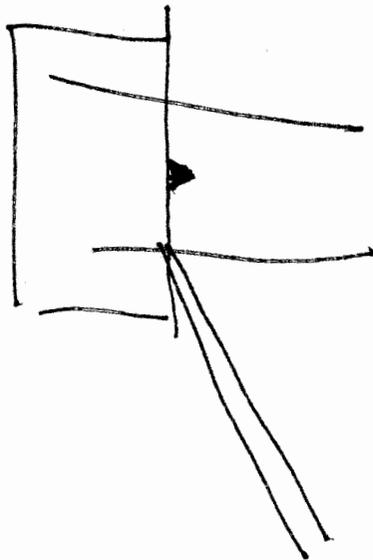
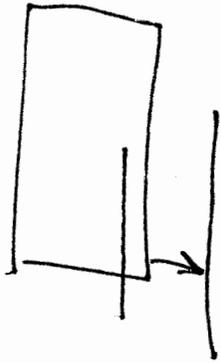
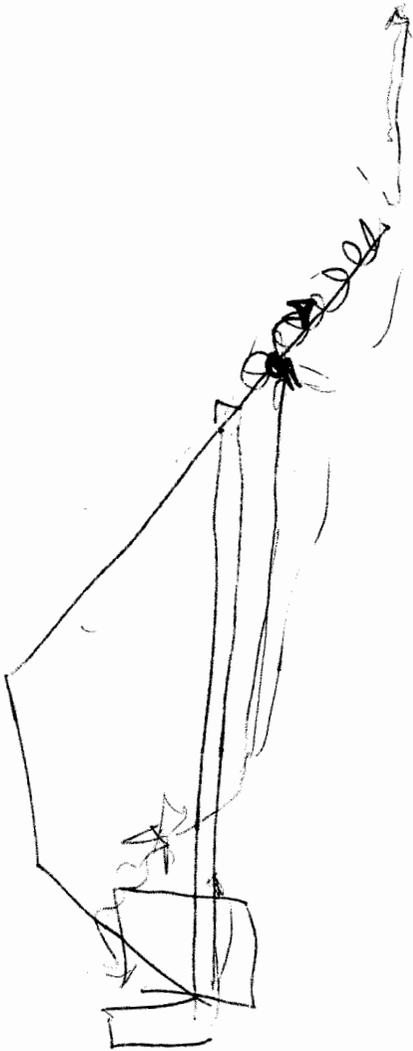
Project: WISE RECYCLING (HANKIN'S INDUSTRIAL PARK)
 BMP Facility: WET POND
 Plan No. SP-138-99
 BMP ID Code: WC 044

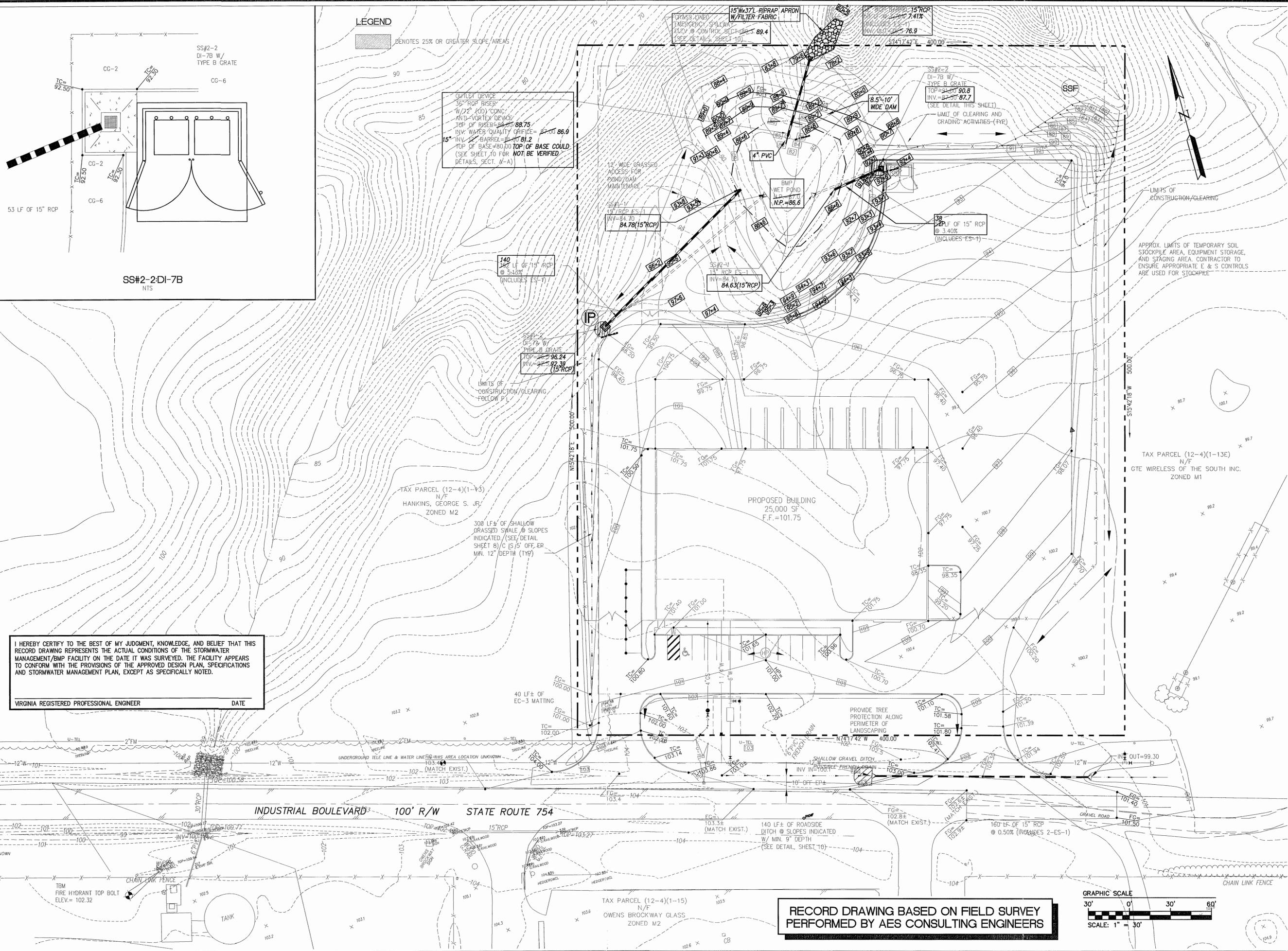
I have received a transmittal for a Record Drawing and Construction Certification for the above referenced facility on 5/30/01. ^{NOT RECEIVED} Prior to full review of these items and field inspection, I am first forwarding the items to you to cursory review in case any major field changes were performed that I should be aware of and/or to ensure the record drawing accurately portrays what you saw in the field. Please review the drawing and return to me promptly so I can proceed with performing a final engineering inspection for certification purposes.

During my review, I will look at issues related to the BMP and its primary inflow and outflow conveyance systems, and will make comment in the following areas: record drawing (RD), construction certification (CC) and construction-related (CR) punch list items. If you have any other related non-BMP site issues such as erosion, stabilization, removal of erosion & sediment controls, etc. that are not related to the BMP, I can easily add these items to any comment letter that I may forward to the owner/engineer. You can let me know of any outstanding site issues or we can schedule to perform a joint inspection.

If I don't hear from you I will ask you if any other outstanding issues remain before I forward any letters to the owner/engineer.

Scott 

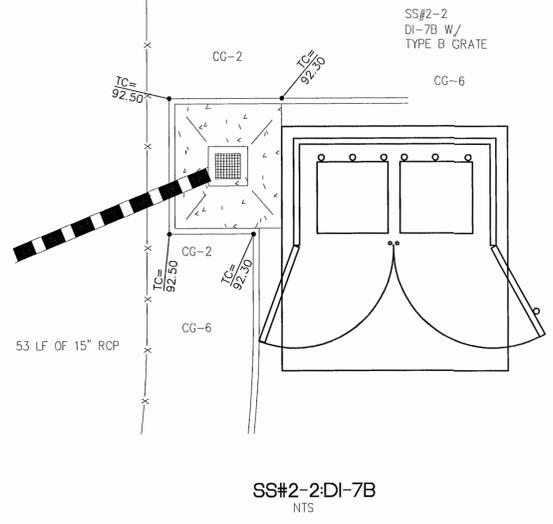




I HEREBY CERTIFY TO THE BEST OF MY JUDGMENT, KNOWLEDGE, AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE ACTUAL CONDITIONS OF THE STORMWATER MANAGEMENT/BMP FACILITY ON THE DATE IT WAS SURVEYED. THE FACILITY APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN, SPECIFICATIONS AND STORMWATER MANAGEMENT PLAN, EXCEPT AS SPECIFICALLY NOTED.

VIRGINIA REGISTERED PROFESSIONAL ENGINEER _____ DATE _____

LEGEND
 [Hatched Box] DENOTES 25% OR GREATER SLOPE AREAS



OUTLET DEVICE
 36\"/>

J40
 342 LF OF 15\"/>

SS#2-2
 DI-7B W/
 TYPE B GRATE
 INV.=92.39
 (15\"/>

15\"/>

SS#2-2
 DI-7B W/
 TYPE B GRATE
 TOP=91.00
 INV.=87.00
 (SEE DETAIL THIS SHEET)
 LIMIT OF CLEARING AND
 GRADING ACTIVITIES (FYR)

BMP WET POND
 N.P.=86.6

38
 20 LF OF 15\"/>

SS#1-1
 15\"/>

SS#1-2
 DI-7B W/
 TYPE B GRATE
 INV.=92.39
 (15\"/>

PROPOSED BUILDING
 25,000 SF
 F.F.=101.75

TAX PARCEL (12-4)(1-43)
 N/F
 HANKINS, GEORGE S. JR.
 ZONED M2

300 LF± OF SHALLOW
 GRASSSED SWALE @ SLOPES
 INDICATED. (SEE DETAIL
 SHEET 8)/C 15'± OFF-ER
 MIN. 12\"/>

TAX PARCEL (12-4)(1-13E)
 N/F
 GTE WIRELESS OF THE SOUTH INC.
 ZONED M1

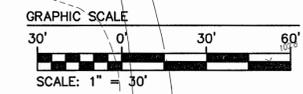
40 LF± OF
 EC-3 MATTING

PROVIDE TREE
 PROTECTION ALONG
 PERIMETER OF
 LANDSCAPING

140 LF± OF ROADSIDE
 DITCH @ SLOPES INDICATED
 W/ MIN. 9\"/>

160 LF OF 15\"/>

**RECORD DRAWING BASED ON FIELD SURVEY
 PERFORMED BY AES CONSULTING ENGINEERS**



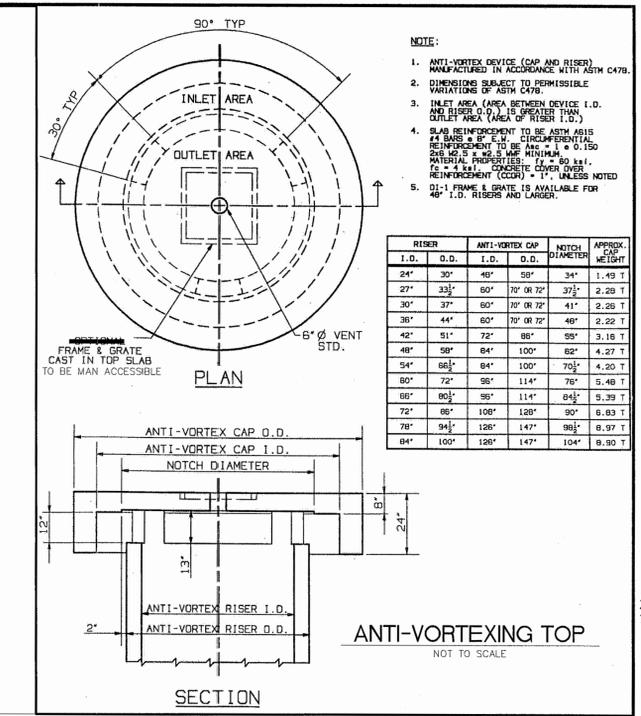
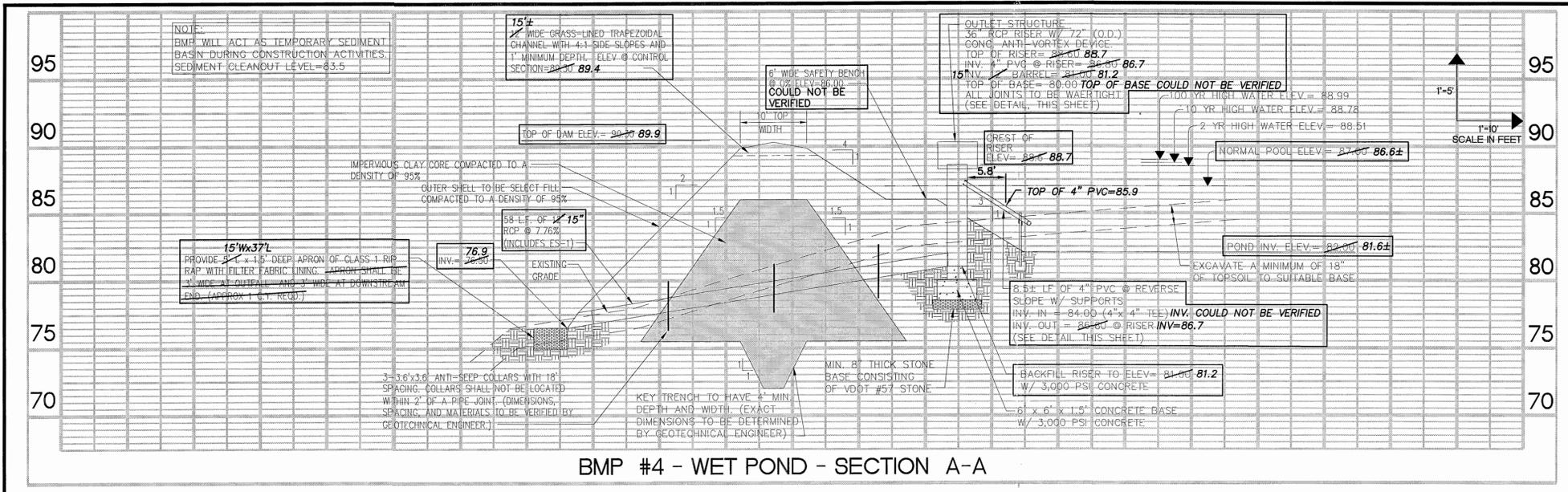
NO.	DATE	REVISION / COMMENT / NOTE	BY



5248 Olde Towne Road, Suite 1
 Williamsburg, Virginia 23188
 (757) 253-0040
 Fax (757) 220-8894



Designed DPW	Drawn ARR
Scale 1"=30'	Date 5/25/01
Project No. 8850-0	Owner / Developer : THE WALTHAM GROUP
Drawing No. 1	STONERHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA



DAM CONSTRUCTION NOTES

- A GEOLOGICAL SUBSURFACE EXPLORATION AT THE PROPOSED DAM SITE SHALL BE PERFORMED TO ENSURE SUITABILITY OF THE SUBGRADE. THE GEOLOGICAL INVESTIGATION WILL DETERMINE THE SUITABILITY OF THE FILL MATERIAL, RECOMMENDED ANTI-SLEEP MEASURES, KEY TRENCH DEPTH AND WIDTH, AND THE ANTICIPATED LOCATION OF THE PHREATIC LINE. THESE RECOMMENDATIONS ARE HEREBY MADE A PART OF THE DAM'S CONSTRUCTION SPECIFICATIONS. A REPRESENTATIVE OF THE GEOLOGICAL CONSULTANT SHALL BE ON SITE DURING CONSTRUCTION TO ENSURE PROPER MATERIALS AND DAM CONSTRUCTION METHODS ARE UTILIZED. FOLLOWING DAM CONSTRUCTION, THE GEOLOGICAL CONSULTANT SHALL PROVIDE WRITTEN DOCUMENTATION, SIGNED BY A PROFESSIONAL ENGINEER, THAT THE DAM WAS BUILT IN ACCORDANCE WITH THEIR RECOMMENDATIONS, PLANS, AND SPECIFICATIONS. THE GEOLOGICAL CONSULTANT SHALL COORDINATE WITH THE DESIGN ENGINEER IN ORDER TO COMPLETE THE JCC ENVIRONMENTAL DIVISION STORMWATER MANAGEMENT/BMP FACILITIES CONSTRUCTION AND AS-BUILT CERTIFICATION FORM. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE DAM CONSTRUCTION SCHEDULE WITH THE GEOLOGICAL CONSULTANT IN ORDER TO ENSURE ON-SITE MONITORING.
- SITE PREPARATION:** THE CONTRACTOR SHALL STRIP ALL AREAS OF THE PERMANENT COVER IN CONSTRUCTION AREA TO REMOVE ALL UNSUITABLE MATERIALS. THE UNSUITABLE MATERIALS TO BE REMOVED BY STRIPPING SHALL INCLUDE ALL TOPSOIL, DEBRIS AND VEGETABLE MATTER, INCLUDING STUMPS AND ROOTS, AND ALL OTHER MATERIALS WHICH MAY BE UNSUITABLE FOR USE IN THE PERMANENT CONSTRUCTION.
- EMBANKMENT:** THE EXPOSED SUB GRADE SOILS SHALL BE CAREFULLY INSPECTED BY THE GEOLOGICAL ENGINEER. ANY UNSUITABLE MATERIALS THIS EXPOSED SHALL BE REMOVED AND REPLACED WITH A WELL COMPACTED, SUITABLE MATERIAL. DENSITY TESTING, AT THE DISCRETION OF THE OWNER/GEOLOGICAL ENGINEER, SHALL BE PERFORMED AT THIS TIME. THE EMBANKMENT SHALL BE KEVED INTO THE UNDISTURBED (EXISTING) SOIL. STRATUM EMBANKMENT SHOULD BE KEVED AT LEAST 3 FEET INTO THE STRATUM OR AS SPECIFIED BY THE GEOLOGICAL ENGINEER (WIDTH=6 FT. MIN.) 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 BACKFILL OR COMPACTED FILL SHALL BE INSPECTED AND, IF NECESSARY, TESTED BY THE GEOLOGICAL 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 MATERIALS. MATERIALS TO BE USED FOR THE CONSTRUCTION OF THE SHELL SHALL BE SELECT BACKFILL 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 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 SUBGRADE MAY BE PLACED AT A DEPTH UP TO 30 INCHES TO BRIDGE SUBGRADE WITH OVER OPTIMUM MOISTURE CONTENT. COMPACTION, AS NOTED ON PLAN, SHALL BE OBTAINED GENERALLY BY USING A SHEEPSFOOT COMPACTOR. FINISHED GRADES SHALL BE MERGED NATURALLY INTO THE EXISTING GRADES.

- CUTOFF TRENCH/KEY TRENCH:** THE TRENCH SHALL BE EXCAVATED ALONG THE CENTERLINE OF THE DAM. THE MINIMUM DEPTH SHALL BE AS SHOWN ON THE PLANS AND SHALL EXTEND UP BOTH ABUTMENTS. THE BOTTOM WIDTH SHALL BE WIDE ENOUGH TO PERMIT OPERATION OF COMPACTING EQUIPMENT. THE SIDE SLOPES SHALL BE NO STEEPER THAN 1:1. COMPACTING OPERATIONS.
- PRINCIPAL SPILLWAY:** THE BOTTOM OF THE SPILLWAY RISER FOUNDATION BASE EXCAVATION SHALL BE OBSERVED BY THE GEOLOGICAL 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 WATER TIGHT CONSTRUCTION. PERVIOUS MATERIALS SUCH AS SAND, GRAVEL OR CRUSHED STONE SHALL NOT BE USED AS BACKFILL AROUND THE BARREL OR ANTI-SLEEP COLLAR. FILL MATERIAL SHALL BE PLACED AROUND THE PIPE IN 4 INCH LAYERS AND COMPACTED BY HAND TO THE SAME DENSITY AS THE EMBANKMENT. A MINIMUM OF TWO FEET OF FILL SHALL BE HAND-COMPACTED OVER THE BARREL BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT.
- VEGETATIVE STABILIZATION:** FINAL VEGETATIVE COVER (STABILIZATION) SHALL CONSIST OF TOP SOILING, LIMING, FERTILIZING, SEEDING, AND MULCHING TO ESTABLISH 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 4" 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: 10/10/10 MIX, 1,000#/ACRE FALL (23#/1,000 S.F.)
 MULCH: STRAW OR HAY (LOCALLY OBTAINED) 4,000#/ACRE (90#/1,000 S.F.)

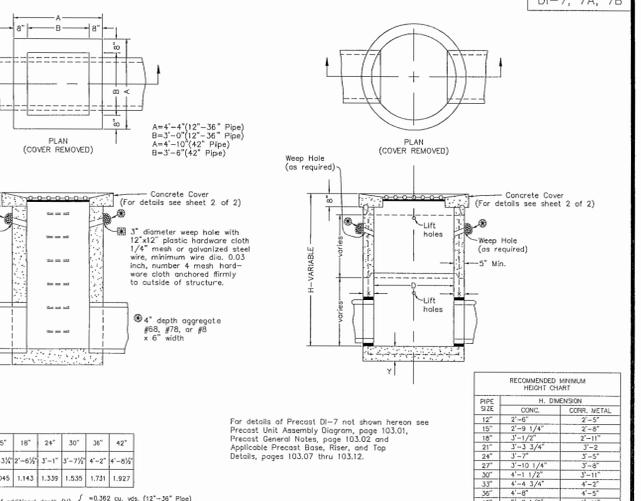
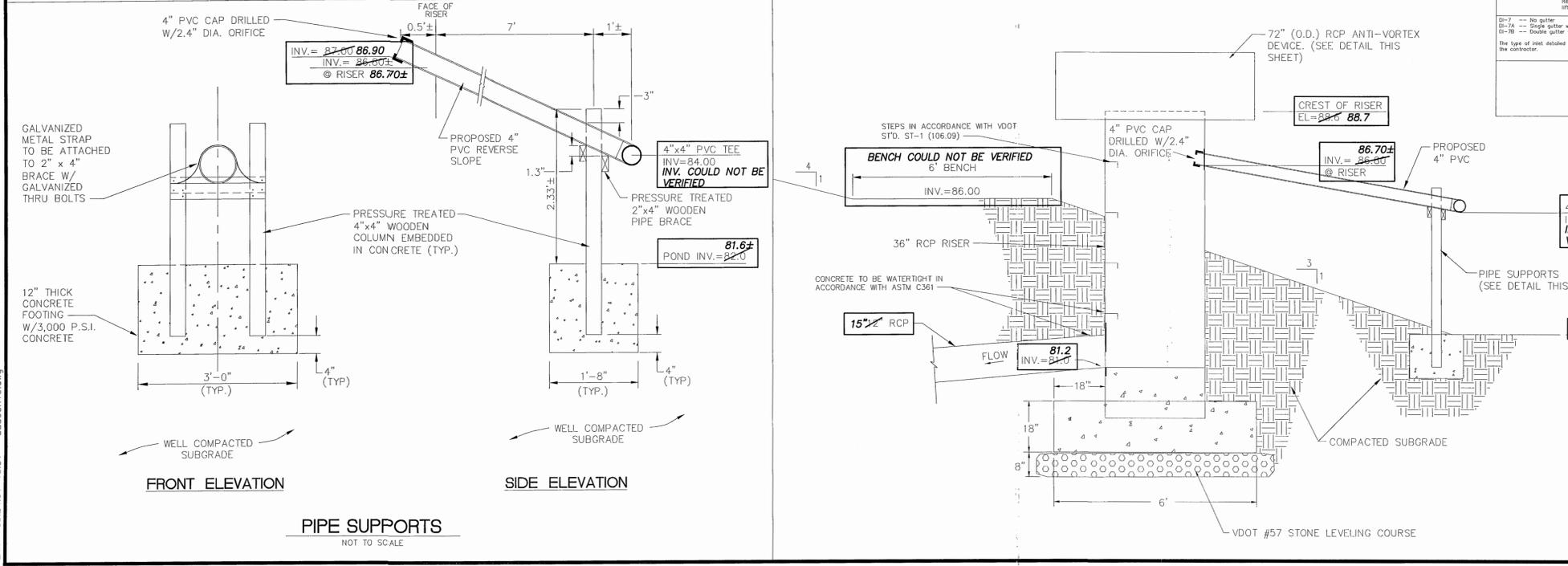
STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT INTO THE FACILITY, SPILLWAYS) AND DOWNSTREAM WATERWAYS. FOLLOWING INSTALLATION OF THE FACILITY AND ESTABLISHMENT OF VEGETATION IN DISTURBED AREAS, INSPECTIONS FOR SEDIMENT BUILDUPS WILL BE PERFORMED AT LEAST QUARTERLY. IT IS ANTICIPATED THAT UNDER NORMAL CONDITIONS, SEDIMENT REMOVAL FROM THE FACILITY WILL BE REQUIRED ONCE EVERY 10 YEARS. IF OTHER CONSTRUCTION OR RELATED ACTIVITIES ARE PERFORMED ON UPSLOPE PARCELS, ADEQUATE PROTECTION SHOULD BE PROVIDED AND INSPECTIONS PERFORMED AT LEAST ONCE WEEKLY.

A DESIGNATED REPRESENTATIVE OF THE OWNER WILL INSPECT THE SWM STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING WORKING DAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF GAUGED RAINFALL WITHIN A 24 HOUR PERIOD. ONCE PER YEAR, A REPRESENTATIVE OF THE COUNTY MAY JOINTLY INSPECT THE STRUCTURE. APPROPRIATE ACTION, PERFORMED AT THE COST OF THE OWNER, WILL BE TAKEN TO ENSURE APPROPRIATE MAINTENANCE. WHERE STRUCTURES ARE TO BE MAINTAINED JOINTLY, ALLOCATION OF MAINTENANCE COSTS WILL BE IN ACCORDANCE WITH THE TERMS ESTABLISHED IN MAINTENANCE AGREEMENTS. KEYS TO LOCKED ACCESS POINTS SHALL BE MADE AVAILABLE TO COUNTY INSPECTION PERSONNEL UPON REQUEST.

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

- THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. IF THE DEPTH OF SEDIMENT REACHES THE DEPTH OF 1'-6" ABOVE THE BOTTOM OF POND (I.E. CLEAVOUT ELEVATION 83.50), REMOVAL IS REQUIRED USING A RUBBER-WHEELED BACKHOE. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, CLEAN THE RISER BOTTOM AND OUTLET PIPE OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA.
- PERFORM MAINTENANCE MOWING OF POND GRASSES AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEAVES CAN BE LESS FREQUENT. TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ON ANY PART OF THE GRADED EMBANKMENT.
- PERFORM SOIL SAMPLING ON STABILIZED POND SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.
- IN STABILIZED POND AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACES, LIME FERTILIZER AND SEED IN ACCORDANCE WITH RECOMMENDATIONS FOR NEW SEEDINGS, AS LISTED IN DAM CONSTRUCTION NOTES, IF VEGETATION COVERS MORE THAN 40% BUT LESS THAN 70% OF SOIL SURFACES, LIME FERTILIZER AND OVERSEED IN ACCORDANCE WITH CURRENT SEEDLING RECOMMENDATIONS.
- PERFORM QUARTERLY INSPECTIONS OF THE RISER SECTION AND CREST OF SPILLWAY FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS TO MAINTAIN THE INTEGRITY OF THE STRUCTURE AND PROVIDE AN ATTRACTIVE APPEARANCE.
- PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, GRITZ/WEBS), OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE INTEGRITY OF THE STRUCTURE.
- RECORD QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE DETENTION FACILITY FOR SIGNS OF ANIMAL, RODENT BORROWS OR SOIL EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.
- RECORD KEEPING. THE OWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.
- THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.



RECORD DRAWING BASED ON FIELD SURVEY PERFORMED BY AES CONSULTING ENGINEERS

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

NOT TO SCALE

DESIGNED: DPW
 SCALE: N.T.S.
 DRAWN: LBA
 DATE: 5/25/01
 PROJECT NO.: 8850
 DRAWING NO.: 2

OWNER/DEVELOPER: THE WALTHAM GROUP
 STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

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

RECORD DRAWING-5/25/01

SP. 13899



MENT PLAN

YCLING

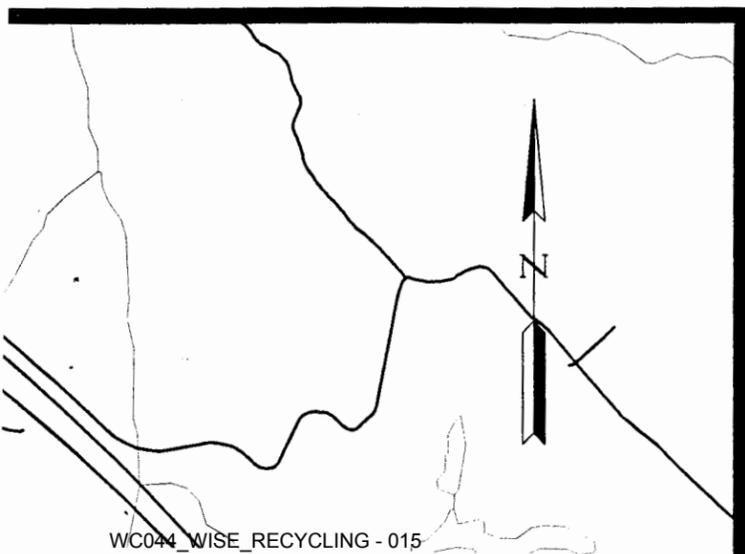
IE WALTHAM GROUP
JNTY, VIRGINIA

COUNTY OF JAMES CITY

DATE	NAME
3-24-00	JD/JS
3-13-00	VY/JS
3-13-00	CEM/JS
4/17/00	TAMR
4/12-00	DEC/JS
4/17/00	TAMR
4-17-00	DWP/JS
1-14-00	WNB/JS

INDEX OF SHEETS

<u>SHEET NUMBER</u>	<u>DESCRIPTION</u>
1	COVER SHEET
2	SITE PLAN
3	GRADING, DRAINAGE, AND EROSION AND SEDIMENT CONTROL PLAN
4	UTILITY PLAN AND PROFILE
5	UTILITY PLAN AND PROFILE
6	LANDSCAPE PLAN
7	LIGHTING PLAN
8	NOTES AND DETAILS
9	NOTES AND DETAILS
10	STORMWATER MANAGEMENT NOTES AND DETAILS



5% OR GREATER SLOPE AREAS

GRASS LINED
EMERGENCY SPILLWAY
ELEV @ CONTROL SECT=89.3
(SEE DETAILS, SHEET 10)

12" RCP BARREL
58 LF @ 7.76%
(INCLUDES ES-1)
INV. OUT=76.5

S74°17'42"E 400.00'

OUTLET DEVICE
36" RCP RISER
W/72" (OD) CONC.
ANTI-VORTEX DEVICE
TOP OF RISER=88.60
INV. WATER QUALITY ORIFICE= 87.00
INV. 12" BARREL=81.00
TOP OF BASE=80.00
(SEE SHEET 10 FOR
DETAILS, SECT. A-A)

SS#2-2
DI-7B W/
TYPE B GRATE
TOP=91.00
INV.=87.50
(SEE DETAIL THIS SHEET)
LIMIT OF CLEARING AND
GRADING ACTIVITIES (TYP)

NOTE:
Dewatering Device
Required.

