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- STORMW ATER DIVISION; WERE SCANNED IN THE REGULAR COURSE OF BUSINESS PURSUANT TO GUIDELINES ESTABLISHED BY THE LIBRARY OF VIRGINIA AND ARCHIVES; AND HA VE BEEN VERIFIED IN THE CUSTODY OF THE INDIVIDUAL LISTED BELOW.

BMPNUMBER: **MC043**

DATE VERIFIED: **May 12, 2016**

QUALITY ASSURANCE TECHNICIAN: **Charles E. Lovett II**

LOCATION: WILLIAMSBURG, VIRGINIA

James City County, Virginia
Environmental Division

Stormwater Management / BMP Facilities
Construction and As-Built Certification Form

(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 guidelines established by the Development Management manager. Erosion and sediment control policy and approved plans 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 of the drainage system for the project including any Best Management Practice facilities must be provided. In addition, for BMP facilities involving the construction of an impounding structure or dam embankment, a certification will be submitted by a Professional Engineer who has inspected the structure during its construction.)

mc 043

Section 1 - Site Information:

Project Name: The Meadows Section V
Structure/BMP Name: Wet Pond Section V
Project Address (if known): Old Field Road and Old Meadows Road
County Plan No. S - 17 - 97
Plan Approval Date: July 28, 1999
Project Type: ☒ Residential ☐ Office ☐ Commercial ☐ Institutional ☐ Roadway ☐ Industrial ☐ Other
Magisterial District: Berkeley
Tax Map/Parcel No.: (38-3) (1-17B)
SIC Code (if applicable):
Zoning District: R-2
Site Area (acre or s.f.): 18.4 AC
Land Use: Single Family Residential
Impervious Cover (acre or s.f.): 9.16 AC ±
Approx. Site Disturbed Area (acre or s.f.): 2.5 AC ±
Site Percent Impervious: 31% ±
Onsite RPA: ☐ Yes ☒ No ☐ Unknown
Wetlands Onsite: ☐ Yes ☒ No ☐ Unknown
Onsite FEMA SFHA: ☐ Yes ☐ No ☒ Unknown

Project and BMP Description: Section V contains 36 single family lots. The Wet Pond BMP serves both the Section V and Section IV, Phase III. This pond also serves approximately 1.8 AC of existing Section I. The pond is designed as a 9 point, 50% removal rate BMP facility.

Project and BMP Location: Section V is bounded by Old Field Road, along Ironbound Road. The BMP is located at the rear of lots 5-9, near the intersection of Old Field Rd and Old Meadows Rd.
Nearest Visible Landmark to SWM/BMP Facility: Intersection of Old Field Rd and Old Meadows Rd
Nearest Vertical Ground Control (if known):
☒ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Other:
Station Number or Name _____ Elev.(ft.) _____ Description: _____
Brief Description of Control Location from Facility: Coordinates given for property corner of Lot 4, Former Sect I Lot 3, and the adjacent Gatling property. This corner is north of the BMP facility

Section 2 - Stormwater Management/BMP Facility Design Information:

Facility Type: ☐ Regional ☐ Offsite ☒ Onsite ☐ Other: _____

Category: ☐ Quantity (Stream Channel Protection/Flooding) ☐ Quality ☒ Combined Use

Subwatershed Category for James City County: ☐ Tidal ☐ Reservoir ☒ Stream

Stormwater Management / BMP Type (Check Group and Type):

☐ **Group A Wet Ponds:**
- ☒ A-1 Small Wet Pond (0.5") ☐ A-2 Wet Pond ☐ A-3 Wet Ext Det Pond

☐ **Group B Wetlands:**
- ☐ B-1 Shallow Marsh ☐ B-2 Extended Detention Shallow Wetland
- ☐ B-3 Pond/Wetland System ☐ B-4 Pocket Wetland

☐ **Group C Infiltration Facilities:**
- ☐ C-1 Trench (0.5"/imp.acre) ☐ C-2 Trench (1.0"/imp. acre)
- ☐ C-3 Basin (0.5"/imp. acre) ☐ C-4 Basin (1.0"/imp. acre)

☐ **Group D Filtering Systems:**
- ☐ D-1 Bioretention ☐ D-2 Surface Sand Filter
- ☐ D-3 Underground Sand Filter ☐ D-4 Perimeter Sand Filter
- ☐ D-5 Organic Filter ☐ D-6 Pocket Sand Filter

☐ **Group E Open Channel Systems:**
- ☐ E-1 Wet Swale (Check Dams) ☐ E-2 Dry Swale ☐ E-3 Biofilters

☐ **Group F Extended Dry Detention Facilities:**
- ☐ F-1 Timber Walls ☐ F-2 Extended Detention Dry Pond w/ Forebay

☐ **Group G Open Spaces** (Conservation Easements)
- ☐ G-1 Accepts and treats stormwater runoff from development site per design specifications.
- ☐ G-2 Open Space adjacent to wetland, mature forest or resource protection area.
- ☐ G-3 All other open space.

☐ **Storm Drainage Systems**
- ☐ Storm Drains (Sewers) ☐ Inlets ☐ Other: _____

☐ **Other** (Requires evidence of prior approval and/or exception from the Environmental Division)
- Describe: _____

Design Treatment Volume (inches per imperv.acre): ☒ 0.5 ☐ 1.0 ☐ 1.5 ☐ 2.0 ☐ Other: _____

Drainage Area to facility: ☐ Onsite Only ☐ Offsite Only ☒ Offsite and Onsite

Total Postdeveloped Drainage Area (acres) to Facility: 30.78 ± ☐ Unknown

Pond/BMP Hydrologic Model: ☒ Yes ☐ No ☐ Unknown

Methodology: ☒ SCS Method ☐ Rational Method ☐ Other: _____

Runoff Curve No. or Coefficient: 77 ☐ Time of Concentration/Travel: _____

List Other Data as Necessary (Rainfall Depths, Distribution, Duration, Intensities,etc.): _____

Pond/BMP Hydraulic or Routing Model: ☒ Yes ☐ No ☐ Unknown Method: Storage Indication Method

Predeveloped Allowable Peak Discharges at Facility (cfs). List all that apply, if known:

☐ 1-yr. _____ ☒ 2-yr. 28.6 ☒ 10-yr. 80.0 ☐ 25-yr. _____ ☒ 100-yr. 149.0

☐ Unknown ☐ Other: _____

PostDeveloped Peak Outflows from Facility (cfs). List all that apply, if known:

☐ 1-yr. _____ ☒ 2-yr. 19.4 ☒ 10-yr. 79.7 ☐ 25-yr. _____ ☒ 100-yr. 158.7

☐ Unknown ☐ Other: _____

Design Pond/BMP Water Surface Elevations (ft.). List all that apply, if known:

☒ Permanent Pool (if applicable) Design El. 66.5

☒ WQV Design El. 66.4 ☐ 1-yr. (Channel Protection Volume) Design El. _____

☒ 2-yr. Design El. 68.4 ☒ 10-yr. Design El. 70.14

☐ 25-yr. Design El. _____ ☒ 100-year Design El. 71.32

Fraction of Site Served by SWM/BMP Facility (%) 44.5± Total Points for BMP: 9

Section 2 - Stormwater Management/BMP Facility Design Information (Continued):

Receiving Water Immediately Downstream of Facility Outfall:

☐ Tidal Estuary ☐ Reservoir ☐ River ☐ Stream ☒ Natural Channel

☐ Manmade Channel ☐ Existing Storm Drain/Inlet System ☐ Other: _____

Receiving Water Name or Description: Channel winds through remainder of Meadows

Nearest Offsite Land Tract / Use Downstream of Facility Outfall: subdivision to Mill Creek.

Tax Map/Parcel: (38-3) Use: Remainder of Meadows subd.

Does the SWM/BMP Facility control onsite or offsite runoff from a classified "Stormwater Hotpsot"?

☐ Yes ☒ No ☐ Unknown If yes, List Classification: _____

(Note: Refer to Chapter 2 Virginia SWM Handbook or Appendix F of theJames City County BMP Guidelines Manual for List of Classified Stormwater Hotspots.)

Section 3 - Stormwater Management/BMP Facility Construction Information:

PreConstruction Meeting Held for Construction of SWM/BMP Facility: ☒ Yes ☐ No ☐ Unknown

Approx. Construction Start Date for SWM/BMP Facility: 1/21/98

Facility Monitored by County Inspector/Engineer during Construction: ☐ Yes ☐ No ☒ Unknown

Name of County Inspector/Engineer who periodically monitored construction: Jerry Lewis

Construction Inspection Reports by Certifying Engineer Attached: ☐ Yes ☐ No

Construction Completion Date for SWM/BMP Facility: 4/98

Date of As-Built Submittal for SWM/BMP Facility: ~~10/22/99~~ 2/28/00

(Note: As-built and Construction Certifications are required within thirty (30) days of the completion of Stormwater Management and/or BMP facility construction. As-builts must be reviewed and accepted by James City County Environmental Division or County Engineer prior to final inspection, acceptance and bond release.)

Section 4 - Owner / Designer / Contractor Information:

Owner/Developer:

Name: Van Kniest, Inc. John H. Kniest, Jr.

Mailing Address: 4216 Airport Road
Williamsburg VA 23188

Business Phone: 757-565-2699 Fax: 565-1617

Contact Person: John Kniest Title: Pres.

Signature: _____

Design Professional:

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

Firm Name: AES Consulting Engineers

Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg VA 23188

Business Phone: 253-0040 Fax: 220-8994

Person Responsible for Design: Steven D. Wigley

Title: Project Manager

Plan Name: The Meadows Section V

Firm's Project No. 7820-5 Plan Date: 3/3/97

Sheet No.'s Applicable to SWM/BMP Facility: 3 / 7 / ___ / ___ / ___

Contractor:

Name: Toano Contractors, Inc

Mailing Address: P.O. Box 712
Toano VA 23168

Business Phone: 566-0097 Fax: 566-8874

Contact Person: Bill Taylor

Site Foreman/Supervisor: Bill Taylor

Specialty Subcontractors & Purpose (BMP Construction Only): N/A

Section 5 - Professional Certifications:

Certifying Professionals: *(Note: A registered Professional Engineer or Certified Land Surveyor is responsible for the preparation of an "As-Built" plan of 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 the Stormwater Management/BMP facility during its construction.)*

Construction and As-Built Certifications for Stormwater Management / BMP Facilities

As-Built Plan Certification

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

Name: RICHARD A. COSTELLO
Title: PRESIDENT
Signature: Richard A Costello
Date: 2/28/00

I hereby certify to the best of my judgement, knowledge and belief that this as-built plan was prepared under my direct supervision and control ~~and represents the actual condition of the Stormwater Management/BMP structure(s) and contains information as required for certification~~. The Stormwater Management/ BMP facility complies with the approved design plan, James City County Guidelines for Design and Construction of BMP's and/or specifications on the approved Stormwater Management Plan, except as shown.

AT TIME OF CONSTRUCTION

COMMONWEALTH OF VIRGINIA
RICHARD A. COSTELLO
CERTIFICATE NO.
013250
2/28/00
CERTIFIED PROFESSIONAL ENGINEER

_____ (Seal)

Virginia Registered Professional Engineer or Certified Land Surveyor

Construction Certification

Firm Name: AES CONSULTING ENGINEERS
Mailing Address: 5248 Olde Towne Rd Ste 1
Williamsburg VA 23188
Business Phone: 253-0040
Fax: 220-8994

Name: RICHARD A. COSTELLO
Title: PRESIDENT
Signature: Richard A Costello
Date: 2/28/00

I hereby certify to the best of my judgement, knowledge and belief that construction of this Stormwater Management/BMP facility was * ~~monitored under my direct control and supervision.~~ GENERALLY The facility was constructed in accordance with the approved design plan, James City County Guidelines for Design and Construction of Stormwater Management BMP's and/or specifications on the approved Stormwater Management Plan.

AT TIME OF CONSTRUCTION

* VERIFIED (BY ECS) BY TESTING AFTER COMPLETION.

COMMONWEALTH OF VIRGINIA
RICHARD A. COSTELLO
CERTIFICATE NO.
013250
2/29/00
CERTIFIED PROFESSIONAL ENGINEER

_____ (Seal)

Virginia Registered Professional Engineer

Section 6 - Construction and As-Built Certification Requirements:

☒ PreConstruction Meeting - Provides an opportunity to review SWM/BMP facility construction, maintenance and operation plans and address any questions regarding construction and/or inspection of the facility. The design engineer, certifying professional (if different), Owner/Applicant, Contractor and County representatives are encouraged to attend the preconstruction meeting. At least 48 hours advanced notice is required to the Environmental Division. Usually this requirement can be met simultaneously with Land Disturbance and Erosion and Sediment Control preconstruction meeting requirements for the project.

COMPLETED TO GREATEST EXTENT POSSIBLE

☐ A fully completed **STORMWATER MANAGEMENT / BMP FACILITIES CONSTRUCTION and AS-BUILT CERTIFICATION FORM** and **AS-BUILT PLAN CHECKLIST**. All applicable sections shall be completed in their entirety and certification statements signed and sealed by the registered professional responsible for individual as-built and/or construction certifications.

☒ An "As-Built" plan shall be prepared by a registered Professional Engineer or Certified Land Surveyor for the drainage system of the project including any Best Managment Practices.

SEE ATTACHED ECS TEST REPORTS

☐ Construction of BMP facilities which contain impoundments, embankments and related engineered appurtenances (compacted fills, geotextiles, filters, seepage controls, hydraulic control structures, etc.) shall be monitored under the direct control and supervision of a registered Professional Engineer. The Engineer must certify that the pond, embankment and associated appurtenances were built in accordance with the approved design plans and shall submit written certifications or drawings along with soil and compaction test reports, concrete test reports, inspection forms and other required material or construction documentation to the James City County Environmental Division immediately following completion of the project. The Engineer shall have the authority and responsibility to make minor plan changes in order to compensate for unsafe or unusual soil conditions encountered during construction of the facility, as long as changes do not adversely affect the integrity of the structure(s). Major changes to the design plan or structure must be reviewed and approved by the original design professional and the James City County Environmental Division or County Engineer.

N/A

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

COMPLETED TO GREATEST EXTENT POSSIBLE

☐ As-built plans shall provide, at a minimum, all information as shown within these requirements and the attached **AS-BUILT PLAN CHECKLIST** specific to the type of BMP facility being constructed. Other additional record data may be formally requested by the James City County Environmental Division or County Engineer.

ENGINEER OF RECORD NOT AVAILABLE

☐ As-built plans shall consist of blue/black line prints or a reproducible (mylar, sepia, diazo, etc.) set of the approved stormwater management plan including applicable plan views, profiles, sections, details, etc. as related to construction of the SWM/BMP facility. The set shall indicate "AS-BUILT " in large text in the lower right hand corner of each sheet with as-built elevations, dimensions and relative data drawn in colored ink and boxed beside design values. Design values, dimensions and data shall not be erased. Plan sheet revision blocks shall be modified as required to indicate as-built status. Elevations to the nearest 0.1' are sufficiently accurate except where higher accuracy is needed to show positive drainage. Certification statements as shown in Section 5 of the Construction and As-Built Certification Form, or similar forms thereof, and professional signatures and seals are also required on the as-built plan prints or reproducibles.

STORMWATER MANAGEMENT / BMP FACILITIES
AS-BUILT PLAN CHECKLIST

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

I. Methods and Presentation:

XX 1. All constructed facilities meet approved design plans, unless otherwise shown. Deviations from design plan shown in colored ink and boxed beside design values.

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

XX 3. All plan sheets labeled with "AS-BUILT" in large text in lower right hand corner.

XX 4. All plan sheet revision blocks modified to indicate date and as-built status.

INC 5. All plan sheets with certification statements and professional signatures and seals.
ENGINEER OF RECORD (DESIGN) NOT AVAILABLE

II. Acceptable Construction:

XX 1. Pipe diameters, lengths, materials and elevations must be correct.

XX 2. Trash rack and number of anti-seep collars and sizes are to be correct.

XX 3. Emergency spillway may be steeper, but no flatter or narrower than design. Location and alignment shall match approved design plans.

INC 4. Embankment or berm elevations along centerline of dam must be no less than design elevation plus any settlement allowances as indicated on the plans.

XX 5. Top widths, berm widths and side slopes must meet design requirements. ~~Show as-built contours at two feet intervals~~.

XX 6. Riser must meet design requirements and trash rack must correspond to actual riser size.

XX 7. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the required design volumes.

XX 8. Outlet structure type, dimensions and installation requirements must be correct.

N/A 9. Landscaping shall conform with arrangement and requirements of the design plan.

N/A 10. Any other information formally requested by the Environmental Division or County Engineer specific to the constructed SWM/BMP facility.

STORMWATER MANAGEMENT / BMP FACILITIES
AS-BUILT PLAN CHECKLIST

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

III. General Information: *(Note: Generally Required for All Stormwater Management / BMP Facilities.)*

XX 1. Plan View: Show general location, arrrangement and dimensions.

XX 2. ~~Profile or~~ elevations along top or berm of the facility. At a minimum, elevations are required at each end, at intervals not to exceed 50 feet and where low spots may be present.

