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: **PC168**

DATE VERIFIED: **January 27, 2017**

QUALITY ASSURANCE TECHNICIAN: **Natalie Prevette**

NM Prevette

LOCATION: WILLIAMSBURG, VIRGINIA

Stormwater Division

MEMORANDUM

DATE: March 13, 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: PC168

PIN: 3910100159

Subdivision, Tract, Business or Owner Name (if known): James City Service Authority

Property Description: 4.427 AC New Town Associates (out of (38-4)(1-50)

Site Address: 149 Tewning Road

(For internal use only) **Box** 2 **Drawer:** 2

Agreements: (in file as of scan date) N **Book or Doc#:** **Page:**

Comments
JCSA operations center parking lot expansion

CERTIFICATE OF AUTHENTICITY

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BMPNUMBER: **PC168**

DATE VERIFIED: **April 21, 2016**

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

LOCATION: WILLIAMSBURG, VIRGINIA

FEB 2002
RECEIVED
ENVIRONMENTAL DIVISION

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: JCSA OPERATIONS CENTER SITE EXPANSION
Structure/BMP Name: WET EXT DET FACILITY
Project Location: END OF TEWNING ROAD
BMP Location: 220' SOUTH OF TERMINUS ON TEWNING ROAD
County Plan No.: SP - 143[redacted] - 00

Project Type:
- ☐ Residential
- ☐ Commercial
- ☐ Institutional
- ☑ Public
- ☐ Other _____
- ☐ Business
- ☐ Office
- ☐ Industrial
- ☐ Roadway

Tax Map/Parcel No.: (39-1)(1-56)
BMP ID Code (if known): _____
Zoning District:: M-1
Land Use: _____
Site Area (sf or acres): 4.4 ACRES

Brief Description of Stormwater Management/BMP Facility: EXTENDED DRY DETENTION FACILITY, CONSTRUCTED WITH EARTHEN BERM. EXCAVATIONS NEED TO CREATE NECESSARY VOLUME

Nearest Visible Landmark to SWM/BMP Facility: NEW PARKING LOT FOR OPERATIONS CTR.

Nearest Vertical Ground Control (if known):
☑ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☐ Other
Station Number or Name: _____
Datum or Reference Elevation: _____
Control Description: _____
Control Location from Subject Facility: _____

Section 2 - Stormwater Management / BMP Facility Construction Information:

PreConstruction Meeting Held for Construction of SWM/BMP Facility: ☑ Yes ☐ No ☐ Unknown 5-8-01
Approx. Construction Start Date for SWM/BMP Facility: _____
Facility Monitored by County Representative during Construction: ☑ Yes ☐ No ☐ Unknown
Name of Site Work Contractor Who Constructed Facility: TOANO CONTRACTORS
Name of Professional Firm Who Routinely Monitored Construction: UNKNOWN
Date of Completion for SWM/BMP Facility: NOV. 2001
Date of Record Drawing/Construction Certification Submittal: 11/13/01

(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: JAMES CITY SERVICE AUTHORITY
Mailing Address: 101-E MOORES BAY ROAD
WILLIAMSBURG, VIRGINIA 23187
Business Phone: 757-253-6809 Fax: _____
Contact Person: MR KEITH LEGGINS Title: ENGINEERING TECHNICIAN

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 VIRGINIA 23188
Business Phone: 757-253-0040
Fax: 757-220-8994
Responsible Plan Preparer: V. MARC BENNETT
Title: SENIOR PROJECT MANAGER
Plan Name: JCSA OPERATIONS CENTER SITE EXPANSION
Firm's Project No. 8651-18
Plan Date: 11/27/00
Sheet No.'s Applicable to SWM/BMP Facility: 4 / 7 / ___ / ___ / ___

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

Name: TOANO CONTRACTORS, INC
Mailing Address: _____
Business Phone: _____
Fax: _____
Contact Person: RANDY TAYLOR
Site Foreman/Supervisor: RANDY TAYLOR
Specialty Subcontractors & Purpose (for BMP Construction Only): _____

Section 4 - Professional Certifications:

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

Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities

Record Drawing Certification

Firm Name: AES Consulting Engineers
Mailing Address: 5248 Olde Towne Road, Suite 1
Williamsburg, VA 23185
Business Phone: 757-253-0040
Fax: 757-220-8494

Name: V. Marc Bennett
Title: Senior Project Manager
Signature: V. Marc Bennett
Date: 12/30/01

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

COMMONWEALTH OF VIRGINIA
VAN MARC BENNETT
No. 26628
PROFESSIONAL ENGINEER

V. Marc Bennett (Seal)

Virginia Registered Professional Engineer or Certified Land Surveyor

Construction Certification

Firm Name: ECS, Ltd.
Mailing Address: 108 Ingram RD, Unit 1
Williamsburg, VA 23188
Business Phone: (757) 229-6677
Fax: (757) 229-9978

Name: Michael J. Galli
Title: Williamsburg Branch Manager
Signature: Michael J. Galli
Date: 01/10/02

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

COMMONWEALTH OF VIRGINIA
MICHAEL J. GALLI
No. 030684
PROFESSIONAL ENGINEER

Michael J. Galli (Seal)

Virginia Registered Professional Engineer

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

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

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

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

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

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

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

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

XX 4. All plan sheet revision blocks modified to indicate date and record drawing status.

XX 5. All plan sheets have certification statements and certifying professional's signature and seal.

II. Minimum Standards: *(Required for all Stormwater Management / BMP facilities, as applicable.)*

XX 1. All requirements of Section I (Methods and Presentation) apply to this section.

XX 2. Plan Views: Show general location, arrangement and dimensions. Location and alignment shall generally match approved design plans.

XX 3. Profile or elevations along top or berm of the facility. At a minimum, elevations are required at each end, at intervals not to exceed 50 feet and where low spots may be present. Top of embankment or berm elevations must be no less than design elevation plus any settlement allowances.

Inc 4. Top widths, berm widths and embankment side slopes.

XX 5. Show length, width and depth of facility or grading, contours or spot elevations as required to verify permanent pool and design storage volumes were met or were reasonably close to the approved design. Evaluation of as-built grading, contours, spot elevations, or cross-sections, may be necessary by the professional to ensure approved design configurations, depths and volumes were closely maintained. If grading or elevations are significantly different from the approved plan, the Environmental Division shall be contacted immediately to determine whether the variation is acceptable or whether further evidence will be required. Facilities which do not closely resemble approved plan grades, elevations or configurations may require regrading by the Contractor; check volumetric computations; and/or a check hydraulic routing to ensure approved design water surface elevations, discharges or freeboard were closely maintained.

XX 6. Cross-section of the embankment through the principal spillway or outlet barrel. Must extend at least 100 ft. downstream of the pipe outlet or to recorded site property line, whichever is closer. Proper correlation is required between principal spillway (control structure) crest, emergency spillway crest, orifice and weirs and the top of the dam or facility. All elevations and dimensions must reasonably match the design plan or be sequentially relative to each other and the facility must reflect the required design storage volume(s) and/or design depth.

XX 7. Profile or elevations along the entire centerline of the emergency spillway. Emergency spillway may be steeper, but no flatter or narrower than design.

XX 8. Elevation of the principal spillway crest or outlet crest of the structure.

XX 9. Primary control structure (riser) diameter or dimensions, height, type of material and base size. Indicate provisions for access that are present such as steps, ladders, etc.

XX 10. Dimensions, locations and elevations of outlet orifices, weirs, slots and drains.

N/A 11. Type and size of anti-vortex and trash rack device. Height, diameter, dimensions, bar spacings (if applicable) and elevations relative to the principal spillway crest. Indicate if lockable hatch is present or not.

XX 12. Type, location, size and number of anti-seep collars or documentation of other methods utilized for seepage control. **May need to obtain this information during construction.**

XX 13. Top of impervious core embankment, core trench limits and elevation of cut-off trench bottom. **May need to obtain this information during construction.**

XX 14. Elevation of the principal spillway barrel (outlet pipe) inlet and outlet invert.

XX 15. Outlet barrel diameter, length, slope, type and thickness class of material and type of flared end sections, headwall or endwall.

XX 16. Outfall protection dimension, type and depth of rock and if underlain filter fabric is present.

XX 17. BMP interior and periphery landscaping zones conform with arrangements and requirements of the approved design plan.

XX 18. Maintenance plan taken from approved design plan transposed onto record drawing set.

N/A 19. Fencing location and type, if applicable to facility.

XX 20. BMP vicinity properly cleaned of stockpiles and construction debris.

XX 21. No visual signs of erosion or channel degradation immediately downstream of facility.

XX 22. Any other information formally requested by the Environmental Division specific to the constructed SWM/BMP facility.

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

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

N/A A1. All requirements of Section II, Minimum Standards, apply to Group A facilities.

___ A2. Principal spillway consists of reinforced concrete pipe with O-Ring gaskets for watertight joint construction.

___ A3. Sediment forebays or pretreatment devices provided at inlets to pond. Generally 4 to 6 ft. deep.

___ A4. Access for maintenance and equipment is provided to the forebay(s). Access corridors are at least 12 ft. wide, have a maximum slope of 15 percent and are adequately stabilized to withstand heavy equipment or vehicle use.

___ A5. Adequate fixed vertical sediment depth markers installed in the forebay(s) for future sediment monitoring purposes.

___ A6. Pond liner (if required) provided. Either clay liners, polyliners, bentonite liners or use of chemical soil additives based on requirements of the approved plan.

___ A7. Minimum 6 percent slope safety bench extending a minimum of 15 feet outward from normal pool edge and/or an aquatic bench extending a minimum of 10 feet inward from the normal shoreline with a maximum depth of 12 inches below the normal pool elevation, if applicable, per the approved design plans. (Note: Safety benches may be waived if pond side slopes are no steeper than 4H:1V).

___ A8. No trees are present within a zone 15 feet around the embankment toe and 25 feet from the principal spillway structure.

___ A9. Wet permanent pool, typically 3 to 6 feet deep, is provided and maintains level within facility.

___ A10. Low flow orifice has a non-clogging mechanism.

___ A11. A pond drain pipe with valve was provided.

___ A12. Pond side slopes are not steeper than 3H:1V, unless approved plan allowed for steeper slope.

___ A13. End walls above barrels (outlet pipe) greater than 48 inch in diameter are fenced to prevent a fall hazard.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

IV. Group B - Wetlands *(Includes B-1 Shallow Marsh; B-2 Ext Det Shallow Wetlands; B-3 Pond Wetland System and B-4 Pocket Wetland)*

N/A B1. Same requirements as Group A Wet Ponds.

___ B2. Minimum 2:1 length to width flow path provided across the facility.

___ B3. Micropool provided at or around outlet from BMP (generally 3 to 6 ft. deep).

___ B4. Wetland type landscaping provided in accordance with approved plan. Includes correct pondscaping zones, plant species, planting arrangements, wetland beds, etc. Wetland plants include 5 to 7 emergent wetland species. Individual plants at 18 inches on center in clumps.

___ B5. Adequate wetland buffer provided (Typically 25 ft. outward from maximum design water surface elevation and 15 ft. setback to structures).

___ B6. No more than one-half (½) of the wetland surface area is planted.

___ B7. Topsoil or wetland mulch provided to support vigorous growth of wetland plants.

___ B8. Planting zones staked or flagged in field and locations subsequently established by appropriate field surveying methods for record drawing presentation.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

V. Group C - Infiltration Practices

(Includes C-1 Infiltration Trench; C-2 Infiltration Trench; C-3 Infiltration Basin; and C-4 Infiltration Basin)

N/A C1. All requirements of Section II, Minimum Standards, apply to Group C facilities as applicable.

___ C2. Facility is not located on fill slopes or on natural ground in excess of six (6) percent.

___ C3. Pretreatment devices provided prior to entry into the infiltration facility. Acceptable pretreatment devices include sediment forebays, sediment basins, sediment traps, sump pits or inlets, grass channels, plunge pools or other acceptable measures.

___ C4. Three (3) or more of the following pretreatment devices provided to protect long term integrity of structure: grass channel; grass filter strip; bottom sand layer; upper filter fabric layer; use of washed bank run gravel aggregate.

___ C5. Sides of infiltration practice lined with filter fabric.

___ C6. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.

___ C7. Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.

___ C8. Minimum one hundred (100) foot separation horizontally from any known water supply well and minimum one hundred (100) foot separation upslope from any building.

___ C9. Minimum twenty-five (25) foot separation down gradient from any structure.

___ C10. Stormwater outfalls provided for overflow associated with larger design storms.

___ C11. No visual signs of erosion or channel degradation immediately downstream of facility.

___ C12. Facility does not currently cause any apparent surface or subsurface water problems to downgrade properties.

___ C13. Observation well provided.

___ C14. Adequate, direct access provided to the facility for future maintenance, operation and inspection.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

VI. Group D - Filtering Systems

(Includes D-1 Bioretention Cells; D-2 Surface Sand Filters; D-3 Underground Sand Filters; D-4 Perimeter Sand Filters; D-5 Organic Filters; and D-6 Pocket Sand Filters)

N/A D1. All requirements of Section II, Minimum Standards, apply to Group D facilities.

___ D2. Sediment pretreatment devices provided.

___ D3. For D-1 BMPs (Bioretention Cells), pretreatment consisting of a grass filter strip below level spreader (deflector); a gravel diaphragm; and mulch and planting soil layers were provided.

___ D4. For D-1 BMPs (Bioretention Cells), plantings consist of native plant species; vegetation provided was based on zones of hydric tolerances; trees and understory of shrubs and herbaceous materials were provided; woody vegetation is absent from inflow locations; and trees are located around facility perimeter.

___ D5. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.

___ D6. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed .

___ D7. Filtering system is off-line from storm drainage conveyance system.

___ D8. Overflow outlet has adequate erosion protection.

___ D9. Deflector, diversion, flow splitter or regulator structure provided to divert the water quality volume to the filtering structure.

___ D10. Minimum four (4) inch perforated underdrain provided in a clean aggregate envelope layer beneath the facility.

___ D11. Minimum fifty (50) foot separation from any slope fifteen (15) percent or greater. Minimum one hundred (100) foot separation horizontally from any known water supply well. Minimum one hundred (100) foot separation upslope and twenty-five (25) foot separation downslope from any building.

___ D12. Stabilization and acceptable vegetative cover established over contributing drainage area prior to conveyance of stormwater to the facility.

___ D13. No visual signs of erosion or channel degradation immediately downstream of facility.

___ D14. Adequate, direct access provided to the pretreatment area and/or filter bed for future maintenance.

STORMWATER MANAGEMENT / BMP FACILITIES
AS-BUILT PLAN CHECKLIST

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

VII. Group E - Open Channel Systems

(Includes E-1 Wet Swales (Check Dams); E-2 Dry Swales;and E-3 Biofilters)

N/A E1. All requirements of Section II, Minimum Standards, apply to Group E facilities as applicable.

___ E2. Open channel system has constructed longitudinal slope of less than four (4) percent.

___ E3. No visual signs of erosion in the open channel system's soil and/or vegetative cover.

___ E4. Open channel side slopes are no steeper than 2H:1V at any location. Preferred channel sideslope is 3H:1V or flatter.

___ E5. No visual signs of ponding are present at any location in the open channel system, except at rock check dam locations for E-1 systems (Wet Swales).

___ E6. For E-2 BMPs (Dry Swales), an underdrain system was provided.

___ E7. Treated timber or rock check dams provided as pretreatment devices for the open channel system.

___ E8. Gravel diaphragm provided in areas where lateral sheet flow from impervious surfaces are directly connected to the open channel system.

___ E9. Grass cover/stabilization in the open channel system appears adaptable to the specific soils and hydric conditions for the site and along the channel system.

___ E10. Open channel system areas with grass covers higher than four (4) to six (6) inches were properly mowed.

___ E11. Facility was not used for erosion and sediment control purposes and sediment was prevented from entering the facility to the greatest extent possible during construction.

___ E12. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed and no adverse affects to the function of the facility are anticipated.

___ E13. For E-3 BMPs (Biofilters), the bottom width is six (6) feet maximum at any location.

___ E14. For E-3 BMPs (Biofilters), sideslopes are 3H:1V maximum at any location.

___ E15. For E-3 BMPs (Biofilters), the constructed channel slope is less than or equal to three (3) percent at any location.

___ E16. For E-3 BMPs (Biofilters), the constructed grass channel is approximately equivalent to the constructed roadway length.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

VIII. Group F - Extended Dry Detention

(Includes F-1 Timber Walls; and F-2 Dry Extended Detention with Forebay)

XX F1. All requirements of Section II, Minimum Standards, apply to Group F facilities.

XX F2. Basin bottom has positive slope and drainage from all basin inflow points to the riser (or outflow) location.

N/A F3. Timber wall BMP used in intermittent stream only. (ie. Prohibited in perennial streams.)

N/A F4. Forebay provided approximately 20 ft. upstream of the facility. Forebays generally 4 to 6 feet in depth.

N/A F5. A reverse slope pipe, vertical stand pipe or mini-barrel and riser was provided to prevent clogging.

XX F6. Principal spillway and outlet barrel provided consisting of ~~reinforced concrete pipe~~ DIP with O-Ring gaskets for watertight joint construction.

N/A F7. Mini-barrel and riser, if used, contains a removable trash rack to reduce clogging.

N/A F8. Low flow orifice, if used, has a minimum diameter of three (3) inches or two (2) inches if internal orifice control was utilized and a small, cage type external trash rack.

N/A F9. Timbers properly reinforced or concrete footing provided if soil conditions were prohibitive.

N/A F10. Timber wall cross members extended to a minimum depth of two (2) feet below ground elevation.

N/A F11. Protection against erosion and scour from the low flow orifice and weir-flow trajectory provided.

XX F12. Stilling basin or standard outlet protection provided at principal spillway outlet.

XX F13. Adequate, direct access provided to the facility. Access corridor to facility is at least ten (10) feet wide, slope is less than twenty (20) percent and appropriate stabilization provided for equipment and vehicle use. Access extends to forebay, standpipe and timber wall, as applicable.

N/A F14. No visual signs of undercutting of timber walls or clogging of the low orifice were present.

XX F15. No visual signs of erosion or channel degradation immediately downstream of facility.

XX F16. No visible signs of accumulated silt/sediment were present in the facility following construction or alternately, accumulated silt/sediment was properly removed and no adverse affects to the function of the facility are anticipated.

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

IX. Group G - Open Spaces *(Includes All Open Space Types G-1; G-2; and G-3)*

N/A G1. All requirements of Section II, Minimum Standards, apply to Group G facilities as applicable.

___ G2. Constructed impervious areas appear to conform with locations indicated on the approved plan and appear less than sixty (60) percent impervious in accordance with the requirements of the James City County Chesapeake Bay Preservation Ordinance.

___ G3. Dedicated open space areas are in undisturbed common areas, conservation easements or are protected by other enforceable instruments that ensures perpetual protection.

___ G4. Provisions included to clearly specify how the natural vegetated areas utilized as dedicated open space will be managed and field identified (marked).

___ G5. Adequate protection measures were implemented during construction to protect the defined dedicated open space areas.

___ G6. Dedicated open space areas were not disturbed during construction (ie. cleared, grubbed or graded).

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

X. Storm Drainage Systems (Associated with BMP's Only)

(Includes all incidental stormwater drainage conveyance systems associated with SWM/BMP facilities such as onsite or offsite storm drains, open channels, inlets, manholes, junctions, outlet protections, deflectors, etc. These facilities are external to the treatment function of, but are directly associated with drainage to and/or from a constructed SWM/BMP facility. The intent of this portion of the certification is to accurately identify the type and quantity of inflow or outflow points associated with the facility for future reference. The Professional may use his/her own discretion to determine inclusive facilities to meet the intent of this section. As a general rule, storm drainage systems would include incidental facilities to the nearest access structure upslope or downslope from the normal physical limits of the facility or 800 feet of storm drainage conveyance system length, whichever is less.)

N/A SD1. All requirements of Section II, Minimum Standards, apply to Storm Drainage Systems.

___ SD2. Horizontal location of all pipe and structures relative to the SWM/BMP facility.

___ SD3. Type, top elevation and invert elevation of all access type structures (inlets, manholes, etc.).

___ SD4. Material type, size or diameter, class, invert elevations, lengths and slopes for all pipe segments.

___ SD5. Class, length, width and depth of riprap and outlet protections or dimensions of special energy dissipation structures.

XII. Other Systems

(Includes any non-typical, specialty, manufactured or innovative stormwater management/BMP practices or systems generally accepted for use as or in conjunction with other acceptable stormwater management / BMP practices. Requires evidence of prior satisfactory industry use and prior Environmental Division approval, waiver or exception .)

N/A O1. All requirements of Section II, Minimum Standards, apply to this section.

N/A O2. Certification criteria to be determined on a case-by-case basis by the Environmental Division specific to the proposed SWM/BMP facility.

XIII. References

(The James City County Record Drawing and Construction Certification Forms and Checklists for Stormwater Management / BMP facilities were developed using the following sources and references.)

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

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

James City County, Virginia
Environmental Division

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

County Plan No.: SP-143-00
Project Name: JCSA OPERATIONS CENTER EXPANSION
Stormwater Management Facility: _____
Phase: ☐ I ☐ II ☒ III

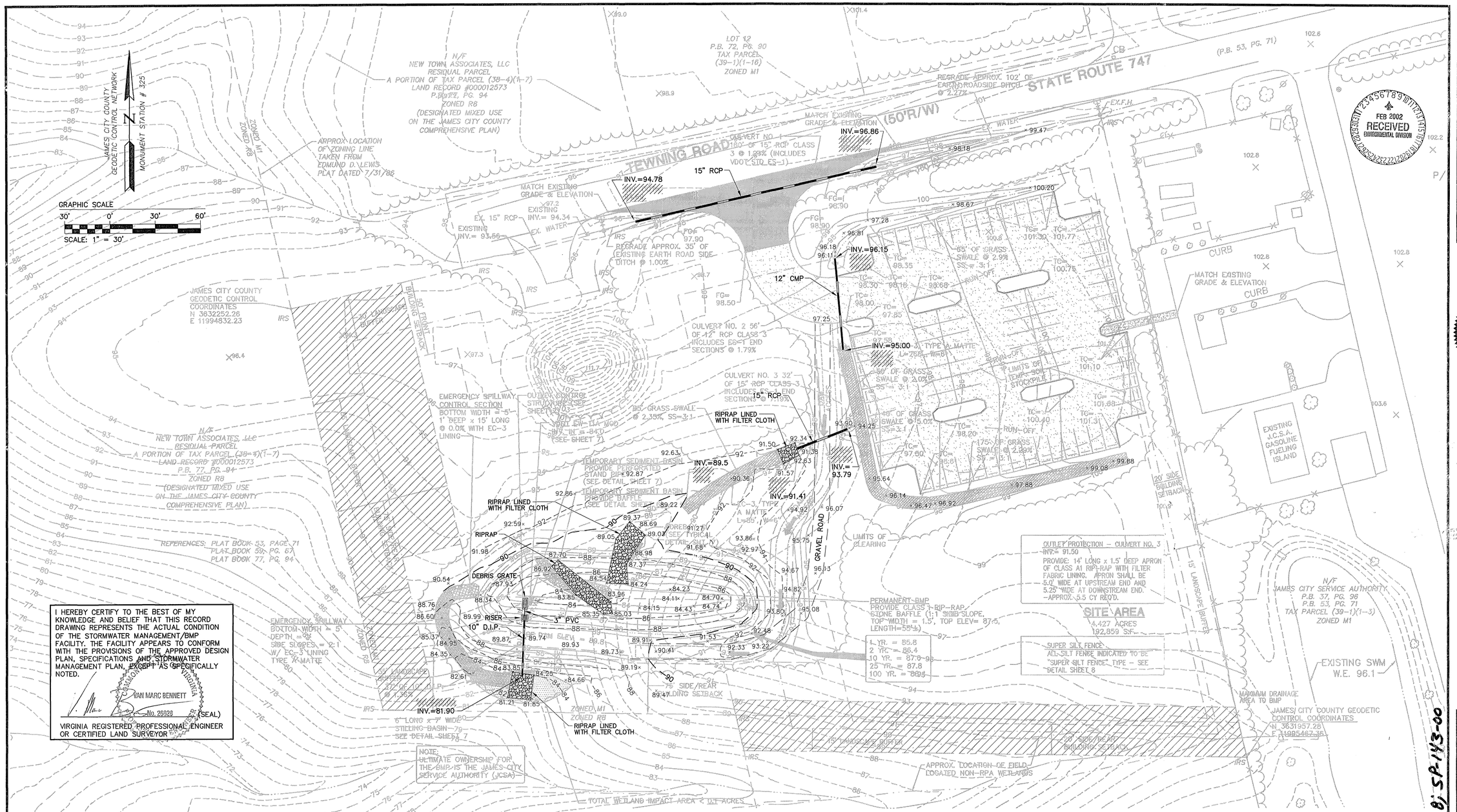
☒ Information Received. Date: FEB 08 '02
☐ Administrative Check.
- ☑ Record Drawing Date: AES 11/13/01; CERT 12/30/01
- ☑ Construction Certification Date: AES 01/10/02 P.E.
- ☑ RD/CC Standard Forms (Required after Feb 1st 2001Only)
- ☐ Insp/Maint Agreement Info: _____
- ☑ BMP Maintenance Plan Location: _____
- ☐ Other: _____

☐ Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review file.
☐ Yes ☐ No Location: _____
☑ Assign County BMP ID Code Code: PC 168
☑ 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, copy hydraulics, BMP information, etc.).
☒ Inspector Check of RD/CC.
☐ Pre-Inspection Drawing Review - Approved Plan (Quick look prior to field inspection).
☐ Final Inspection (FI) Performed Date: _____
☐ Record Drawing (RD) Review Date: _____
☐ Construction Certification (CC) Review Date: _____
☐ Actions:
- ☐ No comments.
- ☐ Comments. Letter Forwarded. Date: _____
  - ☐ Record Drawing (RD)
  - ☐ Construction Certification (CC)
  - ☐ Construction-Related (CR)
  - ☐ Site Issues (SI)
  - ☐ Other : _____

☐ Second Submission: _____
☐ Third Submission: _____
☐ Acceptable for stormwater managment facility purposes (RD/CC/CR/Other). Proceed with bond release.
☐ Notify Darryl/Joan/Pat of acceptability using email (preferred), form or verbal.
☐ Check/Clean active file of any remaining material and finish "As-Built" file.
☐ Add to County BMP Inventory/Inspection schedule (Phase I, II or III).
☐ Copy Final Inspection Report into County BMP Inspection Program file.
☐ Digital Photographs obtained.
☐ Add to JCC Hydrology & Hydraulic database (optional).

BMP Certification Information Acceptable

Plan Reviewer: _____ 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.

VAN MARC BENNETT No. 26628 (SEAL)

VIRGINIA REGISTERED PROFESSIONAL ENGINEER OR CERTIFIED LAND SURVEYOR

RECORD DRAWING BASED ON INFORMATION AS SUPPLIED BY AES CONSULTING ENGINEERS

STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT IN TO THE FACTILITY, 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 OF THESE NEWLY DISTRIBUTED AREAS AS WELL AS INSPECTIONS FOR ACCUMULATED SEDIMENTS AT TWO BMP FACILITY.

A DESIGNATED REPRESENTATIVE OF THE OWNER WILL INSPECT THE BMP STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING WORKING DAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF 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. KEYS TO LOCKED ACCESS POINTS SHALL BE MADE AVAILABLE TO COUNTY INSPECTION PERSONNEL UPON REQUEST.

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

1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. SEDIMENT REMOVAL IS REQUIRED USING A RUBBER-WHEELED BACKHOE. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, THE RISER BOTTOM AND OUTLET PIPE SHALL BE CLEANED OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA. SEDIMENT SHALL NOT BE ALLOWED TO ACCUMULATE IN DEPTHS GREATER THAN 1-FOOT. NO SEDIMENT SHALL BE ALLOWED TO ACCUMULATE TO PREVENT THE PROPER FUNCTION OF ANY PIPE OR CULVERT.

2. PERFORM MAINTENANCE MOWING OF GRASSED AREAS AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ON ANY PART OF THE GRADED EMBANKMENT.

3. PERFORM SOIL SAMPLING ON STABILIZED BMP SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.

4. IN STABILIZED BMP AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACES, LIME 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 SURFACES, LIME FERTILIZE AND OVERSEED IN ACCORDANCE WITH CURRENT SEEDLING RECOMMENDATIONS.

5. PERFORM QUARTERLY INSPECTIONS OF THE RELEASE STRUCTURES, 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. DURING QUARTERLY INSPECTIONS, THE POND DRAIN VALVE, USUALLY LEFT IN THE VALVE "CLOSED" POSITION, SHALL BE INSPECTED AND OPERATED THROUGH TWO COMPLETE FULL-OPEN TO FULL-CLOSE TO FULL-OPEN CYCLES.

6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, ORIFICE/ WEIR(S), OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE CONTINUED INTEGRITY OF THE STRUCTURE.

7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE FACILITY FOR SIGNS OF ANIMAL/ RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.

8. RECORD KEEPING. THE LANDOWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/ OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.

9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.

10. KEEP TREES AND SHRUBS AT LEAST 25' FROM PRINCIPAL FLOW CONTROL STRUCTURES.

11. PLANTINGS ALONG THE SOUTHERN EDGE OF BMP ARE TO ENHANCE VISUAL APPEAL OF FACILITY AND TO STABILIZE EMBANKMENT. QUARTERLY INSPECTIONS SHOULD BE MADE TO INSURE THAT PLANTINGS ARE SERVING THEIR INTENDED PURPOSES.

12. REMOVE PLANTS THAT ARE DEGRADING THE STRUCTURAL INTEGRITY OF THE FACILITY.

13. REPLACE DEAD OR DYING PLANT MATERIAL AS NEEDED TO INSURE STRUCTURAL INTEGRITY OF THE FACILITY.

SUT REVIEW SET PC18; SP-143-00

RECORD DRAWING - 11/13/01

No.	DATE	REVISION / COMMENT / NOTE	BY
1	11/13/01	RECORD AS-BUILT DRAWING	VMB

FEB 2002 RECEIVED ENVIRONMENTAL DIVISION

COMMONWEALTH OF VIRGINIA VAN MARC BENNETT No. 26628 PROFESSIONAL ENGINEER

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

GRADING, DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
JCSA OPERATIONS CENTER SITE EXPANSION
OWNER: JAMES CITY SERVICE AUTHORITY
BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VMB/RDS	SRL
Scale	Date
1"=30'	11/27/00
Project No.	
8651-18	
Drawing No.	
4	

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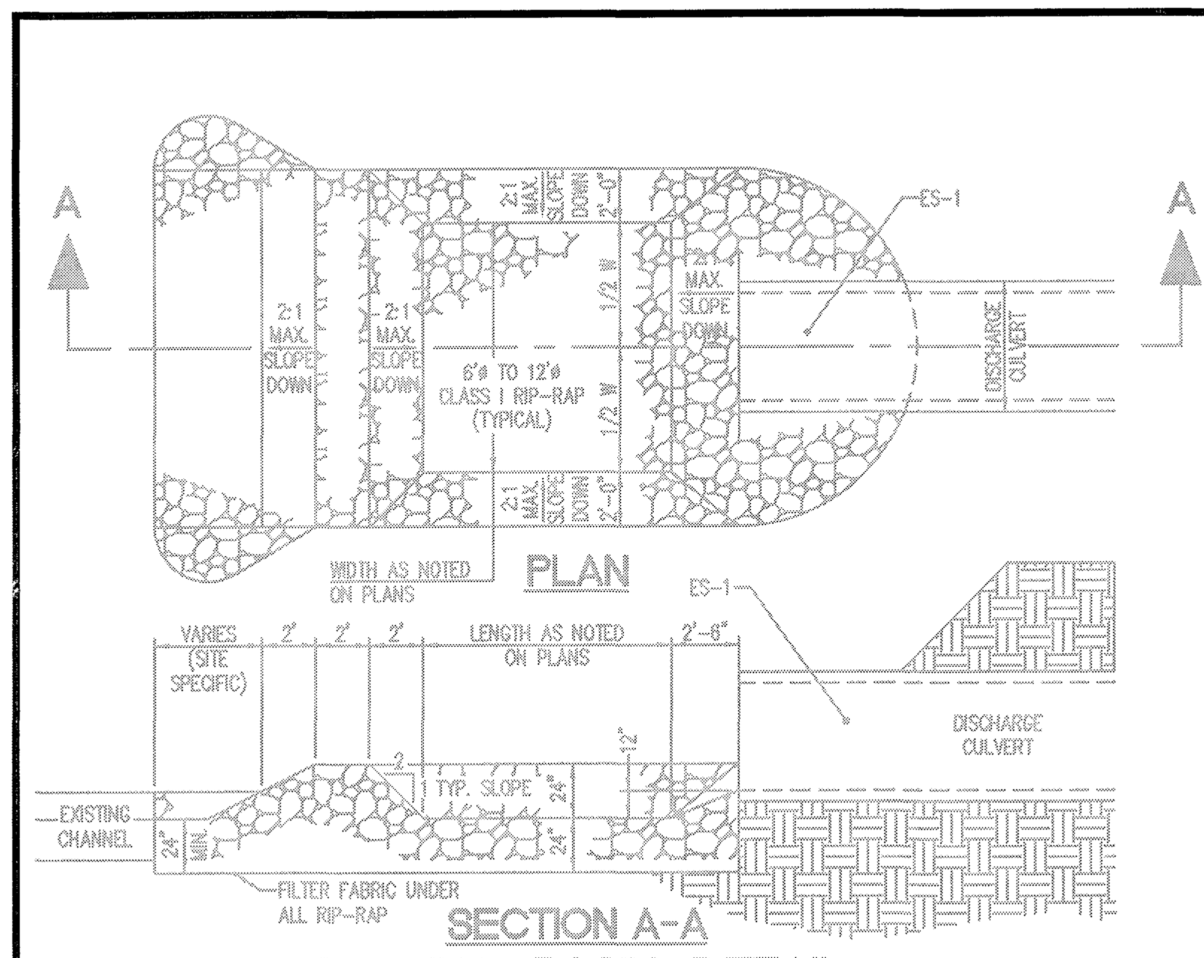
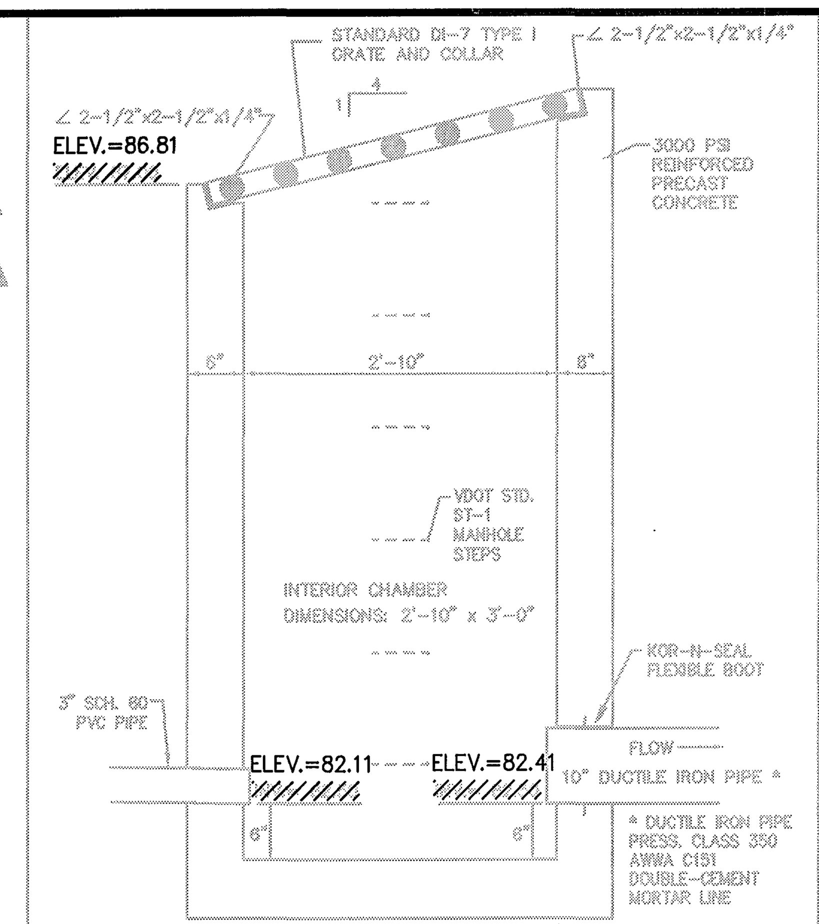


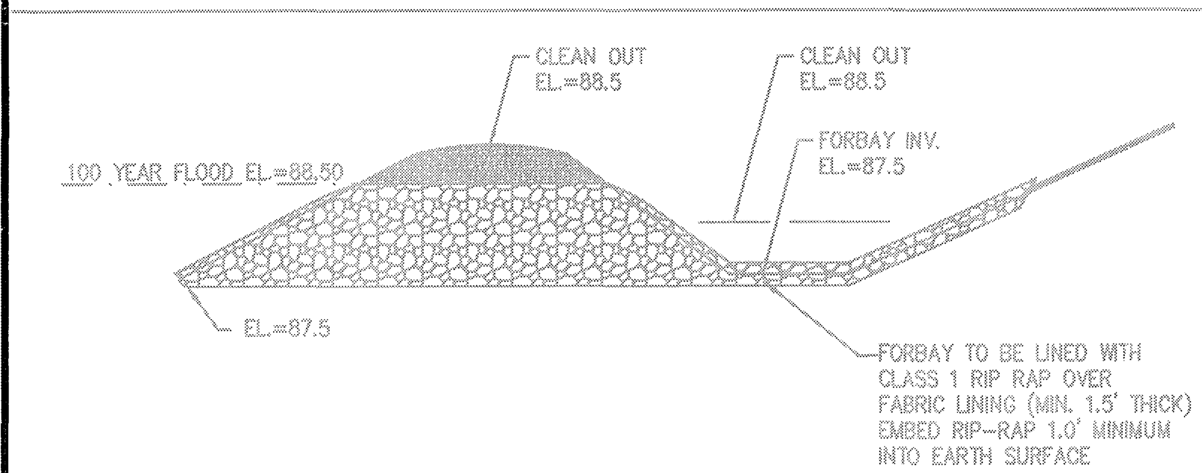
STILLING BASIN DETAIL

NOT TO SCALE



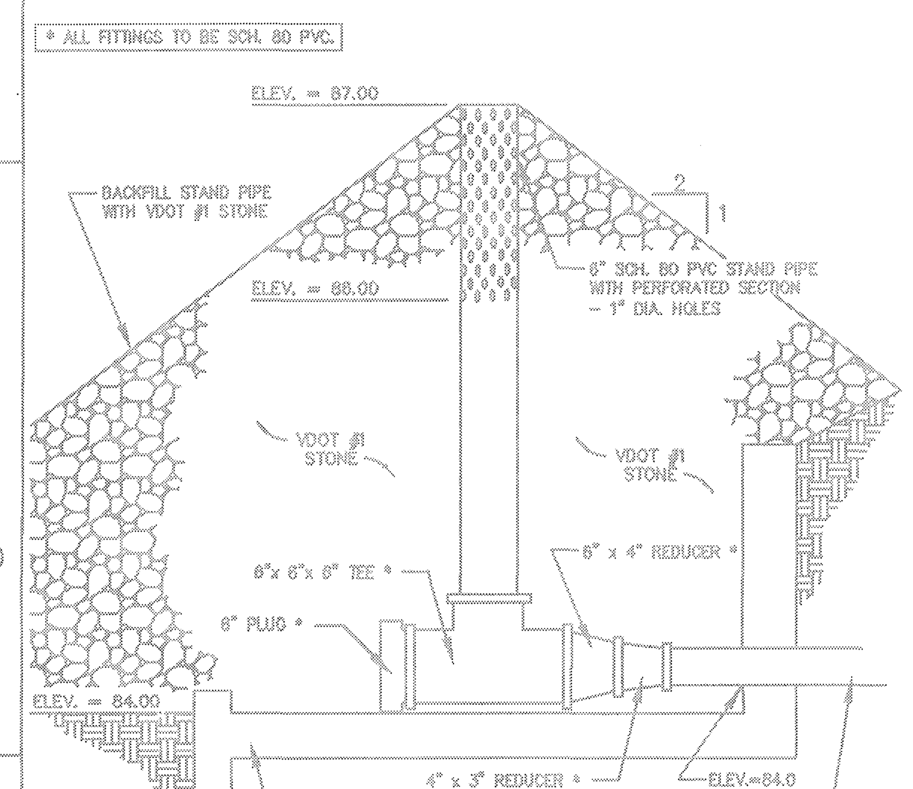
OUTLET CONTROL STRUCTURE DETAIL

SCALE: N.T.S.



TYPICAL FOREBAY RIPRAP DETAIL

N.T.S.



NOTE:
WHEN CONVERTING TO PERMANENT FACILITY, REMOVE STAND PIPE, FITTINGS AND STONE. CLEAN OUT ALL BUILT-UP SEDIMENT AND CUT 3" SCH. 80 PVC PIPE FLUSH WITH WALL OF EW-11 AND ATTACH GRATE.

TEMPORARY SEDIMENT BASIN STAND PIPE

SCALE: N.T.S.

EROSION AND SEDIMENT CONTROL NARRATIVE

PROJECT DESCRIPTION
THIS PROJECT IS DESIGNED AS AN EXPANSION OF THE EXISTING JCSA OPERATIONS CENTER TO THE WEST OF THE SITE, CONTAINING A PARKING LOT . THE ADDRESS FOR THE PROJECT IS 107 TEWNING ROAD.

EXISTING SITE CONDITIONS
THE SITE FOR THIS SUBDIVISION IS PRESENTLY WOODED WITH MODERATELY SLOPING LANDFORMS. WOODED RAVINES EXIST TO THE SOUTHWEST.
WETLAND AREAS ARE LOCATED TO THE SOUTH OF THE SITE. THE EXISTING JCSA OPERATIONS CENTER SITE IS CURRENTLY LOCATED TO THE EAST.

ADJACENT PROPERTY
THE SITE FOR THESE IMPROVEMENTS IS LOCATED ADJACENT TO THE NEW TOWN PLANNED DEVELOPMENT, TO THE WEST AND SOUTH. THE EXISTIND JCSA OPERATIONS CENTER, TO THE EAST. TEWNING ROAD TO THE NORTH.

CRITICAL EROSION AREAS

CRITICAL EROSION AREAS, OR HIGHLY ERODIBLE AREAS HAVE BEEN IDENTIFIED ON SHEET 2 OF THE PLAN SET.

PRACTICES USED IN THESE PLANS

THE FOLLOWING EROSION AND SEDIMENT CONTROL PRACTICES ARE TO BE UTILIZED DURING CONSTRUCTION:

TREE PROTECTION – TO BE INSTALLED PRIOR TO ANY GRADING AND LAND DISTURBING ACTIVITIES

TEMPORARY SEDIMENT BASINS – ONE IS REQUIRED FOR THIS SITE. THE SEDIMENT BASIN IS TO BE CONSTRUCTED ACROSS A NATURAL SWALE, DETAILS INDICATING THE DIMENSIONS OF THESE FACILITIES ARE SHOWN ON THE PLANS.

OUTLET PROTECT – CLASS 1 RIP-RAP SHALL BE UTILIZED IN ALL STILLING BASINS AND STORM SEWER OUTFALLS

SILT FENCE – SILT FENCE BARRIERS SHALL BE INSTALLED AT ALL DOWNSTREAM LOCATIONS OF GRADING AND LAND DISTURBING ACTIVITIES

TEMPORARY CONSTRUCTION ENTRANCE – A STONE TEMPORARY CONSTRUCTION ENTRANCE IS PROVIDED AT THE ENTRANCE TO THE SITE. THE TRACKING OF MUD AND DEBRIS FROM THE SITE BY CONSTRUCTION EQUIPMENT SHALL NOT BE PERMITTED.

CULVERT INLET PROTECTION – CULVERT INLET PROTECTION SHALL BE INSTALLED AT THE INLETS OF ALL CULVERTS

ROCK CHECK DAMS – CHECK DAMS SHALL BE PROVIDED IN ALL ROADSIDE DITCHES AT 100-FOOT INTERVALS

PERMANENT SEEDING – PERMANENT SEEDING SHALL BE APPLIED TO ALL DENUDED AREAS AFTER FINAL GRADING AND TOPSOILING HAS BEEN COMPLETED

ALL EROSION AND SEDIMENT CONTROL MEASURES, WHETHER STRUCTURAL OR NON-STRUCTURAL, SHALL BE MAINTAINED BY THE CONTRACTOR. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE THE EROSION AND SEDIMENT CONTROL MEASURES ARE FUNCTIONAL UNTIL THE ENTIRE SITE HAS BEEN PERMANENTLY STABILIZED.

SEQUENCE OF CONSTRUCTION

1 – CLEAR PERIMETER, (THE NEW PARKING LOT, MATERIALS STORAGE LOT, AND BMP), THEN INSTALL TREE PROTECTION AND SILT FENCE.
2 – INSTALL STONE CONSTRUCTION ENTRANCE (NEW PARKING LOT).
3 – STRIP TOPSOIL FROM CLEARED AREAS FOR EARTHWORK OPERATIONS, AND STOCKPILE ON SITE AS INDICATED ON THE PLAN. CONSTRUCT TEMPORARY SEDIMENT BASIN IN CONJUNCTION WITH THE EARTHWORKS OPERATIONS.
4 – CONTINUE SITE EARTHWORK OPERATIONS (SUB-GRADE GRADING); INSTALL DRIVEWAY CULVERTS.
5 – COMPLETE PARKING CONSTRUCTION WITH FINE GRADING, CEMENT TREATED AGGREGATE (CTA) FINAL SURFACE.
6 – TOPSOIL DENUDED AREAS AND PERMANENTLY SEED.
7 – REMOVE ALL ACCUMULATED SEDIMENT IN TEMPORARY SEDIMENT BASIN CONSTRUCT PERMANENT MODIFICATION TO BMP. REMOVE EROSION CONTROL MEASURES UPON SITE STABILIZATION. INSTALL ALL PERMANENT STILLING, AFTER OBTAINING J.C.C. ENVIRONMENTAL DIVISON APPROVAL.

GENERAL NOTES FOR CONSTRUCTION OF STORMWATER BASINS

1. THE CONTRACTOR SHALL PROVIDE ALL WORK AND MATERIALS NEEDED TO CONSTRUCT THE STORMWATER BASIN, STORMWATER MANAGEMENT PONDS, BEST MANAGEMENT PRACTICES, SEDIMENT BASINS AND SEDIMENT TRAPS. THE WORK SHALL INCLUDE ALL LABOR, MATERIALS, EQUIPMENT AND MATERIALS NEEDED FOR THE COMPLETION OF GRADING AND EARTHWORK ASSOCIATED WITH THE CONSTRUCTION.

2. THE CONTRACTOR SHALL CONSULT AND PROVIDE FOR THE SERVICES OF A GEOTECHNICAL ENGINEER. THE GEOTECHNICAL ENGINEER SHALL PROVIDE TEST RESULTS ON PLACED DAM MATERIALS, IDENTIFYING SOIL CLASSIFICATION, PERMEABILITY, PLASTICITY INDEX, AND COMPACTION. ALL TESTS SHALL BE IN CONFORMANCE WITH ASTM STANDARDS. THE COST OF THE SERVICES OF THE GEOTECHNICAL ENGINEER SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SATISFACTORY GEOTECHNICAL REULTS ARE NEEDED PRIOR TO FINAL APPROVAL.

3. ALL INSPECTIONS REQUIRED FOR THE WORK SHALL BE PERFORMED BY A GEOTECHNICAL ENGINEER AT THE EXPENSE OF THE GENERAL CONTRACTOR.

4. ON-SITE EXCAVATED MATERIAL, IF DETERMINED SUITABLE FOR USE IN DAM CONSTRUCTION BY A GEOTECHNICAL ENGINEER, MAY BE USED FOR DAM CONSTRUCTION. SHOULD ADDITIONAL MATERIAL BE REQUIRED, THE CONTRACTOR SHALL IDENTIFY THE NEED FOR MATERIAL TO THE OWNER, AS ADDITIONAL BORROW MATERIAL MAY BE AVAILABLE ON THE STONEHOUSE PROPERTY. ALL EXCAVATED MATERIAL DETERMINED BY THE GEOTECHNICAL ENGINEER TO BE UNSUITABLE SHALL BE DISPOSED OF PROPERLY AT THE CONTRACTOR'S EXPENSE. ALL EXCAVATED MATERIAL NOT REQUIRED FOR BACKFILLING SHALL EITHER BE DEPOSITED ON SITE AND SPREAD BY THE CONTRACTOR, OR SHALL BE DEPOSITED IN AN AREA ON THE SITE AS DIRECTED BY THE OWNER. THE CONTRACTOR SHALL PROVIDE PROPER STABILIZATION, AND EROSION AND SEDIMENT CONTROL MEASURES NEEDED TO CONTROL AS PER THE VESCH THIRD EDITION.

5. UNDERCUT FOR THE FOUNDATION OF THE DAM EMBANKMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. THE FOUNDATION SHALL BE BACKFILLED WITH SOILS CLASSIFIED AS SM, SC, OR CL UNDER THE UNIFIED SOIL CLASSIFICATION SYSTEM. SOILS SHALL HAVE A MINIMUM OF 15% BY WEIGHT FINES, HAVING A PLASTICITY INDEX OF 30% AND A PERMEABILITY OF 0.0004 IN./SEC. OR LESS. FILL SHALL BE COMPACTED IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO A DRY DENSITY OF 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). EXCAVATION FOR THE DAM KEY SHALL BE IN ACCORDANCE TO THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. HEIGHT, DEPTH, AND WIDTH OF THE KEY SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. THE KEY SHALL BE FORMED USING SOILS CLASSIFIED AS SC OR CL, WITH A PERMEABILITY OF 0.0004 IN./SEC. OR LESS.

6. THE DAM CORE SHALL BE AS CONSTRUCTED WITH NON-EXPANSIVE SC OR CL CLAYEY MATERIAL WITH PERMEABILITY OF 0.0004 IN./SEC. OR LESS. THE FILL OF THE CORE SHALL BE MADE IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). SIZE, SHAPE, WIDTH, DEPTH, AND HEIGHT OF THE DAM CORE SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. TO COVER THE DAM CORE, A SILTY FINE SAND OR CLAYEY SOIL (SM, SC, OR CL) SHALL BE PLACED. A VEGETATIVE COVER USING VDOT EC-2 EROSION CONTROL BLANKETS SHALL BE PLACED ON DAM SLOPES AND CREST TO PREVENT EROSION.

7. UPON COMPLETION, THE CONSTRUCTION OF THE THE DAM WILL BE CERTIFIED BY A GEOTECHNICAL ENGINEER WHO HAS INSPECTED THE STRUCTURE DURING CONSTRUCTION.

STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT IN TO THE FACTILITY, 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 OF THESE NEWLY DISTRIBUTED AREAS AS WELL AS INSPECTIONS FOR ACCUMULATED SEDIMENTS AT TWO BMP FACILITY.

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3. PERFORM SOIL SAMPLING ON STABILIZED BMP SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.

4. IN STABILIZED BMP AREAS, IF VEGETATION COVERS LESS THAN 40 % OF SOIL SURFACES, LIME 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 RELEASE STRUCTURES, 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. DURING QUARTERLY INSPECTIONS, THE POND DRAIN VALVE, USUALLY LEFT IN THE VALVE "CLOSED" POSITION, SHALL BE INSPECTED AND OPERATED THROUGH TWO COMPLETE FULL-OPEN TO FULL-CLOSE TO FULL-OPEN CYCLES.

6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, ORIFICE/ WEIR(S), OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE CONTINUED INTEGRITY OF THE STRUCTURE.

7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE FACILITY FOR SIGNS OF ANIMAL/ RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.

8. RECORD KEEPING. THE LANDOWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/ OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.

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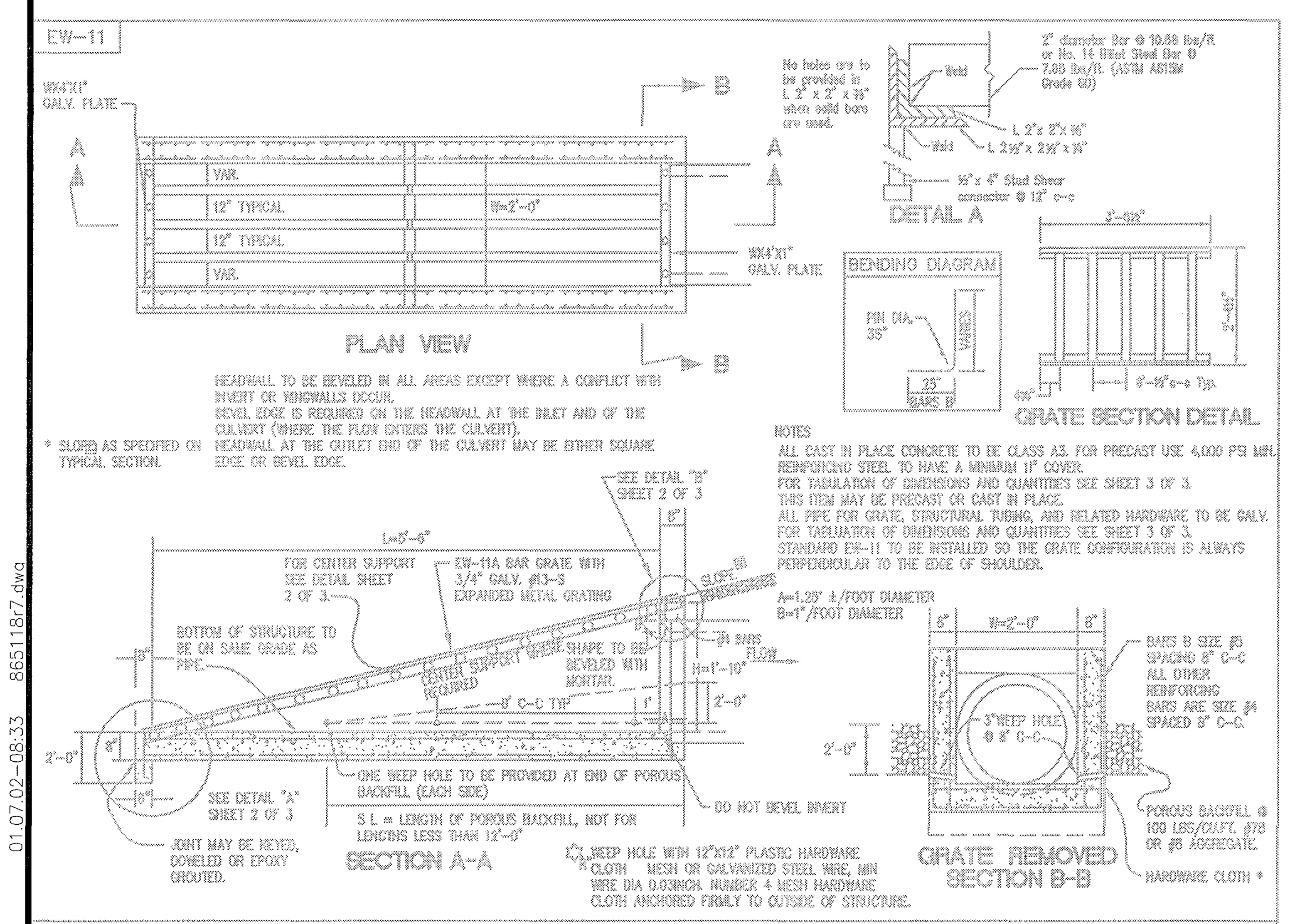
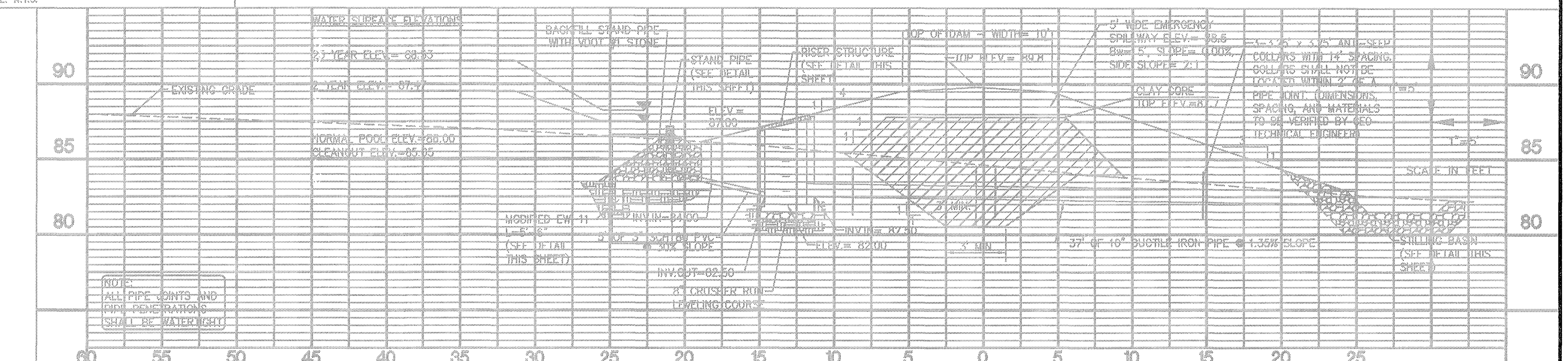


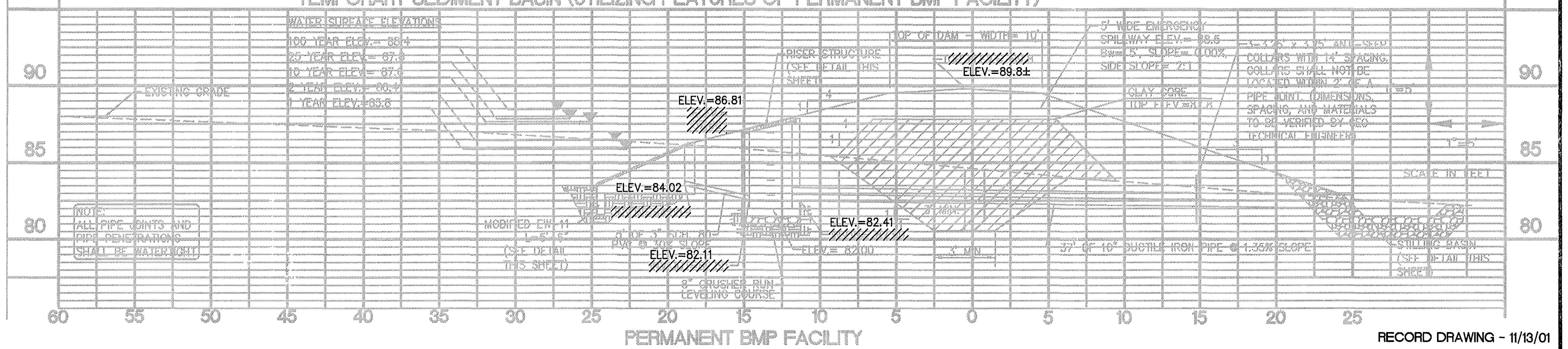
NOTES
ALL CAST IN PLACE CONCRETE TO BE CLASS A3. FOR PRECAST USE 4,000 PSI MIN. REINFORCING STEEL TO HAVE A MINIMUM 1" COVER.
FOR TABULATION OF DIMENSIONS AND QUANTITIES SEE SHEET 3 OF 3.
THIS ITEM MAY BE PRECAST OR CAST IN PLACE.
ALL PIPE FOR GRATE, STRUCTURAL TUBING, AND RELATED HARDWARE TO BE GALV.
FOR TABULATION OF DIMENSIONS AND QUANTITIES SEE SHEET 3 OF 3.
STANDARD EW-11 TO BE INSTALLED SO THE GRATE CONFIGURATION IS ALWAYS PERPENDICULAR TO THE EDGE OF SHOULDER.