12' WIDE GRASSED
ACCESS FOR
POND/DAM
MAINTENANCE

SS#1-1
15" RCP ES-1
INV=84.70

BMP A
WET POND
N.P.=87.0

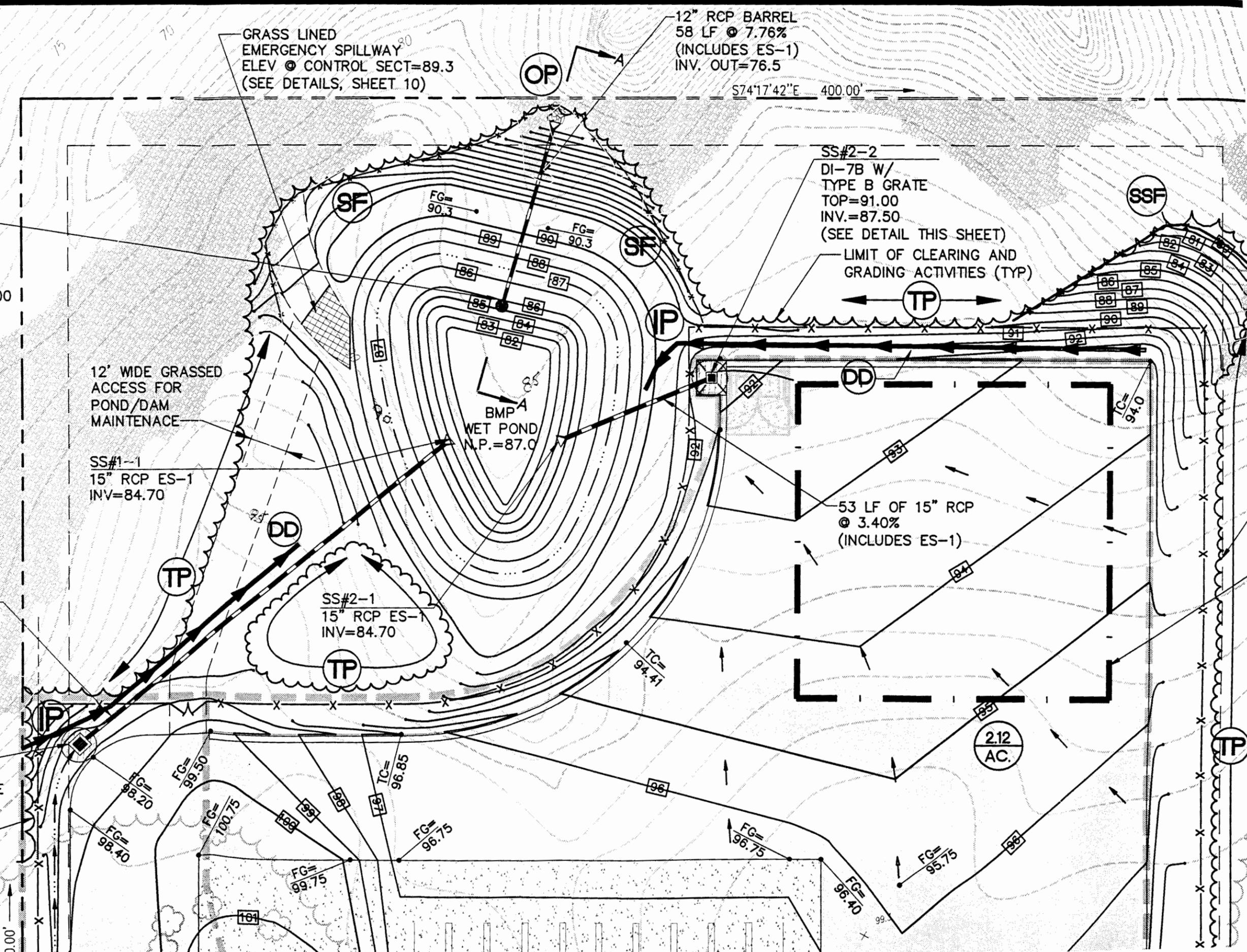
53 LF OF 15" RCP
@ 3.40%
(INCLUDES ES-1)

152 LF OF 15" RCP
@ 5.13%
(INCLUDES ES-1)

SS#2-1
15" RCP ES-1
INV=84.70

SS#1-2
DI-7A W/
TYPE B GRATE
TOP=96.5
INV.=92.5

LIMITS OF
CONSTRUCTION/CLEARING
FOLLOW P



IDE GRASS-LINED TRAPEZOIDAL
NEL WITH 4:1 SIDE SLOPES AND
IMUM DEPTH. ELEV @ CONTROL
ON=89.30

TOP OF DAM ELEV.= 90.30

18" FILL
OF 95%

OF 12"
7.76%

(SLOPES ES-1)

EXISTING
GRADE

TH 18"
LOCATED
DRAINAGE
DITCHES,
STABILIZED BY

KEY TRENCH TO HAVE 4' MIN.
DEPTH AND WIDTH. (EXACT
DIMENSIONS TO BE DETERMINED
BY GEOTECHNICAL ENGINEER)

6' WIDE SAFETY BENCH
@ 0% ELEV=86.00

10' TOP
WIDTH

OUTLET STRUCTURE
36" RCP RISER W/ 72" (O.D.)
CONC. ANTI-VORTEX DEVICE.
TOP OF RISER= 88.60
INV. 4" PVC @ RISER= 86.80
INV. 12" BARREL= 81.00
TOP OF BASE= 80.00
ALL JOINTS TO BE WAERTIGHT
(SEE DETAIL, THIS SHEET)

CREST OF
RISER
ELEV= 88.6

100 YR HIGH WATER ELEV.= 88.99
10 YR HIGH WATER ELEV.= 88.78
2 YR HIGH WATER ELEV.= 88.51
NORMAL POOL ELEV.= 87.00

1"=5'
1"=10'
SCALE IN FEET

95

90

85

80

75

70

POND INV. ELEV.= 82.00
EXCAVATE A MINIMUM OF 18"
OF TOPSOIL TO SUITABLE BASE

8.5± LF OF 4" PVC @ REVERSE
SLOPE W/ SUPPORTS
INV. IN = 84.00 (4"x 4" TEE)
INV. OUT = 86.80 @ RISER
(SEE DETAIL THIS SHEET)

BACKFILL RISER TO ELEV= 81.00
W/ 3,000 PSI CONCRETE

6' x 6' x 1.5' CONCRETE BASE
W/ 3,000 PSI CONCRETE

MIN. 8" THICK STONE
BASE CONSISTING
OF VDOT #57 STONE

BMP #4 - WET POND - SECTION A-A

CONSTRUCTION NOTES

KEY TRENCH:
KEY TRENCH SHALL BE EXCAVATED ALONG THE CENTERLINE OF THE DAM. THE MINIMUM DEPTH SHALL BE AS SHOWN ON THE PLANS AND SHALL EXTEND UP BOTH ABUTMENTS. THE BOTTOM WIDTH SHALL BE AS SHOWN TO PERMIT OPERATION OF COMPACTING EQUIPMENT. THE SIDE SLOPES SHALL BE NO STEEPER THAN 1:1. COMPACTING OPERATIONS.

SPILLWAY:
THE SPILLWAY RISER FOUNDATION BASE EXCAVATION SHALL BE OBSERVED BY THE ENGINEER TO ENSURE THAT ALL UNSUITABLE AND LOOSE MATERIALS ARE REMOVED AND THAT THE FOUNDATION IS IN SOUND BEARING CONDITIONS. ALL JOINTS IN THE SPILLWAY STRUCTURE SHALL BE WATERTIGHT CONSTRUCTION. PERVIOUS MATERIALS SUCH AS SAND OR CRUSHED STONE SHALL NOT BE USED AS BACKFILL AROUND THE BARREL OR RISER. FILL MATERIAL SHALL BE PLACED AROUND THE PIPE IN 4 INCH LAYERS AND COMPACTED TO THE SAME DENSITY AS THE EMBANKMENT. A MINIMUM OF TWO FEET OF FILL SHALL BE PLACED AND COMPACTED OVER THE BARREL BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT.

STABILIZATION:
VEGETATION STABILIZATION SHALL CONSIST OF TOP SOILING, LIMING, FERTILIZING, AND SEEDING TO ASSURE A FIRM STAND OF GRASS AS SOON AS PRACTICABLE.

STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

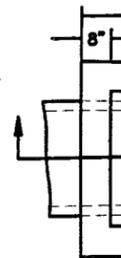
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INSPECTION AND MAINTENANCE OF THE FACILITY WILL CONSIST OF THE FOLLOWING ADDITIONAL MEASURES:

1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. IF THE DEPTH OF SEDIMENT REACHES THE DEPTH OF 1'-6" ABOVE THE BOTTOM OF POND (i.e. CLEANOUT ELEVATION 83.50), REMOVAL IS REQUIRED USING A RUBBER-WHEELED BACKHOE. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, CLEAN THE RISER BOTTOM AND OUTLET PIPE OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS

In the event the invert of the outfall pipe is higher than the bottom of the structure, the invert of the structure shall be shaped with cement mortar to prevent standing or ponding of water in the structure.



70

3-3.6'x3.6' ANTI-SEEP COLLARS WITH 18' SPACING. COLLARS SHALL NOT BE LOCATED WITHIN 2' OF A PIPE JOINT. (DIMENSIONS, SPACING, AND MATERIALS TO BE VERIFIED BY GEOTECHNICAL ENGINEER.)

KEY TRENCH TO HAVE 4' MIN. DEPTH AND WIDTH. (EXACT DIMENSIONS TO BE DETERMINED BY GEOTECHNICAL ENGINEER)

MIN. 8" THICK STONE BASE CONSISTING OF VDOT #57 STONE

BACKFILL RISER T W/ 3,000 PSI CON

6' x 6' x 1.5' CON W/ 3,000 PSI CON

BMP #4 - WET POND - SECTION A-A

DAM CONSTRUCTION NOTES

1. A GEOTECHNICAL SUBSURFACE EXPLORATION AT THE PROPOSED DAM SITE SHALL BE PERFORMED TO ENSURE SUITABILITY OF THE SUBGRADE. THE GEOTECHNICAL INVESTIGATION WILL DETERMINE SUITABILITY OF THE FILL MATERIAL, RECOMMENDED ANTI-SEEP MEASURES, KEY TRENCH DEPTH AND WIDTH, AND THE ANTICIPATED LOCATION OF THE PHREATIC LINE. THESE RECOMMENDATIONS ARE HEREBY MADE A PART OF THE DAM'S CONSTRUCTION SPECIFICATIONS. A REPRESENTATIVE OF THE GEOTECHNICAL CONSULTANT SHALL BE ON SITE DURING CONSTRUCTION TO ENSURE PROPER MATERIALS AND DAM CONSTRUCTION METHODS ARE UTILIZED. FOLLOWING DAM CONSTRUCTION, THE GEOTECHNICAL CONSULTANT SHALL PROVIDE WRITTEN DOCUMENTATION, SIGNED BY A PROFESSIONAL ENGINEER, THAT THE DAM WAS BUILT IN ACCORDANCE WITH THEIR RECOMMENDATIONS, PLANS, AND SPECIFICATIONS. THE GEOTECHNICAL CONSULTANT SHALL COORDINATE WITH THE DESIGN ENGINEER IN ORDER TO COMPLETE THE JCC ENVIRONMENTAL DIVISION STORMWATER MANAGEMENT/BMP FACILITIES CONSTRUCTION AND AS-BUILT CERTIFICATION FORM. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE DAM CONSTRUCTION SCHEDULE WITH THE GEOTECHNICAL CONSULTANT IN ORDER TO ENSURE ON-SITE MONITORING.

2. SITE PREPARATION:
THE CONTRACTOR SHALL STRIP ALL AREAS OF THE PERMANENT COVER IN CONSTRUCTION AREA 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 OWNER/GEOTECHNICAL ENGINEER, SHALL BE PERFORMED AT THIS TIME. THE EMBANKMENT SHALL BE KEYED INTO THE UNDISTURBED (EXISTING) SOIL STRATUM. EMBANKMENT SHOULD BE KEYED AT LEAST 3 FEET INTO THE STRATUM OR AS SPECIFIED BY THE GEOTECHNICAL ENGINEER (WIDTH=6 FT. MIN.) 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 BACKFILL 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 MATERIALS. MATERIALS TO BE USED FOR THE CONSTRUCTION OF THE SHELL SHALL BE SELECT BACKFILL 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 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 SUBGRADE MAY BE PLACED AT A DEPTH UP TO 30 INCHES TO BRIDGE SUBGRADE WITH OVER OPTIMUM MOISTURE CONTENT. COMPACTION, AS NOTED ON PLAN, SHALL BE OBTAINED GENERALLY BY USING A SHEEPSFOOT COMPACTOR. FINISHED GRADES SHALL BE MERGED NATURALLY INTO THE EXISTING GRADES.

4. CUTOFF TRENCH/KEY TRENCH:
THE TRENCH SHALL BE EXCAVATED ALONG THE CENTERLINE OF THE DAM. THE MINIMUM DEPTH SHALL BE AS SHOWN ON THE PLANS AND SHALL EXTEND UP BOTH ABUTMENTS. THE BOTTOM WIDTH SHALL BE WIDE ENOUGH TO PERMIT OPERATION OF COMPACTING EQUIPMENT. THE SIDE SLOPES SHALL BE NO STEEPER THAN 1:1. COMPACTION OPERATIONS.

5. 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 WATERTIGHT CONSTRUCTION. PERVIOUS MATERIALS SUCH AS SAND, GRAVEL OR CRUSHED STONE SHALL NOT BE USED AS BACKFILL AROUND THE BARREL OR ANTI-SEEP COLLAR. 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.

6. 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 4" 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: 10/10/10 MIX, 1,000#/ACRE FALL (23#/1,000 S.F.)
MULCH: STRAW OR HAY (LOCALLY OBTAINED) 4,000#/ACRE (90#/1,000 S.F.)

STORMWATER MANA

PROPER MAINTENANCE OF THIS FACILITY, SPILLWAY(S) AND DOWNSTRE VEGETATION IN DISTURBED AREAS, IS ANTICIPATED THAT UNDER NORMAL CC IF OTHER CONSTRUCTION OR RELATED PROVIDED AND INSPECTIONS PERFORM

A DESIGNATED REPRESENTATIVE OF THE FOLLOWING WORKING DAY IF A W ONE (1) INCH OR MORE OF GAUGED F MAY JOINTLY INSPECT THE STRUCTURE ENSURE APPROPRIATE MAINTENANCE. WILL BE IN ACCORDANCE WITH THE TI MADE AVAILABLE TO COUNTY INSPECT

INSPECTION AND MAINTENANCE OF TH

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4. IN STABILIZED POND AREAS, IF V ACCORDANCE WITH RECOMMENDATIONS THAN 40% BUT LESS THAN 70% OF S RECOMMENDATIONS.

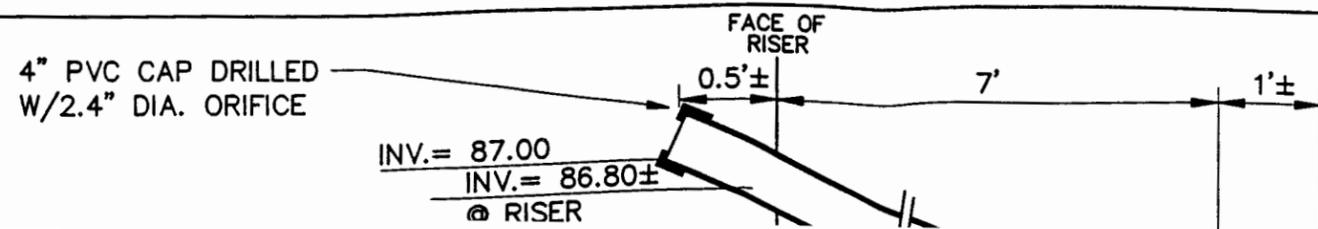
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7. PERFORM QUARTERLY INSPECTION BORROWS OR SLOPE EROSION. IMME

8. RECORD KEEPING. THE OWNER C OR INSPECTIONS PERFORMED FOR TH PROVIDED TO THE COUNTY UPON REC

9. THE FACILITY SHALL NOT BE MOE



NOTE: Downstream device used

STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

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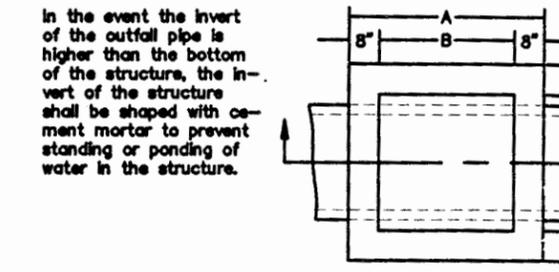
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PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT IN TO THE FACILITY, SPILLWAY(S) AND DOWNSTREAM WATERWAYS. FOLLOWING INSTALLATION OF THE FACILITY AND ESTABLISHMENT OF VEGETATION IN DISTURBED AREAS, INSPECTIONS FOR SEDIMENT BUILDUPS WILL BE PERFORMED AT LEAST QUARTERLY. IT IS ANTICIPATED THAT UNDER NORMAL CONDITIONS, SEDIMENT REMOVAL FROM THE FACILITY WILL BE REQUIRED ONCE EVERY 10 YEARS. IF OTHER CONSTRUCTION OR RELATED ACTIVITIES ARE PERFORMED ON UPSLOPE PARCELS, ADEQUATE PROTECTION SHOULD BE PROVIDED AND INSPECTIONS PERFORMED AT LEAST ONCE WEEKLY.

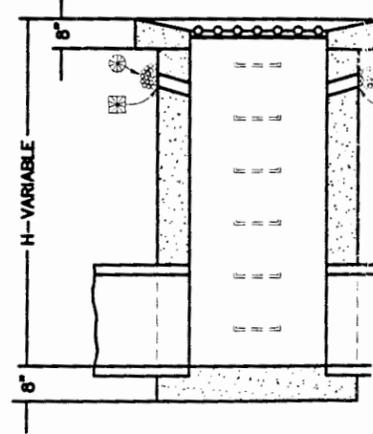
A DESIGNATED REPRESENTATIVE OF THE OWNER WILL INSPECT THE SWM STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING WORKING DAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF GAUGED RAINFALL WITHIN A 24 HOUR PERIOD. ONCE PER YEAR, A REPRESENTATIVE OF THE COUNTY MAY JOINTLY INSPECT THE STRUCTURE. APPROPRIATE ACTION, PERFORMED AT THE COST OF THE OWNER, WILL BE TAKEN TO ENSURE APPROPRIATE MAINTENANCE. WHERE STRUCTURES ARE TO BE MAINTAINED JOINTLY, ALLOCATION OF MAINTENANCE COSTS WILL BE IN ACCORDANCE WITH THE TERMS ESTABLISHED IN MAINTENANCE AGREEMENTS. KEYS TO LOCKED ACCESS POINTS SHALL BE MADE AVAILABLE TO COUNTY INSPECTION PERSONNEL UPON REQUEST.

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

1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. IF THE DEPTH OF SEDIMENT REACHES THE DEPTH OF 1'-6" ABOVE THE BOTTOM OF POND (i.e. CLEANOUT ELEVATION 83.50), REMOVAL IS REQUIRED USING A RUBBER-WHEELED BACKHOE. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, CLEAN THE RISER BOTTOM AND OUTLET PIPE OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA.
2. PERFORM MAINTENANCE MOWING OF POND GRASSES AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ON ANY PART OF THE GRADED EMBANKMENT.
3. PERFORM SOIL SAMPLING ON STABILIZED POND SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.
4. IN STABILIZED POND AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACES, LIME FERTILIZE AND SEED IN ACCORDANCE WITH RECOMMENDATIONS FOR NEW SEEDLINGS, AS LISTED IN DAM CONSTRUCTION NOTES. IF VEGETATION COVERS MORE THAN 40% BUT LESS THAN 70% OF SOIL SURFACES, LIME FERTILIZE AND OVERSEED IN ACCORDANCE WITH CURRENT SEEDLING RECOMMENDATIONS.
5. PERFORM QUARTERLY INSPECTIONS OF THE RISER SECTION AND CREST OF SPILLWAY FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS TO MAINTAIN THE INTEGRITY OF THE STRUCTURE AND PROVIDE AN ATTRACTIVE APPEARANCE.
6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, ORIFICE/ WEIR(S), OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE INTEGRITY OF THE STRUCTURE.
7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE DETENTION FACILITY FOR SIGNS OF ANIMAL/ RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.
8. RECORD KEEPING. THE OWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.
9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.



Steps are to be provided when 'H' is 4'-0" or greater. For step details see STD ST-1.

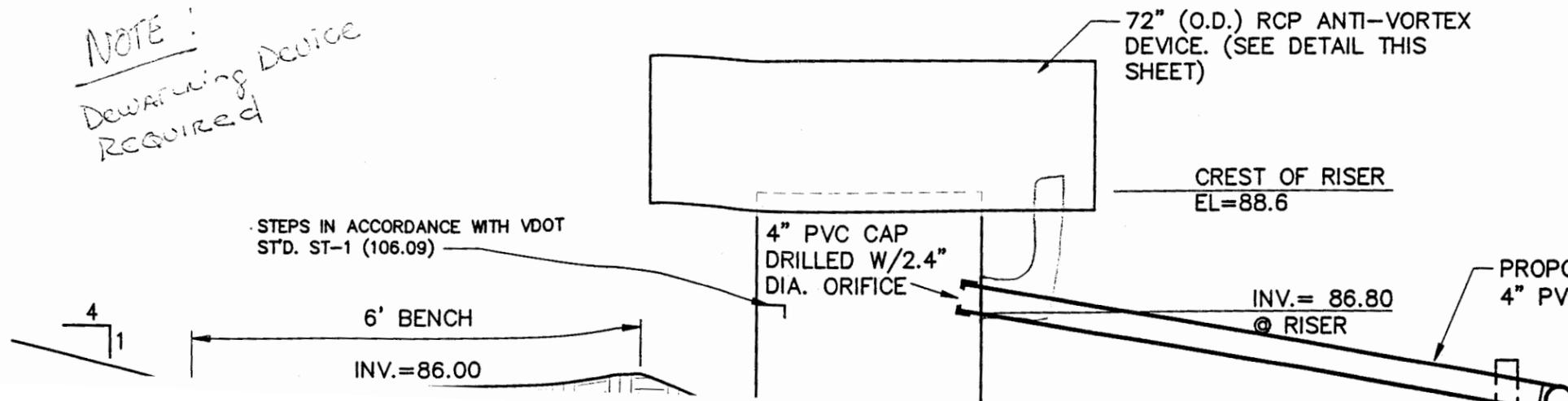
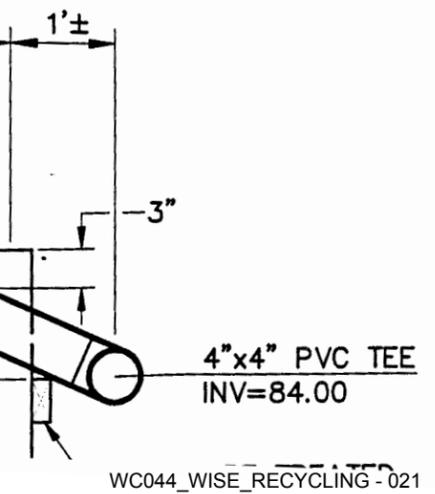


Pipe Size	12"	15"	18"	24"	30"	36"
Minimum Depth H	2'-0"	2'-3 1/2"	2'-6 1/2"	3'-1"	3'-7 1/2"	4'-2"
Cu. Yds. Conc.	.947	1.045	1.143	1.330	1.535	1.731

Increment per foot of additional depth (H) { =0.38
=0.41
Reinforcing concrete footing may be precast or cast lifting hooks of fabricators design to be provided in

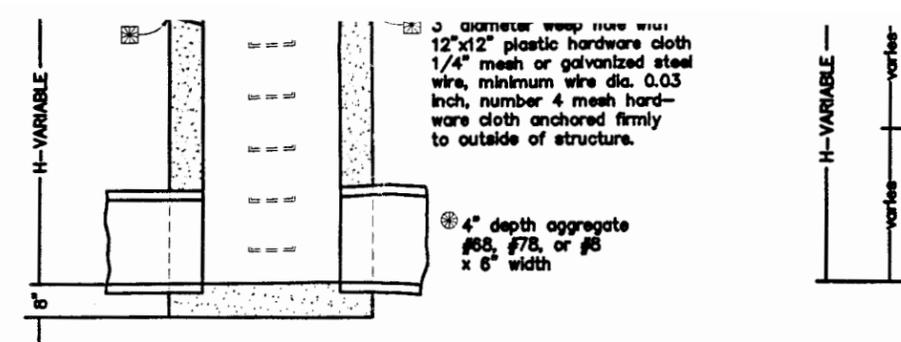
DI-7 --- No gutter
DI-7A --- Single gutter when drop inlet is on a grade.
DI-7B --- Double gutter when drop inlet is in a sag between two grades.
The type of inlet detailed hereon to be constructed will be at the option of the contractor.

STANDARD



4" x 4" PVC TEE

3. PERFORM SOIL SAMPLING ON STABILIZED POND SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.
4. IN STABILIZED POND AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACES, LIME FERTILIZE AND SEED IN ACCORDANCE WITH RECOMMENDATIONS FOR NEW SEEDLINGS, AS LISTED IN DAM CONSTRUCTION NOTES. IF VEGETATION COVERS MORE THAN 40% BUT LESS THAN 70% OF SOIL SURFACES, LIME FERTILIZE AND OVERSEED IN ACCORDANCE WITH CURRENT SEEDLING RECOMMENDATIONS.
5. PERFORM QUARTERLY INSPECTIONS OF THE RISER SECTION AND CREST OF SPILLWAY FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS TO MAINTAIN THE INTEGRITY OF THE STRUCTURE AND PROVIDE AN ATTRACTIVE APPEARANCE.
6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, ORIFICE/ WEIR(S), OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE INTEGRITY OF THE STRUCTURE.
7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE DETENTION FACILITY FOR SIGNS OF ANIMAL/ RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.
8. RECORD KEEPING. THE OWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.
9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.



Pipe Size	12"	15"	18"	24"	30"	36"	42"
Minimum Depth H	2'-0"	2'-3 1/4"	2'-6 1/2"	3'-1"	3'-7 1/2"	4'-2"	4'-8 1/2"
Cu. Yds. Conc.	.947	1.045	1.143	1.339	1.535	1.731	1.927

Increment per foot of additional depth (H) { =0.362 cu. yds. (12"-36" Pipe)
 =0.410 cu. yds. (42" Pipe)
 Reinforcing concrete footing may be precast or cast in place. Two lifting hooks or fabricators design to be provided in precast footing.

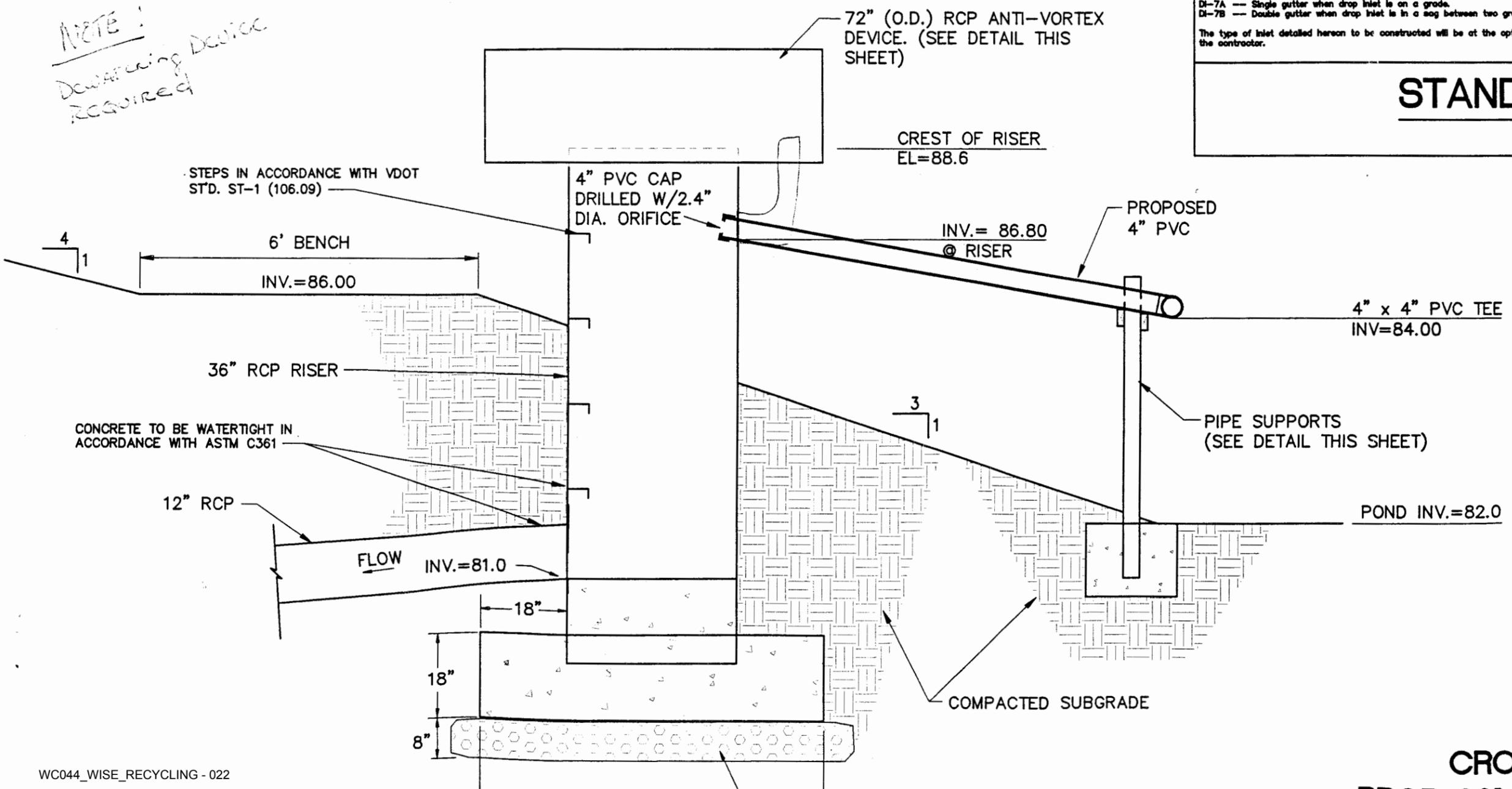
For details of Precast DI-7 n Precast Unit Assembly Diagram Precast General Notes, page Applicable Precast Base, Riser Details, pages 103.07 thru 10

DI-7 --- No gutter
 DI-7A --- Single gutter when drop inlet is on a grade.
 DI-7B --- Double gutter when drop inlet is in a sag between two grades.

GENERAL NOTES
 When specified on plans the invert is to be shaped in accordance with IS-1.
 For details of concrete cover, collar and grate, and method of plain approach gutter see sheet 2 of 2.

The type of inlet detailed herein to be constructed will be at the option of the contractor.

NOTE: Dewatering Device Required



STANDARD MEDIAN DR

NOT TO SCALE

BACKFILL 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 OF 4 INCHES PRIOR TO PLACEMENT OF FILL.