N/A 3. Cross-section of the emergency spillway at the control section.

XX 4. Profile or elevations along the approximate centerline of the emergency spillway.

N/A 5. Cross-section of the embankment through the principal spillway or outlet drain. Must extend at least 100 ft. downstream of the fill or to site property line, whichever is closer.

XX 6. Elevation of the principal spillway crest or outlet crest of the structure.

XX 7. Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.

XX 8. Primary control structure (riser) diameter or dimensions, height, type of material and ~~base size.~~

XX 9. Barrel (outlet drain) diameter, length, slope, ~~type and thickness of material and bedding envelope.~~

XX 10. Outfall protection dimension, type and depth of rock and underlain filter fabric.

XX 11. Type and size of anti-vortex and trash rack device. Height, diameter, dimensions, bar spacings (if applicable) and elevations relative to the principal spillway crest.

XX 12. Type, location, size and number of anti-seep collars or other methods utilized for seepage control. AS DESIGNED

N/A 13. Dimensions, locations and elevations of outlet orifices, weirs, drains and control valves.

N/A 14. Show length, width and depth of facility or contours to verify storage volumes are maintained or reasonably close to the approved design.

X 15. Top of impervious core imbankment, core trench limits and elevation of cut-off trench bottom. Must obtain during construction.

N/A 16. Verification of proposed vegetative areas, slope protections, plantings and landscaping features.

N/A 17. Fencing certifications, if applicable.

X 18. Certification of subgrade conditions and embankment fill material for compaction and unified soil classes by a Professional Engineer. Soil, compaction and visual tests must be performed during construction.

XX 19. Verification that work area is properly cleaned of stockpiles and construction debris.

X SEE ATTACHED ECS TEST REPORTS

STORMWATER MANAGEMENT / BMP FACILITIES
AS-BUILT PLAN CHECKLIST

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

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

XX 1. Principal spillway consists of reinforced concrete pipe with O-Ring gaskets for watertight joint construction. Riser is located within embankment and contains safety measures to prevent unauthorized or unsafe entry (ie. lockable covers, steps, grating, etc.)

N/A 2. Sediment forebays or pretreatment devices provided at inlets to pond. Forebays meet volume requirements for 0.1 inches of runoff per impervious acre and are between 4 to 6 ft. deep.

N/A 3. Access for maintenance and equipment is provided to the forebay(s). Access corridors are at least 12 ft. wide, have a maximum slope of 15 percent and are adequately stabilized to withstand heavy equipment or vehicle use.

N/A 4. Adequate fixed vertical sediment depth markers installed in the forebay(s) for future sediment monitoring purposes.

XX 3. Flared end pipe sections or step pool arrangement used at barrel outlet.

N/A 4. Pond liner (if required) meets County guidelines for either clay liners, polyliners, bentonite liners or use of chemical soil additives or requirements of the approved plan.

N/A 5. Minimum 6 percent slope safety bench extending a minimum of 15 feet outward from normal pool edge and/or an aquatic bench extending a minimum of 10 feet inward from the normal shoreline with a maximum depth of 12 inches below the normal pool elevation, if applicable, per the approved design plans. (Note: Safety benches may be waived if pond side slopes are no steeper than 4H:1V)

5'± WIDE BENCH @ N.P. ELEV.

XX 6. Adequate buffers provided from maximum water surface elevation of the pond.

N/A 7. Verification that no trees are present within a zone 15 feet around the embankment toe and 25 feet from the principal spillway structure.

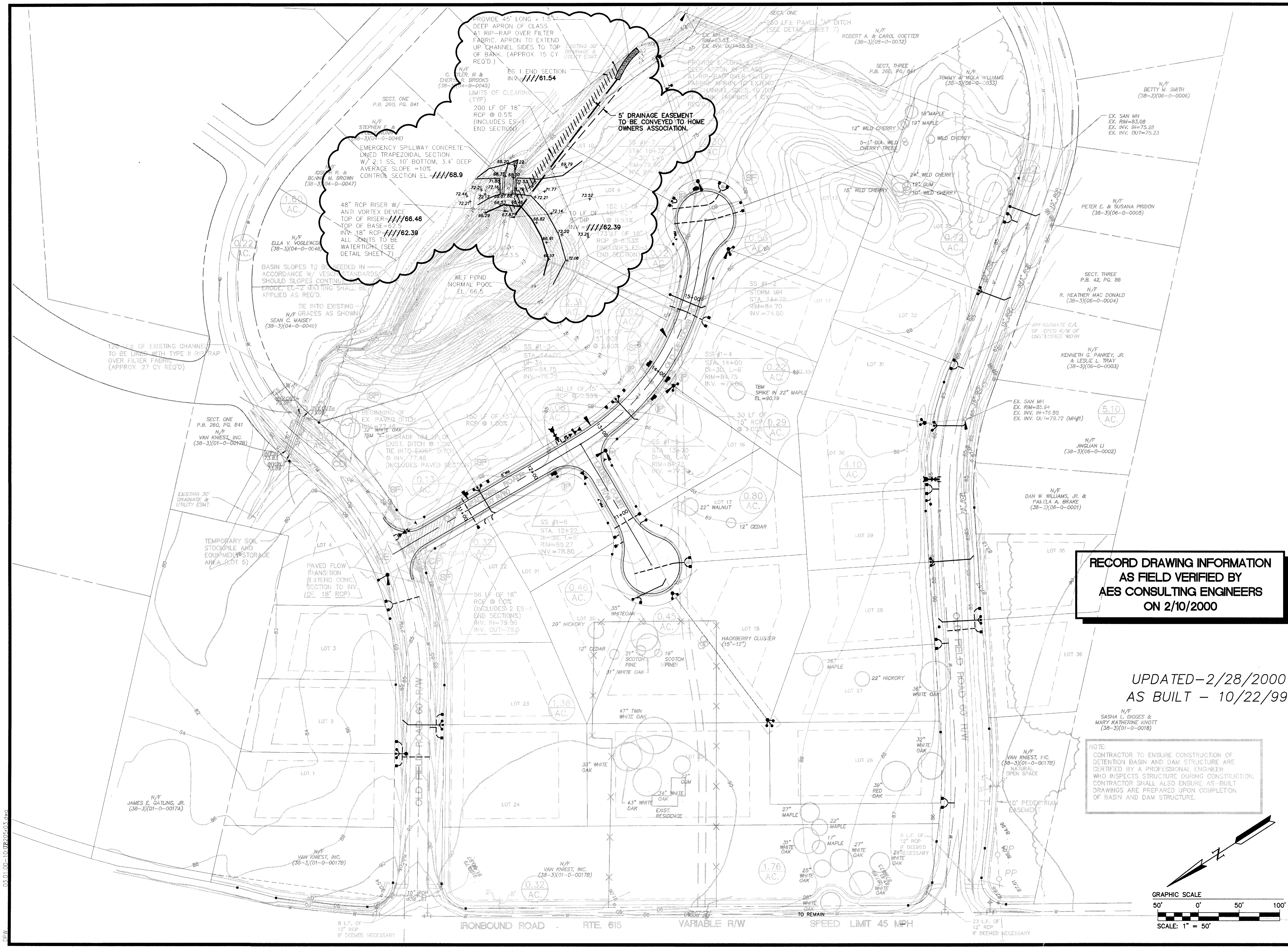
INC 8. Verification that principal spillway is equipped with a removable trash rack or is easily accessible for maintenance or cleaning. TOP NOT EASILY REMOVED

N/A 9. Low flow orifice has a non-clogging mechanism.

XX 10. A pond drain pipe with valve was provided.

XX 11. Pond side slopes are not steeper than 3H:1V. (2:1 UNDER WATER SURFACE AS INDICATED ON APPROVED DESIGN)

N/A 12. Endwalls above barrels (outlet pipe) greater than 48 inch in diameter are fenced to prevent a fall hazard.



PROVIDE 45' LONG x 1.5' DEEP APRON OF CLASS A1 RIP-RAP OVER FILTER FABRIC. APRON TO EXTEND UP CHANNEL SIDES TO TOP OF BANK. (APPROX. 15 CY REQ'D.)
ES 1 END SECTION INV. 61.54
LIMITS OF CLEARING (TYP)
200 LF OF 18" RCP @ 0.5% (INCLUDES ES-1 END SECTION)
5' DRAINAGE EASEMENT TO BE CONVEYED TO HOME OWNERS ASSOCIATION.
EMERGENCY SPILLWAY CONCRETE LINED TRAPEZOIDAL SECTION W/ 2:1 SS, 10' BOTTOM, 3.4' DEEP AVERAGE SLOPE =10% CONTROL SECTION EL. 68.9
48" RCP RISER W/ ANTI VORTEX DEVICE TOP OF RISER 66.46 TOP OF BASE=62.5 INV. 18" RCP 62.39 ALL JOINTS TO BE WATERTIGHT (SEE DETAIL SHEET 7)
10 LF OF 8" DIP INV. 62.39
BASIN SLOPES TO BE SEEDED IN ACCORDANCE W/ VESCH STANDARDS. SHOULD SLOPES CONTINUE TO ERODE, EC-2 MATTING SHALL BE APPLIED AS REQ'D.
WET POND NORMAL POOL EL 66.5
TIE INTO EXISTING GRADES AS SHOWN
120 LF± OF EXISTING CHANNEL TO BE LINED WITH TYPE II RIP-RAP OVER FILTER FABRIC (APPROX. 27 CY REQ'D)
SECT. ONE P.B. 260, PG. 841
N/F ROBERT A. & CAROL GOETTER (38-3)(06-0-0032)
SECT. THREE P.B. 260, PG. 841
N/F TOMMY & VIOLA WILLIAMS (38-3)(06-0-0033)
N/F BETTY M. SMITH (38-3)(06-0-0006)
EX. SAN MH EX. RIM=83.08 EX. INV. IN=75.28 EX. INV. OUT=75.23
N/F PETER E. & SUSANA PRIDON (38-3)(06-0-0005)
SECT. THREE P.B. 42, PG. 86
N/F R. HEATHER MAC DONALD (38-3)(06-0-0004)
N/F KENNETH G. PANKEY, JR. & LESLIE L. TRAY (38-3)(06-0-0003)
EX. SAN MH EX. RIM=83.94 EX. INV. IN=79.80 EX. INV. OUT=79.72 (MH#1)
N/F JINGLIAN LI (38-3)(06-0-0002)
N/F DAN W WILLIAMS, JR. & PAMELA A. BRAKE (38-3)(06-0-0001)
N/F ELLA V. VOGLEWEDE (38-3)(04-0-0048)
N/F SEAN C. MAISEY (38-3)(04-0-0049)
N/F VAN KNIEST, INC. (38-3)(01-0-0017B)
TBM SPIKE IN 22" MAPLE EL.=90.19
TEMPORARY SOIL STOCKPILE AND EQUIPMENT STORAGE AREA (LOT 5)
PAVED FLOW TRANSITION (EXTEND CONC. SECTION TO INV. OF 18" RCP)
58 LF OF 18" RCP @ 1.0% (INCLUDES 2 ES-1 END SECTIONS) INV. IN=79.06 INV. OUT=78.6
N/F JAMES E. GATLING, JR. (38-3)(01-0-0017A)
N/F VAN KNIEST, INC. (38-3)(01-0-0017B)
N/F SASHA L. DIGGES & MARY KATHERINE KNOTT (38-3)(01-0-0018)
NATURAL OPEN SPACE
10' PEDESTRIAN EASEMENT
OLD FIELD ROAD 60' R/W
IRONBOUND ROAD RTE. 615 VARIABLE R/W SPEED LIMIT 45 MPH
TO REMAIN
8 LF OF 12" RCP IF DEEMED NECESSARY
NOTE: CONTRACTOR TO ENSURE CONSTRUCTION OF DETENTION BASIN AND DAM STRUCTURE ARE CERTIFIED BY A PROFESSIONAL ENGINEER WHO INSPECTS STRUCTURE DURING CONSTRUCTION. CONTRACTOR SHALL ALSO ENSURE AS-BUILT DRAWINGS ARE PREPARED UPON COMPLETION OF BASIN AND DAM STRUCTURE.
GRAPHIC SCALE
50' 0' 50' 100'
SCALE: 1" = 50'

RECORD DRAWING INFORMATION AS FIELD VERIFIED BY AES CONSULTING ENGINEERS ON 2/10/2000

UPDATED–2/28/2000
AS BUILT – 10/22/99

No.	DATE	REVISION / COMMENT / NOTE	BY
7	2/28/00	UPDATED RECORD DWG PER FINAL DAM CONSTRUCTION	DPW
6	10/22/99	ADDITIONAL RECORD INFO PER JCC	DPW
5	9/27/99	ADDED POND RECORD DRAWING INFORMATION	DPW
4	1/15/99	REVISED PER J.C.C. COMMENTS TO ADD SIDEWALK	SOW
3	11/98	REVISED SANITARY LAYOUT PER DEVELOPER	DPW
2	11/98	REVISED PER JCC 10/20/97 COMMENT LETTER	DPW
1	8/97	REVISED PER JCC 4/2/97 COMMENT LETTER	DPW

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

DRAINAGE, GRADING, EROSION AND SEDIMENT CONTROL PLAN

THE MEADOWS

SECTION V

OWNER/DEVELOPER: VAN KNIEST, INC.

BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
SOW/DPW	KEG
Scale	Date
1"=50'	3/3/97

Project No. 7820-5

Drawing No. 3 OF 7

DAM CONSTRUCTION NOTES

1. A GEOTECHNICAL SUBSURFACE EXPLORATION AT THE PROPOSED DAM SITE SHALL BE PERFORMED AT THE CONTRACTOR'S EXPENSE. THE GEOTECHNICAL INVESTIGATION WILL DETERMINE KEY TRENCH DEPTH AND WIDTH ACCORDINGLY. THE GEOTECHNICAL CONSULTANT SHALL SUBMIT TO OWNER/CONTRACTOR HIS/HER RECOMMENDATIONS FOR DAM DESIGN, TRENCH WIDTH, DEPTH, ETC. THESE RECOMENDATIONS ARE HEREBY MADE A PART OF THE DAM'S CONSTRUCTION SPECIFICATIONS. ADDITIONALLY, THE GEOTECHNICAL CONSULTANT WILL ENSURE PROPER MATERIALS AND DAM CONSTRUCTION METHODS ARE USED DURING CONSTRUCTION. AFTER CONSTRUCTION,THE GEOTECHNICAL CONSULTANT SHALL SUBMIT A LETTER DEMONSTRATING THE DAM WAS BUILT IN ACCORDANCE WITH THEIR REPORTS RECOMENDATIONS.

2. SITE PREPARATION:
THE CONTRACTOR SHALL STRIP ALL AREAS OF THE PERMANENT CONSTRUCTION TO REMOVE ALL UNSUITABLE MATERIALS. THE UNSUITABLE MATERIALS TO BE REMOVED BY STRIPPING SHALL INCLUDE ALL TOPSOIL, DEBRIS AND VEGETABLE MATTER, INCLUDING STUMPS AND ROOTS, AND ALL OTHER MATERIALS WHICH MAY BE UNSUITABLE FOR USE IN THE PERMANENT CONSTRUCTION.

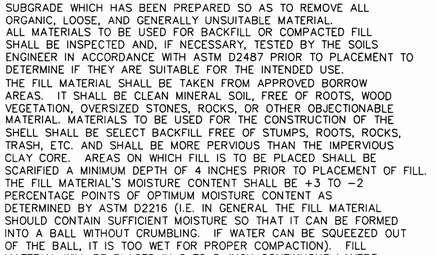
3. EMBANKMENT: THE EXPOSED SUBGRADE SOILS SHALL BE CAREFULLY INSPECTED BY THE GEOTECHNICAL ENGINEER. ANY UNSUITABLE MATERIALS THUS EXPOSED SHALL BE REMOVED AND REPLACED WITH A WELL COMPACTED, SUITABLE MATERIAL. DENSITY TESTING, AT THE DISCRETION OF THE GEOTECHNICAL ENGINEER, SHALL BE PERFORMED AT THIS TIME. THE EMBANKMENT SHALL BE KEYED INTO THE UNDISTURBED (EXISTING) SOIL STRATUM. EMBANKMENT SHOULD BE KEYED AT LEAST 4 FEET INTO THE STRATUM OR AS SPECIFIED BY THE SOILS ENGINEER (WIDTH = 6 FT. MINIMUM). THE EMBANKMENT FOUNDATION AND ABUTMENTS SHALL BEAR ON FIRM AND STABLE EXISTING SUBGRADE 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 SOILS ENGINEER IN ACCORDANCE WITH ASTM D2487 PRIOR TO PLACEMENT TO DETERMINE IF THEY ARE SUITABLE FOR THE INTENDED USE. THE FILL MATERIAL SHALL BE TAKEN FROM APPROVED BORROW AREAS. IT SHALL BE CLEAN MINERAL SOIL, FREE OF ROOTS, WOOD VEGETATION, OVERSIZED STONES, ROCKS, OR OTHER OBJECTIONABLE MATERIAL. 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 DEPTH OF 4 INCHES PRIOR TO PLACEMENT OF FILL. THE FILL MATERIAL'S MOISTURE CONTENT SHALL BE +3 TO −2 PERCENTAGE POINTS OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D2216 (I.E. IN GENERAL THE FILL MATERIAL SHOULD CONTAIN SUFFICIENT MOISTURE SO THAT IT CAN BE FORMED INTO A BALL WITHOUT CRUMBLING. IF WATER CAN BE SQUEEZED OUT OF THE BALL, IT IS TOO WET FOR PROPER COMPACTION). FILL MATERIAL WILL BE PLACED IN 6 TO 8-INCH CONTINUOUS LAYERS OVER THE ENTIRE LENGTH OF THE FILL. FIRST LIFT ON SUBGRADE MAY BE PLACED AT A DEPTH UP TO 36 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 DETERMINED BY THE GEOTECHNICAL ENGINEER. THE BOTTOM WIDTH WIDTH SHALL BE WIDE ENOUGH TO PERMIT OPERATION OF COMPACTION EQUIPMENT. THE SIDE SLOPES SHALL BE NO STEEPER THAN 1:1. COMPACTION REQUIREMENTS SHALL BE THE SAME AS THOSE FOR THE EMBANKMENT. THE TRENCH SHALL BE KEPT DRAINED DURING THE BACKFILLING−COMPACTING OPERATIONS.