HEADWALL TO BE BEVELED IN ALL AREAS EXCEPT WHERE A CONFLICT WITH INVERT OR WINGWALLS OCCUR.
BEVEL EDGE IS REQUIRED ON THE HEADWALL AT THE INLET END OF THE CULVERT (WHERE THE FLOW ENTERS THE CULVERT).
HEADWALL AT THE OUTLET END OF THE CULVERT MAY BE EITHER SQUARE EDGE OR BEVEL EDGE.
* SLOPE AS SPECIFIED ON TYPICAL SECTION.

PIPE ENDWALL (EW-11 MOD.) WITH LOAD - CARRYING GRATE EW-11A



TEMPORARY SEDIMENT BASIN (UTILIZING FEATURES OF PERMANENT BMP FACILITY)



PERMANENT BMP FACILITY

RECORD DRAWING - 11/13/01

No.	DATE	REVISION / COMMENT / NOTE	BY
3	11/13/01	RECORD AS-BUILT DRAWING	VMB
2	6/21/01	REVISED BMP/TEMP. SED. BASIN --FIELD CHANGE	VMB
1	1/11/01	REVISED PER J.C.C. COMMENT LETTER DATED 1/12/01	VMB

COMMONWEALTH OF VIRGINIA
VAN MARC BENNETT
No. 25628
1/16/01
PROFESSIONAL ENGINEER

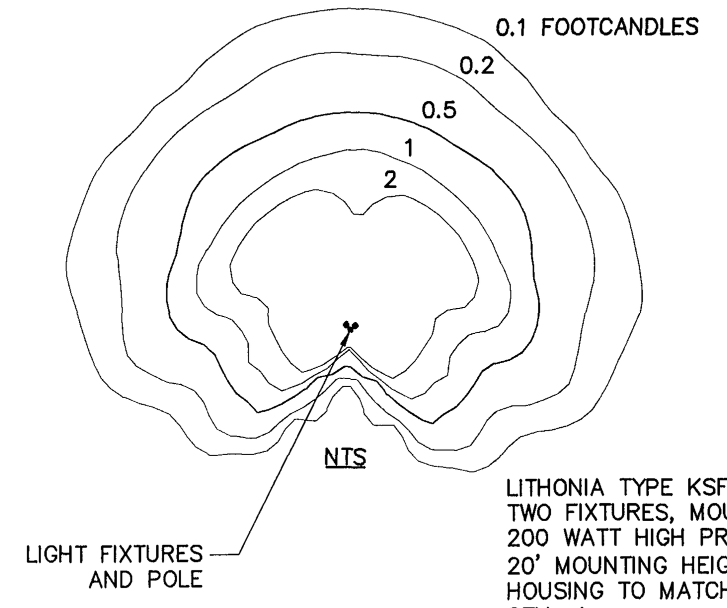
AES CONSULTING ENGINEERS
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
Fax (757) 220-8994

STORM WATER MANAGEMENT BASIN DETAILS
JCSA OPERATIONS CENTER
SITE EXPANSION
OWNER: JAMES CITY SERVICE AUTHORITY

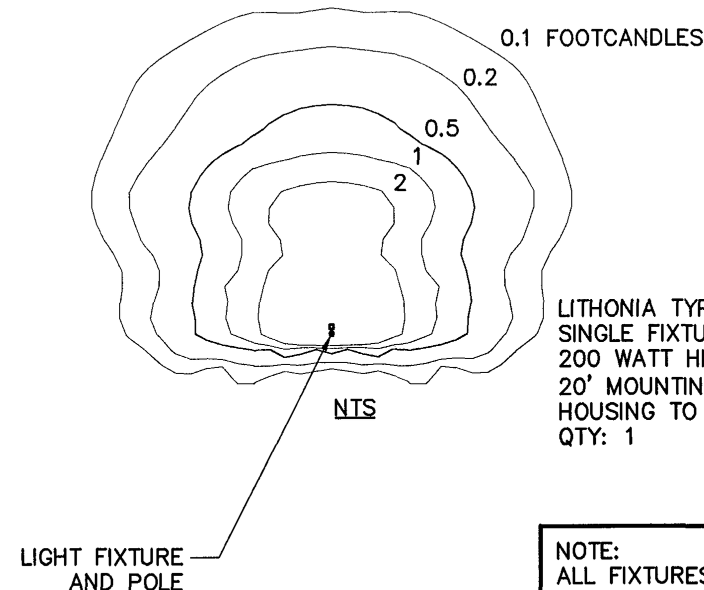
BERKELEY DISTRICT — JAMES CITY COUNTY — VIRGINIA

Designed VMB	Drawn RDS
Scale N.T.S.	Date 11/27/00
Project No. 8651-18	
Drawing No. 7	

AWT 01.07.02-08:33 865118r7.dwg

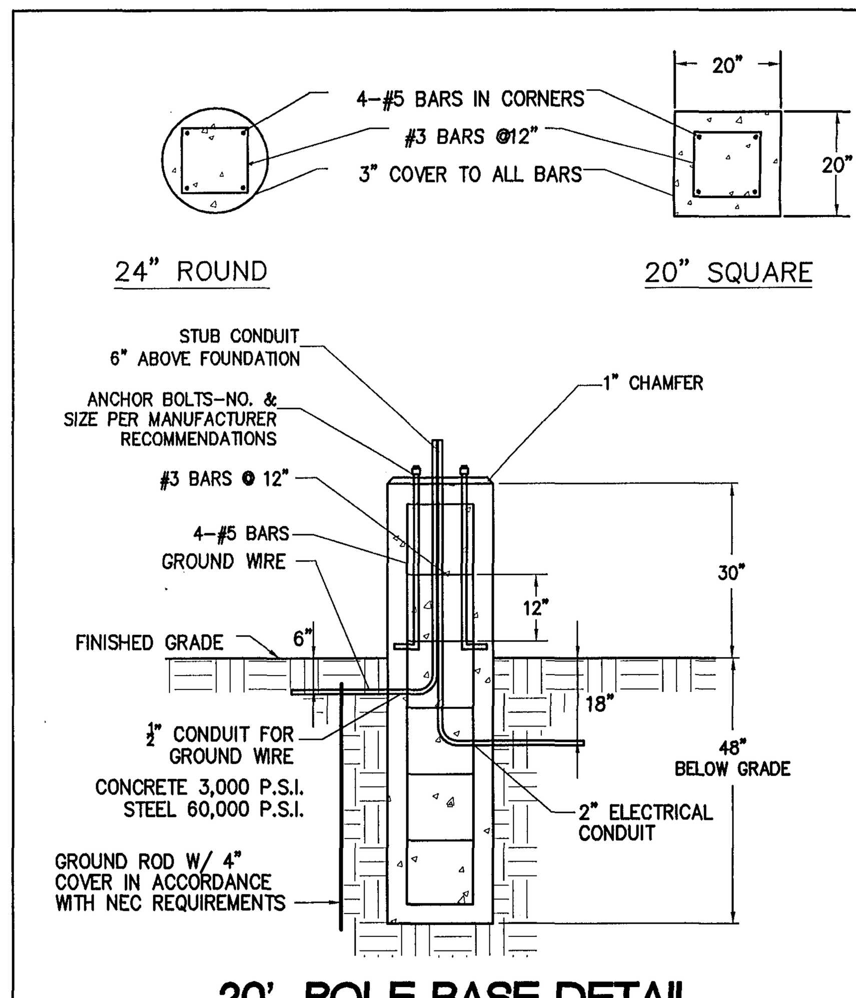


LITHONIA TYPE KSF R4
TWO FIXTURES, MOUNTED AT 0°AND 90°.
200 WATT HIGH PRESSURE SODIUM LAMPS
20' MOUNTING HEIGHT
HOUSING TO MATCH POLE COLOR
QTY: 4



LITHONIA TYPE KSF R4
SINGLE FIXTURE
200 WATT HIGH PRESSURE SODIUM LAMPS
20' MOUNTING HEIGHT
HOUSING TO MATCH POLE COLOR
QTY: 1

NOTE:
ALL FIXTURES EQUIPPED WITH PHOTOELECTRIC CELLS.



20' POLE BASE DETAIL

N.T.S

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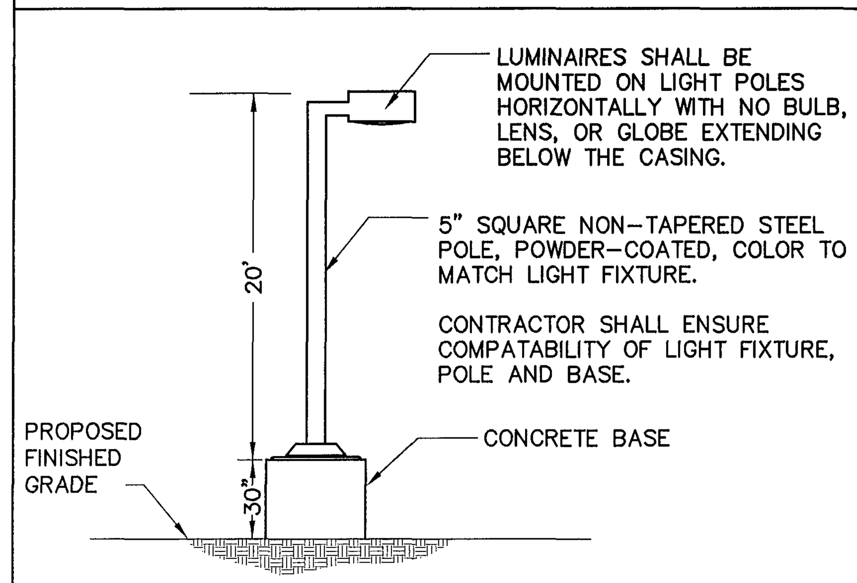
CONDUIT ELBOWS SHALL HAVE A 90° BEND. THE BEND RADIUS SHALL BE IN ACCORDANCE WITH THE NEC.

SIZING OF ELECTRICAL SERVICE WIRING SHALL BE THE CONTRACTORS RESPONSIBILITY AND SHALL MEET NEC REQUIREMENTS FOR APPLICATION.

CONTRACTOR SHALL BASE HIS BID ON PROVIDING ELECTRICAL SERVICE FROM ADJACENT JCSA BUILDINGS UP TO 275 FEET FROM EAST SIDE OF PROPOSED PARKING AREA. ELECTRICAL SERVICE CONNECTION SHALL BE IN AN EXISTING PANEL BOARD WITHIN THE BUILDING. CONTRACTOR SHALL PROVIDE A 2 POLE-20A OR 30A BREAKER AND ALL NECESSARY WIRING FROM THE PANEL BOARD TO THE EXTERIOR OF THE BUILDING. CONTRACTOR SHALL ASSUME THAT THE ELECTRICAL SERVICE SHALL BE TRENCHED ACROSS PAVED SURFACES TO INSTALL CONDUIT. TRENCH SHALL BE REPAIRED, USING VDOT 21-A STONE AND 4" OF SM-2A SURFACE. ALL PAVED SURFACES SHALL BE SAW CUT PRIOR TO TRENCHING.



TYPICAL POLE BASE DETAIL

N.T.S.

08.01.01-15:16 865118c5.dwg DLD

PLANT LIST

KEY	QTY.	BOTANICAL NAME	COMMON NAME	MIN. SIZE	ROOT	COMMENT
TREES:						
AR2	12	ACER RUBRUM 'OCT. GLORY'	OCT. GLORY RED MAPLE	2-1/2 " CAL	B & B	SINGLE STEM
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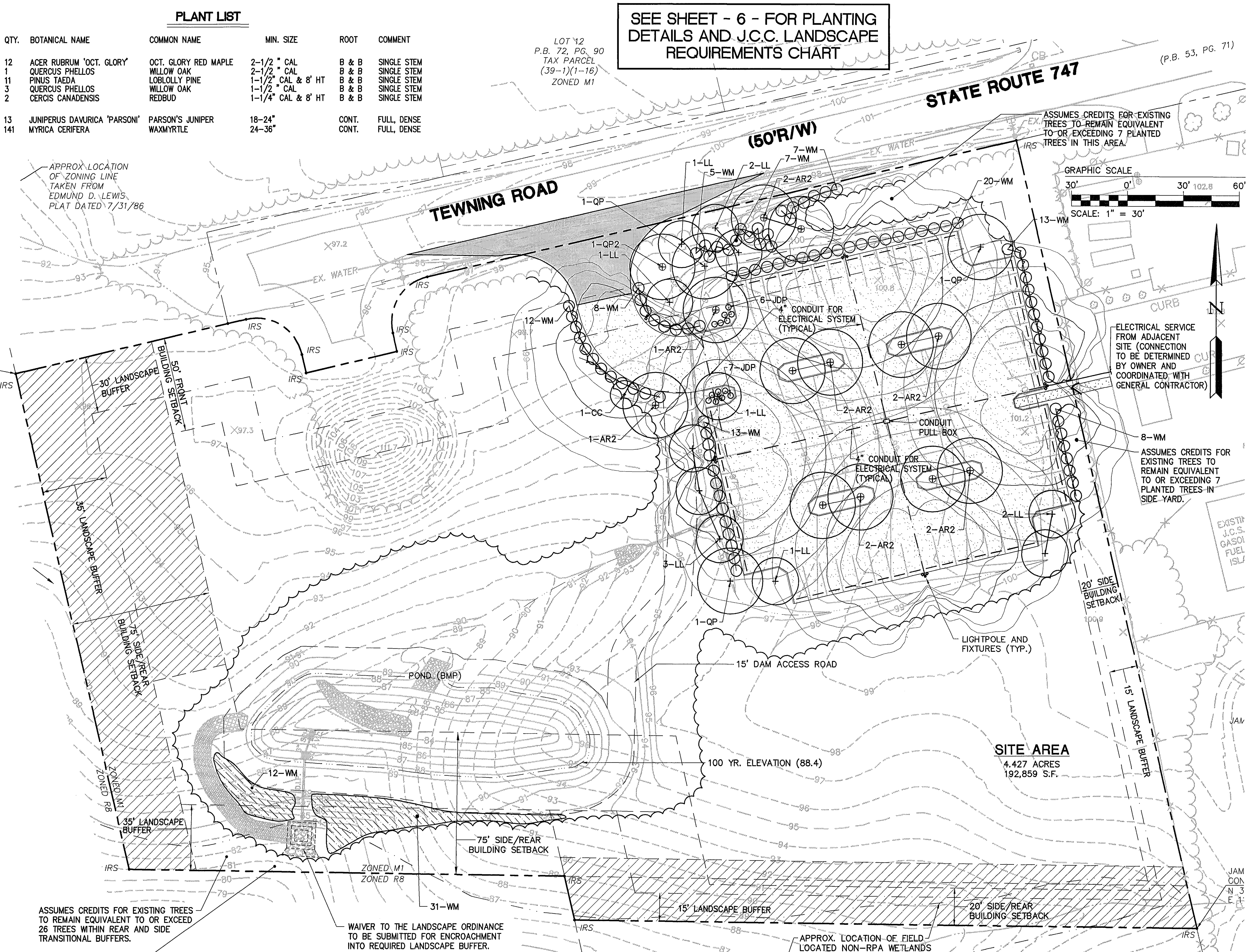
CC	2	CERCIS CANADENSIS	REDBUD	1-1/4" CAL & 8' HT	B & B	SINGLE STEM
SHRUBS:						
JDP	13	JUNIPERUS DAVURICA 'PARSONI'	PARSON'S JUNIPER	18-24"	CONT.	FULL, DENSE
WM	141	MYRICA CERIFERA	WAXMYRTLE	24-36"	CONT.	FULL, DENSE

SEE SHEET - 6 - FOR PLANTING DETAILS AND J.C.C. LANDSCAPE REQUIREMENTS CHART



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PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT IN TO THE FACTILITY, 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 OF THESE NEWLY DISTRIBUTED AREAS AS WELL AS INSPECTIONS FOR ACCUMULATED SEDIMENTS AT TWO BMP FACILITY.

A DESIGNATED REPRESENTATIVE OF THE OWNER WILL INSPECT THE BMP STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING WORKING DAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF 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. KEYS TO LOCKED ACCESS POINTS SHALL BE MADE AVAILABLE TO COUNTY INSPECTION PERSONNEL UPON REQUEST.

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

1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. SEDIMENT REMOVAL IS REQUIRED USING A RUBBER-WHEELED BACKHOE. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, THE RISER BOTTOM AND OUTLET PIPE SHALL BE CLEANED OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA. SEDIMENT SHALL NOT BE ALLOWED TO ACCUMULATE IN DEPTHS GREATER THAN 1-FOOT. NO SEDIMENT SHALL BE ALLOWED TO ACCUMULATE TO PREVENT THE PROPER FUNCTION OF ANY PIPE OR CULVERT.

2. PERFORM MAINTENANCE MOWING OF GRASSED AREAS AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ON ANY PART OF THE GRADED EMBANKMENT.

3. PERFORM SOIL SAMPLING ON STABILIZED BMP SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.

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5. PERFORM QUARTERLY INSPECTIONS OF THE RELEASE STRUCTURES, 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. DURING QUARTERLY INSPECTIONS, THE POND DRAIN VALVE, USUALLY LEFT IN THE VALVE "CLOSED" POSITION, SHALL BE INSPECTED AND OPERATED THROUGH TWO COMPLETE FULL-OPEN TO FULL-CLOSE TO FULL-OPEN CYCLES.

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9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.

10. KEEP TREES AND SHRUBS AT LEAST 25' FROM PRINCIPAL FLOW CONTROL STRUCTURES.

11. PLANTINGS ALONG THE SOUTHERN EDGE OF BMP ARE TO ENHANCE VISUAL APPEAL OF FACILITY AND TO STABILIZE EMBANKMENT. QUARTERLY INSPECTIONS SHOULD BE MADE TO INSURE THAT PLANTINGS ARE SERVING THEIR INTENDED PURPOSES.

12. REMOVE PLANTS THAT ARE DEGRADING THE STRUCTURAL INTEGRITY OF THE FACILITY.

13. REPLACE DEAD OR DYING PLANT MATERIAL AS NEEDED TO INSURE STRUCTURAL INTEGRITY OF THE FACILITY.

NOTES TO LANDSCAPE CONTRACTOR:

1. GROUPINGS OF PLANTS SHALL BE MULCHED IN CONTINUOUS BEDS.
2. SINGLE STEM DECIDUOUS SHADE TREES SHALL BE STAKED AS DETAILED IN TREE PLANTING METHOD.
3. ANY PLANT MATERIAL SUBSTITUTIONS MUST BE APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

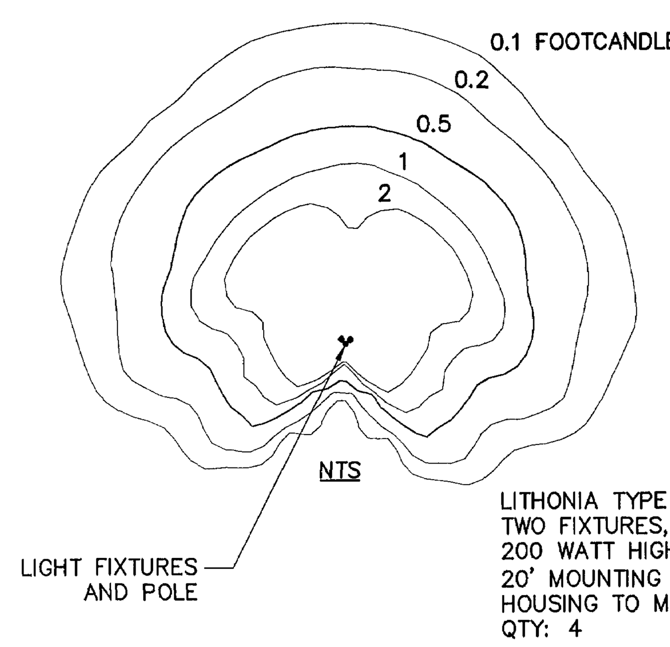
No.	DATE	REVISION / COMMENT / NOTE	BY
2	6/5/01	REVISED PER SITE VISIT & COUNTY AGREEMENT	JSP
1	1/11/01	REVISED PER J.C.C. COMMENT LETTER DATED 1/12/01	JSP

COMMONWEALTH OF VIRGINIA
JAMES S. PETERS
No. 000393
1/16/01
CERTIFIED LANDSCAPE ARCHITECT

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

LANDSCAPE AND LIGHTING PLAN
JCSA OPERATIONS CENTER SITE EXPANSION
OWNER: JAMES CITY SERVICE AUTHORITY
BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
JSP/LLM	AWT
Scale	Date
1"=30'	11/27/00
Project No.	
8651-18	
Drawing No.	
5	



LITHONIA TYPE KSF R4
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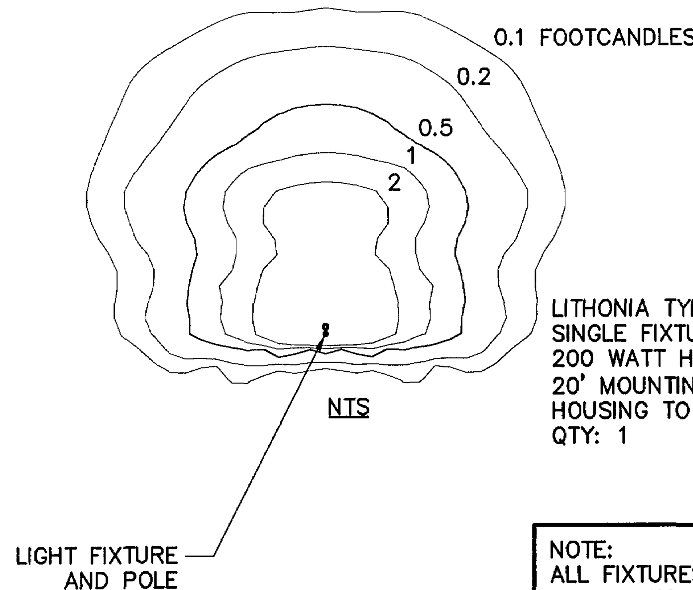
20' MOUNTING HEIGHT
HOUSING TO MATCH POLE COLOR
QTY: 4



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NOTE:
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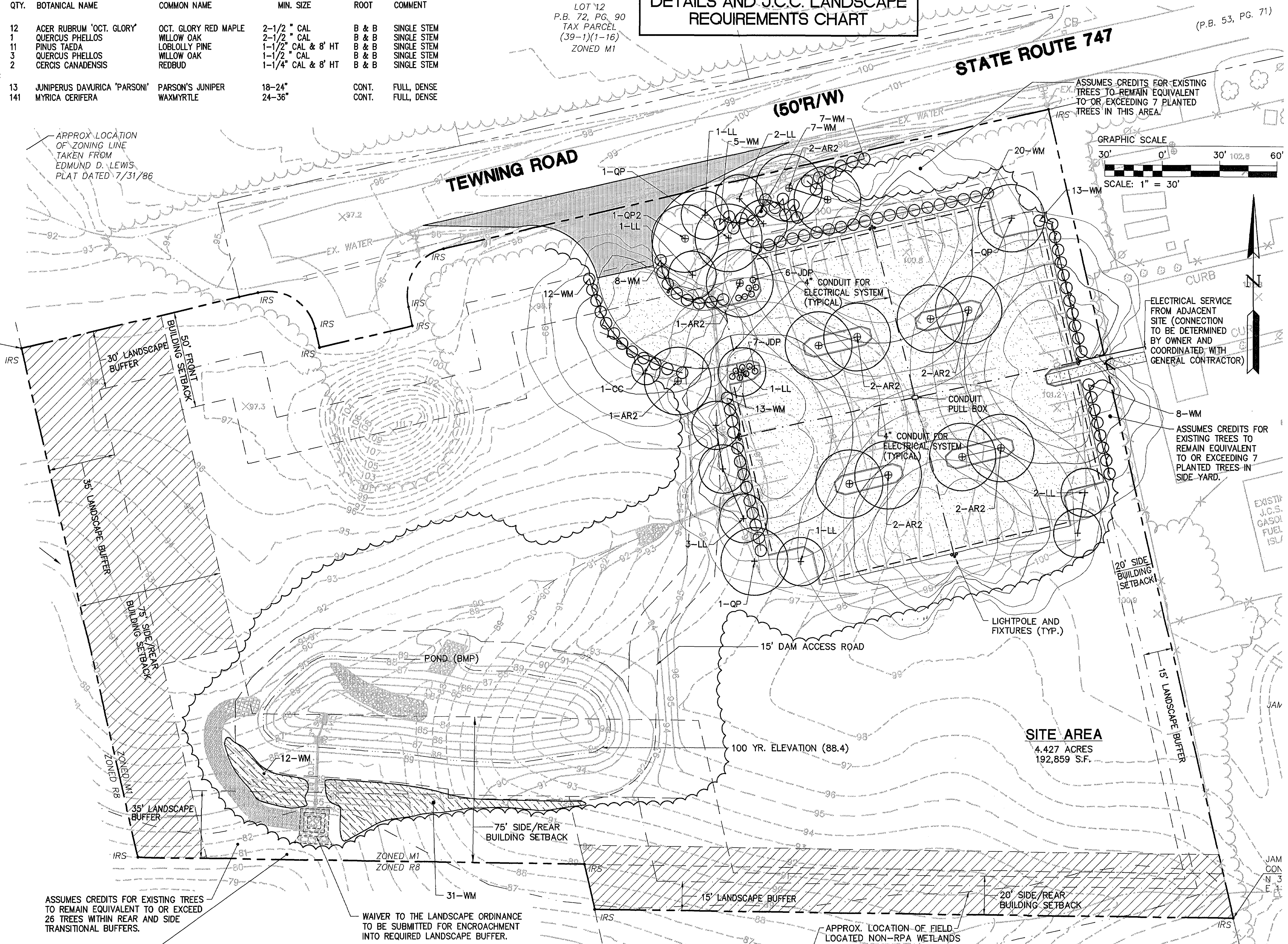
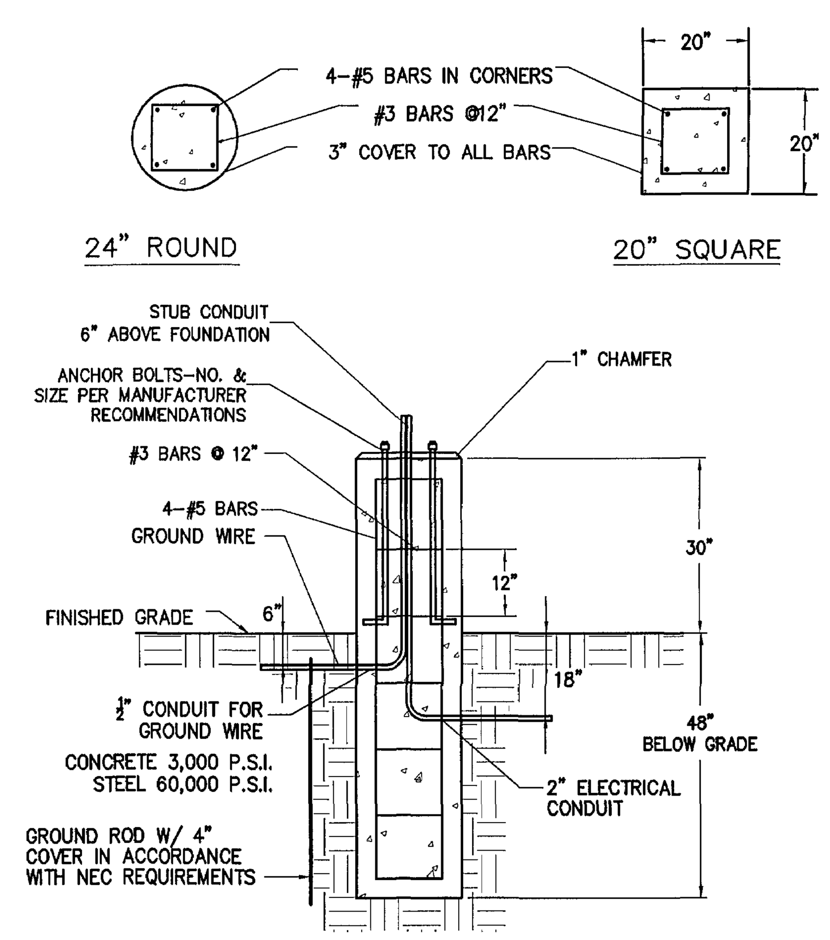
SEE SHEET - 6 - FOR PLANTING DETAILS AND J.C.C. LANDSCAPE REQUIREMENTS CHART





20' POLE BASE DETAIL

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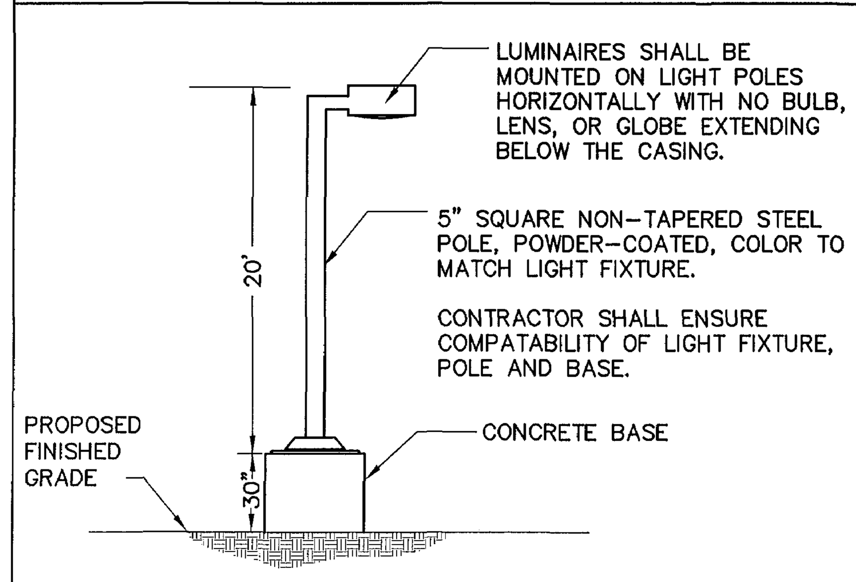

LUMINAIRES SHALL BE MOUNTED ON LIGHT POLES HORIZONTALLY WITH NO BULB, LENS, OR GLOBE EXTENDING BELOW THE CASING.

5" SQUARE NON-TAPERED STEEL POLE, POWDER-COATED, COLOR TO MATCH LIGHT FIXTURE.

CONTRACTOR SHALL ENSURE COMPATABILITY OF LIGHT FIXTURE, POLE AND BASE.

TYPICAL POLE BASE DETAIL

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2. PERFORM MAINTENANCE MOWING OF GRASSED AREAS AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ON ANY PART OF THE GRADED EMBANKMENT.

3. PERFORM SOIL SAMPLING ON STABILIZED BMP SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.

4. IN STABILIZED BMP AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACES, LIME 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 SURFACES, LIME FERTILIZE AND OVERSEED IN ACCORDANCE WITH CURRENT SEEDLING RECOMMENDATIONS.

5. PERFORM QUARTERLY INSPECTIONS OF THE RELEASE STRUCTURES, 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. DURING QUARTERLY INSPECTIONS, THE POND DRAIN VALVE, USUALLY LEFT IN THE VALVE "CLOSED" POSITION, SHALL BE INSPECTED AND OPERATED THROUGH TWO COMPLETE FULL-OPEN TO FULL-CLOSE TO FULL-OPEN CYCLES.

6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, ORIFICE/ WEIR(S), OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE CONTINUED INTEGRITY OF THE STRUCTURE.

7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE FACILITY FOR SIGNS OF ANIMAL/ RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.

8. RECORD KEEPING. THE LANDOWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/ OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.

9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.

10. KEEP TREES AND SHRUBS AT LEAST 25' FROM PRINCIPAL FLOW CONTROL STRUCTURES.

11. PLANTINGS ALONG THE SOUTHERN EDGE OF BMP ARE TO ENHANCE VISUAL APPEAL OF FACILITY AND TO STABILIZE EMBANKMENT. QUARTERLY INSPECTIONS SHOULD BE MADE TO INSURE THAT PLANTINGS ARE SERVING THEIR INTENDED PURPOSES.

12. REMOVE PLANTS THAT ARE DEGRADING THE STRUCTURAL INTEGRITY OF THE FACILITY.

13. REPLACE DEAD OR DYING PLANT MATERIAL AS NEEDED TO INSURE STRUCTURAL INTEGRITY OF THE FACILITY.

NOTES TO LANDSCAPE CONTRACTOR:

1. GROUPINGS OF PLANTS SHALL BE MULCHED IN CONTINUOUS BEDS.
2. SINGLE STEM DECIDUOUS SHADE TREES SHALL BE STAKED AS DETAILED IN TREE PLANTING METHOD.
3. ANY PLANT MATERIAL SUBSTITUTIONS MUST BE APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

No.	DATE	REVISION / COMMENT / NOTE	BY
1	1/11/01	REVISED PER J.C.C. COMMENT LETTER DATED 1/12/01	JSP
2	6/5/01	REVISED PER SITE VISIT & COUNTY AGREEMENT	JSP

COMMONWEALTH OF VIRGINIA
JAMES S. PETERS
No. 000393
1/16/01
CERTIFIED LANDSCAPE ARCHITECT

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

LANDSCAPE AND LIGHTING PLAN
JCSA OPERATIONS CENTER SITE EXPANSION
OWNER: JAMES CITY SERVICE AUTHORITY
BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
JSP/LLM	AWT
Scale	Date
1"=30'	11/27/00
Project No.	
8651-18	
Drawing No.	
5	

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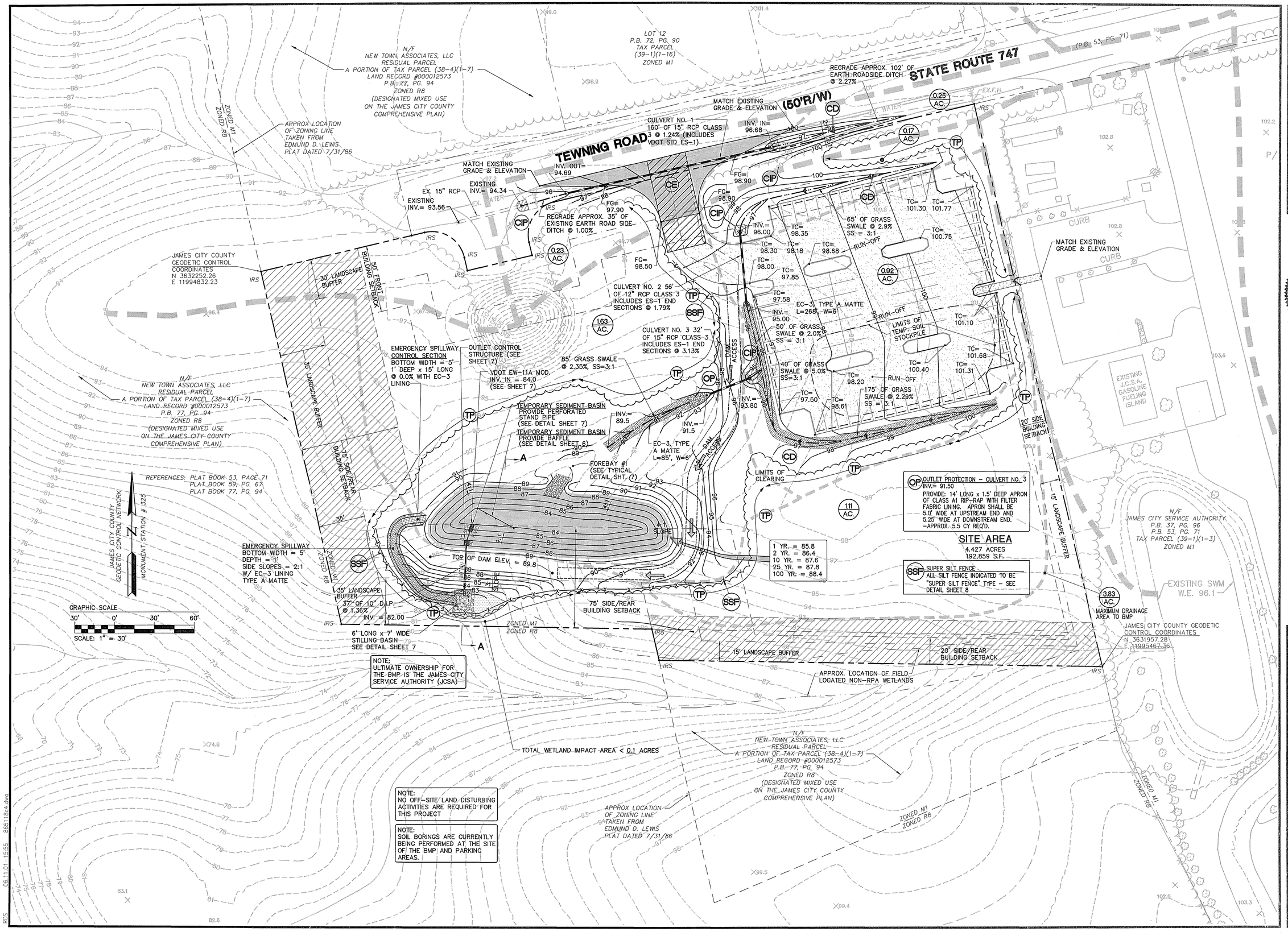
REVISED
POND PLAN

AWAITING
CORRECTION
TO BAFFLE
ARRANGEMENT.



No.	DATE	REVISION / COMMENT / NOTE	BY
1	6/21/01	REVISED BMP/TEMP. SED. BASIN --FIELD CHANGE	VMB
1	1/21/01	REVISED PER J.C.C. COMMENT LETTER DATED 1/12/01	VMB

COMMONWEALTH OF VIRGINIA
VAUGHAN MARC LENNETT
No. 3068
PROFESSIONAL ENGINEER
1/16/01

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

GRADING, DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
JCSA OPERATIONS CENTER SITE EXPANSION

OWNER: JAMES CITY SERVICE AUTHORITY

BERKELEY DISTRICT — JAMES CITY COUNTY — VIRGINIA

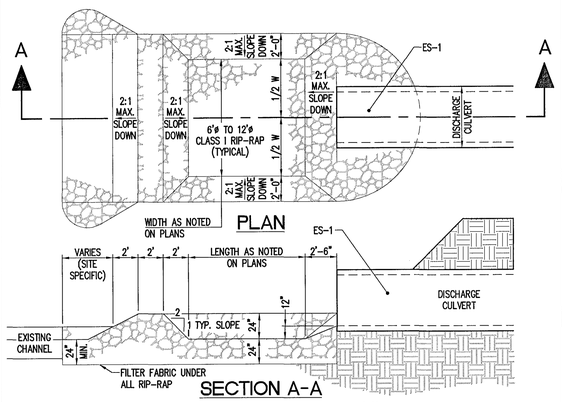
Designed	Drawn
VMB/RDS	SRL
Scale	Date
1"=30'	11/27/00

Project No. 8651-18

Drawing No. 4

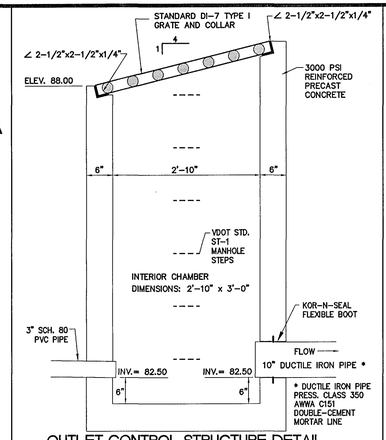
06.11.01-15:55 8651184.dwg

RDS



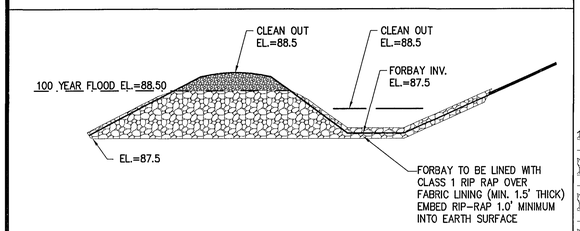
STILLING BASIN DETAIL

NOT TO SCALE



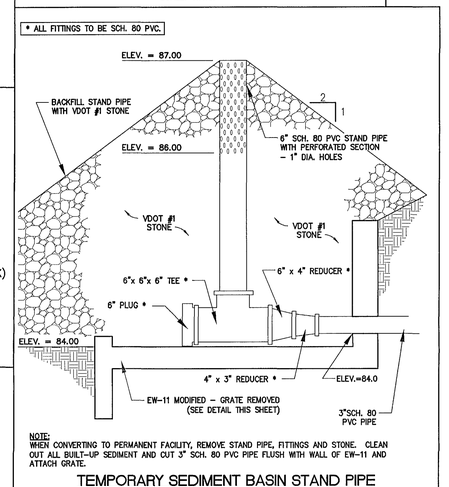
OUTLET CONTROL STRUCTURE DETAIL

SCALE: N.T.S.



TYPICAL FOREBAY RIPRAP DETAIL

N.T.S.



NOTE:
WHEN CONVERTING TO PERMANENT FACILITY, REMOVE STAND PIPE, FITTINGS AND STONE. CLEAN OUT ALL BUILT-UP SEDIMENT AND CUT 3" SCH. 80 PVC PIPE FLUSH WITH WALL OF EW-11 AND ATTACH GRATE.

TEMPORARY SEDIMENT BASIN STAND PIPE

SCALE: N.T.S.

EROSION AND SEDIMENT CONTROL NARRATIVE

PROJECT DESCRIPTION
THIS PROJECT IS DESIGNED AS AN EXPANSION OF THE EXISTING JCSA OPERATIONS CENTER TO THE WEST OF THE SITE, CONTAINING A PARKING LOT . THE ADDRESS FOR THE PROJECT IS 107 TEWNING ROAD.

EXISTING SITE CONDITIONS
THE SITE FOR THIS SUBDIVISION IS PRESENTLY WOODED WITH MODERATELY SLOPING LANDFORMS. WOODED RAVINES EXIST TO THE SOUTHWEST.
WETLAND AREAS ARE LOCATED TO THE SOUTH OF THE SITE. THE EXISTING JCSA OPERATIONS CENTER SITE IS CURRENTLY LOCATED TO THE EAST.

ADJACENT PROPERTY
THE SITE FOR THESE IMPROVEMENTS IS LOCATED ADJACENT TO THE NEW TOWN PLANNED DEVELOPMENT, TO THE WEST AND SOUTH. THE EXISTIND JCSA OPERATIONS CENTER, TO THE EAST. TEWNING ROAD TO THE NORTH.

CRITICAL EROSION AREAS

CRITICAL EROSION AREAS, OR HIGHLY ERODIBLE AREAS HAVE BEEN IDENTIFIED ON SHEET 2 OF THE PLAN SET.

PRACTICES USED IN THESE PLANS

THE FOLLOWING EROSION AND SEDIMENT CONTROL PRACTICES ARE TO BE UTILIZED DURING CONSTRUCTION:

TREE PROTECTION - TO BE INSTALLED PRIOR TO ANY GRADING AND LAND DISTURBING ACTIVITIES

TEMPORARY SEDIMENT BASINS - ONE IS REQUIRED FOR THIS SITE. THE SEDIMENT BASIN IS TO BE CONSTRUCTED ACROSS A NATURAL SWALE, DETAILS INDICATING THE DIMENSIONS OF THESE FACILITIES ARE SHOWN ON THE PLANS.

OUTLET PROJECT - CLASS 1 RIP-RAP SHALL BE UTILIZED IN ALL STILLING BASINS AND STORM SEWER OUTFALLS

SILT FENCE - SILT FENCE BARRIERS SHALL BE INSTALLED AT ALL DOWNSTREAM LOCATIONS OF GRADING AND LAND DISTURBING ACTIVITIES

TEMPORARY CONSTRUCTION ENTRANCE - A STONE TEMPORARY CONSTRUCTION ENTRANCE IS PROVIDED AT THE ENTRANCE TO THE SITE. THE TRACKING OF MUD AND DEBRIS FROM THE SITE BY CONSTRUCTION EQUIPMENT SHALL NOT BE PERMITTED.

CULVERT INLET PROTECTION - CULVERT INLET PROTECTION SHALL BE INSTALLED AT THE INLETS OF ALL CULVERTS

ROCK CHECK DAMS - CHECK DAMS SHALL BE PROVIDED IN ALL ROADSIDE DITCHES AT 100-FOOT INTERVALS

PERMANENT SEEDING - PERMANENT SEEDING SHALL BE APPLIED TO ALL DENUDED AREAS AFTER FINAL GRADING AND TOPSOILING HAS BEEN COMPLETED

ALL EROSION AND SEDIMENT CONTROL MEASURES, WHETHER STRUCTURAL OR NON-STRUCTURAL, SHALL BE MAINTAINED BY THE CONTRACTOR. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE THE EROSION AND SEDIMENT CONTROL MEASURES ARE FUNCTIONAL UNTIL THE ENTIRE SITE HAS BEEN PERMANENTLY STABILIZED.

SEQUENCE OF CONSTRUCTION

1 - CLEAR PERIMETER, (THE NEW PARKING LOT, MATERIALS STORAGE LOT, AND BMP), THEN INSTALL TREE PROTECTION AND SILT FENCE.

2 - INSTALL STONE CONSTRUCTION ENTRANCE (NEW PARKING LOT).

3 - STRIP TOPSOIL FROM CLEARED AREAS FOR EARTHWORK OPERATIONS, AND STOCKPILE ON SITE AS INDICATED ON THE PLAN. CONSTRUCT TEMPORARY SEDIMENT BASIN IN CONJUNCTION WITH THE EARTHWORKS OPERATIONS.

4 - CONTINUE SITE EARTHWORK OPERATIONS (SUB-GRADE GRADING); INSTALL DRIVEWAY CULVERTS.

5 - COMPLETE PARKING CONSTRUCTION WITH FINE GRADING, CEMENT TREATED AGGREGATE (CTA) FINAL SURFACE.

6 - TOPSOIL DENUDED AREAS AND PERMANENTLY SEED.

7 - REMOVE ALL ACCUMULATED SEDIMENT IN TEMPORARY SEDIMENT BASIN CONSTRUCT PERMANENT MODIFICATION TO BMP. REMOVE EROSION CONTROL MEASURES UPON SITE STABILIZATION. INSTALL ALL PERMANENT STILLING, AFTER OBTAINING J.C.C. ENVIRONMENTAL DIVISON APPROVAL.

GENERAL NOTES FOR CONSTRUCTION OF STORMWATER BASINS

1. THE CONTRACTOR SHALL PROVIDE ALL WORK AND MATERIALS NEEDED TO CONSTRUCT THE STORMWATER BASIN, STORMWATER MANAGEMENT PONDS, BEST MANAGEMENT PRACTICES, SEDIMENT BASINS AND SEDIMENT TRAPS. THE WORK SHALL INCLUDE ALL LABOR, MATERIALS, EQUIPMENT AND MATERIALS NEEDED FOR THE COMPLETION OF GRADING AND EARTHWORK ASSOCIATED WITH THE CONSTRUCTION.

2. THE CONTRACTOR SHALL CONSULT AND PROVIDE FOR THE SERVICES OF A GEOTECHNICAL ENGINEER. THE GEOTECHNICAL ENGINEER SHALL PROVIDE TEST RESULTS ON PLACED DAM MATERIALS, IDENTIFYING SOIL CLASSIFICATION, PERMEABILITY, PLASTICITY INDEX, AND COMPACTION. ALL TESTS SHALL BE IN CONFORMANCE WITH ASTM STANDARDS. THE COST OF THE SERVICES OF THE GEOTECHNICAL ENGINEER SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SATISFACTORY GEOTECHNICAL REULTS ARE NEEDED PRIOR TO FINAL APPROVAL.

3. ALL INSPECTIONS REQUIRED FOR THE WORK SHALL BE PERFORMED BY A GEOTECHNICAL ENGINEER AT THE EXPENSE OF THE GENERAL CONTRACTOR.

4. ON-SITE EXCAVATED MATERIAL, IF DETERMINED SUITABLE FOR USE IN DAM CONSTRUCTION BY A GEOTECHNICAL ENGINEER, MAY BE USED FOR DAM CONSTRUCTION. SHOULD ADDITIONAL MATERIAL BE REQUIRED, THE CONTRACTOR SHALL IDENTIFY THE NEED FOR MATERIAL TO THE OWNER, AS ADDITIONAL BORROW MATERIAL MAY BE AVAILABLE ON THE STONEHOUSE PROPERTY. ALL EXCAVATED MATERIAL DETERMINED BY THE GEOTECHNICAL ENGINEER TO BE UNSUITABLE SHALL BE DISPOSED OF PROPERLY AT THE CONTRACTOR'S EXPENSE. ALL EXCAVATED MATERIAL NOT REQUIRED FOR BACKFILLING SHALL EITHER BE DEPOSITED ON SITE AND SPREAD BY THE CONTRACTOR, OR SHALL BE DEPOSITED IN AN AREA ON THE SITE AS DIRECTED BY THE OWNER. THE CONTRACTOR SHALL PROVIDE PROPER STABILIZATION, AND EROSION AND SEDIMENT CONTROL MEASURES NEEDED TO CONTROL AS PER THE VESCH THIRD EDITION.

5. UNDERCUT FOR THE FOUNDATION OF THE DAM EMBANKMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. THE FOUNDATION SHALL BE BACKFILLED WITH SOILS CLASSIFIED AS SM, SC, OR CL UNDER THE UNIFIED SOIL CLASSIFICATION SYSTEM. SOILS SHALL HAVE A MINIMUM OF 15% BY WEIGHT FINES, HAVING A PLASTICITY INDEX OF 30% AND A PERMEABILITY OF 0.0004 IN./SEC. OR LESS. FILL SHALL BE COMPACTED IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO A DRY DENSITY OF 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). EXCAVATION FOR THE DAM KEY SHALL BE IN ACCORDANCE TO THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. HEIGHT, DEPTH, AND WIDTH OF THE KEY SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. THE KEY SHALL BE FORMED USING SOILS CLASSIFIED AS SC OR CL, WITH A PERMEABILITY OF 0.0004 IN./SEC. OR LESS.

6. THE DAM CORE SHALL BE AS CONSTRUCTED WITH NON-EXPANSIVE SC OR CL CLAYEY MATERIAL WITH PERMEABILITY OF 0.0004 IN./SEC. OR LESS. THE FILL OF THE CORE SHALL BE MADE IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). SIZE, SHAPE, WIDTH, DEPTH, AND HEIGHT OF THE DAM CORE SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. TO COVER THE DAM CORE, A SILTY FINE SAND OR CLAYEY SOIL (SM, SC, OR CL) SHALL BE PLACED. A VEGETATIVE COVER USING VDOT EC-2 EROSION CONTROL BLANKETS SHALL BE PLACED ON DAM SLOPES AND CREST TO PREVENT EROSION.

7. UPON COMPLETION, THE CONSTRUCTION OF THE THE DAM WILL BE CERTIFIED BY A GEOTECHNICAL ENGINEER WHO HAS INSPECTED THE STRUCTURE DURING CONSTRUCTION.

STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

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 OF THESE NEWLY DISTRIBUTED AREAS AS WELL AS INSPECTIONS FOR ACCUMULATED SEDIMENTS AT TWO BMP FACILITY.

A DESIGNATED REPRESENTATIVE OF THE OWNER WILL INSPECT THE BMP STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING WORKING DAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF 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. KEYS TO LOCKED ACCESS POINTS SHALL BE MADE AVAILABLE TO COUNTY INSPECTION PERSONNEL UPON REQUEST.

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

1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. SEDIMENT REMOVAL IS REQUIRED USING A RUBBER-WHEELED BACKHOE. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, THE RISER BOTTOM AND OUTLET PIPE SHALL BE CLEANED OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA. SEDIMENT SHALL NOT BE ALLOWED TO ACCUMULATE IN DEPTHS GREATER THAN 1-FOOT. NO SEDIMENT SHALL BE ALLOWED TO ACCUMULATE TO PREVENT THE PROPER FUNCTION OF ANY PIPE OR CULVERT.