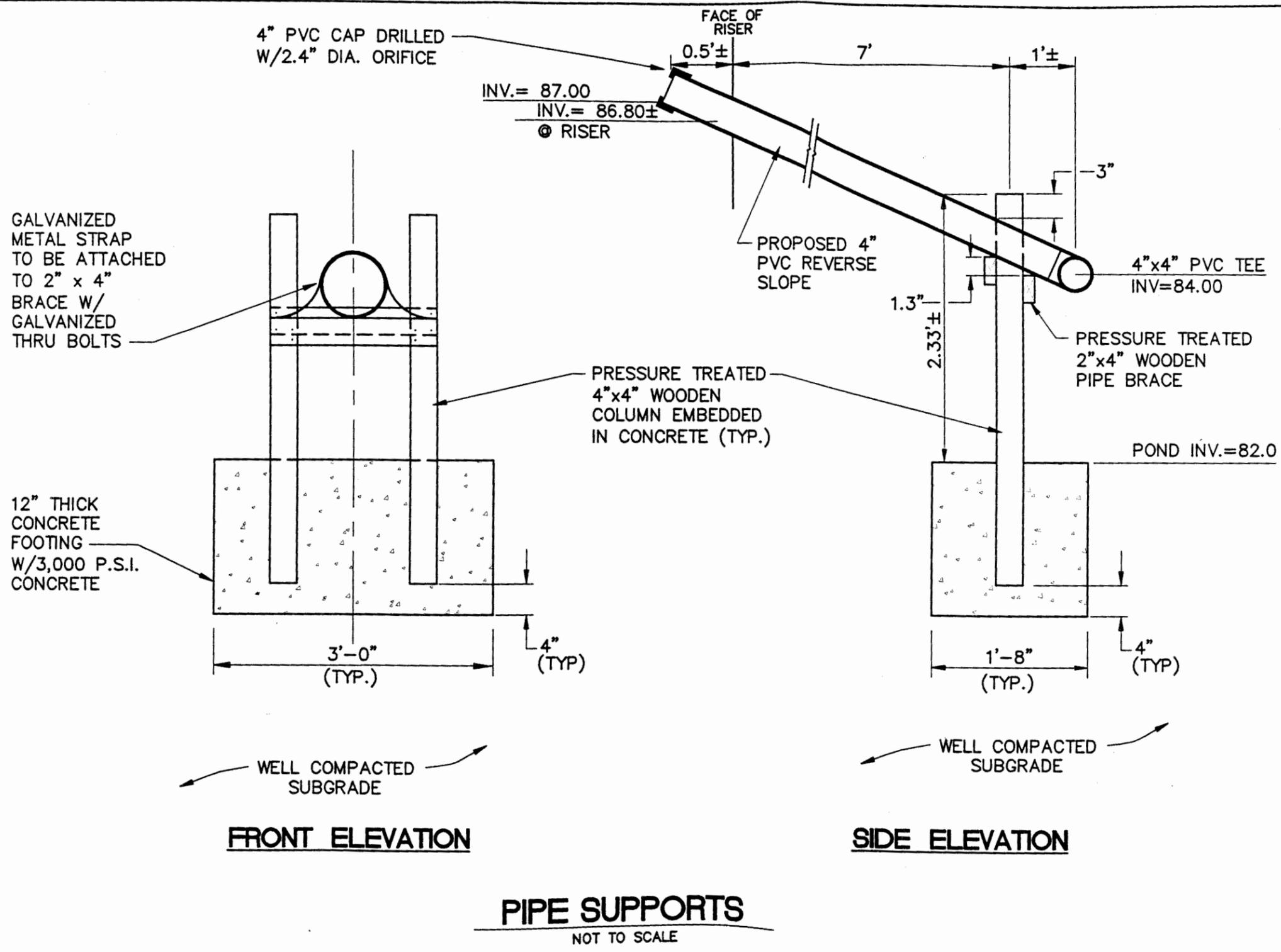
THE FILL MATERIAL'S MOISTURE CONTENT SHALL BE (+3 TO -2) PERCENTAGE POINTS OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D2216 (I.E. IN GENERAL THE FILL MATERIAL SHOULD CONTAIN SUFFICIENT MOISTURE SO THAT IT CAN BE FORMED INTO A BALL WITHOUT CRUMBLING. IF WATER CAN BE SQUEEZED OUT OF THE BALL, IT 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 SUBGRADE MAY BE PLACED AT A DEPTH UP TO 30 INCHES TO BRIDGE SUBGRADE WITH OVER OPTIMUM MOISTURE CONTENT. COMPACTION, AS NOTED ON PLAN, SHALL BE OBTAINED GENERALLY BY USING A SHEEPSFOOT COMPACTOR. FINISHED GRADES SHALL BE MERGED NATURALLY INTO THE EXISTING GRADES.

IS EVIDENT, FURTHER INVESTIGATION OF STRUCTURE.

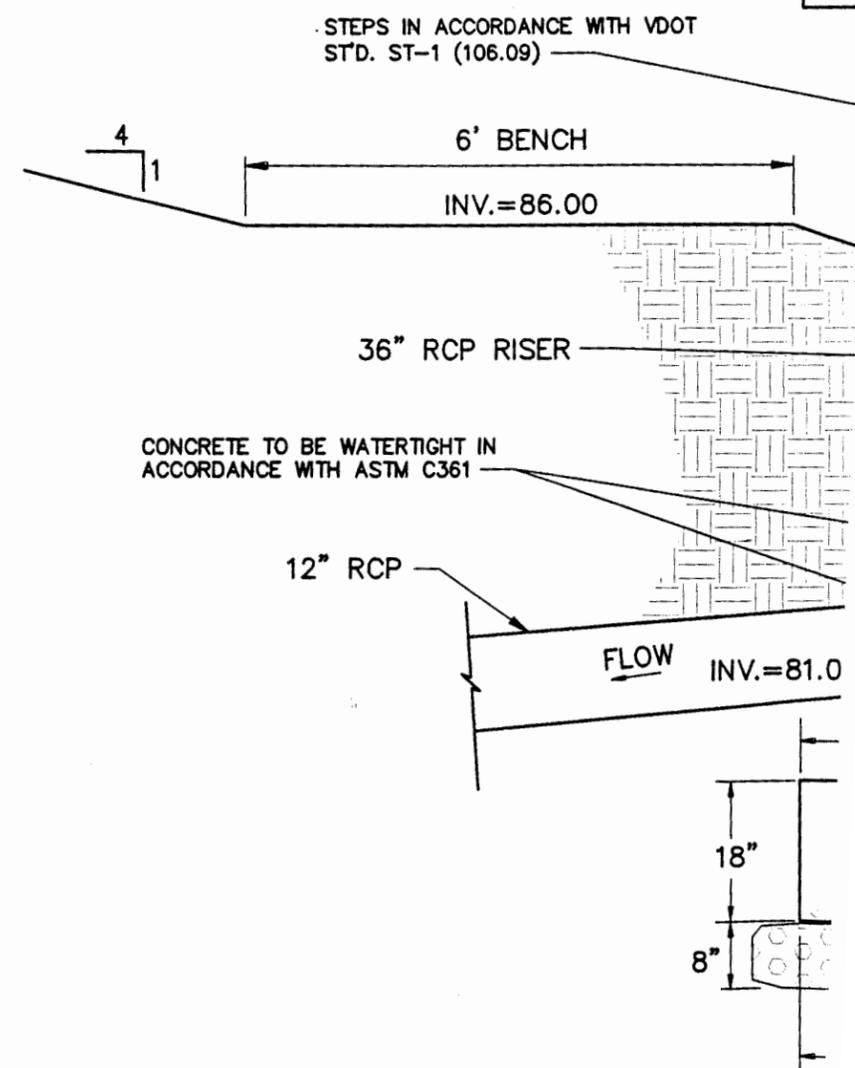
7. PERFORM QUARTERLY INSPECTION FOR BORROWS OR SLOPE EROSION. IMMEDIATELY REPORT TO THE COUNTY UPON REPAIR.

8. RECORD KEEPING. THE OWNER SHALL MAINTAIN RECORDS OF ALL INSPECTIONS PERFORMED FOR THIS FACILITY AND PROVIDE TO THE COUNTY UPON REQUEST.

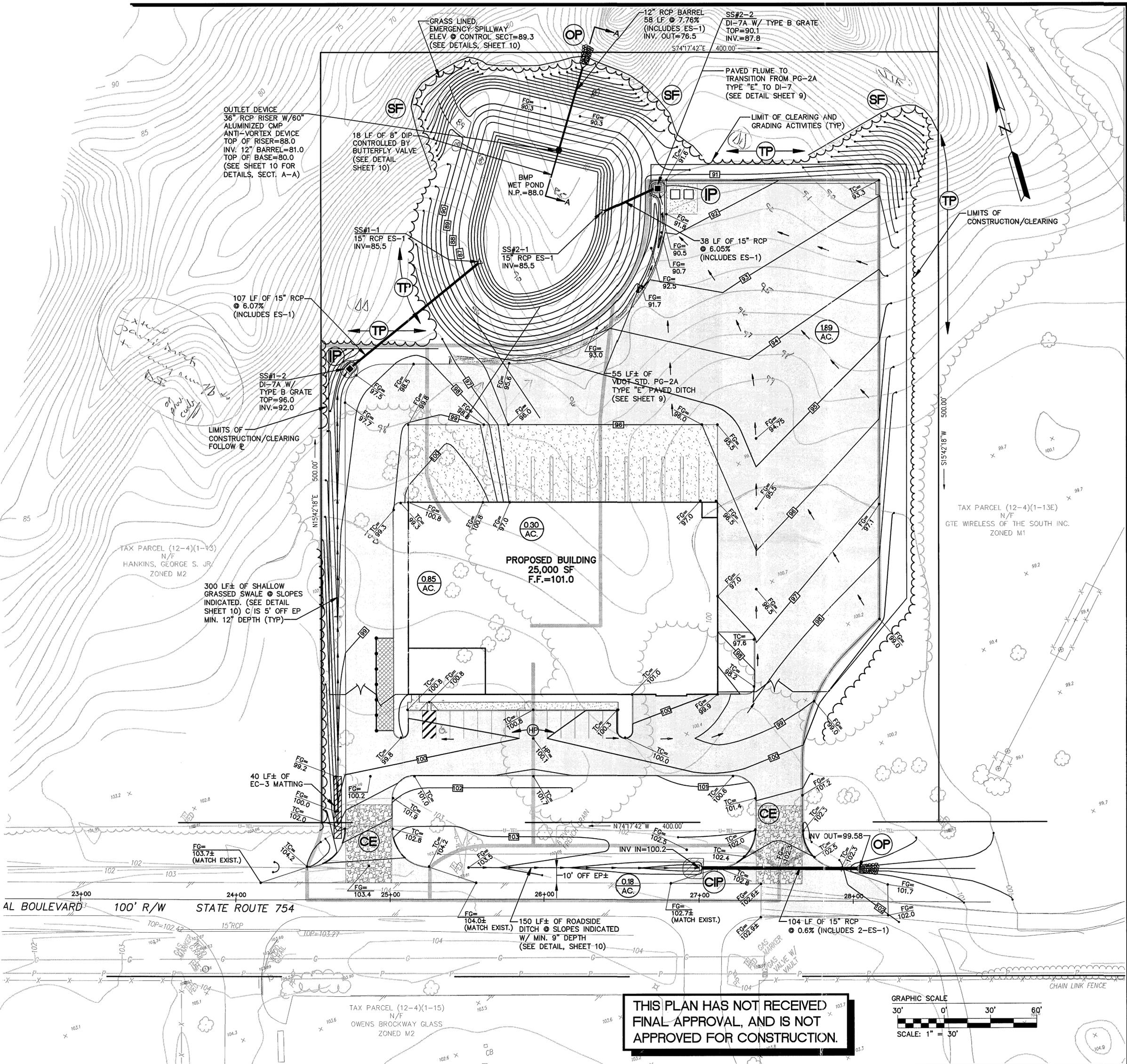
9. THE FACILITY SHALL NOT BE MOVED OR ALTERED WITHOUT THE WRITTEN APPROVAL OF THE COUNTY ENGINEER.



NOTE!
Dewatering Device Required



EAW 04.11.00-11:19 88500C10.dwg



OUTLET DEVICE
36" RCP RISER W/60"
ALUMINIZED CMP
ANTI-VORTEX DEVICE
TOP OF RISER=88.0
INV. 12" BARREL=81.0
TOP OF BASE=80.0
(SEE SHEET 10 FOR
DETAILS, SECT. A-A)

SS#1-1
15" RCP ES-1
INV=85.5

SS#2-1
15" RCP ES-1
INV=85.5

SS#2-2
DI-7A W/ TYPE B GRATE
TOP=90.1
INV.=87.8

107 LF OF 15" RCP
@ 6.07%
(INCLUDES ES-1)

SS#1-2
DI-7A W/
TYPE B GRATE
TOP=96.0
INV.=92.0

38 LF OF 15" RCP
@ 6.05%
(INCLUDES ES-1)

55 LF± OF
VDOT STD. PG-2A
TYPE "E" PAVED DITCH
(SEE SHEET 9)

LIMITS OF
CONSTRUCTION/CLEARING
FOLLOW P

TAX PARCEL (12-4)(1-13)
N/F
HANKINS, GEORGE S. JR.
ZONED M2

300 LF± OF SHALLOW
GRASSED SWALE @ SLOPES
INDICATED. (SEE DETAIL
SHEET 10) C/S IS 5' OFF EP
MIN. 12" DEPTH (TYP)

PROPOSED BUILDING
25,000 SF
F.F.=101.0

TAX PARCEL (12-4)(1-13E)
N/F
GTE WIRELESS OF THE SOUTH INC.
ZONED M1

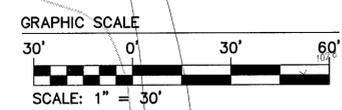
40 LF± OF
EC-3 MATTING

FG=103.7±
(MATCH EXIST.)

150 LF± OF ROADSIDE
DITCH @ SLOPES INDICATED
W/ MIN. 9" DEPTH
(SEE DETAIL, SHEET 10)

104 LF OF 15" RCP
@ 0.6% (INCLUDES 2-ES-1)

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



NO.	DATE	REVISION / COMMENT / NOTE	BY



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



GRADING, DRAINAGE, AND EROSION AND
SEDIMENT CONTROL PLAN

WISE RECYCLING

OWNER / DEVELOPER: THE WALTHAM GROUP

DESIGNED: DPW
DRAWN: ARH
SCALE: 1"=30'
DATE: 12/29/99
PROJECT NO.: 8850-0
DRAWING NO.: 3

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	2.1	1	20	5,154	2	—	—	—	2 YR PRE
2	Rational	11.2	1	8	10,786	2	—	—	—	2 YR POST
3	Rational	2.9	1	20	7,020	10	—	—	—	10 YR PRE
4	Rational	14.3	1	8	13,740	10	—	—	—	10 YR POST
5	Rational	4.1	1	20	9,879	100	—	—	—	100 YR PRE
6	Rational	19.4	1	8	18,590	100	—	—	—	100 YR POST
7	Reservoir	0.5	1	31	10,315	2	2	88.22	22,371	2 YR ROUTE
8	Reservoir	0.6	1	31	13,255	10	4	88.58	25,232	10 YR ROUTE
9	Reservoir	4.6	1	26	18,098	100	6	88.97	28,232	100 YR ROUTE

* NOTE: 7-9 Routed through AS-BUILT POND

As-Built Routing

PREDEV

2-	2.1 cfs ✓	DA = 2.6 AC. ✓
10-	2.9 cfs ✓	C = 0.25 ✓
100-	4.1 cfs ✓	Tc = 20 min. ✓

POST DEV INFLOW

2-	11.2 cfs ✓	DA = 3.5 AC.
10-	14.3 cfs ✓	C = 0.65
100-	19.4 cfs ✓	Tc = 8 min.

POND Routed

2-	0.5 cfs @ EL. 88.22 < PRE
10-	0.6 cfs @ EL. 88.58 < PRE
100-	4.6 cfs @ EL. 88.97 < PRE

T.O.D EL. 89.9; FB = 0.93' OK.
89.7; 0.73'

Proj. file: WET POND R ASBUILT.CDW File: New JCC.IDF

Run date: 11-21-2001

SP-138-99
WC 044

Reservoir Report

Reservoir No. 1 - WET POND

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	82.00 <i>81.6</i>	1,173	0	0
1.00	83.00	1,645	1,409	1,409
2.00	84.00	2,173	1,909	3,318
3.00	85.00	2,758	2,466	5,784
4.00	86.00	3,400	3,079	8,863
4.10	86.10	4,854	413	9,276
5.00	87.00	5,948	4,861	14,137
6.00	88.00	7,143	6,546	20,683
7.00	89.00 <i>To D 89.9</i>	8,439	7,791	28,474
8.00	90.00	9,836	9,138	37,612

Culvert / Orifice Structures

	<i>BARREL</i> [A]	<i>L.F.O.</i> [B]	[C]	[D]
Rise in	= 15.0 ✓	4.0 ✓	0.0	0.0
Span in	= 15.0 ✓	4.0 ✓	0.0	0.0
No. Barrels	= 1	1	0	0
Invert El. ft	= 81.20 ✓	86.70 ✓	0.00	0.00
Length ft	= 58.0 ✓	0.5 ✓	0.0	0.0
Slope %	= 7.41 ✓	0.00	0.00	0.00
N-Value	= .013 ✓	.013 ✓	.000	.000
Orif. Coeff.	= 0.60 ✓	0.60	0.00	0.00
Multi-Stage	= ---	Yes	No	No

Weir Structures

	<i>36" RISER ES.</i> [A]	[B]	[C]	[D]
Crest Len ft	= 9.4 ✓	15.0 ✓	0.0	0.0
Crest El. ft	= 88.70	89.40	0.00	0.00
Weir Coeff.	= 3.00 ✓	3.00 ✓	0.00	0.00
Eqn. Exp.	= 1.50 ✓	1.50	0.00	0.00
Multi-Stage	= Yes	No	No	No

Tailwater Elevation = 0.00 ft

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0	82.00	2.59	0.00	---	---	0.00	0.00	---	---	0.00
1.00	1,409	83.00	6.40	0.00	---	---	0.00	0.00	---	---	0.00
2.00	3,318	84.00	8.71	0.00	---	---	0.00	0.00	---	---	0.00
3.00	5,784	85.00	10.53	0.00	---	---	0.00	0.00	---	---	0.00
4.00	8,863	86.00	12.07	0.00	---	---	0.00	0.00	---	---	0.00
4.10	9,276	86.10	12.22	0.00	---	---	0.00	0.00	---	---	0.00
5.00	14,137	87.00	13.44	0.15	---	---	0.00	0.00	---	---	0.15
6.00	20,683	88.00	14.68	0.45	---	---	0.00	0.00	---	---	0.45
7.00	28,474	89.00	15.83	0.61	---	---	4.64	0.00	---	---	5.26
8.00	37,612	90.00	16.89	0.00	---	---	41.89	20.91	---	---	37.81

Hydrograph Plot

English

Hyd. No. 1

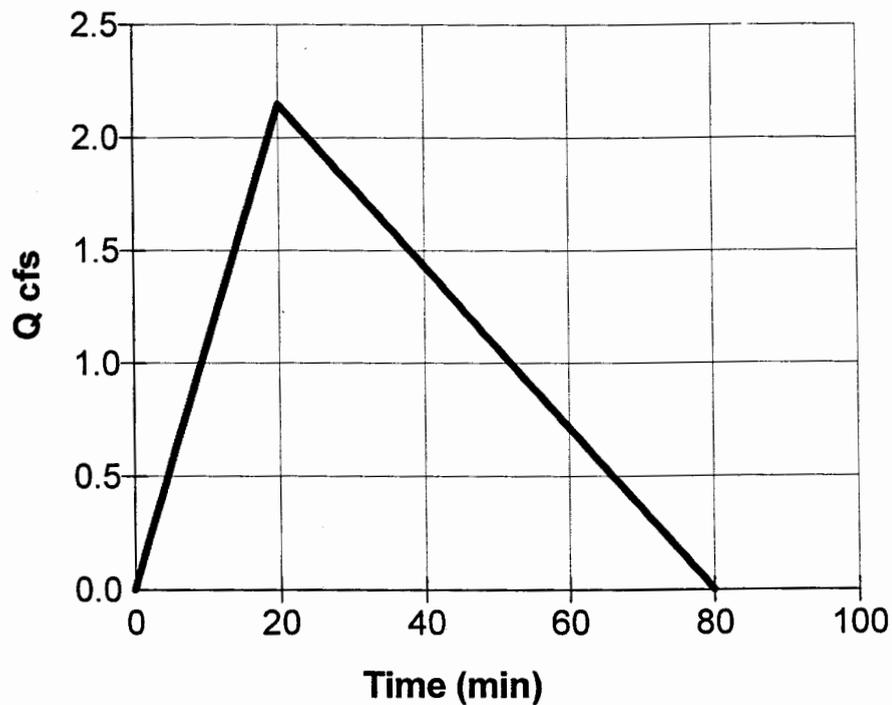
2 YR PRE

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 2.6 ac
Intensity = 3.30 in
I-D-F Curve = New JCC.IDF

Peak discharge = 2.15 cfs
Time interval = 1 min
Runoff coeff. = 0.25
Time of conc. (Tc) = 20 min
Reced. limb factor = 3

Total Volume = 5,154 cuft

1 - Rational - 2 Yr - Qp = 2.15 cfs



Hydrograph Plot

English

Hyd. No. 3

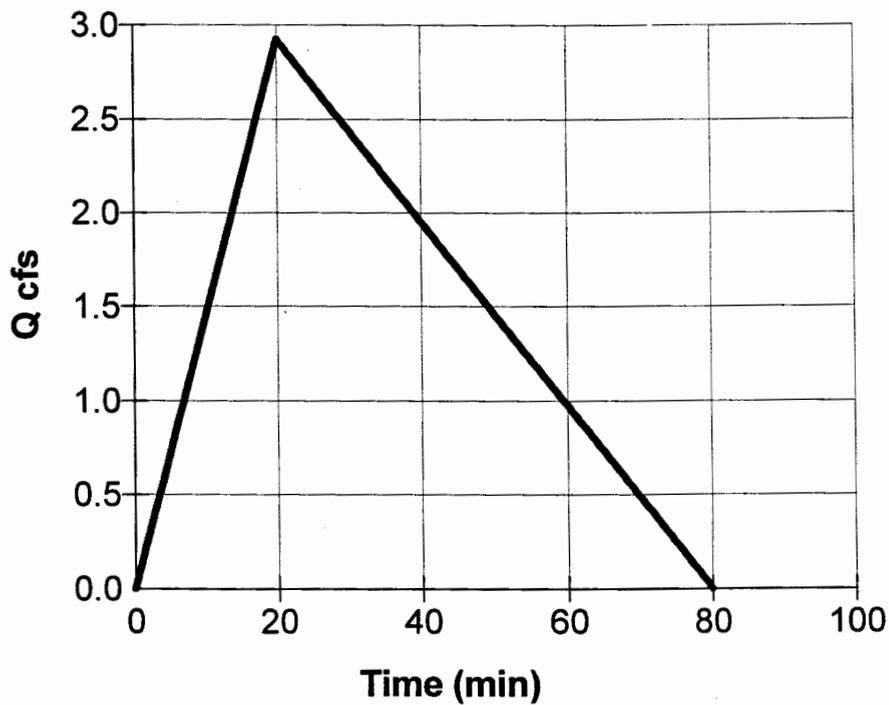
10 YR PRE

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 2.6 ac
Intensity = 4.50 in
I-D-F Curve = New JCC.IDF

Peak discharge = 2.92 cfs
Time interval = 1 min
Runoff coeff. = 0.25
Time of conc. (Tc) = 20 min
Reced. limb factor = 3

Total Volume = 7,020 cuft

3 - Rational - 10 Yr - Qp = 2.92 cfs



Hydrograph Plot

English

Hyd. No. 7

2 YR ROUTE

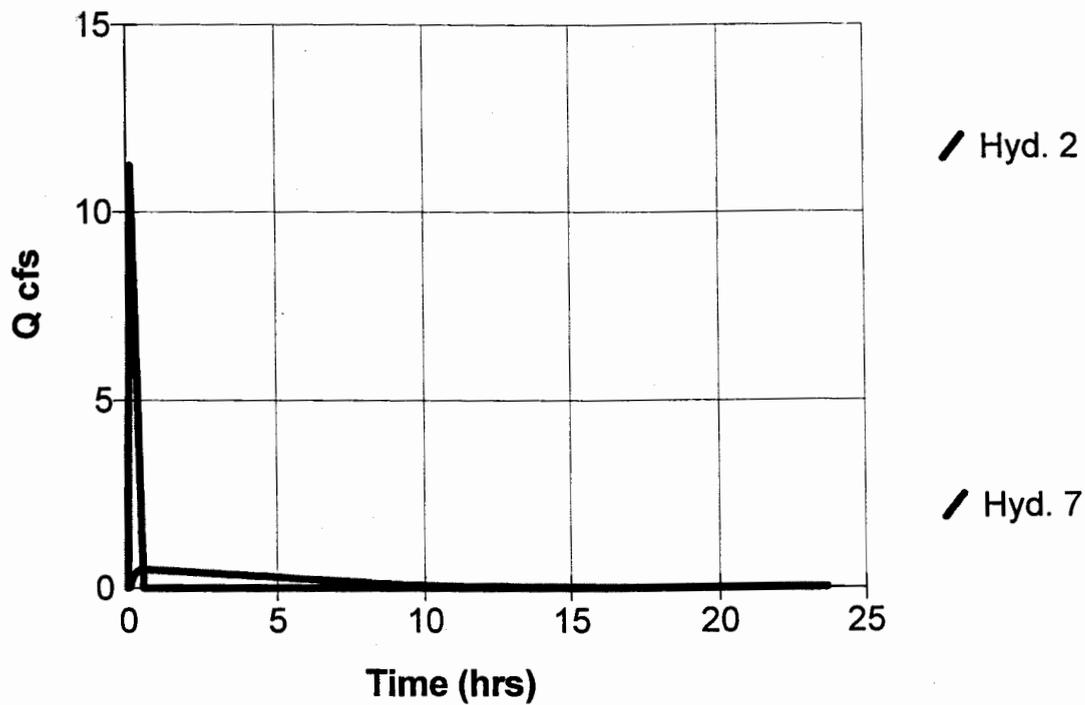
Hydrograph type = Reservoir
Storm frequency = 2 yrs
Inflow hyd. No. = 2
Max. Elevation = 88.22 ft

Peak discharge = 0.49 cfs
Time interval = 1 min
Reservoir name = WET POND
Max. Storage = 22,371 cuft

Storage Indication method used.

Total Volume = 10,315 cuft

7 - Reservoir - 2 Yr - Qp = 0.49 cfs



Hydrograph Plot

English

Hyd. No. 8

10 YR ROUTE

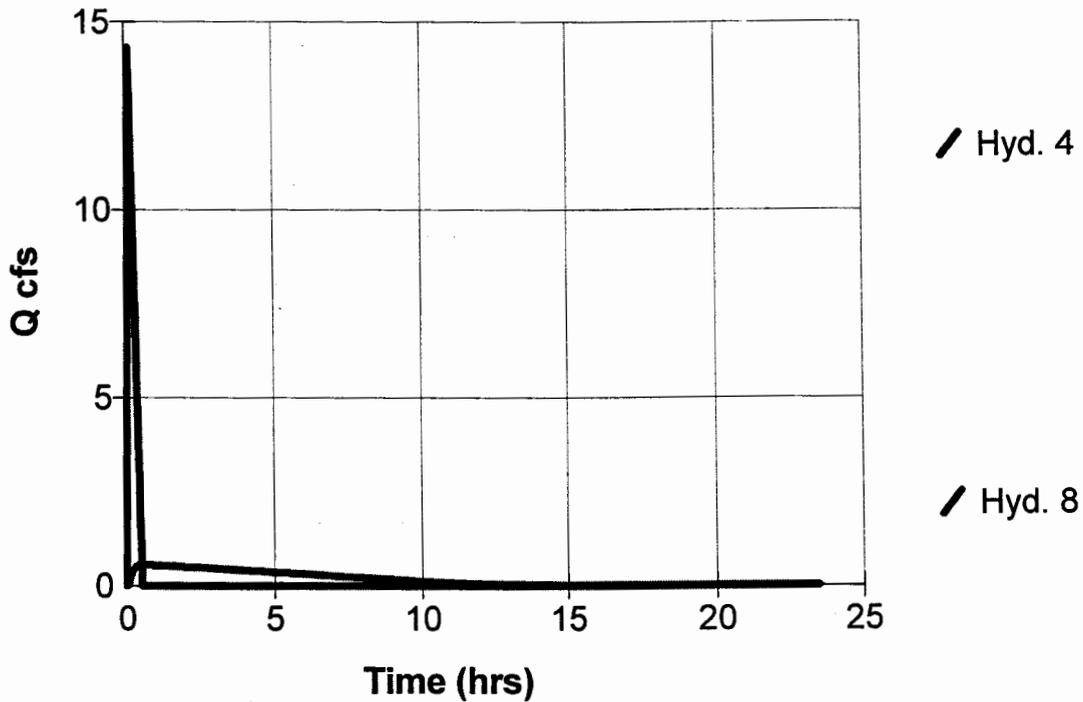
Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 4
Max. Elevation = 88.58 ft

Peak discharge = 0.55 cfs
Time interval = 1 min
Reservoir name = WET POND
Max. Storage = 25,232 cuft

Storage Indication method used.

Total Volume = 13,255 cuft

8 - Reservoir - 10 Yr - $Q_p = 0.55$ cfs



Hydrograph Plot

English

Hyd. No. 9

100 YR ROUTE

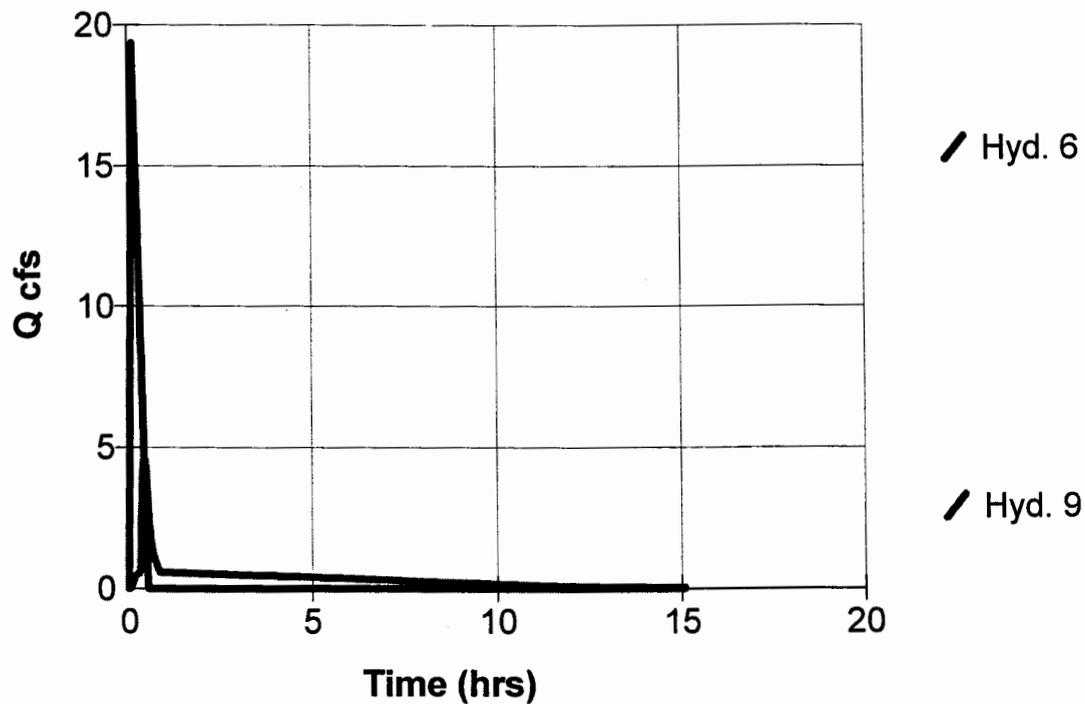
Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 6
Max. Elevation = 88.97 ft

Peak discharge = 4.60 cfs
Time interval = 1 min
Reservoir name = WET POND
Max. Storage = 28,232 cuft

Storage Indication method used.