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

6. VEGETATIVE STABILIZATION: FINAL VEGETATIVE COVER (STABILIZATION) SHALL CONSIST OF TOPSOILING, LIMING, FERTILIZING, SEEDING, AND MULCHING TO ASSURE A FIRM STAND OF GRASS AS SOON AS PRACTICAL. SEDIMENT BASINS AND OTHER TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED ONLY WHEN STABILIZATION IS COMPLETE. FINAL VEGETAL COVER SHALL BE PROVIDED IN ACCORDANCE WITH THE FOLLOWING:

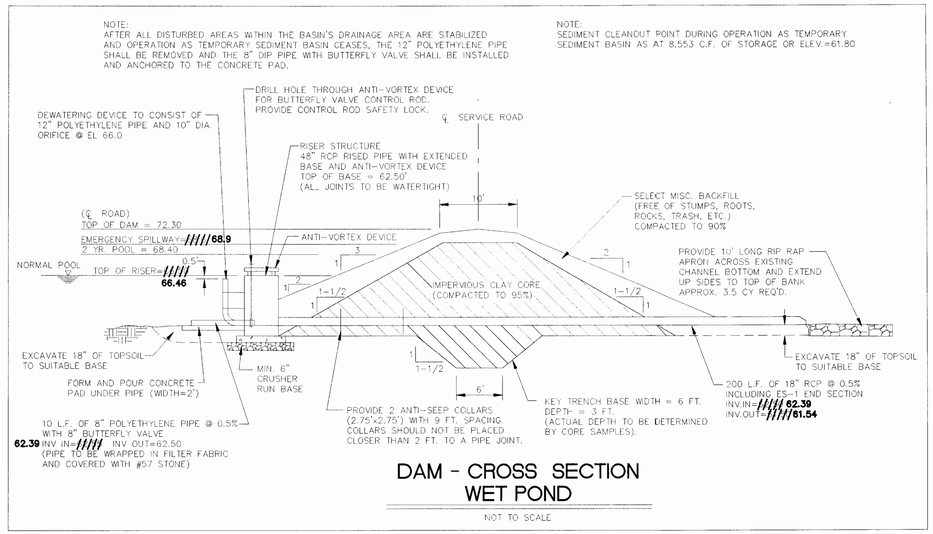
TOPSOIL:	AT LEAST 2" THICKNESS OBTAINED FROM STOCKPILES ON SITE, FREE OF LARGE DEBRIS.
LIME:	4,000#/ACRE (90#/1,000 S.F.)
SEED:	KENTUCKY 31 TALL FESCUE 250#/ACRE (6#/1,000 S.F.)
FERTILIZER:	10/20/10 MIX, 1,000#/ACRE (25#/1,000 S.F.)
MULCH:	STRAW OR HAY (LOCALLY OBTAINED) 4,000#/ACRE (90#/1,000 S.F.)



CONCRETE LINED DITCH SECTION

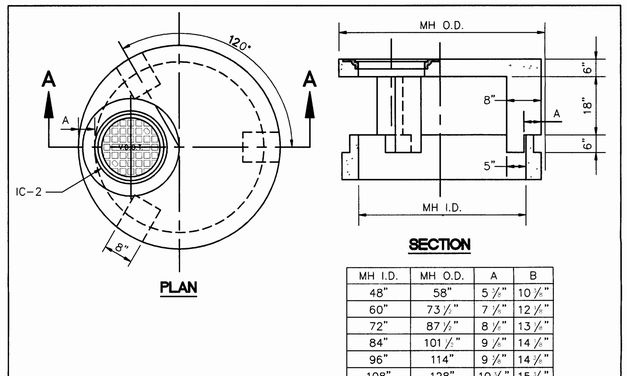
N.T.S.

D−CDITCH



DAM − CROSS SECTION
WET POND

NOT TO SCALE



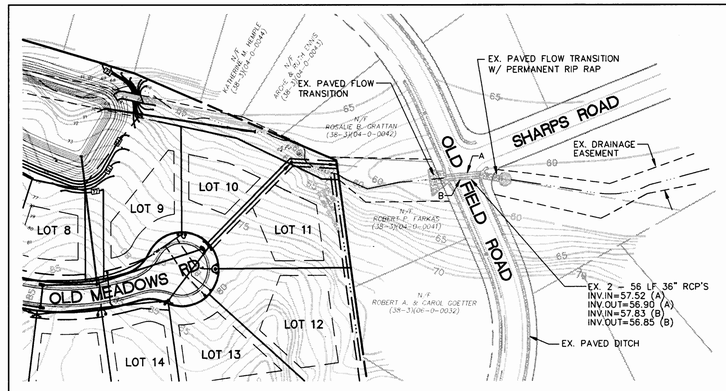
PLAN

SECTION

MH I.D.	MH O.D.	A	B
48"	58"	5 1/2"	10 1/2"
60"	73 1/2"	7 1/2"	12 1/2"
72"	87 1/2"	8 1/2"	13 1/2"
84"	101 1/2"	9 1/2"	14 1/2"
96"	114"	9 1/2"	14 1/2"
108"	128"	10 1/8"	15 1/8"
126"	147"	10 1/8"	15 1/8"

TYPICAL ANTI−VORTEX DEVICE

D−VORTX

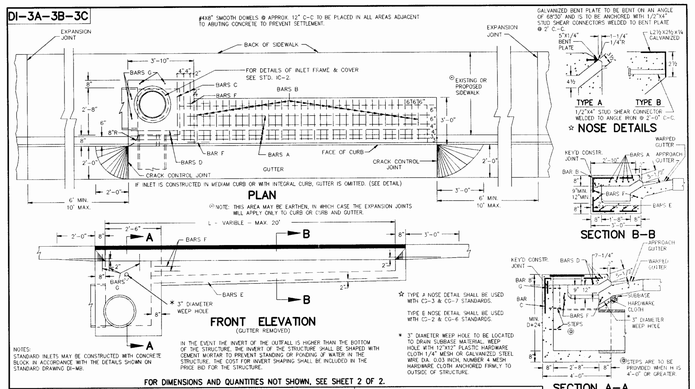


WET POND OUTFALL CHANNEL

SCALE: 1"=100'

RECORD DRAWING INFORMATION
AS FIELD VERIFIED BY
AES CONSULTING ENGINEERS
ON 2/10/2000

DI−3A−3B−3C



STANDARD CURB DROP INLET
12"−30" PIPE MAXIMUM DEPTH (H)=8'

VIRGINIA DEPARTMENT OF TRANSPORTATION

104.09

SHEET 1 OF 2

SPECIFICATION REFERENCE: 233, 302

DI−3A−3B−3C SHEET 2 OF 2

TABLE OF CONTENTS

TYPE	L	AREA OF SLOT	CON−CRETE	REINFORCING STEEL														WEIGHT
				BARS A		BARS B		BARS C		BARS D		BARS E		BARS F		BARS G		
	FT.	SQ. FT.	CU. YDS.	NO.	LIN. FT. *	NO.	LIN. FT. *	NO.	LIN. FT. *	NO.	LIN. FT. *	NO.	LIN. FT. *	NO.	LIN. FT. *	NO.	LIN. FT. *	LBS.
DI−3A	2'−6"	1.15	2.26	−	−	−	−	1	5'−7"	3	3'−2"	−	−	−	−	6	1'−0"	22
DI−3B	4'	1.83	2.59	5	1'−6"	2	6'7"to6'10"	3	5'−7"	3	3'−2"	4	1'−6"	3	1'−6"	4	1'−0"	64
	6'	2.75	3.02	5	3'−6"	6	6'7"to6'10"	3	5'−7"	3	3'−2"	4	3'−6"	3	1'−6"	4	1'−0"	111
	8'	3.67	3.46	5	5'−6"	10	6'7"to6'10"	3	5'−7"	3	3'−2"	4	5'−6"	3	1'−6"	4	1'−0"	158
	10'	4.58	3.90	5	7'−6"	14	6'7"to6'10"	3	5'−7"	3	3'−2"	4	7'−6"	3	1'−6"	4	1'−0"	204
	12'	5.50	4.34	5	9'−6"	18	6'7"to6'10"	3	5'−7"	3	3'−2"	4	9'−6"	3	1'−6"	4	1'−0"	251
	14'	6.42	4.78	5	11'−6"	22	6'7"to6'10"	3	5'−7"	3	3'−2"	4	11'−6"	3	1'−6"	4	1'−0"	298
	16'	7.33	5.22	5	13'−6"	26	6'7"to6'10"	3	5'−7"	3	3'−2"	4	13'−6"	3	1'−6"	4	1'−0"	345
	18'	8.25	5.66	5	15'−6"	30	6'7"to6'10"	3	5'−7"	3	3'−2"	4	15'−6"	3	1'−6"	4	1'−0"	391
	20'	9.17	6.09	5	17'−6"	34	6'7"to6'10"	3	5'−7"	3	3'−2"	4	17'−6"	3	1'−6"	4	1'−0"	438
DI−3C	6'	2.75	3.01	10	1'−9"	4	6'7"to6'10"	5	5'−7"	3	3'−2"	8	1'−9"	6	1'−6"	2	1'−0"	111
	8'	3.67	3.45	10	2'−9"	8	6'7"to6'10"	5	5'−7"	3	3'−2"	8	2'−9"	6	1'−6"	2	1'−0"	158
	10'	4.58	3.89	10	3'−9"	12	6'7"to6'10"	5	5'−7"	3	3'−2"	8	3'−9"	6	1'−6"	2	1'−0"	205
	12'	5.50	4.33	10	4'−9"	16	6'7"to6'10"	5	5'−7"	3	3'−2"	8	4'−9"	6	1'−6"	2	1'−0"	252
	14'	6.42	4.77	10	5'−9"	20	6'7"to6'10"	5	5'−7"	3	3'−2"	8	5'−9"	6	1'−6"	2	1'−0"	298
	16'	7.33	5.21	10	6'−9"	24	6'7"to6'10"	5	5'−7"	3	3'−2"	8	6'−9"	6	1'−6"	2	1'−0"	345
	18'	8.25	5.65	10	7'−9"	28	6'7"to6'10"	5	5'−7"	3	3'−2"	8	7'−9"	6	1'−6"	2	1'−0"	392
	20'	9.17	6.09	10	8'−9"	32	6'7"to6'10"	5	5'−7"	3	3'−2"	8	8'−9"	6	1'−6"	2	1'−0"	439

* DENOTES LENGTH OF (1) BAR.

NOTES: ALL REINFORCING BARS TO BE NO. ⑤.

ALL CAST IN PLACE CONCRETE TO BE CLASS A3. FOR ACCEPTABLE ALTERNATE SEE PRECAST STANDARD DESIGNS.

CONCRETE QUANTITIES ARE SHOWN FOR DEPTH (H) OF 5'−2" WITHOUT PIPES. THE AMOUNT DISPLACED BY PIPES MUST BE DEDUCTED TO OBTAIN TRUE QUANTITIES. FOR INLETS OF DIFFERENT DEPTHS ADD OR SUBTRACT 0.32 CU. YDS. OF CONCRETE FOR EACH FOOT OF DIFFERENCE OF DEPTH.

LENGTH OF ANGLE IRON AS SHOWN ON SHEET 1 IS TO BE L + 16" @ 4.10 LBS. PER FT.

STANDARD CURB DROP INLET
12"−30" PIPE MAXIMUM DEPTH (H)=8'

VIRGINIA DEPARTMENT OF TRANSPORTATION

104.10

SPECIFICATION REFERENCE: 233, 302

No.	DATE	REVISION / COMMENT / NOTE	BY
5	2/28/00	UPDATED RECORD DWG PER FINAL DAM CONSTRUCTION	DPW
4	1/15/99	REVISED PER J.C.C. COMMENTS TO ADD SIDEWALK	SOW
3	11/98	REVISED SANITARY LAYOUT PER DEVELOPER	DPW
2	11/98	REVISED PER JCC 10/20/97 COMMENT LETTER	DPW
1	8/97	REVISED PER JCC 4/2/97 COMMENT LETTER	DPW

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

STORMWATER MANAGEMENT NOTES AND DETAILS

THE MEADOWS
SECTION V
OWNER/DEVELOPER: VAN KNIEST, INC.

BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed SOW/DPW	Drawn KEG
Scale NONE	Date 3/3/97
Project No. 7820−5	
Drawing No. 7 OF 7	

03.02.00 - 14:28:05 - 07.dwg

DPW

MC043_THE_MEADOWS_WET_POND_SECTION_V - 011

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

Meadows II Limited Partnership
426-B Airport Road
Williamsburg, Virginia 23188
Attn: Ms. Vicki Barnes

ECS Project No. R3599-A

Re: The Meadows-Section 5 (Dam)
James City County, Virginia

Dear Ms. Barnes:

At the request of Mr. Bill Taylor of Toano Contractors, ECS, Ltd. observed a test pit which was performed on June 12, 1998, near the centermost portion of the above-referenced dam. The test pit was performed at the longitudinal center of the existing dam in the approximate location of the former ravine. The purpose of this test pit was to ascertain the composition and compaction of the dam core. Results of this test pit and compaction testing are indicated in the following table.

Test Depth (Below Top of Dam)	Approximate Elevation (feet)	Moisture Content	Percent Compaction	Subsurface Material
Surface-1 ft.	72	9.5%	103.5%	Orange, Gray and Tan, Silty, Sandy Clay (CL) [FILL]
2 ft.	70	18.6%	96.3%	Orange, Gray and Tan, Sandy CLAY (CL) to Silty, Clayey, fine Sand (SM) [FILL]
3.5 ft.	68.5	22.6%	91.6%	Orange, Gray and Tan, Sandy CLAY (CL) to Silty, Clayey, fine Sand (SM) [FILL]
5.0 ft.	67	21.82%	94.8%	Light Gray-Tan, Sandy Silty Clay (CL) [FILL]
6.0 ft.	66	-	Firm*	Light Gray-Tan, Sandy Silty Clay (CL) [FILL]
7.0 ft.	65	-	Firm*	Light Gray-Tan, Sandy Silty Clay (CL) [FILL]
8.0 ft.	64	-	Firm*	Light Gray-Tan, Sandy Silty Clay (CL) [FILL]
9.0 ft.	63	-	Firm*	Yellowish Orange and Tan, Silty fine SAND and fine Sandy SILT (SM to SM-ML)
10.0 ft.	62	-	Firm*	Yellowish Orange and Tan, Silty fine SAND and fine Sandy SILT (SM to SM-ML)

* It is noted that the fill material and natural soils below a depth of 5 feet appeared firm and stable based on the resistance to penetration of the backhoe bucket. Actual density testing was not performed below a depth of five feet because of the small excavation and personnel safety issues. It is also noted that the test pit

excavation was dry indicating that the core material and key trench is relatively impermeable and performing satisfactorily. The density test results are based on Standard Proctor values associated with CBR testing for the subdivision roadway development.

Composite soil samples obtained from the test pit were returned to our Richmond laboratory for classification type testing. This testing generally included moisture content evaluation and Percent Passing the No. 200 Sieve analysis. Results of this testing are included in the following table:

Depth (feet)	Moisture Content, %	Liquid Limit	Plasticity Index	Percent Passing the No. 200 Sieve (Silt and Clay)	USCS Symbol
0.5-5.0	17.4	Not Tested	Not Tested	39.5	SM
5.0-8.0	17.9	Not Tested	Not Tested	58.0	CL

Based on the results of the test pit and visual examination of the dam embankment, it is ECS, Ltd.'s professional opinion that the dam was constructed in general accordance with the project drawings and specifications by AES, the ECS letter dated March 31, 1998 (regarding construction of the key trench), and/or in accordance with generally accepted engineering construction practices for a dam of this size and type. It is noted, however, that this conclusion is based solely on the test pit and field data collected after construction of the dam.

ECS, Ltd. has appreciated the opportunity to be of service to you on this project and request that you call us should you have any questions or need further assistance.