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4. IN STABILIZED BMP 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 SEEDING RECOMMENDATIONS

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8. RECORD KEEPING. THE LANDOWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/ OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.

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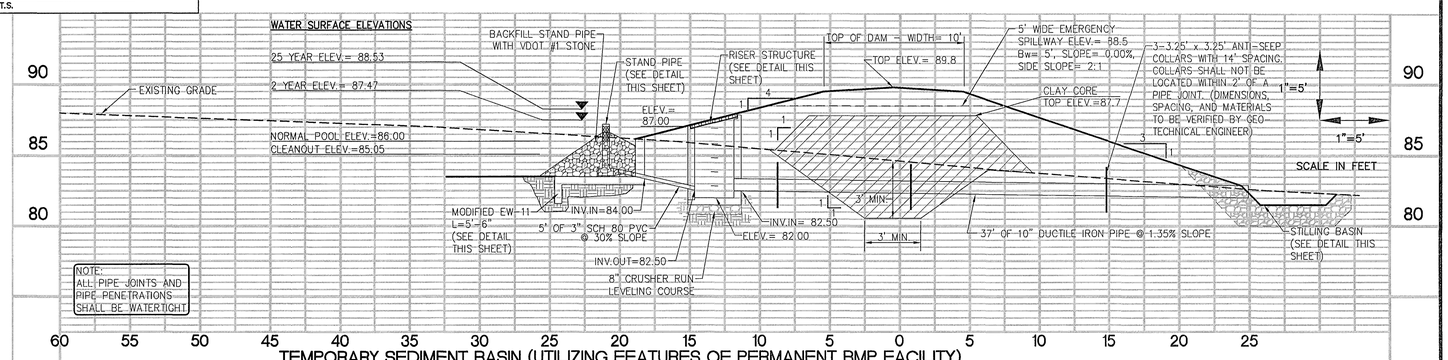
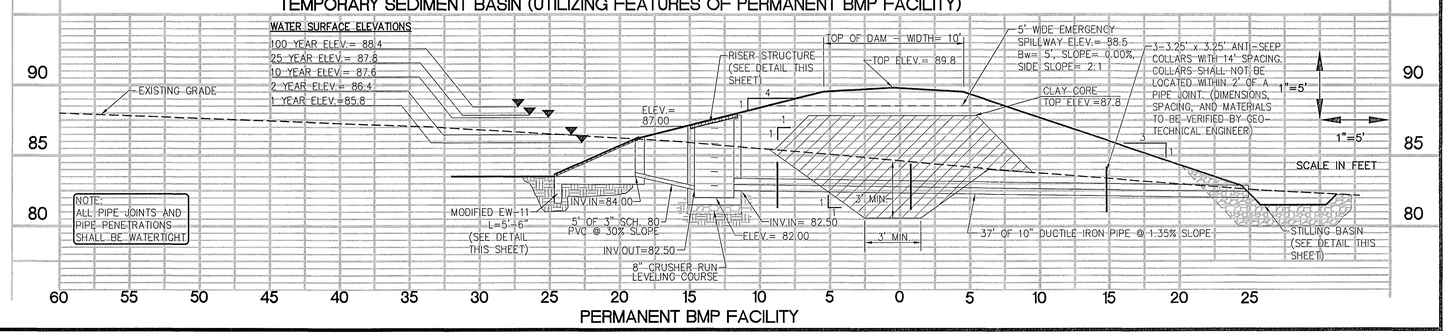
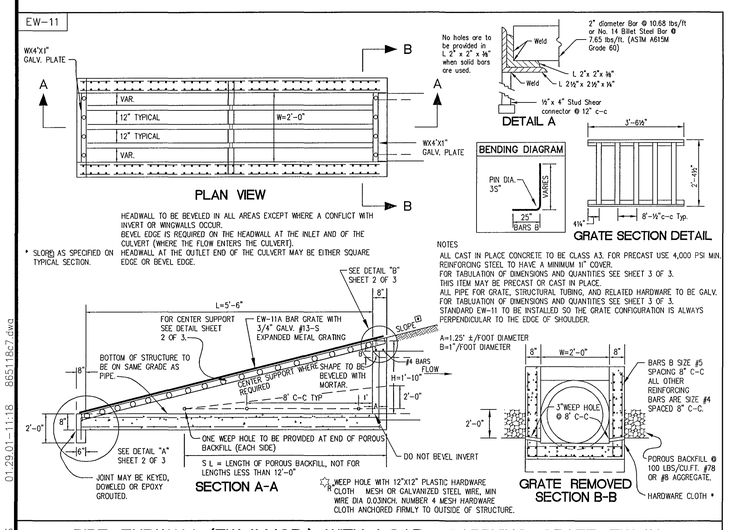


TEMPORARY SEDIMENT BASIN (UTILIZING FEATURES OF PERMANENT BMP FACILITY)



PERMANENT BMP FACILITY



PIPE ENDWALL (EW-11 MOD.) WITH LOAD - CARRYING GRATE EW-11A

No.	DATE	REVISION / COMMENT / NOTE	BY
1	6/21/01	REVISED BMP/TEMP SED. BASIN - FIELD CHANGE	VMB
1	1/11/01	REVISED PER J.C.C. COMMENT LETTER DATED 1/12/01	VMB

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

STORM WATER MANAGEMENT BASIN DETAILS
JCSA OPERATIONS CENTER
SITE EXPANSION
OWNER: JAMES CITY SERVICE AUTHORITY
BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VMB	RDS
Scale	Date
N.T.S.	11/27/00

Project No. 8651-18
Drawing No. 7

01.29.01-11:18 8651-18-7.dwg RDS

SITE PLAN AMENDMENT
FOR
JCSA OPERATIONS CENTER

JAMES CITY COUNTY, VIRGINIA

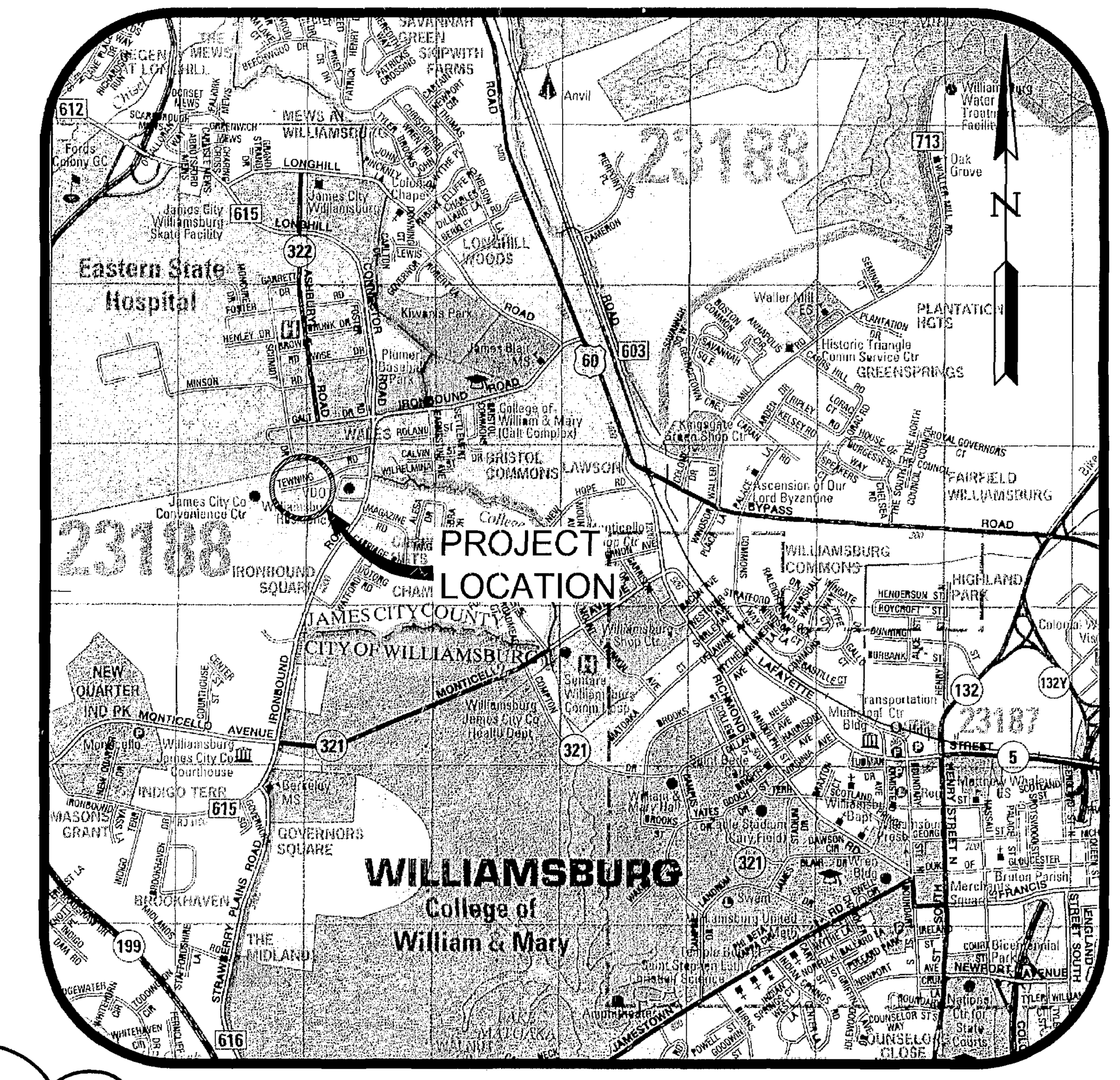
Environmental Division
FEB 14 2011
RECEIVED

RECEIVED
JAN 2011
Planning Department

COUNTY OF JAMES CITY FINAL SITE PLAN	
APPROVALS	DATE
Fire Dept. JB/LC	12/03/10
Health Dept.	
VDOT YF/LC	12/02/10
Planning CHJ	1/27/11
Environ ST/JR	12/03/10
Zo Adm. MOB	1/27/11
JCSA DW/LC	01/25/11
County Eng. PC/LC	12/09/10
HRA	
Other TC/LC Code Compliance	12/01/10

LEGEND

EXISTING		PROPOSED
EX. W	WATER	W
EX. S	SANITARY SEWER	S
	STORM SEWER	
EX. FM	FORCE MAIN	FM
(S)	MANHOLE	
	CURB DROP INLET	
	YARD DROP INLET	
	FLARED END SECTION	
	VALVE	
	FIRE HYDRANT ASSEMBLY	
	BLOW-OFF VALVE	
	AIR RELEASE ASSEMBLY	
SCO	CLEAN OUT	
WM	WATER METER	
	STREETLIGHT	
	CENTERLINE/BASELINE	
	RIGHT OF WAY	
	PROPERTY LINE	
	℄ DITCH/SWALE	
	CONCRETE LINED DITCH	
	EXISTING TREELINE	
	LIMITS OF CLEARING	
	RIP RAP	
	CURB	
	CURB AND GUTTER	
	REVERSE GUTTER PAN	
	EDGE OF PAVEMENT	
+25.1	EXISTING GROUND ELEVATION	
	PROPOSED SPOT GRADE	TC0.00
80	CONTOUR	80
	HIGH POINT	HP
	LOW POINT	LP



VICINITY MAP (APPROX. SCALE 1"=2,000')

INDEX OF SHEETS

SHEET NUMBER	DESCRIPTION
C-01	COVER (REVISED)
~~C-02~~	~~OVERALL DEVELOPMENT PLAN~~
~~C-03~~	~~DEMOLITION PLAN & ENVIRONMENTAL INVENTORY~~
~~C-04~~	~~INITIAL EROSION & SEDIMENT CONTROL PLAN~~
C-05	SITE AND UTILITY LAYOUT (REVISED)
C-06	GRADING AND DRAINAGE PLAN (REVISED)
~~C-07~~	~~BMP NOTES AND DETAILS~~
~~C-08~~	~~NOTES AND DETAILS~~
~~C-09~~	~~NOTES AND DETAILS~~
~~C-10~~	~~NOTES AND DETAILS~~
~~C-11~~	~~NOTES AND DETAILS~~
~~C-12~~	~~GRINDER PUMP NOTES AND DETAILS~~
C-13	LANDSCAPE PLAN (REVISED)
~~C-14~~	~~LIGHTING PLAN~~
~~C-15~~	~~LANDSCAPE & LIGHTING DETAILS~~

GENERAL NOTES

1. CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF CONSTRUCTION EFFORTS WITH THE VIRGINIA POWER COMPANY, VERIZON TELEPHONE, APPROPRIATE CABLE COMPANY AND OTHERS.
2. OUTDOOR SIGNS ON THE PROPERTY SHALL COMPLY WITH THE REGULATIONS FOR EXTERIOR SIGNS IN ARTICLE II, DIVISION 3 EXTERIOR SIGNS OF THE JAMES CITY COUNTY ZONING ORDINANCE.
3. STORM STRUCTURES SHALL CONFORM TO THE VDOT ROAD AND BRIDGE STANDARDS AND VDOT SPECIFICATIONS. ALL MANHOLES SHALL INCLUDE INLET SHAPING (IS-1) AND MANHOLES DEEPER THAN 4 FEET SHALL HAVE STEPS (ST-1). PIPE BEDDING SHALL BE IN ACCORDANCE WITH VDOT PB-1 AND MANUF. SPECS/GUIDELINES.
4. THE CONTRACTOR SHALL SATISFY HIMSELF AS TO ALL SITE CONDITIONS PRIOR TO CONSTRUCTION.
5. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS PRIOR TO COMMENCEMENT OF WORK TO INCLUDE, BUT NOT LIMITED TO, JAMES CITY COUNTY LAND DISTURBANCE, AND VDOT LAND USE PERMIT.
6. A PRECONSTRUCTION CONFERENCE SHALL BE HELD ON-SITE BETWEEN THE COUNTY, THE PROJECT ENGINEERS AND THE CONTRACTOR PRIOR TO ISSUANCE OF A LAND DISTURBING PERMIT.
7. ALL COMPONENTS OF THE WATER DISTRIBUTION AND SANITARY SEWER SYSTEM SHALL BE INSTALLED AND TESTED IN ACCORDANCE WITH THE LATEST EDITION OF THE JCSA DESIGN AND ACCEPTANCE CRITERIA FOR WATER DISTRIBUTION AND SANITARY SEWER SYSTEMS, THE HRPDC REGIONAL CONSTRUCTION STANDARDS (FOURTH EDITION WITH AMENDMENTS), AND THE COMMONWEALTH OF VIRGINIA DEPARTMENT OF HEALTH WATERWORKS AND SANITARY SEWERAGE REGULATIONS. THE CONTRACTOR SHALL USE ONLY NEW MATERIALS, PARTS, AND PRODUCTS ON ALL PROJECTS. ALL MATERIALS SHALL BE STORED SO AS TO ASSURE THE PRESERVATION OF THEIR QUALITY AND FITNESS FOR THE WORK. A COPY OF THE JCSA DESIGN AND ACCEPTANCE CRITERIA AND HRPDC REGIONAL CONSTRUCTION STANDARDS MUST BE KEPT ON-SITE BY THE CONTRACTOR DURING TIME OF INSTALLING, TESTING, AND CONVEYING FACILITIES TO JCSA.
8. ALL SANITARY SEWER FACILITIES MUST HAVE A 5 FOOT MINIMUM HORIZONTAL SEPARATION DISTANCE BETWEEN IT AND ALL OTHER FIXED STRUCTURES, SUCH AS: DROP INLETS, FIRE HYDRANTS, LIGHT POLES, WATERLINE FACILITIES (SHALL BE A MINIMUM OF 10 FEET PER STATE HEALTH DEPARTMENT REGULATIONS. IN ADDITION 5 FEET HORIZONTAL SEPARATION FOR WATER FACILITIES SHALL ALSO BE MAINTAINED FOR CONSISTENCY AMONG THE UTILITIES EXCEPT FOR THE REQUIRED STANDARD HORIZONTAL SEPARATIONS FROM THE SANITARY SEWER.) AND STORM SEWER PIPES, ETC.
9. ANY EXISTING UNUSED WELLS SHALL BE ABANDONED IN ACCORDANCE WITH STATE PRIVATE WELL REGULATIONS AND JAMES CITY COUNTY CODE.
10. THE CONTRACTOR SHALL AT ALL TIMES POSSESS AND MAINTAIN A CURRENT COPY OF THE JAMES CITY SERVICE AUTHORITY STANDARDS AND SPECIFICATIONS, WATER DISTRIBUTION AND SANITARY SEWER SYSTEMS AT THE JOB SITE AND READILY AVAILABLE FOR IMMEDIATE REFERENCE.
11. THE VIRGINIA DEPARTMENT OF TRANSPORTATION WILL HAVE NO MAINTENANCE RESPONSIBILITY FOR THE DETENTION PONDS AND SHALL BE SAVED HARMLESS FROM ANY DAMAGES CAUSED BY FAILURE OF THE PONDS OR THEIR OUTFLOW STRUCTURES.
12. ONLY JCSA PERSONNEL ARE AUTHORIZED TO OPERATE VALVES ON THE EXISTING WATER MAIN.
13. ALL NEW PROPERTY MONUMENTS SHALL BE SET IN ACCORDANCE WITH SECTIONS 19-34 THROUGH 19-36 OF THE JAMES CITY COUNTY SUBDIVISION ORDINANCE
14. IN ACCORDANCE WITH SECTION 19-29(G) OF THE JAMES CITY COUNTY SUBDIVISION ORDINANCE, WETLANDS AND LAND WITHIN RESOURCE PROTECTION AREAS SHALL REMAIN IN A NATURAL UNDISTURBED STATE EXCEPT FOR THOSE ACTIVITIES PERMITTED BY SECTION 23-7(C) OF THE JAMES CITY COUNTY CODE.
15. THE CONTRACTOR IS REQUIRED TO SECURE ALL NECESSARY PERMITS FOR THE ABANDONMENT OR DEMOLITION OF ALL EXISTING WELLS/WATERLINES AND SEPTIC FIELDS IN ACCORDANCE WITH JAMES CITY COUNTY AND VIRGINIA DEPARTMENT OF HEALTH REGULATIONS. CONTACT VIRGINIA DEPARTMENT OF HEALTH AT 1-757-253-4813
16. ALL WATER FITTINGS TO HAVE JOINT RESTRAINTS IN COMPLIANCE WITH JCSA STANDARD JR.1.
17. ALL SANITARY SEWER CLEANOUTS LOCATED WITHIN DRIVEWAYS ARE TO BE IN ACCORDANCE WITH HRPDC DETAIL SS_12.
18. ANY INCIDENTAL DAMAGES RESULTING FROM POST GRADING INSTALLATION OF ANY UTILITIES SUCH AS ELECTRIC, CABLE, TELEPHONE, ETC. TO STABILIZED YARD AREAS OR STORMWATER CONVEYANCE CHANNEL LININGS WILL BE REPAIRED AND RESTORED BY THE UTILITY INSTALLER ACCORDING TO CURRENT JAMES CITY COUNTY ENVIRONMENTAL DIVISION STORMWATER DRAINAGE CONVEYANCE SYSTEMS, GENERAL DESIGN AND CONSTRUCTION GUIDELINES.
19. SURVEY DATA PROVIDED BASED UPON JAMES CITY COUNTY GEODETIC CONTROL NAD-83 ESTABLISHED FROM MONUMENT 343.
20. THIS PROPERTY LIES IN ZONE X, (AREAS DETERMINED TO BE OUTSIDE 500 YEAR FLOOD PLAIN) PER F.I.R.M. #51095C-0140C, DATED 9/28/07.
21. FOR SPECIAL USE PERMIT CONDITIONS REFER TO JCC CASE NO. SUP-0007-2009 APPROVED BY THE BOARD OF SUPERVISORS ON MAY 12, 2009.
22. THE OWNER SHALL COORDINATE AN INSPECTION OF THE BACKFLOW PREVENTION DEVICE WITH JCSA UTILITY COORDINATOR AT (757) 259-4138. THE BACKFLOW PREVENTER SHALL BE TESTED, MAINTAINED AND OPERATED IN ACCORDANCE WITH JCSA STANDARDS.
23. THE PLUMBING INSIDE THE BUILDINGS MUST BE INSPECTED BY JCSA OPERATIONS AT (757) 229-7421 FOR POTENTIAL CROSS CONNECTIONS. ANY CROSS CONNECTIONS MUST BE PROTECTED BY APPROPRIATE BACKFLOW PREVENTION DEVICE(S).
24. SWM/BMP FACILITIES AS PROPOSED FOR THIS PROJECT AND INDICATED ON THESE DRAWINGS WILL REQUIRE SUBMISSION/REVIEW AND APPROVAL OF RECORD DRAWINGS AND CONSTRUCTION CERTIFICATION PRIOR TO RELEASE OF ANY POSTED BONDS OR SURETIES. THE DESIGNATED REPRESENTATIVE OF THE GENERAL CONTRACTOR SHALL KEEP ACCURATE WRITTEN RECORDS OF THE WORK PERFORMED FOR THE SWM/BMP FACILITY, INCLUDING SECURING REGISTERED PROFESSIONALS APPROPRIATE IN CERTIFYING THE CONSTRUCTION OF THE FACILITIES AND APPROPRIATE IN SATISFYING THE ACCURACY OF THE RECORD DRAWINGS. THE GENERAL CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE APPROPRIATE SCHEDULING OF THE CONSTRUCTION, INSPECTION, AND RECORD KEEPING.

LAND USE SUMMARY TABLE

TAX MAP PARCEL ID.	3910100003 & 3910100156
ADDRESS:	119 TEWNING ROAD WILLIAMSBURG, VIRGINIA 23188
ZONING:	PL PUBLIC LAND
PROJECT AREA:	12.33 AC. / 537,095 S.F. (COMBINED)
DISTURBED AREA:	4.33 ACRES / 188,730 S.F.
EXISTING BUILDINGS:	1.00 ACRES / 43,393 S.F.
FLOOR-AREA RATIO:	8.1%
EXISTING PARKING/CONCRETE:	4.43 ACRES / 192,982 S.F.
EXISTING IMPERVIOUS AREA:	5.43 ACRES / 236,375 S.F. (44.04%)
PROPOSED OFFICE BUILDING FOOTPRINT:	0.26 ACRES / 11,397 S.F.
PROPOSED OFFICE BUILDING SQUARE FOOTAGE:	0.31 ACRES / 13,591 S.F.
BUILDING HEIGHT:	29.75'±
FLOOR-AREA RATIO:	10.6% (INCLUDES EXISTING BUILDINGS)
PROPOSED PAVED/PARKING:	~~0.96 ACRES / 41,969 S.F.~~ 1.03 ACRES / 44,737 S.F.
PROPOSED IMPERVIOUS AREA:	~~1.22 ACRES / 53,227 S.F.~~ 1.29 ACRES / 55,995 S.F.
TOTAL PROPOSED & EXISTING BUILDINGS:	1.22 ACRES / 53,188 S.F.
TOTAL PROPOSED & EXISTING PAVED/PARKING:	~~4.91 ACRES / 213,870 S.F.~~ 4.97 ACRES / 216,638 S.F.
TOTAL PROPOSED & EXISTING IMPERVIOUS AREA:	~~6.13 ACRES / 267,058 S.F. (49.72%)~~ 6.19 ACRES / 269,826 S.F. (50.24%)
WATERSHED INFORMATION:	THIS SITE IS SITUATED WITHIN SUBWATERSHED 208-101-1 OF THE POWHATAN CREEK WATERSHED

PARKING CALCULATIONS

EXISTING OFF-STREET SPACES:	81 SPACES
PROVIDED OFF-STREET SPACES:	~~102 SPACES~~ 108 SPACES
HANDICAP SPACES REQUIRED:	5 SPACES
HANDICAP SPACES PROVIDED:	5 SPACES

NOTE:
EXISTING PARKING LOT IS FILLED TO APPROXIMATELY 80% CAPACITY (65 SPACES) WITH ALL EMPLOYEES PRESENT. AN ADDITIONAL 14 EMPLOYEES WILL BE UTILIZING THE EXPANDED PARKING LOT, WHICH HAS AN ADDITIONAL 21 SPACES.

DATE: 11/19/10
AES PROJECT NO.: 9801-E-19
ORIGINAL SPECIAL USE PERMIT NO. SUP-0007-2009
JCC PLAN APPROVED PLAN NUMBER: SP-053-09
JCC PLAN AMENDMENT NUMBER: SP-0110-2010
SHEET C-01

COMMONWEALTH OF VIRGINIA
VAN MARC BENNETT
Lic. No. 26628
11/22/10
PROFESSIONAL ENGINEER

OWNER INFORMATION

JAMES CITY SERVICE AUTHORITY
PO BOX 8784
WILLIAMSBURG, VIRGINIA 23188-8784
CONTACT: LARRY FOSTER
PHONE: (757) 253-6806
FAX: (757) 253-6850
EMAIL: lmfoster@james-city.va.us

EROSION AND SEDIMENT CONTROL RESPONSIBLE LAND DISTURBER

THE PROFESSIONAL WHOSE SEAL IS AFFIXED HEREON SHALL ACT AS THE "RESPONSIBLE LAND DISTURBER" FOR PURPOSES OF PLAN APPROVAL ONLY. PRIOR TO ISSUANCE OF THE LAND DISTURBING PERMIT, THE OWNER OR DEVELOPER SHALL PROVIDE THE NAME OF A "RESPONSIBLE LAND DISTURBER" WHO SHALL ASSUME RESPONSIBILITY AS THE "RESPONSIBLE LAND DISTURBER" FOR THE CONSTRUCTION PHASE OF THE PROJECT. THE OWNER OR DEVELOPER SHALL PROVIDE WRITTEN NOTIFICATION SHOULD THE "RESPONSIBLE LAND DISTURBER" CHANGE DURING CONSTRUCTION.

PURPOSE OF SITE PLAN AMENDMENT:
THE PURPOSE OF THIS PLAN IS TO PROVIDE ON-STREET HANDICAP PARKING ALONG TEWNING ROAD IN FRONT OF THE JCSA OPERATIONS CENTER. THERE WILL BE FOUR PARALLEL SPACES PROVIDED, ELIMINATING THE NEED FOR FOUR OFF-STREET SPACES PROVIDED BY THE ORIGINAL SITE PLAN. ALSO INCLUDED IN THIS AMENDMENT ARE CONCRETE SWALES PROVIDED TO PREVENT EROSION ALONG THE TEWNING ROAD ROAD-SIDE DITCH.

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

ADC THE MAP PEOPLE PERMITTED USE NUMBER 20804129

APPROVAL DATE	No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
	3	11/19/10	TEWNING ROAD ON-STREET HC PARKING ADDITION	GVC	VMB
	2	9/25/09	REVISED PER JCC COMMENTS DATED 8/31/09	GVC	VMB
	1	8/20/09	REVISED PER JCC COMMENTS DATED 6/09	GVC	VMB

JCSA TEWNING ROAD
JOB #9801-E-19

LEGEND

- SIDEWALK CONCRETE
- HEAVY DUTY CONCRETE
- HEAVY DUTY PAVEMENT
- PARKING LOT PAVEMENT

NOTE:
SEE DETAIL SHEET 10 FOR CROSS SECTIONS.

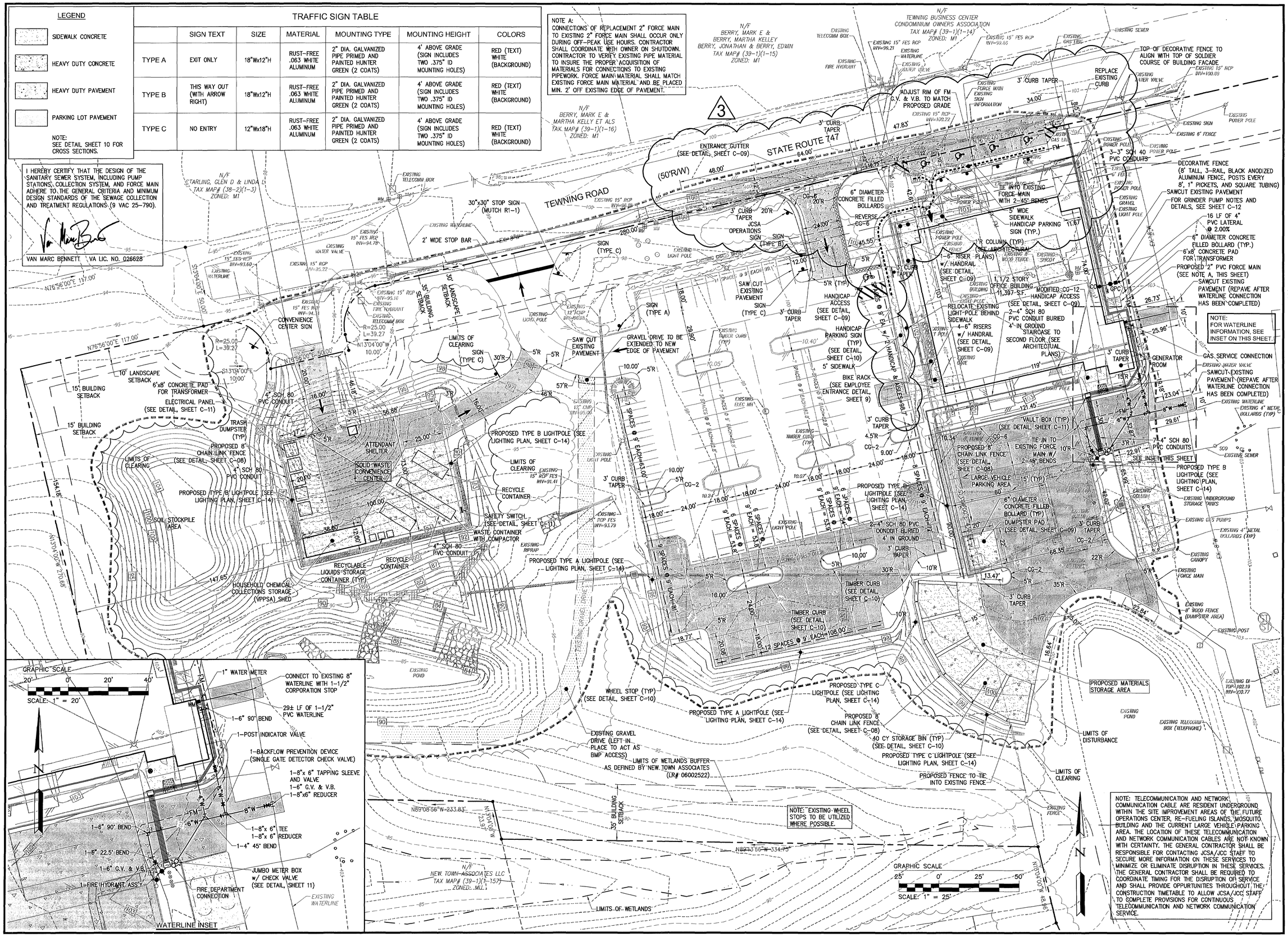
TRAFFIC SIGN TABLE

	SIGN TEXT	SIZE	MATERIAL	MOUNTING TYPE	MOUNTING HEIGHT	COLORS
TYPE A	EXIT ONLY	18"Wx12"H	RUST-FREE .063 WHITE ALUMINUM	2" DIA. GALVANIZED PIPE PRIMED AND PAINTED HUNTER GREEN (2 COATS)	4' ABOVE GRADE (SIGN INCLUDES TWO .375" ID MOUNTING HOLES)	RED (TEXT) WHITE (BACKGROUND)
TYPE B	THIS WAY OUT (WITH ARROW RIGHT)	18"Wx12"H	RUST-FREE .063 WHITE ALUMINUM	2" DIA. GALVANIZED PIPE PRIMED AND PAINTED HUNTER GREEN (2 COATS)	4' ABOVE GRADE (SIGN INCLUDES TWO .375" ID MOUNTING HOLES)	RED (TEXT) WHITE (BACKGROUND)
TYPE C	NO ENTRY	12"Wx18"H	RUST-FREE .063 WHITE ALUMINUM	2" DIA. GALVANIZED PIPE PRIMED AND PAINTED HUNTER GREEN (2 COATS)	4' ABOVE GRADE (SIGN INCLUDES TWO .375" ID MOUNTING HOLES)	RED (TEXT) WHITE (BACKGROUND)

NOTE A:
CONNECTIONS OF REPLACEMENT 2" FORCE MAIN TO EXISTING 2" FORCE MAIN SHALL OCCUR ONLY DURING OFF-PEAK USE HOURS. CONTRACTOR SHALL COORDINATE WITH OWNER ON SHUTDOWN. CONTRACTOR TO VERIFY EXISTING PIPE MATERIAL TO INSURE THE PROPER ACQUISITION OF MATERIALS FOR CONNECTIONS TO EXISTING PIPEWORK. FORCE MAIN MATERIAL SHALL MATCH EXISTING FORCE MAIN MATERIAL AND BE PLACED MIN. 2' OFF EXISTING EDGE OF PAVEMENT.

I HEREBY CERTIFY THAT THE DESIGN OF THE SANITARY SEWER SYSTEM, INCLUDING PUMP STATIONS, COLLECTION SYSTEM, AND FORCE MAIN ADHERE TO THE GENERAL CRITERIA AND MINIMUM DESIGN STANDARDS OF THE SEWAGE COLLECTION AND TREATMENT REGULATIONS (9 VAC 25-790).

VAN MARC BENNETT VA LIC. NO. 026628



No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
3	11/19/10	TEWNING ROAD ON-STREET HC PARKING ADDITION	GVC	VAB
2	9/29/09	REVISED PER JCC COMMENTS DATED 8/31/09	GVC	VAB
1	8/20/09	REVISED PER JCC COMMENTS DATED 6/09	GVC	VAB

VAN MARC BENNETT LIC. 026628 9/25/09

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CONSULTING ENGINEERS
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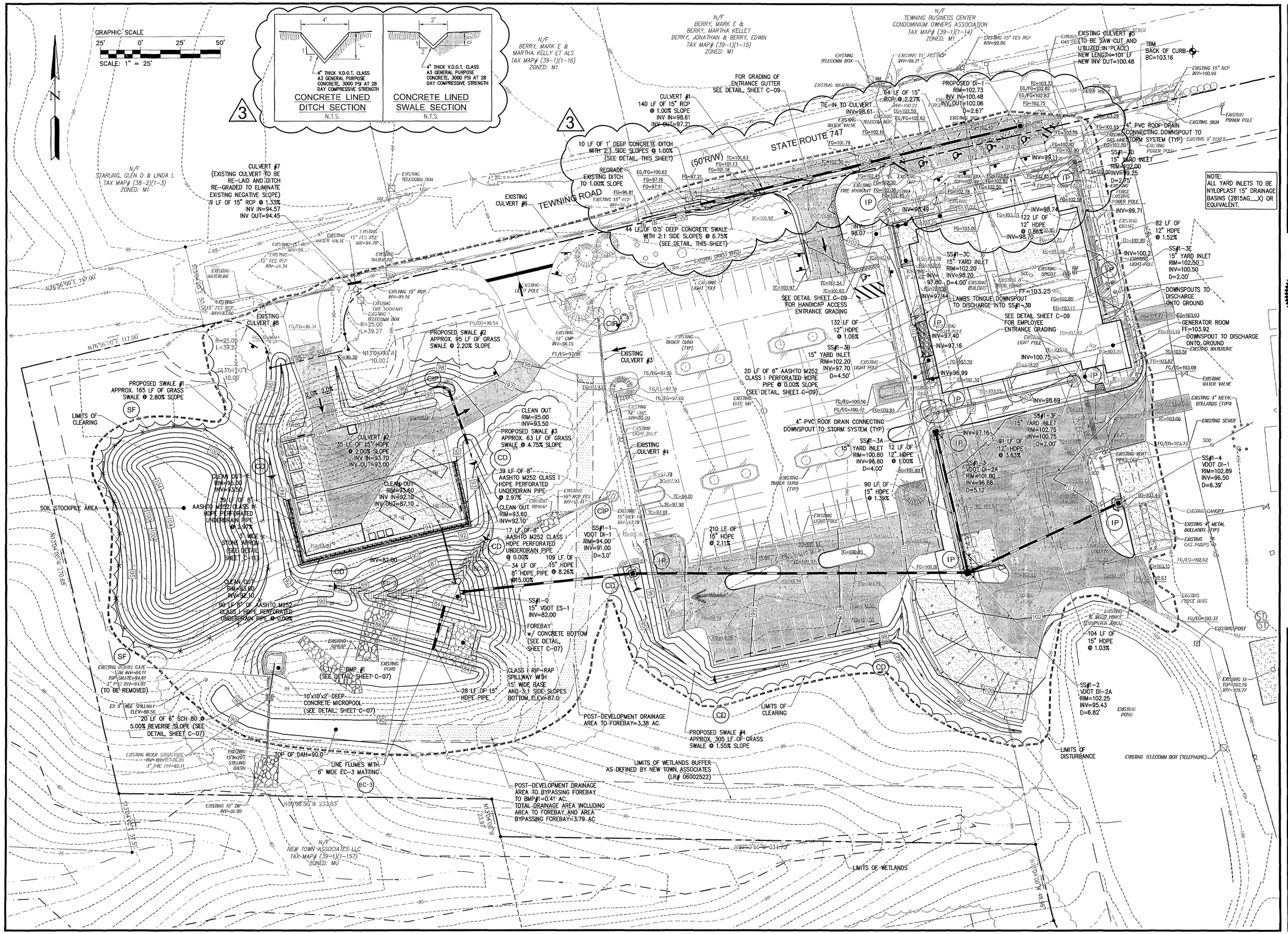
SITE AND UTILITY LAYOUT
JCSA OPERATIONS CENTER

BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
GVC	LG
Scale	Date
1"=25'	8/20/09

Project No. 9801-E-19

Drawing No. C-05



No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	RECHECKED BY
3	11/19/10	TEWNING ROAD ON-STREET HC PARKING ADDITION	GVC	VMB
2	9/25/09	REVISED PER JCC COMMENTS DATED 8/31/09	GVC	VMB
1	8/20/09	REVISED PER JCC COMMENTS DATED 6/09	GVC	VMB

COMMONWEALTH OF VIRGINIA
LAURENCE E. MOSER
No. 9628
PROFESSIONAL ENGINEER
9/25/09

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CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

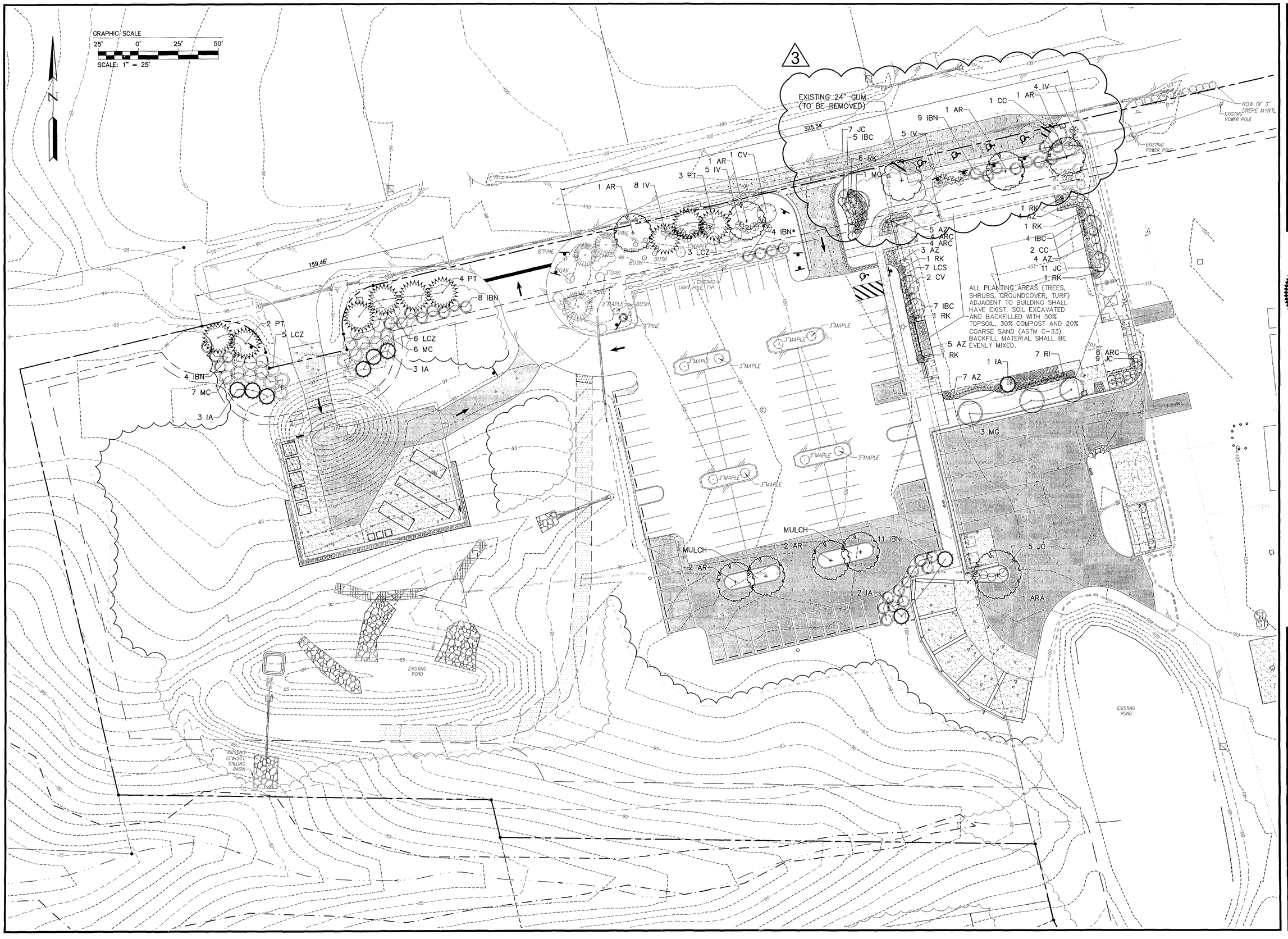
GRADING AND DRAINAGE PLAN
JCSA OPERATIONS CENTER

BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
GVC	LG
Scale	Date
1"=25'	8/20/09

Project No. 9801-E-19

Drawing No. C-06



No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
3	11/19/10	TEWNING ROAD ON-STREET HC PARKING ADDITION	GVC	VMB
2	9/25/09	REVISED PER JCC COMMENTS DATED 8/31/09	GVC	VMB
1	8/20/09	REVISED PER JCC COMMENTS DATED 8/09	GVC	VMB

COMMONWEALTH OF VIRGINIA
GAVIN R. ROBEY
Lic. No. 001299
9/25/09
LANDSCAPE ARCHITECT

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CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

LANDSCAPE PLAN
JCSA OPERATIONS CENTER

BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

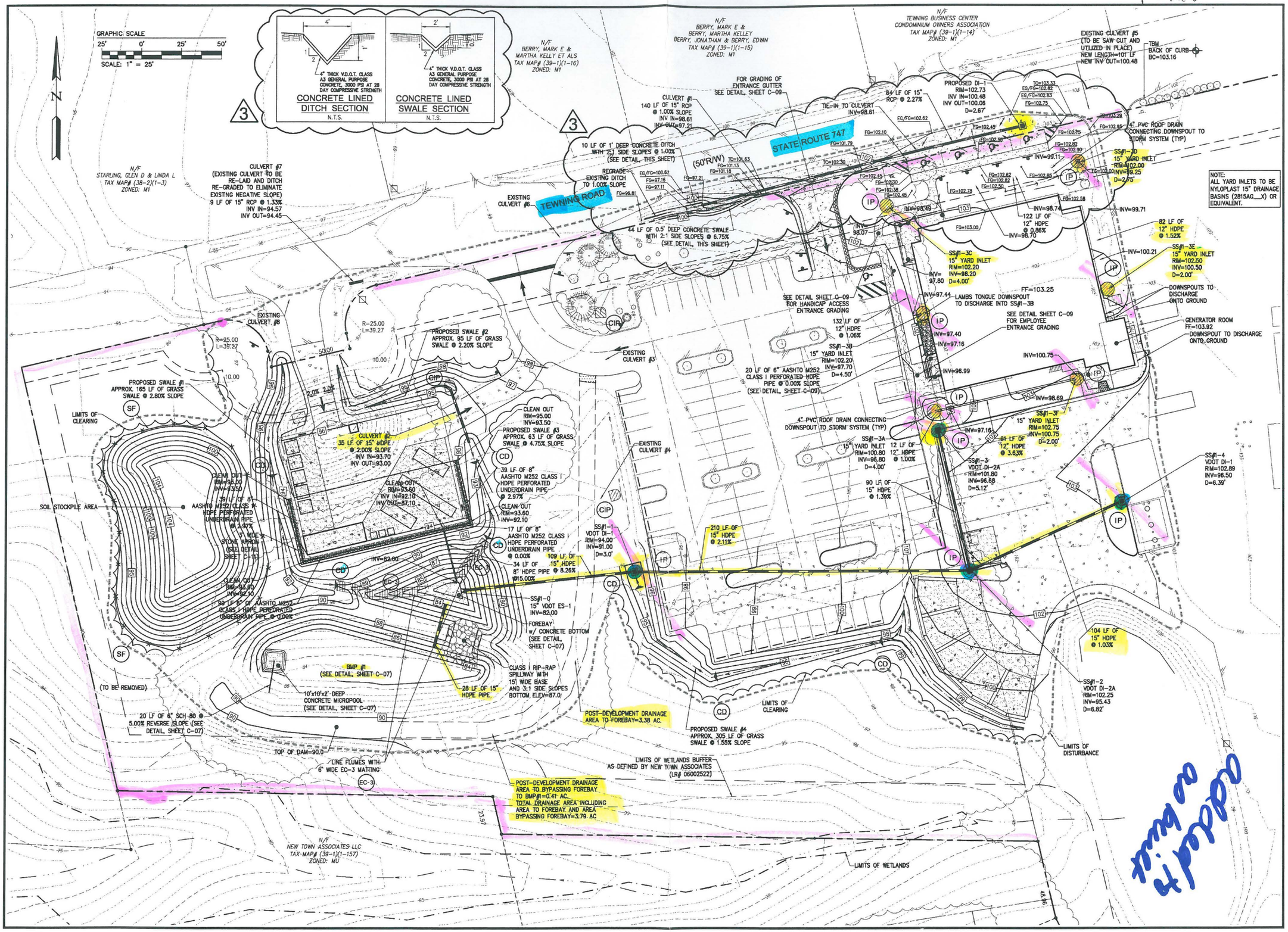
Designed	Drawn
CMB	SJR
Scale	Date
1"=25'	8/20/09

Project No.
9801-E-19

Drawing No.
C-13

S:\Jobs\9801\E-Engineering\19-JCSA Tewning Road Site Plan\dwg\Eng\Plans\On-Street HC Parking Amendment\9801E19c13-landscape.dwg, 1/20/2011 9:35:20 AM, graham.corson

PC168



PC168

No.	DATE	REVISION / COMMENT / NOTE	BY	REVIEWED BY
3	11/19/10	TEWNING ROAD ON-STREET HC PARKING ADDITION	GVC	WMB
2	9/25/09	REVISED PER JCC COMMENTS DATED 9/31/09	GVC	WMB
1	8/20/09	REVISED PER JCC COMMENTS DATED 8/09	GVC	WMB

COMMONWEALTH OF VIRGINIA — VAUGHAN T. WILLIAMS — Lic. No. 0602628 — PROFESSIONAL ENGINEER — 9/25/09

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CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

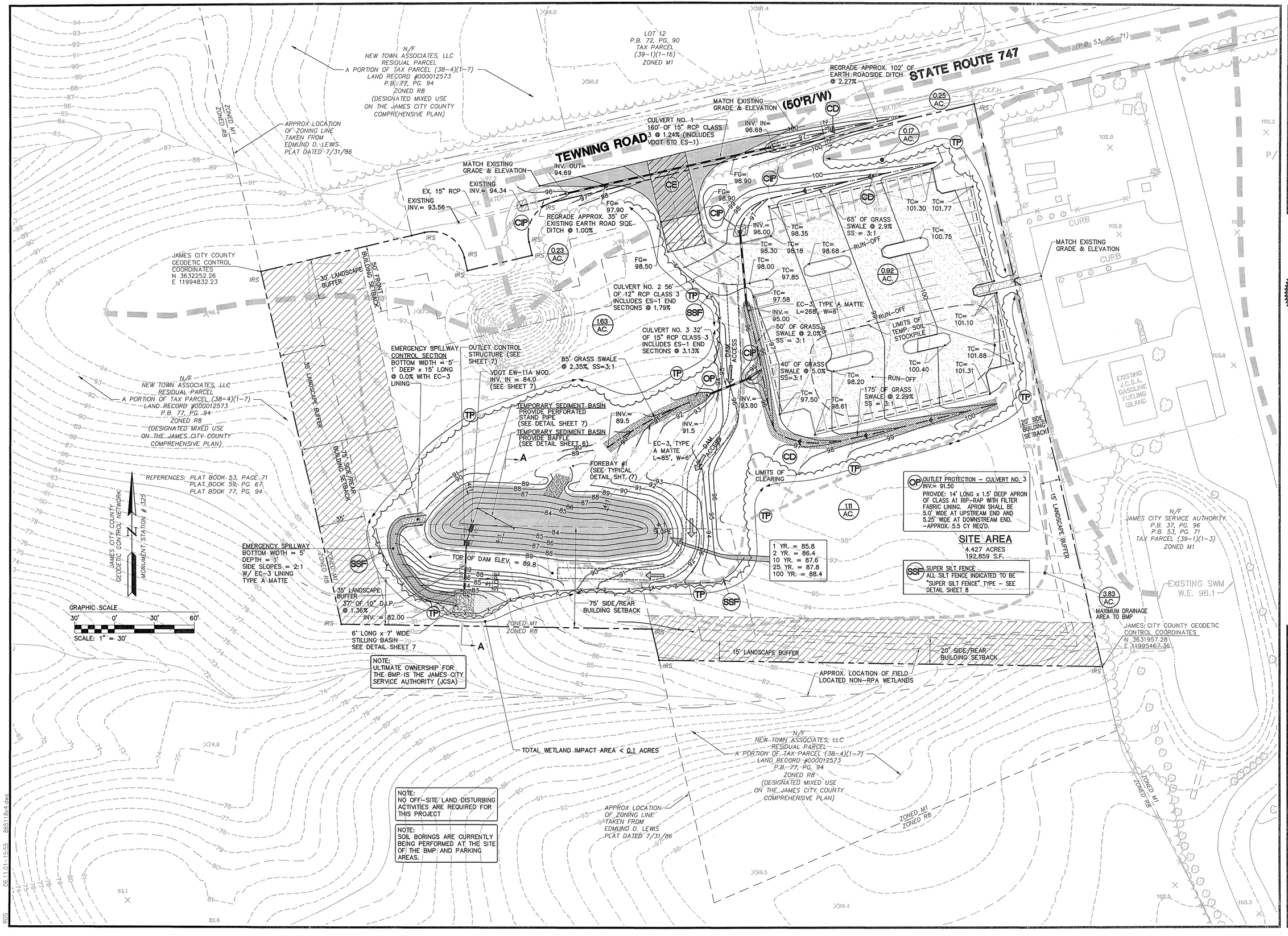
GRADING AND DRAINAGE PLAN
JCSA OPERATIONS CENTER

BERKELEY DISTRICT — JAMES CITY COUNTY — VIRGINIA

Designed	Drawn
GVC	LG
Scale	Date
1"=25'	8/20/09

Project No. 9801-E-19

Drawing No. C-06



No.	DATE	REVISION / COMMENT / NOTE	BY
1	6/21/01	REVISED BMP/TEMP. SED. BASIN --FIELD CHANGE	VMB
1	1/21/01	REVISED PER J.C.C. COMMENT LETTER DATED 1/12/01	VMB

COMMONWEALTH OF VIRGINIA
VAUGHAN MARC LENNETT
No. 3068
PROFESSIONAL ENGINEER
1/16/01

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GRADING, DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
JCSA OPERATIONS CENTER SITE EXPANSION

OWNER: JAMES CITY SERVICE AUTHORITY

BERKELEY DISTRICT — JAMES CITY COUNTY — VIRGINIA

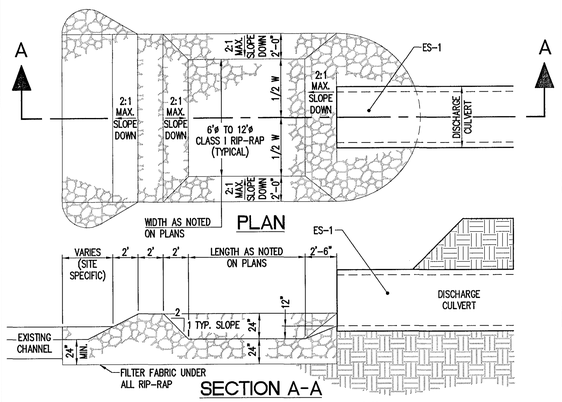
Designed	Drawn
VMB/RDS	SRL
Scale	Date
1"=30'	11/27/00

Project No. 8651-18

Drawing No. 4

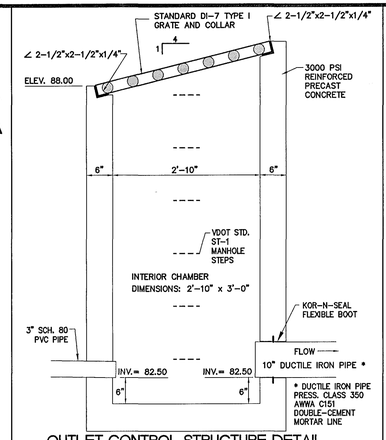
06.11.01-15:55 8651184.dwg

RDS



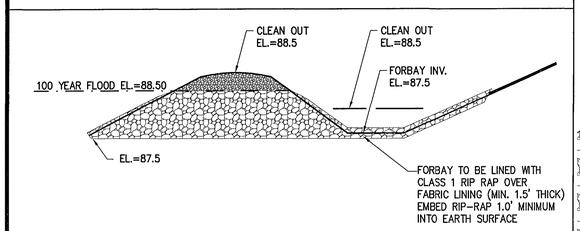
STILLING BASIN DETAIL

NOT TO SCALE



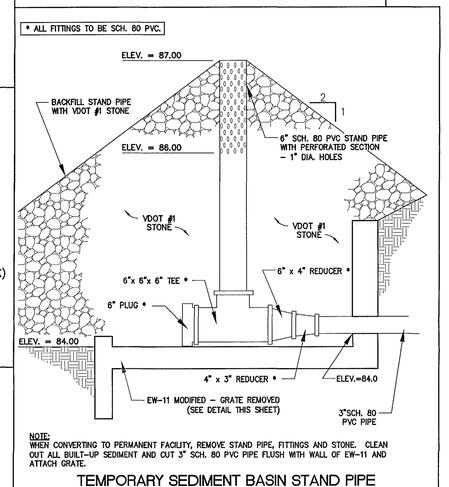
OUTLET CONTROL STRUCTURE DETAIL

SCALE: N.T.S.



TYPICAL FOREBAY RIPRAP DETAIL

N.T.S.



NOTE:
WHEN CONVERTING TO PERMANENT FACILITY, REMOVE STAND PIPE, FITTINGS AND STONE. CLEAN OUT ALL BUILT-UP SEDIMENT AND CUT 3" SCH. 80 PVC PIPE FLUSH WITH WALL OF EW-11 AND ATTACH GRATE.

TEMPORARY SEDIMENT BASIN STAND PIPE

SCALE: N.T.S.

EROSION AND SEDIMENT CONTROL NARRATIVE

PROJECT DESCRIPTION
THIS PROJECT IS DESIGNED AS AN EXPANSION OF THE EXISTING JCSA OPERATIONS CENTER TO THE WEST OF THE SITE, CONTAINING A PARKING LOT . THE ADDRESS FOR THE PROJECT IS 107 TEWNING ROAD.