Total Volume = 18,098 cuft

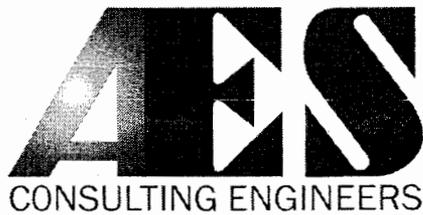
9 - Reservoir - 100 Yr - $Q_p = 4.60$ cfs



STORMWATER MANAGEMENT/ BMP CALCULATIONS
FOR
WET POND BMP

WISE RECYCLING
HANKINS INDUSTRIAL PARK

AES PROJECT #8850



5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
December 15, 1999

REVISED 3/8/00

ENVIRONMENTAL

Table 2

Worksheet for BMP Point System

A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP Points		Fraction of Site Served by BMP		Weighted BMP Points
WET POND	10	x	$\frac{3.31 + .2 = 3.51}{4.59 - .58 = 4.01}$	=	8.75
		x		=	
		x		=	
		x		=	

TOTAL WEIGHTED STRUCTURAL BMP POINTS: 8.75

B. NATURAL OPEN SPACE CREDIT

Fraction of Site		Natural Open Space Credit		Points for Natural Open Space
$\frac{0.58}{4.59}$	x	0.1 (0.1 per 1%)	=	1.26
	x	(0.15 per 1%)	=	

TOTAL NATURAL OPEN SPACE CREDIT: 1.26

C. TOTAL WEIGHTED POINTS

$$\frac{8.75}{\text{Structural BMP Points}} + \frac{1.26}{\text{Natural Open Space Points}} = \frac{10.01}{\text{Total}}$$

TOTAL SITE AREA = 4.59 AC
 ON-SITE NON-DISTURBED AREA = 0.58 AC
 ON-SITE DISTURBED & BMP TREATED AREA = 3.31 AC
 OFF-SITE TREATED AREA = 0.20 AC

3/8/00

Pre-Development

DA = 2.6 AC

General area is unimproved, therefore C = 0.25 (VESCH Table 5-2)

Time of concentration

overland flow = 240 FT w/ $\frac{104-98}{240}$ = 2.5 % slope

Tc = 18 MIN (VESCH Plate 5-1)

shallow flow = 160 FT w/ $\frac{98-90}{160}$ = 5.0 % slope

Avg Vel = 3.6 FPS (VESCH Plate 5-2)

Tc = $\frac{160}{60 * 3.6}$ = 1 MIN

channel flow = 130 FT w/ $\frac{90-82}{130}$ = 6.2 % slope

Avg Vel = 4 FPS (VESCH Plate 5-2)

Tc = $\frac{130}{60 * 4.0}$ = 1 MIN

Tc = 20 MIN

Pre-Development:		
DA =	2.6	AC
C =	0.25	
Tc =	20	MIN

Post-Development

DA = 3.5 AC

(VESCH Table 5-2)

Impervious 2.54 AC C = 0.8
 Open (wooded/ grass) 0.96 AC C = 0.25

Weighted C = $\frac{(2.54)(0.8) + (0.96)(0.25)}{3.5}$ = 0.65

Time of concentration

overland (sheet) flow = 300 FT w/ $\frac{99-91}{300}$ = 2.7 % slope

Tc = 5 MIN (VESCH Plate 5-1)

shallow (gutter) flow = 370 FT w/ $\frac{100-93}{370}$ = 1.9 % slope

Avg Vel = 3 FPS (VESCH Plate 5-2)

3/8/00

Tc = $\frac{370}{60 * 3}$ = 2 MIN

channel (pipe) flow = 173 FT w/ $\frac{92-85}{173}$ = 4.0 % slope

Avg Vel = 4 FPS (VESCH Plate 5-2)

Tc = $\frac{173}{60 * 4.0}$ = 1 MIN

Tc = 8 MIN

Post-Development:			
DA =	3.5	AC	
C =	0.65		
Tc =	8	MIN	

BMP Choice: Wet Pond Type 7 w/ Volume Rqd = 4*Vr

PLEASE SEE NEXT PAGE FOR BMP INFORMATION

Rv = 0.05 + (0.009)(%IMP)

IMP Area: 2.54 AC

% IMP: $\frac{2.54}{3.5}$ = 0.726 = 72.6 %

Rv = 0.70

Vr = (1/2" / AC) * (1' / 12") * (DA) * (43560 SF / AC) * (Rv)

Vr = 4,467 CF

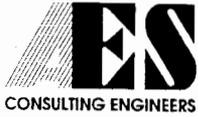
Volume required for normal pool = 4 * Vr = 17,868 CF

(Volume rqd for 10 point BMP = 10 * Vr = 44,670 CF

Volume provided at Normal Pool elevation 88.00 = 45,461 CF **

** see stage/storage table of computer report

POND IS A 10 POINT BMP - WET POND DESIGN TYPE 7A



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

PROJECT WISE RECYCLING ✓
 PROJECT NO. 8850
 SUBJECT BMP CALCULATION
 SHEET NO. _____ OF _____
 CALCULATED BY DPW DATE 3/8/00

AT THE SUGGESTION OF THE ENVIRONMENTAL DIVISION, THE BMP DESIGN WAS REVISITED. THE FOLLOWING DESIGN PROVIDES A 10-POINT FACILITY AND MAINTAINS A GREATER PORTION OF OPEN SPACE.

VOLUME REQD FOR PERMANENT POOL:

1" OVER IMPERVIOUS AREA

SITE IMP AREA = 2.54 AC

$$V_R = 1" \left(\frac{1}{12} \right) (2.54 \text{ AC}) (43560 \text{ SF/AC}) = \underline{9220 \text{ CF}}$$

→ SET NORMAL POOL @ EL 87.0 = 14,137 CF ✓ OK

PROVIDE 24-HR DRAWDOWN OF ADDITIONAL V_R :

$$14137 + 9220 = 23,357 \text{ CF}$$

STORAGE OBTAINED @ EL 88.35

→ SET RISER CREST AT 88.6

$$24 \text{ HR RELEASE RATE, } Q_R = \frac{9220 \text{ CF}}{86400 \text{ S}} = 0.11 \text{ CFS}$$

$$Q_R = 0.6 A \sqrt{2 g \Delta h}$$

$$0.11 = 0.6 A \sqrt{2 (32.2) \frac{(88.6 - 87)}{2}}$$

$$A = 0.0255 \text{ SF}$$

$$r = 1.2" \therefore d = 2.4"$$

→ USE 4" PVC W/ ~~PLUG~~ CAP DRILLED 2.4" DIA. ORIFICE

DAM DESIGN

Anti-seep Collar Design:

$$L_s = Y * (Z + 4) * [1 + S / (0.25 - S)] \quad (\text{VESCH 3.14})$$

$$\begin{aligned} Y &= 88.6-81 \quad \text{FT} \\ Z &= 3 \\ S &= 0.0776 \quad \text{FT/FT} \end{aligned}$$

$$L_s = 77 \quad \text{FT}$$

** For permanent dam, L_s must be increased by 15%; however VESCH 3.14 only increases by 10%. Therefore, increase L_s by 5%, then enter Plate 3.14-12 to add remaining 10%.

$$L_s + 5\% = 77 + (77 * 0.05) = 81 \quad \text{FT}$$

Enter Plate 3.14-12 with 81 FT:

3 collars @ 3.6' x 3.6' ea. with 18' spacing

Anti-Vortex Device:

Riser diameter = 36" RCP

Use concrete anti-vortex device, detail on plans

72" outside diameter anti-vortex device

Emergency Spillway Design:

$$\begin{aligned} 100 \text{ yr storm elev} &= 88.99 && (\text{from Summary Report}) \\ \text{Top of dam elev} &= \underline{90.3} \end{aligned}$$

$$\text{Freeboard} = 1.31 \quad \text{FT}$$

100 year storm is controlled, below the pre-development rate, by the riser structure. An emergency spillway is not required, however a 12' wide, grass-lined channel with 4:1 side slopes and a minimum 1' depth is provided. Elev at control section = 89.3

Rip Rap Calculation for Barrel Outfall:

(VESCH 3.18)

12" diameter barrel outfalls to existing channel, therefore a maximum tailwater condition will be assumed.

$$Q_{10} = 2.4 \quad \text{CFS} \quad (\text{from Summary Report})$$

$$\text{Apron length - Plate 3.18-4} \quad L_a = 5 \quad \text{FT}$$

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	2.1	1	20	5,154	2	---	---	---	2 YR PRE
2	Rational	11.2	1	8	10,786	2	---	---	---	2 YR POST
3	Rational	2.9	1	20	7,020	10	---	---	---	10 YR PRE
4	Rational	14.3	1	8	13,740	10	---	---	---	10 YR POST
5	Rational	4.1	1	20	9,879	100	---	---	---	100 YR PRE
6	Rational	19.4	1	8	18,590	100	---	---	---	100 YR POST
7	Reservoir	0.2	1	32	9,651	2	2	88.51	24,687	2 YR ROUTE
8	Reservoir	2.4	1	28	12,359	10	4	88.78	26,751	10 YR ROUTE
9	Reservoir	7.1	1	23	17,195	100	6	88.99	28,404	100 YR ROUTE

Proj. file: WET POND R.GPW

IDF file: New JCC.IDF

Run date: 03-08-2000

Reservoir Report

Reservoir No. 1 - WET POND

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	82.00	1,173	0	0
1.00	83.00	1,645	1,409	1,409
2.00	84.00	2,173	1,909	3,318
3.00	85.00	2,758	2,466	5,784
4.00	86.00	3,400	3,079	8,863
4.10	86.10	4,854	413	9,276
5.00	87.00	5,948	4,861	14,137
6.00	88.00	7,143	6,546	20,683
7.00	89.00	8,439	7,791	28,474
8.00	90.00	9,836	9,138	37,612

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 12.0	2.4	0.0	0.0
Span in	= 12.0	2.4	0.0	0.0
No. Barrels	= 1	1	0	0
Invert El. ft	= 81.00	87.00	0.00	0.00
Length ft	= 58.0	0.5	0.0	0.0
Slope %	= 7.76	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= ----	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 9.4	12.0	0.0	0.0
Crest El. ft	= 88.60	89.30	0.00	0.00
Weir Coeff.	= 3.00	3.00	0.00	0.00
Eqn. Exp.	= 1.50	1.50	0.00	0.00
Multi-Stage	= Yes	No	No	No

Tailwater Elevation = 0.00 ft

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0	82.00	2.67	0.00	---	---	0.00	0.00	---	---	0.00
0.10	141	82.10	2.93	0.00	---	---	0.00	0.00	---	---	0.00
0.20	282	82.20	3.16	0.00	---	---	0.00	0.00	---	---	0.00
0.30	423	82.30	3.38	0.00	---	---	0.00	0.00	---	---	0.00
0.40	564	82.40	3.59	0.00	---	---	0.00	0.00	---	---	0.00
0.50	705	82.50	3.78	0.00	---	---	0.00	0.00	---	---	0.00
0.60	845	82.60	3.97	0.00	---	---	0.00	0.00	---	---	0.00
0.70	986	82.70	4.14	0.00	---	---	0.00	0.00	---	---	0.00
0.80	1,127	82.80	4.31	0.00	---	---	0.00	0.00	---	---	0.00
0.90	1,268	82.90	4.47	0.00	---	---	0.00	0.00	---	---	0.00
1.00	1,409	83.00	4.63	0.00	---	---	0.00	0.00	---	---	0.00

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Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
1.10	1,600	83.10	4.78	0.00	---	---	0.00	0.00	---	---	0.00
1.20	1,791	83.20	4.93	0.00	---	---	0.00	0.00	---	---	0.00
1.30	1,982	83.30	5.07	0.00	---	---	0.00	0.00	---	---	0.00
1.40	2,173	83.40	5.21	0.00	---	---	0.00	0.00	---	---	0.00
1.50	2,364	83.50	5.35	0.00	---	---	0.00	0.00	---	---	0.00
1.60	2,554	83.60	5.48	0.00	---	---	0.00	0.00	---	---	0.00
1.70	2,745	83.70	5.61	0.00	---	---	0.00	0.00	---	---	0.00
1.80	2,936	83.80	5.73	0.00	---	---	0.00	0.00	---	---	0.00
1.90	3,127	83.90	5.86	0.00	---	---	0.00	0.00	---	---	0.00
2.00	3,318	84.00	5.98	0.00	---	---	0.00	0.00	---	---	0.00
2.10	3,565	84.10	6.10	0.00	---	---	0.00	0.00	---	---	0.00
2.20	3,811	84.20	6.21	0.00	---	---	0.00	0.00	---	---	0.00
2.30	4,058	84.30	6.33	0.00	---	---	0.00	0.00	---	---	0.00
2.40	4,304	84.40	6.44	0.00	---	---	0.00	0.00	---	---	0.00
2.50	4,551	84.50	6.55	0.00	---	---	0.00	0.00	---	---	0.00
2.60	4,798	84.60	6.66	0.00	---	---	0.00	0.00	---	---	0.00
2.70	5,044	84.70	6.76	0.00	---	---	0.00	0.00	---	---	0.00
2.80	5,291	84.80	6.87	0.00	---	---	0.00	0.00	---	---	0.00
2.90	5,537	84.90	6.97	0.00	---	---	0.00	0.00	---	---	0.00
3.00	5,784	85.00	7.07	0.00	---	---	0.00	0.00	---	---	0.00
3.10	6,092	85.10	7.17	0.00	---	---	0.00	0.00	---	---	0.00
3.20	6,400	85.20	7.27	0.00	---	---	0.00	0.00	---	---	0.00
3.30	6,708	85.30	7.37	0.00	---	---	0.00	0.00	---	---	0.00
3.40	7,016	85.40	7.47	0.00	---	---	0.00	0.00	---	---	0.00
3.50	7,324	85.50	7.56	0.00	---	---	0.00	0.00	---	---	0.00
3.60	7,631	85.60	7.66	0.00	---	---	0.00	0.00	---	---	0.00
3.70	7,939	85.70	7.75	0.00	---	---	0.00	0.00	---	---	0.00
3.80	8,247	85.80	7.84	0.00	---	---	0.00	0.00	---	---	0.00
3.90	8,555	85.90	7.93	0.00	---	---	0.00	0.00	---	---	0.00
4.00	8,863	86.00	8.02	0.00	---	---	0.00	0.00	---	---	0.00
4.01	8,904	86.01	8.03	0.00	---	---	0.00	0.00	---	---	0.00
4.02	8,946	86.02	8.04	0.00	---	---	0.00	0.00	---	---	0.00
4.03	8,987	86.03	8.05	0.00	---	---	0.00	0.00	---	---	0.00
4.04	9,028	86.04	8.06	0.00	---	---	0.00	0.00	---	---	0.00
4.05	9,069	86.05	8.07	0.00	---	---	0.00	0.00	---	---	0.00
4.06	9,111	86.06	8.07	0.00	---	---	0.00	0.00	---	---	0.00
4.07	9,152	86.07	8.08	0.00	---	---	0.00	0.00	---	---	0.00
4.08	9,193	86.08	8.09	0.00	---	---	0.00	0.00	---	---	0.00
4.09	9,235	86.09	8.10	0.00	---	---	0.00	0.00	---	---	0.00
4.10	9,276	86.10	8.11	0.00	---	---	0.00	0.00	---	---	0.00
4.19	9,762	86.19	8.19	0.00	---	---	0.00	0.00	---	---	0.00
4.28	10,248	86.28	8.27	0.00	---	---	0.00	0.00	---	---	0.00
4.37	10,734	86.37	8.34	0.00	---	---	0.00	0.00	---	---	0.00
4.46	11,220	86.46	8.42	0.00	---	---	0.00	0.00	---	---	0.00
4.55	11,707	86.55	8.50	0.00	---	---	0.00	0.00	---	---	0.00
4.64	12,193	86.64	8.57	0.00	---	---	0.00	0.00	---	---	0.00
4.73	12,679	86.73	8.65	0.00	---	---	0.00	0.00	---	---	0.00
4.82	13,165	86.82	8.72	0.00	---	---	0.00	0.00	---	---	0.00
4.91	13,651	86.91	8.79	0.00	---	---	0.00	0.00	---	---	0.00
5.00	14,137	87.00	8.87	0.00	---	---	0.00	0.00	---	---	0.00
5.10	14,792	87.10	8.95	0.02	---	---	0.00	0.00	---	---	0.02
5.20	15,446	87.20	9.03	0.05	---	---	0.00	0.00	---	---	0.05
5.30	16,101	87.30	9.11	0.06	---	---	0.00	0.00	---	---	0.06

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Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
5.40	16,755	87.40	9.18	0.08	---	---	0.00	0.00	---	---	0.08
5.50	17,410	87.50	9.26	0.10	---	---	0.00	0.00	---	---	0.10
5.60	18,065	87.60	9.34	0.11	---	---	0.00	0.00	---	---	0.11
5.70	18,719	87.70	9.42	0.12	---	---	0.00	0.00	---	---	0.12
5.80	19,374	87.80	9.49	0.13	---	---	0.00	0.00	---	---	0.13
5.90	20,028	87.90	9.57	0.14	---	---	0.00	0.00	---	---	0.14
6.00	20,683	88.00	9.64	0.14	---	---	0.00	0.00	---	---	0.14
6.10	21,462	88.10	9.71	0.15	---	---	0.00	0.00	---	---	0.15
6.20	22,241	88.20	9.79	0.16	---	---	0.00	0.00	---	---	0.16
6.30	23,020	88.30	9.86	0.17	---	---	0.00	0.00	---	---	0.17
6.40	23,799	88.40	9.93	0.17	---	---	0.00	0.00	---	---	0.17
6.50	24,579	88.50	10.00	0.18	---	---	0.00	0.00	---	---	0.18
6.60	25,358	88.60	10.08	0.19	---	---	0.00	0.00	---	---	0.19
6.70	26,137	88.70	10.15	0.19	---	---	0.89	0.00	---	---	1.08
6.80	26,916	88.80	10.22	0.20	---	---	2.53	0.00	---	---	2.72
6.90	27,695	88.90	10.29	0.20	---	---	4.64	0.00	---	---	4.85
7.00	28,474	89.00	10.36	0.21	---	---	7.15	0.00	---	---	7.36
7.10	29,388	89.10	10.42	0.21	---	---	9.99	0.00	---	---	10.21
7.20	30,302	89.20	10.49	0.10	---	---	13.13	0.00	---	---	10.49
7.30	31,215	89.30	10.56	0.00	---	---	16.55	0.00	---	---	10.56
7.40	32,129	89.40	10.63	0.00	---	---	20.22	1.14	---	---	11.77
7.50	33,043	89.50	10.69	0.00	---	---	24.13	3.22	---	---	13.91
7.60	33,957	89.60	10.76	0.00	---	---	28.26	5.92	---	---	16.68
7.70	34,870	89.70	10.83	0.00	---	---	32.60	9.11	---	---	19.93
7.80	35,784	89.80	10.89	0.00	---	---	37.15	12.73	---	---	23.62
7.90	36,698	89.90	10.96	0.00	---	---	41.89	16.73	---	---	27.69
8.00	37,612	90.00	11.02	0.00	---	---	46.81	21.08	---	---	32.11

...End

Hydrograph Report

Hyd. No. 1

2 YR PRE

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 2.6 ac
Intensity = 3.30 in
I-D-F Curve = New JCC.IDF

Peak discharge = 2.15 cfs
Time interval = 1 min
Runoff coeff. = 0.25
Time of conc. (Tc) = 20 min
Reced. limb factor = 3

Total Volume = 5,154 cuft

Hydrograph Discharge Table

Time -- Outflow (hrs cfs)	Time -- Outflow (hrs cfs)	Time -- Outflow (hrs cfs)
0.03 0.21	0.57 1.65	1.10 0.50
0.05 0.32	0.58 1.61	1.12 0.47
0.07 0.43	0.60 1.57	1.13 0.43
0.08 0.54	0.62 1.54	1.15 0.39
0.10 0.64	0.63 1.50	1.17 0.36
0.12 0.75	0.65 1.47	1.18 0.32
0.13 0.86	0.67 1.43	1.20 0.29
0.15 0.97	0.68 1.40	1.22 0.25
0.17 1.07	0.70 1.36	
0.18 1.18	0.72 1.32	
0.20 1.29	0.73 1.29	...End
0.22 1.40	0.75 1.25	
0.23 1.50	0.77 1.22	
0.25 1.61	0.78 1.18	
0.27 1.72	0.80 1.15	
0.28 1.83	0.82 1.11	
0.30 1.93	0.83 1.07	
0.32 2.04	0.85 1.04	
0.33 2.15 <<	0.87 1.00	
0.35 2.11	0.88 0.97	
0.37 2.08	0.90 0.93	
0.38 2.04	0.92 0.89	
0.40 2.00	0.93 0.86	
0.42 1.97	0.95 0.82	
0.43 1.93	0.97 0.79	
0.45 1.90	0.98 0.75	
0.47 1.86	1.00 0.72	
0.48 1.83	1.02 0.68	
0.50 1.79	1.03 0.64	
0.52 1.75	1.05 0.61	
0.53 1.72	1.07 0.57	
0.55 1.68	1.08 0.54	

Hydrograph Report

Hyd. No. 2

2 YR POST

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 3.5 ac
Intensity = 4.94 in
I-D-F Curve = New JCC.IDF

Peak discharge = 11.24 cfs
Time interval = 1 min
Runoff coeff. = 0.65
Time of conc. (Tc) = 8 min
Reced. limb factor = 3

Total Volume = 10,786 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.02	1.40
0.03	2.81
0.05	4.21
0.07	5.62
0.08	7.02
0.10	8.43
0.12	9.83
0.13	11.24 <<
0.15	10.77
0.17	10.30
0.18	9.83
0.20	9.36
0.22	8.89
0.23	8.43
0.25	7.96
0.27	7.49
0.28	7.02
0.30	6.55
0.32	6.09
0.33	5.62
0.35	5.15
0.37	4.68
0.38	4.21
0.40	3.75
0.42	3.28
0.43	2.81
0.45	2.34
0.47	1.87
0.48	1.40

...End

Hydrograph Report

Hyd. No. 3

10 YR PRE

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 2.6 ac
Intensity = 4.50 in
I-D-F Curve = New JCC.IDF

Peak discharge = 2.92 cfs
Time interval = 1 min
Runoff coeff. = 0.25
Time of conc. (Tc) = 20 min
Reced. limb factor = 3

Total Volume = 7,020 cuft

Hydrograph Discharge Table

Time -- Outflow (hrs cfs)	Time -- Outflow (hrs cfs)	Time -- Outflow (hrs cfs)
0.03 0.29	0.57 2.24	1.10 0.68
0.05 0.44	0.58 2.19	1.12 0.63
0.07 0.58	0.60 2.14	1.13 0.58
0.08 0.73	0.62 2.10	1.15 0.54
0.10 0.88	0.63 2.05	1.17 0.49
0.12 1.02	0.65 2.00	1.18 0.44
0.13 1.17	0.67 1.95	1.20 0.39
0.15 1.32	0.68 1.90	1.22 0.34
0.17 1.46	0.70 1.85	
0.18 1.61	0.72 1.80	
0.20 1.75	0.73 1.75	...End
0.22 1.90	0.75 1.71	
0.23 2.05	0.77 1.66	
0.25 2.19	0.78 1.61	
0.27 2.34	0.80 1.56	
0.28 2.49	0.82 1.51	
0.30 2.63	0.83 1.46	
0.32 2.78	0.85 1.41	
0.33 2.92 <<	0.87 1.36	
0.35 2.88	0.88 1.32	
0.37 2.83	0.90 1.27	
0.38 2.78	0.92 1.22	
0.40 2.73	0.93 1.17	
0.42 2.68	0.95 1.12	
0.43 2.63	0.97 1.07	
0.45 2.58	0.98 1.02	
0.47 2.53	1.00 0.97	
0.48 2.49	1.02 0.93	
0.50 2.44	1.03 0.88	
0.52 2.39	1.05 0.83	
0.53 2.34	1.07 0.78	
0.55 2.29	1.08 0.73	

Hydrograph Report

Hyd. No. 4

10 YR POST

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 3.5 ac
Intensity = 6.29 in
I-D-F Curve = New JCC.IDF

Peak discharge = 14.31 cfs
Time interval = 1 min
Runoff coeff. = 0.65
Time of conc. (Tc) = 8 min
Reced. limb factor = 3

Total Volume = 13,740 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.02	1.79
0.03	3.58
0.05	5.37
0.07	7.16
0.08	8.95
0.10	10.73
0.12	12.52
0.13	14.31 <<
0.15	13.72
0.17	13.12
0.18	12.52
0.20	11.93
0.22	11.33
0.23	10.73
0.25	10.14
0.27	9.54
0.28	8.95
0.30	8.35
0.32	7.75
0.33	7.16
0.35	6.56
0.37	5.96
0.38	5.37
0.40	4.77
0.42	4.17
0.43	3.58
0.45	2.98
0.47	2.39
0.48	1.79

...End

Hydrograph Report

Hyd. No. 5

100 YR PRE

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 2.6 ac
Intensity = 6.33 in
I-D-F Curve = New JCC.IDF

Peak discharge = 4.12 cfs
Time interval = 1 min
Runoff coeff. = 0.25
Time of conc. (Tc) = 20 min
Reced. limb factor = 3

Total Volume = 9,879 cuft

Hydrograph Discharge Table

Time -- Outflow (hrs cfs)	Time -- Outflow (hrs cfs)	Time -- Outflow (hrs cfs)
0.03 0.41	0.57 3.16	1.10 0.96
0.05 0.62	0.58 3.09	1.12 0.89
0.07 0.82	0.60 3.02	1.13 0.82
0.08 1.03	0.62 2.95	1.15 0.75
0.10 1.23	0.63 2.88	1.17 0.69
0.12 1.44	0.65 2.81	1.18 0.62
0.13 1.65	0.67 2.74	1.20 0.55
0.15 1.85	0.68 2.68	1.22 0.48
0.17 2.06	0.70 2.61	1.23 0.41
0.18 2.26	0.72 2.54	
0.20 2.47	0.73 2.47	
0.22 2.68	0.75 2.40	...End
0.23 2.88	0.77 2.33	
0.25 3.09	0.78 2.26	
0.27 3.29	0.80 2.20	
0.28 3.50	0.82 2.13	
0.30 3.70	0.83 2.06	
0.32 3.91	0.85 1.99	
0.33 4.12 <<	0.87 1.92	
0.35 4.05	0.88 1.85	
0.37 3.98	0.90 1.78	
0.38 3.91	0.92 1.72	
0.40 3.84	0.93 1.65	
0.42 3.77	0.95 1.58	
0.43 3.70	0.97 1.51	
0.45 3.64	0.98 1.44	
0.47 3.57	1.00 1.37	
0.48 3.50	1.02 1.30	
0.50 3.43	1.03 1.23	
0.52 3.36	1.05 1.17	
0.53 3.29	1.07 1.10	
0.55 3.22	1.08 1.03	

Hydrograph Report

Hyd. No. 6

100 YR POST

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 3.5 ac
Intensity = 8.51 in
I-D-F Curve = New JCC.IDF

Peak discharge = 19.36 cfs
Time interval = 1 min
Runoff coeff. = 0.65
Time of conc. (Tc) = 8 min
Reced. limb factor = 3

Total Volume = 18,590 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.02	2.42
0.03	4.84
0.05	7.26
0.07	9.68
0.08	12.10
0.10	14.52
0.12	16.94
0.13	19.36 <<
0.15	18.56
0.17	17.75
0.18	16.94
0.20	16.14
0.22	15.33
0.23	14.52
0.25	13.72
0.27	12.91
0.28	12.10
0.30	11.30
0.32	10.49
0.33	9.68
0.35	8.88
0.37	8.07
0.38	7.26
0.40	6.45
0.42	5.65
0.43	4.84
0.45	4.03
0.47	3.23
0.48	2.42

...End

Hydrograph Report

Hyd. No. 7

2 YR ROUTE

Hydrograph type = Reservoir
 Storm frequency = 2 yrs
 Inflow hyd. No. = 2
 Max. Elevation = 88.51 ft

Peak discharge = 0.18 cfs
 Time interval = 1 min
 Reservoir name = WET POND
 Max. Storage = 24,687 cuft

Storage Indication method used.