Respectfully,

ENGINEERING CONSULTING SERVICES, LTD.

David E. Stinnette, P.E.
Engineering Services Manager

Copies: (1) Toano Contractors (Bill Taylor)
(1) AES Consulting Engineers (Steve Wigley)

Fieldserv/letter/r3599a.doc

ECS, Ltd.
Engineering Consulting Services, Ltd.
2119-D North Hamilton Street
Richmond, VA 23230
Phone: (804)353-6333
Fax #: (804)353-9478

MATERIALS ENGINEERING DIVISION
FIELD REPORT

Project No. R3599A

Project The Meadows Section V Day/Date Tuesday 06/02/98

Location James City County Weather/Temp Clear /90 °

Contractor Toano Contractors Client Meadows II - Ltd Partnership

Equipment $ 0.00 Arrive Job 13:00 Depart Job 14:15

Tolls $ 0.00 Total Hours on Job 1.25

Travel Chg$ 0.00 Laboratory Time 0.50

Mileage 4 Travel Time 0.25

TOTAL CHARGEABLE HOURS 2.00

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 compaction of an earth dam behind a retaining pond. Test were taken at the existing grade and every 2 feet undercut from that.

According to ASTM test methods the material met the project requirements of 95% relative compaction and appeared to look very good.

By Jason Quinter

REPORT # 1

ECS, Ltd.
Engineering Consulting Services, Ltd.
2119-D North Hamilton Street
Richmond, VA 23230
Phone: (804)353-6333
Fax #: (804)353-9478

MATERIALS ENGINEERING DIVISION
FIELD REPORT

Project No. R3599A

Project The Meadows Section V Day/Date Friday 06/12/98

Location James City County Weather/Temp Overcast/ °

Contractor Toano Contractors Client Meadows II - Ltd Partnership

Equipment $ 0.00 Arrive Job 09:30 Depart Job 10:30

Tolls $ 0.00 Total Hours on Job 1.00

Travel Chg$ 0.00 Laboratory Time 0.50

Mileage 2 Travel Time 0.25

TOTAL CHARGEABLE HOURS 1.75

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 soils within dam key.

Utilizing the Nuclear Method (ASTM D-2922) density tests were performed at 2', 3.5', 5' within dam core.

Please see David Stinnette's report of the same date for more information to specifications.

1	2	3	
20.70	24.00	24.00	
132.40	130.20	133.90	(WET DENSITY)
111.60	106.20	109.90	(DRY DENSITY)
18.58	22.60	21.82	(MOISTURE CONTENT)
2'	3.5'	5'	(DEPTH)
115.9 pcf	115.9 pcf	115.9 pcf	(PROCTOR, γ_d)

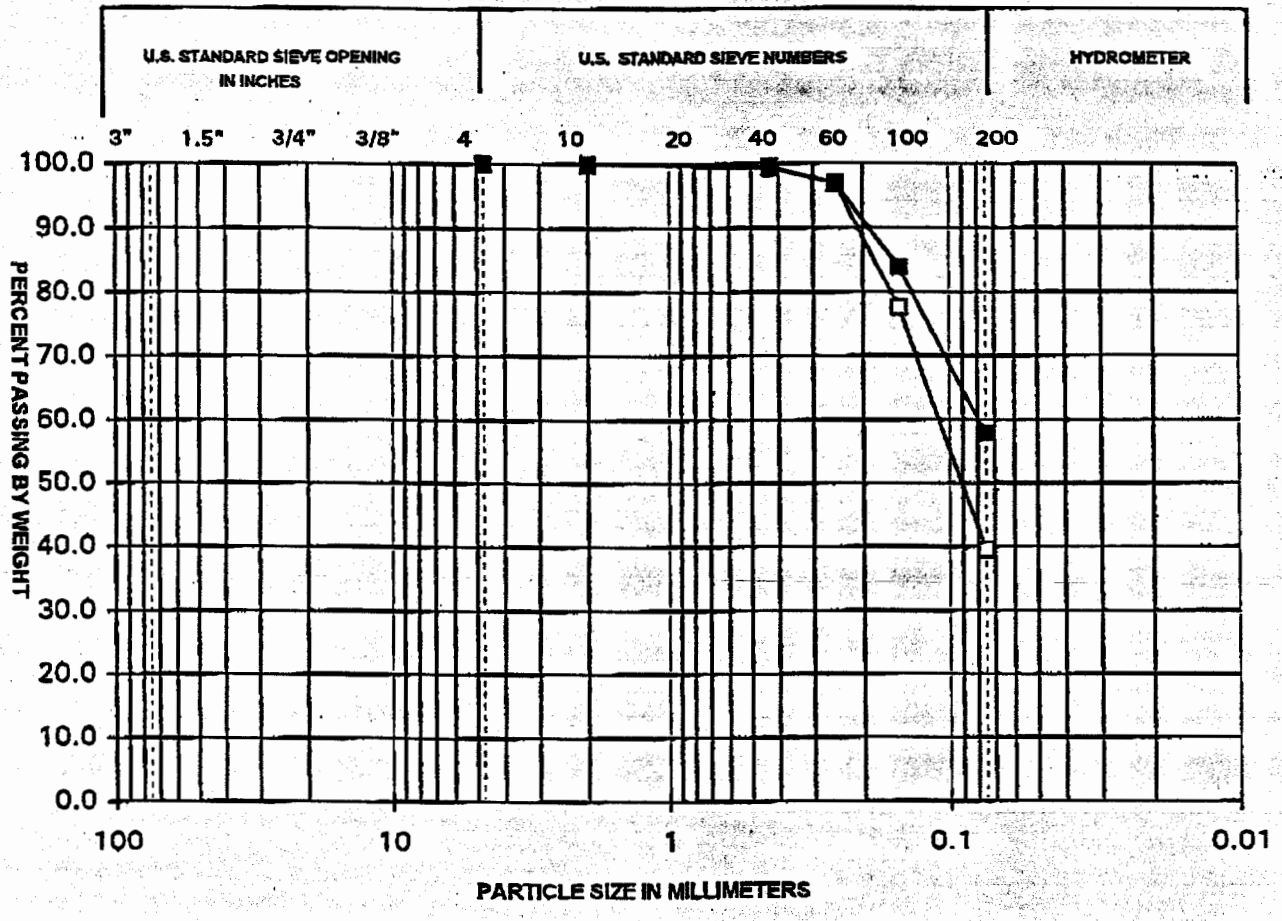
By Jennifer Bliskis

REPORT # 2

3831 00000 1B

Meadows II HOA
426 Airport Road
Wmsb 23188
Common Space S-5

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Boring/ Sample No.	Depth (feet)	Symbol	LL	PI	Description
* / TP-1	0.0 - 5.0	□	-	-	EARTH DAM FILL
* / TP-2	5.0 - 8.0	■	-	-	EARTH DAM FILL
/		△			
/		▲			

Project: Meadows Dam Section V
Project No.: R3599A

Date: 6/16/98

Engineering Consulting Services, Ltd
Richmond, Virginia
Particle Size Distribution Curves


MC031
MC042
MC043
Meadows Subdivision
Scale: 1 inch = 500 feet (approx.)

MC043_THE_MEADOWS_WET_POND_SECTION_V - 020

From this point forward the file is not certified. The list below details the documents that have been added to the file, the person that added the documents and the date they were added.

Name	Content	Date
Jo Anna Ripley	The Meadows Section 5 as-builts (updated in 2000) by AES	6/21/2013
Jo Anna Ripley	The Meadows Section 5 Stormwater Management BMP Design Calculations by AES	6/21/2013

No.	DATE	REVISION / COMMENT / NOTE	BY
7	2/28/00	UPDATED RECORD DWG PER FINAL DAM CONSTRUCTION	DPW
6	10/22/99	ADDITIONAL RECORD INFO PER AGC	DPW
5	4/23/98	ADDED POND RECORD DRAWING INFORMATION	DPW
4	1/15/98	REVISED PER AGC COMMENTS TO ADD SIDEWALK	SOW
3	11/7/97	REVISED SANITARY LAYOUT PER DEVELOPER	DPW
2	11/7/97	REVISED PER AGC 10/20/97 COMMENT LETTER	DPW
1	8/97	REVISED PER AGC 4/22/97 COMMENT LETTER	DPW

5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
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CONSULTING ENGINEERS

COMMONWEALTH OF VIRGINIA
STEVEN O. WIGHT
No. 019307
11/13/98
PROFESSIONAL ENGINEER

PROVIDE 45' LONG x 1.5' DEEP APRON OF CLASS A1 RIP-RAP OVER FILTER FABRIC. APRON TO EXTEND UP CHANNEL SIDES TO TOP OF BANK. (APPROX. 15 CY REQ'D.)

ES 1 END SECTION INV.=61.5/61.54

EXISTING 30' DRAINAGE & UTILITY ESMT.

N/F C. TYLER, III & CHERYL R. BROOKS (38-3)(04-0-0045)

LIMITS OF CLEARING (TYP)

200 LF OF 18" RCP @ 0.5% (INCLUDES ES-1 END SECTION)

SECT. ONE P.B. 260, PG. 841

N/F STEPHEN E. & HOLLY KUNN (38-3)(04-0-0046)

EMERGENCY SPILLWAY CONCRETE LINED TRAPEZOIDAL SECTION W/ 2:1 SS, 10' BOTTOM, 3.4' DEEP AVERAGE SLOPE =10% CONTROL SECTION EL.=65.6/68.9

N/F JOSEPH R. & BONNIE M. BROWN (38-3)(04-0-0047)

48" RCP RISER W/ ANTI VORTEX DEVICE TOP OF RISER=66.5/66.46 TOP OF BASE=62.5 INV. 18" RCP=62.5/62.39 ALL JOINTS TO BE WATERTIGHT (SEE DETAIL SHEET 7)

N/F ELLA V. VOGLEWEDE (38-3)(04-0-0048)

BASIN SLOPES TO BE SEEDED IN ACCORDANCE W/ VESCH STANDARDS. SHOULD SLOPES CONTINUE TO ERODE, EC-2 MATTING SHALL BE APPLIED AS REQ'D.

TIE INTO EXISTING GRADES AS SHOWN

N/F SEAN C. MAISEY (38-3)(04-0-0049)

WET POND NORMAL POOL EL. 66.5

10 LF OF 8" DIP INV.=62.5/62.39

152 LF OF 15" RCP @ 0.53%

173 LF OF 18" RCP @ 0.53% (INCLUDES ES-1 END SECTION)

SS #1-1 INV.=63.5

SS #1-2 STORM MH STA. 14+78 RIM=84.70 INV.=74.80

SS #1-3 STA. 14+00 DI-3A RIM=84.75 INV.=76.75

75 LF OF 15" RCP @ 2.60%

30 LF OF 15" RCP @ 0.83%

150 LF OF 15" RCP @ 1.60%

SS #1-4 STA. 14+00 DI-3C, L=6' RIM=84.75 INV. =77.00

30 LF OF 15" RCP @ 1.00%

SS #1-5 STA. 13+70 DI-3B, L=8' RIM=84.72 INV. =77.30

SS #1-6 STA. 12+22 DI-3B, L=6' RIM=85.27 INV.=78.80

56 LF OF 18" RCP @ 1.0% (INCLUDES 2 ES-1 END SECTIONS) INV. IN=79.06 INV. OUT=78.5

120 LF± OF EXISTING CHANNEL TO BE LINED WITH TYPE II RIP RAP OVER FILTER FABRIC (APPROX. 27 CY REQ'D)

BEGINNING OF EX. PAVED DITCH INV.=77.46

32" WHITE OAK TBM

REGRADE 104 LF OF EXIST. DITCH @ 1.0% TIE INTO EXIST. DITCH @ INV.=77.46 (INCLUDES PAVED SECTION)

TEMPORARY SOIL STOCKPILE AND EQUIPMENT STORAGE AREA (LOT 5)

PAVED FLOW TRANSITION (EXTEND CONC. SECTION TO INV. OF 18" RCP)

SECT. ONE P.B. 260, PG. 841

N/F VAN KNIEST, INC. (38-3)(01-0-0017B)

N/F JAMES E. GATLING, JR. (38-3)(01-0-0017A)

SECT. ONE 260 LF± PAVED "V" DITCH (SEE DETAIL, SHEET 7)

EX. MH RIM=63.03 EX. INV. OUT=55.53

PROVIDE 6' LONG x 1.0' DEEP APRON OF CLASS A1 RIP-RAP OVER FILTER FABRIC. APRON TO EXTEND UP CHANNEL SIDES TO TOP OF BANK. (APPROX. 1 CY REQ'D.)

5' DRAINAGE EASEMENT TO BE CONVEYED TO HOME OWNERS ASSOCIATION

N/F ROBERT A. & CAROL GOETTER (38-3)(06-0-0032)

SECT. THREE P.B. 260, PG. 841

N/F TOMMY & VIOLA WILLIAMS (38-3)(06-0-0033)

N/F BETTY M. SMITH (38-3)(06-0-0006)

EX. SAN MH EX. RIM=83.08 EX. INV. IN=75.28 EX. INV. OUT=75.23

N/F PETER E. & SUSANA PRIDON (38-3)(06-0-0005)

SECT. THREE P.B. 42, PG. 86

N/F R. HEATHER MAC DONALD (38-3)(06-0-0004)

APPROXIMATE C/L OF VEPCO R/W OF UNSPECIFIED WIDTH

N/F KENNETH G. PANKEY, JR. & LESLIE L. TRAY (38-3)(06-0-0003)

TBM SPIKE IN 22" MAPLE EL.=90.19

EX. SAN MH EX. RIM=85.94 EX. INV. IN=79.80 EX. INV. OUT=79.72 (MH#1)

N/F JINGLIAN LI (38-3)(06-0-0002)

N/F DAN W. WILLIAMS, JR. & PAMELA A. BRAKE (38-3)(06-0-0001)

N/F SASHA L. DIGGES & MARY KATHERINE KNOTT (38-3)(01-0-0018)

N/F VAN KNIEST, INC. (38-3)(01-0-0017B) NATURAL OPEN SPACE

10' PEDESTRIAN EASEMENT

8 L.F. OF 12" RCP IF DEEMED NECESSARY

23 L.F. OF 12" RCP IF DEEMED NECESSARY

OLD FIELD ROAD 60' R/W

IRONBOUND ROAD RTE. 615 VARIABLE R/W SPEED LIMIT 45 MPH

LOT 1 LOT 2 LOT 3 LOT 4 LOT 5 LOT 10 LOT 11 LOT 12 LOT 13 LOT 14 LOT 15 LOT 16 LOT 17 LOT 18 LOT 20 LOT 21 LOT 22 LOT 23 LOT 24 LOT 25 LOT 26 LOT 27 LOT 28 LOT 29 LOT 30 LOT 31 LOT 32 LOT 33 LOT 34 LOT 35 LOT 36

2.30 AC. 1.60 AC. 0.22 AC. 0.12 AC. 0.54 AC. 0.72 AC. 0.42 AC. 2.31 AC. 0.02 AC. 0.22 AC. 0.06 AC. 0.07 AC. 0.13 AC. 0.29 AC. 5.10 AC. 0.80 AC. 4.10 AC. 0.32 AC. 0.46 AC. 0.45 AC. 1.38 AC. 1.76 AC. 0.32 AC.

RECORD DRAWING INFORMATION AS FIELD VERIFIED BY AES CONSULTING ENGINEERS ON 2/10/2000

UPDATED-2/28/2000
AS BUILT - 10/22/99

NOTE:
CONTRACTOR TO ENSURE CONSTRUCTION OF DETENTION BASIN AND DAM STRUCTURE ARE CERTIFIED BY A PROFESSIONAL ENGINEER WHO INSPECTS STRUCTURE DURING CONSTRUCTION. CONTRACTOR SHALL ALSO ENSURE AS-BUILT DRAWINGS ARE PREPARED UPON COMPLETION OF BASIN AND DAM STRUCTURE.

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

DRAINAGE, GRADING, EROSION AND SEDIMENT CONTROL PLAN

THE MEADOWS

SECTION V

OWNER/DEVELOPER: VAN KNIEST, INC.

BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
SOW/DPW	KEG
Scale	Date
1"=50'	3/3/97
Project No.	
7820-5	
Drawing No.	
3 OF 7	

03.01.00-10:07 2205r03.dwg

DPW

SWM/ BMP DESIGN
FOR
THE MEADOWS - SECTION V

(REVISED 8-97)

AES PROJECT # 7820-5

PREPARED BY:

AES CONSULTING ENGINEERS
5248 OLDE TOWNE ROAD, SUITE 1
WILLIAMSBURG, VIRGINIA 23188

MARCH 1997

SECTION IV, PHASE I WET POND REVISIONS

Revisions to the Phase II plans required an additional 3.05 acres be directed to the existing Phase I wet pond. When the original calculations for this pond were checked for adequacy, the pond was found to be capable of managing the required Chesapeake Bay water quality volume. Unfortunately, the existing pond would not hydraulically control drainage flow. Modifications to the existing pond configuration are proposed in conjunction with the Phase III development. The pond will be excavated at the elevations above existing normal pool such that the desired flow routing is achieved. Please see the drainage and erosion control sheet (4) for the grading details.