EXISTING SITE CONDITIONS
THE SITE FOR THIS SUBDIVISION IS PRESENTLY WOODED WITH MODERATELY SLOPING LANDFORMS. WOODED RAVINES EXIST TO THE SOUTHWEST.
WETLAND AREAS ARE LOCATED TO THE SOUTH OF THE SITE. THE EXISTING JCSA OPERATIONS CENTER SITE IS CURRENTLY LOCATED TO THE EAST.

ADJACENT PROPERTY
THE SITE FOR THESE IMPROVEMENTS IS LOCATED ADJACENT TO THE NEW TOWN PLANNED DEVELOPMENT, TO THE WEST AND SOUTH. THE EXISTIND JCSA OPERATIONS CENTER, TO THE EAST. TEWNING ROAD TO THE NORTH.

CRITICAL EROSION AREAS

CRITICAL EROSION AREAS, OR HIGHLY ERODIBLE AREAS HAVE BEEN IDENTIFIED ON SHEET 2 OF THE PLAN SET.

PRACTICES USED IN THESE PLANS

THE FOLLOWING EROSION AND SEDIMENT CONTROL PRACTICES ARE TO BE UTILIZED DURING CONSTRUCTION:

TREE PROTECTION - TO BE INSTALLED PRIOR TO ANY GRADING AND LAND DISTURBING ACTIVITIES

TEMPORARY SEDIMENT BASINS - ONE IS REQUIRED FOR THIS SITE. THE SEDIMENT BASIN IS TO BE CONSTRUCTED ACROSS A NATURAL SWALE, DETAILS INDICATING THE DIMENSIONS OF THESE FACILITIES ARE SHOWN ON THE PLANS.

OUTLET PROJECT - CLASS 1 RIP-RAP SHALL BE UTILIZED IN ALL STILLING BASINS AND STORM SEWER OUTFALLS

SILT FENCE - SILT FENCE BARRIERS SHALL BE INSTALLED AT ALL DOWNSTREAM LOCATIONS OF GRADING AND LAND DISTURBING ACTIVITIES

TEMPORARY CONSTRUCTION ENTRANCE - A STONE TEMPORARY CONSTRUCTION ENTRANCE IS PROVIDED AT THE ENTRANCE TO THE SITE. THE TRACKING OF MUD AND DEBRIS FROM THE SITE BY CONSTRUCTION EQUIPMENT SHALL NOT BE PERMITTED.

CULVERT INLET PROTECTION - CULVERT INLET PROTECTION SHALL BE INSTALLED AT THE INLETS OF ALL CULVERTS

ROCK CHECK DAMS - CHECK DAMS SHALL BE PROVIDED IN ALL ROADSIDE DITCHES AT 100-FOOT INTERVALS

PERMANENT SEEDING - PERMANENT SEEDING SHALL BE APPLIED TO ALL DENUDED AREAS AFTER FINAL GRADING AND TOPSOILING HAS BEEN COMPLETED

ALL EROSION AND SEDIMENT CONTROL MEASURES, WHETHER STRUCTURAL OR NON-STRUCTURAL, SHALL BE MAINTAINED BY THE CONTRACTOR. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE THE EROSION AND SEDIMENT CONTROL MEASURES ARE FUNCTIONAL UNTIL THE ENTIRE SITE HAS BEEN PERMANENTLY STABILIZED.

SEQUENCE OF CONSTRUCTION

1 - CLEAR PERIMETER, (THE NEW PARKING LOT, MATERIALS STORAGE LOT, AND BMP), THEN INSTALL TREE PROTECTION AND SILT FENCE.

2 - INSTALL STONE CONSTRUCTION ENTRANCE (NEW PARKING LOT).

3 - STRIP TOPSOIL FROM CLEARED AREAS FOR EARTHWORK OPERATIONS, AND STOCKPILE ON SITE AS INDICATED ON THE PLAN. CONSTRUCT TEMPORARY SEDIMENT BASIN IN CONJUNCTION WITH THE EARTHWORKS OPERATIONS.

4 - CONTINUE SITE EARTHWORK OPERATIONS (SUB-GRADE GRADING); INSTALL DRIVEWAY CULVERTS.

5 - COMPLETE PARKING CONSTRUCTION WITH FINE GRADING, CEMENT TREATED AGGREGATE (CTA) FINAL SURFACE.

6 - TOPSOIL DENUDED AREAS AND PERMANENTLY SEED.

7 - REMOVE ALL ACCUMULATED SEDIMENT IN TEMPORARY SEDIMENT BASIN CONSTRUCT PERMANENT MODIFICATION TO BMP. REMOVE EROSION CONTROL MEASURES UPON SITE STABILIZATION. INSTALL ALL PERMANENT STILLING, AFTER OBTAINING J.C.C. ENVIRONMENTAL DIVISON APPROVAL.

GENERAL NOTES FOR CONSTRUCTION OF STORMWATER BASINS

1. THE CONTRACTOR SHALL PROVIDE ALL WORK AND MATERIALS NEEDED TO CONSTRUCT THE STORMWATER BASIN, STORMWATER MANAGEMENT PONDS, BEST MANAGEMENT PRACTICES, SEDIMENT BASINS AND SEDIMENT TRAPS. THE WORK SHALL INCLUDE ALL LABOR, MATERIALS, EQUIPMENT AND MATERIALS NEEDED FOR THE COMPLETION OF GRADING AND EARTHWORK ASSOCIATED WITH THE CONSTRUCTION.

2. THE CONTRACTOR SHALL CONSULT AND PROVIDE FOR THE SERVICES OF A GEOTECHNICAL ENGINEER. THE GEOTECHNICAL ENGINEER SHALL PROVIDE TEST RESULTS ON PLACED DAM MATERIALS, IDENTIFYING SOIL CLASSIFICATION, PERMEABILITY, PLASTICITY INDEX, AND COMPACTION. ALL TESTS SHALL BE IN CONFORMANCE WITH ASTM STANDARDS. THE COST OF THE SERVICES OF THE GEOTECHNICAL ENGINEER SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SATISFACTORY GEOTECHNICAL REULTS ARE NEEDED PRIOR TO FINAL APPROVAL.

3. ALL INSPECTIONS REQUIRED FOR THE WORK SHALL BE PERFORMED BY A GEOTECHNICAL ENGINEER AT THE EXPENSE OF THE GENERAL CONTRACTOR.

4. ON-SITE EXCAVATED MATERIAL, IF DETERMINED SUITABLE FOR USE IN DAM CONSTRUCTION BY A GEOTECHNICAL ENGINEER, MAY BE USED FOR DAM CONSTRUCTION. SHOULD ADDITIONAL MATERIAL BE REQUIRED, THE CONTRACTOR SHALL IDENTIFY THE NEED FOR MATERIAL TO THE OWNER, AS ADDITIONAL BORROW MATERIAL MAY BE AVAILABLE ON THE STONEHOUSE PROPERTY. ALL EXCAVATED MATERIAL DETERMINED BY THE GEOTECHNICAL ENGINEER TO BE UNSUITABLE SHALL BE DISPOSED OF PROPERLY AT THE CONTRACTOR'S EXPENSE. ALL EXCAVATED MATERIAL NOT REQUIRED FOR BACKFILLING SHALL EITHER BE DEPOSITED ON SITE AND SPREAD BY THE CONTRACTOR, OR SHALL BE DEPOSITED IN AN AREA ON THE SITE AS DIRECTED BY THE OWNER. THE CONTRACTOR SHALL PROVIDE PROPER STABILIZATION, AND EROSION AND SEDIMENT CONTROL MEASURES NEEDED TO CONTROL AS PER THE VESCH THIRD EDITION.

5. UNDERCUT FOR THE FOUNDATION OF THE DAM EMBANKMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. THE FOUNDATION SHALL BE BACKFILLED WITH SOILS CLASSIFIED AS SM, SC, OR CL UNDER THE UNIFIED SOIL CLASSIFICATION SYSTEM. SOILS SHALL HAVE A MINIMUM OF 15% BY WEIGHT FINES, HAVING A PLASTICITY INDEX OF 30% AND A PERMEABILITY OF 0.0004 IN./SEC. OR LESS. FILL SHALL BE COMPACTED IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO A DRY DENSITY OF 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). EXCAVATION FOR THE DAM KEY SHALL BE IN ACCORDANCE TO THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. HEIGHT, DEPTH, AND WIDTH OF THE KEY SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. THE KEY SHALL BE FORMED USING SOILS CLASSIFIED AS SC OR CL, WITH A PERMEABILITY OF 0.0004 IN./SEC. OR LESS.

6. THE DAM CORE SHALL BE AS CONSTRUCTED WITH NON-EXPANSIVE SC OR CL CLAYEY MATERIAL WITH PERMEABILITY OF 0.0004 IN./SEC. OR LESS. THE FILL OF THE CORE SHALL BE MADE IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). SIZE, SHAPE, WIDTH, DEPTH, AND HEIGHT OF THE DAM CORE SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. TO COVER THE DAM CORE, A SILTY FINE SAND OR CLAYEY SOIL (SM, SC, OR CL) SHALL BE PLACED. A VEGETATIVE COVER USING VDOT EC-2 EROSION CONTROL BLANKETS SHALL BE PLACED ON DAM SLOPES AND CREST TO PREVENT EROSION.

7. UPON COMPLETION, THE CONSTRUCTION OF THE THE DAM WILL BE CERTIFIED BY A GEOTECHNICAL ENGINEER WHO HAS INSPECTED THE STRUCTURE DURING CONSTRUCTION.

STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

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 OF THESE NEWLY DISTRIBUTED AREAS AS WELL AS INSPECTIONS FOR ACCUMULATED SEDIMENTS AT TWO BMP FACILITY.

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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. SEDIMENT REMOVAL IS REQUIRED USING A RUBBER-WHEELED BACKHOE. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, THE RISER BOTTOM AND OUTLET PIPE SHALL BE CLEANED OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA. SEDIMENT SHALL NOT BE ALLOWED TO ACCUMULATE IN DEPTHS GREATER THAN 1-FOOT. NO SEDIMENT SHALL BE ALLOWED TO ACCUMULATE TO PREVENT THE PROPER FUNCTION OF ANY PIPE OR CULVERT.

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3. PERFORM SOIL SAMPLING ON STABILIZED BMP SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS

4. IN STABILIZED BMP AREAS, IF VEGETATION COVERS LESS THAN 40 % OF SOIL SURFACES, LIME 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 SEEDING RECOMMENDATIONS

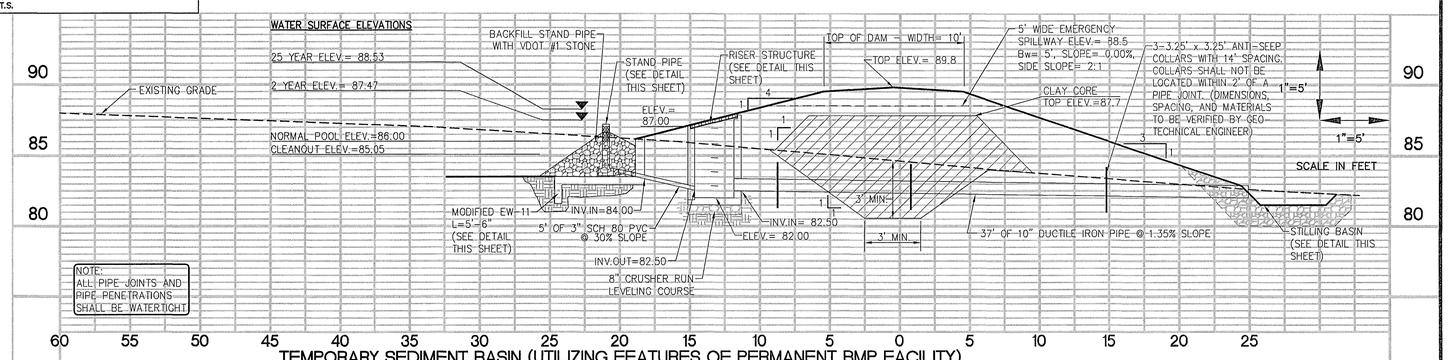
5. PERFORM QUARTERLY INSPECTIONS OF THE RELEASE STRUCTURES, RISER SECTION AND CREST OF SPILLWAY FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS TO MAINTAIN THE INTEGRITY OF THE STRUCTURE AND PROVIDE AN ATTRACTIVE APPEARANCE. DURING QUARTERLY INSPECTIONS, THE POND DRAIN VALVE, USUALLY LEFT IN THE VALVE "CLOSED" POSITION, SHALL BE INSPECTED AND OPERATED THROUGH TWO COMPLETE FULL-OPEN TO FULL-CLOSE TO FULL-OPEN CYCLES.

6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, ORIFICE/ WEIR(S), OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE CONTINUED INTEGRITY OF THE STRUCTURE.

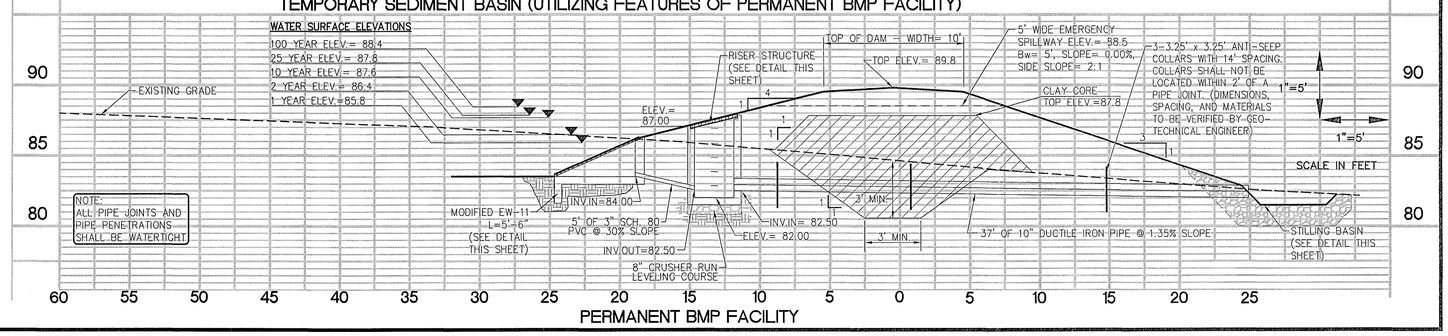
7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE FACILITY FOR SIGNS OF ANIMAL/ RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.

8. RECORD KEEPING. THE LANDOWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/ OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.

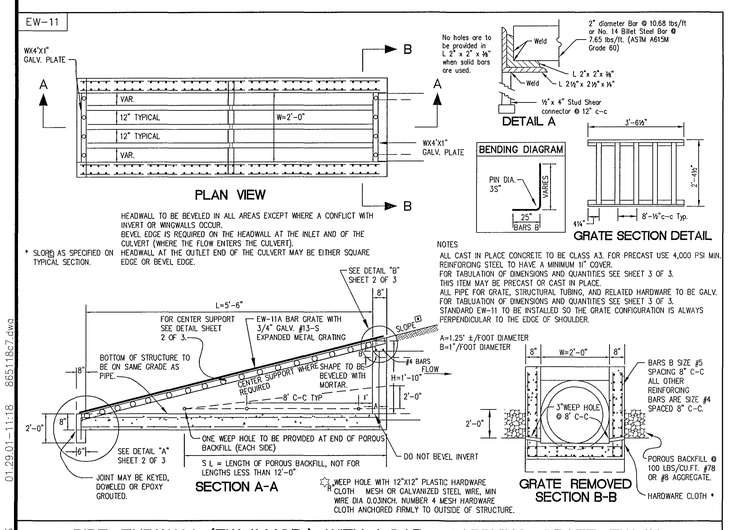
9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.



TEMPORARY SEDIMENT BASIN (UTILIZING FEATURES OF PERMANENT BMP FACILITY)



PERMANENT BMP FACILITY



PIPE ENDWALL (EW-11 MOD.) WITH LOAD - CARRYING GRATE EW-11A

No.	DATE	REVISION / COMMENT / NOTE	BY
1	6/21/01	REVISED BMP/TEMP SED. BASIN - FIELD CHANGE	VMB
1	1/11/01	REVISED PER J.C.C. COMMENT LETTER DATED 1/12/01	VMB

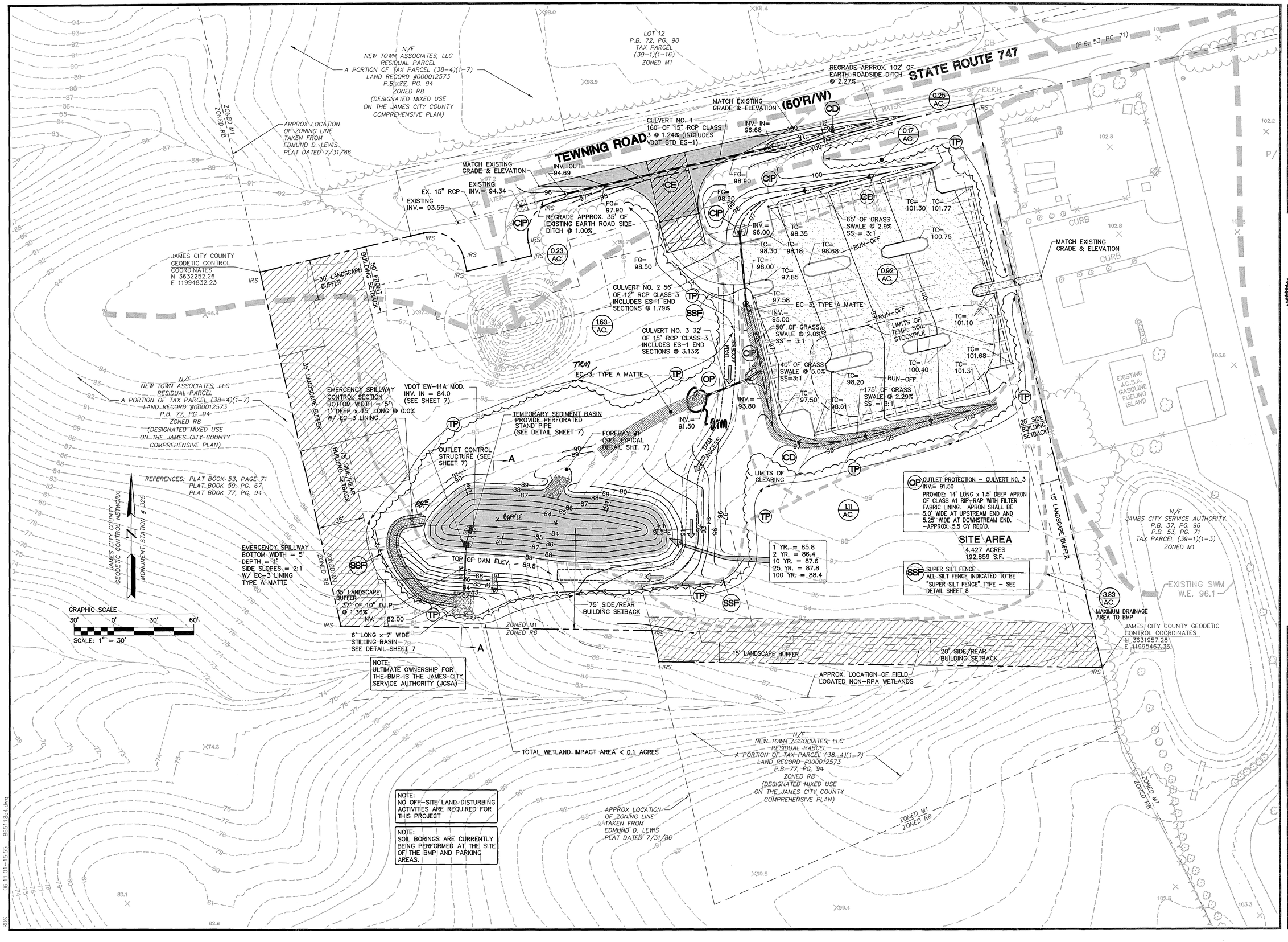
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
Fax (757) 220-8994
CONSULTING ENGINEERS

STORM WATER MANAGEMENT BASIN DETAILS
JCSA OPERATIONS CENTER
SITE EXPANSION
OWNER: JAMES CITY SERVICE AUTHORITY
BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VMB	RDS
Scale	Date
N.T.S.	11/27/00

Project No. 8651-18
Drawing No. 7

01.29.01-11:18 8651-18-7.dwg RDS



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1	6/21/01	REVISED BMP/TEMP. SED. BASIN - FIELD CHANGE	VMB
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5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
Fax (757) 220-9994
CONSULTING ENGINEERS

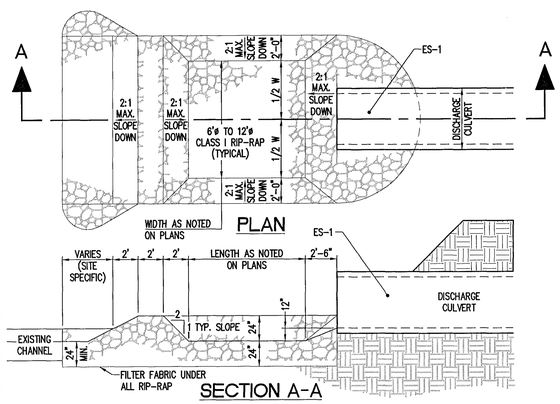
GRADING, DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
JCSA OPERATIONS CENTER SITE EXPANSION

OWNER: JAMES CITY SERVICE AUTHORITY

BERKELEY DISTRICT — JAMES CITY COUNTY — VIRGINIA

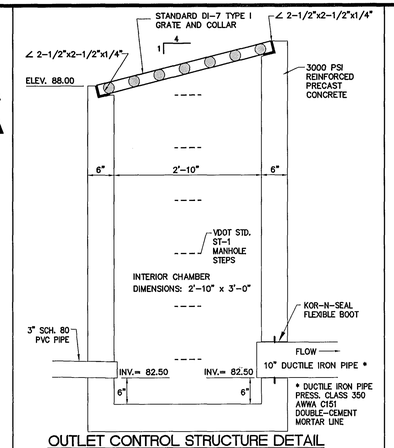
Designed VMB/RDS	Drawn SRL
Scale 1"=30'	Date 11/27/00
Project No. 8651-18	
Drawing No. 4	

06/11/01-15:55 8651184.dwg RDS



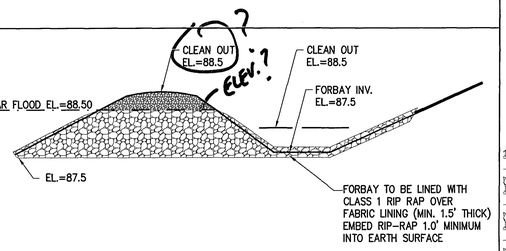
STILLING BASIN DETAIL

NOT TO SCALE



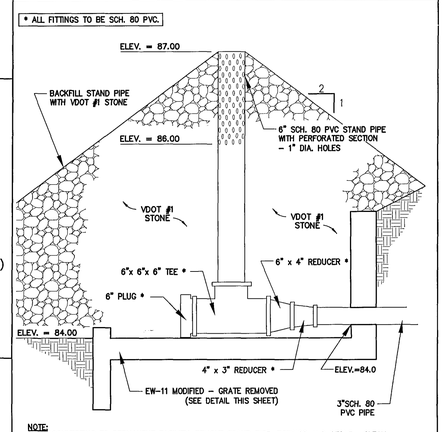
OUTLET CONTROL STRUCTURE DETAIL

SCALE: N.T.S.



TYPICAL FOREBAY RIPRAP DETAIL

N.T.S.



NOTE:
WHEN CONVERTING TO PERMANENT FACILITY, REMOVE STAND PIPE, FITTINGS AND STONE. CLEAN OUT ALL BUILT-UP SEDIMENT AND CUT 3" SCH. 80 PVC PIPE FLUSH WITH WALL OF EW-11 AND ATTACH GRATE.

TEMPORARY SEDIMENT BASIN STAND PIPE

SCALE: N.T.S.

EROSION AND SEDIMENT CONTROL NARRATIVE

PROJECT DESCRIPTION
THIS PROJECT IS DESIGNED AS AN EXPANSION OF THE EXISTING JCSA OPERATIONS CENTER TO THE WEST OF THE SITE, CONTAINING A PARKING LOT . THE ADDRESS FOR THE PROJECT IS 107 TEWNING ROAD.

EXISTING SITE CONDITIONS
THE SITE FOR THIS SUBDIVISION IS PRESENTLY WOODED WITH MODERATELY SLOPING LANDFORMS. WOODED RAVINES EXIST TO THE SOUTHWEST.
WETLAND AREAS ARE LOCATED TO THE SOUTH OF THE SITE. THE EXISTING JCSA OPERATIONS CENTER SITE IS CURRENTLY LOCATED TO THE EAST.

ADJACENT PROPERTY
THE SITE FOR THESE IMPROVEMENTS IS LOCATED ADJACENT TO THE NEW TOWN PLANNED DEVELOPMENT, TO THE WEST AND SOUTH. THE EXISTIND JCSA OPERATIONS CENTER, TO THE EAST. TEWNING ROAD TO THE NORTH.

CRITICAL EROSION AREAS

CRITICAL EROSION AREAS, OR HIGHLY ERODIBLE AREAS HAVE BEEN IDENTIFIED ON SHEET 2 OF THE PLAN SET.

PRACTICES USED IN THESE PLANS

THE FOLLOWING EROSION AND SEDIMENT CONTROL PRACTICES ARE TO BE UTILIZED DURING CONSTRUCTION:

TREE PROTECTION - TO BE INSTALLED PRIOR TO ANY GRADING AND LAND DISTURBING ACTIVITIES

TEMPORARY SEDIMENT BASINS - ONE IS REQUIRED FOR THIS SITE. THE SEDIMENT BASIN IS TO BE CONSTRUCTED ACROSS A NATURAL SWALE, DETAILS INDICATING THE DIMENSIONS OF THESE FACILITIES ARE SHOWN ON THE PLANS.

OUTLET PROTECT - CLASS I RIP-RAP SHALL BE UTILIZED IN ALL STILLING BASINS AND STORM SEWER OUTFALLS

SILT FENCE - SILT FENCE BARRIERS SHALL BE INSTALLED AT ALL DOWNSTREAM LOCATIONS OF GRADING AND LAND DISTURBING ACTIVITIES

TEMPORARY CONSTRUCTION ENTRANCE - A STONE TEMPORARY CONSTRUCTION ENTRANCE IS PROVIDED AT THE ENTRANCE TO THE SITE. THE TRACKING OF MUD AND DEBRIS FROM THE SITE BY CONSTRUCTION EQUIPMENT SHALL NOT BE PERMITTED.

CULVERT INLET PROTECTION - CULVERT INLET PROTECTION SHALL BE INSTALLED AT THE INLETS OF ALL CULVERTS

ROCK CHECK DAMS - CHECK DAMS SHALL BE PROVIDED IN ALL ROADSIDE DITCHES AT 100-FOOT INTERVALS

PERMANENT SEEDING - PERMANENT SEEDING SHALL BE APPLIED TO ALL DENUDED AREAS AFTER FINAL GRADING AND TOPSOILING HAS BEEN COMPLETED

ALL EROSION AND SEDIMENT CONTROL MEASURES, WHETHER STRUCTURAL OR NON-STRUCTURAL, SHALL BE MAINTAINED BY THE CONTRACTOR. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE THE EROSION AND SEDIMENT CONTROL MEASURES ARE FUNCTIONAL UNTIL THE ENTIRE SITE HAS BEEN PERMANENTLY STABILIZED.

SEQUENCE OF CONSTRUCTION

1 - CLEAR PERIMETER, (THE NEW PARKING LOT, MATERIALS STORAGE LOT, AND BMP), THEN INSTALL TREE PROTECTION AND SILT FENCE.

2 - INSTALL STONE CONSTRUCTION ENTRANCE (NEW PARKING LOT).

3 - STRIP TOPSOIL FROM CLEARED AREAS FOR EARTHWORK OPERATIONS, AND STOCKPILE ON SITE AS INDICATED ON THE PLAN. CONSTRUCT TEMPORARY SEDIMENT BASIN IN CONJUNCTION WITH THE EARTHWORKS OPERATIONS.

4 - CONTINUE SITE EARTHWORK OPERATIONS (SUB-GRADE GRADING); INSTALL DRIVEWAY CULVERTS.

5 - COMPLETE PARKING CONSTRUCTION WITH FINE GRADING, CEMENT TREATED AGGREGATE (CTA) FINAL SURFACE.

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7 - REMOVE ALL ACCUMULATED SEDIMENT IN TEMPORARY SEDIMENT BASIN CONSTRUCT PERMANENT MODIFICATION TO BMP. REMOVE EROSION CONTROL MEASURES UPON SITE STABILIZATION. INSTALL ALL PERMANENT STILLING, AFTER OBTAINING J.C.C. ENVIRONMENTAL DIVISON APPROVAL.

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3. PERFORM SOIL SAMPLING ON STABILIZED BMP SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.

4. IN STABILIZED BMP AREAS, IF VEGETATION COVERS LESS THAN 40 % OF SOIL SURFACES, LIME 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 SEEDING RECOMMENDATIONS.

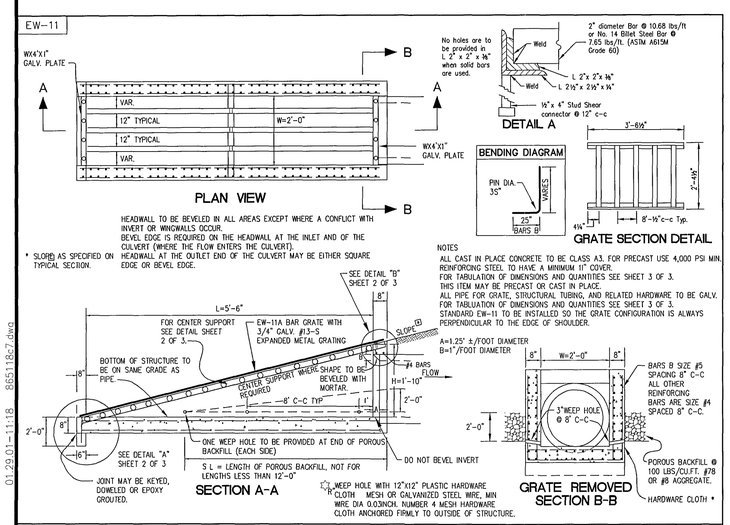
5. PERFORM QUARTERLY INSPECTIONS OF THE RELEASE STRUCTURES, RISER SECTION AND CREST OF SPILLWAY FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS TO MAINTAIN THE INTEGRITY OF THE STRUCTURE AND PROVIDE AN ATTRACTIVE APPEARANCE. DURING QUARTERLY INSPECTIONS, THE POND DRAIN VALVE, USUALLY LEFT IN THE VALVE "CLOSED" POSITION, SHALL BE INSPECTED AND OPERATED THROUGH TWO COMPLETE FULL-OPEN TO FULL-CLOSE TO FULL-OPEN CYCLES.

6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, ORIFICE/ WEIR(S), OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE CONTINUED INTEGRITY OF THE STRUCTURE.

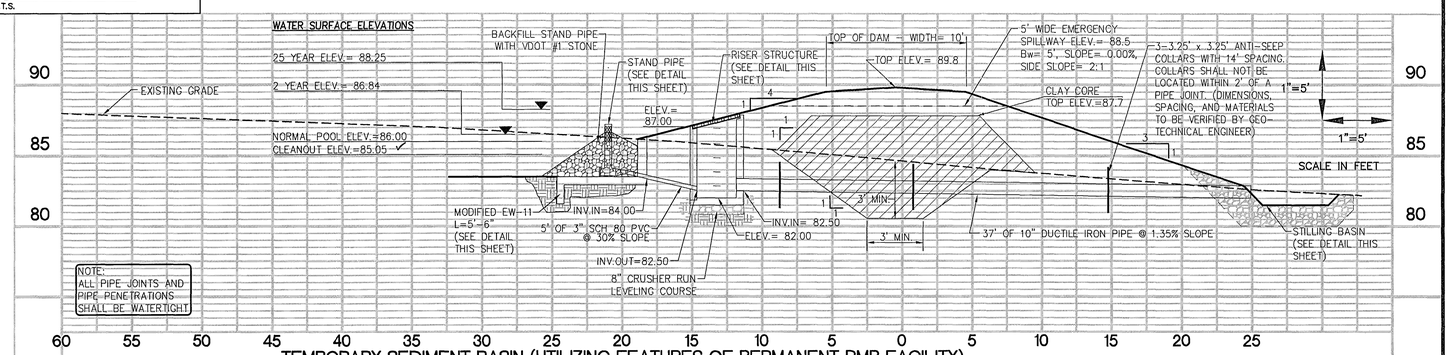
7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE FACILITY FOR SIGNS OF ANIMAL/ RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.

8. RECORD KEEPING. THE LANDOWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/ OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.

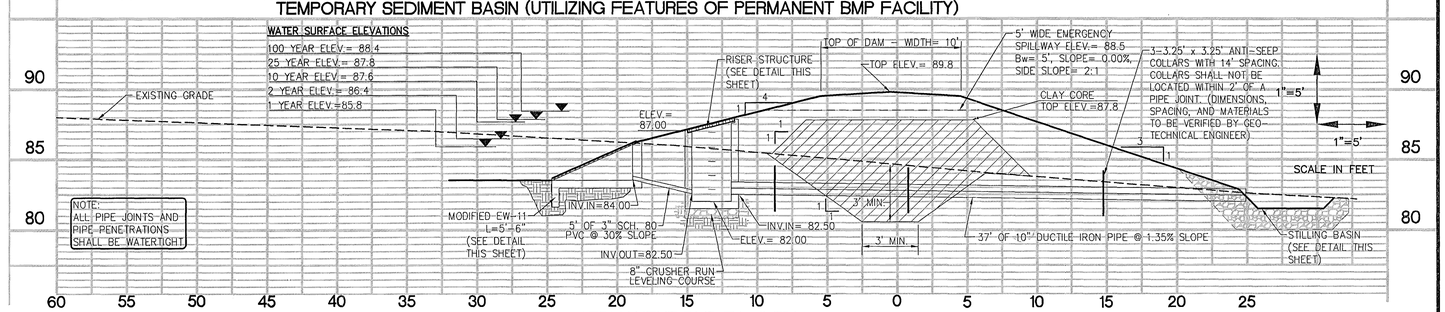
9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.



PIPE ENDWALL (EW-11 MOD.) WITH LOAD - CARRYING GRATE EW-11A



TEMPORARY SEDIMENT BASIN (UTILIZING FEATURES OF PERMANENT BMP FACILITY)



PERMANENT BMP FACILITY

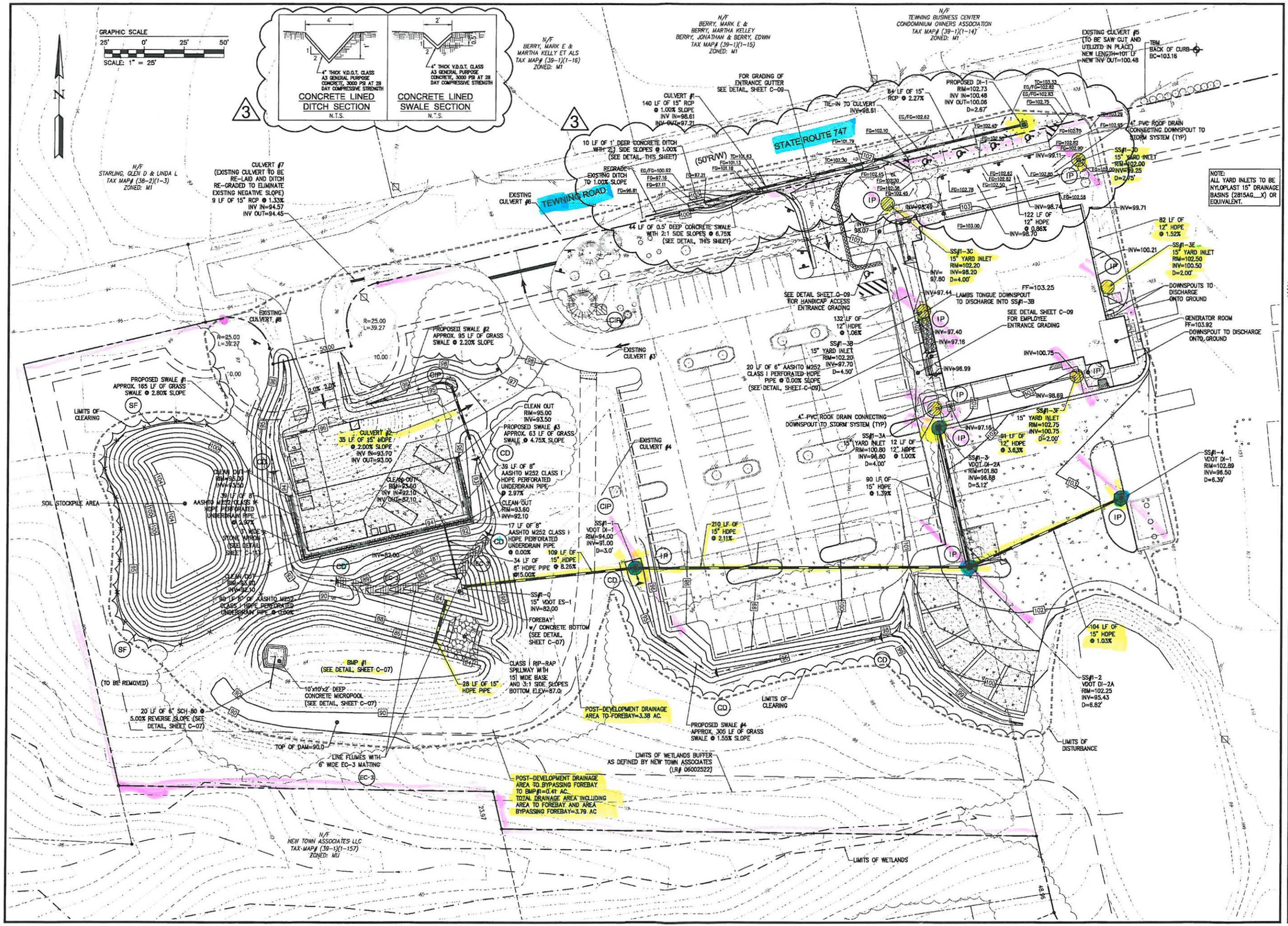
No.	DATE	REVISION / COMMENT / NOTE	BY
1	6/21/01	REVISED BMP/TEMP. SED. BASIN --FIELD CHANGE	VMB
1	1/11/01	REVISED PER J.C.C. COMMENT LETTER DATED 1/12/01	VMB

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

STORM WATER MANAGEMENT BASIN DETAILS
JCSA OPERATIONS CENTER
SITE EXPANSION
OWNER: JAMES CITY SERVICE AUTHORITY
JAMES CITY COUNTY VIRGINIA
BERKELEY DISTRICT

Designed	Drawn
VMB	RDS
Scale N.T.S.	Date 11/27/00
Project No. 8651-18	
Drawing No. 7	

RDS 01.29.01-11:18 8651\18c7.dwg



No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
3	11/16/10	TEWNING ROAD ON-STREET HC PARKING ADDITION	GVC	MJB
2	9/28/09	REVISED PER JCC COMMENTS DATED 8/31/09	GVC	MJB
1	8/20/09	REVISED PER JCC COMMENTS DATED 8/09	GVC	MJB

COMMONWEALTH OF VIRGINIA
WILLIAM J. MCCARTY
No. 26528
PROFESSIONAL ENGINEER
9/17/09

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

CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

GRADING AND DRAINAGE PLAN
JCSA OPERATIONS CENTER

BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
GVC	LG
Scale	Date
1"=25'	8/20/09

Project No. 9801-E-19

Drawing No. C-06

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

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

LETTER OF TRANSMITTAL

DATE	JOB NO.
6/28/01	8651-18

ATTENTION: MR. SCOTT THOMAS

RE: JCSA OPERATIONS CENTER — SITE EXPANSION SP-143-00 REVISED

TO JAMES CITY COUNTY
DEVELOPMENT MANAGEMENT
ENVIRONMENTAL DIVISION

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

☐ Shop drawings ☒ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
2	6/28		CONSTRUCTION DWGS. (4 + 7)
2	6/28		DRAINAGE CALCS

RECEIVED JUL 2001 ENVIRONMENTAL DIVISION

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

AWAITING CORRECTION TO ITEM #7 BAFFLE.

COPY TO FILE SIGNED: [signature]

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

CONSULTING ENGINEERS

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

June 28, 2001

Mr. Scott Thomas
James City County
Development Management
101-E Mounts Bay Road
Williamsburg, VA 23187-8784

RE: JCSA Operations Center
Site Expansion
J.C.C. Case No. S-143-00
AES Project No. 8651-18

Dear Mr. Thomas:

This letter will serve as an outline to the changes or revisions to the amended or supplemental plans for a field change at the above referenced site. Changes or revisions were made to these documents to address concerns provided in your June 25, 2001, e-mail correspondence. We very much appreciate your quick response in reviewing these plans.

Environmental Department:

General Comments:

✓ **Item 1: Outlet Protection**

Please refer to sheet 4; right hand side of the sheet, the required dimensions and quantities are located just above "Site Area" notation.

✓ **Item 2: Stormwater Conveyance Channel**

Please refer to the attached calculations for the velocity calculations for this channel. It is our opinion that the EC-3 lining is more than adequate for this application. Designed ditch velocity is less than 3 f.p.s. The EC-3 lining is able to accommodate velocity up to 10 f.p.s. (per the VESCH handbook). Since this material is being used at all other ditch locations on the site it is also our opinion that this also keep the cost down for the owner.

✓ **Item 3: BMP Design**

Please refer to the attached drainage calculations the stage-storage curve is now included with this submittal, we apologize for this oversight.

Item 4: BMP Design

Please refer to the attached drainage calculations the elevation-discharge curve is now included with this submittal, we apologize for this oversight.

Item 5: BMP Design

The computations for the 3-inch low flow orifice are located at the end of the spreadsheet entitled "Calculation for SCS Hydrograph Generation and Channel Protection for BMP/SWM Tewning Road Maintenance Parking / Material Storage Facility.

NO **Item 6: TSB Design**

The temporary sediment basin baffle has been included in the plan. The use of a more permanent baffle, in our opinion is not necessary due to the fact that the site should be stabilized at the time of conversion to a permanent BMP facility, and also short circuiting should not occur because the facility pond is designed to retain the 2- year storm event before cresting the weir of the riser structure, thus preventing "short circuits". WATER QUALITY EVENT – 3" ORIF. IS BELOW CREST @ EL. 87.0'. THUS SHORT-CIRCUITING. DETAIL SHEET 6? BAFFLE ARRANGEMENT INCORRECT.

Item 7: TSB Design

The temporary sediment basin the Q-values for the 2-year and 25-year storms have been revised, please refer to the attached drainage calculations. The sediment basin has re-calculated based upon the site being in a denuded condition. The slopes and the curve numbers have been adjusted accordingly, these are also included in the above referenced spreadsheet.

Thank you for your assistance on this project and kind assistance in expediting this for our client. Should any further questions arise, please feel free to contact us.

Sincerely,

AES Consulting Engineers

Richard D. Smith
Project Engineer

Scott Thomas

From: Scott Thomas
Sent: Monday, June 25, 2001 3:43 PM
To: 'mbennett@aesva.com'
Cc: Darryl Cook; Larry Foster; Pat Menichino
Subject: JCSA OP Center SP-143-00

On June 22nd 2001, AES submitted revised Sheets 4 and 7 and pond design computations to the Environmental Division for review. The revised plans shows erosion and sediment control, drainage and layout/configuration changes associated with the plan and the temporary sediment basin/permanent BMP at the southwest corner of the site. The changes to the plan are as a result of our prior meetings in which it was agreed that extended detention would be provided at the site for areas currently to be developed. The control of future additional onsite developed areas will be handled either by expansion of the onsite pond or via offsite stormwater management/BMP's on the Casey New Town tract, whichever happens accordingly.

It is my understanding that our office needed to review the revised drawings/computations in order for clearing and earthmoving operations to resume at the site. Based on my review of the plans/computations, I feel the concept/arrangement is in order and operations as such can proceed.

I do have some minor technical questions that I feel need resolved before we could approve the plan as final; however, these issues would not delay land-disturbing operations from resuming at the site.

As such AES should respond to the following concerning the revised plan.

✓1. Outlet Protection. Show dimensions and class, depth and amount of stone required for the OP at the end of the 15-inch RCP pipe across the dam access road.

✓2. Stormwater Conveyance Channel. Use of high performance turf reinforcement matting (TRM) is recommended for the outfall channel just below the 15-inch RCP pipe across the dam access road. This is the existing swale which leads to the pond. If TRM is not used, provide computations to show the EC-3 lining is adequate for erosion protection. V= 2.4 FPS

✓3. BMP Design. Provide a stage-storage curve (or table) for the pond's new grading scheme.

✓4. BMP Design. Provide an elevation-discharge rating curve (or table) for the pond's new discharge arrangement (ie. low flow orifice, riser/barrel and emergency spillway).

✓5. BMP Design. Provide computations showing the 3-inch low flow BMP orifice meets 24-hour extended detention requirements. This is necessary due to drastic volume changes in the pond as compared to the previous design.

6. TSB Design. The sediment basin design data sheet shows a baffle is required in the basin during its temporary mode. None was shown on the plan. Also, due to its length to width layout, use of a more permanent type baffle should be considered to prevent short-circuiting in the basin once its converted to permanent BMP mode.
· WQ EVENT
· DETAIL SHEET 6.
· BAFFLE ARRANGEMENT

✓7. TSB Design. The 25-year peak discharge in the Sediment Basin Design Data Sheet appears incorrect, as a 25-year value of 4.9 cfs is less the 2-year design value of 5.3 cfs. Ensure design of the temporary sediment basin for the 25-year event reflects the condition of the drainage area in a denuded condition. The postdeveloped 25-year peak inflow into the facility is 13.01 cfs based on a composite CN value of 81. This peak discharge is based on the site parking area in an impervious condition; however, flatter slopes are present and a major portion of the site area is considered stabilized. During initial clearing, a large portion of the site will be in a disturbed state and site slopes are much steeper. Ensure the CN value (and peak discharge) for the 25-year TSB design are not higher during the construction phase. Provide computations as required to support the Q2/Q25 runoff values used in the design data sheet and provide the ultimate routing to confirm the 25-year design high water elevation for TSB design (Note: currently design high water for the basin in TSB mode is El. 88.25; for final BMP mode it is at El. 87.81).

Hopefully, this will allow the project to move forward. If you have any questions, call me at 757-253-6639.

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

TSB. SHOULD BISSECT MIDDLE OF POND IN LENGTH DIRECTION.
★ BAFFLE ARRANGEMENT INCORRECT. PARALLEL TO POND CONTOUR, REFER TO PLATE 3.14-6 OF MIN STD. 3.14 OF THE VESCH. AND FIG 3.06-3 OF THE VSMH. (SHOULD NOT GO ACROSS POND BOTTOM STRADDLE TOE-TOE.)

FINAL REVISED COMPS.
07/02/01 (SJT CHECK SET)

CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR TEMPORARY SEDIMENT BASIN
Tewning Road Maintenance Parking/Materials Storage Facility
for
James City Service Authority
AES Project No.: 8651-18
June 26, 2001

I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN

A. Pre-Development Drainage Area to Point of Concern = 1.71 Acres

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

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Wooded	0.62	73	45
2)	19-B Kempsville-Emporia Fine Sandy Loams	B	Wooded	0.16	60	10
3)	17 Johnston complex	D	Wooded	0.93	79	73
	Totals =			1.71		128
	Composite CN =					75

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	mainly wooded	
Manning's roughness coefficient., n (table 5-7)	0.4	
Length of overland flow, L	200	Feet
2-year 24-hour rainfall, P2	3.6	inches
Average slope of overland flow , s	0.0335	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.48	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved, wooded	
Length of shallow concentrated flow, L	247	Feet
Average slope of shallow concentrated flow, s	0.0335	feet per foot
Average velocity, v	0.5	feet per second
Travel time, Tt = L/(3600*v)	0.14	hours

3) Channel or Pipe Flow

Length of channel flow, L	0	Feet
Average velocity of channel flow, v	2.5	feet per second
Travel time, Tt = L/(3600*v)	0.00	hours
Total Time of Concentration =	0.62	hours
or	37	minutes

6/26/01

II. **POST-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for total site and Off-site Contributing Areas)**

A. Post-Development Drainage Area to Point of Concern = 2.45 Acres

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

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Wooded	0.19	73	14
2)	11-C Craven-Uchee	C	Newly Graded Area	0.29	91	26
4)	19-B Kempsville-Emporia Fine Sandy Loams	B	Wooded	0.38	60	23
5)	19-B Kempsville-Emporia Fine Sandy Loams	B	Newly Graded Area	1.59	91	145
	Total Adjusted CN =			2.45		208
	Composite CN =					85

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	denuded earth	
Manning's roughness coefficient., n (table 5-7)	0.02	
Length of overland flow, L	240	Feet
25-year 24-hour rainfall, P25	6.5	inches
Average slope of overland flow , s	0.0208	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.05	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	impervious, commercial	
Length of shallow concentrated flow, L	260	Feet
Average slope of shallow concentrated flow, s	0.054	feet per foot
Average velocity, v	1.00	feet per second
Travel time, Tt = L/(3600*v)	0.07	hours

3) Channel or Pipe Flow

Length of channel flow, L	0	Feet
Average velocity of channel flow, v	0	feet per second
Travel time, Tt = L/(3600*v)	0.00	hours
Total Time of Concentration =	0.12	hours
or	7	minutes

6/26/01

III. PROPOSED ESTIMATED POND(S) VOLUME

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
83	0	0	0	0	0	0
84	1	1482	741	27	741	27
85	1	2662	2072	77	2813	104
86	1	4087	3375	125	6188	229
87	1	5449	4768	177	10956	406
88	1	7340	6395	237	17350	643
89	1	9532	8436	312	25786	955
90	1	11456	10494	389	36280	1344

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

Volume of 1-Year, 24-Hour Storm (based upon Hydrograph #1) = 10,074 cubic feet

Elevation of water surface associated with 1-Year, 24-Hour Storm Volume = 85.8

Elevation of Release Inlet for Channel Protection = 84.0

Average Head, in feet, on Release Inlet = 0.9

Average Release Rate Calculation $\frac{\text{10,074 cubic feet}}{\text{(24 hours x 60 minutes/hour x 60 seconds/ minute)}}$ = 0.1 cfs AVERAGE, Not Peak

Calculation of Size of Release Inlet

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

Diameter of Release Inlet = 0.20 feet, or 3 inches USE 3" DIAMETER IN DESIGN ✓

6/26/01

Hydrograph Summary Report JCSA OPERATIONS CENTER - SED.BASIN JOB No.8651-18

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	1.0	2	736	5,109	1	—	—	—	Pre-Development 1-
2	SCS Runoff	1.7	2	736	7,989	2	—	—	—	Pre-Development 2-
3	SCS Runoff	4.2	2	734	19,100	10	—	—	—	Pre-Development 10
4	SCS Runoff	4.9	2	734	22,249	25	—	—	—	Pre-Development 25
5	SCS Runoff	6.8	2	734	30,940	100	—	—	—	Pre-Development 100
7	SCS Runoff	3.5	2	722	10,074	1	—	—	—	Post-Development 1
8	SCS Runoff	5.3	2	722	14,815	2	—	—	—	Post-Development 2
9	SCS Runoff	11.4	2	722	32,100	10	—	—	—	Post-Development 10
10	SCS Runoff	13.0	2	722	36,852	25	—	—	—	Post-Development 25
11	SCS Runoff	17.4	2	722	49,792	100	—	—	—	Post-Development 100
12	Reservoir	0.3	2	782	10,074	1	7	85.79	4,733	1 YR POST ROUTED
13	Reservoir	0.4	2	798	14,815	2	8	86.44	7,568	2 YR POST ROUTED
14	Reservoir	3.8	2	736	32,099	10	9	87.62	14,151	10 YR POST ROUTED
15	Reservoir	5.5	2	734	36,851	25	10	87.81	15,404	25 YR POST ROUTED
16	Reservoir	6.5	2	734	49,791	100	11	88.40	19,980	100 YR POST ROUTED
20	SCS Runoff	7.8	2	718	17,933	2	—	—	—	Post-Development 2
21	SCS Runoff	17.6	2	718	41,631	25	—	—	—	Post-Development 25
25	Reservoir	2.5	2	728	17,892	2	20	87.47	7,744	2-yr Construction
26	Reservoir	6.4	2	728	41,569	25	21	88.53	15,606	25yr construction

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6/26/01

Hydrograph Plot

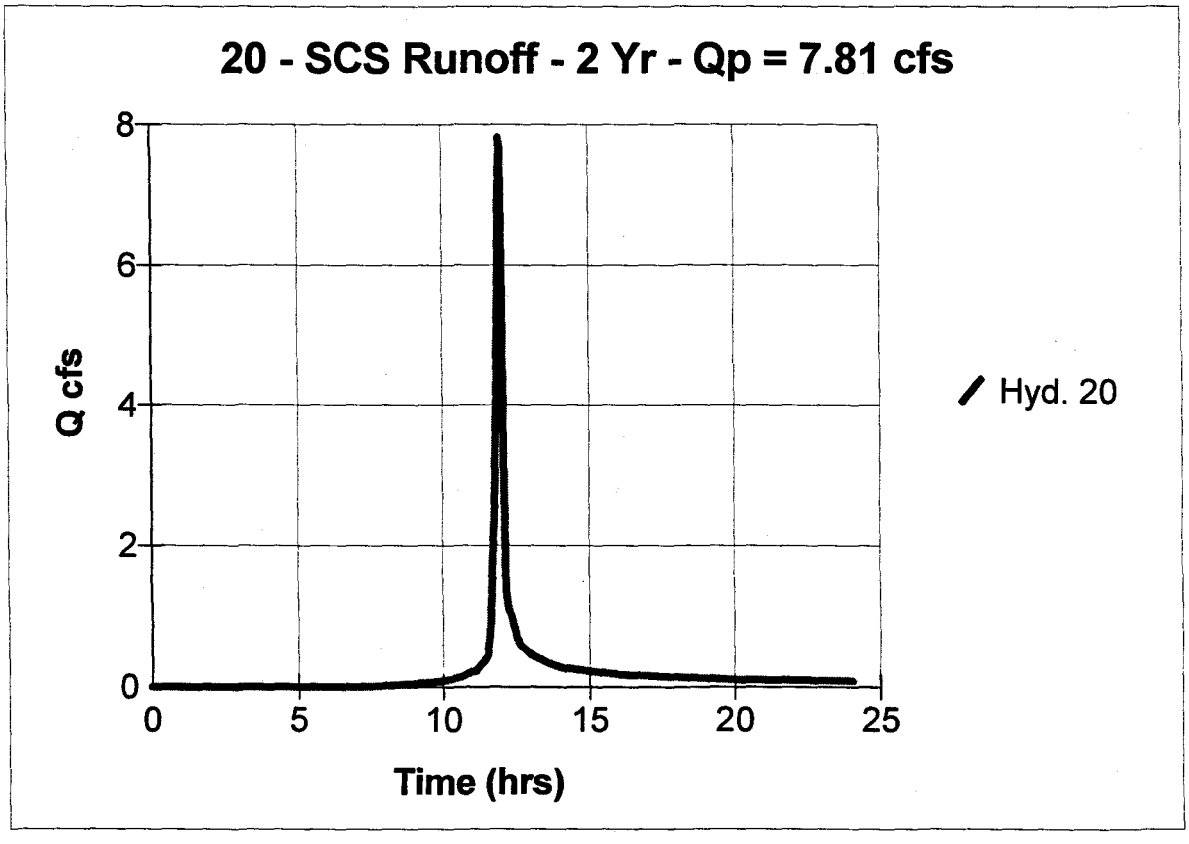
English

Hyd. No. 20

Post-Development 2-Year TSB

Hydrograph type	= SCS Runoff	Peak discharge	= 7.81 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 2.45 ac	Curve number	= 85
Basin Slope	= 3.8 %	Hydraulic length	= 480 ft
Tc method	= USER	Time of conc. (Tc)	= 7 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 17,933 cuft