Total Volume = 9,651 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
0.17	10.30	87.61	9.34	0.11	----	----	----	----	----	----	0.11
0.20	9.36	87.78	9.48	0.12	----	----	----	----	----	----	0.12
0.23	8.43	87.94	9.60	0.14	----	----	----	----	----	----	0.14
0.27	7.49	88.07	9.69	0.15	----	----	----	----	----	----	0.15
0.30	6.55	88.18	9.77	0.16	----	----	----	----	----	----	0.16
0.33	5.62	88.27	9.84	0.16	----	----	----	----	----	----	0.16
0.37	4.68	88.35	9.89	0.17	----	----	----	----	----	----	0.17
0.40	3.75	88.41	9.94	0.17	----	----	----	----	----	----	0.17
0.43	2.81	88.46	9.97	0.18	----	----	----	----	----	----	0.18
0.47	1.87	88.49	10.00	0.18	----	----	----	----	----	----	0.18
0.50	0.94	88.51	10.01	0.18	----	----	----	----	----	----	0.18
0.53	0.00	88.51 <<	10.01	0.18	----	----	----	----	----	----	0.18 <<
0.57	0.00	88.51	10.01	0.18	----	----	----	----	----	----	0.18
0.60	0.00	88.51	10.01	0.18	----	----	----	----	----	----	0.18
0.63	0.00	88.51	10.01	0.18	----	----	----	----	----	----	0.18
0.67	0.00	88.50	10.01	0.18	----	----	----	----	----	----	0.18
0.70	0.00	88.50	10.00	0.18	----	----	----	----	----	----	0.18
0.73	0.00	88.50	10.00	0.18	----	----	----	----	----	----	0.18
0.77	0.00	88.49	10.00	0.18	----	----	----	----	----	----	0.18
0.80	0.00	88.49	10.00	0.18	----	----	----	----	----	----	0.18
0.83	0.00	88.49	10.00	0.18	----	----	----	----	----	----	0.18
0.87	0.00	88.49	9.99	0.18	----	----	----	----	----	----	0.18
0.90	0.00	88.48	9.99	0.18	----	----	----	----	----	----	0.18
0.93	0.00	88.48	9.99	0.18	----	----	----	----	----	----	0.18
0.97	0.00	88.48	9.99	0.18	----	----	----	----	----	----	0.18
1.00	0.00	88.48	9.99	0.18	----	----	----	----	----	----	0.18
1.03	0.00	88.47	9.98	0.18	----	----	----	----	----	----	0.18
1.07	0.00	88.47	9.98	0.18	----	----	----	----	----	----	0.18
1.10	0.00	88.47	9.98	0.18	----	----	----	----	----	----	0.18
1.13	0.00	88.46	9.98	0.18	----	----	----	----	----	----	0.18
1.17	0.00	88.46	9.98	0.18	----	----	----	----	----	----	0.18
1.20	0.00	88.46	9.97	0.18	----	----	----	----	----	----	0.18
1.23	0.00	88.46	9.97	0.18	----	----	----	----	----	----	0.18
1.27	0.00	88.45	9.97	0.18	----	----	----	----	----	----	0.18
1.30	0.00	88.45	9.97	0.18	----	----	----	----	----	----	0.18
1.33	0.00	88.45	9.97	0.18	----	----	----	----	----	----	0.18

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
1.37	0.00	88.45	9.97	0.18	----	----	----	----	----	----	0.18
1.40	0.00	88.44	9.96	0.18	----	----	----	----	----	----	0.18
1.43	0.00	88.44	9.96	0.18	----	----	----	----	----	----	0.18
1.47	0.00	88.44	9.96	0.17	----	----	----	----	----	----	0.17
1.50	0.00	88.43	9.96	0.17	----	----	----	----	----	----	0.17
1.53	0.00	88.43	9.96	0.17	----	----	----	----	----	----	0.17
1.57	0.00	88.43	9.95	0.17	----	----	----	----	----	----	0.17
1.60	0.00	88.43	9.95	0.17	----	----	----	----	----	----	0.17
1.63	0.00	88.42	9.95	0.17	----	----	----	----	----	----	0.17
1.67	0.00	88.42	9.95	0.17	----	----	----	----	----	----	0.17
1.70	0.00	88.42	9.95	0.17	----	----	----	----	----	----	0.17
1.73	0.00	88.42	9.94	0.17	----	----	----	----	----	----	0.17
1.77	0.00	88.41	9.94	0.17	----	----	----	----	----	----	0.17
1.80	0.00	88.41	9.94	0.17	----	----	----	----	----	----	0.17
1.83	0.00	88.41	9.94	0.17	----	----	----	----	----	----	0.17
1.87	0.00	88.41	9.94	0.17	----	----	----	----	----	----	0.17
1.90	0.00	88.40	9.93	0.17	----	----	----	----	----	----	0.17
1.93	0.00	88.40	9.93	0.17	----	----	----	----	----	----	0.17
1.97	0.00	88.40	9.93	0.17	----	----	----	----	----	----	0.17
2.00	0.00	88.39	9.93	0.17	----	----	----	----	----	----	0.17
2.03	0.00	88.39	9.93	0.17	----	----	----	----	----	----	0.17
2.07	0.00	88.39	9.92	0.17	----	----	----	----	----	----	0.17
2.10	0.00	88.39	9.92	0.17	----	----	----	----	----	----	0.17
2.13	0.00	88.38	9.92	0.17	----	----	----	----	----	----	0.17
2.17	0.00	88.38	9.92	0.17	----	----	----	----	----	----	0.17
2.20	0.00	88.38	9.92	0.17	----	----	----	----	----	----	0.17
2.23	0.00	88.38	9.92	0.17	----	----	----	----	----	----	0.17
2.27	0.00	88.37	9.91	0.17	----	----	----	----	----	----	0.17
2.30	0.00	88.37	9.91	0.17	----	----	----	----	----	----	0.17
2.33	0.00	88.37	9.91	0.17	----	----	----	----	----	----	0.17
2.37	0.00	88.37	9.91	0.17	----	----	----	----	----	----	0.17
2.40	0.00	88.36	9.91	0.17	----	----	----	----	----	----	0.17
2.43	0.00	88.36	9.90	0.17	----	----	----	----	----	----	0.17
2.47	0.00	88.36	9.90	0.17	----	----	----	----	----	----	0.17
2.50	0.00	88.36	9.90	0.17	----	----	----	----	----	----	0.17
2.53	0.00	88.35	9.90	0.17	----	----	----	----	----	----	0.17
2.57	0.00	88.35	9.90	0.17	----	----	----	----	----	----	0.17
2.60	0.00	88.35	9.89	0.17	----	----	----	----	----	----	0.17
2.63	0.00	88.34	9.89	0.17	----	----	----	----	----	----	0.17
2.67	0.00	88.34	9.89	0.17	----	----	----	----	----	----	0.17
2.70	0.00	88.34	9.89	0.17	----	----	----	----	----	----	0.17
2.73	0.00	88.34	9.89	0.17	----	----	----	----	----	----	0.17
2.77	0.00	88.33	9.89	0.17	----	----	----	----	----	----	0.17
2.80	0.00	88.33	9.88	0.17	----	----	----	----	----	----	0.17
2.83	0.00	88.33	9.88	0.17	----	----	----	----	----	----	0.17
2.87	0.00	88.33	9.88	0.17	----	----	----	----	----	----	0.17
2.90	0.00	88.32	9.88	0.17	----	----	----	----	----	----	0.17
2.93	0.00	88.32	9.88	0.17	----	----	----	----	----	----	0.17
2.97	0.00	88.32	9.87	0.17	----	----	----	----	----	----	0.17

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
3.00	0.00	88.32	9.87	0.17	----	----	----	----	----	----	0.17
3.03	0.00	88.31	9.87	0.17	----	----	----	----	----	----	0.17
3.07	0.00	88.31	9.87	0.17	----	----	----	----	----	----	0.17
3.10	0.00	88.31	9.87	0.17	----	----	----	----	----	----	0.17
3.13	0.00	88.31	9.86	0.17	----	----	----	----	----	----	0.17
3.17	0.00	88.30	9.86	0.17	----	----	----	----	----	----	0.17
3.20	0.00	88.30	9.86	0.17	----	----	----	----	----	----	0.17
3.23	0.00	88.30	9.86	0.17	----	----	----	----	----	----	0.17
3.27	0.00	88.30	9.86	0.17	----	----	----	----	----	----	0.17
3.30	0.00	88.29	9.86	0.17	----	----	----	----	----	----	0.17
3.33	0.00	88.29	9.85	0.17	----	----	----	----	----	----	0.17
3.37	0.00	88.29	9.85	0.16	----	----	----	----	----	----	0.16
3.40	0.00	88.29	9.85	0.16	----	----	----	----	----	----	0.16
3.43	0.00	88.28	9.85	0.16	----	----	----	----	----	----	0.16
3.47	0.00	88.28	9.85	0.16	----	----	----	----	----	----	0.16
3.50	0.00	88.28	9.84	0.16	----	----	----	----	----	----	0.16
3.53	0.00	88.28	9.84	0.16	----	----	----	----	----	----	0.16
3.57	0.00	88.27	9.84	0.16	----	----	----	----	----	----	0.16
3.60	0.00	88.27	9.84	0.16	----	----	----	----	----	----	0.16
3.63	0.00	88.27	9.84	0.16	----	----	----	----	----	----	0.16
3.67	0.00	88.27	9.84	0.16	----	----	----	----	----	----	0.16
3.70	0.00	88.26	9.83	0.16	----	----	----	----	----	----	0.16
3.73	0.00	88.26	9.83	0.16	----	----	----	----	----	----	0.16
3.77	0.00	88.26	9.83	0.16	----	----	----	----	----	----	0.16
3.80	0.00	88.26	9.83	0.16	----	----	----	----	----	----	0.16
3.83	0.00	88.25	9.83	0.16	----	----	----	----	----	----	0.16
3.87	0.00	88.25	9.82	0.16	----	----	----	----	----	----	0.16
3.90	0.00	88.25	9.82	0.16	----	----	----	----	----	----	0.16
3.93	0.00	88.25	9.82	0.16	----	----	----	----	----	----	0.16
3.97	0.00	88.24	9.82	0.16	----	----	----	----	----	----	0.16
4.00	0.00	88.24	9.82	0.16	----	----	----	----	----	----	0.16
4.03	0.00	88.24	9.82	0.16	----	----	----	----	----	----	0.16
4.07	0.00	88.24	9.81	0.16	----	----	----	----	----	----	0.16
4.10	0.00	88.23	9.81	0.16	----	----	----	----	----	----	0.16
4.13	0.00	88.23	9.81	0.16	----	----	----	----	----	----	0.16
4.17	0.00	88.23	9.81	0.16	----	----	----	----	----	----	0.16
4.20	0.00	88.23	9.81	0.16	----	----	----	----	----	----	0.16
4.23	0.00	88.22	9.80	0.16	----	----	----	----	----	----	0.16
4.27	0.00	88.22	9.80	0.16	----	----	----	----	----	----	0.16
4.30	0.00	88.22	9.80	0.16	----	----	----	----	----	----	0.16
4.33	0.00	88.22	9.80	0.16	----	----	----	----	----	----	0.16
4.37	0.00	88.21	9.80	0.16	----	----	----	----	----	----	0.16
4.40	0.00	88.21	9.80	0.16	----	----	----	----	----	----	0.16
4.43	0.00	88.21	9.79	0.16	----	----	----	----	----	----	0.16
4.47	0.00	88.21	9.79	0.16	----	----	----	----	----	----	0.16
4.50	0.00	88.20	9.79	0.16	----	----	----	----	----	----	0.16
4.53	0.00	88.20	9.79	0.16	----	----	----	----	----	----	0.16
4.57	0.00	88.20	9.79	0.16	----	----	----	----	----	----	0.16
4.60	0.00	88.20	9.78	0.16	----	----	----	----	----	----	0.16

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
4.63	0.00	88.19	9.78	0.16	----	----	----	----	----	----	0.16
4.67	0.00	88.19	9.78	0.16	----	----	----	----	----	----	0.16
4.70	0.00	88.19	9.78	0.16	----	----	----	----	----	----	0.16
4.73	0.00	88.19	9.78	0.16	----	----	----	----	----	----	0.16
4.77	0.00	88.18	9.78	0.16	----	----	----	----	----	----	0.16
4.80	0.00	88.18	9.77	0.16	----	----	----	----	----	----	0.16
4.83	0.00	88.18	9.77	0.16	----	----	----	----	----	----	0.16
4.87	0.00	88.18	9.77	0.16	----	----	----	----	----	----	0.16
4.90	0.00	88.17	9.77	0.16	----	----	----	----	----	----	0.16
4.93	0.00	88.17	9.77	0.16	----	----	----	----	----	----	0.16
4.97	0.00	88.17	9.77	0.16	----	----	----	----	----	----	0.16
5.00	0.00	88.17	9.76	0.16	----	----	----	----	----	----	0.16
5.03	0.00	88.16	9.76	0.16	----	----	----	----	----	----	0.16
5.07	0.00	88.16	9.76	0.16	----	----	----	----	----	----	0.16
5.10	0.00	88.16	9.76	0.16	----	----	----	----	----	----	0.16
5.13	0.00	88.16	9.76	0.16	----	----	----	----	----	----	0.16
5.17	0.00	88.16	9.75	0.16	----	----	----	----	----	----	0.16
5.20	0.00	88.15	9.75	0.16	----	----	----	----	----	----	0.16
5.23	0.00	88.15	9.75	0.15	----	----	----	----	----	----	0.15
5.27	0.00	88.15	9.75	0.15	----	----	----	----	----	----	0.15
5.30	0.00	88.15	9.75	0.15	----	----	----	----	----	----	0.15
5.33	0.00	88.14	9.75	0.15	----	----	----	----	----	----	0.15
5.37	0.00	88.14	9.74	0.15	----	----	----	----	----	----	0.15
5.40	0.00	88.14	9.74	0.15	----	----	----	----	----	----	0.15
5.43	0.00	88.14	9.74	0.15	----	----	----	----	----	----	0.15
5.47	0.00	88.13	9.74	0.15	----	----	----	----	----	----	0.15
5.50	0.00	88.13	9.74	0.15	----	----	----	----	----	----	0.15
5.53	0.00	88.13	9.74	0.15	----	----	----	----	----	----	0.15
5.57	0.00	88.13	9.73	0.15	----	----	----	----	----	----	0.15
5.60	0.00	88.12	9.73	0.15	----	----	----	----	----	----	0.15
5.63	0.00	88.12	9.73	0.15	----	----	----	----	----	----	0.15
5.67	0.00	88.12	9.73	0.15	----	----	----	----	----	----	0.15
5.70	0.00	88.12	9.73	0.15	----	----	----	----	----	----	0.15
5.73	0.00	88.11	9.73	0.15	----	----	----	----	----	----	0.15
5.77	0.00	88.11	9.72	0.15	----	----	----	----	----	----	0.15
5.80	0.00	88.11	9.72	0.15	----	----	----	----	----	----	0.15
5.83	0.00	88.11	9.72	0.15	----	----	----	----	----	----	0.15
5.87	0.00	88.11	9.72	0.15	----	----	----	----	----	----	0.15
5.90	0.00	88.10	9.72	0.15	----	----	----	----	----	----	0.15
5.93	0.00	88.10	9.71	0.15	----	----	----	----	----	----	0.15
5.97	0.00	88.10	9.71	0.15	----	----	----	----	----	----	0.15
6.00	0.00	88.10	9.71	0.15	----	----	----	----	----	----	0.15
6.03	0.00	88.09	9.71	0.15	----	----	----	----	----	----	0.15
6.07	0.00	88.09	9.71	0.15	----	----	----	----	----	----	0.15
6.10	0.00	88.09	9.71	0.15	----	----	----	----	----	----	0.15
6.13	0.00	88.09	9.70	0.15	----	----	----	----	----	----	0.15
6.17	0.00	88.08	9.70	0.15	----	----	----	----	----	----	0.15
6.20	0.00	88.08	9.70	0.15	----	----	----	----	----	----	0.15
6.23	0.00	88.08	9.70	0.15	----	----	----	----	----	----	0.15

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
6.27	0.00	88.08	9.70	0.15	----	----	----	----	----	----	0.15
6.30	0.00	88.08	9.70	0.15	----	----	----	----	----	----	0.15
6.33	0.00	88.07	9.69	0.15	----	----	----	----	----	----	0.15
6.37	0.00	88.07	9.69	0.15	----	----	----	----	----	----	0.15
6.40	0.00	88.07	9.69	0.15	----	----	----	----	----	----	0.15
6.43	0.00	88.07	9.69	0.15	----	----	----	----	----	----	0.15
6.47	0.00	88.06	9.69	0.15	----	----	----	----	----	----	0.15
6.50	0.00	88.06	9.69	0.15	----	----	----	----	----	----	0.15
6.53	0.00	88.06	9.68	0.15	----	----	----	----	----	----	0.15
6.57	0.00	88.06	9.68	0.15	----	----	----	----	----	----	0.15
6.60	0.00	88.05	9.68	0.15	----	----	----	----	----	----	0.15
6.63	0.00	88.05	9.68	0.15	----	----	----	----	----	----	0.15
6.67	0.00	88.05	9.68	0.15	----	----	----	----	----	----	0.15
6.70	0.00	88.05	9.68	0.15	----	----	----	----	----	----	0.15
6.73	0.00	88.05	9.67	0.15	----	----	----	----	----	----	0.15
6.77	0.00	88.04	9.67	0.15	----	----	----	----	----	----	0.15
6.80	0.00	88.04	9.67	0.15	----	----	----	----	----	----	0.15
6.83	0.00	88.04	9.67	0.15	----	----	----	----	----	----	0.15
6.87	0.00	88.04	9.67	0.15	----	----	----	----	----	----	0.15
6.90	0.00	88.03	9.67	0.15	----	----	----	----	----	----	0.15
6.93	0.00	88.03	9.66	0.15	----	----	----	----	----	----	0.15
6.97	0.00	88.03	9.66	0.15	----	----	----	----	----	----	0.15
7.00	0.00	88.03	9.66	0.15	----	----	----	----	----	----	0.15
7.03	0.00	88.03	9.66	0.15	----	----	----	----	----	----	0.15
7.07	0.00	88.02	9.66	0.15	----	----	----	----	----	----	0.15
7.10	0.00	88.02	9.66	0.15	----	----	----	----	----	----	0.15
7.13	0.00	88.02	9.65	0.14	----	----	----	----	----	----	0.14
7.17	0.00	88.02	9.65	0.14	----	----	----	----	----	----	0.14
7.20	0.00	88.01	9.65	0.14	----	----	----	----	----	----	0.14
7.23	0.00	88.01	9.65	0.14	----	----	----	----	----	----	0.14
7.27	0.00	88.01	9.65	0.14	----	----	----	----	----	----	0.14
7.30	0.00	88.01	9.65	0.14	----	----	----	----	----	----	0.14
7.33	0.00	88.01	9.64	0.14	----	----	----	----	----	----	0.14
7.37	0.00	88.00	9.64	0.14	----	----	----	----	----	----	0.14
7.40	0.00	88.00	9.64	0.14	----	----	----	----	----	----	0.14
7.43	0.00	88.00	9.64	0.14	----	----	----	----	----	----	0.14
7.47	0.00	88.00	9.64	0.14	----	----	----	----	----	----	0.14
7.50	0.00	87.99	9.64	0.14	----	----	----	----	----	----	0.14
7.53	0.00	87.99	9.63	0.14	----	----	----	----	----	----	0.14
7.57	0.00	87.99	9.63	0.14	----	----	----	----	----	----	0.14
7.60	0.00	87.99	9.63	0.14	----	----	----	----	----	----	0.14
7.63	0.00	87.98	9.63	0.14	----	----	----	----	----	----	0.14
7.67	0.00	87.98	9.63	0.14	----	----	----	----	----	----	0.14
7.70	0.00	87.98	9.62	0.14	----	----	----	----	----	----	0.14
7.73	0.00	87.98	9.62	0.14	----	----	----	----	----	----	0.14
7.77	0.00	87.97	9.62	0.14	----	----	----	----	----	----	0.14
7.80	0.00	87.97	9.62	0.14	----	----	----	----	----	----	0.14
7.83	0.00	87.97	9.62	0.14	----	----	----	----	----	----	0.14
7.87	0.00	87.96	9.61	0.14	----	----	----	----	----	----	0.14

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
7.90	0.00	87.96	9.61	0.14	----	----	----	----	----	----	0.14
7.93	0.00	87.96	9.61	0.14	----	----	----	----	----	----	0.14
7.97	0.00	87.96	9.61	0.14	----	----	----	----	----	----	0.14
8.00	0.00	87.95	9.61	0.14	----	----	----	----	----	----	0.14
8.03	0.00	87.95	9.60	0.14	----	----	----	----	----	----	0.14
8.07	0.00	87.95	9.60	0.14	----	----	----	----	----	----	0.14
8.10	0.00	87.95	9.60	0.14	----	----	----	----	----	----	0.14
8.13	0.00	87.94	9.60	0.14	----	----	----	----	----	----	0.14
8.17	0.00	87.94	9.60	0.14	----	----	----	----	----	----	0.14
8.20	0.00	87.94	9.59	0.14	----	----	----	----	----	----	0.14
8.23	0.00	87.94	9.59	0.14	----	----	----	----	----	----	0.14
8.27	0.00	87.93	9.59	0.14	----	----	----	----	----	----	0.14
8.30	0.00	87.93	9.59	0.14	----	----	----	----	----	----	0.14
8.33	0.00	87.93	9.59	0.14	----	----	----	----	----	----	0.14
8.37	0.00	87.93	9.59	0.14	----	----	----	----	----	----	0.14
8.40	0.00	87.92	9.58	0.14	----	----	----	----	----	----	0.14
8.43	0.00	87.92	9.58	0.14	----	----	----	----	----	----	0.14
8.47	0.00	87.92	9.58	0.14	----	----	----	----	----	----	0.14
8.50	0.00	87.92	9.58	0.14	----	----	----	----	----	----	0.14
8.53	0.00	87.91	9.58	0.14	----	----	----	----	----	----	0.14
8.57	0.00	87.91	9.57	0.14	----	----	----	----	----	----	0.14
8.60	0.00	87.91	9.57	0.14	----	----	----	----	----	----	0.14
8.63	0.00	87.91	9.57	0.14	----	----	----	----	----	----	0.14
8.67	0.00	87.90	9.57	0.14	----	----	----	----	----	----	0.14
8.70	0.00	87.90	9.57	0.14	----	----	----	----	----	----	0.14
8.73	0.00	87.90	9.56	0.14	----	----	----	----	----	----	0.14
8.77	0.00	87.90	9.56	0.13	----	----	----	----	----	----	0.13
8.80	0.00	87.89	9.56	0.13	----	----	----	----	----	----	0.13
8.83	0.00	87.89	9.56	0.13	----	----	----	----	----	----	0.13
8.87	0.00	87.89	9.56	0.13	----	----	----	----	----	----	0.13
8.90	0.00	87.89	9.56	0.13	----	----	----	----	----	----	0.13
8.93	0.00	87.88	9.55	0.13	----	----	----	----	----	----	0.13
8.97	0.00	87.88	9.55	0.13	----	----	----	----	----	----	0.13
9.00	0.00	87.88	9.55	0.13	----	----	----	----	----	----	0.13
9.03	0.00	87.88	9.55	0.13	----	----	----	----	----	----	0.13
9.07	0.00	87.87	9.55	0.13	----	----	----	----	----	----	0.13
9.10	0.00	87.87	9.54	0.13	----	----	----	----	----	----	0.13
9.13	0.00	87.87	9.54	0.13	----	----	----	----	----	----	0.13
9.17	0.00	87.87	9.54	0.13	----	----	----	----	----	----	0.13
9.20	0.00	87.86	9.54	0.13	----	----	----	----	----	----	0.13
9.23	0.00	87.86	9.54	0.13	----	----	----	----	----	----	0.13
9.27	0.00	87.86	9.54	0.13	----	----	----	----	----	----	0.13
9.30	0.00	87.86	9.53	0.13	----	----	----	----	----	----	0.13
9.33	0.00	87.85	9.53	0.13	----	----	----	----	----	----	0.13
9.37	0.00	87.85	9.53	0.13	----	----	----	----	----	----	0.13
9.40	0.00	87.85	9.53	0.13	----	----	----	----	----	----	0.13
9.43	0.00	87.85	9.53	0.13	----	----	----	----	----	----	0.13
9.47	0.00	87.85	9.52	0.13	----	----	----	----	----	----	0.13
9.50	0.00	87.84	9.52	0.13	----	----	----	----	----	----	0.13

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
9.53	0.00	87.84	9.52	0.13	----	----	----	----	----	----	0.13
9.57	0.00	87.84	9.52	0.13	----	----	----	----	----	----	0.13
9.60	0.00	87.84	9.52	0.13	----	----	----	----	----	----	0.13
9.63	0.00	87.83	9.52	0.13	----	----	----	----	----	----	0.13
9.67	0.00	87.83	9.51	0.13	----	----	----	----	----	----	0.13
9.70	0.00	87.83	9.51	0.13	----	----	----	----	----	----	0.13
9.73	0.00	87.83	9.51	0.13	----	----	----	----	----	----	0.13
9.77	0.00	87.82	9.51	0.13	----	----	----	----	----	----	0.13
9.80	0.00	87.82	9.51	0.13	----	----	----	----	----	----	0.13
9.83	0.00	87.82	9.51	0.13	----	----	----	----	----	----	0.13
9.87	0.00	87.82	9.50	0.13	----	----	----	----	----	----	0.13
9.90	0.00	87.81	9.50	0.13	----	----	----	----	----	----	0.13
9.93	0.00	87.81	9.50	0.13	----	----	----	----	----	----	0.13
9.97	0.00	87.81	9.50	0.13	----	----	----	----	----	----	0.13
10.00	0.00	87.81	9.50	0.13	----	----	----	----	----	----	0.13
10.03	0.00	87.81	9.49	0.13	----	----	----	----	----	----	0.13
10.07	0.00	87.80	9.49	0.13	----	----	----	----	----	----	0.13
10.10	0.00	87.80	9.49	0.13	----	----	----	----	----	----	0.13
10.13	0.00	87.80	9.49	0.13	----	----	----	----	----	----	0.13
10.17	0.00	87.80	9.49	0.13	----	----	----	----	----	----	0.13
10.20	0.00	87.79	9.49	0.13	----	----	----	----	----	----	0.13
10.23	0.00	87.79	9.48	0.13	----	----	----	----	----	----	0.13
10.27	0.00	87.79	9.48	0.13	----	----	----	----	----	----	0.13
10.30	0.00	87.79	9.48	0.13	----	----	----	----	----	----	0.13
10.33	0.00	87.78	9.48	0.13	----	----	----	----	----	----	0.13
10.37	0.00	87.78	9.48	0.12	----	----	----	----	----	----	0.12
10.40	0.00	87.78	9.48	0.12	----	----	----	----	----	----	0.12
10.43	0.00	87.78	9.47	0.12	----	----	----	----	----	----	0.12
10.47	0.00	87.78	9.47	0.12	----	----	----	----	----	----	0.12
10.50	0.00	87.77	9.47	0.12	----	----	----	----	----	----	0.12
10.53	0.00	87.77	9.47	0.12	----	----	----	----	----	----	0.12
10.57	0.00	87.77	9.47	0.12	----	----	----	----	----	----	0.12
10.60	0.00	87.77	9.47	0.12	----	----	----	----	----	----	0.12
10.63	0.00	87.76	9.46	0.12	----	----	----	----	----	----	0.12
10.67	0.00	87.76	9.46	0.12	----	----	----	----	----	----	0.12
10.70	0.00	87.76	9.46	0.12	----	----	----	----	----	----	0.12
10.73	0.00	87.76	9.46	0.12	----	----	----	----	----	----	0.12
10.77	0.00	87.75	9.46	0.12	----	----	----	----	----	----	0.12
10.80	0.00	87.75	9.46	0.12	----	----	----	----	----	----	0.12
10.83	0.00	87.75	9.45	0.12	----	----	----	----	----	----	0.12
10.87	0.00	87.75	9.45	0.12	----	----	----	----	----	----	0.12
10.90	0.00	87.75	9.45	0.12	----	----	----	----	----	----	0.12
10.93	0.00	87.74	9.45	0.12	----	----	----	----	----	----	0.12
10.97	0.00	87.74	9.45	0.12	----	----	----	----	----	----	0.12
11.00	0.00	87.74	9.44	0.12	----	----	----	----	----	----	0.12
11.03	0.00	87.74	9.44	0.12	----	----	----	----	----	----	0.12
11.07	0.00	87.73	9.44	0.12	----	----	----	----	----	----	0.12
11.10	0.00	87.73	9.44	0.12	----	----	----	----	----	----	0.12
11.13	0.00	87.73	9.44	0.12	----	----	----	----	----	----	0.12

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
11.17	0.00	87.73	9.44	0.12	----	----	----	----	----	----	0.12
11.20	0.00	87.73	9.43	0.12	----	----	----	----	----	----	0.12
11.23	0.00	87.72	9.43	0.12	----	----	----	----	----	----	0.12
11.27	0.00	87.72	9.43	0.12	----	----	----	----	----	----	0.12
11.30	0.00	87.72	9.43	0.12	----	----	----	----	----	----	0.12
11.33	0.00	87.72	9.43	0.12	----	----	----	----	----	----	0.12
11.37	0.00	87.72	9.43	0.12	----	----	----	----	----	----	0.12
11.40	0.00	87.71	9.43	0.12	----	----	----	----	----	----	0.12
11.43	0.00	87.71	9.42	0.12	----	----	----	----	----	----	0.12
11.47	0.00	87.71	9.42	0.12	----	----	----	----	----	----	0.12
11.50	0.00	87.71	9.42	0.12	----	----	----	----	----	----	0.12
11.53	0.00	87.70	9.42	0.12	----	----	----	----	----	----	0.12
11.57	0.00	87.70	9.42	0.12	----	----	----	----	----	----	0.12
11.60	0.00	87.70	9.42	0.12	----	----	----	----	----	----	0.12
11.63	0.00	87.70	9.41	0.12	----	----	----	----	----	----	0.12
11.67	0.00	87.70	9.41	0.12	----	----	----	----	----	----	0.12
11.70	0.00	87.69	9.41	0.12	----	----	----	----	----	----	0.12
11.73	0.00	87.69	9.41	0.12	----	----	----	----	----	----	0.12
11.77	0.00	87.69	9.41	0.12	----	----	----	----	----	----	0.12
11.80	0.00	87.69	9.41	0.12	----	----	----	----	----	----	0.12
11.83	0.00	87.69	9.40	0.12	----	----	----	----	----	----	0.12
11.87	0.00	87.68	9.40	0.12	----	----	----	----	----	----	0.12
11.90	0.00	87.68	9.40	0.12	----	----	----	----	----	----	0.12
11.93	0.00	87.68	9.40	0.11	----	----	----	----	----	----	0.11
11.97	0.00	87.68	9.40	0.11	----	----	----	----	----	----	0.11
12.00	0.00	87.67	9.40	0.11	----	----	----	----	----	----	0.11
12.03	0.00	87.67	9.39	0.11	----	----	----	----	----	----	0.11
12.07	0.00	87.67	9.39	0.11	----	----	----	----	----	----	0.11
12.10	0.00	87.67	9.39	0.11	----	----	----	----	----	----	0.11
12.13	0.00	87.67	9.39	0.11	----	----	----	----	----	----	0.11
12.17	0.00	87.66	9.39	0.11	----	----	----	----	----	----	0.11
12.20	0.00	87.66	9.39	0.11	----	----	----	----	----	----	0.11
12.23	0.00	87.66	9.38	0.11	----	----	----	----	----	----	0.11
12.27	0.00	87.66	9.38	0.11	----	----	----	----	----	----	0.11
12.30	0.00	87.66	9.38	0.11	----	----	----	----	----	----	0.11
12.33	0.00	87.65	9.38	0.11	----	----	----	----	----	----	0.11
12.37	0.00	87.65	9.38	0.11	----	----	----	----	----	----	0.11
12.40	0.00	87.65	9.38	0.11	----	----	----	----	----	----	0.11
12.43	0.00	87.65	9.38	0.11	----	----	----	----	----	----	0.11
12.47	0.00	87.65	9.37	0.11	----	----	----	----	----	----	0.11
12.50	0.00	87.64	9.37	0.11	----	----	----	----	----	----	0.11
12.53	0.00	87.64	9.37	0.11	----	----	----	----	----	----	0.11
12.57	0.00	87.64	9.37	0.11	----	----	----	----	----	----	0.11
12.60	0.00	87.64	9.37	0.11	----	----	----	----	----	----	0.11
12.63	0.00	87.64	9.37	0.11	----	----	----	----	----	----	0.11
12.67	0.00	87.63	9.36	0.11	----	----	----	----	----	----	0.11
12.70	0.00	87.63	9.36	0.11	----	----	----	----	----	----	0.11
12.73	0.00	87.63	9.36	0.11	----	----	----	----	----	----	0.11
12.77	0.00	87.63	9.36	0.11	----	----	----	----	----	----	0.11

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
12.80	0.00	87.63	9.36	0.11	----	----	----	----	----	----	0.11
12.83	0.00	87.62	9.36	0.11	----	----	----	----	----	----	0.11
12.87	0.00	87.62	9.36	0.11	----	----	----	----	----	----	0.11
12.90	0.00	87.62	9.35	0.11	----	----	----	----	----	----	0.11
12.93	0.00	87.62	9.35	0.11	----	----	----	----	----	----	0.11
12.97	0.00	87.62	9.35	0.11	----	----	----	----	----	----	0.11
13.00	0.00	87.61	9.35	0.11	----	----	----	----	----	----	0.11
13.03	0.00	87.61	9.35	0.11	----	----	----	----	----	----	0.11
13.07	0.00	87.61	9.35	0.11	----	----	----	----	----	----	0.11
13.10	0.00	87.61	9.34	0.11	----	----	----	----	----	----	0.11
13.13	0.00	87.61	9.34	0.11	----	----	----	----	----	----	0.11
13.17	0.00	87.60	9.34	0.11	----	----	----	----	----	----	0.11
13.20	0.00	87.60	9.34	0.11	----	----	----	----	----	----	0.11
13.23	0.00	87.60	9.34	0.11	----	----	----	----	----	----	0.11
13.27	0.00	87.60	9.34	0.11	----	----	----	----	----	----	0.11
13.30	0.00	87.60	9.34	0.11	----	----	----	----	----	----	0.11
13.33	0.00	87.59	9.33	0.11	----	----	----	----	----	----	0.11
13.37	0.00	87.59	9.33	0.11	----	----	----	----	----	----	0.11
13.40	0.00	87.59	9.33	0.11	----	----	----	----	----	----	0.11
13.43	0.00	87.59	9.33	0.11	----	----	----	----	----	----	0.11
13.47	0.00	87.59	9.33	0.11	----	----	----	----	----	----	0.11
13.50	0.00	87.58	9.33	0.11	----	----	----	----	----	----	0.11
13.53	0.00	87.58	9.33	0.10	----	----	----	----	----	----	0.10
13.57	0.00	87.58	9.32	0.10	----	----	----	----	----	----	0.10
13.60	0.00	87.58	9.32	0.10	----	----	----	----	----	----	0.10
13.63	0.00	87.58	9.32	0.10	----	----	----	----	----	----	0.10
13.67	0.00	87.57	9.32	0.10	----	----	----	----	----	----	0.10
13.70	0.00	87.57	9.32	0.10	----	----	----	----	----	----	0.10
13.73	0.00	87.57	9.32	0.10	----	----	----	----	----	----	0.10
13.77	0.00	87.57	9.31	0.10	----	----	----	----	----	----	0.10
13.80	0.00	87.57	9.31	0.10	----	----	----	----	----	----	0.10
13.83	0.00	87.56	9.31	0.10	----	----	----	----	----	----	0.10
13.87	0.00	87.56	9.31	0.10	----	----	----	----	----	----	0.10
13.90	0.00	87.56	9.31	0.10	----	----	----	----	----	----	0.10
13.93	0.00	87.56	9.31	0.10	----	----	----	----	----	----	0.10
13.97	0.00	87.56	9.31	0.10	----	----	----	----	----	----	0.10
14.00	0.00	87.56	9.30	0.10	----	----	----	----	----	----	0.10
14.03	0.00	87.55	9.30	0.10	----	----	----	----	----	----	0.10
14.07	0.00	87.55	9.30	0.10	----	----	----	----	----	----	0.10
14.10	0.00	87.55	9.30	0.10	----	----	----	----	----	----	0.10
14.13	0.00	87.55	9.30	0.10	----	----	----	----	----	----	0.10
14.17	0.00	87.55	9.30	0.10	----	----	----	----	----	----	0.10
14.20	0.00	87.54	9.30	0.10	----	----	----	----	----	----	0.10
14.23	0.00	87.54	9.29	0.10	----	----	----	----	----	----	0.10
14.27	0.00	87.54	9.29	0.10	----	----	----	----	----	----	0.10
14.30	0.00	87.54	9.29	0.10	----	----	----	----	----	----	0.10
14.33	0.00	87.54	9.29	0.10	----	----	----	----	----	----	0.10
14.37	0.00	87.54	9.29	0.10	----	----	----	----	----	----	0.10
14.40	0.00	87.53	9.29	0.10	----	----	----	----	----	----	0.10