Post-Development Conditions
(TR-55/ SCS Method)

Total DA = 30.62 AC

Determine weighted runoff curve number, CN:

Description	CN	Area, AC	CN*Area
ROW	91	4.97	452.3
Single Fam Res. Lots	80	23.80	1904.0
Open Space	74	1.85	136.9
		30.62	2493.2

CN (weighted) = 2493.2/ 30.62 ≅ 81

Determine required volume for normal pool, V_r:

BMP/ SWM wet pond, design 7 (9 points, 50% removal rate)

V_r = 4(0.5"/ AC)(DA)(R_v)

where: R_v = runoff coefficient = 0.05 + 0.009(% impervious)

Determine % impervious:

Single Family Residential Lots = (23.8)(0.30) = 7.14 AC
Right of Way = (4.97)(0.70) = 3.47 AC
10.61 AC

Total % imp for site = 10.61/ 30.62 = 34%

R_v = 0.05 + 0.009(34) = 0.356

V_r = 4(0.5"/AC)(1'/12")(30.62 AC)(43,560 SF/AC)(0.356) = 76,139 CF

Water Quality elevation for this volume is achieved at EL 73.0
(from stage/ storage table)
∴ Existing Normal Pool El 73.0 **DOES NOT CHANGE**

Determine Stormwater Management Control Requirements:

Additional storage at the elevations at and above Normal Pool (73.0) will allow the pond riser structure to control the 2 year and 10 year storms below the pre-development rates. The following list details the volume added through excavation to each elevation:

ELEV	ORIGINAL STORAGE	PROPOSED STORAGE	INCREASE
73.0	22985 CF	23585 CF	600 CF
74.0	25230 CF	28093 CF	2863 CF
76.0	33935 CF	36664 CF	2729 CF
78.0	45221 CF	47206 CF	1985 CF

Total additional storage = 8177 CF

The calculations are located in the Appendix and detail the storage and routing pond configurations, as well as list the pre-development and post development discharge rates. The existing riser, top of dam, and emergency spillway elevations do not change.

PROPOSED WET POND CALCULATIONS

The revised overall BMP/ SWM plan for The Meadows subdivisions designates the following portions of the site as contributing areas of the proposed wet pond. Please note that the existing portion of Section I listed was not included as part of the overall point calculation.

- Section IV - Phase III (future development) - 21.80 acres
- Section V - 18.84 acres (portions thereof and including previously platted Lot 3)
- Section I - 1.82 acres
- Old Field Road ROW and Ironbound Road ROW - 1.4 acres

The proposed wet pond will discharge to an existing stream which winds through existing portions of The Meadows subdivision to Mill Creek. Post-development discharge will be held below the present discharge. (See sheet 3: "Drainage, Grading, Erosion and Sediment Control Plan" for delineation of drainage areas.)

Pre-Development Conditions
(TR-55/ SCS Method)
For pre-development calculations, the Section V, Old Field Road ROW, and Ironbound Road ROW areas of 20.24 acres (total) are divided as listed below:

- 2.31 AC included in Section IV - Phase III total of 21.8 AC
- 1.15 AC discharges to ditch along Old Field Road
- 16.78 AC subdivided as listed below:
  - 7.00 AC discharges to ditch along Old Field Road
  - 2.95 AC discharges to existing stream south of proposed wet pond
  - 0.32 AC discharges to ditch along Ironbound Road
  - 6.51 AC discharges to wet pond area via pipe, ditch, or overland flow

The calculations for the ditches along Old Field Road and Ironbound Road were previously completed for submittal with Section I and Section III development plans. These calculations accounted for development of Section V, and were approved with those plans. Therefore, they will not be reproduced as part of the Section V submittal.

Total DA = 6.51 + 21.80 + 1.82 = 30.13 AC (draining to proposed pond site)

Determine weighted runoff curve number, CN:

Soil Type	Soil Group	Description	CN	Area, AC	CN*Area
Craven-Uchee complex	C	non-wooded	79	2.82	222.78
Emporia	B	wooded	65	19.51	1268.15
Emporia complex	D	wooded	82	2.30	188.60
Kempsville-Emporia	B	non-wooded	69	5.10	351.90
Slagle	B	non-wooded	69	0.40	27.60
				30.13	2059.03

CN (weighted) = 2059.03/ 30.13 ≅ 68

Post-Development Conditions

(TR-55/ SCS Method)

For post-development calculations, the Section V, Old Field Road ROW, and Ironbound Road ROW areas of 20.24 acres (total) are divided as listed below:

- 2.31 AC included in Section IV - Phase III total of 21.8 AC
- 1.15 AC will discharge to ditch along Old Field Road
- 16.78 AC subdivided as listed below:
  - 7.00 AC will discharge to ditch along Old Field Road
  - 2.30 AC will discharge to existing stream south of proposed wet pond
  - 0.32 AC will discharge to ditch along Ironbound Road
  - 7.16 AC will discharge to wet pond via pipe, ditch, or overland flow

Total DA = 7.16 + 21.80 + 1.82 = 30.78 AC (draining to BMP)

Determine weighted runoff curve number, CN:

Soil Group	Description	CN	Area, AC	CN*Area
B	ROW	98	3.55	347.90
B	Single Fam Res. Lots	72	20.96	1509.12
B	Open Space	69	1.15	79.35
C	ROW	98	0.25	24.50
C	Single Fam Res. Lots	81	0.16	12.96
C	Open Space	79	2.41	190.39
D	ROW	98	0.22	21.56
D	Single Fam Res. Lots	86	1.60	137.60
D	Open Space	84	0.48	40.32
			30.78	2363.70

CN (weighted) = 2363.70/ 30.78 $\cong$ 77

Determine required volume for normal pool, V_r:

BMP/ SWM wet pond, design 7 (9 points, 50% removal rate)

V_r = 4(0.5"/ AC)(DA)(R_v)

where: R_v = runoff coefficient = 0.05 + 0.009(% impervious)

Determine % impervious:

Single Family Residential Lots = (22.72)(0.30)		= 6.82 AC
Right of Way	= (4.02)(0.70)	= 2.81 AC
		9.63 AC
Total % imp for site	= 9.63/ 30.78	= 31%

R_v = 0.05 + 0.009(31) = 0.33

V_r = 4(0.5"/AC)(1'/12")(30.78 AC)(43,560 SF/AC)(0.33) = 73,742 CF

Minimum normal pool elevation = EL 66.4
(from stage/ storage table)
∴ set Normal Pool elev = EL 66.5 (available storage = 74,603 CF)

Stormwater Management Calculations

2 yr pre-development: 29 CFS
2 yr post-development: 55 CFS

Post-development runoff from 2 year storm event is contained within proposed wet pond and is released at a rate of 19.4 CFS, which is significantly below the pre-development rate. The 10 year storm event is not contained below the emergency spillway elevation of 68.6. Therefore, the emergency spillway and drainage channel shall be paved.

Emergency Spillway Design

Assume a trapezoidal section with bottom width = 10'; 2:1 side slopes; depth = 3.4'; 10.0% slope
Set invert of channel at EL 68.6.

Max elevation for 100 yr storm event = EL 71.3
At EL 71.3, Q_{100} = 134.5 CFS over the spillway

Using the channel charts, the depth of flow, d, through the spillway channel = 0.8'
∴ assumed channel section is acceptable

Anti-seep Collar Design

L_s = Y (Z + 4) (1 + S/(0.25 - S))

where: L_s = length of barrel in saturated zone (FT)
Y = depth of water at principal spillway crest (FT) = 4'
Z = slope of upstream embankment face (FT/FT) = 2
S = slope of barrel (FT/FT) = 0.005

L_s ≅ 24.5 FT

Using Plate 3.14-12 (VESCH): 2 collars @ 2.75' x 2.75'

Spacing of collars = 14 (Projection of collar above barrel) = 14 (0.625) ≅ 8.75 FT

Riser Pipe Base Design

Embankment height is less than 10', therefore a concrete base may be used. This base shall be sized in accordance with Plate 13.14-14 (VESCH). Dimensions are shown as part of the dam detail on sheet 6 of 6.

TEMPORARY SEDIMENT BASIN CALCULATIONS

Permanent wet pond shall be used as temporary sediment basin during construction activities. The temporary basin shall be sized for the Phase 3 contributing area, disturbed and undisturbed, of 18.8 acres. The VESCH form may be found in the Appendix.

Determine storage volume required by basin, V_{basin}:

V_{basin} = 18.8 AC (134 CY/ AC) = 1260 CY = 34,020 CF

Wet storage volume of 36,519 CF is achieved at EL 64.0 and total storage is achieved by EL 66.5. The sediment clean out point occurs at EL 62.5. The elevation of proposed principle spillway is 66.5.

Determine the dewatering orifice size, d_{orf}:

Q = S/ 21,600 sec = 1.76 CFS

where: Q = discharge through orifice (CFS)
S = total storage available for dry storage (CF) = 38,084 CF

A = $Q/ \{(64.32*h/2)^{0.5} * 0.6\}$ = 0.42 FT^2

where: A = flow area of orifice (FT^2)
h = average head (FT) = 1.5 FT

d_{orf} = $2 * (A/3.14)^{0.5}$ = 0.73 FT $\cong$ 8.8 IN $\therefore$ Use 10 IN

Flexible tubing shall be 12 IN diameter. A detail of the dewatering system appears on sheet 7 of 7 as part of the dam detail.

APPENDIX

- BMP point tabulation sheet (revised)
- Section V Storm sewer calculations (revised)
- Stormwater inlet calculations (no revisions)
- Culvert calculations (no revision)
- Existing wet pond calculations (revised)
- Proposed wet pond calculations (no revision)
- Temporary sediment basin design form (revised)
- Miscellaneous revision calculations

BMP Point Tabulation Sheet

THE MEADOWS
BMP POINT SYSTEM
(revised 8-97)

Total area to be developed:

Section IV	= 50.19 AC (includes 2.31 AC of Section V)
Section V	= 16.53 AC
Total Area	= 66.72 AC

Area divided for BMP service:

30.22 AC	served by existing wet pond	9 points
4.04 AC	served by dry pond (in review)	6 points
30.78 AC	served by proposed wet pond	9 points

Area not served by BMP system:

The portions of Sections IV and V not served by the BMP system are either Natural Open Space or drain to Mill Creek via existing roadside ditches. The roadside ditches wind through the existing Sections I and III before discharging into Mill Creek.

Structural BMP points:

30.22/66.72 (9) + 4.04/66.72 (6) + 30.78/66.72 (9) = 8.59 points

Area to be Natural Open Space:

Section IV	= 10.79 AC (areas taken from Phase I, II, and III development plans)
Section V	= 2.26 AC (area taken from revision to Section V development plans)
Total	= 13.05 AC

Natural Open Space points:

13.05/66.72 = 0.195 or 19.5%; 19.5(0.1) = 1.95 points

Total Points:

8.59 + 1.95 = 10.54 points ∴ Overall BMP plan is acceptable

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Section V Storm Sewer Calculations

STORM SEWER DESIGN / ANALYSIS

Return Period = 10 Yrs
Rainfall file: jcc

Run Date: 06-12-1997
File: 7820-SR.ST3

LINE 1 / Q = 7.39 / HT = 18 / WID = 18 / N = .013 / L = 173 / JLC = 1.1

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

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	70.10	18.00	63.50	4.18	70.37	0.00	-4	1.77
UPSTRM	75.54	12.44	74.50	5.67	76.04	16.63	8.69	1.30

Drainage area (ac)	= 0.00	Slope of invert (%)	= 6.3584
Runoff coefficient	= 0.00	Slope energy grade line (%)	= 3.2742
Time of conc (min)	= 11.61	Critical depth (in)	= 12.44
Inlet time (min)	= 0.00	Natural ground elev. (ft)	= 84.70
Intensity (in/hr)	= 5.51	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 1.34	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 7.39	Line capacity (cfs)	= 26.48
Q catchment (cfs)	= 0.00	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 2.41	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 2.41	Ponding width (ft)	= N/A

LINE 2 / Q = 5.24 / HT = 15 / WID = 15 / N = .013 / L = 75 / JLC = 1

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

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	76.09	15.00	74.50	4.27	76.37	0.00	8.94	1.23
UPSTRM	76.92	10.99	76.00	5.44	77.38	13.28	7.5	0.96

Drainage area (ac)	= 0.08	Slope of invert (%)	= 2.0000
Runoff coefficient	= 0.90	Slope energy grade line (%)	= 1.3419
Time of conc (min)	= 11.35	Critical depth (in)	= 10.99
Inlet time (min)	= 5.00	Natural ground elev. (ft)	= 84.75
Intensity (in/hr)	= 5.56	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 0.94	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 5.24	Line capacity (cfs)	= 9.13
Q catchment (cfs)	= 0.50	Inlet length (ft)	= 2.50
Q carryover (cfs)	= 1.62	Gutter slope (ft/ft)	= 0.0010
Q captured (cfs)	= 0.62	Cross slope (ft/ft)	= 0.0203
Q bypassed (cfs)	= 1.51	Ponding width (ft)	= N/A

STORM SEWER DESIGN / ANALYSIS

Return Period = 10 Yrs
Rainfall file: jcc

Run Date: 06-12-1997
File: 7820-5R.ST3

LINE 3 / Q = 4.86 / HT = 15 / WID = 15 / N = .013 / L = 30 / JLC = 1

SS#1-3 - SS#1-4 / DNLN = 2

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	77.38	15.00	76.00	3.96	77.62	0.00	7.5	1.23
UPSTRM	77.48	10.58	76.60	5.25	77.91	13.68	6.9	0.93

Drainage area (ac)	= 0.51	Slope of invert (%)	= 2.0000
Runoff coefficient	= 0.44	Slope energy grade line (%)	= 0.9703
Time of conc (min)	= 11.25	Critical depth (in)	= 10.58
Inlet time (min)	= 7.00	Natural ground elev. (ft)	= 84.75
Intensity (in/hr)	= 5.58	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 0.87	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 4.86	Line capacity (cfs)	= 9.13
Q catchment (cfs)	= 1.45	Inlet length (ft)	= 6.00
Q carryover (cfs)	= 2.00	Gutter slope (ft/ft)	= 0.0010
Q captured (cfs)	= 1.82	Cross slope (ft/ft)	= 0.0208
Q bypassed (cfs)	= 1.62	Ponding width (ft)	= N/A

LINE 4 / Q = 3.62 / HT = 15 / WID = 15 / N = .013 / L = 30 / JLC = 1

SS#1-4 - SS#1-5 / DNLN = 3

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	77.91	15.00	76.60	2.95	78.04	0.00	6.9	1.23
UPSTRM	77.96	9.14	77.20	4.63	78.29	14.64	6.27	0.78

Drainage area (ac)	= 0.80	Slope of invert (%)	= 2.0000
Runoff coefficient	= 0.51	Slope energy grade line (%)	= 0.8292
Time of conc (min)	= 11.11	Critical depth (in)	= 9.14
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 84.72
Intensity (in/hr)	= 5.60	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 0.65	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 3.62	Line capacity (cfs)	= 9.13
Q catchment (cfs)	= 2.37	Inlet length (ft)	= 6.00
Q carryover (cfs)	= 0.82	Gutter slope (ft/ft)	= 0.0110
Q captured (cfs)	= 1.19	Cross slope (ft/ft)	= 0.0200
Q bypassed (cfs)	= 2.00	Ponding width (ft)	= N/A

LINE 5 / Q = 1.38 / HT = 15 / WID = 15 / N = .013 / L = 150 / JLC = .9

SS#1-5 - SS#1-6 / DNLN = 4

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	78.29	13.12	77.20	1.22	78.32	14.03	6.27	1.14
UPSTRM	81.89	5.65	81.27	3.27	82.06	14.54	2.75	0.42

Drainage area (ac)	= 0.45	Slope of invert (%)	= 2.7133
Runoff coefficient	= 0.53	Slope energy grade line (%)	= 2.4957
Time of conc (min)	= 10.00	Critical depth (in)	= 5.65
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 85.27
Intensity (in/hr)	= 5.81	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 0.24	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 1.38	Line capacity (cfs)	= 10.64
Q catchment (cfs)	= 1.38	Inlet length (ft)	= 6.00
Q carryover (cfs)	= 0.00	Gutter slope (ft/ft)	= 0.0100
Q captured (cfs)	= 0.56	Cross slope (ft/ft)	= 0.0208
Q bypassed (cfs)	= 0.82	Ponding width (ft)	= N/A

LINE 6 / Q = 2.30 / HT = 15 / WID = 15 / N = .013 / L = 152 / JLC = .9

SS#1-7 - SS#1-2 / DNLN = 1

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	76.09	15.00	74.50	1.88	76.14	0.00	8.94	1.23
UPSTRM	76.41	9.58	75.50	2.78	76.53	14.41	2.84	0.83