6/26/01

Hydrograph Plot

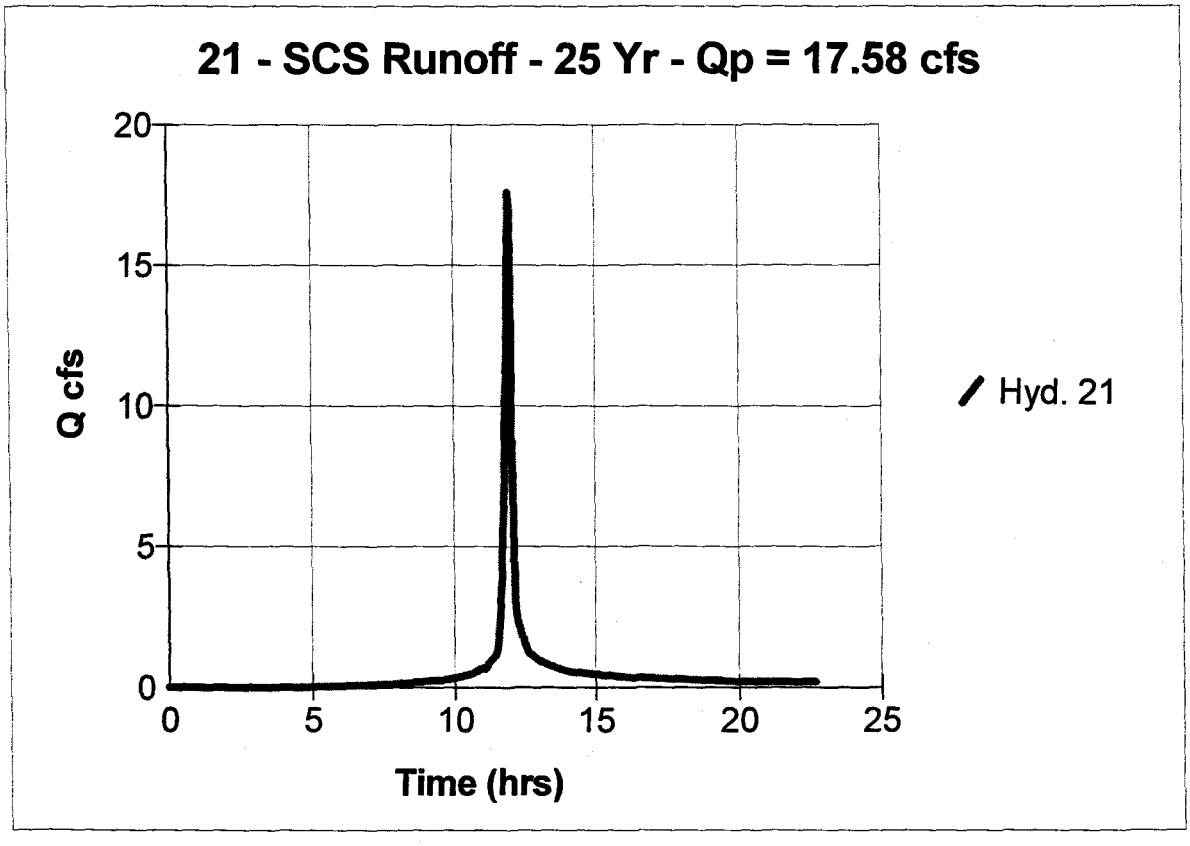
English

Hyd. No. 21

Post-Development 25-Year TSB

Hydrograph type	= SCS Runoff	Peak discharge	= 17.58 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 2.45 ac	Curve number	= 85
Basin Slope	= 3.8 %	Hydraulic length	= 480 ft
Tc method	= USER	Time of conc. (Tc)	= 7 min
Total precip.	= 6.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 41,631 cuft



6/26/01

Hydrograph Plot

English

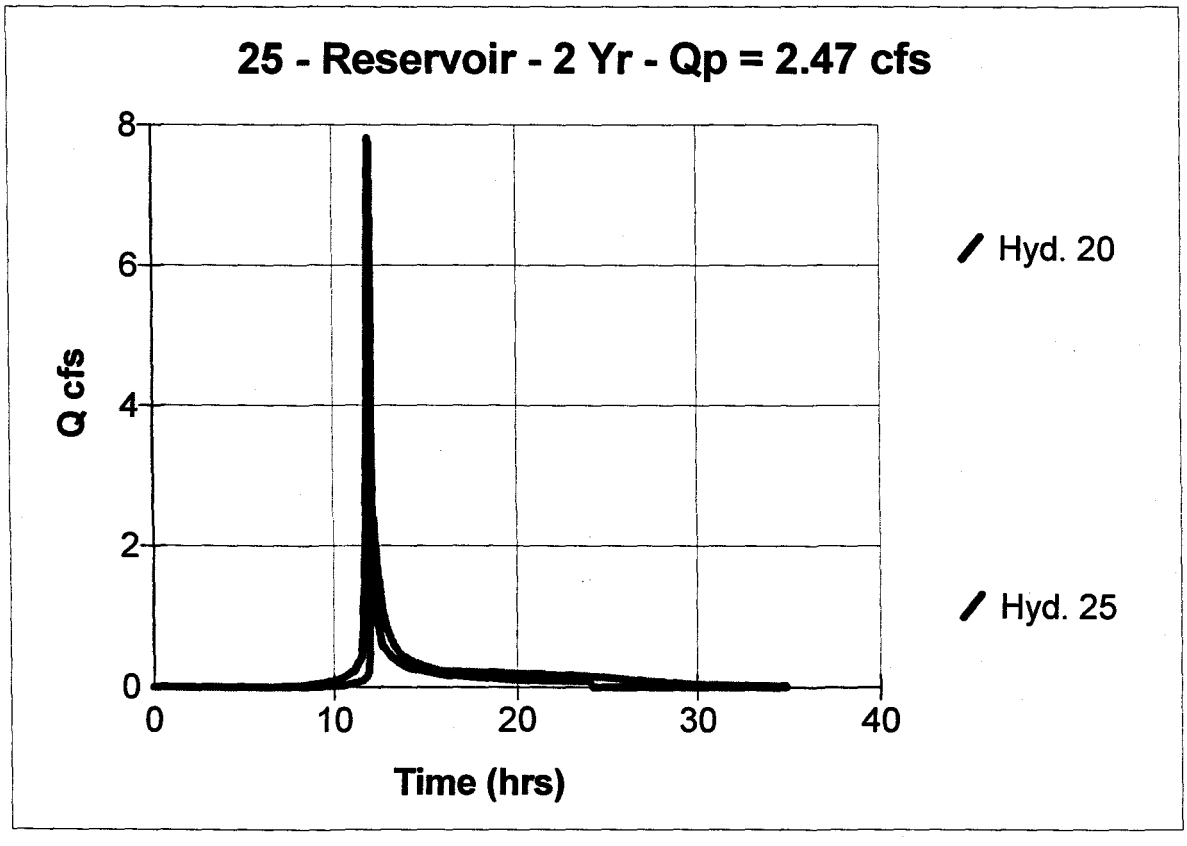
Hyd. No. 25

2-yr Construction TSB

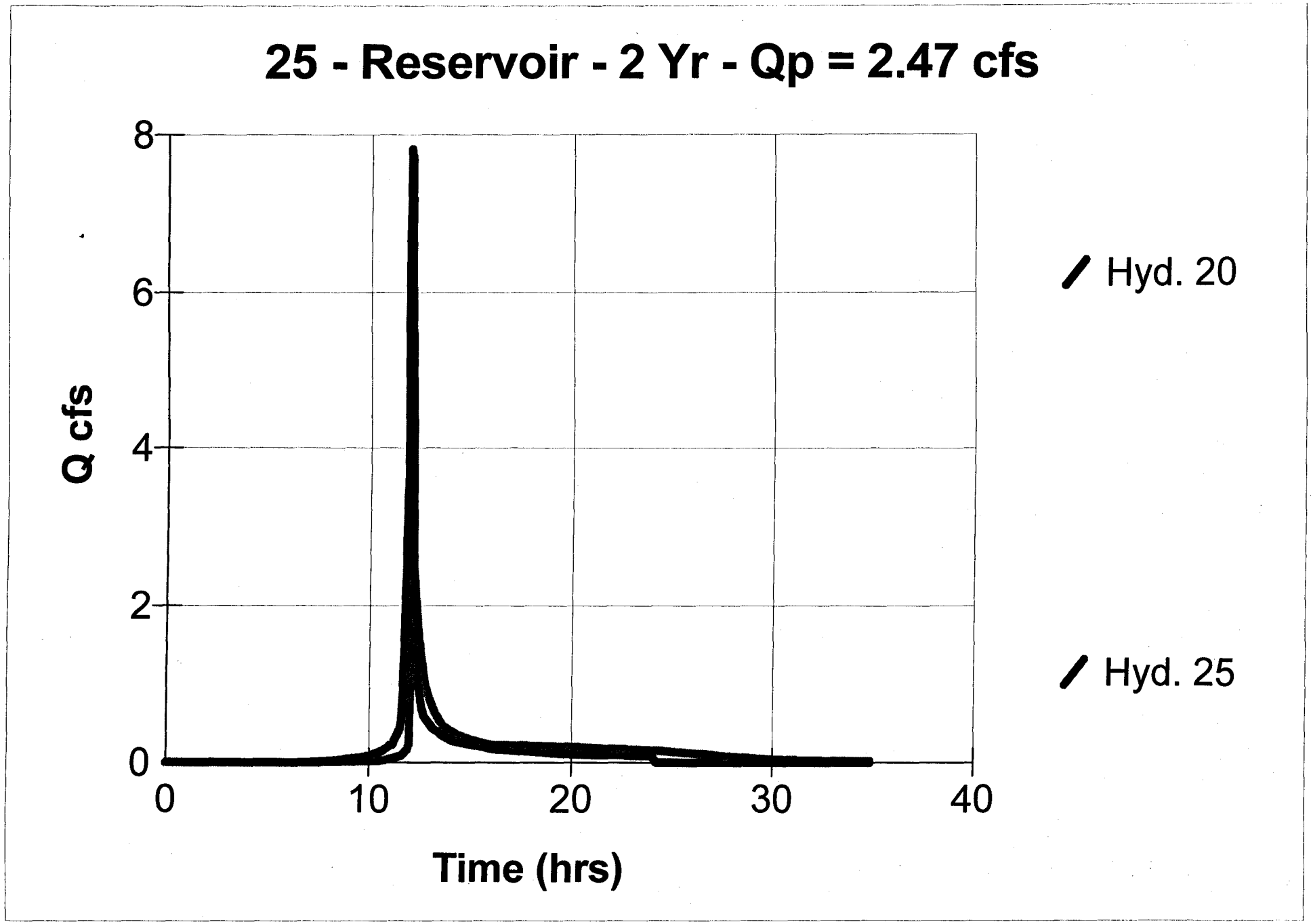
Hydrograph type	= Reservoir	Peak discharge	= 2.47 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Inflow hyd. No.	= 20	Reservoir name	= Sediment Basin
Max. Elevation	= 87.47 ft	Max. Storage	= 7,744 cuft

Storage Indication method used.

Total Volume = 17,892 cuft



6/26/01


25 - Reservoir - 2 Yr - Qp = 2.47 cfs
Q cfs
8
6
4
2
0
0
10
20
30
40
Time (hrs)
Hyd. 20
Hyd. 25

10/26/01

Hydrograph Plot

English

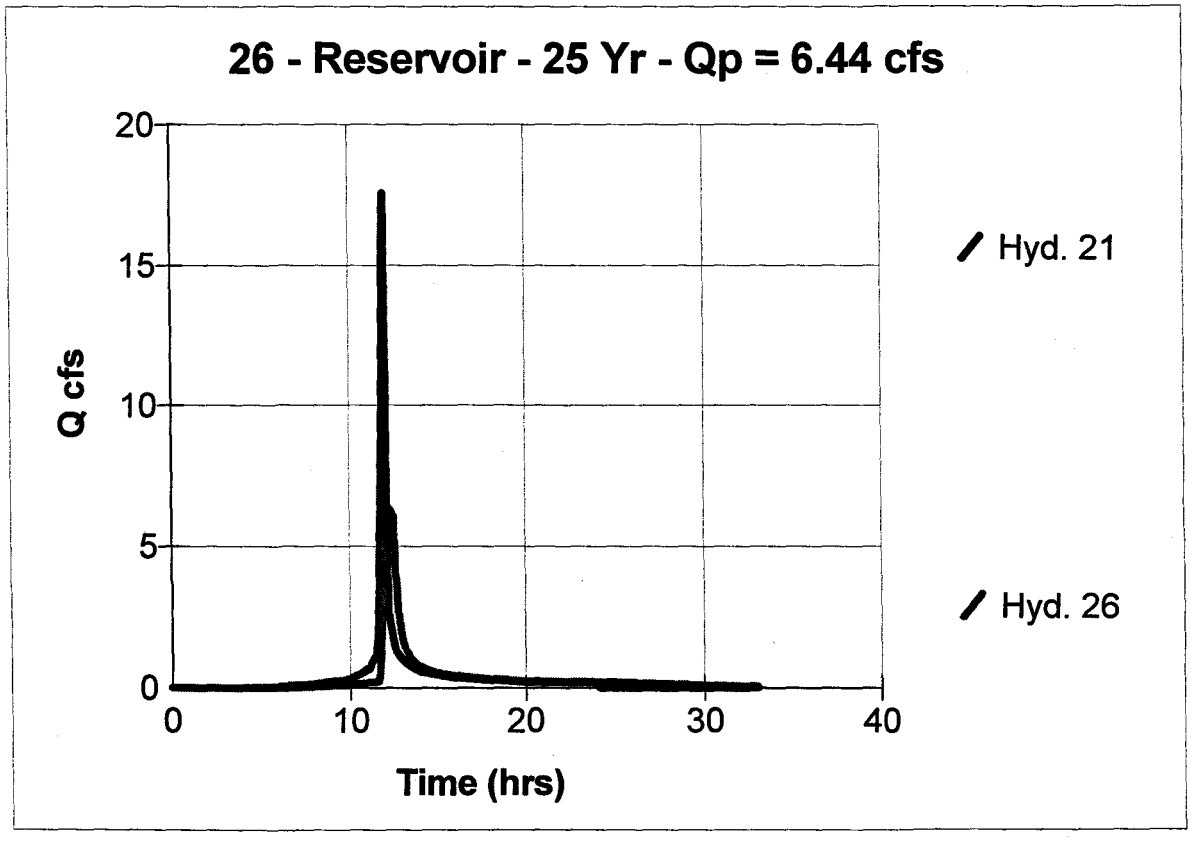
Hyd. No. 26

25yr construction TSB

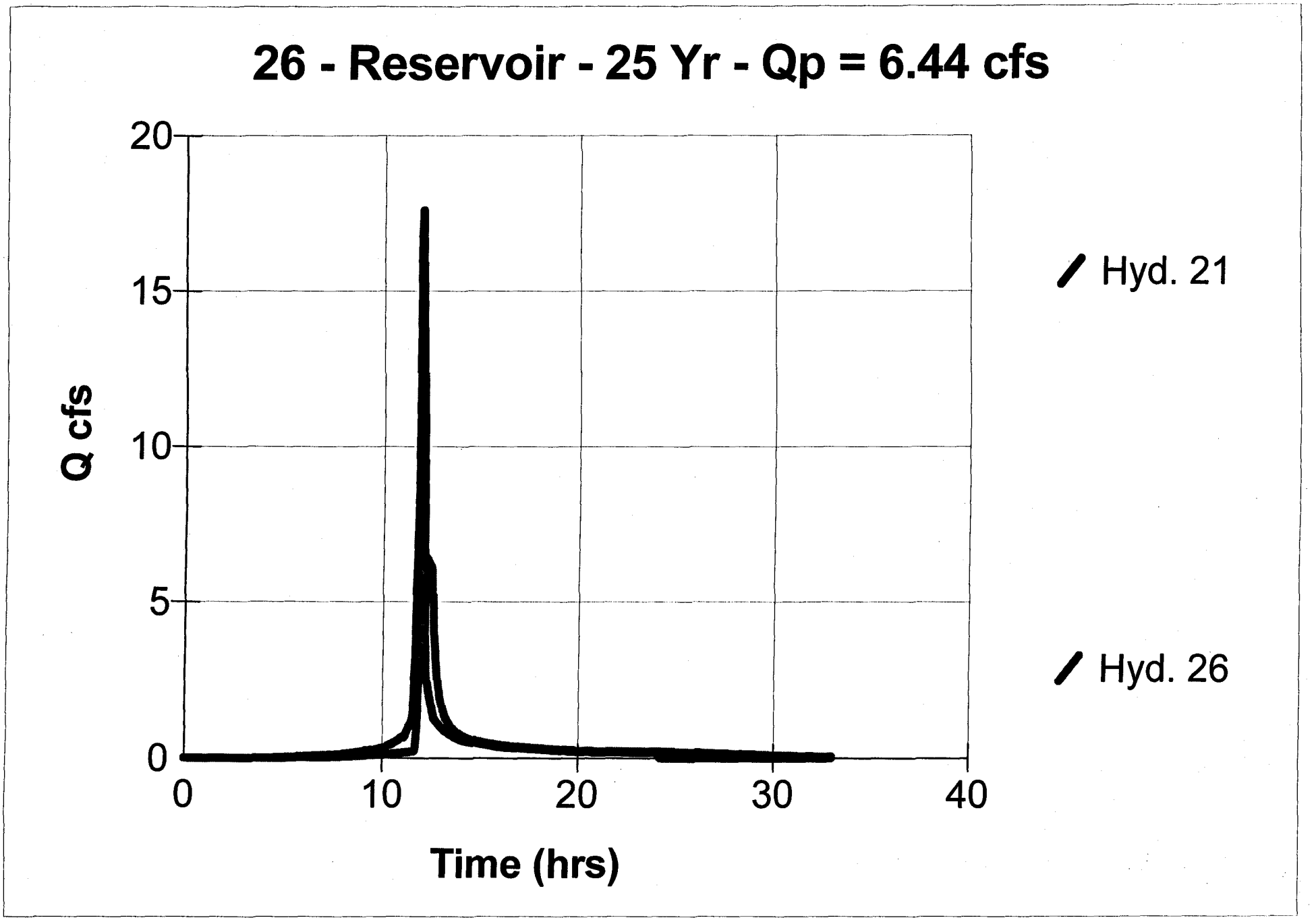
Hydrograph type	= Reservoir	Peak discharge	= 6.44 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Inflow hyd. No.	= 21	Reservoir name	= Sediment Basin
Max. Elevation	= 88.53 ft	Max. Storage	= 15,606 cuft

Storage Indication method used.

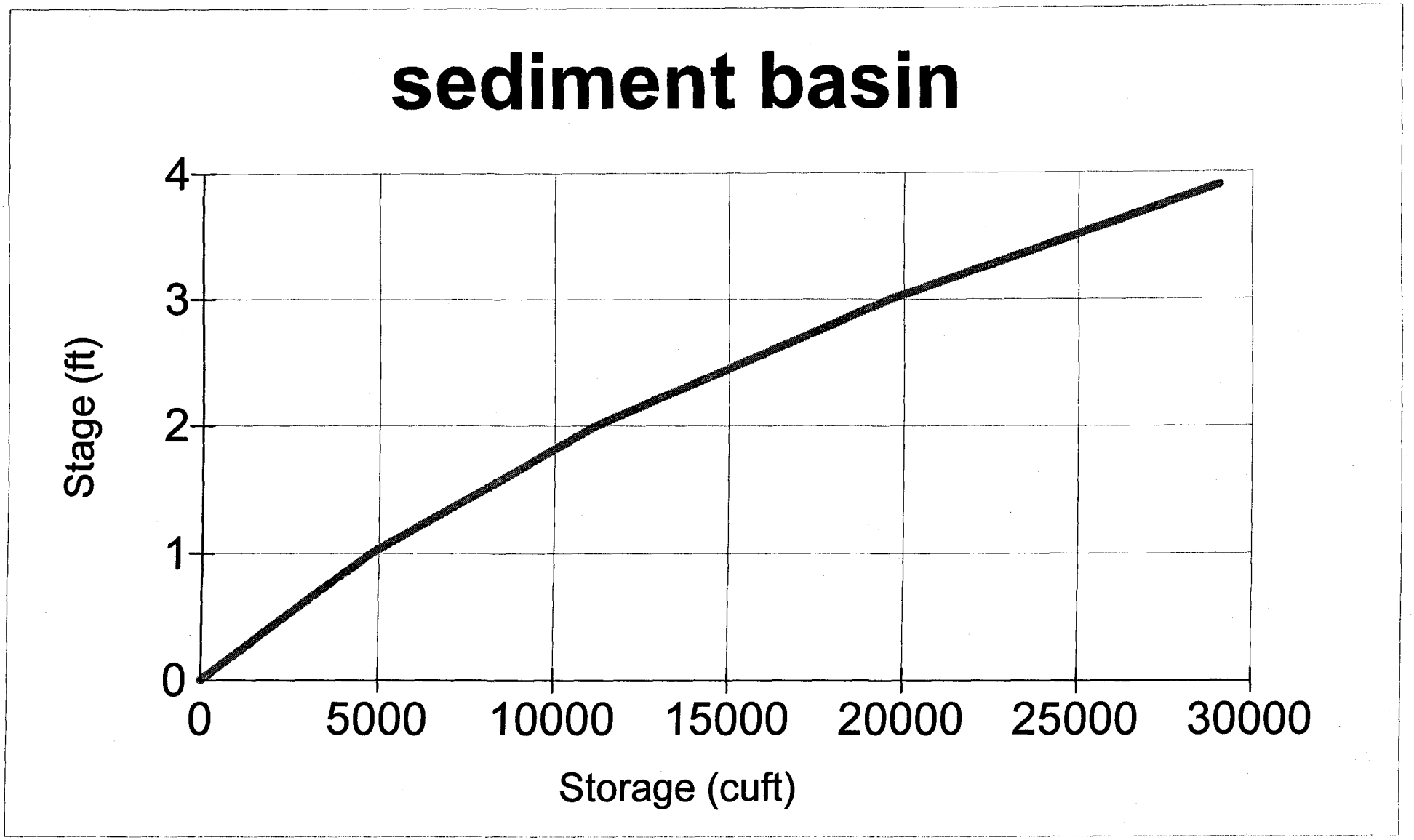
Total Volume = 41,569 cuft



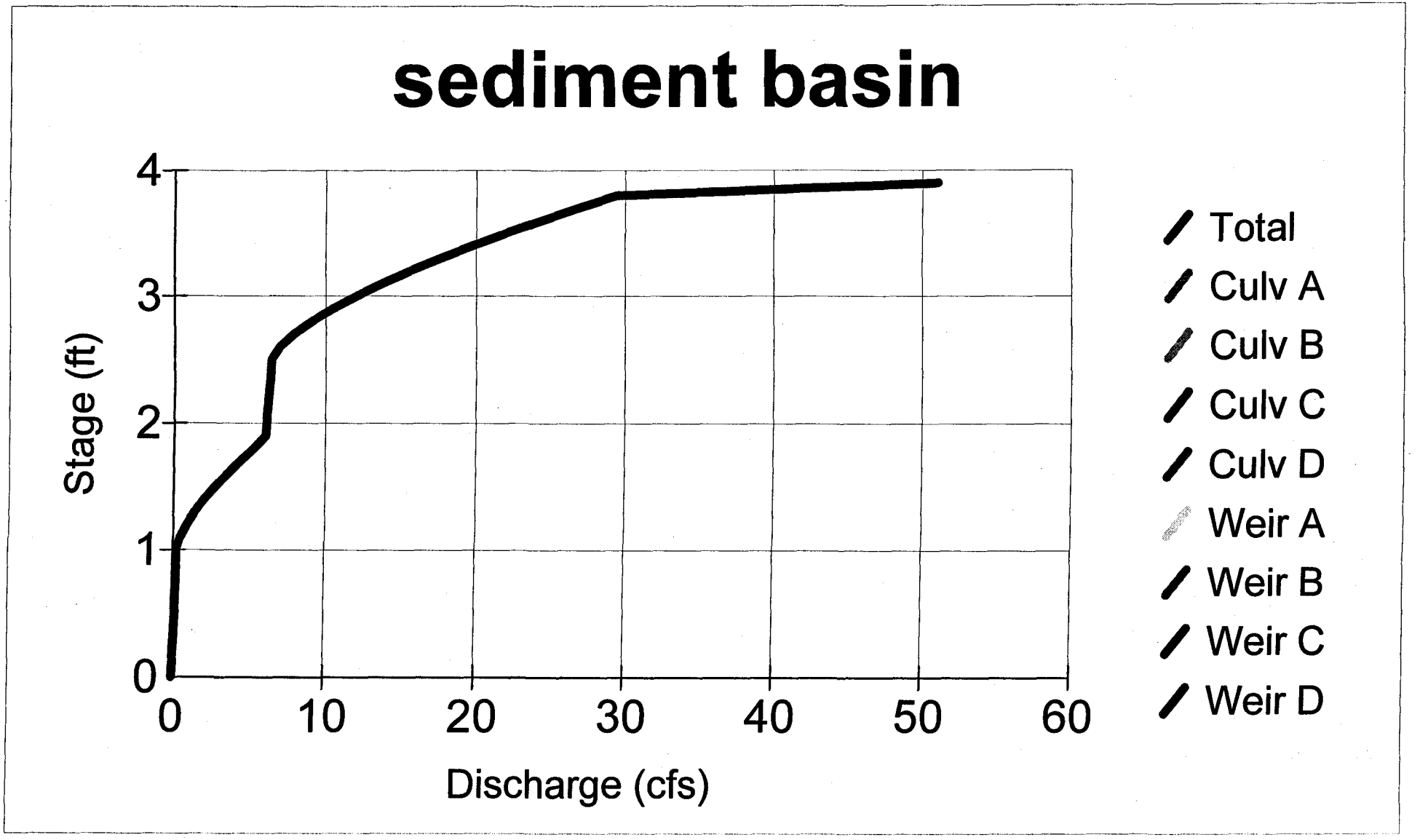
6/26/01


26 - Reservoir - 25 Yr - Qp = 6.44 cfs
Q cfs
20
15
10
5
0
0
10
20
30
40
Time (hrs)
Hyd. 21
Hyd. 26

6/26/01


sediment basin
Stage (ft)
0
1
2
3
4
0
5000
10000
15000
20000
25000
30000
Storage (cuft)

6/20/01


sediment basin
Stage (ft)
0
1
2
3
4
0
10
20
30
40
50
60
Discharge (cfs)
Total
Culv A
Culv B
Culv C
Culv D
Weir A
Weir B
Weir C
Weir D

6/26/01

Reservoir Report

English

Reservoir No. 10 - Sediment Basin

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	86.00	4,087	0	0
1.00	87.00	5,449	4,768	4,768
2.00	88.00	7,340	6,395	11,163
3.00	89.00	9,532	8,436	19,599
4.00	90.00	11,456	10,494	30,093

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 10.0	3.0	0.0	0.0
Span in	= 10.0	3.0	0.0	0.0
No. Barrels	= 1	1	0	0
Invert El. ft	= 82.50	86.00	0.00	0.00
Length ft	= 37.0	5.0	0.0	0.0
Slope %	= 1.36	30.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= -----	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 2.3	5.0	200.0	0.0
Crest El. ft	= 87.00	89.50	89.80	0.00
Weir Coeff.	= 3.00	3.00	3.00	0.00
Eqn. Exp.	= 1.50	1.50	1.50	0.00
Multi-Stage	= Yes	No	No	No

Tailwater Elevation = 82.67 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	86.00	4.53	0.00	---	---	0.00	0.00	0.00	---	0.00
1.00	4,768	87.00	5.19	0.22	---	---	0.00	0.00	0.00	---	0.22
2.00	11,163	88.00	5.78	0.32	---	---	6.90	0.00	0.00	---	6.11
3.00	19,599	89.00	6.32	0.40	---	---	19.52	0.00	0.00	---	6.72
4.00	30,093	90.00	6.81	0.47	---	---	35.85	5.30	53.66	---	66.24

6/26/01

AES PROJ. # 8651-18
6/26/01

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project JCSA TEWNING ROAD SITE EXPANSION

Basin # 1 Location SOUTHWEST CORNER OF PROPERTY

Total area draining to basin: 3.83 acres.

Basin Volume Design

Wet Storage:

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

   67 cu. yds. x ~~3.83~~ 2.45 acres = ~~257~~ 164 cu. yds.

2. Available basin volume = ~~524~~ 373 cu. yds. at elevation 87. (From storage - elevation curve)

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

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

4. Available volume before cleanout required.

   33 cu. yds. x ~~3.83~~ 2.45 acres = ~~126~~ 81 cu. yds.

5. Elevation corresponding to cleanout level = ~~84.75~~ 85.05.

   (From Storage - Elevation Curve)

6. Distance from invert of the dewatering orifice to cleanout level = ~~2.25~~ 1.0 ft. (Min. = 1.0 ft.) ✓

Dry Storage:

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

   67 cu. yds. x ~~3.83~~ 2.45 acres = ~~257~~ 164 cu. yds.

6/26/01

8. Total available basin volume at crest of riser* = ~~924~~ 373 cu. yds. at elevation ~~88~~ 87. (From Storage - Elevation Curve)

(OR 328 cy)

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

S = ~~10881~~ 4691 CF (DEV STOR)
Q_2 = ~~10881~~ 4691 / 21600 = ~~0.50~~ 0.22
A = ~~0.50~~ 0.22 / (64.23 × 3/2)^½ (0.6) = 0.04

9. Diameter of dewatering orifice = ~~6"~~ 3" in.

10. Diameter of flexible tubing = ~~8"~~ 6" in. (diameter of dewatering orifice plus 2 inches).

d = 12×2×(0.04 / 3.14)
d = ~~5.2"~~ 2.7
USE ~~6"~~ 3"

Preliminary Design Elevations

11. Crest of Riser = ~~88~~ 87

Top of Dam = ~~91.3~~ 90

Design High Water = ~~89.5~~ 88.25 (25-YR STORM)

Upstream Toe of Dam = ~~83~~ 84

Basin Shape

12. Length of Flow / Effective Width: $\frac{L}{We} = \frac{115}{A/L} = \frac{115}{9950/115} = \frac{115}{86} = 1.3$

If > 2, baffles are not required _____

If < 2, baffles are required ✓ REQUIRED

Runoff

13. Q_2 = ~~4.7~~ 7.81 cfs (From Chapter 5) ✓

14. Q_{25} = ~~22.1~~ 17.58 cfs (From Chapter 5) ✓

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2$ = ~~4.7~~ 7.8 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) = ~~2.3~~ 1.5 ft. (Using Q_2) 88.5-87.0

h = Crest of Emergency Spillway Elevation - Crest of Riser Elevation
~~90.3 - 88~~ 87.0

Without emergency spillway:

Assumed available head (h) = N/A ft. (Using Q_{25})

h = Design High Water Elevation - Crest of Riser Elevation

17. Riser diameter (D_r) = 27 in. Actual head (h) = ~~0.6~~ 0.4 ft.

(From Plate 3.14-8.) NOTE: DESIGNED RISER IS A 2.8 x 2.8 CHAMBER, EQUIVALENT TO A 38" DIA. RISER

Note: Avoid orifice flow conditions.

18. Barrel length (l) = ~~60~~ 45 ft.

Head (H) on barrel through embankment = ~~8.3~~ 6.5 ft. 88.5-82.0 ~~90.3-82~~

(From Plate 3.14-7).

19. Barrel diameter = ~~8~~ 10 in. (FROM DESIGN CALCULATIONS)

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

20. Trash rack and anti-vortex device

Diameter = N/A inches.

Height = N/A inches.

(From Table 3.14-D).

Emergency Spillway Design

21. Required spillway capacity $Q_e = Q_{25} - Q_p$ = ~~22.0 - 9.7 = 12.3~~ 17.6 - 7.8 = 9.8 cfs.

22. Bottom width (b) = 5 ft.; the slope of the exit channel (s) = 3 ft./foot; and the minimum length of the exit channel (x) = 65 ft.
(From Table 3.14-C). (SEE PLANS)

Anti-Seep Collar Design

23. Depth of water at principal spillway crest (Y) = ~~5~~ 2 ft. 86-84 (~~88-83~~)

Slope of upstream face of embankment (Z) = ~~3~~ 4 :1.

Slope of principal spillway barrel (S_b) = ~~0.83~~ 1.11 %

Length of barrel in saturated zone (L_s) = ~~37~~ 15 ft.

24. Number of collars required = 2 dimensions = ~~2.75 x 2.75~~ 2.0' x 2.0'

(from Plate 3.14-12).

Final Design Elevations

25. Top of Dam = ~~91.3~~ 89.8

Design High Water = ~~89.52~~ 88.53 (25-YR STORM)

Emergency Spillway Crest = ~~90.3~~ 88.5

Principal Spillway Crest = ~~88.0~~ 87.0

Dewatering Orifice Invert = ~~82.5~~ 86.0

Cleanout Elevation = ~~84.75~~ 85.05

Elevation of Upstream Toe of Dam or Excavated Bottom of "Wet Storage Area" (if excavation was performed) = 84

CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR BMP / SWM
Tewning Road Maintenance Parking/Materials Storage Facility
for
James City Service Authority
AES Project No.: 8651-18
June 18, 2001

I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN

A. Pre-Development Drainage Area to Point of Concern = 1.71 Acres

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

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Wooded	0.62	73	45
2)	19-B Kempsville-Emporia Fine Sandy Loams	B	Wooded	0.16	60	10
3)	17 Johnston complex	D	Wooded	0.93	79	73
	Totals =			1.71		128
	Composite CN =					75

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	mainly wooded	
Manning's roughness coefficient., n (table 5-7)	0.4	
Length of overland flow, L	200	Feet
2-year 24-hour rainfall, P2	3.6	inches
Average slope of overland flow , s	0.0335	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.48	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved, wooded	
Length of shallow concentrated flow, L	247	Feet
Average slope of shallow concentrated flow, s	0.0335	feet per foot
Average velocity, v	0.5	feet per second
Travel time, Tt = L/(3600*v)	0.14	hours

3) Channel or Pipe Flow

Length of channel flow, L	0	Feet
Average velocity of channel flow, v	2.5	feet per second
Travel time, Tt = L/(3600*v)	0.00	hours
Total Time of Concentration =	0.62	hours
or	37	minutes

6/26/01

II. POST-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for total site and Off-site Contributing Areas)

A. Post-Development Drainage Area to Point of Concern = 2.45 Acres

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

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Wooded	0.19	73	14
2)	11-C Craven-Uchee	C	Green Space	0.10	77	8
3)	11-C Craven-Uchee	C	BMP Surface	0.19	98	19
4)	19-B Kempsville-Emporia Fine Sandy Loams	B	Wooded	0.38	60	23
5)	19-B Kempsville-Emporia Fine Sandy Loams	B	Green Space	0.70	68	48
6)	19-B Kempsville-Emporia Fine Sandy Loams	B	Parking & BMP Surface	0.89	98	87
	Total Adjusted CN =			2.45		198
	Composite CN =					81

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	impervious, commercial
Manning's roughness coefficient., n (table 5-7)	0.2
Length of overland flow, L	180 Feet
25-year 24-hour rainfall, P25	6.5 inches
Average slope of overland flow , s	0.03 feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.20 hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	impervious, commercial
Length of shallow concentrated flow, L	200 Feet
Average slope of shallow concentrated flow, s	0.02 feet per foot
Average velocity, v	1.00 feet per second
Travel time, Tt = L/(3600*v)	0.06 hours

3) Channel or Pipe Flow

Length of channel flow, L	120 Feet
Average velocity of channel flow, v	2.5 feet per second
Travel time, Tt = L/(3600*v)	0.01 hours
Total Time of Concentration =	0.27 hours
or	16 minutes

6/26/01

III. PROPOSED ESTIMATED POND(S) VOLUME

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
83	0	0	0	0	0	0
84	1	1474	737	27	737	27
85	1	2655	2065	76	2802	104
86	1	3950	3303	122	6104	226
87	1	5400	4675	173	10779	399
88	1	6916	6158	228	16937	627
89	1	8534	7725	286	24662	913
90	1	10252	9393	348	34055	1261

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

Volume of 1-Year, 24-Hour Storm (based upon Hydrograph #1) = 10,074 cubic feet

Elevation of water surface associated with 1-Year, 24-Hour Storm Volume = 86.0

Elevation of Release Inlet for Channel Protection = 84.0

Average Head, in feet, on Release Inlet = 1.0

Average Release Rate Calculation $\frac{\text{10,074 cubic feet}}{\text{(24 hours x 60 minutes/hour x 60 seconds/ minute)}}$ = 0.1 cfs AVERAGE, Not Peak

Calculation of Size of Release Inlet

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

Diameter of Release Inlet = 0.20 feet, or 3 inches USE 3" DIAMETER IN DESIGN

6/7/01

Hydrograph Summary Report

JCSA OPERATIONS CENTER – BMP
JOB No.8651-18

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	1.0	2	736	5,109	1	---	-----	-----	Pre-Development 1-
2	SCS Runoff	1.7	2	736	7,989	2	---	-----	-----	Pre-Development 2-
3	SCS Runoff	4.2	2	734	19,100	10	---	-----	-----	Pre-Development 10
4	SCS Runoff	4.9	2	734	22,249	25	---	-----	-----	Pre-Development 25
5	SCS Runoff	6.8	2	734	30,940	100	---	-----	-----	Pre-Development 10
7	SCS Runoff	3.5	2	722	10,074	1	---	-----	-----	Post-Development 1
8	SCS Runoff	5.3	2	722	14,815	2	---	-----	-----	Post-Development 2
9	SCS Runoff	11.4	2	722	32,100	10	---	-----	-----	Post-Development 1
10	SCS Runoff	13.0	2	722	36,852	25	---	-----	-----	Post-Development 2
11	SCS Runoff	17.4	2	722	49,792	100	---	-----	-----	Post-Development 1
12	Reservoir	0.3	2	782	10,074	1	7	85.79	4,733	1 YR POST ROUTED
13	Reservoir	0.4	2	798	14,815	2	8	86.44	7,568	2 YR POST ROUTED
14	Reservoir	3.8	2	736	32,099	10	9	87.62	14,151	10 YR POST ROUTED
15	Reservoir	5.5	2	734	36,851	25	10	87.81	15,404	25 YR POST ROUTED
16	Reservoir	6.5	2	734	49,791	100	11	88.40	19,980	100 YR POST ROUTED
20	SCS Runoff	7.8	2	718	17,933	2	---	-----	-----	Post-Development 2
21	SCS Runoff	17.6	2	718	41,631	25	---	-----	-----	Post-Development 2
25	Reservoir	2.5	2	728	17,892	2	20	87.47	7,744	2-yr Construction
26	Reservoir	6.4	2	728	41,569	25	21	88.53	15,606	25yr construction

Proj. file: 865118FINAL.JAG.GPW IDF file: Jcc.idf | Run date: 06-26-2001

6/26/01

Hydrograph Plot

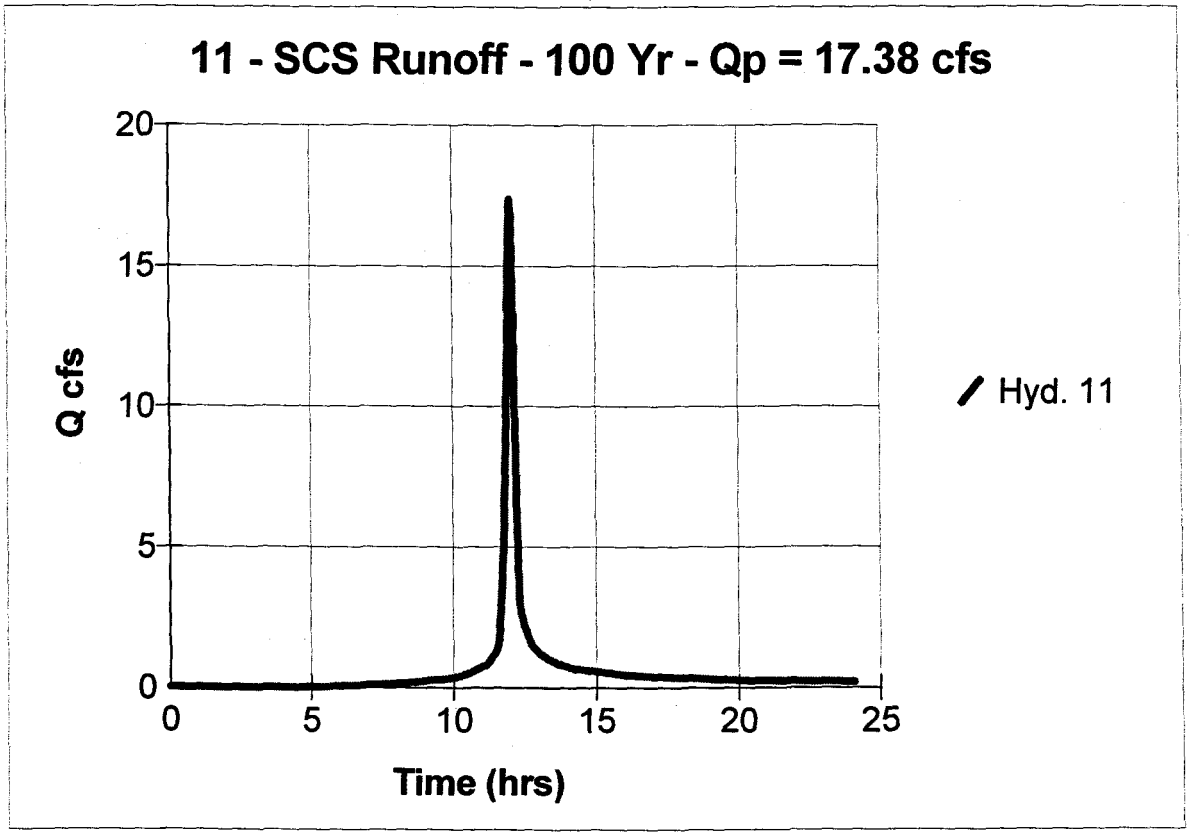
English

Hyd. No. 11

Post-Development 100-Year

Hydrograph type	= SCS Runoff	Peak discharge	= 17.38 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 2.45 ac	Curve number	= 81
Basin Slope	= 1.5 %	Hydraulic length	= 480 ft
Tc method	= USER	Time of conc. (Tc)	= 16 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 49,792 cuft



6/26/01

Hydrograph Plot

English

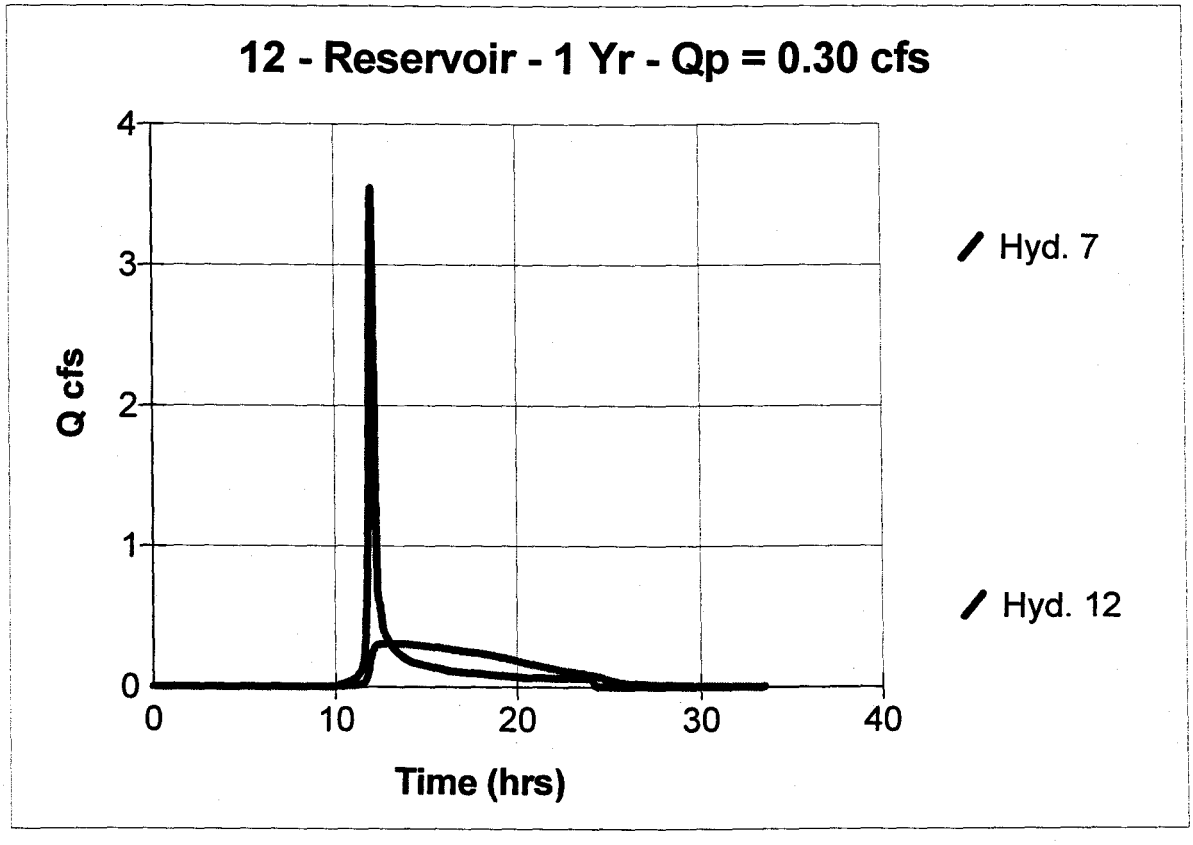
Hyd. No. 12

1 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.30 cfs
Storm frequency	= 1 yrs	Time interval	= 2 min
Inflow hyd. No.	= 7	Reservoir name	= Tewning BMP Fin
Max. Elevation	= 85.79 ft	Max. Storage	= 4,733 cuft

Storage Indication method used.

Total Volume = 10,074 cuft



6/16/01

Hydrograph Plot

English

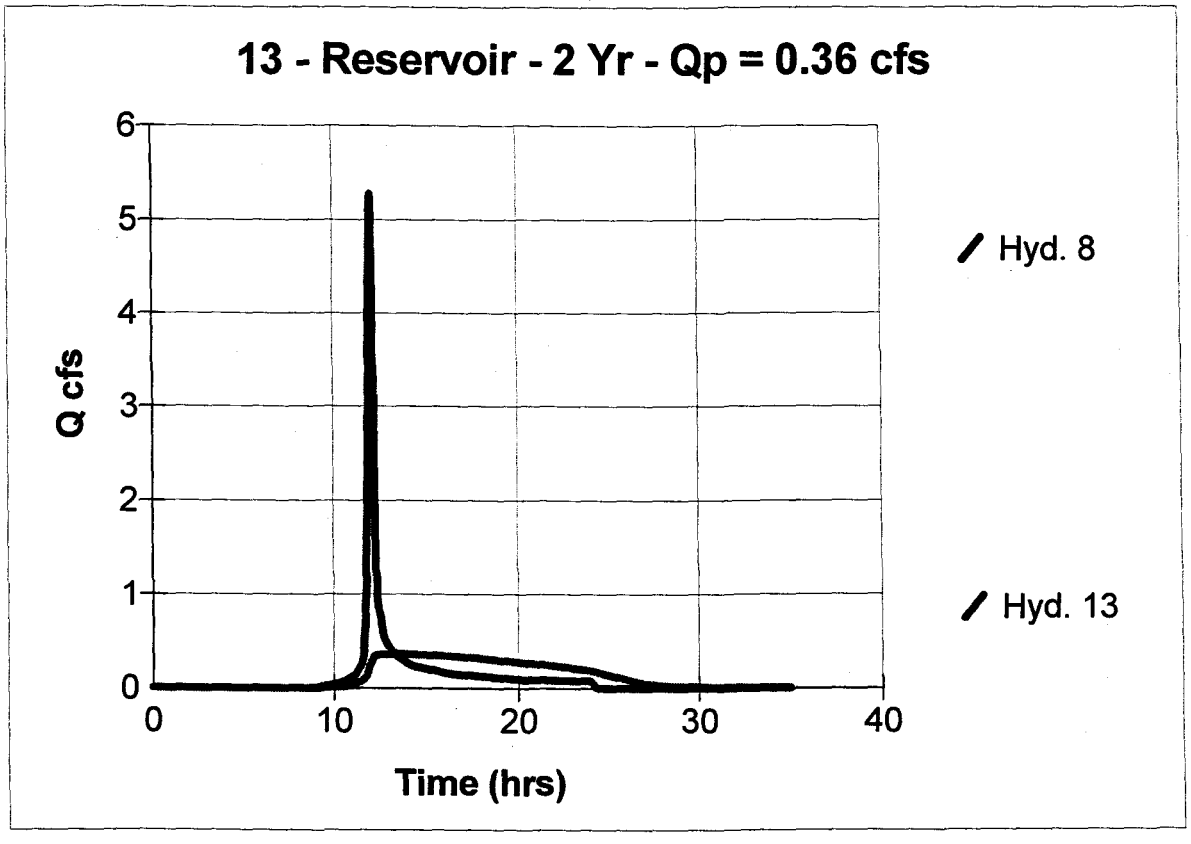
Hyd. No. 13

2 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.36 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Inflow hyd. No.	= 8	Reservoir name	= Tewning BMP Fin
Max. Elevation	= 86.44 ft	Max. Storage	= 7,568 cuft

Storage Indication method used.

Total Volume = 14,815 cuft



6/26/01

Hydrograph Plot

English

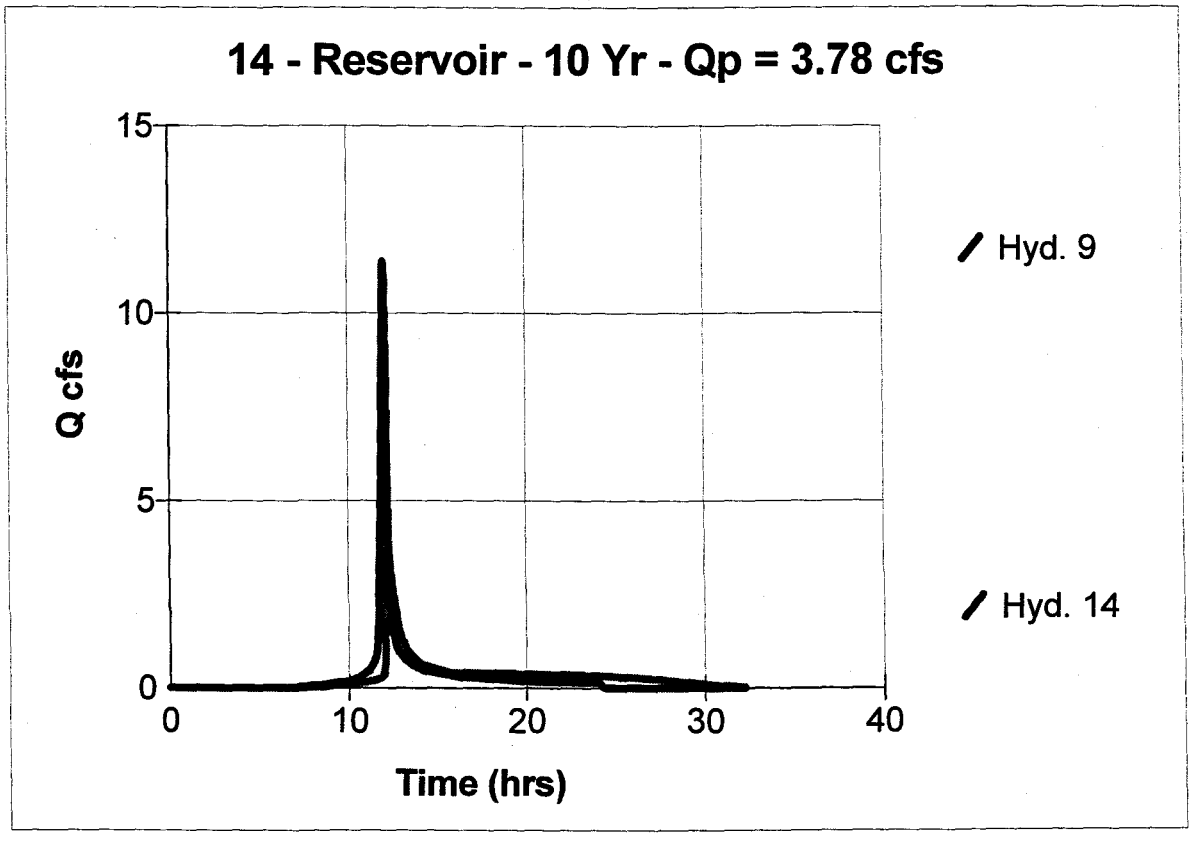
Hyd. No. 14

10 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 3.78 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Inflow hyd. No.	= 9	Reservoir name	= Tewning BMP Fin
Max. Elevation	= 87.62 ft	Max. Storage	= 14,151 cuft

Storage Indication method used.

Total Volume = 32,099 cuft



6/26/01

Hydrograph Plot

English

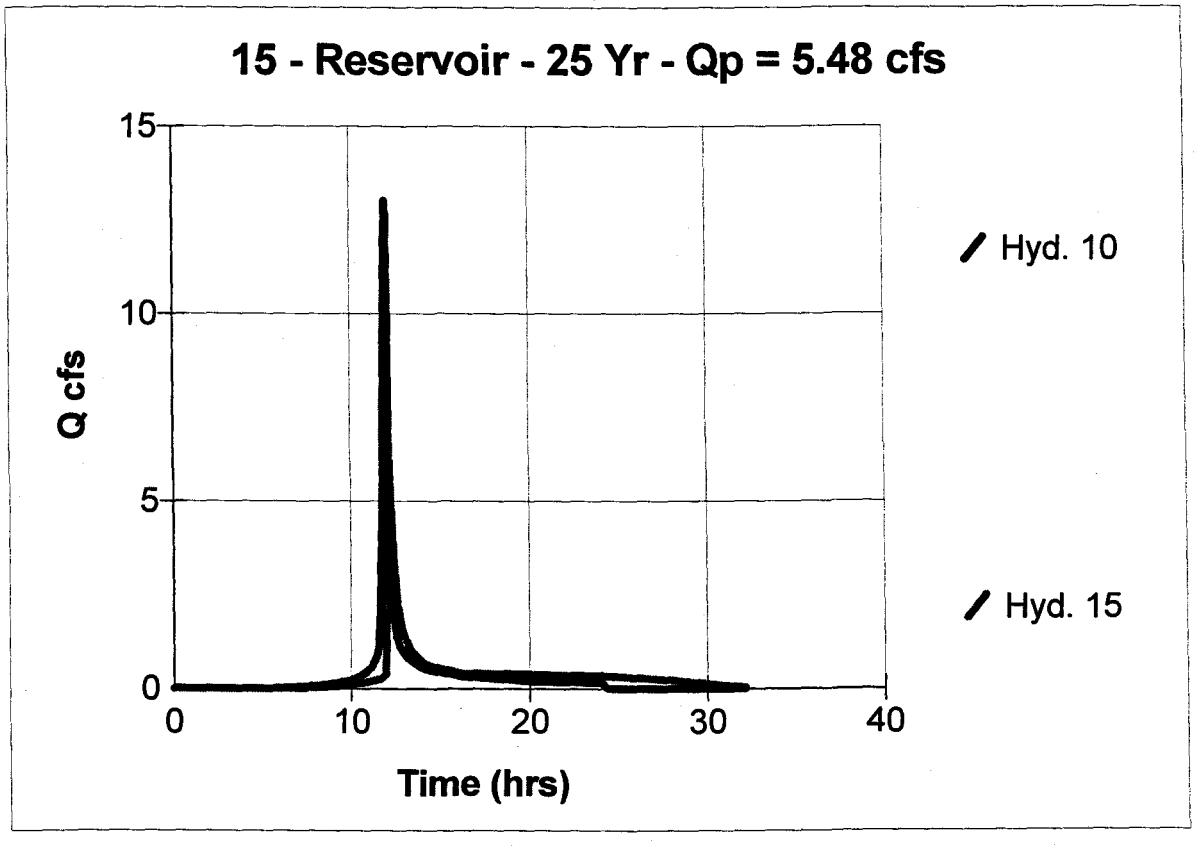
Hyd. No. 15

25 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 5.48 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Inflow hyd. No.	= 10	Reservoir name	= Tewning BMP Fin
Max. Elevation	= 87.81 ft	Max. Storage	= 15,404 cuft

Storage Indication method used.