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
14.43	0.00	87.53	9.29	0.10	----	----	----	----	----	----	0.10
14.47	0.00	87.53	9.28	0.10	----	----	----	----	----	----	0.10
14.50	0.00	87.53	9.28	0.10	----	----	----	----	----	----	0.10
14.53	0.00	87.53	9.28	0.10	----	----	----	----	----	----	0.10
14.57	0.00	87.52	9.28	0.10	----	----	----	----	----	----	0.10
14.60	0.00	87.52	9.28	0.10	----	----	----	----	----	----	0.10
14.63	0.00	87.52	9.28	0.10	----	----	----	----	----	----	0.10
14.67	0.00	87.52	9.28	0.10	----	----	----	----	----	----	0.10
14.70	0.00	87.52	9.28	0.10	----	----	----	----	----	----	0.10
14.73	0.00	87.52	9.27	0.10	----	----	----	----	----	----	0.10
14.77	0.00	87.51	9.27	0.10	----	----	----	----	----	----	0.10
14.80	0.00	87.51	9.27	0.10	----	----	----	----	----	----	0.10
14.83	0.00	87.51	9.27	0.10	----	----	----	----	----	----	0.10
14.87	0.00	87.51	9.27	0.10	----	----	----	----	----	----	0.10
14.90	0.00	87.51	9.27	0.10	----	----	----	----	----	----	0.10
14.93	0.00	87.50	9.27	0.10	----	----	----	----	----	----	0.10
14.97	0.00	87.50	9.26	0.10	----	----	----	----	----	----	0.10
15.00	0.00	87.50	9.26	0.10	----	----	----	----	----	----	0.10
15.03	0.00	87.50	9.26	0.10	----	----	----	----	----	----	0.10
15.07	0.00	87.50	9.26	0.10	----	----	----	----	----	----	0.10
15.10	0.00	87.50	9.26	0.10	----	----	----	----	----	----	0.10
15.13	0.00	87.49	9.26	0.09	----	----	----	----	----	----	0.09
15.17	0.00	87.49	9.26	0.09	----	----	----	----	----	----	0.09
15.20	0.00	87.49	9.25	0.09	----	----	----	----	----	----	0.09
15.23	0.00	87.49	9.25	0.09	----	----	----	----	----	----	0.09
15.27	0.00	87.49	9.25	0.09	----	----	----	----	----	----	0.09
15.30	0.00	87.49	9.25	0.09	----	----	----	----	----	----	0.09
15.33	0.00	87.48	9.25	0.09	----	----	----	----	----	----	0.09
15.37	0.00	87.48	9.25	0.09	----	----	----	----	----	----	0.09
15.40	0.00	87.48	9.25	0.09	----	----	----	----	----	----	0.09
15.43	0.00	87.48	9.25	0.09	----	----	----	----	----	----	0.09
15.47	0.00	87.48	9.24	0.09	----	----	----	----	----	----	0.09
15.50	0.00	87.48	9.24	0.09	----	----	----	----	----	----	0.09
15.53	0.00	87.47	9.24	0.09	----	----	----	----	----	----	0.09
15.57	0.00	87.47	9.24	0.09	----	----	----	----	----	----	0.09
15.60	0.00	87.47	9.24	0.09	----	----	----	----	----	----	0.09
15.63	0.00	87.47	9.24	0.09	----	----	----	----	----	----	0.09
15.67	0.00	87.47	9.24	0.09	----	----	----	----	----	----	0.09
15.70	0.00	87.47	9.24	0.09	----	----	----	----	----	----	0.09
15.73	0.00	87.46	9.23	0.09	----	----	----	----	----	----	0.09
15.77	0.00	87.46	9.23	0.09	----	----	----	----	----	----	0.09
15.80	0.00	87.46	9.23	0.09	----	----	----	----	----	----	0.09
15.83	0.00	87.46	9.23	0.09	----	----	----	----	----	----	0.09
15.87	0.00	87.46	9.23	0.09	----	----	----	----	----	----	0.09
15.90	0.00	87.46	9.23	0.09	----	----	----	----	----	----	0.09

...End

Hydrograph Report

Hyd. No. 8

10 YR ROUTE

Hydrograph type = Reservoir
 Storm frequency = 10 yrs
 Inflow hyd. No. = 4
 Max. Elevation = 88.78 ft

Peak discharge = 2.38 cfs
 Time interval = 1 min
 Reservoir name = WET POND
 Max. Storage = 26,751 cuft

Storage Indication method used.

Total Volume = 12,359 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
0.35	6.56	88.63	10.09	0.19	----	----	0.24	----	----	----	0.43
0.37	5.96	88.67	10.13	0.19	----	----	0.63	----	----	----	0.82
0.38	5.37	88.71	10.15	0.19	----	----	1.00	----	----	----	1.19
0.40	4.77	88.73	10.17	0.19	----	----	1.46	----	----	----	1.65
0.42	4.17	88.75	10.18	0.19	----	----	1.79	----	----	----	1.98
0.43	3.58	88.77	10.19	0.20	----	----	2.01	----	----	----	2.21
0.45	2.98	88.78	10.20	0.20	----	----	2.14	----	----	----	2.34
0.47	2.39	88.78 <<	10.20	0.20	----	----	2.18	----	----	----	2.38 <<
0.48	1.79	88.78	10.20	0.20	----	----	2.15	----	----	----	2.34
0.50	1.19	88.77	10.20	0.20	----	----	2.05	----	----	----	2.24
0.52	0.60	88.76	10.19	0.19	----	----	1.89	----	----	----	2.08
0.53	0.00	88.75	10.18	0.19	----	----	1.68	----	----	----	1.87
0.55	0.00	88.73	10.17	0.19	----	----	1.45	----	----	----	1.65
0.57	0.00	88.72	10.16	0.19	----	----	1.26	----	----	----	1.45
0.58	0.00	88.71	10.15	0.19	----	----	1.09	----	----	----	1.28
0.60	0.00	88.70	10.15	0.19	----	----	0.94	----	----	----	1.13
0.62	0.00	88.69	10.14	0.19	----	----	0.84	----	----	----	1.03
0.63	0.00	88.69	10.14	0.19	----	----	0.77	----	----	----	0.96
0.65	0.00	88.68	10.13	0.19	----	----	0.71	----	----	----	0.90
0.67	0.00	88.67	10.13	0.19	----	----	0.65	----	----	----	0.84
0.68	0.00	88.67	10.12	0.19	----	----	0.59	----	----	----	0.78
0.70	0.00	88.66	10.12	0.19	----	----	0.54	----	----	----	0.73
0.72	0.00	88.66	10.11	0.19	----	----	0.49	----	----	----	0.68
0.73	0.00	88.65	10.11	0.19	----	----	0.45	----	----	----	0.64
0.75	0.00	88.65	10.11	0.19	----	----	0.41	----	----	----	0.59
0.77	0.00	88.64	10.10	0.19	----	----	0.37	----	----	----	0.55
0.78	0.00	88.64	10.10	0.19	----	----	0.33	----	----	----	0.52
0.80	0.00	88.63	10.10	0.19	----	----	0.29	----	----	----	0.48
0.82	0.00	88.63	10.10	0.19	----	----	0.26	----	----	----	0.45
0.83	0.00	88.63	10.09	0.19	----	----	0.23	----	----	----	0.42
0.85	0.00	88.62	10.09	0.19	----	----	0.20	----	----	----	0.39
0.87	0.00	88.62	10.09	0.19	----	----	0.18	----	----	----	0.37
0.88	0.00	88.62	10.09	0.19	----	----	0.15	----	----	----	0.34
0.90	0.00	88.61	10.09	0.19	----	----	0.13	----	----	----	0.32
0.92	0.00	88.61	10.08	0.19	----	----	0.11	----	----	----	0.30
0.93	0.00	88.61	10.08	0.19	----	----	0.09	----	----	----	0.28

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
0.95	0.00	88.61	10.08	0.19	----	----	0.07	----	----	----	0.26
0.97	0.00	88.61	10.08	0.19	----	----	0.06	----	----	----	0.24

...End

Hydrograph Report

Hyd. No. 9

100 YR ROUTE

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Inflow hyd. No. = 6
 Max. Elevation = 88.99 ft

Peak discharge = 7.13 cfs
 Time interval = 1 min
 Reservoir name = WET POND
 Max. Storage = 28,404 cuft

Storage Indication method used.

Total Volume = 17,195 cuft

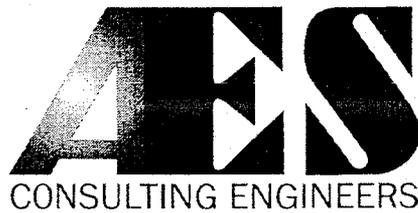
Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
0.27	12.91	88.73	10.17	0.19	----	----	1.38	----	----	----	1.58
0.28	12.10	88.81	10.22	0.20	----	----	2.72	----	----	----	2.91
0.30	11.30	88.87	10.27	0.20	----	----	4.04	----	----	----	4.24
0.32	10.49	88.92	10.30	0.20	----	----	5.11	----	----	----	5.31
0.33	9.68	88.95	10.32	0.21	----	----	5.95	----	----	----	6.15
0.35	8.88	88.97	10.34	0.21	----	----	6.50	----	----	----	6.71
0.37	8.07	88.99	10.35	0.21	----	----	6.81	----	----	----	7.02
0.38	7.26	88.99 <<	10.35	0.21	----	----	6.92	----	----	----	7.13 <<
0.40	6.45	88.99	10.35	0.21	----	----	6.88	----	----	----	7.08
0.42	5.65	88.98	10.34	0.21	----	----	6.69	----	----	----	6.90
0.43	4.84	88.97	10.33	0.21	----	----	6.40	----	----	----	6.61
0.45	4.03	88.95	10.32	0.21	----	----	6.02	----	----	----	6.23
0.47	3.23	88.94	10.31	0.20	----	----	5.56	----	----	----	5.77
0.48	2.42	88.92	10.30	0.20	----	----	5.05	----	----	----	5.25
0.50	1.61	88.89	10.28	0.20	----	----	4.50	----	----	----	4.70
0.52	0.81	88.87	10.26	0.20	----	----	3.97	----	----	----	4.18
0.53	0.00	88.84	10.25	0.20	----	----	3.41	----	----	----	3.61
0.55	0.00	88.82	10.23	0.20	----	----	2.86	----	----	----	3.06
0.57	0.00	88.79	10.21	0.20	----	----	2.43	----	----	----	2.63
0.58	0.00	88.77	10.20	0.20	----	----	2.12	----	----	----	2.31
0.60	0.00	88.76	10.19	0.19	----	----	1.84	----	----	----	2.04
0.62	0.00	88.74	10.18	0.19	----	----	1.60	----	----	----	1.80
0.63	0.00	88.73	10.17	0.19	----	----	1.39	----	----	----	1.58
0.65	0.00	88.72	10.16	0.19	----	----	1.20	----	----	----	1.40
0.67	0.00	88.71	10.15	0.19	----	----	1.04	----	----	----	1.23
0.68	0.00	88.70	10.15	0.19	----	----	0.89	----	----	----	1.08
0.70	0.00	88.69	10.14	0.19	----	----	0.82	----	----	----	1.01
0.72	0.00	88.68	10.13	0.19	----	----	0.75	----	----	----	0.94
0.73	0.00	88.68	10.13	0.19	----	----	0.69	----	----	----	0.88
0.75	0.00	88.67	10.13	0.19	----	----	0.63	----	----	----	0.82
0.77	0.00	88.66	10.12	0.19	----	----	0.58	----	----	----	0.77
0.78	0.00	88.66	10.12	0.19	----	----	0.53	----	----	----	0.72

...End

CULVERT CALCULATION/ STORM SEWER CALCULATION
FOR
WISE RECYCLING
HANKINS INDUSTRIAL PARK

AES PROJECT #8850



5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
December 21, 1999

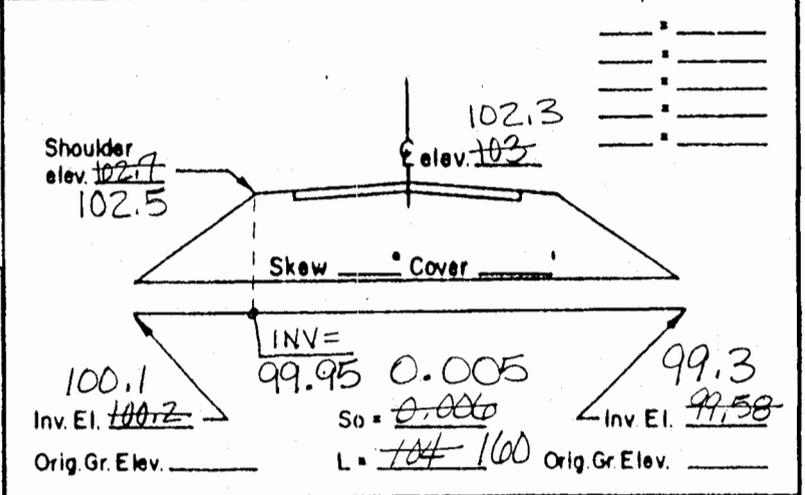
REVISED 3/8/00

Project WISE RECYCLING Plan Sheet No. 1 Designer DPW Sheet 1 of 1
 Rev. Date 3/8/00 Date 12/21/99

HYDROLOGICAL DATA:
 D.A. = 0.18 AC. 0.13 AC
 $C = 0.7$ (RIGHT-OF-WAY) ✓
 $T_c = 5$ MIN ✓
 $i_{10} = 7.00$ in/hr ✓
 $Q_{10} = C i A = 0.88$ CFS 0.64 CFS
 SAY 1 CFS ✓

AHW Controls STATION: _____
 100yr. Flood plain _____ elev. _____
 Design AHW depth _____ elev. _____
 Structures _____ elev. _____

DISCHARGES USED RISK ASSESSMENT ADT _____
 Q 10 = 1 CFS
 Q _____ CFS
 Q _____ CFS
 Q _____ CFS
 Q _____ CFS
 Detours Available _____, Length _____
 Overtopping Stage _____
 Flood Plain Management _____
 Criteria and Significant Impact _____



2404

CULVERT TYPE & SIZE	Q	Q/B	HEADWATER COMPUTATIONS									CONT. HW. ELEV.	OUTLET VELOCITY		End Treat.	COMMENTS
			INLET CONT.			OUTLET CONTROL							C.M.	Smooth		
			HW/D	HW	K_e	d_c	d_c/D	h_o	H	LSO	HW					
15" RCP	1		0.5	0.63	0.5	0.5	0.87	0.87	0.4	0.63	0.16				INLET CONTROLS - OK	
										0.8	0.33				INLET CONTROL - OK	

Design Flood Exceed Prob. _____ Elev _____
 Over top Flood Exceed Prob. _____ Elev _____
 Base Flood 1% Exceed Prob. _____ Elev _____

Hydraflow Storm Sewer Tabulation

SYSTEM #1

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr (ft)	Total (ft)	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	152.0	0.85	0.85	0.65	0.55	0.55	7.0	7.0	7.4	4.06	14.63	4.08	15	5.13	92.50	84.70	93.31	88.78	96.50	86.14	1-1 to 1-2
Project File: WISESTRM.stm								I-D-F File: New JCC.IDF								Total number of lines: 1				Run Date: 03-07-2000		
NOTES: Intensity = 134.36 / (Tc + 19.20) ^ 0.89; Return period = 10 Yrs. ; Initial tailwater elevation = 88.78 (ft)																						

Hydraflow Storm Sewer Tabulation

SYSTEM # 2

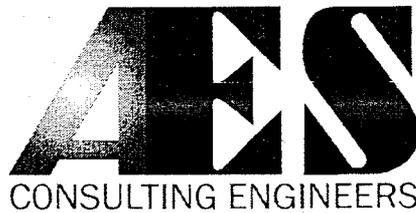
Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	53.0	2.12	2.12	0.70	1.48	1.48	7.0	7.0	7.4	10.92	14.84	8.90	15	5.28	87.50	84.70	90.30	88.78	91.00	86.14	2-1 to 2-2

Project File: WISESTRM2.stm I-D-F File: New JCC.IDF Total number of lines: 1 Run Date: 03-07-2000

NOTES: Intensity = $134.36 / (Tc + 19.20) ^ 0.89$; Return period = 10 Yrs. ; Initial tailwater elevation = 88.78 (ft)

SWALE CALCULATIONS
FOR
WISE RECYCLING
HANKINS INDUSTRIAL PARK

AES PROJECT #8850



5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
December 21, 1999

REVISED 3/8/00



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

PROJECT WISE RECYCLING
 PROJECT NO. 8850
 SUBJECT SWALE CALCS
 SHEET NO. 1 OF 1
 CALCULATED BY DPW DATE 12/21/99

TYPICAL SECTION

REVISED
 3/8/00

"V" TYPE GRASSED
 2:1 MIN. SIDE SLOPES
 SLOPES AS INDICATED ON SHEET 3
 USE VDOT FIG 2.8.23

WESTERN SWALE

3/8/00

REACH 1 - ENTRANCE TO BLDG MIDPT ±
 $90' \pm L = 80' \pm$ $S = 0.025$ ft/ft $DA = 0.52$ AC $C = 0.65$ $T_c = 5$ MIN
 $i_2 = 5.6$ in/hr $i_{10} = 7.00$ in/hr
 $Q_2 = 1.89$ CFS $Q_{10} = 2.36$ CFS
 $V_2 = 2.2$ FPS $V_{10} = 2.35$ FPS $d_{10} = 8.5" \ 10"$
 1.65 1.80
TYP SECT w/ 9" MIN DEPTH OK ✓

REACH 2 - BLDG MIDPT - SS #3

3/8/00

$180' L = 170' \pm$ $S = 0.012$ ft/ft $DA = 0.3$ AC $C = 0.65$ $T_c = 5$ MIN
 0.014
 $Q_2 = 1.09 + 1.89 = 2.98$ CFS $Q_{10} = 1.36 + 2.36 = 3.72$ CFS
 $V_2 = 1.9$ FPS $V_{10} = 2.0$ FPS $d_{10} = 11.5" \ 11.5"$
 1.95 2.1
TYP SECT w/ 12" MIN DEPTH OK ✓

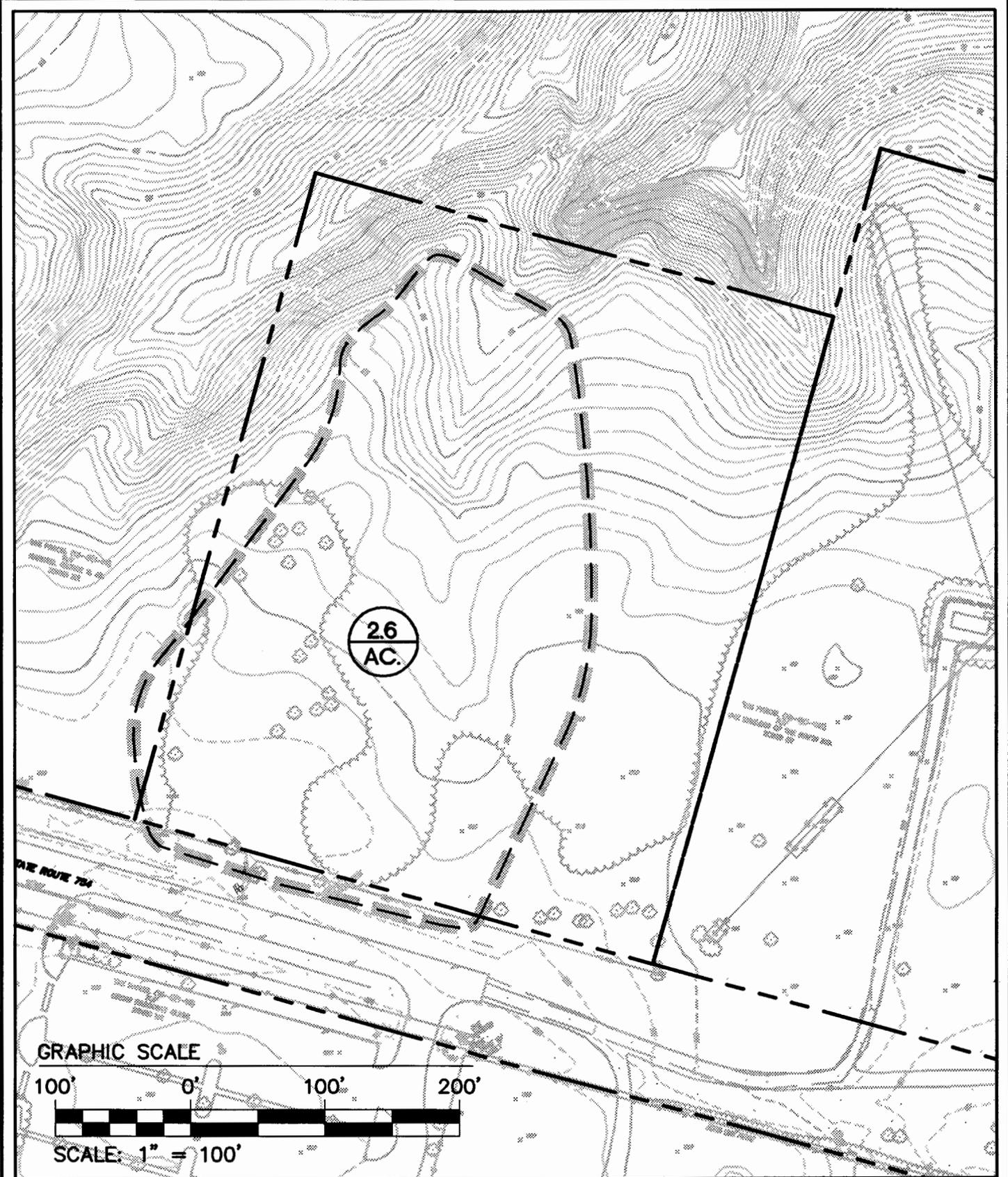
NORTHERN SWALE

ELIMINATED 3/8/00

$L = 100'$ $S = 0.022$ ft/ft $DA = 1.89$ $C = 0.65$ $T_c = 7$ MIN
 $i_2 = 5.18$ in/hr $i_{10} = 6.52$ in/hr
 $Q_2 = 6.36$ CFS $Q_{10} = 8.00$ CFS
 $V_2 = 2.7$ FPS $V_{10} = 3.0$ FPS $d = 12"$
USED PAVED DITCH w/ 1.2' MIN D.

ROADSIDE DITCH

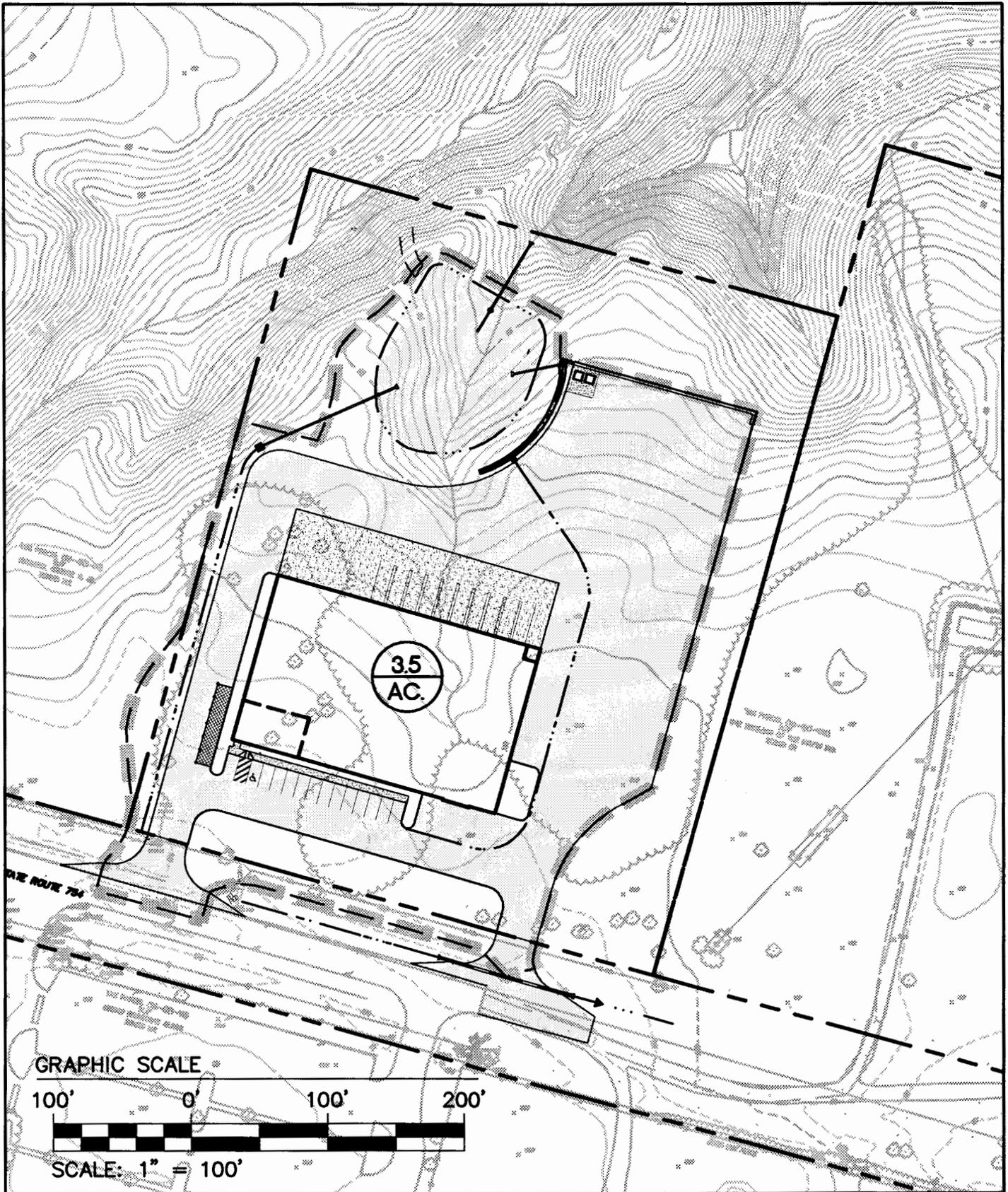
$L = 150' \pm 140'$ $S = 0.021$ ft/ft ✓ 0.13
 $DA = 0.18$ AC $C = 0.7$ $T_c = 5$ MIN
 $Q_2 = 0.7$ CFS $Q_{10} = 0.88$ CFS 0.64 CFS
 $V_2 = 1.6$ FPS $V_{10} = 1.7$ FPS $d = 6.2"$
TYP SECT w/ 9" MIN DEPTH OK - 3/8/00



ES Consulting Engineers Engineers, Surveyors, Planners Williamsburg, Virginia

**WISE RECYCLING
PRE-DEVELOPMENT DRAINAGE AREA MAP**

Job No.
8850-0
Drawing No.
1 of 2



ES Consulting Engineers Engineers, Surveyors, Planners Williamsburg, Virginia

**WISE RECYCLING
POST-DEVELOPMENT DRAINAGE AREA MAP**

Job No.
8850-0
Drawing No.
2 of 2

1st Sub.

$$T_c = \frac{370}{60 * 3} = 2 \text{ MIN}$$

$$\text{channel (pipe) flow} = 173 \text{ FT w/ } \frac{92-85}{173} = 4.0 \text{ \% slope}$$

$$\text{Avg Vel} = 4 \text{ FPS (VESCH Plate 5-2)}$$

$$T_c = \frac{173}{60 * 4.0} = 1 \text{ MIN}$$

$$T_c = 8 \text{ MIN}$$

Post-Development:			
DA =	3.5	AC	
C =	0.65		
Tc =	8	MIN	

BMP Choice: Wet Pond Type 7 w/ Volume Rqd = 4*Vr

$$R_v = 0.05 + (0.009)(\%IMP)$$

$$\text{IMP Area: } 2.54 \text{ AC}$$

$$\% \text{ IMP: } \frac{2.54}{3.5} = 0.726 = 72.6 \%$$

$$R_v = 0.70$$

$$V_r = (1/2" / AC) * (1' / 12") * (DA) * (43560 \text{ SF} / AC) * (R_v)$$

$$V_r = 4,467 \text{ CF}$$

$$\text{Volume required for normal pool} = 4 * V_r = 17,868 \text{ CF}$$

$$(\text{Volume rqd for 10 point BMP} = 10 * V_r = 44,670 \text{ CF})$$

$$\text{Volume provided at Normal Pool elevation 88.00} = 45,461 \text{ CF **}$$

** see stage/storage table of computer report

POND IS A 10 POINT BMP - WET POND DESIGN TYPE 7A

1" x 2.54 ac
9220 - Perm Pool
9220 - Drawdown

12,663 for sed basin.

DAM DESIGN

Anti-seep Collar Design:

$$L_s = Y * (Z + 4) * [1 + S / (0.25 - S)] \quad (\text{VESCH 3.14})$$

$$Y = 88-81 \quad \text{FT}$$

$$Z = 2$$

$$S = 0.0776 \quad \text{FT/ FT}$$

$$L_s = 61 \quad \text{FT}$$

** For permanent dam, Ls must be increased by 15%; however VESCH 3.14 only increases by 10%. Therefore, increase Ls by 5%, then enter Plate 3.14-12 to add remaining 10%.

$$L_s + 5\% = 61 + (61 * 0.05) = 64 \quad \text{FT}$$

Enter Plate 3.14-12 with 64 FT:

3 collars @ 3.25' x 3.25' ea. with 16' spacing ✓

Anti-Vortex Device:

Riser diameter = 36" RCP

Use Table 3.14-D to choose appropriate size of aluminized CMP anti-vortex device

60" diameter anti-vortex device ✓

Emergency Spillway Design:

$$100 \text{ yr storm elev} = 89.22 \quad (\text{from Summary Report})$$

$$\text{Top of dam elev} = \underline{90.3}$$

$$\text{Freeboard} = 1.08 \quad \text{FT} \quad \checkmark$$

100 year storm is controlled, below the pre-development rate, by the riser structure. An emergency spillway is not required, however a 12' wide, grass-lined channel with 1:1 side slopes and a minimum 1' depth is provided. Elev at control section = 89.3 ✓

Rip Rap Calculation for Barrel Outfall:

(VESCH 3.18)

12" diameter barrel outfalls to existing channel, therefore a maximum tailwater condition will be assumed.

$$Q_{10} = 1.4 \quad \text{CFS} \quad (\text{from Summary Report})$$

$$\text{Apron length - Plate 3.18-4} \quad L_a = 5 \quad \text{FT}$$

Reservoir Report

Reservoir No. 1 - WET POND

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	82.00	5,353	0	0
1.00	83.00	5,918	5,636	5,636
2.00	84.00	6,511	6,215	11,851
3.00	85.00	7,130	6,821	18,672
4.00	86.00	7,776	7,453	26,125
5.00	87.00	8,449	8,113	34,238
5.10	87.10	10,623	954	35,192
6.00	88.00	12,198	10,269	45,461
7.00	89.00	13,874	13,036	58,497
8.00	90.00	15,650	14,762	73,259

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 5.0 ✓	0.0	0.0	0.0
Span in	= 5.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 81.00	0.00	0.00	0.00
Length ft	= 58.0	0.0	0.0	0.0
Slope %	= 7.76	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= ---- } <i>was as orifice</i>	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 9.4 ✓	12.0 ✓	0.0	0.0
Crest El. ft	= 88.00 ✓	89.30 ✓	0.00	0.00
Weir Coeff.	= 3.00	3.00	0.00	0.00
Eqn. Exp.	= 1.50	1.50	0.00	0.00
Multi-Stage	= Yes	No	No	No

Tailwater Elevation = 0.00 ft

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0	82.00	0.58	---	---	---	0.00	0.00	---	---	0.00
0.10	564	82.10	0.62	---	---	---	0.00	0.00	---	---	0.00
0.20	1,127	82.20	0.65	---	---	---	0.00	0.00	---	---	0.00
0.30	1,691	82.30	0.69	---	---	---	0.00	0.00	---	---	0.00
0.40	2,254	82.40	0.72	---	---	---	0.00	0.00	---	---	0.00
0.50	2,818	82.50	0.75	---	---	---	0.00	0.00	---	---	0.00
0.60	3,382	82.60	0.77	---	---	---	0.00	0.00	---	---	0.00
0.70	3,945	82.70	0.80	---	---	---	0.00	0.00	---	---	0.00
0.80	4,509	82.80	0.83	---	---	---	0.00	0.00	---	---	0.00
0.90	5,072	82.90	0.85	---	---	---	0.00	0.00	---	---	0.00
1.00	5,636	83.00	0.88	---	---	---	0.00	0.00	---	---	0.00

Continues on next page...