Drainage area (ac)	= 0.65	Slope of invert (%)	= 0.6579
Runoff coefficient	= 0.61	Slope energy grade line (%)	= 0.1032
Time of conc (min)	= 10.00	Critical depth (in)	= 7.28
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 79.60
Intensity (in/hr)	= 5.81	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 0.40	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 2.30	Line capacity (cfs)	= 5.24
Q catchment (cfs)	= 2.30	Inlet length (ft)	= 6.00
Q carryover (cfs)	= 0.00	Gutter slope (ft/ft)	= 0.0010
Q captured (cfs)	= 1.40	Cross slope (ft/ft)	= 0.0208
Q bypassed (cfs)	= 0.91	Ponding width (ft)	= N/A

Stormwater Inlet Calculations

STORM WATER INLET COMPUTATIONS

FORM LD 204
REV 6-85

RTE ROADS A & B

PROJECT NAME THE MEADOWS - SECT I

DATE 10-13-97

AES PROJ # 7820-5

	INLET NUMBER	INLET TYPE	INLET LENGTH (FT)	STATION	DRAINAGE AREA (AC)	C	CA	I (IN/HR)	Q INCR (CFS)	Q CARRY OVER (CFS)	Qt GUTTER FLOW (CFS)	S GUTTER SLOPE (FT/FT)	Sx CROSS SLOPE (FT/FT)	T SPREAD	W (FT)	W/ T	Sw (FT/FT)	Sw/ Sx	Eo (#10)	a	Sw = a/ 12W	Se = Sx+SwEo (FT/FT)	Lt (FT)	P EFFECT (FT)	L/ Lt	d (FT)	E (#16)	h (FT)	Q: INTRCPT (CFS)	d/ h	Qb: CARRY OVER (CFS)
				ROADS	A & B																										
GRADE	3	B	8	13+70	0.80	.51	.41	3.5	1.43	—	1.43	.011	.0208	6.3	2	.32	.0833	4.0	0.8	3.5	.1458	.14	7.9 ✓							
				ROAD A																											
SUMP	3	A	2.5	14+00	0.29	.43	.12	3.5	.42	—	.42	.001	.0208	6.5 ✓																	
				RT (N)																											
SUMP	3	A	2.5	14+00	0.22	.44	.10	3.5	.35	—	.35	.001	.0208	5.4 ✓																	
				RT (S)																											
				TOTAL							.77	.001	.0208				.0833						6.1	.15	.27	.55			7.2'	
	3	C	6	TOTAL							.77	.001	.0208				.0833						9.6	.11	.27	.41			5.3' <	
SUMP	3	A	2.5	14+00	0.06	0.9	.05	3.5	.18	—	.18	.001	.0208	4.0 ✓																	
				LF (N)																											
	3	A	2.5	14+00	0.02	0.9	.02	3.5	.07	—	.07	.001	.0208	2.8 ✓																	
				LF (S)																											
				TOTAL							.25	.001	.0208				.0833						10.1	.10	.27	.37			4.8' <	
SUMP * CUL-DE-SAC	3	C	6	16+35	0.53	.55	.29	3.5	1.02	—	1.02	.001	.0208	9.9 ✓																	
				RT																											
	3	C	6	16+35	0.12	0.9	.11	3.5	.38	—	.38	.001	.0208	16.2 ✓																	
				LF																											
				TOTAL							1.40	.001	.0208				.0833						9.6	.17	.27	.63			8.2' <	

STORM WATER INLET COMPUTATIONS

FORM LD 204
REV 6-85

RTE ROADS A&B

PROJECT NAME THE MEADOWS-SECT II

DATE 10-11-97
AES PROJ # 7820-5

	INLET																														
	NUMBER	TYPE	LENGTH (FT)	STATION	DRAINAGE AREA (AC)	C	CA	I (IN/HR)	Q INCR (CFS)	Q CARRY OVER (CFS)	Qt GUTTER FLOW (CFS)	S GUTTER SLOPE (FT/FT)	Sx CROSS SLOPE (FT/FT)	T SPREAD	W (FT)	W/ T	Sw (FT/FT)	Sw/ Sx	Eo (#10)	a	Sw = a/ 12W	Se = Sx+SwEo (FT/FT)	Lt (FT)	P EFFECT (FT)	L/ Lt	d (FT)	E (#16)	h (FT)	Q: INTRCPT (CFS)	d/ h	Qb: CARRY OVER (CFS)
				ROAD B																											
GRADE				10+20 (RT)	0.32	0.67	.213	3.5	.74	—	.74	.0191	.0208	(3.8)✓																	
GRADE				10+20 (LF)	0.21	0.71	.149	3.5	.52	—	.52	.0191	.0208	(2.7)✓																	
GRADE				ROAD A																											
				11+25 (LF)	0.07	0.9	.063	3.5	.22	—	.22	.01	.0208	(1.6)✓																	
GRADE				10+00 (LF)	0.06	0.9	.054	3.5	.19	.22	.41	.0307	.0208	(1.7)✓																	
				ROAD A																											
GRADE				11+25 (RT)	.46	.48	.221	3.5	.77	—	.77	.01	.0208	(4.8)✓																	
GRADE				10+00 (RT)	.32	.49	.157	3.5	.55	.43	1.32	.0307	.0208	(4.3)✓																	
				ROADS A&B																											
GRADE	3	B	10	12+22	.45	.53	.238	3.5	.83	—	.83	.01	.0208	5.0	2	.40	.0833	4	.81	3.5	.1458	.14	6.14	.977	99.9	0.83					$Q_b = 0$

Culvert Calculations

LD-269
Rev 3-83

Project THE MEADOWS SECTION V — CULVERT #1

Plan Sheet No. 2 Designer DPW — Sheet 1 of 1

Rev. Date ____ Date 2-18-97

HYDROLOGICAL DATA:

D.A. = 2.16 AC.

$Q = C i A$

$C = 0.47$

$i_2 = 5.7$ in/hr

$i_{10} = 7$ in/hr

AHW Controls — STATION 10+ OLD MEADOWS ROAD

100 yr. Flood plain ____ elev. ____

Design AHW depth ____ elev. ____

Structures ____ elev. ____

freq. TW elev.

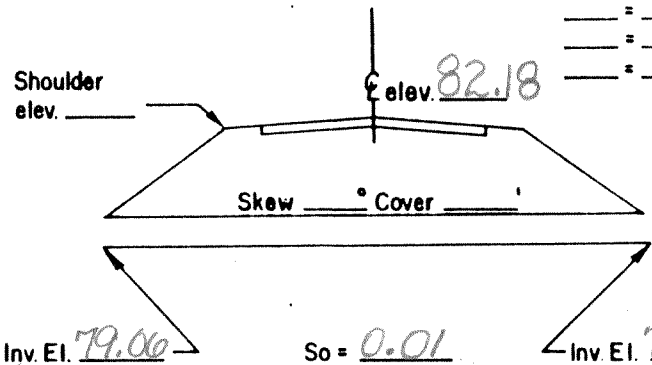
____ = ____

____ = ____

____ = ____

____ = ____

____ = ____



DISCHARGES USED

Q 2 = 5.79 CFS

Q 10 = 7.16 CFS

Q ____ = ____ CFS

Q ____ = ____ CFS

Q ____ = ____ CFS

RISK ASSESSMENT ADT ____

Detours Available ____ , Length ____

Overtopping Stage ____

Flood Plain Management ____

Criteria and Significant Impact ____

240 A

CULVERT TYPE & SIZE	Q	Q/B	HEADWATER COMPUTATIONS									CONT. HW. ELEV.	OUTLET VELOCITY		End Treat.	COMMENTS
			INLET CONT.		OUTLET CONTROL											
			HW/D	HW	Ke	dc	$\frac{dc+D}{2}$	ho	H	LSo	HW		C.M.	Smooth		
18" RCP	7.16	.	1.07	1.61	0.5	1.0	1.25	1.25	0.16	.56	1.29					INLET CONTROLS

Design Flood Exceed Prob. ____ Elev. ____

Overtop Flood Exceed Prob. ____ Elev ____

Base Flood 1% Exceed Prob ____ Elev ____

Existing Wet Pond Calculations

HYDROLOGIC REPORT

2 YR PRE DEVELOPMENT..
TO POND #1.....
.....

Hyd. No. 1

Hydrograph type	= S.C.S. RUNOFF	Peak discharge	= 7.34 cfs
Storm frequency	= 2 yr	Time interval	= 2 min
Basin area	= 4.1 ac	Basin curve No.	= 74
Ave basin slope	= 6 %	Hydraulic len	= 550 ft
Basin lag	= 9.0 min	Time of concen	= 15.00 min
Total precip.	= 3.80 in	Distribution	= S.C.S. II

HYDROGRAPH DISCHARGE TABLE

TIME--OUTFLOW (hrs cfs)	TIME--OUTFLOW (hrs cfs)	TIME--OUTFLOW (hrs cfs)	TIME--OUTFLOW (hrs cfs)
11.77 1.27	11.80 1.67	11.83 2.19	11.87 2.88
11.90 3.79	11.93 4.89	11.97 5.98	12.00 6.85
12.03 7.34	12.07 7.32	12.10 6.81	12.13 6.30
12.17 5.10	12.20 4.22	12.23 3.40	12.27 2.67
12.30 2.09	12.33 1.68	12.37 1.46	12.40 1.36
12.43 1.30	12.47 1.24	12.50 1.17	12.53 1.11
12.57 1.05	12.60 0.99	12.63 0.93	12.67 0.89

HYDROLOGIC REPORT

2 YR POST DEVELOPMENT.
TO POND #1.....
.....

Hyd. No. 2

Hydrograph type	= S.C.S. RUNOFF	Peak discharge	= 39.98 cfs
Storm frequency	= 2 yr	Time interval	= 2 min
Basin area	= 30.62 ac	Basin curve No.	= 81
Ave basin slope	= 1 %	Hydraulic len	= 1700 ft
Basin lag	= 28.2 min	Time of concen	= 47.16 min
Total precip.	= 3.80 in	Distribution	= S.C.S. II

HYDROGRAPH DISCHARGE TABLE

TIME--OUTFLOW (hrs cfs)	TIME--OUTFLOW (hrs cfs)	TIME--OUTFLOW (hrs cfs)	TIME--OUTFLOW (hrs cfs)
10.70 0.94	10.73 0.97	10.77 1.01	10.80 1.05
10.83 1.09	10.87 1.13	10.90 1.17	10.93 1.22
10.97 1.27	11.00 1.32	11.03 1.36	11.07 1.41
11.10 1.47	11.13 1.52	11.17 1.58	11.20 1.64
11.23 1.71	11.27 1.78	11.30 1.85	11.33 1.93
11.37 2.01	11.40 2.10	11.43 2.20	11.47 2.30
11.50 2.42	11.53 2.55	11.57 2.71	11.60 2.91
11.63 3.17	11.67 3.50	11.70 3.93	11.73 4.48
11.77 5.17	11.80 6.07	11.83 7.24	11.87 8.77
11.90 10.72	11.93 13.09	11.97 15.74	12.00 18.48
12.03 21.22	12.07 23.94	12.10 26.60	12.13 29.18
12.17 31.63	12.20 33.92	12.23 36.00	12.27 37.76
12.30 39.10	12.33 39.89	12.37 39.98	12.40 39.42
12.43 38.41	12.47 37.21	12.50 35.95	12.53 34.63
12.57 33.25	12.60 31.82	12.63 30.33	12.67 28.80
12.70 27.23	12.73 25.62	12.77 23.98	12.80 22.32
12.83 20.65	12.87 18.99	12.90 17.36	12.93 15.76
12.97 14.22	13.00 12.75	13.03 11.40	13.07 10.20
13.10 9.21	13.13 8.47	13.17 7.98	13.20 7.65
13.23 7.38	13.27 7.14	13.30 6.90	13.33 6.69
13.37 6.49	13.40 6.31	13.43 6.14	13.47 5.98
13.50 5.84	13.53 5.70	13.57 5.58	13.60 5.46
13.63 5.36	13.67 5.25	13.70 5.15	13.73 5.06
13.77 4.97	13.80 4.88	13.83 4.79	13.87 4.71
13.90 4.63	13.93 4.55	13.97 4.47	14.00 4.40
14.03 4.33	14.07 4.26	14.10 4.19	14.13 4.13
14.17 4.06	14.20 4.00	14.23 3.94	14.27 3.88
14.30 3.83	14.33 3.77	14.37 3.72	14.40 3.67
14.43 3.62	14.47 3.58	14.50 3.53	14.53 3.49

HYDROGRAPH DISCHARGE TABLE Cont'd

TIME--OUTFLOW (hrs cfs)	TIME--OUTFLOW (hrs cfs)	TIME--OUTFLOW (hrs cfs)	TIME--OUTFLOW (hrs cfs)

Option J STAGE / STORAGE TABLE STORAGE POND R to reset

1. RESERVOIR No = 4. 2. RESERVOIR NAME = ...
3. S = Ks * Z^b
Ks = 0..... b = 0.....
START ELEV = 0..... INCREMENT = 0...

	STAGE ft	ELEVATION ft	CO AREA sq ft	INC STORAGE cu ft	TOT STORAGE cu ft
4	0.00	64.00.	89.....	0	0
5	2.00	66.00.	2176....	2265	2265
6	4.00	68.00.	7108....	9284	11549
7	6.00	70.00.	11699...	18807	30356
8	8.00	72.00.	17977...	29676	60032
9	9.00	73.00.	23585...	20781	80813
10	10.00	74.00.	28093...	25839	106652
11	12.00	76.00.	36664...	64757	171409
12	14.00	78.00.	47206...	83870	255279
13	0.00	0.00.	0.....	0	0
14	0.00	0.00.	0.....	0	0

Change item number: 0 ↵ to cont

Option 1 STAGE / STORAGE TABLE ROUTING POND R to reset

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

	STAGE ft	ELEVATION ft	CO AREA sq ft	INC STORAGE cu ft	TOT STORAGE cu ft
4	0.00	72.80.	22863...	0	0
5	0.20	73.00.	23585...	4644	4644
6	1.20	74.00.	28093...	25839	30483
7	3.20	76.00.	36664...	64757	95240
8	5.20	78.00.	47206...	83543	178783
9	0.00	0.00.	0.....	0	0
10	0.00	0.00.	0.....	0	0
11	0.00	0.00.	0.....	0	0
12	0.00	0.00.	0.....	0	0
13	0.00	0.00.	0.....	0	0
14	0.00	0.00.	0.....	0	0

Change item number: 0 ↵ to cont

Reservoir No. 3 OUTLET STRUCTURES

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

1. WIDTH (in) = 24.
2. HEIGHT (in) = 24.
3. No. BARRELS = 1..
4. INVERT ELEV. = 64.25....
5. Co = 0.60
6. CULVERT LENGTH (ft) = 105.
7. CULVERT SLOPE (%) = 5.95
8. MANNING'S N-VALUE = .013

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

9. WIDTH (in) = 6..
10. HEIGHT (in) = 6..
11. No. BARRELS = 1..
12. INVERT ELEV. = 73.....
13. Co = 0.60
14. CULVERT LENGTH (ft) = 0...
15. CULVERT SLOPE (%) = 0...
16. MANNING'S N-VALUE = .013
17. MULTI-STAGE OPTION ? (Y/N) N