Total Volume = 36,851 cuft



6/26/01

Hydrograph Plot

English

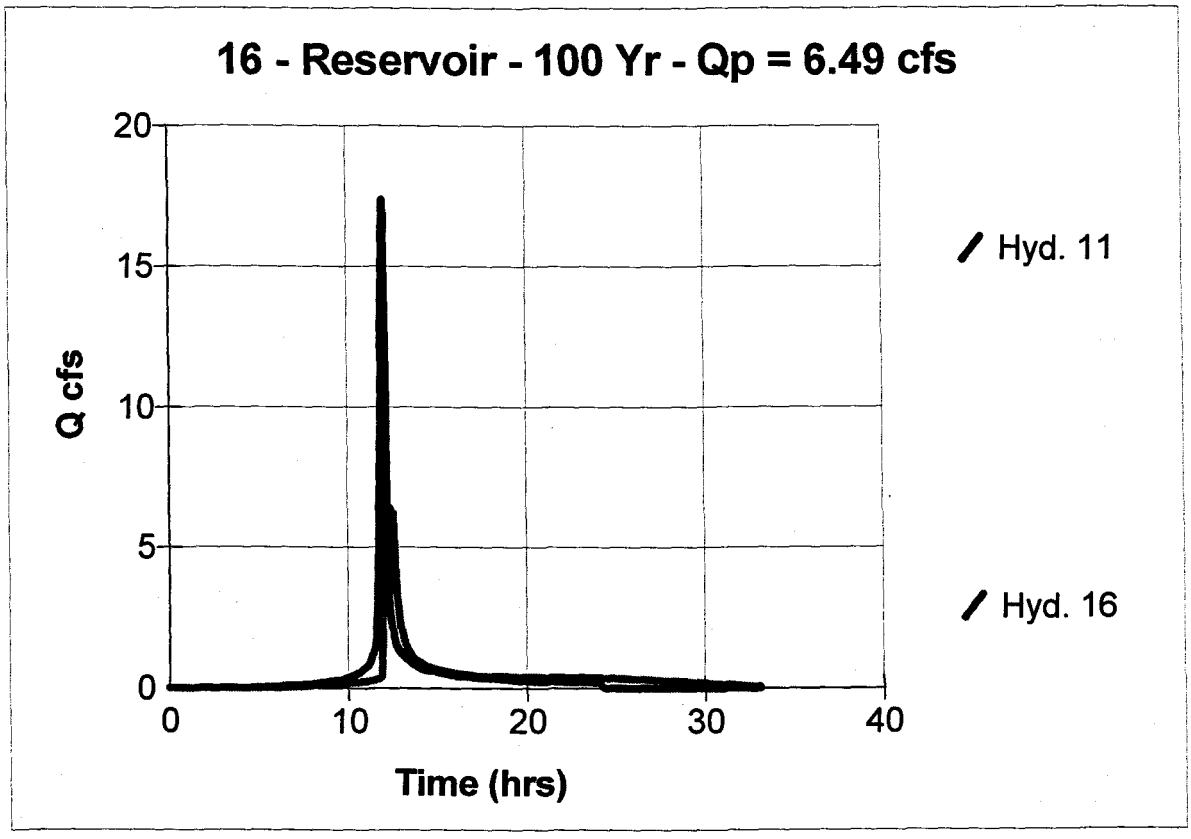
Hyd. No. 16

100 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 6.49 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Inflow hyd. No.	= 11	Reservoir name	= Tewning BMP Fin
Max. Elevation	= 88.40 ft	Max. Storage	= 19,980 cuft

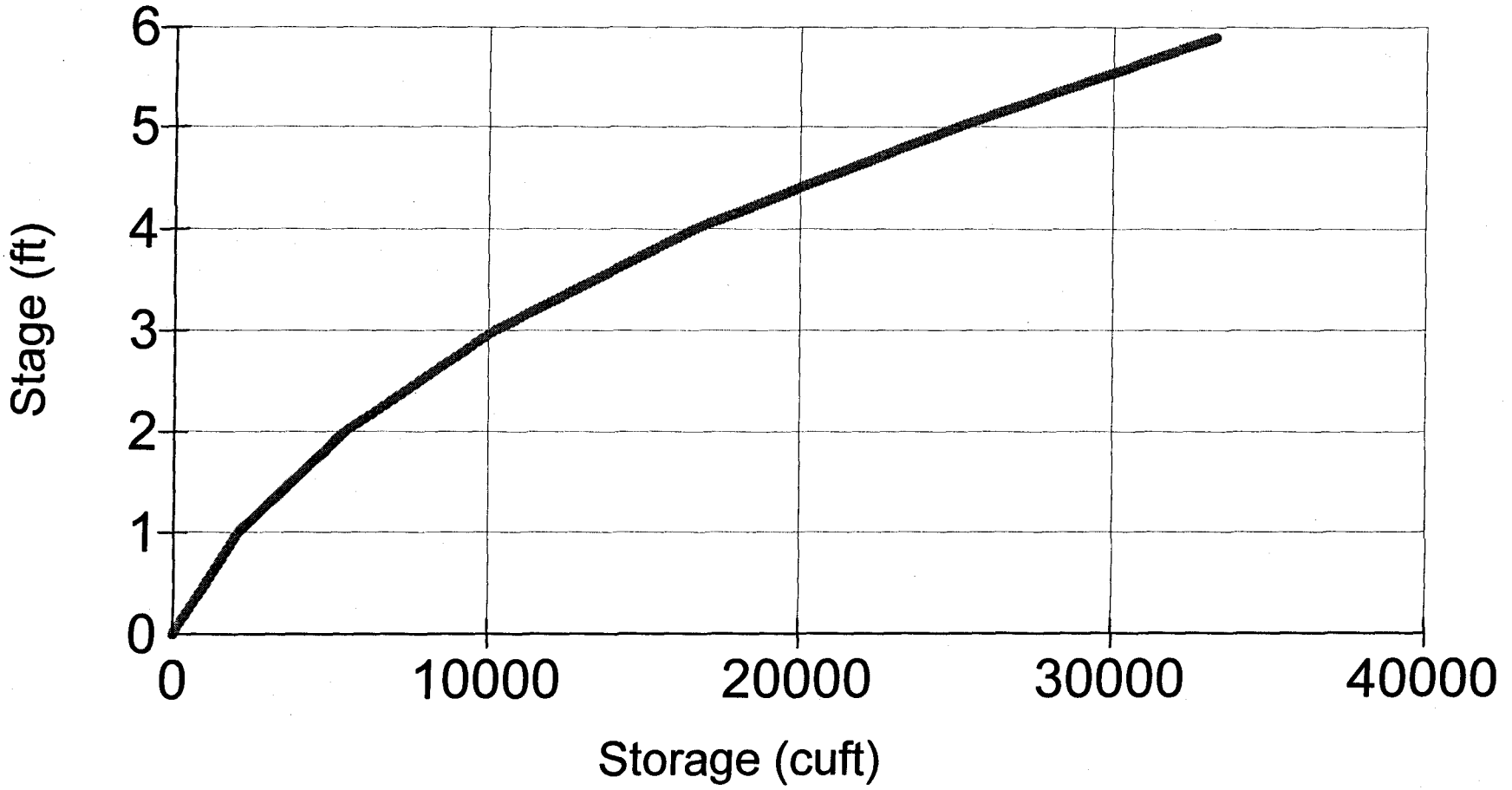
Storage Indication method used.

Total Volume = 49,791 cuft



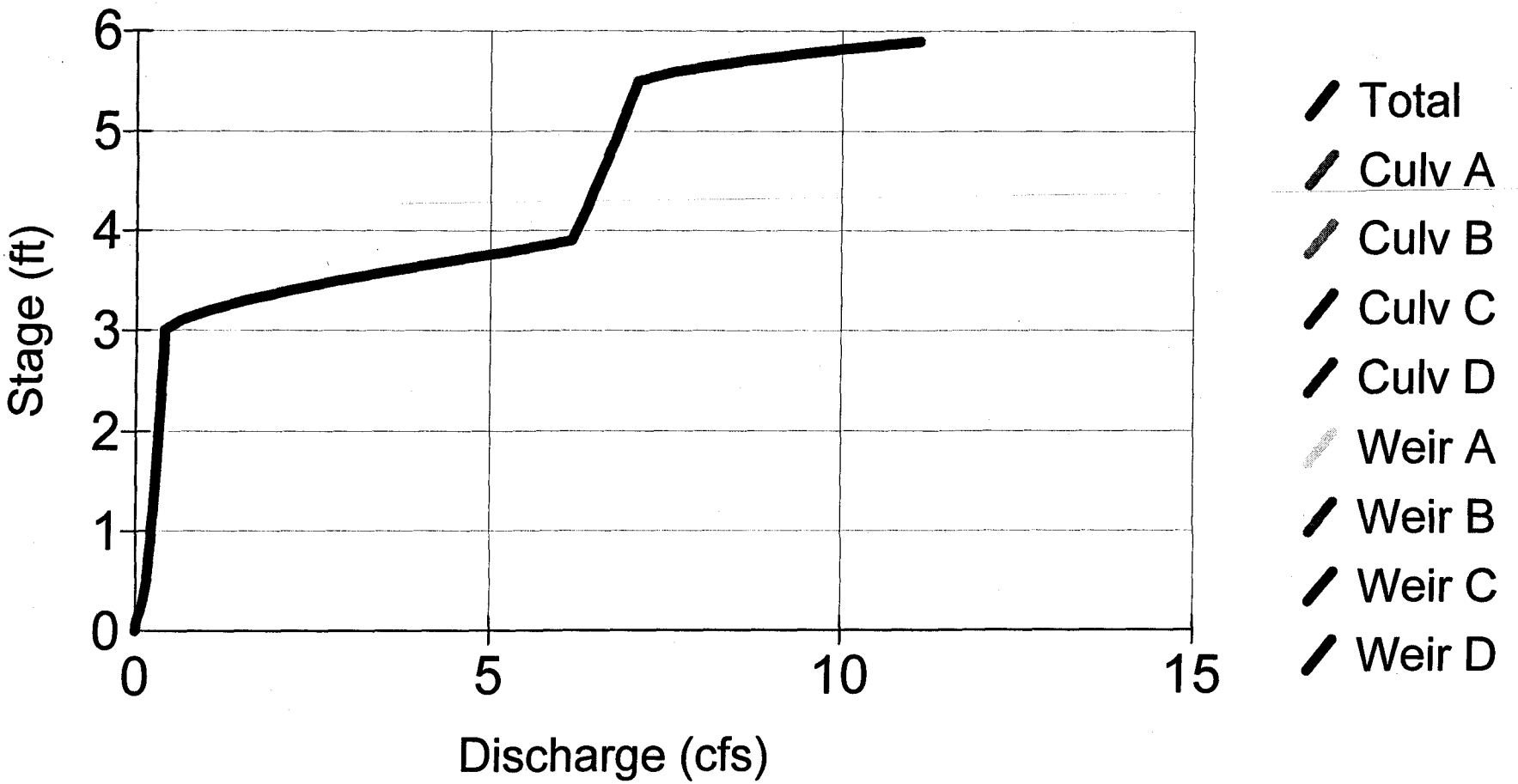
6/26/01

Tewning BMP - Final



6/26/07

Tewning BMP - Final



6/20/01

Reservoir Report

English

Reservoir No. 1 - Tewning BMP Final

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	84.00	1,482	0	0
1.00	85.00	2,662	2,072	2,072
2.00	86.00	4,087	3,375	5,447
3.00	87.00	5,449	4,768	10,215
4.00	88.00	7,340	6,395	16,610
5.00	89.00	9,532	8,436	25,046
6.00	90.00	11,456	10,110	34,182

Culvert / Orifice Structures

		[A]	[B]	[C]	[D]
Rise in	=	10.0	3.0	0.0	0.0
Span in	=	10.0	3.0	0.0	0.0
No. Barrels	=	1	1	0	0
Invert El. ft	=	82.50	84.00	0.00	0.00
Length ft	=	37.0	5.0	0.0	0.0
Slope %	=	1.36	30.00	0.00	0.00
N-Value	=	.013	.013	.000	.000
Orif. Coeff.	=	0.60	0.60	0.00	0.00
Multi-Stage	=	----	No	No	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len ft	=	2.3	5.0	0.0	0.0
Crest El. ft	=	87.00	89.50	0.00	0.00
Weir Coeff.	=	3.00	3.00	0.00	0.00
Eqn. Exp.	=	1.50	1.50	0.00	0.00
Multi-Stage	=	Yes	No	No	No

Tailwater Elevation = 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	84.00	2.73	0.00	—	—	0.00	0.00	—	—	0.00
1.00	2,072	85.00	3.75	0.22	—	—	0.00	0.00	—	—	0.22
2.00	5,447	86.00	4.53	0.32	—	—	0.00	0.00	—	—	0.32
3.00	10,215	87.00	5.19	0.40	—	—	0.00	0.00	—	—	0.40
4.00	16,610	88.00	5.78	0.47	—	—	6.90	0.00	—	—	6.25
5.00	25,046	89.00	6.32	0.52	—	—	19.52	0.00	—	—	6.84
6.00	34,182	90.00	6.81	0.57	—	—	35.85	5.30	—	—	12.69

AES PROJ. # 8651-18
6/26/01

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project JCSA Tewning Road Site Expansion

Basin # 1 Location Southwest Corner of Property

Total area draining to basin: 3.83 acres.

Basin Volume Design

Wet Storage:

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

   67 cu. yds. x ~~3.83~~ 2.45 acres = ~~257~~ 164 cu. yds.

2. Available basin volume = ~~524~~ 373 cu. yds. at elevation 87. (From storage - elevation curve)

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

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

4. Available volume before cleanout required.

   33 cu. yds. x ~~3.83~~ 2.45 acres = ~~126~~ 81 cu. yds.

5. Elevation corresponding to cleanout level = ~~84.75~~ 85.05.

   (From Storage - Elevation Curve)

6. Distance from invert of the dewatering orifice to cleanout level = ~~2.25~~ 1.0 ft. (Min. = 1.0 ft.) ✓

Dry Storage:

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

   67 cu. yds. x ~~3.83~~ 2.45 acres = ~~257~~ 164 cu. yds.

6/26/01

8. Total available basin volume at crest of riser* = ~~924~~ 373 cu. yds. at elevation ~~88~~ 87. (From Storage - Elevation Curve)

(OR 328 cy)

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

S = ~~10881~~ 4691 CF (DEW STORE 0.22)
Q_e = ~~10881~~ 4691 / 21600 = ~~0.50~~ 0.22
A = ~~0.50~~ 0.22 / (64.23 × 3/2)^½ (0.6) = 0

9. Diameter of dewatering orifice = ~~6"~~ 3" in.

10. Diameter of flexible tubing = ~~8"~~ 6" in. (diameter of dewatering orifice plus 2 inches).

d = 12×2×(0.04 / 3.14)
d = ~~5.2"~~ 2.7
USE ~~6"~~ 3"

Preliminary Design Elevations

11. Crest of Riser = ~~88~~ 87

Top of Dam = ~~91.3~~ 90

Design High Water = ~~89.5~~ 88.25 (25-YR STORM)

Upstream Toe of Dam = ~~83~~ 84

Basin Shape

12. Length of Flow / Effective Width $\frac{L}{We}$ = $\frac{115}{A/L}$ = $\frac{115}{9950/115}$ = $\frac{115}{86}$ = 1.3

If > 2, baffles are not required _____

If < 2, baffles are required ✓ REQUIRED

Runoff

13. Q_2 = ~~9.7~~ 7.81 cfs (From Chapter 5)

14. Q_{25} = ~~22.1~~ 17.58 cfs (From Chapter 5)

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2$ = ~~9.7~~ 7.8 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) = ~~8.3~~ 1.5 ft. (Using Q_2) 88.5-87.0

h = Crest of Emergency Spillway Elevation - Crest of Riser Elevation
~~90.3 - 88~~ 87.0

Without emergency spillway:

Assumed available head (h) = N/A ft. (Using Q_{25})

h = Design High Water Elevation - Crest of Riser Elevation

17. Riser diameter (D_r) = 27 in. Actual head (h) = ~~0.6~~ 0.4 ft.

(From Plate 3.14-8.) NOTE: DESIGNED RISER IS A 2.8 x 2.8 CHAMBER, EQUIVALENT TO A 38" DIA. RISE.

Note: Avoid orifice flow conditions.

18. Barrel length (l) = ~~60~~ 45 ft.

Head (H) on barrel through embankment = ~~8.3~~ 6.5 ft. 88.5-82.0 ~~90.3-82~~

(From Plate 3.14-7).

19. Barrel diameter = ~~8~~ 10 in. (FROM DESIGN CALCULATIONS)

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

20. Trash rack and anti-vortex device

Diameter = N/A inches.

Height = N/A inches.

(From Table 3.14-D).

Emergency Spillway Design

21. Required spillway capacity $Q_e = Q_{25} - Q_p$ = ~~22.0-9.7=12.3~~ 17.6-7.8=9.8 cfs.

22. Bottom width (b) = 5 ft.; the slope of the exit channel (s) = 3 ft./foot; and the minimum length of the exit channel (x) = 65 ft.
(From Table 3.14-C). (SEE PLANS)

Anti-Seep Collar Design

23. Depth of water at principal spillway crest (Y) = ~~5~~ 2 ft. 86-84 (~~88-83~~)

Slope of upstream face of embankment (Z) = ~~3~~ 4 :1.

Slope of principal spillway barrel (S_b) = ~~0.83~~ 1.11 %

Length of barrel in saturated zone (L_s) = ~~37~~ 15 ft.

24. Number of collars required = 2 dimensions = ~~2.75 x 2.75~~ 2.0' x 2.0'

(from Plate 3.14-12).

Final Design Elevations

25. Top of Dam = ~~91.3~~ 89.8

Design High Water = ~~89.52~~ 88.53 (25-YR STORM)

Emergency Spillway Crest = ~~90.3~~ 88.5

Principal Spillway Crest = ~~88.0~~ 87.0

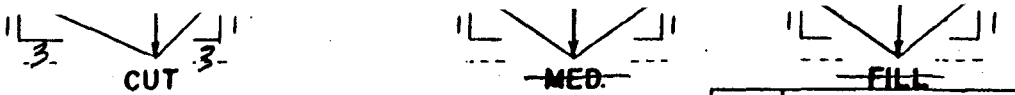
Dewatering Orifice Invert = ~~82.5~~ 86.0

Cleanout Elevation = ~~84.75~~ 85.05

Elevation of Upstream Toe of Dam or Excavated Bottom of "Wet Storage Area" (if excavation was performed) = 84

N/A LANE

N/A SIDE



PROJECT TEWNING UCSA OPERATIONS,

BY RDS DATE 1/8/01

REVISED 6/26/01 RD

STA. TO STA.	FLOW		C	A	C A INCR.	C A ACC.	Tc	I_2	Q_2	C or F	Slope Ft/Ft	ALLOW VEL	Earth n=.03 VEL.	Protective Lining n=.05 Qn	n=.05 VEL.	n=.05 DEP.	n=.015 Qn	n=.015 DEP.	I_{10}	Q_{10}	DEP.	REMARKS
DITCH @ CULV. #2 OUTFALL			0.7	0.55	0.39	0.39	5	5.6	2.16	C	0.02	2.5			2.05	6.1"			6.8	2.65	6.5"	GRASS (OK)
DITCH DUE SOUTH PARKING			0.7	0.14	0.10	0.10	5	5.6	0.55	C	0.023	2.5			1.5	3.7"			6.8	0.67	3.8"	GRASS (OK)
DITCH SW OF PARKING LOT			0.7	0.24	0.17	0.27	7.5	5.1	1.38	C	0.05	2.5			2.5	4.3"			6.8	1.84	4.9"	GRASS (OK)
DITCH @ CULV #3 OUTFALL			0.7	1.02	0.72	0.72	7.5	5.1	3.67	C	0.024	2.5			2.4	6.8"			6.8	4.89	9.1"	GRASS (OK)

AES CONSULTING ENGINEERS
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PROJECT JCSA TEWNING ROAD SITE
PROJECT NO. 8651-18
SUBJECT DITCH LINING (EC-3)
SHEET NO. 1 OF 1
CALCULATED BY RDS DATE 6/26/01

Q-10 YEAR STORM = 4.89 CFS

AVERAGE SLOPE OF GRASS SWALE (LOCATED IMMEDIATELY DOWNSTREAM OF CULV. #3 OUTLET PROTECTION) = 2.35%

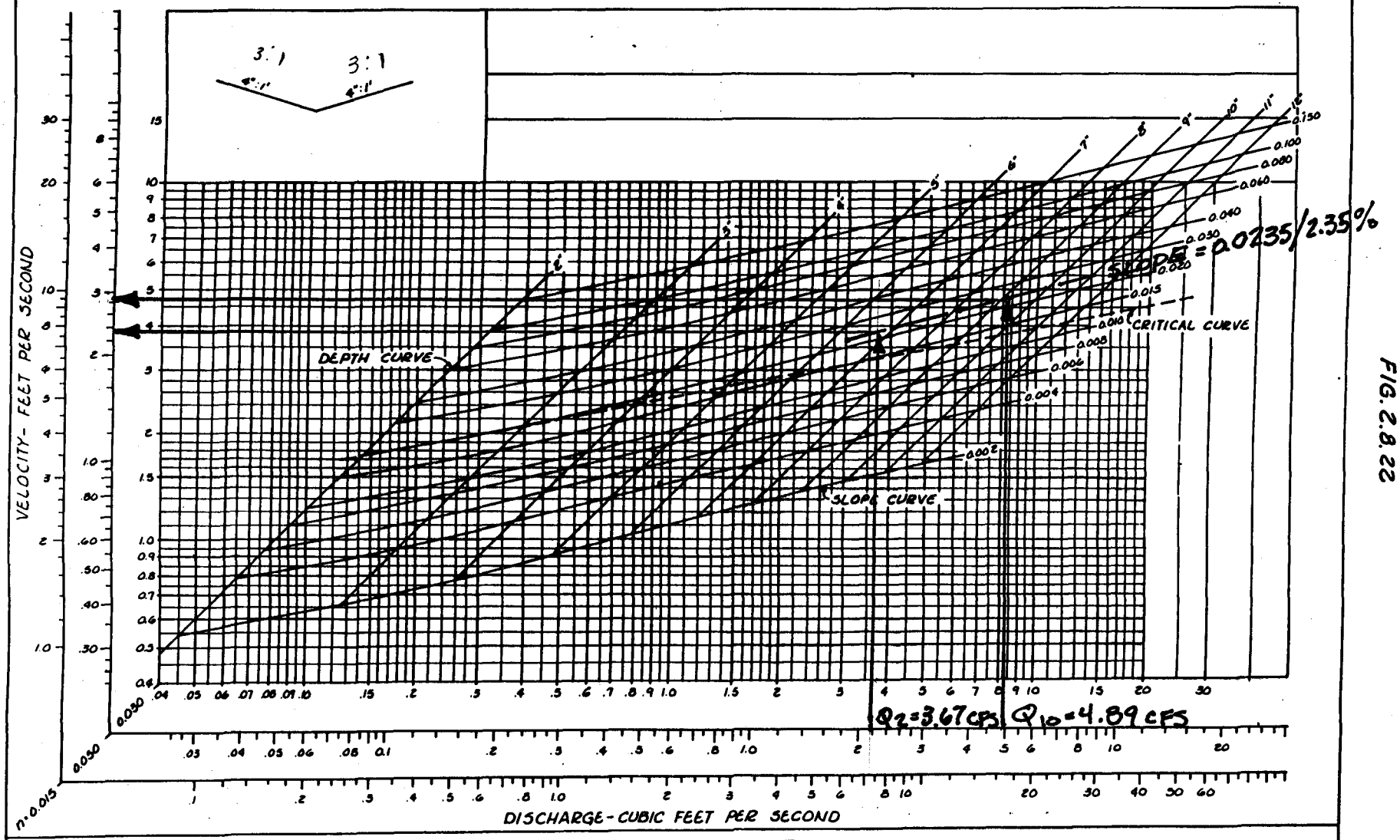
MANNING'S N OF GRASS LINED CHANNEL = 0.050

CHANNEL SIDE SLOPE = 3:1 (4"/1')

FROM FIG. 2.8.22 (VDOT DRAINAGE MANUAL-85.ED.)

V = 2.93 FPS USE EC-3 LINING (VESCH TYPE 2 TREATMENT)

THE EC-3 LINING CHOSEN FOR THIS EARTH SWALE IS ADEQUATE. THIS LINING IS ACCEPTABLE FOR VELOCITIES FROM 0-10 FPS.



TRIANGULAR MEDIAN DITCH

FIG. 2.8.22

MD-3

TEWNING ROAD (JCSA OPERATIONS) 6/26/01

CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR BMP / SWM
Tewning Road Maintenance Parking/Materials Storage Facility
for
James City Service Authority
AES Project No.: 8651-18
June 18, 2001

I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN

A. Pre-Development Drainage Area to Point of Concern = 1.71 Acres

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

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Wooded	0.62	73	45
2)	19-B Kempsville-Emporia Fine Sandy Loams	B	Wooded	0.16	60	10
3)	17 Johnston complex	D	Wooded	0.93	79	73
	Totals =			1.71		128
	Composite CN =					75

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	mainly wooded	
Manning's roughness coefficient., n (table 5-7)	0.4	
Length of overland flow, L	200	Feet
2-year 24-hour rainfall, P2	3.6	inches
Average slope of overland flow , s	0.0335	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.48	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved, wooded	
Length of shallow concentrated flow, L	247	Feet
Average slope of shallow concentrated flow, s	0.0335	feet per foot
Average velocity, v	0.5	feet per second
Travel time, Tt = L/(3600*v)	0.14	hours

3) Channel or Pipe Flow

Length of channel flow, L	0	Feet
Average velocity of channel flow, v	2.5	feet per second
Travel time, Tt = L/(3600*v)	0.00	hours
Total Time of Concentration =	0.62	hours
or	37	minutes

6/26/01

II. POST-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for total site and Off-site Contributing Areas)

A. Post-Development Drainage Area to Point of Concern = 2.45 Acres

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

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Wooded	0.19	73	14
2)	11-C Craven-Uchee	C	Green Space	0.10	77	8
3)	11-C Craven-Uchee	C	BMP Surface	0.19	98	19
4)	19-B Kempsville-Emporia Fine Sandy Loams	B	Wooded	0.38	60	23
5)	19-B Kempsville-Emporia Fine Sandy Loams	B	Green Space	0.70	68	48
6)	19-B Kempsville-Emporia Fine Sandy Loams	B	Parking & BMP Surface	0.89	98	87
	Total Adjusted CN =			2.45		198
	Composite CN =					81

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	impervious, commercial
Manning's roughness coefficient., n (table 5-7)	0.2
Length of overland flow, L	180 Feet
25-year 24-hour rainfall, P25	6.5 inches
Average slope of overland flow , s	0.03 feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.20 hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	impervious, commercial
Length of shallow concentrated flow, L	200 Feet
Average slope of shallow concentrated flow, s	0.02 feet per foot
Average velocity, v	1.00 feet per second
Travel time, Tt = L/(3600*v)	0.06 hours

3) Channel or Pipe Flow

Length of channel flow, L	120 Feet
Average velocity of channel flow, v	2.5 feet per second
Travel time, Tt = L/(3600*v)	0.01 hours
Total Time of Concentration =	0.27 hours
or	16 minutes

6/26/01

III. PROPOSED ESTIMATED POND(S) VOLUME

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
83	0	0	0	0	0	0
84	1	1474	737	27	737	27
85	1	2655	2065	76	2802	104
86	1	3950	3303	122	6104	226
87	1	5400	4675	173	10779	399
88	1	6916	6158	228	16937	627
89	1	8534	7725	286	24662	913
90	1	10252	9393	348	34055	1261

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

Volume of 1-Year, 24-Hour Storm (based upon Hydrograph #1) = 10,074 cubic feet

Elevation of water surface associated with 1-Year, 24-Hour Storm Volume = 86.0

Elevation of Release Inlet for Channel Protection = 84.0

Average Head, in feet, on Release Inlet = 1.0

Average Release Rate Calculation $\frac{\text{10,074 cubic feet}}{\text{(24 hours x 60 minutes/hour x 60 seconds/ minute)}}$ = 0.1 cfs AVERAGE, Not Peak

Calculation of Size of Release Inlet

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

Diameter of Release Inlet = 0.20 feet, or 3 inches USE 3" DIAMETER IN DESIGN

6/16/01

Hydrograph Summary Report

JCSA OPERATIONS CENTER – BMP
JOB No.8651-18

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	1.0	2	736	5,109	1	—	—	—	Pre-Development 1-
2	SCS Runoff	1.7	2	736	7,989	2	—	—	—	Pre-Development 2-
3	SCS Runoff	4.2	2	734	19,100	10	—	—	—	Pre-Development 10
4	SCS Runoff	4.9	2	734	22,249	25	—	—	—	Pre-Development 25
5	SCS Runoff	6.8	2	734	30,940	100	—	—	—	Pre-Development 100
7	SCS Runoff	3.5	2	722	10,074	1	—	—	—	Post-Development 1
8	SCS Runoff	5.3	2	722	14,815	2	—	—	—	Post-Development 2
9	SCS Runoff	11.4	2	722	32,100	10	—	—	—	Post-Development 10
10	SCS Runoff	13.0	2	722	36,852	25	—	—	—	Post-Development 25
11	SCS Runoff	17.4	2	722	49,792	100	—	—	—	Post-Development 100
12	Reservoir	0.3	2	782	10,074	1	7	85.79	4,733	1 YR POST ROUTED
13	Reservoir	0.4	2	798	14,815	2	8	86.44	7,568	2 YR POST ROUTED
14	Reservoir	3.8	2	736	32,099	10	9	87.62	14,151	10 YR POST ROUTED
15	Reservoir	5.5	2	734	36,851	25	10	87.81	15,404	25 YR POST ROUTED
16	Reservoir	6.5	2	734	49,791	100	11	88.40	19,980	100 YR POST ROUTED
20	SCS Runoff	7.8	2	718	17,933	2	—	—	—	Post-Development 2
21	SCS Runoff	17.6	2	718	41,631	25	—	—	—	Post-Development 25
25	Reservoir	2.5	2	728	17,892	2	20	87.47	7,744	2-yr Construction
26	Reservoir	6.4	2	728	41,569	25	21	88.53	15,606	25yr construction

Proj. file: 865118FINAL.JAG.GPW IDF file: Jcc.idf | Run date: 06-26-2001

6/26/01

Hydrograph Plot

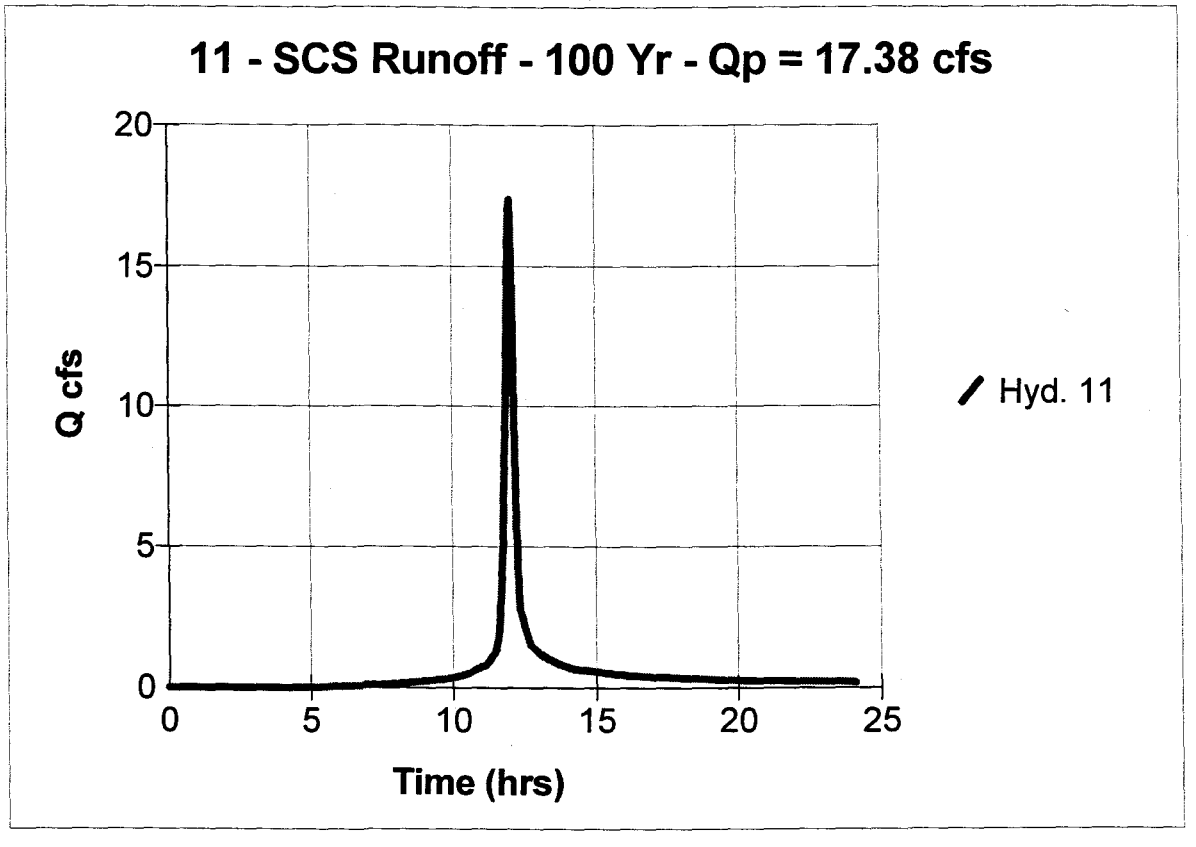
English

Hyd. No. 11

Post-Development 100-Year

Hydrograph type	= SCS Runoff	Peak discharge	= 17.38 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 2.45 ac	Curve number	= 81
Basin Slope	= 1.5 %	Hydraulic length	= 480 ft
Tc method	= USER	Time of conc. (Tc)	= 16 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 49,792 cuft



6/26/01

Hydrograph Plot

English

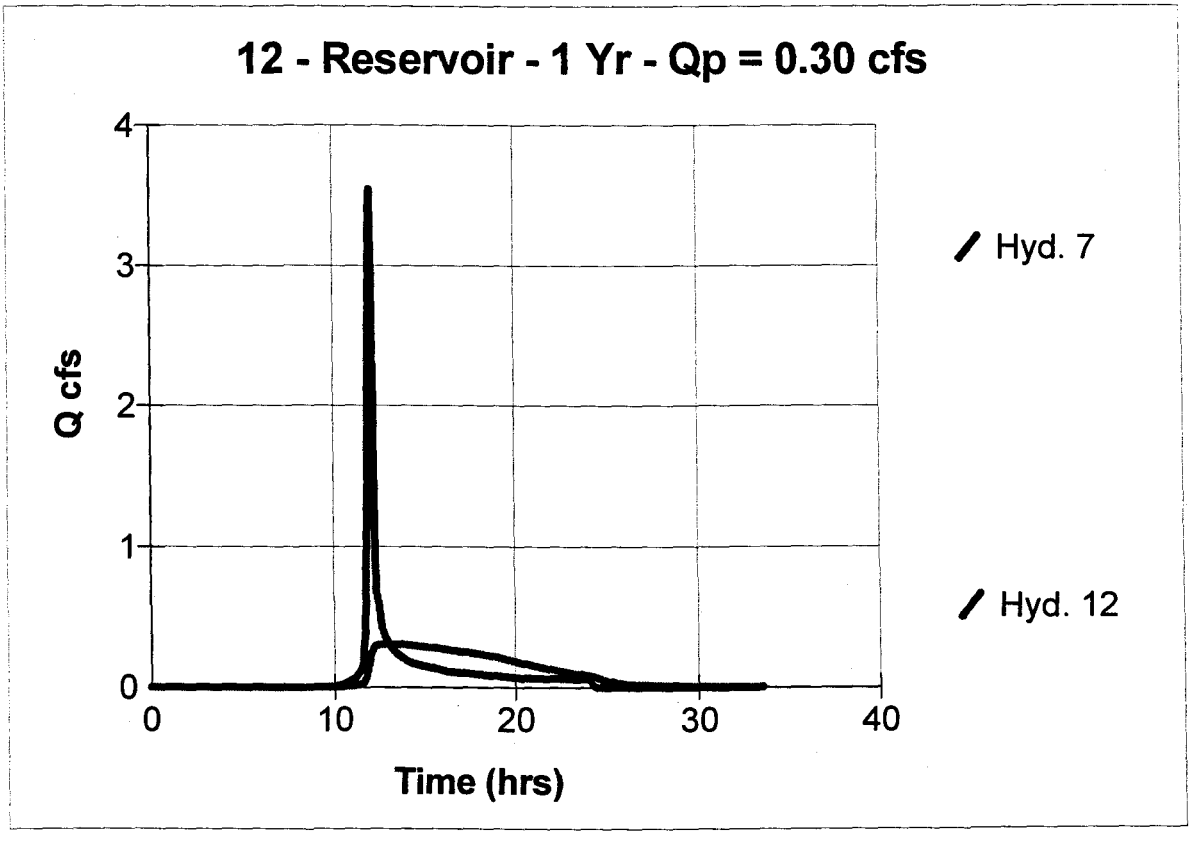
Hyd. No. 12

1 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.30 cfs
Storm frequency	= 1 yrs	Time interval	= 2 min
Inflow hyd. No.	= 7	Reservoir name	= Tewning BMP Fin
Max. Elevation	= 85.79 ft	Max. Storage	= 4,733 cuft

Storage Indication method used.

Total Volume = 10,074 cuft



6/26/01

Hydrograph Plot

English

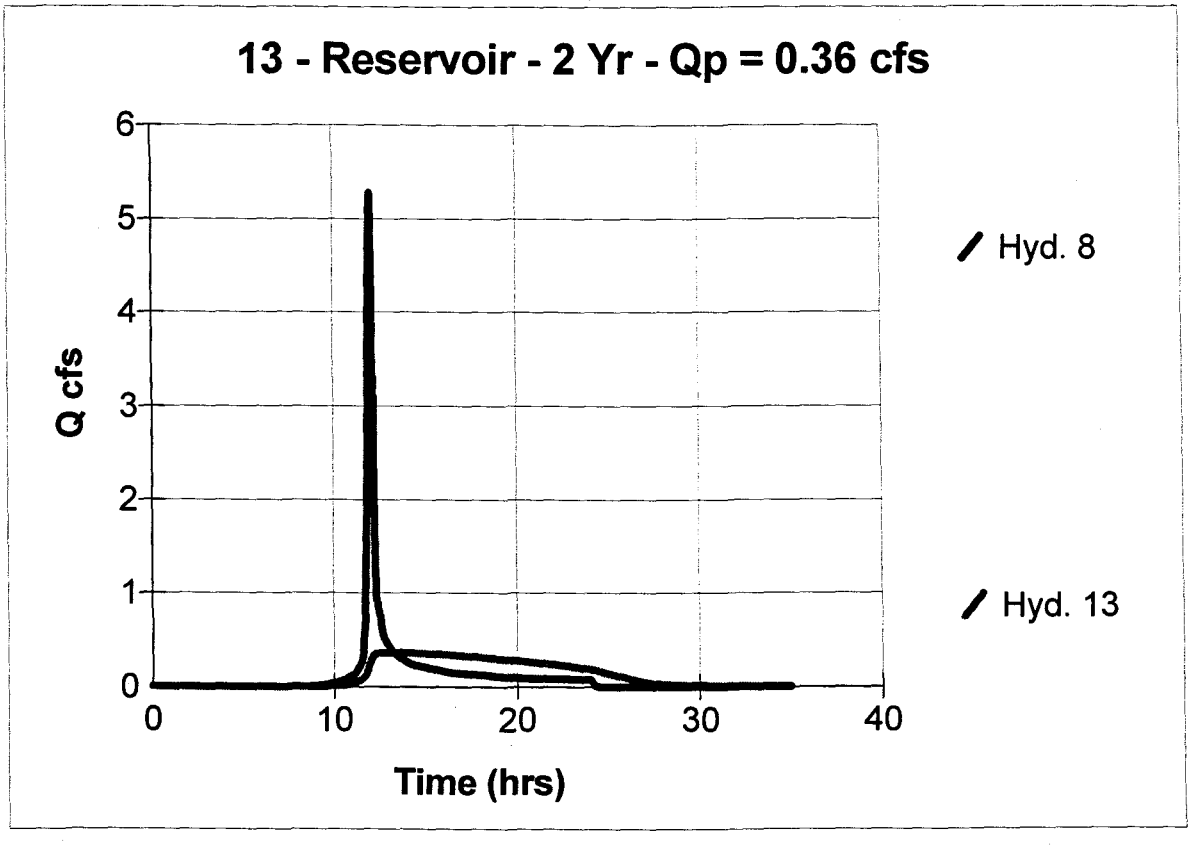
Hyd. No. 13

2 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.36 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Inflow hyd. No.	= 8	Reservoir name	= Tewning BMP Fin
Max. Elevation	= 86.44 ft	Max. Storage	= 7,568 cuft

Storage Indication method used.

Total Volume = 14,815 cuft



6/26/01

Hydrograph Plot

English

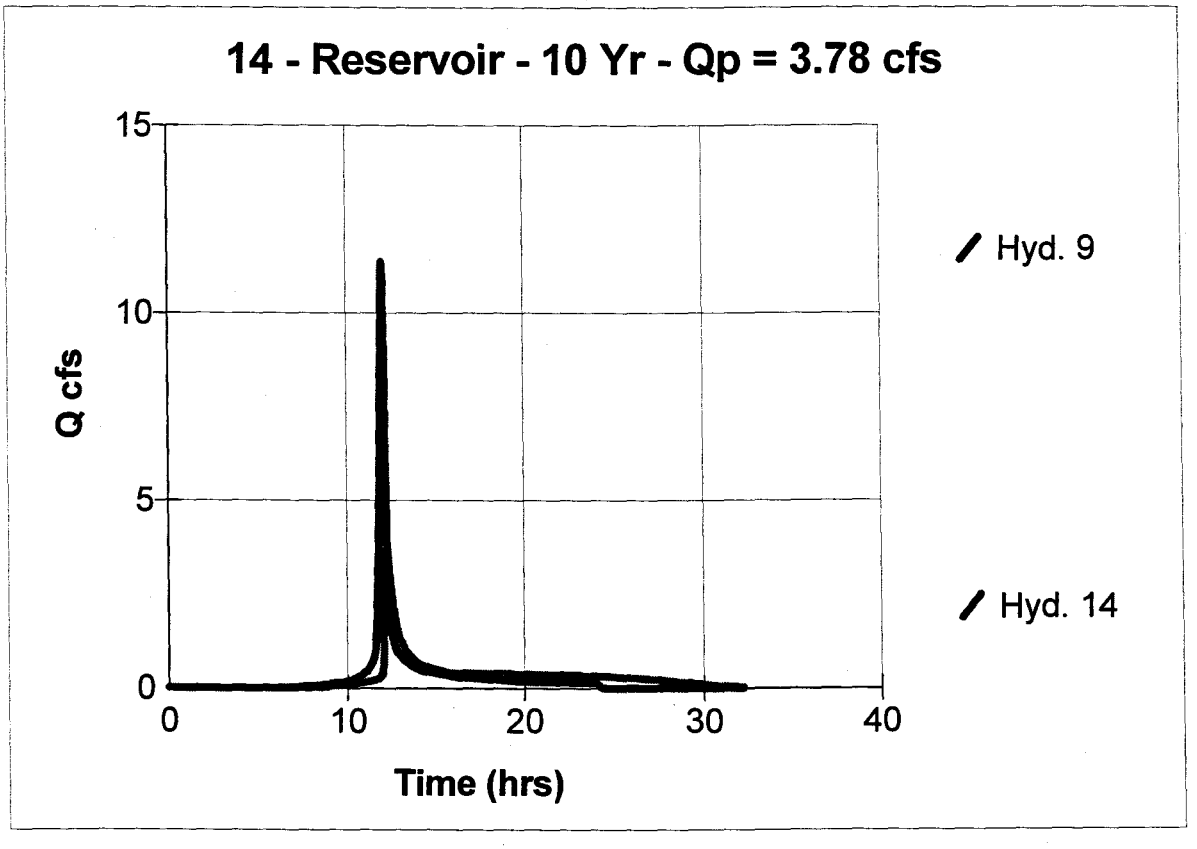
Hyd. No. 14

10 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 3.78 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Inflow hyd. No.	= 9	Reservoir name	= Tewning BMP Fin
Max. Elevation	= 87.62 ft	Max. Storage	= 14,151 cuft

Storage Indication method used.

Total Volume = 32,099 cuft



6/26/01

Hydrograph Plot

English

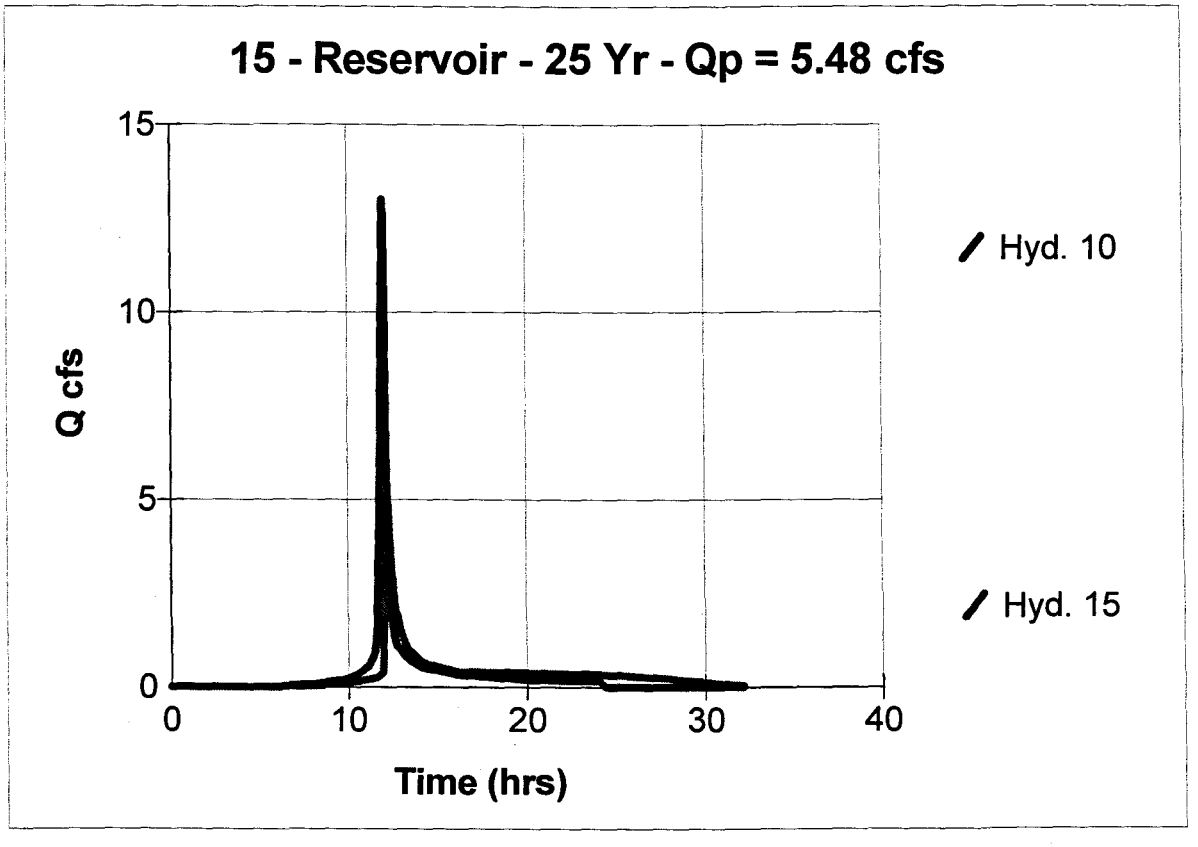
Hyd. No. 15

25 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 5.48 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Inflow hyd. No.	= 10	Reservoir name	= Tewning BMP Fin
Max. Elevation	= 87.81 ft	Max. Storage	= 15,404 cuft

Storage Indication method used.

Total Volume = 36,851 cuft



6/26/01

Hydrograph Plot

English

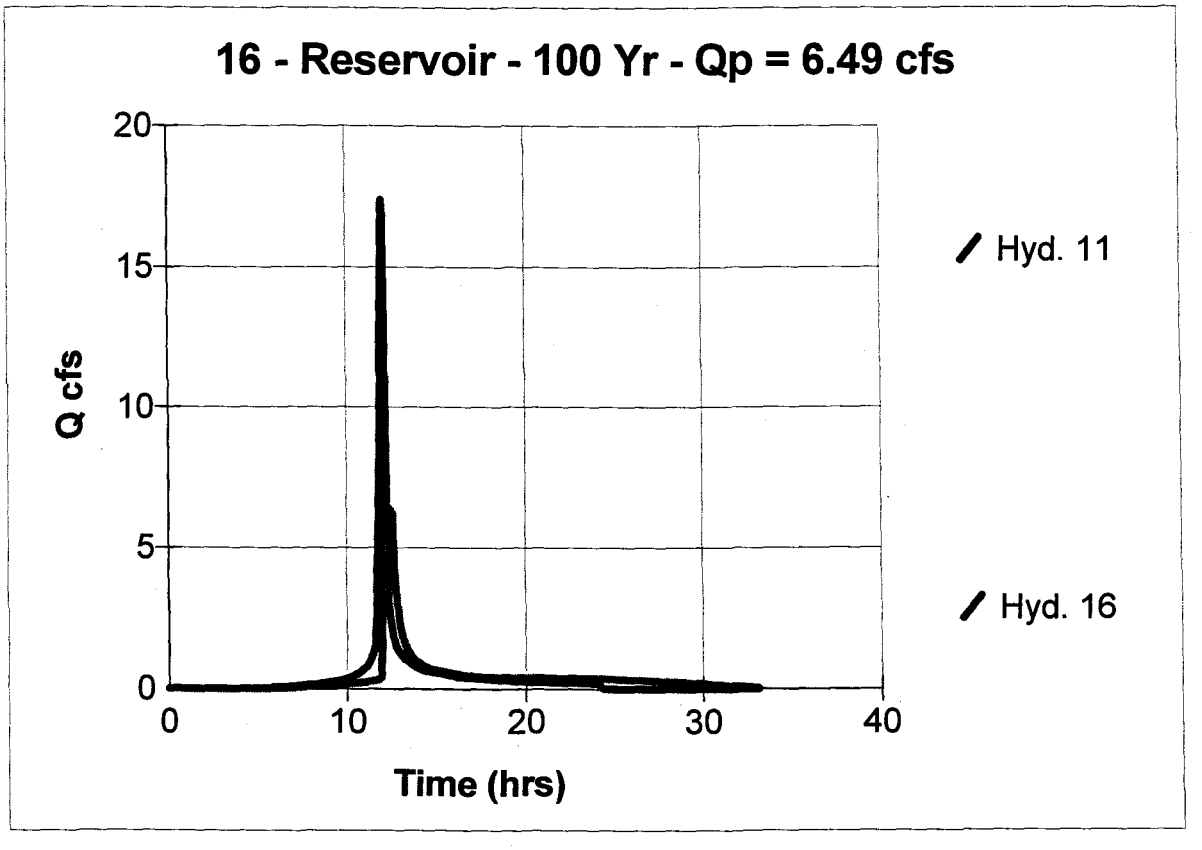
Hyd. No. 16

100 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 6.49 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Inflow hyd. No.	= 11	Reservoir name	= Tewning BMP Fin
Max. Elevation	= 88.40 ft	Max. Storage	= 19,980 cuft

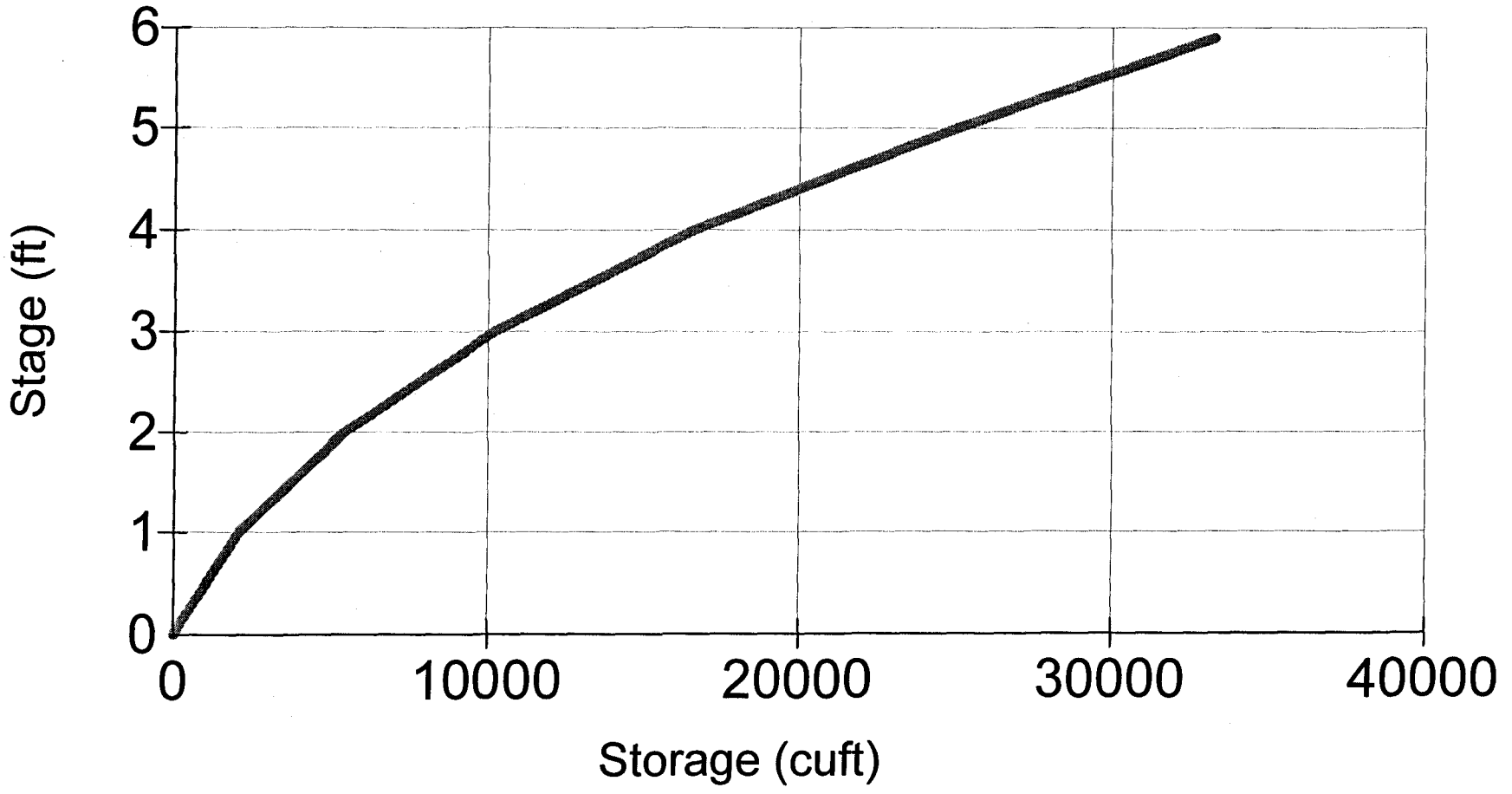
Storage Indication method used.