Hydrograph Report

137 Sub.

Hyd. No. 7

2 YR ROUTE

Hydrograph type = Reservoir
 Storm frequency = 2 yrs
 Inflow hyd. No. = 2
 Max. Elevation = 88.66 ft

Peak discharge = 1.39 cfs
 Time interval = 1 min
 Reservoir name = WET POND
 Max. Storage = 54,129 cuft

Storage Indication method used.

Total Volume = 10,786 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
0.07	5.62	88.05	1.36	----	----	----	0.44	----	----	----	0.44
0.10	8.43	88.11	1.36	----	----	----	1.01	----	----	----	0.93
0.13	11.24 <<	88.19	1.36	----	----	----	2.32	----	----	----	1.31
0.17	10.30	88.27	1.37	----	----	----	4.10	----	----	----	1.37
0.20	9.36	88.35	1.37	----	----	----	5.95	----	----	----	1.37
0.23	8.43	88.42	1.38	----	----	----	7.76	----	----	----	1.38
0.27	7.49	88.48	1.38	----	----	----	9.48	----	----	----	1.38
0.30	6.55	88.53	1.38	----	----	----	11.05	----	----	----	1.38
0.33	5.62	88.58	1.39	----	----	----	12.41	----	----	----	1.39
0.37	4.68	88.61	1.39	----	----	----	13.53	----	----	----	1.39
0.40	3.75	88.64	1.39	----	----	----	14.42	----	----	----	1.39
0.43	2.81	88.66	1.39	----	----	----	15.01	----	----	----	1.39
0.47	1.87	88.66	1.39	----	----	----	15.31	----	----	----	1.39
0.50	0.94	88.66	1.39	----	----	----	15.32	----	----	----	1.39
0.53	0.00	88.66	1.39	----	----	----	15.03	----	----	----	1.39
0.57	0.00	88.64	1.39	----	----	----	14.59	----	----	----	1.39
0.60	0.00	88.63	1.39	----	----	----	14.15	----	----	----	1.39
0.63	0.00	88.62	1.39	----	----	----	13.71	----	----	----	1.39
0.67	0.00	88.60	1.39	----	----	----	13.28	----	----	----	1.39
0.70	0.00	88.59	1.39	----	----	----	12.86	----	----	----	1.39
0.73	0.00	88.58	1.39	----	----	----	12.46	----	----	----	1.39
0.77	0.00	88.57	1.39	----	----	----	12.06	----	----	----	1.39
0.80	0.00	88.55	1.39	----	----	----	11.66	----	----	----	1.39
0.83	0.00	88.54	1.39	----	----	----	11.26	----	----	----	1.39
0.87	0.00	88.53	1.38	----	----	----	10.86	----	----	----	1.38
0.90	0.00	88.51	1.38	----	----	----	10.46	----	----	----	1.38
0.93	0.00	88.50	1.38	----	----	----	10.06	----	----	----	1.38
0.97	0.00	88.49	1.38	----	----	----	9.69	----	----	----	1.38
1.00	0.00	88.48	1.38	----	----	----	9.33	----	----	----	1.38
1.03	0.00	88.46	1.38	----	----	----	8.97	----	----	----	1.38
1.07	0.00	88.45	1.38	----	----	----	8.61	----	----	----	1.38
1.10	0.00	88.44	1.38	----	----	----	8.25	----	----	----	1.38
1.13	0.00	88.43	1.38	----	----	----	7.88	----	----	----	1.38
1.17	0.00	88.41	1.38	----	----	----	7.52	----	----	----	1.38
1.20	0.00	88.40	1.38	----	----	----	7.16	----	----	----	1.38
1.23	0.00	88.39	1.38	----	----	----	6.84	----	----	----	1.38

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Hydrograph Report

1st Sub.

English

Hyd. No. 8

10 YR ROUTE

Hydrograph type = Reservoir
 Storm frequency = 10 yrs
 Inflow hyd. No. = 4
 Max. Elevation = 88.88 ft

Peak discharge = 1.41 cfs
 Time interval = 1 min
 Reservoir name = WET POND
 Max. Storage = 56,993 cuft

Storage Indication method used.

Total Volume = 13,740 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
0.07	7.16	88.06	1.36	----	----	----	0.56	----	----	----	0.56
0.10	10.73	88.14	1.36	----	----	----	1.50	----	----	----	1.07
0.13	14.31 <<	88.24	1.37	----	----	----	3.39	----	----	----	1.37
0.17	13.12	88.35	1.37	----	----	----	6.00	----	----	----	1.37
0.20	11.93	88.46	1.38	----	----	----	8.77	----	----	----	1.38
0.23	10.73	88.55	1.39	----	----	----	11.52	----	----	----	1.39
0.27	9.54	88.63	1.39	----	----	----	14.13	----	----	----	1.39
0.30	8.35	88.70	1.39	----	----	----	16.50	----	----	----	1.39
0.33	7.16	88.76	1.40	----	----	----	18.65	----	----	----	1.40
0.37	5.96	88.80	1.40	----	----	----	20.40	----	----	----	1.40
0.40	4.77	88.84	1.40	----	----	----	21.83	----	----	----	1.40
0.43	3.58	88.87	1.40	----	----	----	22.82	----	----	----	1.40
0.47	2.39	88.88	1.41	----	----	----	23.39	----	----	----	1.41
0.50	1.19	88.88 <<	1.41	----	----	----	23.53	----	----	----	1.41 <<
0.53	0.00	88.88	1.41	----	----	----	23.24	----	----	----	1.41
0.57	0.00	88.86	1.40	----	----	----	22.73	----	----	----	1.40
0.60	0.00	88.85	1.40	----	----	----	22.23	----	----	----	1.40
0.63	0.00	88.84	1.40	----	----	----	21.72	----	----	----	1.40
0.67	0.00	88.83	1.40	----	----	----	21.22	----	----	----	1.40
0.70	0.00	88.81	1.40	----	----	----	20.71	----	----	----	1.40
0.73	0.00	88.80	1.40	----	----	----	20.21	----	----	----	1.40
0.77	0.00	88.79	1.40	----	----	----	19.74	----	----	----	1.40
0.80	0.00	88.77	1.40	----	----	----	19.26	----	----	----	1.40
0.83	0.00	88.76	1.40	----	----	----	18.79	----	----	----	1.40
0.87	0.00	88.75	1.40	----	----	----	18.32	----	----	----	1.40
0.90	0.00	88.74	1.40	----	----	----	17.85	----	----	----	1.40
0.93	0.00	88.72	1.40	----	----	----	17.38	----	----	----	1.40
0.97	0.00	88.71	1.40	----	----	----	16.90	----	----	----	1.40
1.00	0.00	88.70	1.39	----	----	----	16.44	----	----	----	1.39
1.03	0.00	88.68	1.39	----	----	----	16.00	----	----	----	1.39
1.07	0.00	88.67	1.39	----	----	----	15.56	----	----	----	1.39
1.10	0.00	88.66	1.39	----	----	----	15.13	----	----	----	1.39
1.13	0.00	88.65	1.39	----	----	----	14.69	----	----	----	1.39
1.17	0.00	88.63	1.39	----	----	----	14.25	----	----	----	1.39
1.20	0.00	88.62	1.39	----	----	----	13.81	----	----	----	1.39
1.23	0.00	88.61	1.39	----	----	----	13.38	----	----	----	1.39

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ENGINEERING CONSULTING SERVICES, LTD.
Geotechnical • Construction Materials • Environmental

January 24, 2002

Mr. Bill Strack
Henderson, Inc.
P. O. Box BM
Williamsburg, Virginia 23187

ECS Project No. 04:4184-A

Reference: Stormwater Management Facility – Wet Pond
Wise Recycling - Hankins Industrial Park
Richmond Road
Toano, Virginia

Dear Mr. Strack:

Engineering Consulting Services, Ltd. was requested to evaluate and respond to a letter issued by the James City County (JCC) Development Management Division dated November 7, 2001. The letter documents several construction-related items for the contractor to address regarding the SWM pond. ECS, Ltd. was specifically requested to address Item No. 5 of this letter. This item referred to a possible seepage problem at the Stormwater Management Facility (SWM). We were requested to observe the SWM and to evaluate possible sources of the apparent seepage and recommend potential remedial measures.

A letter containing our recommendations and observations was issued on November 29, 2001. Based on the findings of our evaluation, and the subsequent repairs completed by the contractor, it appeared that the flow of water beneath the spillway pipe had subsided. However, at the time of the repairs, the region was experiencing lower than normal rainfall and there was little, if any, water in the pond. Therefore, we were unable to determine at that time if the repairs that were implemented were completely successful.

A new letter was issued by JCC dated January 17, 2002, again addressing a seepage problem. Their letter, dated January 17, 2002 indicated that they had observed a higher than expected draw down of the normal pool elevation of the pond, and that they observed a seep exiting the slope about 10 feet downstream from the pipe outlet.

814 Greenbrier Circle, Suite A, - Chesapeake, Virginia 23320-2643 • (757) 366-5100 • Fax (757) 366-5203

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Wise Recycling
ECS Project No. 04:4184-A
Page 2

Observations

Engineering personnel from our office visited the site on January 22, 2002 to observe the aforementioned seepage condition at the SWM pond. Mr. Bill Strack of Henderson, Inc. was also present at the time of this site visit. The general condition of the dam appeared to be good, as the side slopes were graded and had good vegetation growth on the upstream and downstream side slopes. The water level appeared to be about 1 to 2 inches below the bottom of the riser cap at the time of this visit. Looking into the spillway pipe from the downstream end, we could see where water appeared to be leaking through the pipe joint of the last section of spillway pipe. Also, we observed water seeping from the down stream slope about 4 to 5 feet below the spillway pipe.

Conclusions and Recommendations

We were informed during our previous investigation that several inches of an open-graded bedding stone had been placed under the entire length of the spillway pipe during the initial construction. This was corroborated by a test pit that was excavated at the time of our earlier site visit. We believed this to be the most probable cause of the seepage. We recommended removing the stone beneath the spillway pipe for about an 8 foot length of pipe on the upstream side and encapsulating the pipe with concrete and a flexible water stop material in hopes to "pinch" off the flow of water. This corrective measure was considered successful since the water was no longer observed flowing directly underneath the pipe.

However, water will seek the path of least resistance. Once the primary seepage path was cut off, the water may have found a secondary path. Based on our recent observations, we believe some additional factors may be contributing to the continuing seepage losses. We observed seepage through the joint(s) of the spillway pipe. We recommend scaling any joint within the spillway pipe that may have separated during the course of construction. We also recommend excavating along the spillway pipe starting at the downstream end to observe the subgrade soils below the spillway pipe invert. Considering we observed water exiting the slope about 4 feet below the pipe, it may be necessary to excavate down to a depth of 4 feet below the pipe to observe the conditions of these soils to see if a seepage plane exists. We recommend the pipe be supported on a concrete cradle similar to the upstream side, to ensure adequate support beneath the pipe. The area should be backfilled in controlled compacted lifts with Lean Clay soils similar to the soils used in the dam core. The soil should be placed in 8 inch loose lifts compacted to at least 95 percent of the standard proctor and within 2 percent (+/-) of optimum moisture content as per the original project plans and specifications. If light-weight compaction equipment is used, the lift thickness should be reduced to 4 to 6 inches.

Please note that the length of the spillway pipe that will need to be exposed and the required depth of the excavation below the pipe may not become evident until the excavation begins. It may be necessary to remove all the stone beneath the pipe if this appears to be the primary cause

Wise Recycling
ECS Project No. 04:4184-A
Page 3

of the seepage. Hence, we recommend the pond be dewatered prior to the start of the repair to reduce the risk of a dam failure while reconstruction of the dam embankment occurs. Also, considering that water is seeping through the embankment, some of the soils excavated from the dam may be saturated and may not be considered suitable for reuse as compacted structural fill without first drying them to a suitable moisture content.

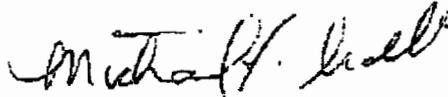
General Comments

This letter has been prepared in order to aid in the evaluation of this SWM pond and to assist the contractor in determining an appropriate course of action. The report scope is limited to the specific project and location described, and the project description represents our understanding of the significant aspects relevant to the pond and spillway construction.

We appreciate being of continued service to you during this project and look forward to its successful completion. If you should have any questions regarding the information and recommendations contained in this report or if we can be of any further assistance, please contact our office.

Respectfully,

ENGINEERING CONSULTING SERVICES, LTD.



Michael J. Galli, P.E.
Project Manager



Gary R. Witsman, P.E.
Principal Engineer



Copies: (2) Henderson, Inc. (Mr. Bill Stack)

MJG/ct/4184-a2/tr.doc



Engineering Consulting Services, Ltd.
 108 Ingram Road
 Unit #1
 Williamsburg, VA 23188
 Phone: (757)229-8677
 Fax #: (757)229-9978

MATERIALS ENGINEERING DIVISION
 FIELD REPORT

Project No. N4184A

Project Wise Recycling Day/Date Wednesday 11/28/20

Location Toano Weather/Temp cloudy /70 °

Contractor Henderson, Inc. Client Henderson, Inc.

Equipment \$ <u>0.00</u>	Arrive Job <u>400</u>	Depart Job <u>430</u>
Tolls \$ <u>0.00</u>	Total Hours on Job <u>0.50</u>	
Travel Chgs <u>0.00</u>	Laboratory Time <u>0.50</u>	
Mileage <u>26</u>	Travel Time <u>0.75</u>	
TOTAL CHARGEABLE HOURS <u>1.75</u>		

Permit No. _____

Deficiency Noted (D) Nuclear gauge (N)

Summary of Services Performed, Field Test Data, Locations, Elevations & Depths are Estimated.

The undersigned arrived on site, as requested, to observe repair work to a BMP prior to concrete and fill placement.

Soils had been properly excavated, all #57 stone had been removed from under the pipe and concrete forms were properly placed (18" from outside diameter of drain pipe) over an 8 foot long area, surrounding the drain pipe. Mastic water seals were also observed to be placed properly along the area of pipe to be encased with concrete. Additional seals will be placed on each end of concrete once the concrete forms are removed.

This area of repair is approved for concrete and fill placement.

By Mark Schwindt

REPORT # 46

ECS, Ltd.

Engineering Consulting Services, Ltd.
108 Ingram Road
Unit #1
Williamsburg, VA 23188
Phone: (757)229-6677
Fax #: (757)229-9978

MATERIALS ENGINEERING DIVISION
FIELD REPORT

Project No. N4184A

Project Wise Recycling Day/Date Thursday 11/29/20

Location Toano Weather/Temp clear /65

Contractor Henderson, Inc. Client Henderson, Inc.

Equipment \$ 0.00 Arrive Job 800 Depart Job 1100

Tolls \$ 0.00 Total Hours on Job 3.00

Travel Chg \$ 0.00 Laboratory Time 0.50

Mileage 26 Travel Time 0.75

TOTAL CHARGEABLE HOURS 4.25

Permit No. _____

Deficiency Noted (D) Nuclear gauge (N)

Summary of Services Performed. Field Test Data, Locations, Elevations & Depths are Estimated.

The undersigned arrived on site, as requested, to observe the placement and compaction of engineered fill for BMP repair around pipe.

Utilizing the Nuclear Method (ASTM D-2922) to check the compaction of soils, test results indicated that compacted material, at areas and elevations tested, met or exceeded the project requirements of 95% of the maximum laboratory dry density, as obtained in our laboratory by using the Standard Proctor Method (ASTM D-698).

The soils observed on this date appeared to be in compliance with project specifications and drawings with regard to lift thickness and moisture content.

Mastic water seals were also observed to be placed properly on each end of the concrete collar surrounding the pipe.

By Kenneth Jarvis

REPORT # 47

FIELD DENSITY TEST - NUCLEAR METHOD ASTM D - 2922

PROJECT: Wise Recycling

JOB NO.: N4184

SUBJECT: NUCLEAR FIELD DENSITY TESTS

DATE: 11-29-01

STANDARD COUNTY DENSITY _____

STANDARD COUNT MOISTURE _____

CONTRACTOR: Henderson, Inc.

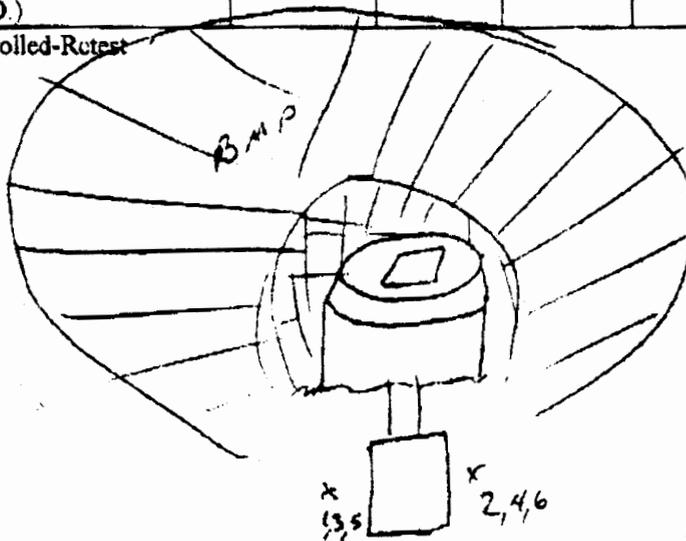
CLIENT: _____

TECH: Kenny

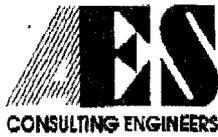
TEST NO.	1	2	3	4	5	6	
MOISTURE CONTENT (PCF)	11.4	13.1	12.0	11.7	14.3	11.2	
WET DENSITY (PCF)	121.5	122.2	119.6	120.0	122.5	118.8	
DRY DENSITY (PCF)	110.1	109.1	107.6	108.2	108.2	107.6	
MOISTURE CONTENT (%)	10.4	12.0	11.1	10.9	13.2	10.4	
STANDARD PROCTOR MODIFIED PROCTOR	112.3						
OPT. WATER CONTENT	12.8						
LIFT ELEVATION OR SOIL MARK	1 st lift		2 nd lift		3 rd lift		
PROBE DEPTH (INCH)	6"						
PERCENT COMPACTION	98.1	97.1	95.9	96.4	96.4	95.8	
REQUIRED COMPACTION	95%						
* AR (TEST NO.)							

* AR = Area Rerolled-Retest

Location Diagram/Remarks:



Moist RANGE
10.24 - 15.36 ∴ OK.



AES Consulting Engineers Fax Memorandum

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

To: Darryl Cook	Org./Firm: JCC Environmental
Fax Number: 259-4032	Date: 4/11/00
From: Deirdre Wells	Pages Including Cover Page: 1
cc:	cc Fax Number:
Subject: Wise Recycling Revisions to Stormwater Management Details Sheet	

Urgent
 For Review
 Please Comment
 Please Reply

Comments:

During revision of the 100 year elevation and anti-seep collars, we reviewed the design of the reverse slope pipe supports and decided to modify the design in order to provide greater stability. The modification includes shortening the pipe from 17' to 8.5', eliminating one of the wooden support structures, and, most importantly, providing a more substantial concrete footing for the remaining support structure. We believe this modification will provide greater stability for the 4" pipe and will reduce any chance of support failure.

This plan will be slip-sheeted this afternoon. Please contact me or Arch Marston with any questions. I appreciate your quick review and response concerning this project.

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

TOTAL P.01

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 <u>5/30/01</u>	JOB NO. <u>8850</u>
ATTENTION	
RE: <u>WISE RECYCLING</u> <u>HANKINS INDUSTRIAL PARK</u> <u>WC 044</u>	

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
<u>4</u>		<u>1</u>	<u>RECORD DRAWINGS</u>
<u>1</u>		<u>2</u>	<u>CERTIFICATION FORM</u>



THESE ARE TRANSMITTED as checked below:

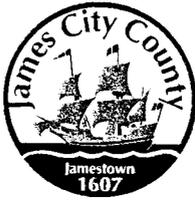
- For approval Approved as submitted Resubmit _____ copies for approval
 For your use Approved as noted Submit _____ copies for distribution
 As requested Returned for corrections Return _____ corrected prints
 For review and comment _____
 FOR BIDS DUE _____ PRINTS RETURNED AFTER LOAN TO US

REMARKS

COPY TO _____

SIGNED: _____

Maude K. ...



DEVELOPMENT MANAGEMENT

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

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codecomp@james-city.va.us

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(757) 253-6670
environ@james-city.va.us

PLANNING
(757) 253-6685
planning@james-city.va.us

COUNTY ENGINEER
(757) 253-6678
INTEGRATED PEST MANAGEMENT
(757) 259-4116

November 7, 2001

The Waltham Group
442 1/2 East Main Street
Clayton, NC 27520

Attn: Mr. Norwood Thompson

Re: Wise Recycling (Hankins Industrial Park)
County Plan SP-138-99; County BMP ID Code: WC 044
Stormwater Management Facility - Wet Pond

Dear Mr. Thompson:

The Environmental Division has reviewed a record drawing and certification information as submitted to our office for the above referenced project. The record drawing provides as-built information for a wet pond stormwater management facility located in the northwest corner of the site.

Based on our review of information as submitted and a concurrent field observations as performed on August 27th 2001 and after, the following items must be addressed prior to release of the developer's surety instrument for the stormwater management/BMP facility:

Construction Certification:

- 2. In accordance with Note # 19 on Sheet 9 of the approved plan, construction certification for the stormwater management/BMP facility is required. None was provided. This is especially important since the facility has a large engineered and compacted earthen embankment located in a deep ravine. The certification can be in letter format or by use of the certification statements in Section 4 of the JCC, Stormwater Management/BMP Facilities, Record Drawing and Construction Certification, Standard Forms & Instructions.

Record Drawing:

- 3. The record drawing set (two sheets) dated May 25 2001 is **satisfactory**, pending any changes that may occur as a result of construction-related (field) items as outlined below.

Construction-Related Items:

- 4. The approved plan called for a design top of dam elevation at El. 90.30 and a 12-inch diameter RCP outlet barrel through the dam. Based on a review of the as-built drawings, the actual low point along top of dam as constructed is at El. 89.7 and a 15-inch diameter RCP outlet barrel was used through the dam. The 100-year design high water elevation for the BMP was previously established at El. 88.99, therefore, freeboard to top of dam is at 0.71 feet. This does not conform with the provisions of the approved plan, which called for freeboard of 1.3 feet, nor the County's minimum standard of 1 foot for facilities with emergency spillways. Use of a 15-inch barrel, instead of a 12-inch barrel may result in an decrease in the design high water elevation and adequate freeboard may be present; however, it would still be unclear if use of a larger

✓
R.D.
11-29-01
OK. SAT

barrel would result in the facility exceeding allowable discharges established for the facility for the 2-year design storm event. Use of a larger barrel size would result in higher discharge from the facility under routed hydraulic conditions. Therefore, either field correct the opening size of the outlet barrel through the dam to an appropriate 12-inch size; or alternatively, provide evaluation by an engineer that use of the 15-inch size barrel, as constructed, does not result in exceeding the allowable 2-year predevelopment discharge set for the facility and adequate freeboard from new 100-year design high water to top of dam elevation (El. 89.7) as constructed is present. (Note: A hydraulic model of the pond to show adequacy should be based on field obtained as-built conditions).

5. ✓

The facility was designed to function as a wet pond type facility with normal pool elevation at or near to the higher side invert elevation of the reverse slope pipe which is at El. 87.0 in the riser. Based on our engineering inspection as performed on August 27th 2001 and several cursory inspections afterward, the pond has remained substantially dry. Although rainfall has been below normal the past few months, this situation is still indicative of a seepage problem either through the soils in the bottom of the dam, through the compacted earthen embankment or along the outlet barrel through the dam. Either of these cases is harmful to the structural integrity of the dam. Assessment by a qualified professional geotechnical engineer is required along with necessary repairs or modifications or conclusions that seepage conditions are not present. (Note: At the time of the engineering inspection performed on August 27th 2001, there were signs that embankment soils were reworked along the upstream toe of embankment in the vicinity of the riser, possibly to alleviate a seepage condition.)

OK
Report
By ELS
11/29/01

6. ✓

The erosion gully which has formed along the east (right) downstream embankment toe of the dam needs repaired and stabilized. This gully is approximately 2 feet deep and 3 ft. wide.

7. ✓

A scour hole is present at the outfall of the 15-inch storm drain into the pond on the east (parking lot) side. The scour hole is approximately 1 ft. deep by 8 ft. long. This area needs refilled and appropriate rock outlet protection added. Also, the end section at the outfall of the 15-inch pipe at this same location has settled and needs reset.

8. ✓

Clear and remove trash and debris from two onsite VDOT DI-7 grates. These grates are labeled as storm drain structures SS # 1-2 and SS # 2-2 on the approved plan and are located along the main access drive into the site and at the northwest corner of the back parking area, respectively.

Once this work is satisfactorily completed, contact our office appropriately. We can then proceed with final release of the surety on the project. One reproducible and one blue/black line set of the record drawings will be required once the above items are adequately addressed.

Please contact me at 757-253-6639 or the assigned Environmental Division inspector, Gerry Lewis, at 757-253-6672 if you have any further comments or questions.

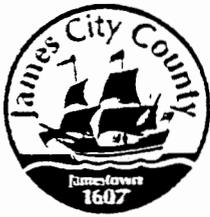
Sincerely,



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

cc: Tony Gregory, Henderson (via fax)
AES Consulting Engineers, Mark Richardson/Arch Marston (via fax)

G:\SWMPProg\AsBuilts\SP13899.wc044



JAMES CITY COUNTY - ENVIRONMENTAL DIVISION

Office Phone: 757-253-6670

Fax Number: 757-259-4032

DATE SENT: 11/07/01

Name: Henderson

Firm or Company: TONY GREGORY

Facsimile Number: 564-9120

Number of pages including this transmittal: 3

From: SCOTT J. THOMAS

James City County
 P O Box 8784
 Williamsburg VA 23187-8784

Comments: WISE RECYCLING SP-138-99; WC 044

If you do not receive all pages, call 757-253-6670 as soon as possible



SCOTT J. THOMAS. P.E.
CIVIL ENGINEER

ENVIRONMENTAL DIVISION

101 MOUNTS BAY ROAD, P.O. Box 8784 (757) 253-6639
 WILLIAMSBURG, VIRGINIA 23187-8784 FAX: (757) 259-4032
 E-MAIL: scottt@james-city.va.us



DEVELOPMENT MANAGEMENT

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(757) 253-6678
INTEGRATED PEST MANAGEMENT
(757) 259-4116

November 7, 2001

The Waltham Group
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Clayton, NC 27520

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County Plan SP-138-99; County BMP ID Code: WC 044
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barrel would result in the facility exceeding allowable discharges established for the facility for the 2-year design storm event. Use of a larger barrel size would result in higher discharge from the facility under routed hydraulic conditions. Therefore, either field correct the opening size of the outlet barrel through the dam to an appropriate 12-inch size; or alternatively, provide evaluation by an engineer that use of the 15-inch size barrel, as constructed, does not result in exceeding the allowable 2-year predevelopment discharge set for the facility and adequate freeboard from new 100-year design high water to top of dam elevation (El. 89.7) as constructed is present. *(Note: A hydraulic model of the pond to show adequacy should be based on field obtained as-built conditions).*

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6. The erosion gully which has formed along the east (right) downstream embankment toe of the dam needs repaired and stabilized. This gully is approximately 2 feet deep and 3 ft. wide.
7. A scour hole is present at the outfall of the 15-inch storm drain into the pond on the east (parking lot) side. The scour hole is approximately 1 ft. deep by 8 ft. long. This area needs refilled and appropriate rock outlet protection added. Also, the end section at the outfall of the 15-inch pipe at this same location has settled and needs reset.
8. Clear and remove trash and debris from two onsite VDOT DI-7 grates. These grates are labeled as storm drain structures SS # 1-2 and SS # 2-2 on the approved plan and are located along the main access drive into the site and at the northwest corner of the back parking area, respectively.

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Please contact me at 757-253-6639 or the assigned Environmental Division inspector, Gerry Lewis, at 757-253-6672 if you have any further comments or questions.

Sincerely,



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

cc: Tony Gregory, Henderson (via fax)
AES Consulting Engineers, Mark Richardson/Arch Marston (via fax)

G:\SWMPProg\AsBuilts\SP13899.wc044

Scott Thomas

To: Joan Etchberger; Pat Menichino; Darryl Cook
Subject: Bond Release

Project: Wise Recycling
Plan No.: SP-138-99
BMP ID Code: WC 044

I am now ok with release of the erosion & sediment control bond being held for the project. Gerry was ok with site stabilization and the problems I had with the piping at the BMP have been repaired and all appears well.

Final Inspection: 8/27/01. Comments forwarded.
Reinspections: 1/14/02, 1/15/02, March 02, April 02.
Record Drawing: 5/25/01 by AES. Satisfactory
Construction Cert: 12/10/01 and 3/21/02. Satisfactory.

(Note: Our original field inspection revealed that the wet pond was completely dry and there was seepage along the outlet pipe barrel through the dam. ECS did an assessment and one attempt was made to repair to no avail. I issued a second letter and Henderson and ECS decided to excavate down to the barrel, repair and reconstruct using compacted soil. It appeared seepage was due to a gravel bedding layer placed under the pipe. I received construction cert on the original dam construction and the dam repairs by ECS. Based on reinspection, appears to be functioning properly and holding permanent pool. Bob Lane performed an inspection to insure the repair work area was stabilized and grass was growing.)

Scott

AES CONSULTING ENGINEERS

Engineering, Surveying and Planning

5248 Olde Towne Road, Suite 1
WILLIAMSBURG, VIRGINIA 23188

LETTER OF TRANSMITTAL

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

TO James City County
Environmental Division

DATE <u>3/24/00</u>	JOB NO. <u>8850</u>
ATTENTION <u>Mark Eversole</u>	
RE: <u>Wise</u> <u>Recycling</u>	

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
<u>1</u>			<u>Channel Adequacy Calculation</u>

THESE ARE TRANSMITTED as checked below:

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

REMARKS

Please contact me with any questions-

COPY TO _____

SIGNED: Linda Pulls

(Handwritten signature: Linda Pulls)



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

PROJECT Wise Recycling
PROJECT NO. 8850
SUBJECT Channel Adequacy
SHEET NO. 1 OF 1
DATE 3/24/00
BY DPW

In response to comment #14 of the 2/1/00 Environmental Division comments for this project, the receiving channel analysis follows. The pond resizing resulted in a post-development 2-year routed flow of 0.2 CFS. Due to this extremely low value, control of the 1-year, 24-hour rainfall event was not implemented. As per Minimum Standard 19 b (2), current at the time of plan submittal, the existing natural channel was analyzed by use of the 2-year storm event.