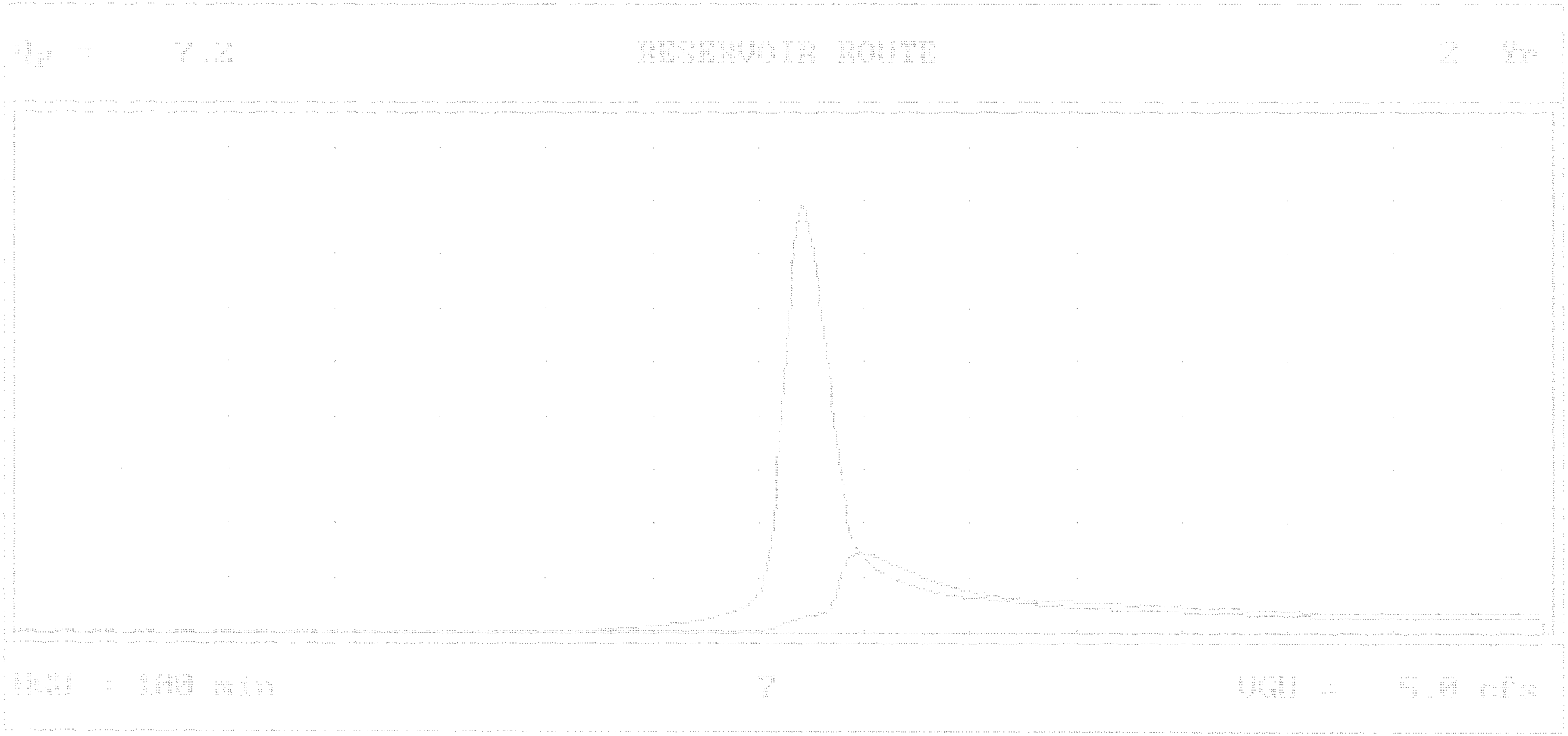
WEIR STRUCTURE A. Q=CWLH^EXP

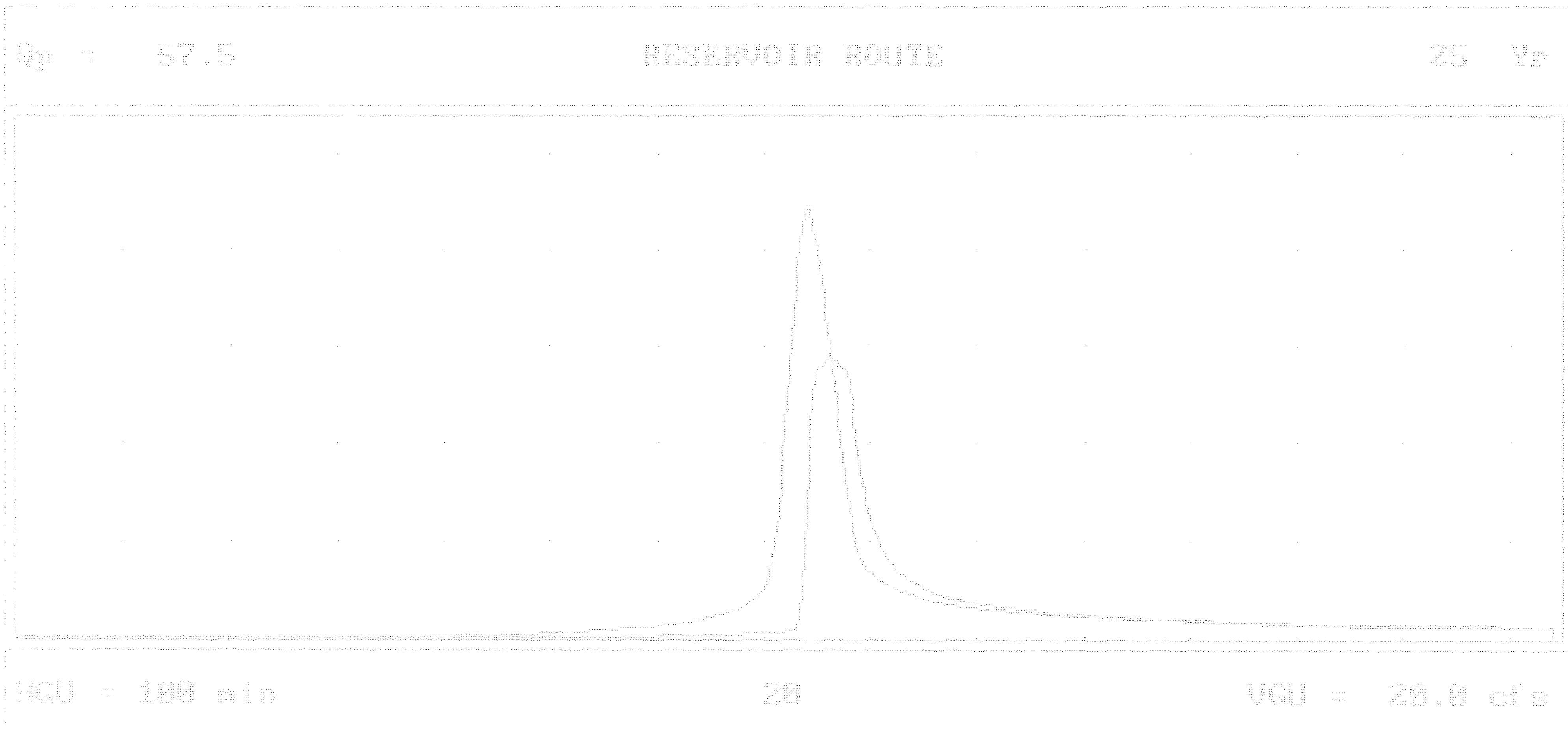
18. CREST LENGTH (ft) = 12.56..
19. CREST ELEVATION = 76.3...
20. Cw = 3.00
21. EXP = 1.50
22. MULTI-STAGE OPTION ? (Y/N) Y

WEIR STRUCTURE B. Q=CWLH^EXP

23. CREST LENGTH (ft) = 10.....
24. CREST ELEVATION = 77.75..
25. Cw = 3.00
26. EXP = 1.50
27. MULTI-STAGE OPTION ? (Y/N) N

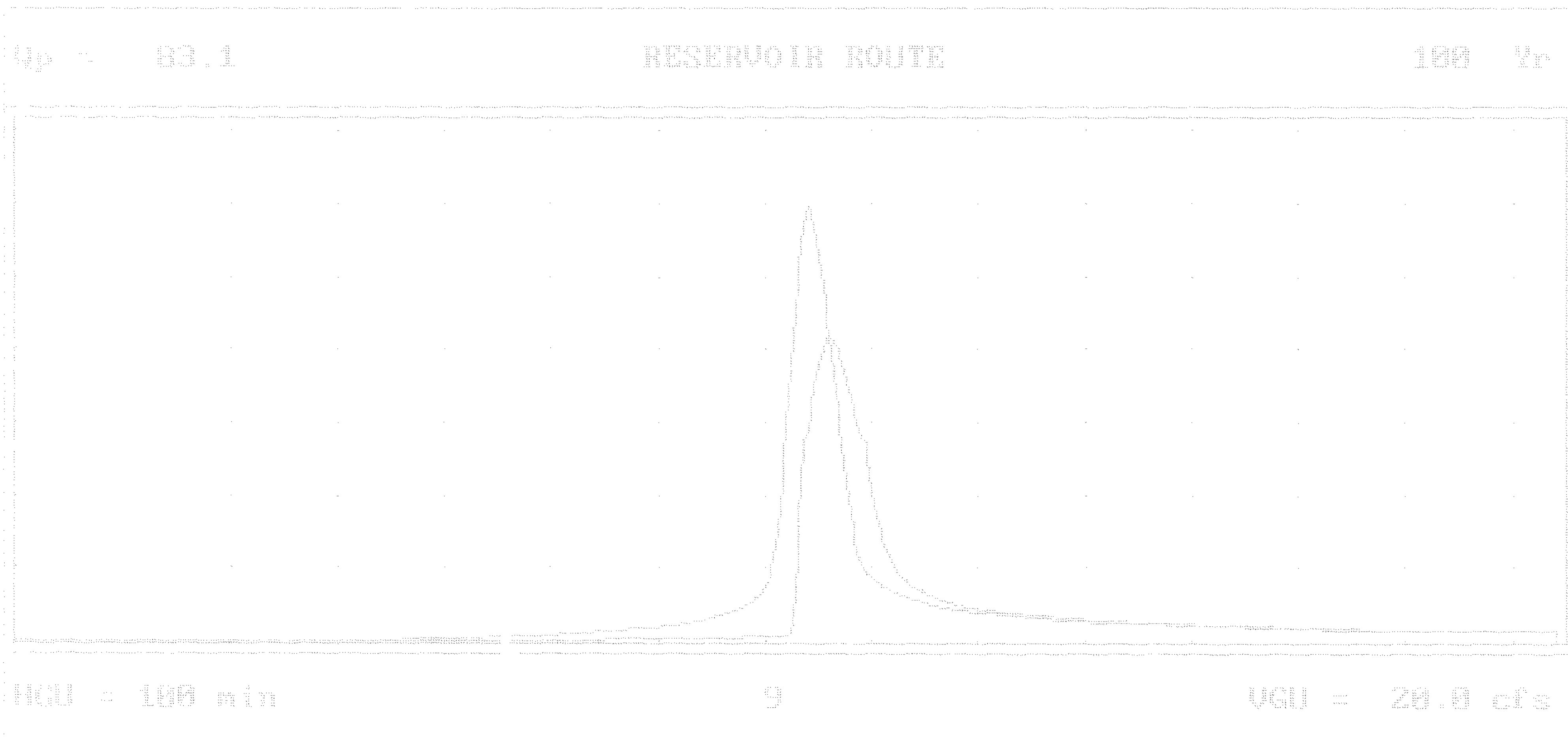
Change item number: 0 ↵ to cont


RESERVOIR ROUTE



MAX STORAGE = 173744

MAX ELEVATION = 27.00



MAX STORAGE = 211922

MAX ELEVATION = 78.65

Proposed Wet Pond Calculations

Option 1 STAGE / STORAGE TABLE R to reset

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

	STAGE ft	ELEVATION ft	CO AREA sq ft	INC STORAGE cu ft	TOT STORAGE cu ft
4	0.00	61.00.	9852....	0	0
5	1.00	62.00.	11815...	10834	10834
6	3.00	64.00.	13870...	25685	36519
7	5.00	66.00.	16050...	29920	66439
8	5.50	66.50.	16607...	8164	74603
9	6.00	67.00.	20167...	9193	83796
10	7.00	68.00.	22051...	21109	104905
11	9.00	70.00.	26030...	48081	152986
12	11.00	72.00.	32210...	58240	211226
13	0.00	0.00.	0.....	0	0
14	0.00	0.00.	0.....	0	0

Change item number: 0 ↵ to cont

Option 1 STAGE / STORAGE TABLE R to reset

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

	STAGE ft	ELEVATION ft	CO AREA sq ft	INC STORAGE cu ft	TOT STORAGE cu ft
4	0.00	66.50.	19860...	0	0
5	0.50	67.00.	20167...	10006	10006
6	1.50	68.00.	22051...	21109	31115
7	2.50	69.00.	24006...	23028	54143
8	3.50	70.00.	26030...	25018	79161
9	4.50	71.00.	28786...	27408	106569
10	5.50	72.00.	32210...	30498	137067
11	0.00	0.00.	0.....	0	0
12	0.00	0.00.	0.....	0	0
13	0.00	0.00.	0.....	0	0
14	0.00	0.00.	0.....	0	0

Change item number: 0 ↵ to cont

Reservoir No. 2 OUTLET STRUCTURES

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

1. WIDTH (in) = 18.
2. HEIGHT (in) = 18.
3. No. BARRELS = 1..
4. INVERT ELEV. = 62.5.....
5. Co = 0.60
6. CULVERT LENGTH (ft) = 200.
7. CULVERT SLOPE (%) = .5..
8. MANNING'S N-VALUE = .013

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

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

WEIR STRUCTURE A. Q=CwLH^EXP

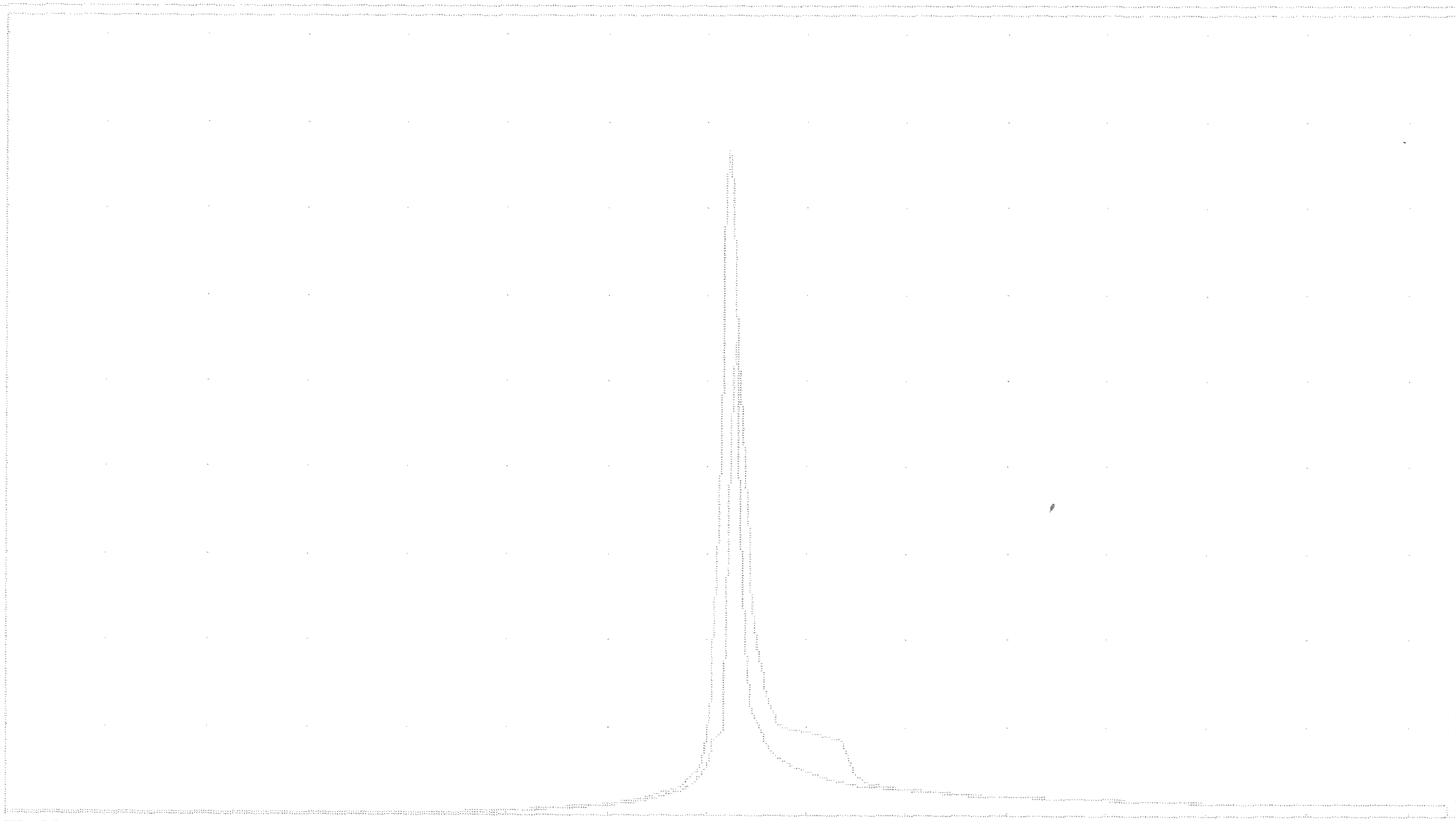
18. CREST LENGTH (ft) = 12.57..
19. CREST ELEVATION = 66.5...
20. Cw = 3.00
21. EXP = 1.50
22. MULTI-STAGE OPTION ? (Y/N) Y

WEIR STRUCTURE B. Q=CwLH^EXP

23. CREST LENGTH (ft) = 10.....
24. CREST ELEVATION = 68.6...
25. Cw = 3.00
26. EXP = 1.50
27. MULTI-STAGE OPTION ? (Y/N) N

Change item number: 0 ↵ to cont

Qp = 108.9 RESERVOIR ROUTE 25 Yr



HGU = 100 min 11 VGU = 20.0 cfs

MAX STORAGE = 95993

MAX ELEVATION = 70.61

Temporary Sediment Basin Design Form

8.5.97
(PARTIAL DRAINAGE AREA)

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project MEADOWS - SECT'S I & II, Ph 3

Basin # 1 Location SECT I

Total area draining to basin: 30.78 acres.

Total Ph 3 area (disturbed & undist'b) to basin = 18.8 AC

Basin Volume Design Total SECT 5 area (dist'b & undist'b) to basin = 9.47 AC

Wet Storage: ∴ USE 18.8 AC

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

   67 cu. yds. x 18.8 acres = 1260 cu. yds.

2. Available basin volume = 1260 cu. yds. at elevation 63.8. (From storage - elevation ~~curve~~ TABLE)

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

   * Elevation corresponding to required volume = invert of the dewatering orifice. USE EL 64.0 → 36519 CF OR 1352 CY

4. Available volume before cleanout required.

   33 cu. yds. x 18.8 acres = 620 cu. yds.