Total Volume = 49,791 cuft



6/26/01

Tewning BMP - Final



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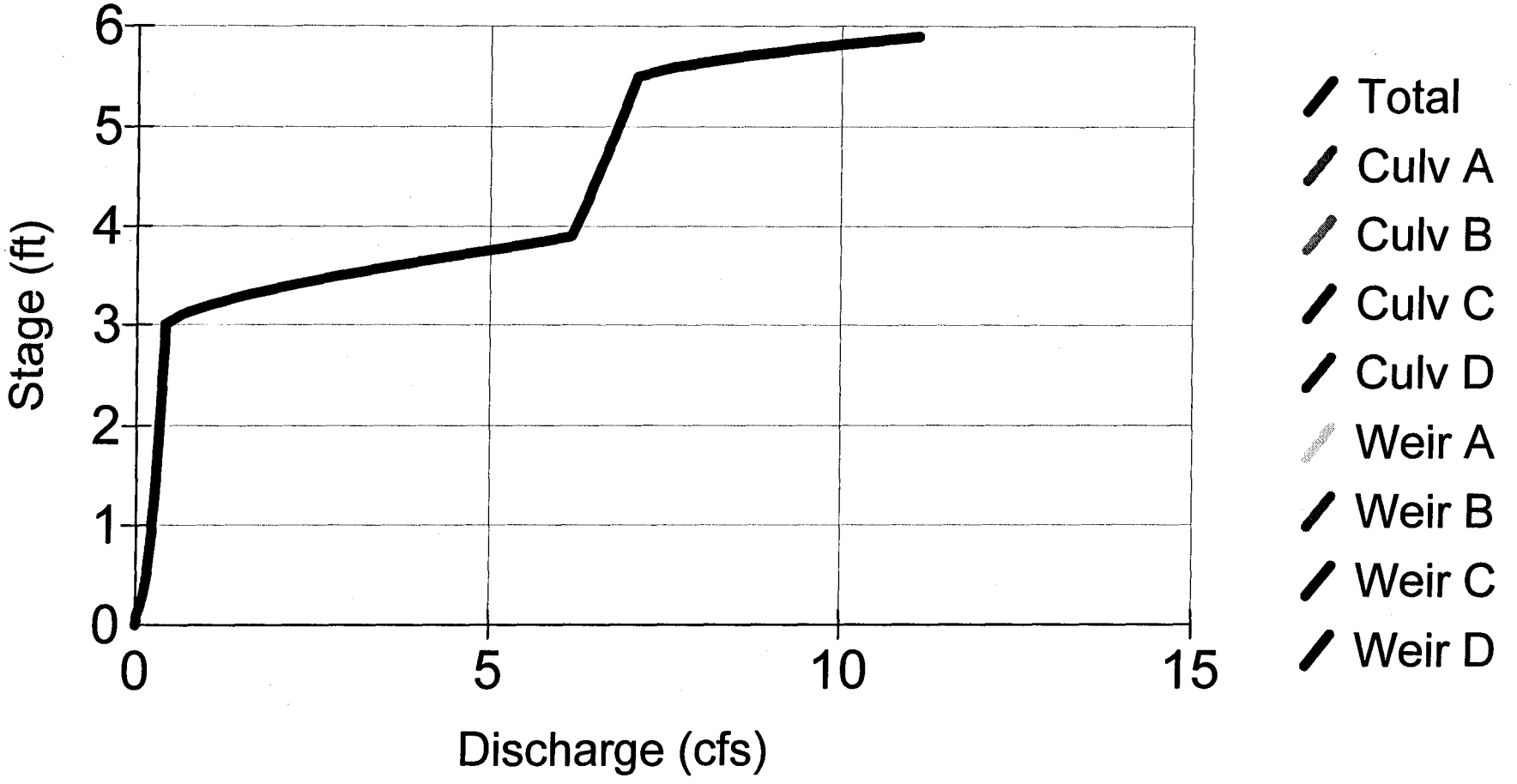
Tewning BMP - Final



6/20/01

Reservoir Report

English

Reservoir No. 1 - Tewning BMP Final

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	84.00	1,482	0	0
1.00	85.00	2,662	2,072	2,072
2.00	86.00	4,087	3,375	5,447
3.00	87.00	5,449	4,768	10,215
4.00	88.00	7,340	6,395	16,610
5.00	89.00	9,532	8,436	25,046
6.00	90.00	11,456	10,110	34,182

Culvert / Orifice Structures

		[A]	[B]	[C]	[D]
Rise in	=	10.0	3.0	0.0	0.0
Span in	=	10.0	3.0	0.0	0.0
No. Barrels	=	1	1	0	0
Invert El. ft	=	82.50	84.00	0.00	0.00
Length ft	=	37.0	5.0	0.0	0.0
Slope %	=	1.36	30.00	0.00	0.00
N-Value	=	.013	.013	.000	.000
Orif. Coeff.	=	0.60	0.60	0.00	0.00
Multi-Stage	=	-----	No	No	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len ft	=	2.3	5.0	0.0	0.0
Crest El. ft	=	87.00	89.50	0.00	0.00
Weir Coeff.	=	3.00	3.00	0.00	0.00
Eqn. Exp.	=	1.50	1.50	0.00	0.00
Multi-Stage	=	Yes	No	No	No

Tailwater Elevation = 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	84.00	2.73	0.00	---	---	0.00	0.00	---	---	0.00
1.00	2,072	85.00	3.75	0.22	---	---	0.00	0.00	---	---	0.22
2.00	5,447	86.00	4.53	0.32	---	---	0.00	0.00	---	---	0.32
3.00	10,215	87.00	5.19	0.40	---	---	0.00	0.00	---	---	0.40
4.00	16,610	88.00	5.78	0.47	---	---	6.90	0.00	---	---	6.25
5.00	25,046	89.00	6.32	0.52	---	---	19.52	0.00	---	---	6.84
6.00	34,182	90.00	6.81	0.57	---	---	35.85	5.30	---	---	12.69

CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR TEMPORARY SEDIMENT BASIN
Tewning Road Maintenance Parking/Materials Storage Facility
for
James City Service Authority
AES Project No.: 8651-18
June 26, 2001

I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN

A. Pre-Development Drainage Area to Point of Concern = 1.71 Acres

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

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Wooded	0.62	73	45
2)	19-B Kempsville-Emporia Fine Sandy Loams	B	Wooded	0.16	60	10
3)	17 Johnston complex	D	Wooded	0.93	79	73
	Totals =			1.71		128
	Composite CN =					75

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	mainly wooded	
Manning's roughness coefficient., n (table 5-7)	0.4	
Length of overland flow, L	200	Feet
2-year 24-hour rainfall, P2	3.6	inches
Average slope of overland flow , s	0.0335	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.48	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved, wooded	
Length of shallow concentrated flow, L	247	Feet
Average slope of shallow concentrated flow, s	0.0335	feet per foot
Average velocity, v	0.5	feet per second
Travel time, Tt = L/(3600*v)	0.14	hours

3) Channel or Pipe Flow

Length of channel flow, L	0	Feet
Average velocity of channel flow, v	2.5	feet per second
Travel time, Tt = L/(3600*v)	0.00	hours
Total Time of Concentration =	0.62	hours
or	37	minutes

6/26/01

II. **POST-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for total site and Off-site Contributing Areas)**

A. Post-Development Drainage Area to Point of Concern = 2.45 Acres

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

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Wooded	0.19	73	14
2)	11-C Craven-Uchee	C	Newly Graded Area	0.29	91	26
4)	19-B Kempsville-Emporia Fine Sandy Loams	B	Wooded	0.38	60	23
5)	19-B Kempsville-Emporia Fine Sandy Loams	B	Newly Graded Area	1.59	91	145
	Total Adjusted CN =			2.45		208
	Composite CN =					85

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	denuded earth	
Manning's roughness coefficient., n (table 5-7)	0.02	
Length of overland flow, L	240	Feet
25-year 24-hour rainfall, P25	6.5	inches
Average slope of overland flow , s	0.0208	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.05	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	impervious, commercial	
Length of shallow concentrated flow, L	260	Feet
Average slope of shallow concentrated flow, s	0.054	feet per foot
Average velocity, v	1.00	feet per second
Travel time, Tt = L/(3600*v)	0.07	hours

3) Channel or Pipe Flow

Length of channel flow, L	0	Feet
Average velocity of channel flow, v	0	feet per second
Travel time, Tt = L/(3600*v)	0.00	hours
Total Time of Concentration =	0.12	hours
or	7	minutes

6/26/01

III. PROPOSED ESTIMATED POND(S) VOLUME

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
83	0	0	0	0	0	0
84	1	1482	741	27	741	27
85	1	2662	2072	77	2813	104
86	1	4087	3375	125	6188	229
87	1	5449	4768	177	10956	406
88	1	7340	6395	237	17350	643
89	1	9532	8436	312	25786	955
90	1	11456	10494	389	36280	1344

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

Volume of 1-Year, 24-Hour Storm (based upon Hydrograph #1) = 10,074 cubic feet

Elevation of water surface associated with 1-Year, 24-Hour Storm Volume = 85.8

Elevation of Release Inlet for Channel Protection = 84.0

Average Head, in feet, on Release Inlet = 0.9

Average Release Rate Calculation $\frac{10{,}074 \text{ cubic feet}}{(24 \text{ hours} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/ minute})}$ = 0.1 cfs AVERAGE, Not Peak

Calculation of Size of Release Inlet

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

Diameter of Release Inlet = 0.20 feet, or 3 inches USE 3" DIAMETER IN DESIGN

6/26/01

Hydrograph Summary Report JCSA OPERATIONS CENTER - SED.BASIN JOB No.8651-18

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	1.0	2	736	5,109	1	—	—	—	Pre-Development 1-
2	SCS Runoff	1.7	2	736	7,989	2	—	—	—	Pre-Development 2-
3	SCS Runoff	4.2	2	734	19,100	10	—	—	—	Pre-Development 10
4	SCS Runoff	4.9	2	734	22,249	25	—	—	—	Pre-Development 25
5	SCS Runoff	6.8	2	734	30,940	100	—	—	—	Pre-Development 10
7	SCS Runoff	3.5	2	722	10,074	1	—	—	—	Post-Development 1
8	SCS Runoff	5.3	2	722	14,815	2	—	—	—	Post-Development 2
9	SCS Runoff	11.4	2	722	32,100	10	—	—	—	Post-Development 1
10	SCS Runoff	13.0	2	722	36,852	25	—	—	—	Post-Development 2
11	SCS Runoff	17.4	2	722	49,792	100	—	—	—	Post-Development 1
12	Reservoir	0.3	2	782	10,074	1	7	85.79	4,733	1 YR POST ROUTED
13	Reservoir	0.4	2	798	14,815	2	8	86.44	7,568	2 YR POST ROUTED
14	Reservoir	3.8	2	736	32,099	10	9	87.62	14,151	10 YR POST ROUTED
15	Reservoir	5.5	2	734	36,851	25	10	87.81	15,404	25 YR POST ROUTED
16	Reservoir	6.5	2	734	49,791	100	11	88.40	19,980	100 YR POST ROUTED
20	SCS Runoff	7.8	2	718	17,933	2	—	—	—	Post-Development 2
21	SCS Runoff	17.6	2	718	41,631	25	—	—	—	Post-Development 2
25	Reservoir	2.5	2	728	17,892	2	20	87.47	7,744	2-yr Construction
26	Reservoir	6.4	2	728	41,569	25	21	88.53	15,606	25yr construction

Proj. file: 865118FINAL.JAG.GPW IDF file: Jcc.idf Run date: 06-26-2001

6/26/01

Hydrograph Plot

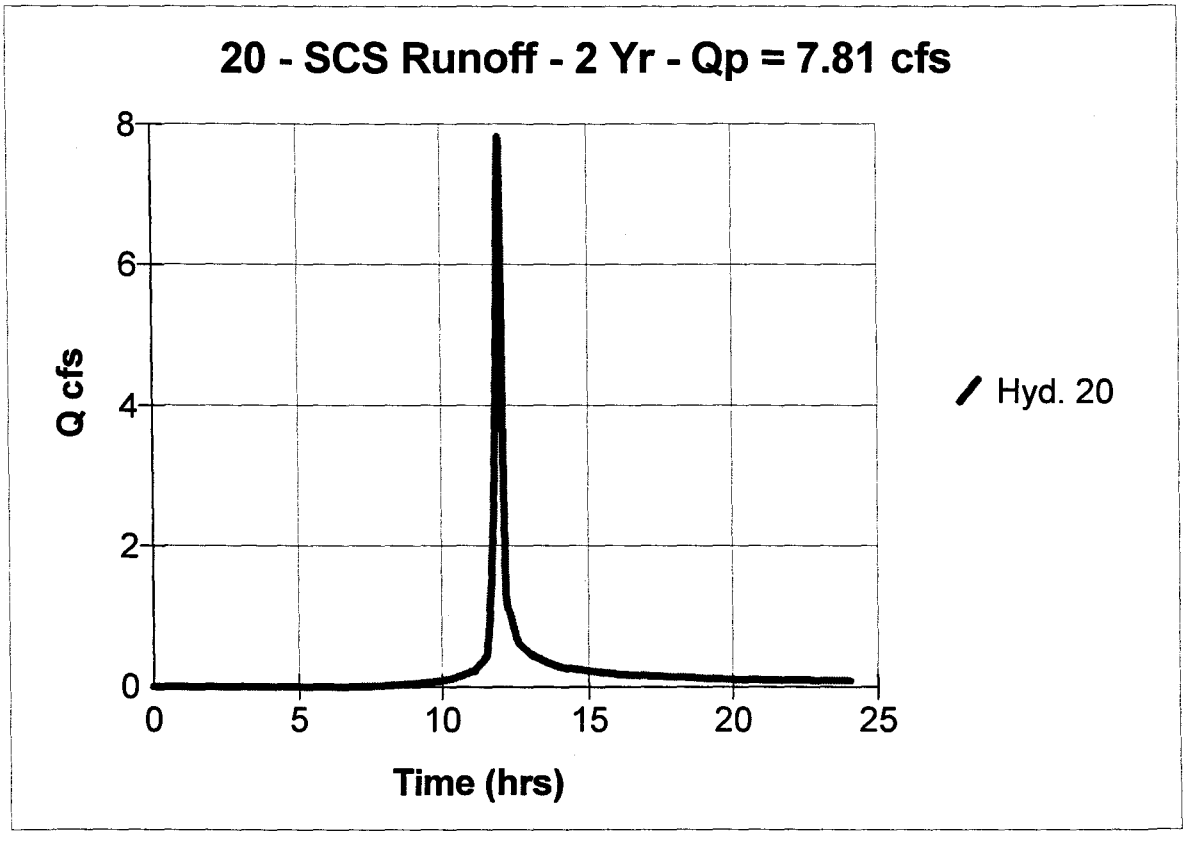
English

Hyd. No. 20

Post-Development 2-Year TSB

Hydrograph type	= SCS Runoff	Peak discharge	= 7.81 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 2.45 ac	Curve number	= 85
Basin Slope	= 3.8 %	Hydraulic length	= 480 ft
Tc method	= USER	Time of conc. (Tc)	= 7 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 17,933 cuft



6/26/01

Hydrograph Plot

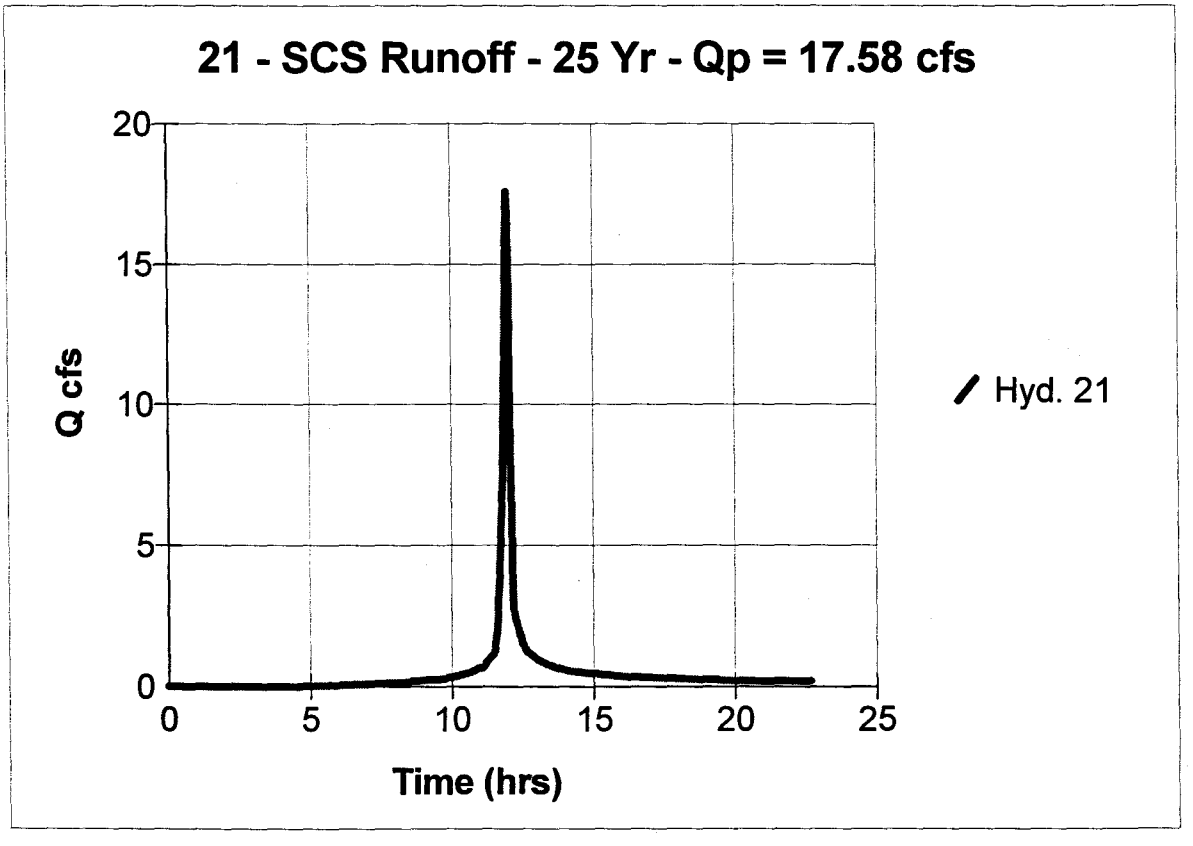
English

Hyd. No. 21

Post-Development 25-Year TSB

Hydrograph type	= SCS Runoff	Peak discharge	= 17.58 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 2.45 ac	Curve number	= 85
Basin Slope	= 3.8 %	Hydraulic length	= 480 ft
Tc method	= USER	Time of conc. (Tc)	= 7 min
Total precip.	= 6.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 41,631 cuft



6/26/01

Hydrograph Plot

English

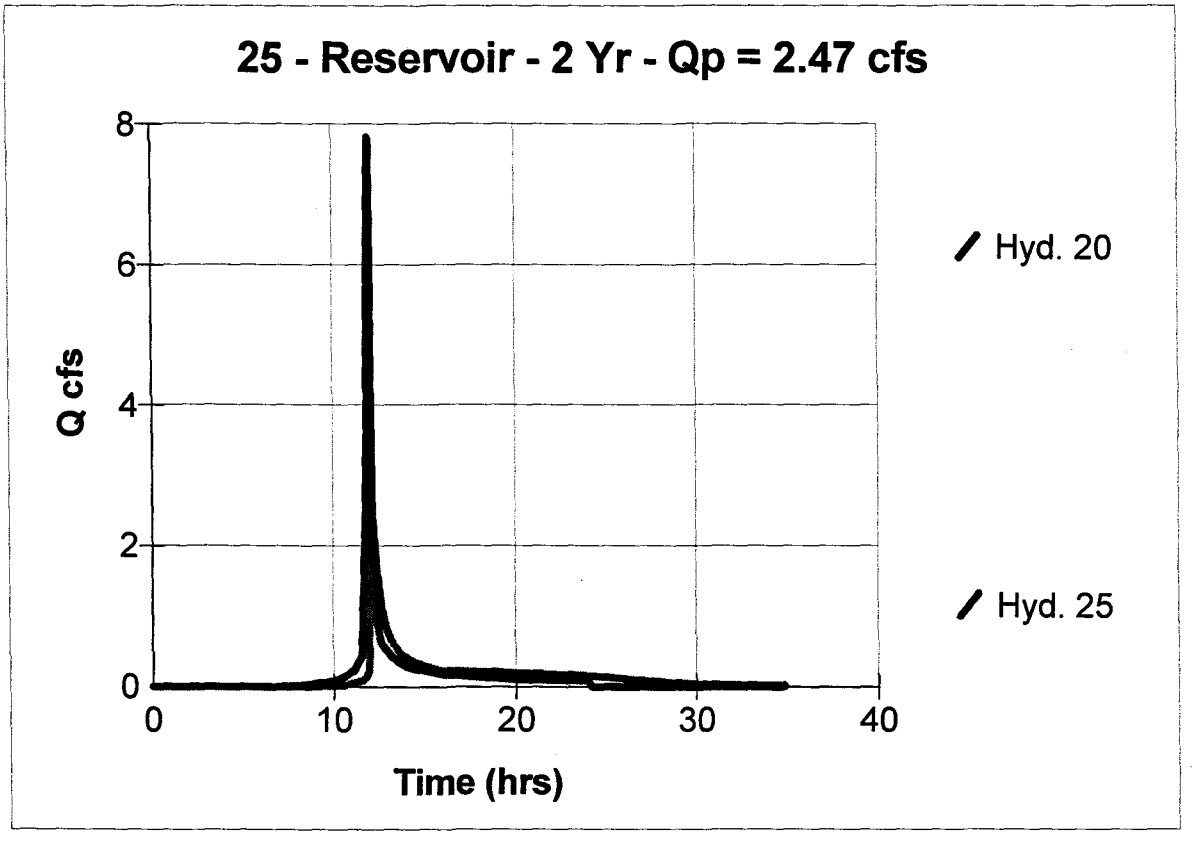
Hyd. No. 25

2-yr Construction TSB

Hydrograph type	= Reservoir	Peak discharge	= 2.47 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Inflow hyd. No.	= 20	Reservoir name	= Sediment Basin
Max. Elevation	= 87.47 ft	Max. Storage	= 7,744 cuft

Storage Indication method used.

Total Volume = 17,892 cuft



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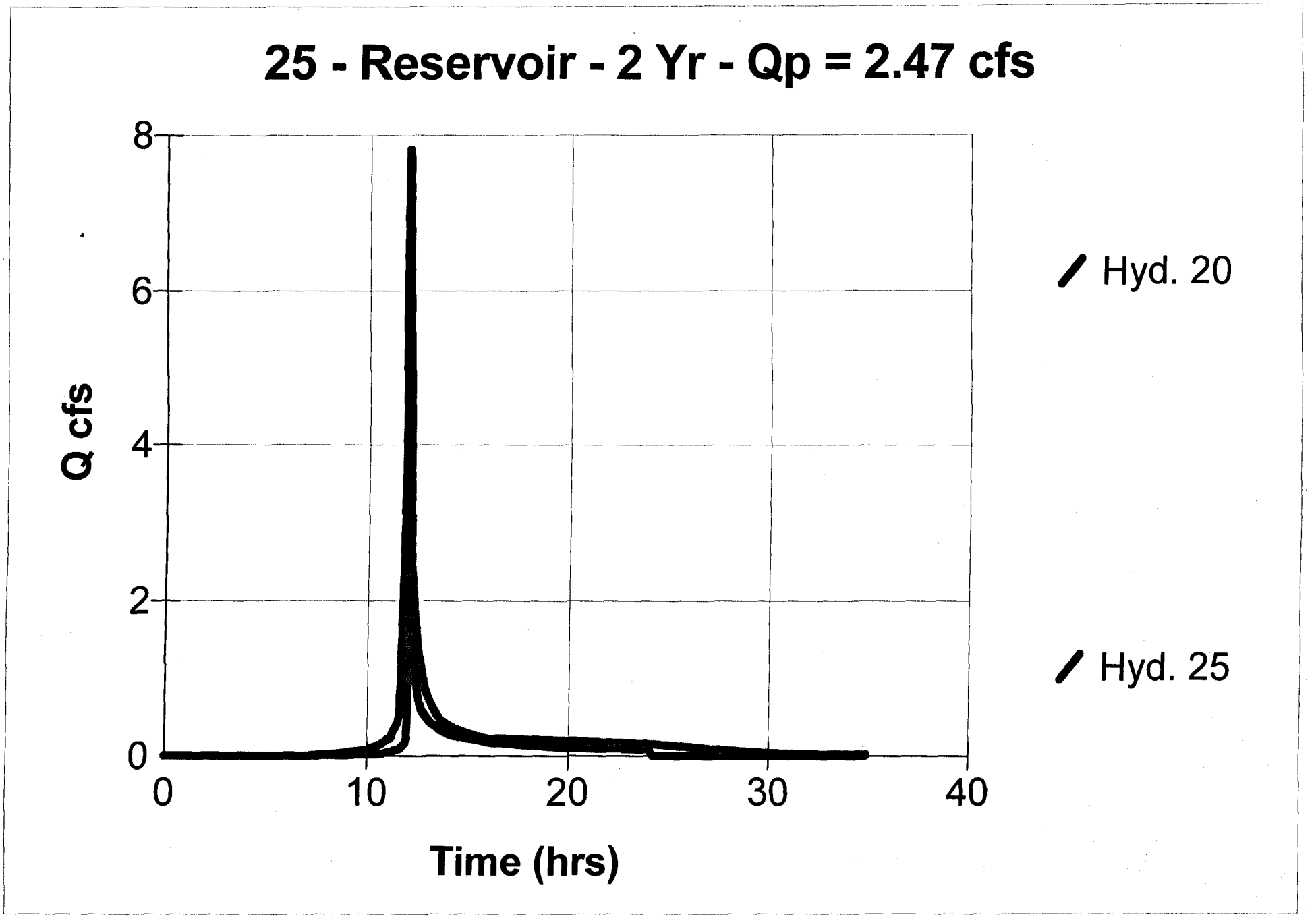

25 - Reservoir - 2 Yr - Qp = 2.47 cfs
Q cfs
8
6
4
2
0
0
10
20
30
40
Time (hrs)
Hyd. 20
Hyd. 25

4/26/01

Hydrograph Plot

English

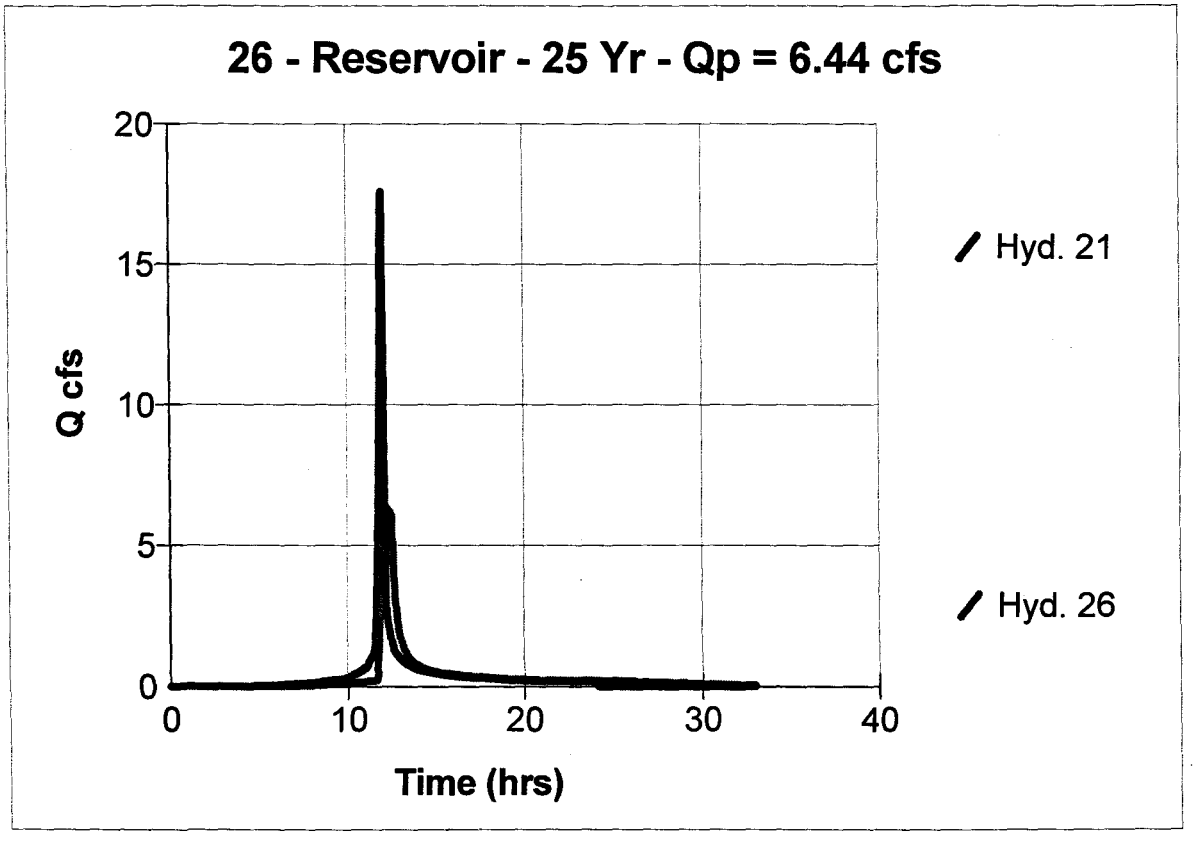
Hyd. No. 26

25yr construction TSB

Hydrograph type	= Reservoir	Peak discharge	= 6.44 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Inflow hyd. No.	= 21	Reservoir name	= Sediment Basin
Max. Elevation	= 88.53 ft	Max. Storage	= 15,606 cuft

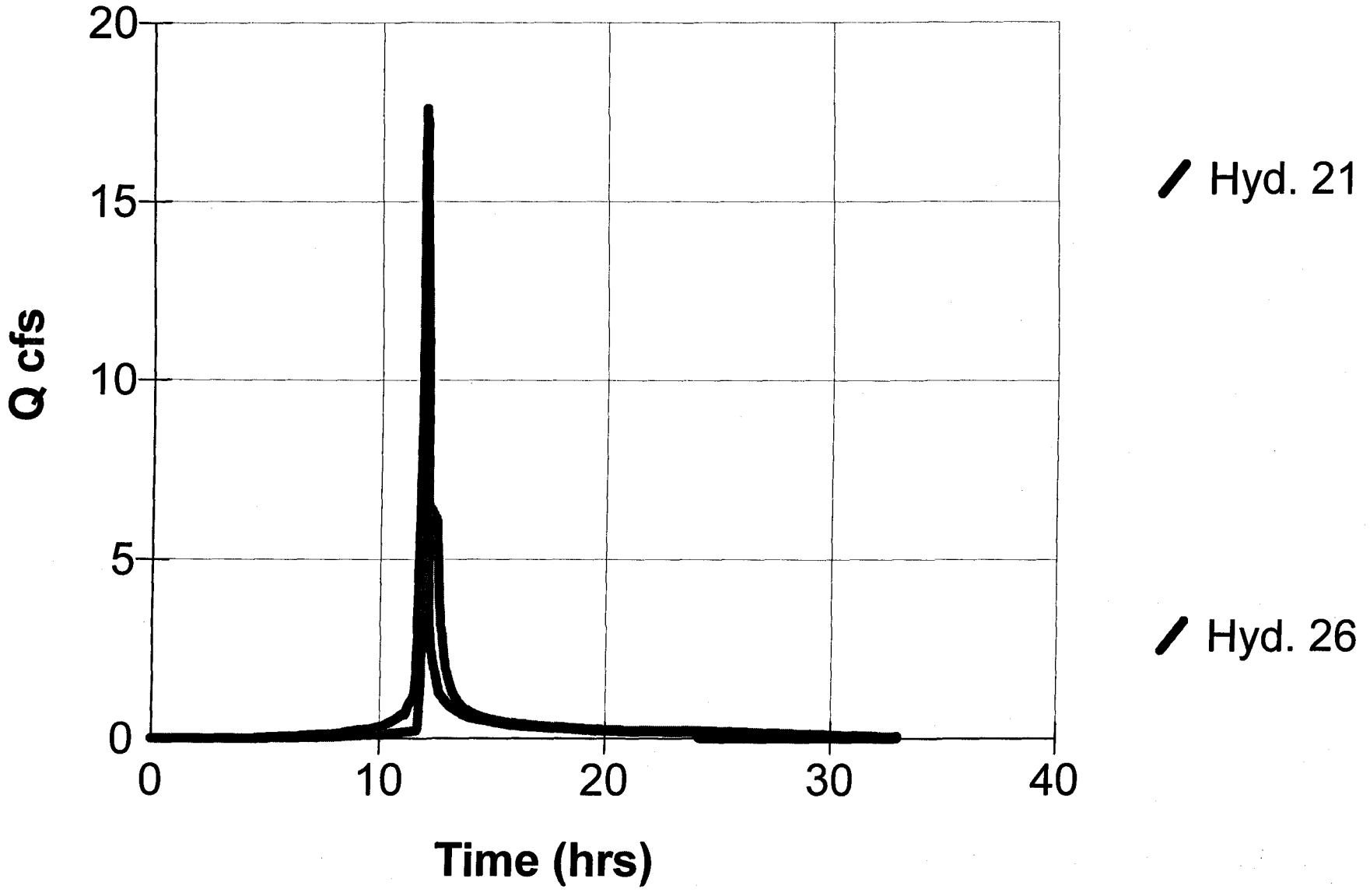
Storage Indication method used.

Total Volume = 41,569 cuft



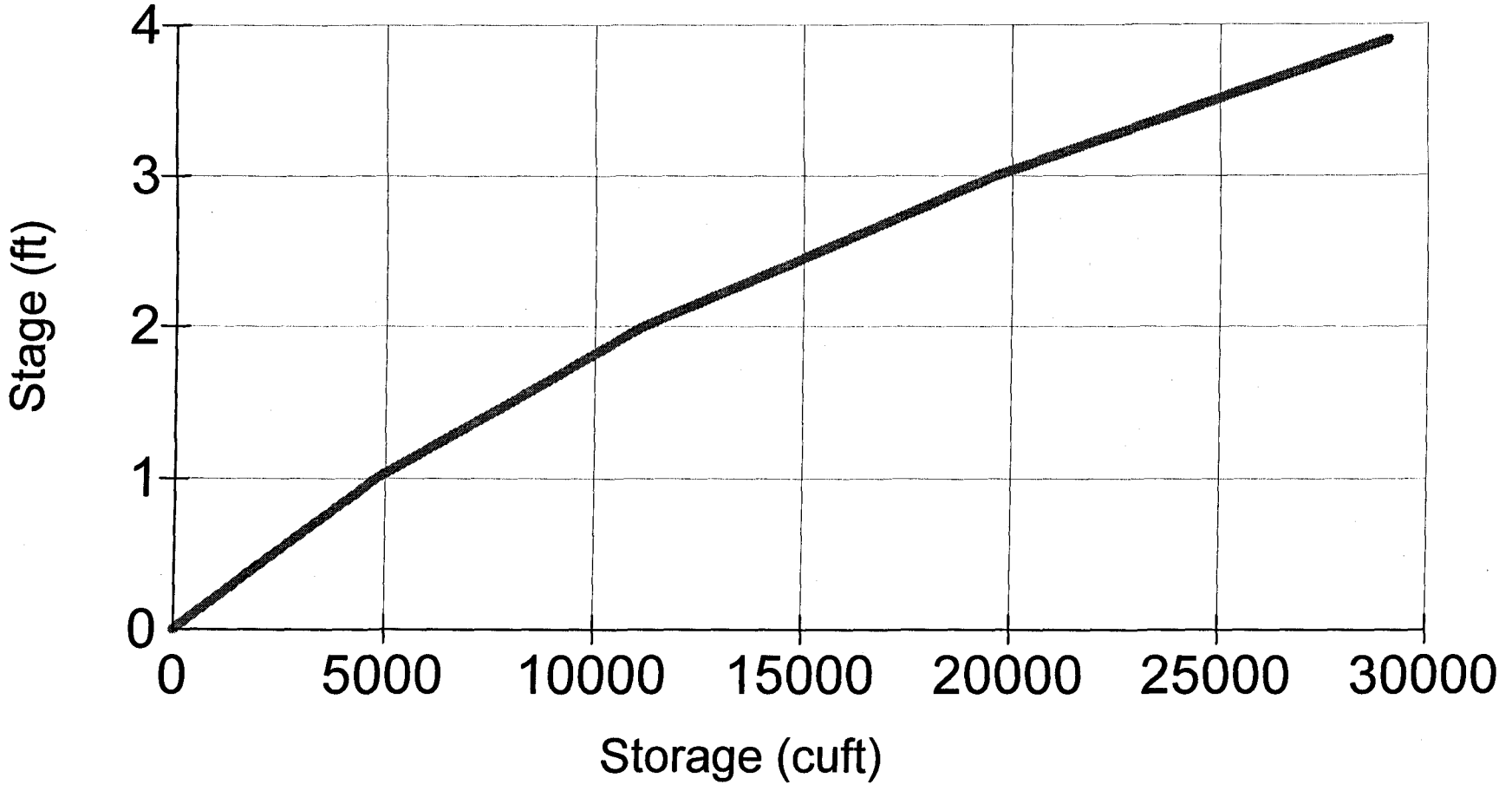
6/26/01

26 - Reservoir - 25 Yr - Qp = 6.44 cfs

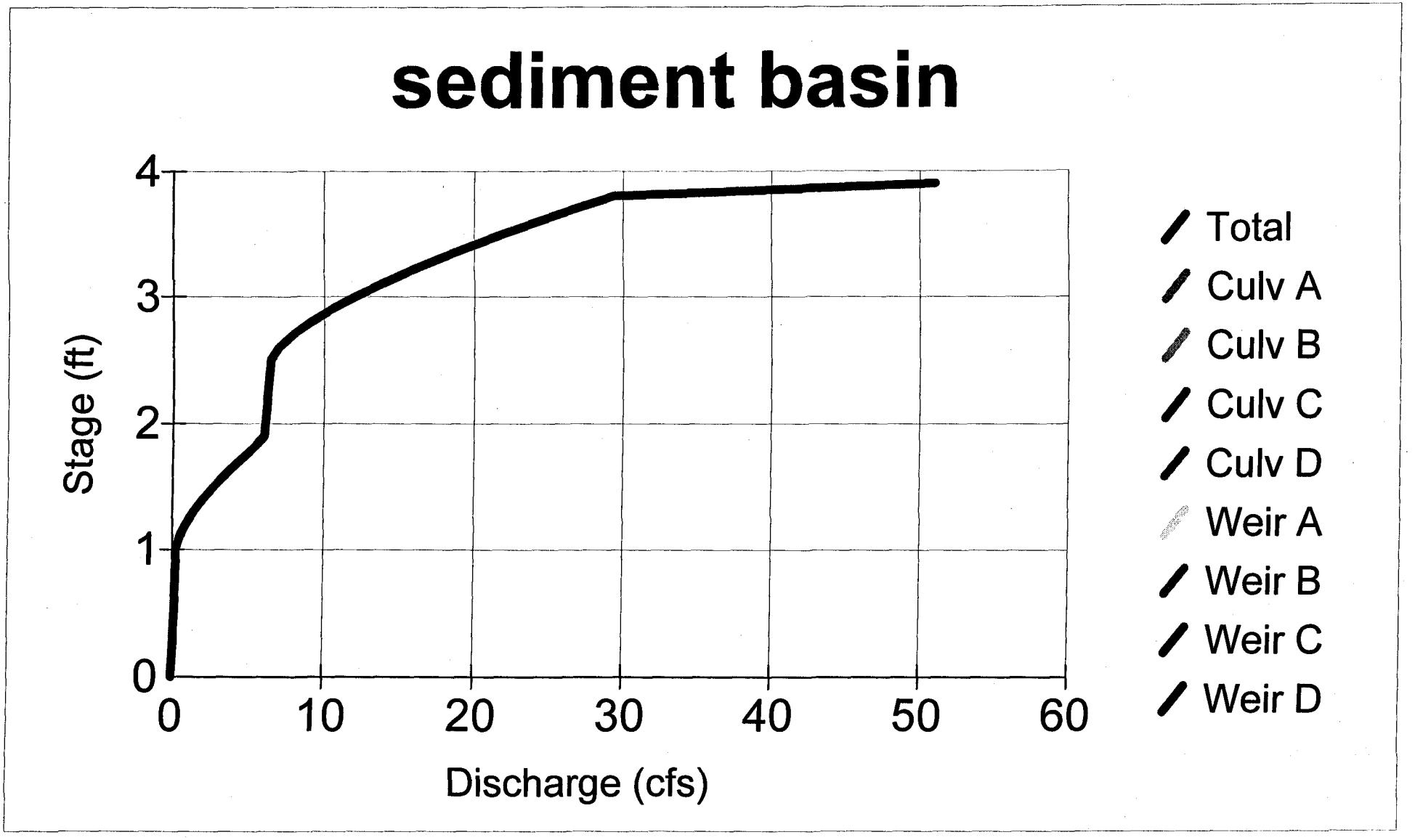


6/26/07

sediment basin



10/20/01


sediment basin
Stage (ft)
0
1
2
3
4
0
10
20
30
40
50
60
Discharge (cfs)
Total
Culv A
Culv B
Culv C
Culv D
Weir A
Weir B
Weir C
Weir D

10/20/01

Reservoir Report

English

Reservoir No. 10 - Sediment Basin

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	86.00	4,087	0	0
1.00	87.00	5,449	4,768	4,768
2.00	88.00	7,340	6,395	11,163
3.00	89.00	9,532	8,436	19,599
4.00	90.00	11,456	10,494	30,093

Culvert / Orifice Structures

		[A]	[B]	[C]	[D]
Rise in	=	10.0	3.0	0.0	0.0
Span in	=	10.0	3.0	0.0	0.0
No. Barrels	=	1	1	0	0
Invert El. ft	=	82.50	86.00	0.00	0.00
Length ft	=	37.0	5.0	0.0	0.0
Slope %	=	1.36	30.00	0.00	0.00
N-Value	=	.013	.013	.000	.000
Orif. Coeff.	=	0.60	0.60	0.00	0.00
Multi-Stage	=	----	No	No	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len ft	=	2.3	5.0	200.0	0.0
Crest El. ft	=	87.00	89.50	89.80	0.00
Weir Coeff.	=	3.00	3.00	3.00	0.00
Eqn. Exp.	=	1.50	1.50	1.50	0.00
Multi-Stage	=	Yes	No	No	No

Tailwater Elevation = 82.67 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	86.00	4.53	0.00	---	---	0.00	0.00	0.00	---	0.00
1.00	4,768	87.00	5.19	0.22	---	---	0.00	0.00	0.00	---	0.22
2.00	11,163	88.00	5.78	0.32	---	---	6.90	0.00	0.00	---	6.11
3.00	19,599	89.00	6.32	0.40	---	---	19.52	0.00	0.00	---	6.72
4.00	30,093	90.00	6.81	0.47	---	---	35.85	5.30	53.66	---	66.24

6/26/01

N/A LANE

N/A SIDE

CUT 3 3

~~MED.~~

~~FILL~~

PROJECT TEWNING CESA OPERATIONS,

BY RDS DATE 1/8/01

REVISED 6/26/01 RD

STA. TO STA.	FLOW		C	A	C A INCR.	C A ACC.	Tc	I_2	Q_2	C or F	Slope Ft/Ft	ALLOW. VEL.	Earth n=.03 VEL.	Protective Lining n=.05 Qn	Protective Lining n=.05 VEL.	Protective Lining n=.05 DEP.	Lining n=.015 Qn	Lining n=.015 DEP.	I_{10}	Q_{10}	DEP.	REMARKS
DITCH @ CULV. #2 OUTFALL			0.7	0.55	0.39	0.39	5	5.6	2.16	C	0.02	2.5			2.05	6.1"			6.8	2.65	6.5"	GRASS (OK)
DITCH DUE SOUTH PARKING			0.7	0.14	0.10	0.10	5	5.6	0.55	C	0.023	2.5			1.5	3.7"			6.8	0.67	3.8"	GRASS (OK)
DITCH SW OF PARKING LOT			0.7	0.24	0.17	0.27	7.5	5.1	1.38	C	0.05	2.5			2.5	4.3"			6.8	1.84	4.9"	GRASS (OK)
DITCH @ CULV #3 OUTFALL			0.7	1.02	0.72	0.72	7.5	5.1	3.67	C	0.024	2.5			2.4	6.8"			6.8	4.89	9.1"	GRASS (OK)

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

PROJECT JCSA TEWNING ROAD SITE
PROJECT NO. 8651-18
SUBJECT DITCH LINING (EC-3)
SHEET NO. 1 OF 1
CALCULATED BY RDS DATE 6/26/01

Q-10 YEAR STORM = 4.89 CFS

AVERAGE SLOPE OF GRASS SWALE (LOCATED IMMEDIATELY DOWNSTREAM OF CULV. #3 OUTLET PROTECTION) = 2.35%

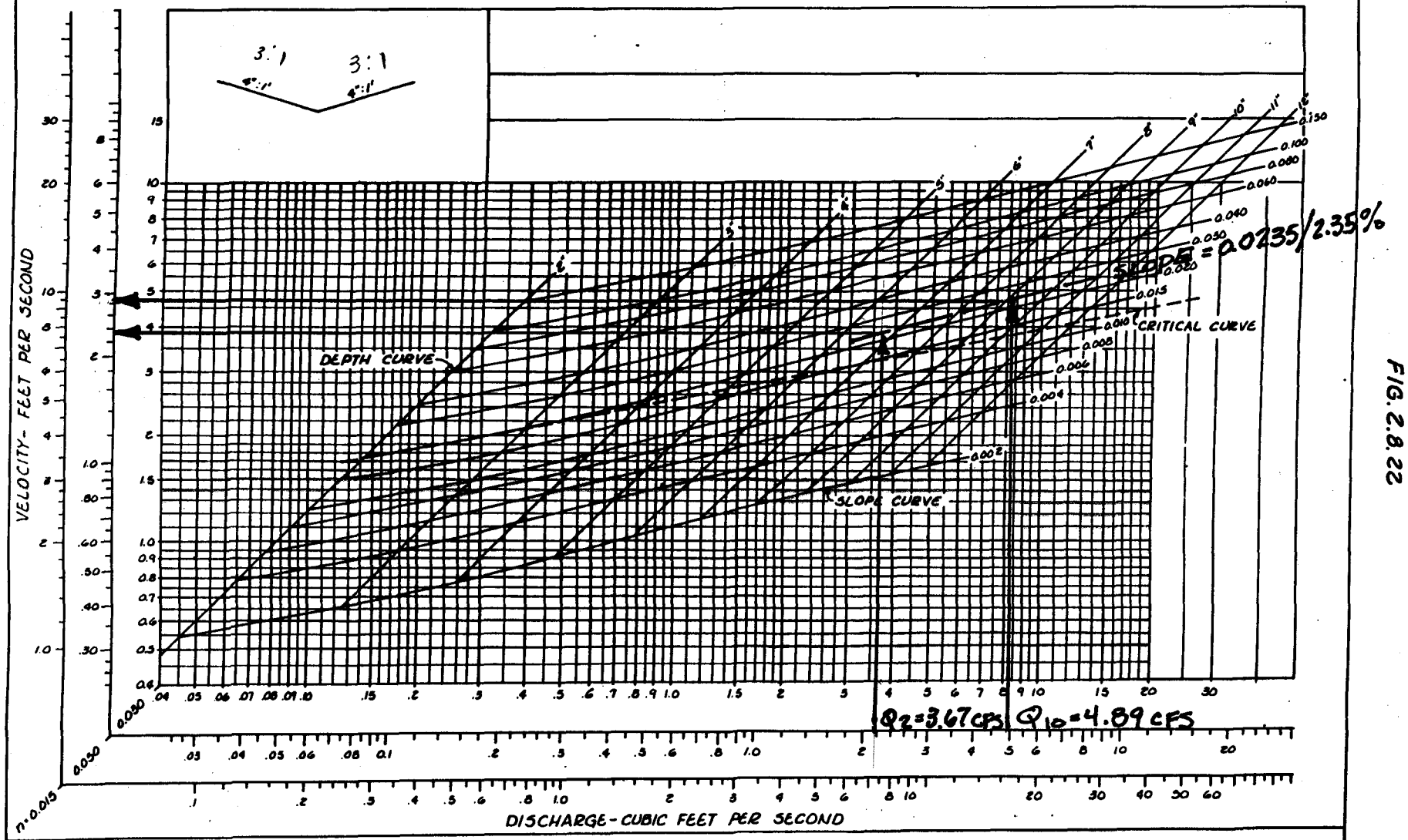
MANNING'S N OF GRASS LINED CHANNEL = 0.050

CHANNEL SIDE SLOPE = 3:1 (4"/1')

FROM FIG. 2.8.22 (VDOT DRAINAGE MANUAL - 8S. ED.)

V = 2.93 FPS USE EC-3 LINING (VESCH TYPE 2 TREATMENT)
TYPE A MATTE

THE EC-3 LINING CHOSEN FOR THIS EARTH SWALE IS ADEQUATE. THIS LINING IS ACCEPTABLE FOR VELOCITIES FROM 0-10 FPS.



TRIANGULAR MEDIAN DITCH

FIG. 2.8.22

MD-3

TEWNING ROAD (JCSA OPERATIONS) 6/26/01

Scott Thomas

From: Scott Thomas
Sent: Monday, June 25, 2001 3:43 PM
To: 'mbennett@aesva.com'
Cc: Darryl Cook; Larry Foster; Pat Menichino
Subject: JCSA OP Center SP-143-00

On June 22nd 2001, AES submitted revised Sheets 4 and 7 and pond design computations to the Environmental Division for review. The revised plans shows erosion and sediment control, drainage and layout/configuration changes associated with the plan and the temporary sediment basin/permanent BMP at the southwest corner of the site. The changes to the plan are as a result of our prior meetings in which it was agreed that extended detention would be provided at the site for areas currently to be developed. The control of future additional onsite developed areas will be handled either by expansion of the onsite pond or via offsite stormwater management/BMP's on the Casey New Town tract, whichever happens accordingly.

It is my understanding that our office needed to review the revised drawings/computations in order for clearing and earthmoving operations to resume at the site. Based on my review of the plans/computations, I feel the concept/arrangement is in order and operations as such can proceed.

I do have some minor technical questions that I feel need resolved before we could approve the plan as final; however, these issues would not delay land-disturbing operations from resuming at the site.

As such AES should respond to the following concerning the revised plan.

1. Outlet Protection. Show dimensions and class, depth and amount of stone required for the OP at the end of the 15-inch RCP pipe across the dam access road.

2. Stormwater Conveyance Channel. Use of high performance turf reinforcement matting (TRM) is recommended for the outfall channel just below the 15-inch RCP pipe across the dam access road. This is the existing swale which leads to the pond. If TRM is not used, provide computations to show the EC-3 lining is adequate for erosion protection.

3. BMP Design. Provide a stage-storage curve (or table) for the pond's new grading scheme.

4. BMP Design. Provide an elevation-discharge rating curve (or table) for the pond's new discharge arrangement (ie. low flow orifice, riser/barrel and emergency spillway).

5. BMP Design. Provide computations showing the 3-inch low flow BMP orifice meets 24-hour extended detention requirements. This is necessary due to drastic volume changes in the pond as compared to the previous design.

6. TSB Design. The sediment basin design data sheet shows a baffle is required in the basin during its temporary mode. None was shown on the plan. Also, due to its length to width layout, use of a more permanent type baffle should be considered to prevent short-circuiting in the basin once its converted to permanent BMP mode.

7. TSB Design. The 25-year peak discharge in the Sediment Basin Design Data Sheet appears incorrect, as a 25-year value of 4.9 cfs is less the 2-year design value of 5.3 cfs. Ensure design of the temporary sediment basin for the 25-year event reflects the condition of the drainage area in a denuded condition. The postdeveloped 25-year peak inflow into the facility is 13.01 cfs based on a composite CN value of 81. This peak discharge is based on the site parking area in an impervious condition; however, flatter slopes are present and a major portion of the site area is considered stabilized. During initial clearing, a large portion of the site will be in a disturbed state and site slopes are much steeper. Ensure the CN value (and peak discharge) for the 25-year TSB design are not higher during the construction phase. Provide computations as required to support the Q2/Q25 runoff values used in the design data sheet and provide the ultimate routing to confirm the 25-year design high water elevation for TSB design (Note: currently design high water for the basin in TSB mode is El. 88.25; for final BMP mode it is at El. 87.81).

Hopefully, this will allow the project to move forward. If you have any questions, call me at 757-253-6639.

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

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

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

LETTER OF TRANSMITTAL

TO JCSA

DATE 6/22/01	JOB NO. 8851-18
ATTENTION Scott Thomas, P.E.	
RE: Tewning Rd - JCSA Op. Site	

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
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1			Sed. Basin / BMP Calcs.

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REMARKS

SP-143-00
JCSA OPERATIONS CENTER
"POND REVISIONS"

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6/20/01

3.14

REVISED BMP 6/22

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project JCSA TEWNING ROAD SITE EXPANSION

Basin # 1 (REVISED) Location SOUTHWEST CORNER OF PROPERTY

Total area draining to basin: ~~3.83~~ 2.45 acres. ✓

Basin Volume Design

Wet Storage:

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

   67 cu. yds. x ~~3.83~~ 2.45 acres = ~~257~~ 164 cu. yds.

2. Available basin volume = ~~524~~ 373 cu. yds. at elevation 87. (From storage - elevation curve)

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

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

4. Available volume before cleanout required.

   33 cu. yds. x ~~3.83~~ 2.45 acres = ~~126~~ 81 cu. yds.

5. Elevation corresponding to cleanout level = ~~84.75~~ 85.05. ✓

   (From Storage - Elevation Curve)

6. Distance from invert of the dewatering orifice to cleanout level = ~~2.55~~ ~~86~~ 1.0 ft. (Min. = 1.0 ft.) ✓

Dry Storage:

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

   67 cu. yds. x ~~3.83~~ 2.45 acres = ~~257~~ 164 cu. yds.

8. Total available basin volume at crest of riser* = ~~929~~ 373 cu. yds. at elevation ~~85~~ 87. (From Storage - Elevation Curve)

* Minimum = 134 cu. yds./acre of total drainage area. (OR 328 cy)

S = ~~10881~~ 4691 CF (DRY STORAGE)

Q_2 = ~~10881~~ 4691 / 21600 = ~~0.50~~ 0.22 CFS

A = ~~0.50~~ 0.22 / (64.23 × 3/2)^1/2 (0.6) = ~~0.14~~ 0.04

9. Diameter of dewatering orifice = ~~6"~~ 3" in.

10. Diameter of flexible tubing = ~~8"~~ 6" in. (diameter of dewatering orifice plus 2 inches).

d = 12 × 2 × (0.04 / 3.14)^1/2

d = ~~5.2"~~ 2.7

USE ~~6"~~ 3"

Preliminary Design Elevations

11. Crest of Riser = ~~88~~ 87

Top of Dam = ~~91.3~~ 90.

Design High Water = ~~89.5~~ 88.25 (25-YR STORM)

Upstream Toe of Dam = ~~83~~ 84

Basin Shape

12. Length of Flow / Effective Width: $\frac{L}{We} = \frac{115}{A/L} = \frac{115}{9950/115} = \frac{115}{86} = 1.3$

If > 2, baffles are not required _____

If < 2, baffles are required ✓ REQUIRED NONE ON PLAN.