2-year Post-Development routed flow = 0.2 CFS

The existing channel was visually inspected on 3/23/00, following a storm event. The channel is a "V"-type ravine, with approximately 2:1 side slopes and a depth between 5 and 6 feet. It is covered by grass and leaf matter, which is not uncommon for this time of year, and shows little to no evidence of erosion or degradation. The bottom slope varies along the course of the channel, but can best be estimated at 0.09 ft/ft. This shape is close to that shown in VDOT figure 2.8.23. Velocity and depth are determined from this figure.

velocity (2 yr) = 2.0 FPS

depth (2 yr) = 2.8 INCHES

Channel appears adequate for post-
development flow

**FAX****Date** 4/10/02 11:30 AM**Number of pages to follow:** 3**TO:** Scott Thomas
JCC - Environmental Division**Phone** (757) 253-6639**Fax Phone** (757) 259-4032**FROM:** Michael J. Galli, P.E.
ECS, Ltd.
108 Ingram Road, Unit 1
Williamsburg, VA 23188**Phone** (757) 229-6677**Fax Phone** (757) 229-9978**Originals to Follow Via:** Mail FedEx Courier Not Applicable**REMARKS:** Urgent For your review Reply ASAP**Re:** Wise Recycling final letter.

Please call if you have any questions.

Thanks, Mike

FINAL CERT.
BARREL REPAIR

Established 1957
State Regis No. 4849
www.hendersonincgc.com

HENDERSON
INCORPORATED
GENERAL CONTRACTORS
5800 Moorstown Road
Williamsburg, VA 23188

(757) 565-1090
FAX: (757) 564-9120
E-Mail: Henderson @ hendersonincgc.com

Fax

To: Scott Thomas From: Donna Chapman

Co: _____

Fax: 259-4032 Pages: 3

Phone: _____ Date: 4/1/02

Re: Wise Boilout cc: PVA, TG, BS, DAC, JB

- Urgent
- For Review
- Please Comment
- Please Reply
- Please Recycle

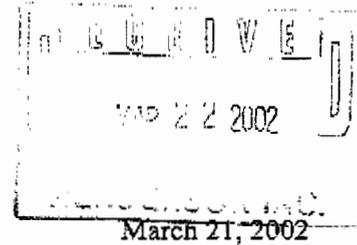
• Comments:

*DAM
Repair -
Certification
04/01/02*

"Our Future is Today's Quality"



ENGINEERING CONSULTING SERVICES, LTD.
 Geotechnical • Construction Materials • Environmental



Mr. Bill Strack
 Henderson, Inc.
 P. O. Box BM
 Williamsburg, Virginia 23187

PH
 Bills
 Joe
 Donna-File

ECS Project No. 04:4184-A

Reference: Stormwater Management Facility – Wet Pond
 Wise Recycling - Hankins Industrial Park
 Richmond Road
 Toano, Virginia

Dear Mr. Strack:

Engineering Consulting Services, Ltd. has observed the reconstruction of the center section of the BMP dam and the above referenced site. Based on previous observations by the James City County (JCC) Development Management Division and by ECS, Ltd. personnel, we observed that the dam was "leaking". Upon further evaluation, which consisted of test pits along the spillway pipe, we observed that the spillway pipe was placed on a bed of open-graded stone. Also, we could observe water entering the spillway pipe from the riser structure, yet did not observe any water exiting the spillway pipe. Instead, we observed water flowing out of the slope below the spillway pipe elevation. The contractor elected to remove the RCP spillway pipe and stone material, reset it, and backfill the area with compacted structural fill.

Personnel from our office observed the removal of the spillway pipe and stone material. The subgrades for the new pipe were observed to be firm and stable and considered suitable for placement of the pipe. Once the pipe was set, the joints were grouted and then the excavation was backfilled to grade with compacted structural fill. Density test results and our observations during the reconstruction of the spillway pipe were submitted in interim reports.

Engineering personnel visited the site March 14 and March 21, 2002 to observe the condition of the dam after several days of rain had occurred. The water level of the pond was observed to be at the top of the riser structure and flowing into the spillway pipe. Water was then observed exiting the spillway pipe and flowing down slope. It is our opinion that the dam repair was successful in eliminating the seepage problem as previously identified.

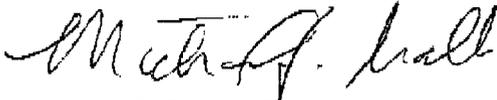
2119-D North Hamilton Street, Richmond, Virginia 23230 • (804) 353-6333 • Fax (804) 353-9478
 Offices: Richmond, VA • Washington, D.C. • Norfolk, VA • Williamsburg, VA • Roanoke, VA • Fredericksburg, VA
 Danville, VA • Baltimore, MD • Fredrick, MD • Research Triangle Park, NC • Wilmington, NC • Charlotte, NC • Greensboro, NC

Wise Recycling
ECS Project No. 04:4184-A
Page 2

We appreciated being of service to you on this project. If you should have any questions regarding the information and recommendations contained in this report or if we can be of any further assistance, please contact our office.

Respectfully,

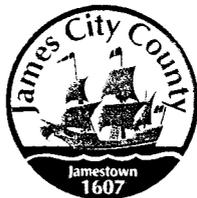
ENGINEERING CONSULTING SERVICES, LTD.



Michael J. Galli, P.E.
Project Manager

MJG/let/4184-AFinal.doc





DEVELOPMENT MANAGEMENT

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COUNTY ENGINEER
 (757) 253-6678

INTEGRATED PEST MANAGEMENT
 (757) 253-2620

January 17, 2002

The Waltham Group
 442 ½ East Main Street
 Clayton, NC 27520

Attn: Mr. Norwood Thompson

Re: Wise Recycling (Hankins Industrial Park)
 County Plan SP-138-99; County BMP ID Code: WC 044
 Stormwater Management Facility - Wet Pond

Dear Mr. Thompson:

Pursuant to several requests from the contractor to close-out and release surety for the above project, several events have transpired over the past few months pertaining to the wet pond stormwater management facility which services the site. Certification information was first received for the project in May of 2001 and the record drawing dated May 25th 2001 was reviewed and found to be satisfactory. A construction certification, which was originally not received for the BMP, but which was subsequently submitted on December 10th 2001 was also found to be acceptable. Similarly, based on our final inspection of the BMP as performed on August 27th 2001, there were five construction-related field issues that also needed addressed. These issues were outlined in a letter from our office dated November 7th 2001.

As of the date of this letter, all construction related comments as outlined in our November 7th letter appear to have been fully addressed, except for comment # 5 which pertained to our concern about seepage through the dam and it's potential to be harmful to the structural integrity of the dam embankment. Comment # 5 recommended assessment by a qualified professional geotechnical engineer and necessary repairs/modification to be performed to eliminate the seep or show that it was non-detrimental to the facility. Subsequently, an engineer was retained, an evaluation performed and a summary geotechnical report forwarded to our office. The geotech report dated November 29th 2001 outlined observations, conclusions and recommendations to control the seep as well as field logs documenting repair work performed at the end of November 2001.

Since the repairs were performed, our office has monitored the water level in the BMP on a routine basis. As most of the month of December was relatively dry, it was difficult to assess success of the repair. Only recently have heavier rains occurred to allow the pond to fill to or above normal pool elevation. On January 14 and 15th 2002, staff visited the site on two occasions. On the first visit, water was approximately 1 inch above the bottom of the concrete riser cap (anti-vortex/trash rack device). Twenty-four hours later, the water level was approximately 3 inches below the bottom of the riser cap, thus resulting in a 4-inch drawdown in a 24-hour period. Since the water level was above the elevation

of the reverse slope BMP control orifice, this occurrence is normally not considered unusual; however, upon further inspection, the outfall end of the 15-inch RCP barrel through the dam was completely dry. There was no evidence on January 15th of drawdown through the principal flow control structure (riser-barrel). Upon further inspection of the outfall area on the downstream embankment, approximately 10 feet downstream of the 15-inch barrel outlet end section there was an obvious sign of flow (seepage) underneath the outlet protection riprap. Based on rough estimation, the seep appeared to be somewhat considerable and of a rate at least 1 to 2 gallon per minute. Due to the location of the seep, it did not appear to be a natural spring in adjacent natural toe soils, but seepage through the compacted earthen dam embankment. Furthermore, dam embankment soils along the interior side slope of the dam just behind the riser structure appeared unusually saturated when probed.

As such, although considerable measures were taken to attempt to investigate and resolve the condition, our original concern about seepage through the dam appears to still be present and has not been fully resolved. Therefore, at this time and under such a condition which relates to the structural integrity of the BMP, we cannot consider release of the developer's surety instrument for the stormwater management/BMP facility. Further assessment by a qualified professional geotechnical engineer is warranted along with necessary repairs or modifications or conclusions that seepage conditions are not detrimental to the dam embankment or the structural integrity of the BMP.

Please contact me at 757-253-6639 or the assigned Environmental Division inspector, Gerry Lewis, at 757-253-6672 if you have any further comments or questions. We are also willing to meet at the site to mutually observe the condition as outlined above. I highly suggest observation be performed during a dry period, when no flow is being conveyed through the barrel structure.

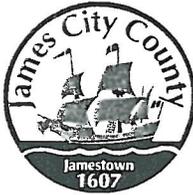
Sincerely



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

cc: Tony Gregory, Henderson (via fax)
Michael J. Galli, ECS Ltd. (via fax)

G:\SWMProg\AsBuilts\ClarLetters\C044.0



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January 17, 2002

The Waltham Group
 442 ½ East Main Street
 Clayton, NC 27520

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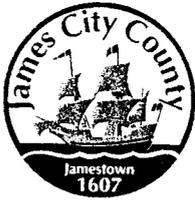
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Sincerely



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

cc: Tony Gregory, Henderson (via fax)
Michael J. Galli, ECS Ltd. (via fax)



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planning@james-city.va.us

COUNTY ENGINEER
(757) 253-6678
INTEGRATED PEST MANAGEMENT
(757) 259-4116

November 7, 2001

The Waltham Group
442 1/2 East Main Street
Clayton, NC 27520

Attn: Mr. Norwood Thompson

Re: Wise Recycling (Hankins Industrial Park)
County Plan SP-138-99; County BMP ID Code: WC 044
Stormwater Management Facility - Wet Pond

*Reinspect 1-15-02
still leaking*

Dear Mr. Thompson:

The Environmental Division has reviewed a record drawing and certification information as submitted to our office for the above referenced project. The record drawing provides as-built information for a wet pond stormwater management facility located in the northwest corner of the site.

Based on our review of information as submitted and a concurrent field observations as performed on August 27th 2001 and after, the following items must be addressed prior to release of the developer's surety instrument for the stormwater management/BMP facility:

Construction Certification:

Received

- In accordance with Note # 19 on Sheet 9 of the approved plan, construction certification for the stormwater management/BMP facility is required. None was provided. This is especially important since the facility has a large engineered and compacted earthen embankment located in a deep ravine. The certification can be in letter format or by use of the certification statements in Section 4 of the JCC, Stormwater Management/BMP Facilities, Record Drawing and Construction Certification, Standard Forms & Instructions.

Record Drawing:

- The record drawing set (two sheets) dated May 25 2001 is **satisfactory**, pending any changes that may occur as a result of construction-related (field) items as outlined below.

Construction-Related Items:

*OK SAT
REC
11-29-01*

- The approved plan called for a design top of dam elevation at El. 90.30 and a 12-inch diameter RCP outlet barrel through the dam. Based on a review of the as-built drawings, the actual low point along top of dam as constructed is at El. 89.7 and a 15-inch diameter RCP outlet barrel was used through the dam. The 100-year design high water elevation for the BMP was previously established at El. 88.99, therefore, freeboard to top of dam is at 0.71 feet. This does not conform with the provisions of the approved plan, which called for freeboard of 1.3 feet, nor the County's minimum standard of 1 foot for facilities with emergency spillways. Use of a 15-inch barrel, instead of a 12-inch barrel may result in an decrease in the design high water elevation and adequate freeboard may be present; however, it would still be unclear if use of a larger

barrel would result in the facility exceeding allowable discharges established for the facility for the 2-year design storm event. Use of a larger barrel size would result in higher discharge from the facility under routed hydraulic conditions. Therefore, either field correct the opening size of the outlet barrel through the dam to an appropriate 12-inch size; or alternatively, provide evaluation by an engineer that use of the 15-inch size barrel, as constructed, does not result in exceeding the allowable 2-year predevelopment discharge set for the facility and adequate freeboard from new 100-year design high water to top of dam elevation (El. 89.7) as constructed is present. (Note: A hydraulic model of the pond to show adequacy should be based on field obtained as-built conditions).

5. The facility was designed to function as a wet pond type facility with normal pool elevation at or near to the higher side invert elevation of the reverse slope pipe which is at El. 87.0 in the riser. Based on our engineering inspection as performed on August 27th 2001 and several cursory inspections afterward, the pond has remained substantially dry. Although rainfall has been below normal the past few months, this situation is still indicative of a seepage problem either through the soils in the bottom of the dam, through the compacted earthen embankment or along the outlet barrel through the dam. Either of these cases is harmful to the structural integrity of the dam. Assessment by a qualified professional geotechnical engineer is required along with necessary repairs or modifications or conclusions that seepage conditions are not present. (Note: At the time of the engineering inspection performed on August 27th 2001, there were signs that embankment soils were reworked along the upstream toe of embankment in the vicinity of the riser, possibly to alleviate a seepage condition.)

✓
OK
Revised
by ECS
11/2/01.

6. The erosion gully which has formed along the east (right) downstream embankment toe of the dam needs repaired and stabilized. This gully is approximately 2 feet deep and 3 ft. wide. *Repaired*

✓

7. A scour hole is present at the outfall of the 15-inch storm drain into the pond on the east (parking lot) side. The scour hole is approximately 1 ft. deep by 8 ft. long. This area needs refilled and appropriate rock outlet protection added. Also, the end section at the outfall of the 15-inch pipe at this same location has settled and needs reset. *OK*

✓

8. Clear and remove trash and debris from two onsite VDOT DI-7 grates. These grates are labeled as storm drain structures SS # 1-2 and SS # 2-2 on the approved plan and are located along the main access drive into the site and at the northwest corner of the back parking area, respectively. *OK*

Once this work is satisfactorily completed, contact our office appropriately. We can then proceed with final release of the surety on the project. One reproducible and one blue/black line set of the record drawings will be required once the above items are adequately addressed.

Please contact me at 757-253-6639 or the assigned Environmental Division inspector, Gerry Lewis, at 757-253-6672 if you have any further comments or questions.

Sincerely,



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

cc: Tony Gregory, Henderson (via fax)
AES Consulting Engineers, Mark Richardson/Arch Marston (via fax)

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www.hendersonincgc.com

HENDERSON
INCORPORATED
GENERAL CONTRACTORS
5800 Mooretown Road
Williamsburg, VA 23188

(757) 565-1090
FAX: (757) 564-9120
E-Mail: Henderson @ hendersonincgc.com

Fax



To: Scott Thomas	From: Donna A. Chapman
Fax: 259-4032	Pages: 5
Phone:	Date: 01/25/2002
Re: Wise Buildout	PVH, TG, Joe B., BS, DC, Mike Galli
CC: 366-5203	

- Urgent
 For Review
 Please Comment
 Please Reply
 Please Recycle

● **Comments:**

Scott,

We are proceeding with repairs per attached report. Mike will issue re-certification upon completion.

Please do not hesitate to call with any questions or concerns.

GEO TECH REPORT #2
POST BMP CONST.
BARREL REPAIR

"Our Future is Today's Quality"



ENGINEERING CONSULTING SERVICES, LTD.

814 Greenbrier Circle, Suite A
Chesapeake, Virginia 23320

PHONE: 757-366-5100

FAX: 757-366-5203

Put
Joe
Donna-76
Bill S
Tony

FACSIMILE TRANSMISSION COVER SHEET

COMPANY NAME: Henderson, Inc.

FAX NUMBER: 564-9120

FOR: Bill Strack

NUMBER OF PAGES INCLUDING COVER SHEET: 4

ORIGINALS: WILL NOT FOLLOW _____ WILL FOLLOW X

FROM: Mike Galli

DATE: 1/25/02 TIME: _____

SUBJECT: Wise Recycling

MESSAGE: Call if you have any questions,

Mike

PLEASE PHONE 757-366-5100 IF THIS TRANSMISSION IS INCOMPLETE OR IF COPY QUALITY IS POOR.
FAXCOVER.DOC

H INCORPORATED **I**
GENERAL CONTRACTORS
P.O. Box BM - 5800 Mooretown Road
Williamsburg, VA 23187

Fax

To: Scott Thomas From: Donna Chapman
Fax: 253-1850 Pages: 2
Phone: _____ Date: 12/14/01
Re: Wise Buildout cc: PVN, Joe. B. JR, DC, BS

Urgent For Review Please Comment Please Reply Please Recycle

• Comments:

CONST. CERT.



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HENDERSON

INCORPORATED
GENERAL CONTRACTORS

5800 MOORETOWN ROAD
WILLIAMSBURG, VA 23188

(757) 565-1090 FAX (757) 564-9120

Bill Stron
592-0998
Const Cert Mon
DEC 1 to me.

WC 044;
SP-138-99

LETTER OF TRANSMITTAL

DATE: 11/29/01

JOB#: 21728

ATTENTION: Scott Thomas

RE: Wise Buildout

TO:

Scott Thomas
Civil Engineer/Environmental Division
James City County
101-E Mounts Bay Rd.
Williamsburg, Va. 23187

We are sending you:

<input checked="" type="checkbox"/>	Attached		
<input type="checkbox"/>	Under separate cover VIA:		
<input checked="" type="checkbox"/>	Shop drawings	<input type="checkbox"/>	Plans
<input checked="" type="checkbox"/>	Copy of letter	<input type="checkbox"/>	Change Order
<input type="checkbox"/>	Photographs	<input type="checkbox"/>	Samples
<input type="checkbox"/>	Contract	<input type="checkbox"/>	Specifications

Transmitted as checked below:

<input type="checkbox"/>	For your approval
<input type="checkbox"/>	For your use
<input type="checkbox"/>	As requested
<input type="checkbox"/>	For your review and comment
<input type="checkbox"/>	Approved as submitted
<input type="checkbox"/>	Returned for correction
<input type="checkbox"/>	Other: _____



Copies	Date	Number	Descriptions
1	11/29/01		Hydrograph Summary Report dated 11/21/01
1	11/29/01		Record drawings(AES) dated 5/25/01
1	11/29/01		Stormwater Mgmt Facility Report by ECS dated 11/29/01

Remarks:

GEOTECH REPORT. SEEPAGE.

Copy To: PVH, BS, TG, J. Blumber, JR, DC

Signed Donna A. Chapman

HENDERSON

INCORPORATED
GENERAL CONTRACTORS

5800 MOORETOWN ROAD
WILLIAMSBURG, VA 23188

(757) 565-1090 FAX (757) 564-9120

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DATE: 11/29/01

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ATTENTION: Scott Thomas

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TO:

Scott Thomas
Civil Engineer/Environmental Division
James City County
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<input type="checkbox"/>	Other: _____

Copies	Date	Number	Descriptions
1	11/29/01		Field Report per ECS dated 11/29/01

Remarks:

Copy To: PVH, BS, TG, J. Blumber, JR, DC

Signed Donna A. Chapman



Stormwater Management / BMP Inspection Report

Detention and Retention Pond Facilities

SP-138-99
GPIN 1240100013B

Database Inventory No. (if known): WC 044

Name of Facility: WISE RECYCLING (HANKINS INDUSTRIAL PARK) BMP No.: 1 of 1 Date: 8/27/01

Location: HANKINS INDUSTRIAL PARK, 177 INDUSTRIAL BLVD.

Name of Owner: WALTHAM GROUP II

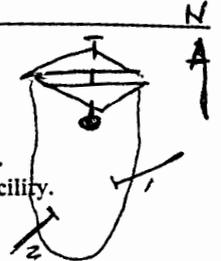
Inspector: SJ Thomas

Type of Facility: WET POND

Weather Conditions: Sunny, Warm, High 70's.

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

- O.K. - The item checked is in adequate condition and the maintenance program is currently satisfactory.
- Routine - The item checked requires attention, but does not present an immediate threat to the function of the BMP.
- Urgent - The item checked requires immediate attention to keep the BMP operational and prevent damage to the facility.



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

Facility Item	O.K.	Routine	Urgent	Comments
Embankments and Side Slopes:		<u>EARTHEN DAM; MOD SLOPE 2H:1V SLOPE; INT 3H:1V OR 4H:1V</u>		
Grass Height	✓			<u>2-4" GRASS U/S, TOP & D/S.</u>
Vegetation Condition	✓			<u>GOOD GRASS COVER.</u>
Tree Growth	✓			<u>NO TREES</u>
Erosion		✓	✓	<u>SEVERE EROSION GULY ALONG EAST</u>
Trash & Debris	✓			<u>RIGHT D/S EMB TOE. 1-2 FT DEEP 2-4' WIDE.</u>
Seepage	✓			<u>NONE OBSERVED. POND "BONE" DRY.</u>
Fencing or Benches				<u>6' WIDE SAFETY BENCH COULD NOT BE FOUND. FLATTER INT POND SS.</u>
Interior Landscaping/Planted Areas:	<input checked="" type="checkbox"/> None <input type="checkbox"/> Constructed Wetland/Shallow Marsh <input type="checkbox"/> Naturally Established Vegetation			
Vegetated Conditions	✓			<u>WET POND, HOWEVER BONE</u>
Trash & Debris	✓			<u>DRY DURING INSPECTION. INDICATIVE</u>
Floating Material	✓			<u>OF LEAK @ RISER.</u>
Erosion	✓			<u>GOOD POSITIVE DRAINAGE FROM</u>
Sediment	✓			<u>2 PIPE INFLOWS TO RISER.</u>
Dead Plant	✓			
Aesthetics	✓			
Other				

Serves Building & YARD PAVEMENT AREAS.

Water Pools Permanent Pool (Retention Basin) Shallow Marsh (Detention Basin) None (Detention Basin)

Shoreline Erosion	✓			None.
Algae	✓			POND WAS DRY.
Trash & Debris	✓			
Sediment	✓			
Aesthetics	✓			
Other	✓			

Inflow Structures (Describe Locations): *DUAL RCP 1) 15" @ EAST SIDE 2) 15" @ SW END*

Condition of Structure	✓			
Erosion		✓	✓	PIPE #1 1' DEEP X 8' LONG SCOVE HOLE AT END. RESET END SECTION PIPE 1.
Trash and Debris	✓	✓		CLEAN SS #2-1 GRATE
Sediment	✓			None.
Aesthetics	✓			
Other		✓	✓	INFLOW PIPES NEED OP.

Principal Flow Control Structure - Intake, Riser, etc. (Describe Location): *36" RCP RISER W/ 72" RCP CAP*

Condition of Structure	✓	✓	✓	POND WAS DRY. RISER/BARREL LEAK
Corrosion	✓			LEAK
Trash and Debris	✓			
Sediment	✓			
Aesthetics	✓			
Other				D1-1 GRATE; 4" REV SLOPE BMP DRAIN

Principal Outlet Structure - Barrel, Conduit, etc. : *12" RCP BARREL*

Condition of Structure	✓	✓	✓	POND WAS DRY. RISER/BARREL LEAK
Settlement		✓	✓	
Trash & Debris	✓			
Sediment	✓			
Erosion	✓			
Other	✓			

Emergency Spillway (Overflow): *None on DRAWING. None in FIELD.*

Vegetation				
Lining				
Erosion				
Trash & Debris				
Other				

POND IS NOT HOLDING WATER. SOILS OR LEAKAGE @ RISER/BARREL.

Distance Type Conditions:

Mosquito Breeding	✓			
Animal Burrows	✓			
Graffiti	✓			
Other	✓			

Surrounding Perimeter Conditions: Woods west + south; INO YARD AREA south + east.

Land Uses	✓			Good Buffer from Imperv Area.
Vegetation	✓			Good shoreline grasses.
Trash & Debris	✓			
Aesthetics	✓			
Access/Maintenance Roads or Paths				Through Parking Area.
Other				

- Remarks:
- ▷ EROSION ON D/S EAST TOE NEEDS REPAIRED & RUNOFF TO EMB REDUCED.
 - ▷ 6' SAFETY BENCH NOT FOUND. HOWEVER INTERIOR POND SS IS FLAT & GENTLE COULD BE ACCEPT DUE TO INDUSTR USE OF SITE AND NON PUBLIC REMOTE LOCATION.
 - ▷ POND WAS DRY. LEAK @ RISER. NEEDS REPAIRED.
 - ▷ 15" PIPE UNFLOW @ EAST SIDE (PIPE #1). SCOUR HOLE 1' DEEP X 8' LONG. Needs repair. Both pipes need OP. Reset END SEC 15" PIPE #1 - (dropped due to undercutting)
 - ▷ BARREL IS 12" NOT 15" PER AS-BUILT.
 - ▷ POND WAS "Bone" DRY, supposed to be wet. Indicative of soils or riser/barrel leakage. Signs of water entry around front part of riser and soils rework between riser + emb. Possible barrel piping. Large d/s emb in natural valley. Possible toe seepage.
 - ▷ No pond drain for wet pool.
 - ▷ CLEAN TRASH & Debris SS #2-1 grate.

Overall Environmental Division Internal Rating: 3 (Serious, due to wet pool leakage.)
 CHANGED TO RATING 3 BARREL REPAIRED + COMMENTS ADDRESSED
 SPRING 2002. SAT 4.22.02

Signature: [Signature] P.E.
 Title: Civil Engineer ENV DIV
 Date: 08/27/01

November 29, 2001

Mr. Bill Strack
Henderson, Inc.
P. O. Box 8M
Williamsburg, Virginia 23187

ECS Project No. 04:4184-A

Reference: Stormwater Management Facility – Wet Pond
Wise Recycling - Hankins Industrial Park
Richmond Road
Toano, Virginia

Dear Mr. Strack:

Engineering Consulting Services, Ltd. was requested to evaluate and respond to a letter issued by the James City County (JCC) Development Management Division. The letter from JCC dated November 7, 2001 documented several construction-related items for the contractor to address at the above referenced project. ECS, Ltd. was specifically requested to address Item No. 5 of this letter. **Item No. 5 indicated that there appeared to be a seepage problem at the Stormwater Management Facility (SWM).** We were requested to observe the SWM and evaluate whether or not we believe there is a seepage problem and to then recommend potential remedial measures.

Observations

Engineering personnel from our office arrived at the site on November 28, 2001 to observe the condition of the SWM embankment and spillway structure. A representative with Henderson, Inc. was also on-site at the time of our arrival and had excavated a test pit to reveal about an 8 feet long section of the upstream end of the spillway pipe. The test pit was excavated to just below the bottom of the RCP pipe invert and extended from about the base of the riser structure outlet toward the outfall structure.

We observed a thin layer of an open graded stone (approximately 1 to 2 inches) underlying the pipe. The underlying clayey soils appeared to be soft and saturated for several inches below the stone layer along the length of the pipe at this location. The soils extending out laterally beyond the pipe alignment appeared to be a stiff consistency Lean Clay soil that was considered suitable as dam core material.

The wet pond area was dry at the time of this site visit. The outfall area had been dressed up and the rip rap stone reset. Also, the contractor was in the process of dressing up other areas of the BMP in response to the JCC comments.

Conclusions and Recommendations

As indicated in the letter issued by JCC, we have had a lower than usual rainfall average for this time of year. As such, this could be a possible cause as to why the pond has remained dry. However, we also noted a **thin layer of an open-graded stone underlying the RCP pipe**. The contractor indicated that this layer may possibly extend the entire length of the pipe. This would create a direct path for the water to seep through the embankment and bypass the spillway structure. **Based on our observations in the field at the time of this site visit, we believe this to be the most probable cause of seepage and could result in the eventual piping failure of the earthen embankment parallel to the principal spillway pipe.**

We therefore recommend trying to cut off the seepage of water beneath the principal spillway pipe. An 8 foot section of pipe has been exposed. We recommend additional excavation around and along the length of the pipe at this location. The soft, saturated soils should be removed beneath the pipe to at least 18 inches in all directions to suitable subgrade soils. The pipe should then be encapsulated by at least 18 inches of concrete along the length of this section of pipe. Prior to the concrete placement, we also recommend installing a suitable flexible water stop material, such as Mastek, around the perimeter of the pipe and at opposite ends of the pipe at the joints where the freshly placed concrete meets the RCP pipe. The water stop material should be placed in at least 2 locations. This material should act as a seal in case any shrinkage occurs as the concrete encasement cures. The area should then be backfilled with a Lean Clay material similar to that which was used to construct the dam core. The soil should be placed in 8 inch loose lifts compacted to at least 95 percent of the standard proctor and within 2 percent (+/-) of optimum moisture content as per the original plans and specifications.

General Comments

This report has been prepared in order to aid in the evaluation of this site and to assist the client in determining the appropriate course of action. The report scope is limited to the specific project and location described, and the project description represents our understanding of the significant aspects relevant to concrete characteristics.

Wise Recycling
Toano, Virginia
ECS Project No. 04:4181-A
Page 3

We appreciate being of continued service to you during this project and look forward to its successful completion. If you should have any questions regarding the information and recommendations contained in this report or if we can be of any further assistance, please contact our office.

Respectfully,

ENGINEERING CONSULTING SERVICES, LTD.

Michael J. Galli, P.E.
Project Manager

Copies: (3) Henderson, Inc. (Mr. Bill Strack)

MJG/lew4184-Arpt.doc

WATERSHED	WC	MAINTENANCE PLAN	Yes	CTRL STRUC DESC	RCP Riser
BMP ID NO	044	SITE AREA acre	4.59	CTRL STRUC SIZE inches	36
PLAN NO	SP-138-99	LAND USE	Gen Industrial	OTLT BARRL DESC	RCP
TAX PARCEL	(12-04)(01-13B)	old BMP TYP	Wet Ext Det Pond	OTLT BARRL SIZE inch	15
PIN NO	1240100013B	JCC BMP CODE			
CONSTRUCTION DATE	8/4/2000	POINT VALUE	10	EMERG SPILLWAY	Yes
PROJECT NAME	Wise Recycling			DESIGN HW ELEV	88.99
FACILITY LOCATION	177 Industrial Blvd.			PERM POOL ELEV	86.6
CITY-STATE	Toano, Va. 23188	SVC DRAIN AREA acres	3.5	2-YR OUTFLOW cfs	0.20
CURRENT OWNER	Waltham Group II			10-YR OUTFLOW cfs	2.40
OWNER ADDRESS	442 1/2 East Main St.			REC DRAWING	Yes
OWNER ADDRESS 2		SERVICE AREA DESCRI	Building & Parking Area		
CITY-STATE-ZIP CODE	Clayton, NC 27520	IMPERV AREA acres	2.54	CONSTR CERTI	No
OWNER PHONE		RECV STREAM	UT France Swamp		
MAINT AGREEMENT	Yes	EXT DET-WQ-CTRL	Yes	LAST INSP DATE	
EMERG ACTION PLAN	No	WTR QUAL VOL acre-ft	0.5362	INTERNAL RATING	
		CHAN PROT CTRL	No	MISC/COMMENTS	
		CHAN PROT VOL acre-ft	0	15" barrel used instead of 12". Rev slope BMP orifice. 6' aquatic bench.	
		SW/FLOOD CONTROL	Yes		
		GEOTECH REPORT	No		

[Get Last BMP No](#)

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HANKINS INDUSTRIAL PARK

✓ Still need cc +
✓ FI items to be complete.

✓ AB Routing by AES - OK
ECS Gerlach Report - OK.

□ Want to see if hold's water
still seeping 1/15/02. Sent letter 1/17/02

□ SEEDING + REPAIRED. ALL OK