5. Elevation corresponding to cleanout level = 62.5.

   (From Storage - Elevation ~~Curve~~ TABLE)

6. Distance from invert of the dewatering orifice to cleanout level = 1.5 ft. (Min. = 1.0 ft.) ✓

Dry Storage:

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

   67 cu. yds. x 18.8 acres = 1260 cu. yds.

8. Total available basin volume at crest of riser* = 27163 cu. yds. at elevation 160.5. (From Storage - Elevation ~~Curve~~)
DRY STORAGE B/W 160.4 & 160.5 = TABLE
38,084 CF OR 1410 CY > 1260 CY ∴ ✓
* Minimum = 134 cu. yds./acre of total drainage area. = 2519 CY ∴ ✓

9. Diameter of dewatering orifice = 10" in.
Q = 38084/21600 = 1.76 CFS A = 0.42 SF (W/ h=1.5') ∴ d = 0.73 FT = 8.8"

10. Diameter of flexible tubing = 12" in. (diameter of dewatering orifice plus 2 inches).

Preliminary Design Elevations

11. Crest of Riser = 160.5

Top of Dam = 72.3

Design High Water = 70.6

Upstream Toe of Dam = 61.0

Basin Shape

12. Length of Flow / Effective Width — L / We ≥ 2.14

If > 2, baffles are not required ✓

If < 2, baffles are required _____

Runoff

13. Q_2 = 19.4 cfs (From Chapter 5)

14. Q_{25} = 108.8 cfs (From Chapter 5)

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2$ = 19.4 cfs. (riser and barrel)

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

16. With emergency spillway:

Assumed available head (h) = 2.1 ft. (Using Q_2)

h = Crest of Emergency Spillway Elevation - Crest of Riser Elevation
68.6 666.5

Without emergency spillway:

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

h = Design High Water Elevation - Crest of Riser Elevation

17. Riser diameter (D_r) = 24 in. Actual head (h) = ____ ft.

(From Plate 3.14-8.) 24 < 48 ∴ ✓

Note: Avoid orifice flow conditions.

18. Barrel length (l) = 200 ft.

Head (H) on barrel through embankment = 7.1 ft.

(From Plate 3.14-7).

19. Barrel diameter = 18" in.

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

20. Trash rack and anti-vortex device

Diameter = 72 inches.

Height = 21 inches.

(From Table 3.14-D).

Emergency Spillway Design

21. Required spillway capacity $Q_e = Q_{25} - Q_p$ = 89.4 cfs.

22. Bottom width (b) = 10' ft.; the slope of the exit channel (s) = 2.4 ft./foot; and the minimum length of the exit channel (x) = 93 ft.
(From Table 3.14-C). PAVED

Anti-Seep Collar Design

23. Depth of water at principal spillway crest (Y) = 4 ft.

Slope of upstream face of embankment (Z) = 2 :1.

Slope of principal spillway barrel (S_b) = 0.5 %

Length of barrel in saturated zone (L_s) = 24.5 ft.

24. Number of collars required = 2 dimensions = 2.75' x 2.75'

(from Plate 3.14-12).

Final Design Elevations

25. Top of Dam = 72.3

Design High Water = 70.6

Emergency Spillway Crest = 68.6

Principal Spillway Crest = 66.5

Dewatering Orifice Invert = 64.0

Cleanout Elevation = 62.5

Elevation of Upstream Toe of Dam or Excavated Bottom of "Wet Storage Area" (if excavation was performed) = 61.0

Miscellaneous Revision Calculations

ENVIRONMENTAL COMMENTS OF 3-31-97

#11 18" RCP OUTLET PROTECTION

MAX Q THROUGH RCP = 25.2 CFS (FROM ROUTING INFO)

ASSUME MAX TW CONDITION (VESCH 3.18 & 3.19)

→ USE PLATE 3.18-4
APRON LENGTH, La = 42 FT
∴ USE 45 FT

→ APRON WIDTH
APRON SHALL FOLLOW CHANNEL CHARACTERISTICS
SS ≈ 2.5:1

→ TYPE OF STONE
USE PLATE 3.19-3 w/ S = 0.0125 & d = 1.5'
D_{50} = 0.25'
∴ CLASS A1 RIPRAP

(45 LF)(1.5' DEEP)(6' WIDE) ≅ 15 CY CLASS A1 RIPRAP REQD

ENVIRONMENTAL COMMENTS OF 3.31.97

#15 EXISTING RECEIVING CHANNEL

THE EXISTING RECEIVING CHANNEL HAS BEEN OBSERVED DURING DRY CONDITIONS (ie, NO RAINFALL FOR SEVERAL WEEKS) AND FOLLOWING A HEAVY AND INTENSE RAINFALL. THE CHANNEL GRADUALLY CHANGES DIMENSIONS, BUT MAINTAINS A CONSISTENT TRAPEZOIDAL CROSS-SECTION WITH LITTLE EXCEPTION.

ONE AREA OF EXCEPTION WAS FOUND ALONG THE REAR OF LOTS BELONGING TO TYLER, BROWN, AND ENNIS. FOR THIS PORTION, THE CHANNEL MEANDERS OFTEN AND IS NOT WELL DEFINED. THIS IS ALSO THE PORTION OF THE CHANNEL TO BE REPLACED WITH THE 18" RCP OUTLET BARREL. A 45 LF APRON OF CLASS A1 RIP RAP WILL EXTEND FROM THE BARREL OUTFALL POINT TO A POINT AT WHICH THE CHANNEL IS WELL-DEFINED (ie, REAR OF GRATTAN PROPERTY).

THERE ARE NO CHANNEL IMPROVEMENTS REQUIRED ALONG THE REAR OF THE TYLER, BROWN, OR ENNIS PROP'S.!

→ DETERMINE ADEQUACY OF EXISTING CHANNEL FROM END OF RIP RAP APRON TO INLET OF 36" RCP'S (USE VESCH CHAP. 5 PROCEDURE - P122)

- DETERMINE STUDY REACHES

  1) END OF RR APRON TO INLET OF CONC. SWALE
  2) INLET OF CONC SWALE TO INLET OF 36" RCP'S

- DETERMINE TYP. SECTION (FROM VISIT & TOPO)

$b \cong 2.5'$	$b = 2.5'$
$y \cong 2.5'$	$y = 2.5'$
$z = 1$	$z = 1.5$
REACH 1	REACH 2
(w/ < 3" STANDING H_2O)	(w/ < 2" STANDING H_2O)
MEANDERS SLIGHTLY	MOSTLY STRAIGHT

- DETERMINE "n" (composite) FOR EACH REACH

1) $n_1 = 0.02$ (TABLE 5-16)
   $n_2 = 0.01$ (TABLE 5-17)
   $n_3 = 0.005$ (TABLE 5-18)
   $n_4 = 0.012$ (TABLE 5-19)
   $n_5 = 0.025$ (TABLE 5-20)
   $n_6 = 0.015$ n_5 (TABLE 5-21) w/ RATIO = 1.4
   $= 0.001$

#15 CON'T

REACH 1 "n":

$$n = (0.02+0.01+0.005+0.012+0.025)(0.001) + (0.02+0.01+0.005+0.012+0.025)$$

$n = 0.072$

REACH 2 "n":

$n_1 = 0.02$ (TBL 5-16)
$n_2 = 0.005$ (TBL 5-17)
$n_3 = 0.0$ (TBL 5-18)
$n_4 = 0.01$ (TBL 5-19)
$n_5 = 0.025$ (TBL 5-20)
$n_6 = 0.0$ (TBL 5-21) w/ RATIO < 1.0

$n = 0.06$

- DETERMINE RUNOFF RATES

FROM POND ROUTING: $Q_2 = 19.4$ CFS
$Q_{10} = 79.7$ CFS

Q_2 FOR STABILIZATION ANALYSIS
Q_{10} FOR DEPTH ANALYSIS

- DETERMINE REACH CHARACTERISTICS (AVERAGE): A, R, S

REACH 1: $A = by + zy^2$ = 12.5 SF

$R = \frac{A}{b + 2y\sqrt{1+z^2}}$ = 1.3 FT

S = 0.006 FT/FT (AVG)

REACH 2: $A = by + zy^2$ = 15.6 CFS

$R = \frac{A}{b + 2y\sqrt{1+z^2}}$ = 1.4 FT

S = 0.013 FT/FT (AVG)

- DETERMINE V & Q FOR EACH REACH (MAX)

REACH 1: $V_{MX} = \frac{1.49}{n} R^{2/3} S^{1/2}$ = 1.9 FPS

$V_2 = \frac{Q_2}{A} = \frac{19.4}{12.5} = 1.6$ FPS OK

Q = 24 CFS OK FOR 2 YR

REACH 2: V = 3.5 FPS

$V_2 = 1.3$ FPS OK

Q = 55 CFS OK FOR 2 YR

LD-269
Rev 3-83

Project: MEADOWS-SECT 5 — EX. TWIN CULVERTS DNSTRM OF WET POND OUTFALL
Plan Sheet No. ____ Designer ____ Rev. Date ____ Date 7-14-97
Sheet 3 of 4

HYDROLOGICAL DATA:
D.A. = ~ AC.

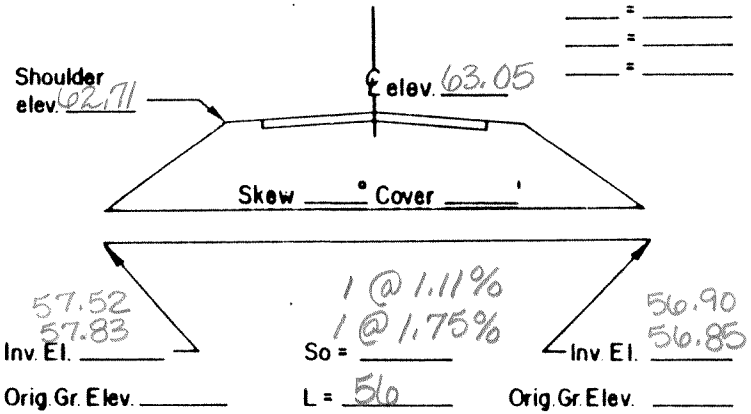
SEE SECTION 5 WET POND CALCS!
(EX. ADDITIONAL FLOW TO CHANNEL IS INCLUDED IN BELOW Q VALUE - SEE ATTACHED) (4/4)

AHW Controls
100 yr. Flood plain ____ elev. ____
Design AHW depth ____ elev. ____
Structures ____ elev. ____

STATION ____

(FROM AS-BUILT INFO)

freq. TW elev.
____ = ____
____ = ____
____ = ____
____ = ____
____ = ____



DISCHARGES USED
Q 10 = 98 CFS
Q ____ = ____ CFS
Q ____ = ____ CFS
Q ____ = ____ CFS
Q ____ = ____ CFS

RISK ASSESSMENT ADT ____
Detours Available ____, Length ____
Overtopping Stage ____
Flood Plain Management ____
Criteria and Significant Impact ____

240A

CULVERT TYPE & SIZE	Q	Q/B	HEADWATER COMPUTATIONS: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL Ke	OUTLET CONTROL dc	OUTLET CONTROL (dc+D)/2	OUTLET CONTROL ho	OUTLET CONTROL H	OUTLET CONTROL LSo	OUTLET CONTROL HW	CONT. HW. ELEV.	OUTLET VELOCITY C.M.	OUTLET VELOCITY Smooth	End Treat.	COMMENTS
2-36" RCP																
ASSUME Q SPLIT B/W PIPES																
@ 1.11% ⇒	49		1.22	3.66	0.5	2.3	2.65	2.65	1.4	0.62	3.43					INLET CONTROLS
@ 1.75%	49		1.22	3.66	0.5	2.3	2.65	2.65	1.4	0.98	3.07					INLET CONTROLS
																w/ ≈ 1.8' FREEBOARD (EACH PIPE)

Design Flood Exceed Prob. ____ Elev ____
Overtop Flood Exceed Prob. ____ Elev ____
Base Flood 1% Exceed Prob. ____ Elev ____

ENVIRONMENTAL COMMENTS OF 3.31.97

#15 (TWIN CULVERTS UNDER OLD FIELD ROAD)

TOTAL DISCHARGE THROUGH PIPES:

→ FROM WET POND	Q_{10} = 80 CFS		
FROM LOTS 11-13	Q_{10} = 1.2 CFS		
FROM OLD FIELD(S)	Q_{10} = 10.4 CFS	(SECT 3 PLANS)	
FROM OLD FIELD(N)	Q_{10} = 2.7 CFS	(SECT 1 PLANS)	
FROM EX SECT 1 LOTS	Q_{10} = 3.8 CFS	(SECT 1 PLANS)	

TOTAL Q_{10} = 98.1 CFS

SEE CULVERT FORM.

ENVIRONMENTAL COMMENTS OF 3-31-97

#25

EXISTING DRAINAGE OF LOTS 11-13

THE EXISTING DRAINAGE PROBLEM WILL BE ADDRESSED BY ADDING A PAVED SWALE ALONG THE REAR LINES OF LOTS 11 AND 12. THE CONTRIBUTING AREA IS ESTIMATED AT 0.5 AC.

→ DISCHARGE THROUGH SWALE
0.5 AC w/ T_c = 10 MIN & C = 0.4

$i_2 = 4.54$ in/hr $i_{10} = 5.81$ in/hr

$Q_2 = 0.9 \approx 1$ CFS
$Q_{10} = 1.2$ CFS

→ DETERMINE SWALE SECTION

USE "V" TYPE w/ 2:1 SS & 1.0' DEPTH

$S \cong 0.055$ (FROM TOPO) $L = 210$ LF ±
$n = 0.015$

FROM VDOT FIG 2.8.23:
$Vel_2 = 6.0$ FPS
$Vel_{10} = 6.3$ FPS
$d_{10} = 3.8"$

∴ USE "V" TYPE DITCH w/ 2:1 SS & 0.5' DEPTH

→ RIP RAP DESIGN (VESCH SPEC 3.19 a)
USING PLATE 3.19-3 w/ d = 3.8" & S = 0.055 : $d_{50} = 0.25$ FT
USING PLATE 3.19-4 w/ z = 2 & b/d = 1 : $K_1 = 0.92$
USING PLATE 3.19-5 w/ $d_{50} = 3"$: 40°
USING PLATE 3.19-6 w/ z = 2 & 40° : $K_2 = 0.71$

$$d'_{50} = d_{50}\left(\frac{K_1}{K_2}\right) = 0.32 \text{ FT} = 3.8" \rightarrow 4"$$

∴ USE TYPE II RIP RAP
APRON 6' LONG (SPEC 3.18 MINIMUM)
4' WIDE
1' DEEP → 1.0 CY REQ'D

ENVIRONMENTAL COMMENTS OF 3-31-97

#20

UPSTREAM CHANNEL OF PROPOSED WET POND

IF POSSIBLE, THE EXISTING CHANNEL WILL NOT BE REGRADED. THE EXISTING CHARACTERISTICS ARE AS FOLLOWS:

SECTION W/ Y = 20" = 1.6 FT
z = 2
S = 0.017 FT/FT (AVG)

→ DISCHARGE THROUGH CHANNEL (VIA 30' CULVERTS & ROADSIDE DITCHES)

CULVERTS: Q_{10} (ORIGINAL DESIGN) = 48 CFS
Q_{10} (UPDATED) = 39 CFS Q_2 = 28 CFS
DA = 21.8 AC; C = 0.5; T_c = 30 MIN; i_{10} = 3.6 IN/HR
i_2 = 2.6 IN/HR

DITCHES: Q_{10} (UPDATED) = 8.5 CFS Q_2 = 6.8 CFS
DA = 2.58 AC; C = 0.47; T_c = 5 MIN; i_{10} = 7 IN/HR
i_2 = 5.2 IN/HR

Q_{10} TOTAL = 47.5 CFS
Q_2 TOTAL = 34.8 CFS

→ USE VDOT FIG 2.8.20 TO DETERMINE V_2, V_{10}, & d_{10}
ASSUME EARTHERN CHANNEL, n = 0.03

V_2 = 4.5 FPS > 2.5 FPS ALL ∴ LINED (RIPRAP)

n = 0.015
V_2 = 8.0 FPS
V_{10} = 8.5 FPS
d_{10} = 11 INCHES
∴ EXISTING CHANNEL W/ ADDED RIP-RAP LINER

→ RIP RAP DESIGN (IN ACCORDANCE W/ VESCH SPEC 3.19a)
USING PLATE 3.19-3 W/ d = 11" & S = 0.017 : d_{50} = 0.25 FT
USING PLATE 3.19-4 W/ z = 2 & b/d = 1.0 : K_1 = 0.92
USING PLATE 3.19-5 W/ d_{50} = 3" : 40°
USING PLATE 3.19-6 W/ z = 2 & 40° : K_2 = 0.71

$d'_{50} = d_{50} (K_1/K_2)$ = 0.32 FT = 3.84 INCHES ∴ USE 4" = d'_{50}

USE TYPE II RIPRAP TO LINE CHANNEL:
(120 LF x 6 FT WIDE x 1 FT DEEP) ≅ 27 CY REQ'D