Runoff

				POSTDEV	
13.	Q_2 =	~~9.7~~ 5.3	cfs	5.3	(From Chapter 5)
14.	Q_{25} =	~~22.1~~ 4.9	cfs	13.0	(From Chapter 5)

4.9? CONCERN than Q2? Ensure 25-YR DESIGN DURING TSB MODE IS BASED ON ENTIRE SITE DA. IN A DISTURBED, DENUDED CONDITION CN COULD BE HIGHER THAN 81.

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2$ = ~~9.7~~ 5.3 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) = ~~2.3~~ 1.5 ft. (Using Q_2) 88.5-87

h = Crest of Emergency Spillway Elevation - Crest of Riser Elevation
~~90.3 - 88~~ 88.5-87

Without emergency spillway:

Assumed available head (h) = N/A ft. (Using Q_{25})

h = Design High Water Elevation - Crest of Riser Elevation

17. Riser diameter (D_r) = 27 in. Actual head (h) = ~~0.6~~ 0.4 ft.

(From Plate 3.14-8.) NOTE: DESIGNED RISER IS A 2.3 x 2.3 CHAMBER, EQUIVALENT TO A 38 DIA. RISER

Note: Avoid orifice flow conditions.

18. Barrel length (l) = ~~60~~ 45 ft.

Head (H) on barrel through embankment = ~~8.3~~ 6.5 ft. 88.5 - 82 ~~90.3 - 82~~

(From Plate 3.14-7).

19. Barrel diameter = ~~8~~ 10 in. (FROM DESIGN CALCULATIONS)

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

20. Trash rack and anti-vortex device

Diameter = N/A inches.

Height = N/A inches.

(From Table 3.14-D).

Emergency Spillway Design

21. Required spillway capacity $Q_e = Q_{25} - Q_p$ = ~~22.0 - 9.7 = 12.3~~ 13.0 - 5.3 = 7.7 cfs.

22. Bottom width (b) = 5 ft.; the slope of the exit channel (s) = 3 ft./foot; and the minimum length of the exit channel (x) = 65 ft.
(From Table 3.14-C). (SEE PLANS)

Anti-Seep Collar Design

23. Depth of water at principal spillway crest (Y) = ~~5~~ 2 ft. (~~88~~ 86 - ~~83~~ 84)

Slope of upstream face of embankment (Z) = ~~3~~ 4 :1.

Slope of principal spillway barrel (S_b) = ~~0.83~~ 1.11 %

Length of barrel in saturated zone (L_s) = ~~37~~ 15 ft.

24. Number of collars required = 2 dimensions = ~~2.75 x 2.75~~ 2.0' x 2.0' (3 COLLARS, ~~2.5~~ 3.25' x 3.25' USE for FUTURE DESIGN)

(from Plate 3.14-12).

Final Design Elevations

25. Top of Dam = ~~91.3~~ 89.8 ✓

Design High Water = ~~89.52~~ 88.25 (25-YR STORM) TSB MODE

Emergency Spillway Crest = ~~90.3~~ 88.5 ✓

Principal Spillway Crest = ~~88.0~~ 87 ✓

Dewatering Orifice Invert = ~~82.5~~ 86 ✓

Cleanout Elevation = ~~84.75~~ 85.05 ✓

Elevation of Upstream Toe of Dam or Excavated Bottom of "Wet Storage Area" (if excavation was performed) = 84 ✓

Hydrograph Summary Report

JCSA Op. Center BMP
Job#: 8651-18

REVISED BMP 6/22

6/20/01

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	1.0	2	736	5,109	1	----	------	------	Pre-Development 1-
2	SCS Runoff	1.7	2	736	7,989	2	----	------	------	Pre-Development 2-
3	SCS Runoff	4.2	2	734	19,100	10	----	------	------	Pre-Development 10
4	SCS Runoff	4.9	2	734	22,249	25	----	------	------	Pre-Development 25
5	SCS Runoff	6.8	2	734	30,940	100	----	------	------	Pre-Development 100
7	SCS Runoff	3.5	2	722	10,074	1	----	------	------	Post-Development 1
8	SCS Runoff	5.3	2	722	14,815	2	----	------	------	Post-Development 2
9	SCS Runoff	11.4	2	722	32,100	10	----	------	------	Post-Development 10
10	SCS Runoff	13.0	2	722	36,852	25	----	------	------	Post-Development 25
11	SCS Runoff	17.4	2	722	49,792	100	----	------	------	Post-Development 100
13	Reservoir	0.3	2	782	10,074	1	7	85.79	4,733	1 YR POST ROUTED
14	Reservoir	0.4	2	798	14,815	2	8	86.44	7,568	2 YR POST ROUTED
15	Reservoir	3.8	2	736	32,099	10	9	87.62	14,151	10 YR POST ROUTED
16	Reservoir	5.5	2	734	36,851	25	10	87.81	15,404	25 YR POST ROUTED
17	Reservoir	6.5	2	734	49,791	100	11	88.40 DHW	19,980	100 YR POST ROUTED

	PREDEV	POSTDEV w/o BMP	ROUTING POSTDEV WITH BMP
DRAIN. AREA	1.71 AC.	2.45 AC.	
CN	75	81	
TIME OF CONC.	37 MIN.	16 MIN.	
PEAK 1-YR	1.03 CFS; 5109 CF	3.55 CFS; 10,074 CF	1-YR 0.30 CFS; 85.79; 10,074 CF
2-YR.	1.69 CFS; 7989 CF	5.28 CFS; 14,815 CF	2-YR 0.36 CFS; 86.44 14,815 CF
10-YR.	4.21 CFS; 19,100 CF	11.38 CFS; 32,100 CF	10-YR. 3.78 CFS; 87.62 32,099 CFS
25-YR.	4.91 CFS; 22,249 CF	13.01 CFS; 36,582 CF	25-YR 5.48 CFS; 87.81 36,851 CF
100-YR.	6.83 CFS; 30,940 CF	17.38 CFS; 49,792 CF	100-YR (DHW) 6.49 CFS; 88.40 49,791 CF.

Proj. file: 865118FINAL.JAG.GPW IDF file: Jcc.idf | Run date: 06-21-2001

FB = 89.8
88.4
1.4' OK

Comments

- SS CURVE + DISCH RATING CURVE/TABLE
- COMPS SHOWING 24-HOUR EXTENDED DET FOR 3" LOW FLOW ORIFICE.
- SHOW BAFFLE RQD DURING TSB MODE. BAFFLE MAY NEED TO BE PERMANENT NATURE TO SERVE DURING PERM. BMP MODE.
- TSB 25-YR DESIGN. 88.25 TSB VS. 87.81 Perm. BMP.

Hydrograph Report

English

Hyd. No. 1

Pre-Development 1-Year

Hydrograph type	= SCS Runoff	Peak discharge	= 1.03 cfs
Storm frequency	= 1 yrs	Time interval	= 2 min
Drainage area	= 1.71 ac	Curve number	= 75
Basin Slope	= 3.3 %	Hydraulic length	= 447 ft
Tc method	= USER	Time of conc. (Tc)	= 37 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 5,109 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)
11.57	0.01	12.63	0.58	13.70	0.14	14.77	0.09
11.60	0.01	12.67	0.53	13.73	0.13	14.80	0.09
11.63	0.02	12.70	0.48	13.77	0.13	14.83	0.09
11.67	0.02	12.73	0.43	13.80	0.13	14.87	0.09
11.70	0.03	12.77	0.38	13.83	0.13	14.90	0.09
11.73	0.04	12.80	0.33	13.87	0.13	14.93	0.09
11.77	0.06	12.83	0.30	13.90	0.12	14.97	0.09
11.80	0.08	12.87	0.27	13.93	0.12	15.00	0.09
11.83	0.11	12.90	0.25	13.97	0.12	15.03	0.09
11.87	0.16	12.93	0.24	14.00	0.12	15.07	0.09
11.90	0.22	12.97	0.23	14.03	0.12	15.10	0.09
11.93	0.30	13.00	0.22	14.07	0.11	15.13	0.09
11.97	0.39	13.03	0.21	14.10	0.11	15.17	0.09
12.00	0.48	13.07	0.21	14.13	0.11	15.20	0.08
12.03	0.57	13.10	0.20	14.17	0.11	15.23	0.08
12.07	0.66	13.13	0.19	14.20	0.11	15.27	0.08
12.10	0.75	13.17	0.19	14.23	0.11	15.30	0.08
12.13	0.83	13.20	0.18	14.27	0.11	15.33	0.08
12.17	0.91	13.23	0.18	14.30	0.10	15.37	0.08
12.20	0.97	13.27	0.17	14.33	0.10	15.40	0.08
12.23	1.01	13.30	0.17	14.37	0.10	15.43	0.08
12.27	1.03 <<	13.33	0.17	14.40	0.10	15.47	0.08
12.30	1.02	13.37	0.16	14.43	0.10	15.50	0.08
12.33	0.99	13.40	0.16	14.47	0.10	15.53	0.08
12.37	0.95	13.43	0.16	14.50	0.10	15.57	0.08
12.40	0.92	13.47	0.15	14.53	0.10	15.60	0.08
12.43	0.87	13.50	0.15	14.57	0.10	15.63	0.08
12.47	0.83	13.53	0.15	14.60	0.10	15.67	0.08
12.50	0.78	13.57	0.15	14.63	0.09	15.70	0.08
12.53	0.74	13.60	0.14	14.67	0.09	15.73	0.08
12.57	0.69	13.63	0.14	14.70	0.09	15.77	0.08
12.60	0.64	13.67	0.14	14.73	0.09	15.80	0.07

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Hydrograph Report

English

Hyd. No. 2

Pre-Development 2-Year

Hydrograph type	= SCS Runoff	Peak discharge	= 1.69 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 1.71 ac	Curve number	= 75
Basin Slope	= 3.3 %	Hydraulic length	= 447 ft
Tc method	= USER	Time of conc. (Tc)	= 37 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 7,989 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.10	0.02	12.17	1.53	13.23	0.26	14.30	0.15
11.13	0.02	12.20	1.62	13.27	0.26	14.33	0.15
11.17	0.02	12.23	1.68	13.30	0.25	14.37	0.15
11.20	0.02	12.27	1.69 <<	13.33	0.24	14.40	0.15
11.23	0.03	12.30	1.66	13.37	0.24	14.43	0.14
11.27	0.03	12.33	1.61	13.40	0.23	14.47	0.14
11.30	0.03	12.37	1.54	13.43	0.23	14.50	0.14
11.33	0.03	12.40	1.47	13.47	0.23	14.53	0.14
11.37	0.04	12.43	1.40	13.50	0.22	14.57	0.14
11.40	0.04	12.47	1.33	13.53	0.22	14.60	0.14
11.43	0.04	12.50	1.25	13.57	0.21	14.63	0.14
11.47	0.05	12.53	1.16	13.60	0.21	14.67	0.14
11.50	0.05	12.57	1.08	13.63	0.21	14.70	0.13
11.53	0.05	12.60	0.99	13.67	0.20	14.73	0.13
11.57	0.06	12.63	0.90	13.70	0.20	14.77	0.13
11.60	0.07	12.67	0.82	13.73	0.20	14.80	0.13
11.63	0.08	12.70	0.73	13.77	0.19	14.83	0.13
11.67	0.09	12.73	0.65	13.80	0.19	14.87	0.13
11.70	0.11	12.77	0.57	13.83	0.19	14.90	0.13
11.73	0.13	12.80	0.50	13.87	0.18	14.93	0.13
11.77	0.16	12.83	0.44	13.90	0.18	14.97	0.13
11.80	0.21	12.87	0.40	13.93	0.18	15.00	0.13
11.83	0.27	12.90	0.37	13.97	0.18	15.03	0.13
11.87	0.35	12.93	0.35	14.00	0.17	15.07	0.13
11.90	0.45	12.97	0.34	14.03	0.17	15.10	0.12
11.93	0.58	13.00	0.33	14.07	0.17	15.13	0.12
11.97	0.72	13.03	0.32	14.10	0.16	15.17	0.12
12.00	0.87	13.07	0.31	14.13	0.16	15.20	0.12
12.03	1.02	13.10	0.29	14.17	0.16	15.23	0.12
12.07	1.16	13.13	0.29	14.20	0.16	15.27	0.12
12.10	1.30	13.17	0.28	14.23	0.16	15.30	0.12
12.13	1.42	13.20	0.27	14.27	0.15	15.33	0.12

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Hydrograph Report

English

Hyd. No. 3

Pre-Development 10-Year

Hydrograph type	= SCS Runoff	Peak discharge	= 4.21 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Drainage area	= 1.71 ac	Curve number	= 75
Basin Slope	= 3.3 %	Hydraulic length	= 447 ft
Tc method	= USER	Time of conc. (Tc)	= 37 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 19,100 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)
9.77	0.04	10.83	0.12	11.90	1.40	12.97	0.73
9.80	0.04	10.87	0.13	11.93	1.73	13.00	0.70
9.83	0.05	10.90	0.13	11.97	2.08	13.03	0.68
9.87	0.05	10.93	0.13	12.00	2.44	13.07	0.65
9.90	0.05	10.97	0.14	12.03	2.79	13.10	0.63
9.93	0.05	11.00	0.14	12.07	3.12	13.13	0.61
9.97	0.05	11.03	0.15	12.10	3.43	13.17	0.59
10.00	0.05	11.07	0.15	12.13	3.71	13.20	0.57
10.03	0.05	11.10	0.16	12.17	3.94	13.23	0.56
10.07	0.06	11.13	0.17	12.20	4.11	13.27	0.54
10.10	0.06	11.17	0.17	12.23	4.21 <<	13.30	0.53
10.13	0.06	11.20	0.18	12.27	4.20	13.33	0.52
10.17	0.06	11.23	0.18	12.30	4.10	13.37	0.51
10.20	0.06	11.27	0.19	12.33	3.94	13.40	0.49
10.23	0.07	11.30	0.20	12.37	3.76	13.43	0.48
10.27	0.07	11.33	0.21	12.40	3.57	13.47	0.48
10.30	0.07	11.37	0.22	12.43	3.37	13.50	0.47
10.33	0.07	11.40	0.23	12.47	3.16	13.53	0.46
10.37	0.07	11.43	0.24	12.50	2.95	13.57	0.45
10.40	0.08	11.47	0.25	12.53	2.73	13.60	0.44
10.43	0.08	11.50	0.26	12.57	2.51	13.63	0.43
10.47	0.08	11.53	0.28	12.60	2.29	13.67	0.43
10.50	0.09	11.57	0.30	12.63	2.07	13.70	0.42
10.53	0.09	11.60	0.32	12.67	1.86	13.73	0.41
10.57	0.09	11.63	0.36	12.70	1.65	13.77	0.40
10.60	0.09	11.67	0.40	12.73	1.45	13.80	0.40
10.63	0.10	11.70	0.46	12.77	1.26	13.83	0.39
10.67	0.10	11.73	0.53	12.80	1.10	13.87	0.38
10.70	0.11	11.77	0.63	12.83	0.96	13.90	0.38
10.73	0.11	11.80	0.75	12.87	0.86	13.93	0.37
10.77	0.11	11.83	0.91	12.90	0.80	13.97	0.37
10.80	0.12	11.87	1.13	12.93	0.76	14.00	0.36

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Hydrograph Report

English

Hyd. No. 4

Pre-Development 25-Year

Hydrograph type	= SCS Runoff	Peak discharge	= 4.91 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 1.71 ac	Curve number	= 75
Basin Slope	= 3.3 %	Hydraulic length	= 447 ft
Tc method	= USER	Time of conc. (Tc)	= 37 min
Total precip.	= 6.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 22,249 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)
9.43	0.05	10.50	0.12	11.57	0.37	12.63	2.39
9.47	0.05	10.53	0.12	11.60	0.40	12.67	2.14
9.50	0.05	10.57	0.12	11.63	0.44	12.70	1.89
9.53	0.05	10.60	0.13	11.67	0.49	12.73	1.66
9.57	0.06	10.63	0.13	11.70	0.56	12.77	1.45
9.60	0.06	10.67	0.13	11.73	0.65	12.80	1.26
9.63	0.06	10.70	0.14	11.77	0.76	12.83	1.10
9.67	0.06	10.73	0.14	11.80	0.91	12.87	0.99
9.70	0.06	10.77	0.15	11.83	1.11	12.90	0.92
9.73	0.06	10.80	0.15	11.87	1.36	12.93	0.87
9.77	0.06	10.83	0.16	11.90	1.68	12.97	0.83
9.80	0.06	10.87	0.16	11.93	2.06	13.00	0.80
9.83	0.07	10.90	0.17	11.97	2.47	13.03	0.77
9.87	0.07	10.93	0.18	12.00	2.89	13.07	0.74
9.90	0.07	10.97	0.18	12.03	3.29	13.10	0.72
9.93	0.07	11.00	0.19	12.07	3.68	13.13	0.69
9.97	0.07	11.03	0.19	12.10	4.03	13.17	0.67
10.00	0.07	11.07	0.20	12.13	4.35	13.20	0.65
10.03	0.08	11.10	0.21	12.17	4.61	13.23	0.63
10.07	0.08	11.13	0.21	12.20	4.81	13.27	0.62
10.10	0.08	11.17	0.22	12.23	4.91 <<	13.30	0.60
10.13	0.08	11.20	0.23	12.27	4.90	13.33	0.59
10.17	0.09	11.23	0.24	12.30	4.78	13.37	0.58
10.20	0.09	11.27	0.24	12.33	4.59	13.40	0.56
10.23	0.09	11.30	0.25	12.37	4.37	13.43	0.55
10.27	0.09	11.33	0.26	12.40	4.15	13.47	0.54
10.30	0.10	11.37	0.27	12.43	3.91	13.50	0.53
10.33	0.10	11.40	0.29	12.47	3.67	13.53	0.52
10.37	0.10	11.43	0.30	12.50	3.42	13.57	0.51
10.40	0.11	11.47	0.32	12.53	3.16	13.60	0.50
10.43	0.11	11.50	0.33	12.57	2.90	13.63	0.49
10.47	0.11	11.53	0.35	12.60	2.64	13.67	0.48

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Hydrograph Report

English

Hyd. No. 5

Pre-Development 100-Year

Hydrograph type	= SCS Runoff	Peak discharge	= 6.83 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 1.71 ac	Curve number	= 75
Basin Slope	= 3.3 %	Hydraulic length	= 447 ft
Tc method	= USER	Time of conc. (Tc)	= 37 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 30,940 cuft

Hydrograph Discharge Table

Time (hrs	Outflow cfs)	Time (hrs	Outflow cfs)	Time (hrs	Outflow cfs)	Time (hrs	Outflow cfs)
8.87	0.07	9.93	0.13	11.00	0.31	12.07	5.20
8.90	0.07	9.97	0.14	11.03	0.32	12.10	5.68
8.93	0.07	10.00	0.14	11.07	0.33	12.13	6.11
8.97	0.08	10.03	0.14	11.10	0.34	12.17	6.46
9.00	0.08	10.07	0.15	11.13	0.35	12.20	6.71
9.03	0.08	10.10	0.15	11.17	0.36	12.23	6.83 <<
9.07	0.08	10.13	0.15	11.20	0.37	12.27	6.80
9.10	0.08	10.17	0.16	11.23	0.38	12.30	6.62
9.13	0.09	10.20	0.16	11.27	0.40	12.33	6.35
9.17	0.09	10.23	0.17	11.30	0.41	12.37	6.04
9.20	0.09	10.27	0.17	11.33	0.42	12.40	5.71
9.23	0.09	10.30	0.17	11.37	0.44	12.43	5.38
9.27	0.10	10.33	0.18	11.40	0.46	12.47	5.03
9.30	0.10	10.37	0.18	11.43	0.48	12.50	4.68
9.33	0.10	10.40	0.19	11.47	0.50	12.53	4.32
9.37	0.10	10.43	0.19	11.50	0.52	12.57	3.96
9.40	0.10	10.47	0.20	11.53	0.55	12.60	3.60
9.43	0.11	10.50	0.20	11.57	0.58	12.63	3.24
9.47	0.11	10.53	0.21	11.60	0.63	12.67	2.89
9.50	0.11	10.57	0.21	11.63	0.69	12.70	2.56
9.53	0.11	10.60	0.22	11.67	0.76	12.73	2.24
9.57	0.11	10.63	0.23	11.70	0.86	12.77	1.94
9.60	0.11	10.67	0.23	11.73	0.99	12.80	1.68
9.63	0.12	10.70	0.24	11.77	1.16	12.83	1.47
9.67	0.12	10.73	0.25	11.80	1.37	12.87	1.32
9.70	0.12	10.77	0.25	11.83	1.65	12.90	1.22
9.73	0.12	10.80	0.26	11.87	2.00	12.93	1.16
9.77	0.12	10.83	0.27	11.90	2.45	12.97	1.11
9.80	0.13	10.87	0.28	11.93	2.98	13.00	1.07
9.83	0.13	10.90	0.29	11.97	3.56	13.03	1.03
9.87	0.13	10.93	0.29	12.00	4.13	13.07	0.99
9.90	0.13	10.97	0.30	12.03	4.68	13.10	0.96

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Hydrograph Report

English

Hyd. No. 7

Post-Development 1-Year

Hydrograph type	= SCS Runoff	Peak discharge	= 3.55 cfs
Storm frequency	= 1 yrs	Time interval	= 2 min
Drainage area	= 2.45 ac	Curve number	= 81
Basin Slope	= 1.5 %	Hydraulic length	= 480 ft
Tc method	= USER	Time of conc. (Tc)	= 16 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 10,074 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
10.80	0.04	11.87	1.45	12.93	0.33	14.00	0.19
10.83	0.04	11.90	1.89	12.97	0.32	14.03	0.18
10.87	0.04	11.93	2.41	13.00	0.31	14.07	0.18
10.90	0.04	11.97	2.92	13.03	0.31	14.10	0.18
10.93	0.05	12.00	3.33	13.07	0.30	14.13	0.18
10.97	0.05	12.03	3.55 <<	13.10	0.29	14.17	0.17
11.00	0.05	12.07	3.52	13.13	0.29	14.20	0.17
11.03	0.05	12.10	3.27	13.17	0.28	14.23	0.17
11.07	0.06	12.13	2.87	13.20	0.27	14.27	0.17
11.10	0.06	12.17	2.43	13.23	0.27	14.30	0.17
11.13	0.06	12.20	2.01	13.27	0.26	14.33	0.17
11.17	0.07	12.23	1.61	13.30	0.26	14.37	0.17
11.20	0.07	12.27	1.26	13.33	0.26	14.40	0.16
11.23	0.08	12.30	0.98	13.37	0.25	14.43	0.16
11.27	0.08	12.33	0.79	13.40	0.25	14.47	0.16
11.30	0.09	12.37	0.69	13.43	0.24	14.50	0.16
11.33	0.09	12.40	0.64	13.47	0.24	14.53	0.16
11.37	0.10	12.43	0.61	13.50	0.24	14.57	0.16
11.40	0.11	12.47	0.58	13.53	0.23	14.60	0.16
11.43	0.12	12.50	0.55	13.57	0.23	14.63	0.16
11.47	0.13	12.53	0.52	13.60	0.22	14.67	0.16
11.50	0.13	12.57	0.49	13.63	0.22	14.70	0.16
11.53	0.15	12.60	0.46	13.67	0.22	14.73	0.15
11.57	0.16	12.63	0.44	13.70	0.21	14.77	0.15
11.60	0.19	12.67	0.42	13.73	0.21	14.80	0.15
11.63	0.24	12.70	0.40	13.77	0.21	14.83	0.15
11.67	0.30	12.73	0.38	13.80	0.20	14.87	0.15
11.70	0.40	12.77	0.37	13.83	0.20	14.90	0.15
11.73	0.52	12.80	0.36	13.87	0.20	14.93	0.15
11.77	0.67	12.83	0.35	13.90	0.20	14.97	0.15
11.80	0.86	12.87	0.34	13.93	0.19	15.00	0.15
11.83	1.12	12.90	0.33	13.97	0.19	15.03	0.15

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Hydrograph Report

English

Hyd. No. 8

Post-Development 2-Year

Hydrograph type	= SCS Runoff	Peak discharge	= 5.28 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Drainage area	= 2.45 ac	Curve number	= 81
Basin Slope	= 1.5 %	Hydraulic length	= 480 ft
Tc method	= USER	Time of conc. (Tc)	= 16 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 14,815 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
10.37	0.05	11.43	0.23	12.50	0.77	13.57	0.32
10.40	0.06	11.47	0.24	12.53	0.73	13.60	0.31
10.43	0.06	11.50	0.26	12.57	0.69	13.63	0.31
10.47	0.06	11.53	0.27	12.60	0.65	13.67	0.30
10.50	0.06	11.57	0.30	12.63	0.61	13.70	0.30
10.53	0.07	11.60	0.35	12.67	0.58	13.73	0.29
10.57	0.07	11.63	0.43	12.70	0.56	13.77	0.29
10.60	0.07	11.67	0.54	12.73	0.53	13.80	0.28
10.63	0.08	11.70	0.69	12.77	0.52	13.83	0.28
10.67	0.08	11.73	0.89	12.80	0.50	13.87	0.27
10.70	0.08	11.77	1.13	12.83	0.49	13.90	0.27
10.73	0.09	11.80	1.43	12.87	0.48	13.93	0.27
10.77	0.09	11.83	1.82	12.90	0.47	13.97	0.26
10.80	0.09	11.87	2.33	12.93	0.46	14.00	0.26
10.83	0.10	11.90	2.97	12.97	0.45	14.03	0.25
10.87	0.10	11.93	3.71	13.00	0.44	14.07	0.25
10.90	0.11	11.97	4.44	13.03	0.43	14.10	0.25
10.93	0.11	12.00	5.00	13.07	0.42	14.13	0.24
10.97	0.12	12.03	5.28 <<	13.10	0.41	14.17	0.24
11.00	0.12	12.07	5.20	13.13	0.40	14.20	0.24
11.03	0.12	12.10	4.79	13.17	0.39	14.23	0.24
11.07	0.13	12.13	4.19	13.20	0.38	14.27	0.23
11.10	0.13	12.17	3.53	13.23	0.37	14.30	0.23
11.13	0.13	12.20	2.90	13.27	0.37	14.33	0.23
11.17	0.14	12.23	2.31	13.30	0.36	14.37	0.23
11.20	0.15	12.27	1.80	13.33	0.36	14.40	0.23
11.23	0.16	12.30	1.40	13.37	0.35	14.43	0.23
11.27	0.17	12.33	1.12	13.40	0.34	14.47	0.22
11.30	0.18	12.37	0.97	13.43	0.34	14.50	0.22
11.33	0.19	12.40	0.90	13.47	0.33	14.53	0.22
11.37	0.20	12.43	0.86	13.50	0.33	14.57	0.22
11.40	0.22	12.47	0.82	13.53	0.32	14.60	0.22

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Hydrograph Report

English

Hyd. No. 9

Post-Development 10-Year

Hydrograph type	= SCS Runoff	Peak discharge	= 11.38 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Drainage area	= 2.45 ac	Curve number	= 81
Basin Slope	= 1.5 %	Hydraulic length	= 480 ft
Tc method	= USER	Time of conc. (Tc)	= 16 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 32,100 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)
9.17	0.11	10.23	0.21	11.30	0.56	12.37	1.93
9.20	0.12	10.27	0.22	11.33	0.59	12.40	1.79
9.23	0.12	10.30	0.22	11.37	0.62	12.43	1.70
9.27	0.12	10.33	0.23	11.40	0.65	12.47	1.61
9.30	0.12	10.37	0.23	11.43	0.69	12.50	1.53
9.33	0.12	10.40	0.24	11.47	0.72	12.53	1.44
9.37	0.12	10.43	0.25	11.50	0.75	12.57	1.35
9.40	0.13	10.47	0.25	11.53	0.80	12.60	1.28
9.43	0.13	10.50	0.26	11.57	0.87	12.63	1.20
9.47	0.13	10.53	0.27	11.60	1.00	12.67	1.14
9.50	0.13	10.57	0.27	11.63	1.19	12.70	1.09
9.53	0.13	10.60	0.28	11.67	1.48	12.73	1.05
9.57	0.13	10.63	0.29	11.70	1.86	12.77	1.01
9.60	0.14	10.67	0.30	11.73	2.34	12.80	0.98
9.63	0.14	10.70	0.31	11.77	2.91	12.83	0.95
9.67	0.14	10.73	0.32	11.80	3.61	12.87	0.93
9.70	0.14	10.77	0.33	11.83	4.48	12.90	0.91
9.73	0.15	10.80	0.34	11.87	5.57	12.93	0.89
9.77	0.15	10.83	0.35	11.90	6.92	12.97	0.87
9.80	0.15	10.87	0.36	11.93	8.45	13.00	0.85
9.83	0.16	10.90	0.37	11.97	9.88	13.03	0.83
9.87	0.16	10.93	0.38	12.00	10.93	13.07	0.81
9.90	0.16	10.97	0.40	12.03	11.38 <<	13.10	0.79
9.93	0.17	11.00	0.41	12.07	11.09	13.13	0.77
9.97	0.17	11.03	0.41	12.10	10.12	13.17	0.75
10.00	0.18	11.07	0.42	12.13	8.77	13.20	0.74
10.03	0.18	11.10	0.43	12.17	7.33	13.23	0.72
10.07	0.18	11.13	0.44	12.20	5.97	13.27	0.71
10.10	0.19	11.17	0.45	12.23	4.72	13.30	0.70
10.13	0.19	11.20	0.48	12.27	3.65	13.33	0.69
10.17	0.20	11.23	0.50	12.30	2.80	13.37	0.68
10.20	0.20	11.27	0.53	12.33	2.23	13.40	0.67

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Hydrograph Report

English

Hyd. No. 10

Post-Development 25-Year

Hydrograph type	= SCS Runoff	Peak discharge	= 13.01 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Drainage area	= 2.45 ac	Curve number	= 81
Basin Slope	= 1.5 %	Hydraulic length	= 480 ft
Tc method	= USER	Time of conc. (Tc)	= 16 min
Total precip.	= 6.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 36,852 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
8.97	0.13	10.03	0.22	11.10	0.52	12.17	8.34
9.00	0.13	10.07	0.23	11.13	0.53	12.20	6.78
9.03	0.14	10.10	0.24	11.17	0.54	12.23	5.36
9.07	0.14	10.13	0.24	11.20	0.57	12.27	4.13
9.10	0.14	10.17	0.25	11.23	0.60	12.30	3.16
9.13	0.15	10.20	0.25	11.27	0.63	12.33	2.52
9.17	0.15	10.23	0.26	11.30	0.67	12.37	2.18
9.20	0.15	10.27	0.27	11.33	0.71	12.40	2.02
9.23	0.15	10.30	0.27	11.37	0.74	12.43	1.92
9.27	0.15	10.33	0.28	11.40	0.78	12.47	1.82
9.30	0.16	10.37	0.29	11.43	0.82	12.50	1.72
9.33	0.16	10.40	0.30	11.47	0.86	12.53	1.62
9.37	0.16	10.43	0.30	11.50	0.89	12.57	1.53
9.40	0.16	10.47	0.31	11.53	0.95	12.60	1.44
9.43	0.16	10.50	0.32	11.57	1.04	12.63	1.36
9.47	0.16	10.53	0.33	11.60	1.18	12.67	1.29
9.50	0.17	10.57	0.34	11.63	1.41	12.70	1.23
9.53	0.17	10.60	0.35	11.67	1.75	12.73	1.18
9.57	0.17	10.63	0.36	11.70	2.19	12.77	1.14
9.60	0.17	10.67	0.37	11.73	2.74	12.80	1.10
9.63	0.17	10.70	0.38	11.77	3.41	12.83	1.07
9.67	0.18	10.73	0.39	11.80	4.22	12.87	1.05
9.70	0.18	10.77	0.40	11.83	5.22	12.90	1.02
9.73	0.18	10.80	0.41	11.87	6.46	12.93	1.00
9.77	0.19	10.83	0.42	11.90	8.00	12.97	0.98
9.80	0.19	10.87	0.44	11.93	9.73	13.00	0.96
9.83	0.20	10.90	0.45	11.97	11.35	13.03	0.93
9.87	0.20	10.93	0.47	12.00	12.52	13.07	0.91
9.90	0.21	10.97	0.48	12.03	13.01 <<	13.10	0.89
9.93	0.21	11.00	0.49	12.07	12.66	13.13	0.87
9.97	0.21	11.03	0.50	12.10	11.54	13.17	0.85
10.00	0.22	11.07	0.51	12.13	9.99	13.20	0.83

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Hydrograph Report

English

Hyd. No. 11

Post-Development 100-Year

Hydrograph type	= SCS Runoff	Peak discharge	= 17.38 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Drainage area	= 2.45 ac	Curve number	= 81
Basin Slope	= 1.5 %	Hydraulic length	= 480 ft
Tc method	= USER	Time of conc. (Tc)	= 16 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 49,792 cuft

Hydrograph Discharge Table

Time (hrs	Outflow cfs)	Time (hrs	Outflow cfs)	Time (hrs	Outflow cfs)	Time (hrs	Outflow cfs)
8.57	0.17	9.63	0.28	10.70	0.57	11.77	4.77
8.60	0.18	9.67	0.28	10.73	0.58	11.80	5.87
8.63	0.18	9.70	0.29	10.77	0.60	11.83	7.22
8.67	0.19	9.73	0.29	10.80	0.62	11.87	8.88
8.70	0.19	9.77	0.30	10.83	0.64	11.90	10.92
8.73	0.19	9.80	0.31	10.87	0.66	11.93	13.19
8.77	0.20	9.83	0.31	10.90	0.68	11.97	15.30
8.80	0.20	9.87	0.32	10.93	0.69	12.00	16.80
8.83	0.21	9.90	0.33	10.97	0.71	12.03	17.38 <<
8.87	0.21	9.93	0.33	11.00	0.73	12.07	16.85
8.90	0.21	9.97	0.34	11.03	0.74	12.10	15.33
8.93	0.22	10.00	0.35	11.07	0.75	12.13	13.24
8.97	0.22	10.03	0.35	11.10	0.77	12.17	11.03
9.00	0.23	10.07	0.36	11.13	0.78	12.20	8.94
9.03	0.23	10.10	0.37	11.17	0.80	12.23	7.05
9.07	0.24	10.13	0.38	11.20	0.84	12.27	5.42
9.10	0.24	10.17	0.39	11.23	0.88	12.30	4.14
9.13	0.24	10.20	0.39	11.27	0.93	12.33	3.29
9.17	0.25	10.23	0.40	11.30	0.98	12.37	2.84
9.20	0.25	10.27	0.41	11.33	1.03	12.40	2.63
9.23	0.25	10.30	0.42	11.37	1.08	12.43	2.50
9.27	0.26	10.33	0.43	11.40	1.13	12.47	2.37
9.30	0.26	10.37	0.45	11.43	1.19	12.50	2.24
9.33	0.26	10.40	0.46	11.47	1.24	12.53	2.11
9.37	0.26	10.43	0.47	11.50	1.29	12.57	1.99
9.40	0.27	10.47	0.48	11.53	1.36	12.60	1.87
9.43	0.27	10.50	0.49	11.57	1.49	12.63	1.77
9.47	0.27	10.53	0.50	11.60	1.69	12.67	1.68
9.50	0.27	10.57	0.51	11.63	2.01	12.70	1.60
9.53	0.27	10.60	0.53	11.67	2.48	12.73	1.53
9.57	0.28	10.63	0.54	11.70	3.10	12.77	1.48
9.60	0.28	10.67	0.55	11.73	3.86	12.80	1.43

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Hydrograph Plot

English

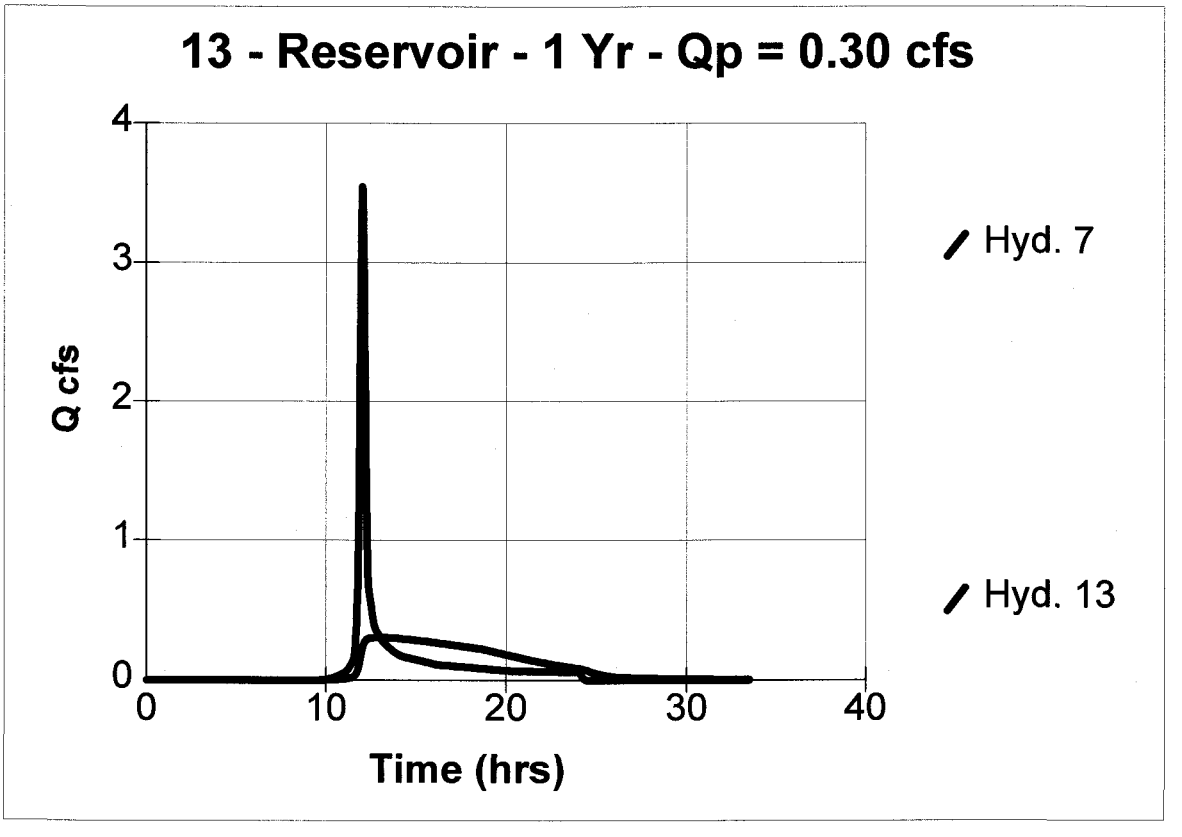
Hyd. No. 13

1 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.30 cfs
Storm frequency	= 1 yrs	Time interval	= 2 min
Inflow hyd. No.	= 7	Reservoir name	= FINAL REVISION-
Max. Elevation	= 85.79 ft	Max. Storage	= 4,733 cuft

Storage Indication method used.

Total Volume = 10,074 cuft



Hydrograph Plot

English

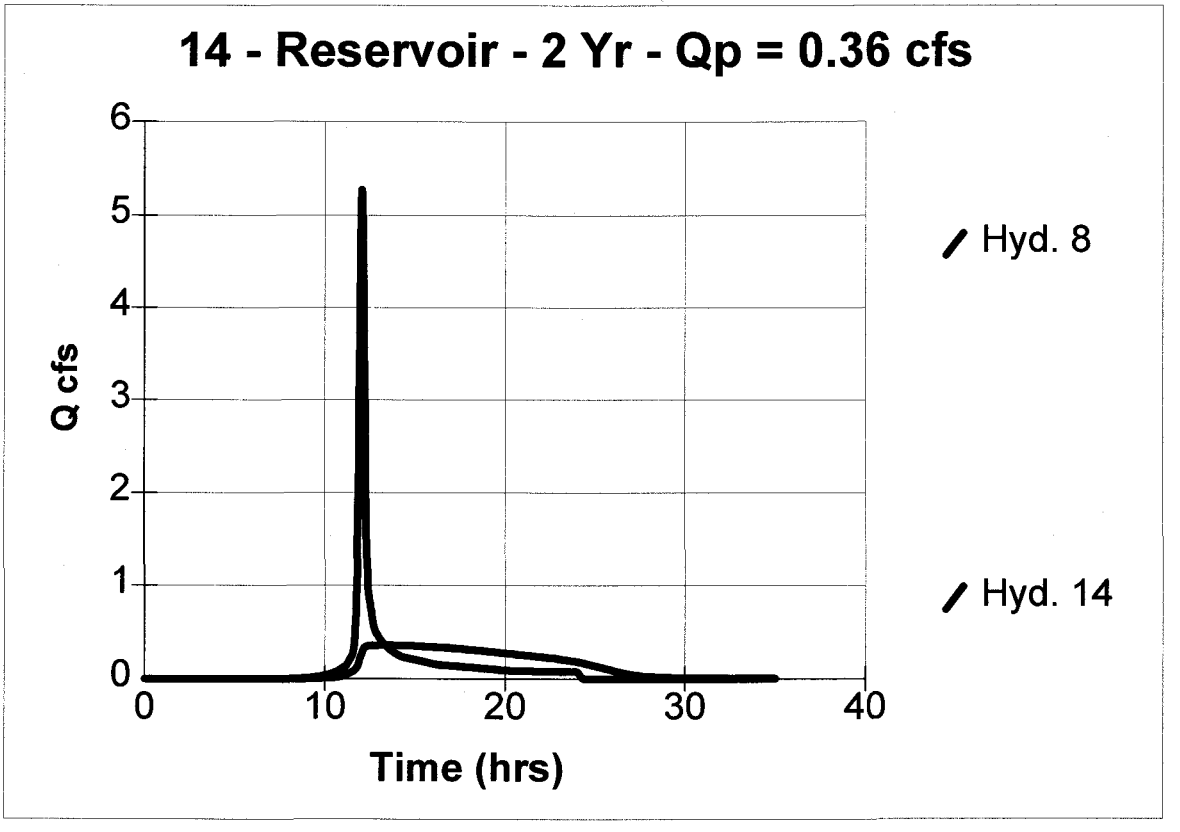
Hyd. No. 14

2 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.36 cfs
Storm frequency	= 2 yrs	Time interval	= 2 min
Inflow hyd. No.	= 8	Reservoir name	= FINAL REVISION-
Max. Elevation	= 86.44 ft	Max. Storage	= 7,568 cuft

Storage Indication method used.

Total Volume = 14,815 cuft



Hydrograph Plot

English

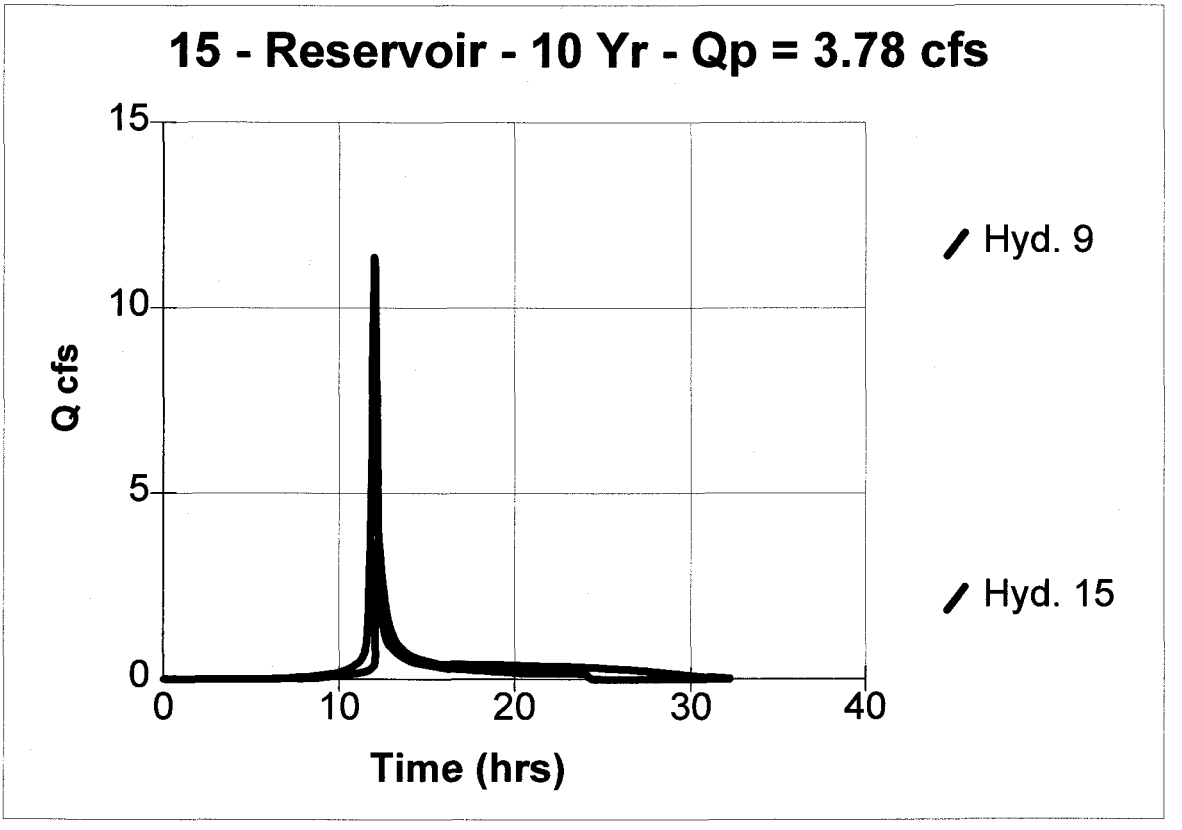
Hyd. No. 15

10 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 3.78 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Inflow hyd. No.	= 9	Reservoir name	= FINAL REVISION-
Max. Elevation	= 87.62 ft	Max. Storage	= 14,151 cuft

Storage Indication method used.

Total Volume = 32,099 cuft



Hydrograph Plot

English

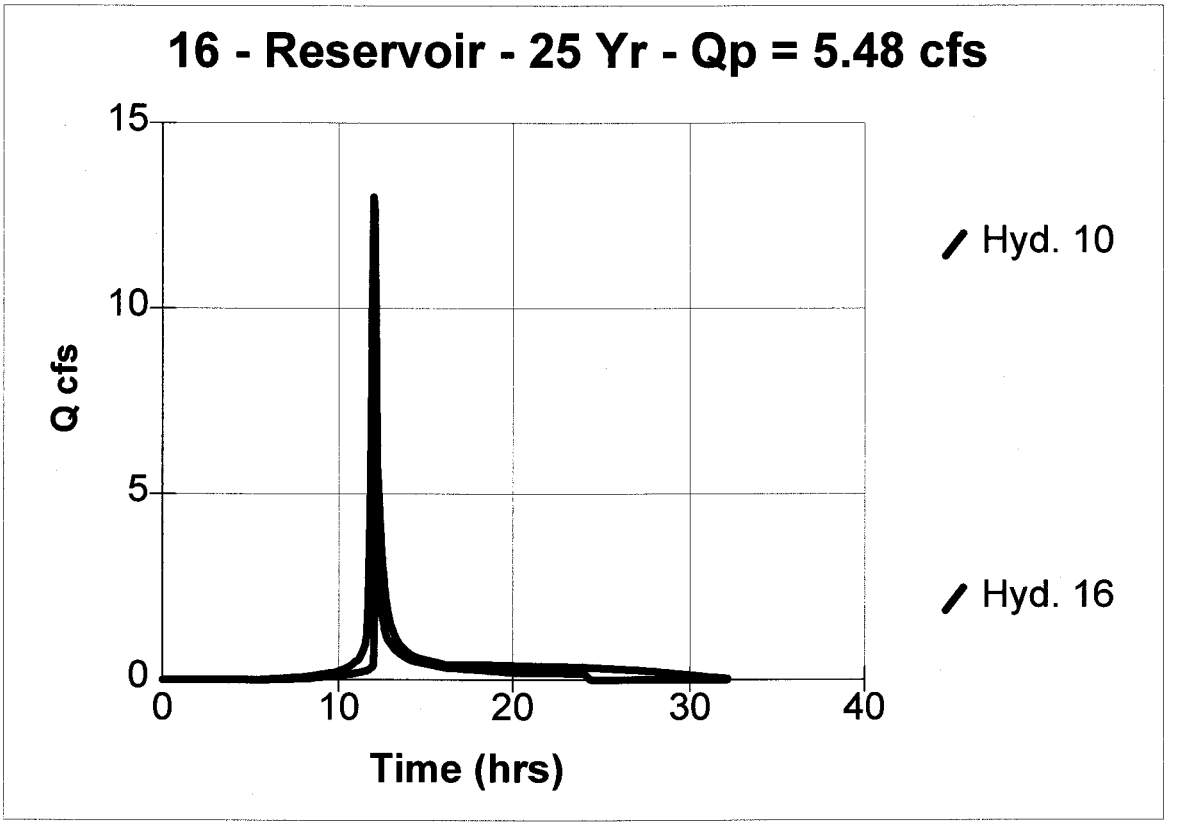
Hyd. No. 16

25 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 5.48 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Inflow hyd. No.	= 10	Reservoir name	= FINAL REVISION-
Max. Elevation	= 87.81 ft	Max. Storage	= 15,404 cuft

Storage Indication method used.

Total Volume = 36,851 cuft



Hydrograph Plot

English

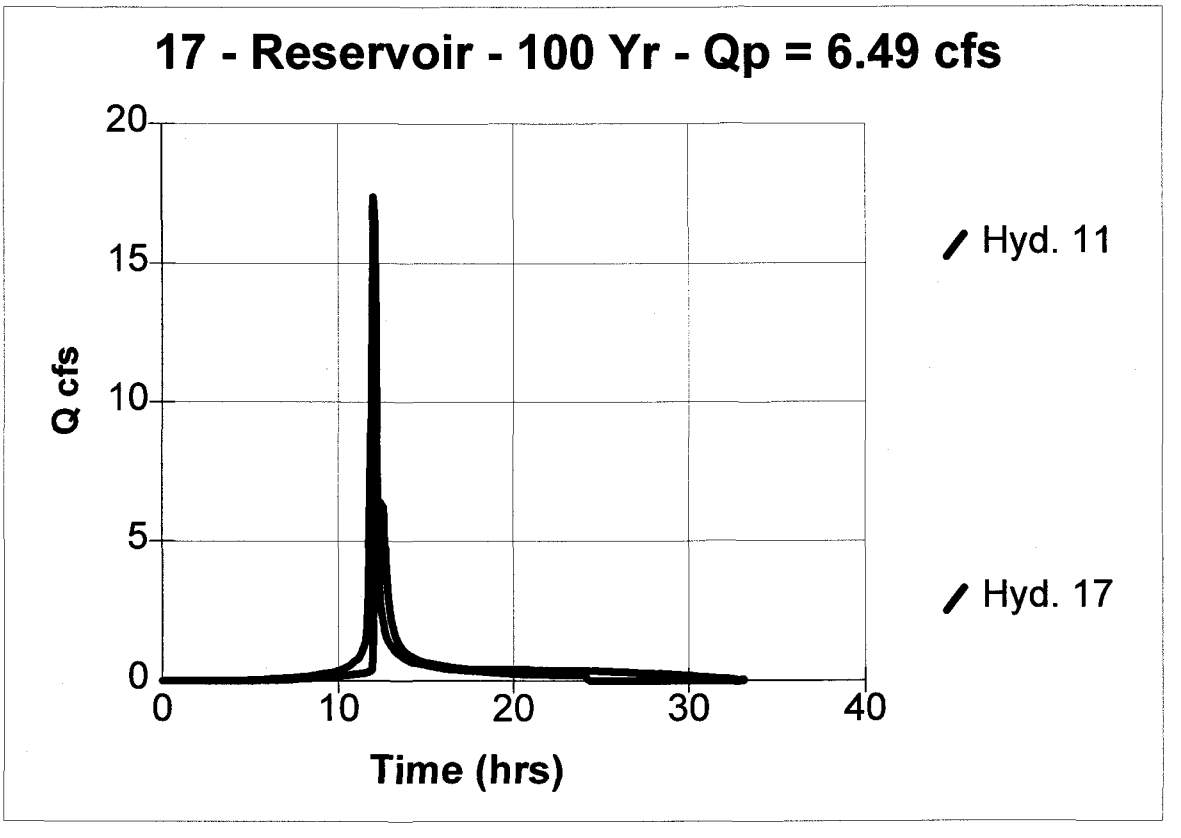
Hyd. No. 17

100 YR POST ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 6.49 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Inflow hyd. No.	= 11	Reservoir name	= FINAL REVISION-
Max. Elevation	= 88.40 ft	Max. Storage	= 19,980 cuft

Storage Indication method used.

Total Volume = 49,791 cuft



SP-146-00

JAN 2001
RECEIVED
PLANNING DEPARTMENT

ENGINEERING CALCULATIONS

SUPPORTING DRAINAGE AND EROSION CONTROL FACILITIES

FOR

JCSA OPERATIONS CENTER SITE EXPANSION

AES Project No. 8651-18

October 31, 2000

Prepared by

AES
CONSULTING ENGINEERS

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PROJECT JCSA Tewning Road Site
PROJECT NO. 8651-18
SUBJECT Imperviousness of Site
SHEET NO. 1 OF
CALCULATED BY VMB DATE 10/3/00

BMP TO BE DESIGNED FOR MAXIMUM DEVELOPMENT, OR OF IMPERVIOUS SURACES. THAT IS, IN ACCORDANCE TO THE CHESAPEAKE BAY PRESERVATION ORDINANCE, NO MORE THAN 60% OF THE SITE CAN BE IMPERVIOUS.

THE TASK HERE IS TO BALANCE SITE IMPERVIOUS WITH OPEN SPACE REQUIRED TO MEET THE CHESAPEAKE BAY PRESERVATION ORDINACE.

BY PREVIOUS CALCULATIONS AND PLANNING, APPROXIMATELY 3.83 ACRES OF THE TOTAL 4.43 ACRES AVAILABLE ON SITE CAN BE SERVED BY A STRUCTURAL BMP. ASSUMING THIS STRUCTURAL BMP TO BE CONSTRULTED TO THE REQUIREMENTS OF A 10 POINT BMP, ABOUT 3.6 POINTS OF THE TOTAL 10 BMP POINTS REQUIRED FOR THE SITE CAN BE RECLAIMED WITH THE STRULTURAL BMP. THUS THE REMAINDING 1.6 BMP POINTS MUST BE RECLAIMED BY OPEN SPACE CREDITS.

USING THE RATE OF RETURN OF 0.1 POINTS / 1% OF TOTAL SITE AREA, THE NEED IS TO SET ASIDE APPROPRIATE OPEN SPACE. THUS 0.62 ACRES OF NATURAL OPEN NATURAL SPACE WOULD NEED TO BE SET ASIDE AS PERVIOUS AREA.

TO FIND MAXIMUM IMPERVIOUSLIESS WHICH MAY OCCUR TO THE REST OF THE SIDE, YET MAINTAIN A MAXIMUM OF 60% IMPERVIOUS FOR THE ENTIRE SITE, WE HAVE THE FOLLOWING:

60% IMPERVIOUS * TOTAL SITE AREA = X % IMPERVIOUS * (TOTAL SITE AREA - NATURAL OPEN SPACE AREA)

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PROJECT JCSA TENNING ROAD SITE
PROJECT NO. 8651-18
SUBJECT IMPERVIOUSNESS OF SITE
SHEET NO. 2 OF
CALCULATED BY VMB DATE 10/3/08

So —

60% * 4.43 Ac = X * (4.43 Ac − 0.62 Acres)

2.65 Ac = (3.81 Ac) * X

0.6955 = X

OR X = 70% IMPERVIOUS

THUS FOR DETERMINING THE WATER QUALITY VOLUME WE HAVE —

70% IMPERVIOUS * 3.83 ACRES * 2.0 IN / IMPERVIOUS ACRE

= 5.36 AC-IN = 19,464 CF = WQ_V

CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR BMP / SWM
Tewning Road Maintenance Parking/Materials Storage Facility
for
James City Service Authority
AES Project No.: 8651-18
October 17, 2000

I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN

A. Pre-Development Drainage Area to Point of Concern = 1.71 Acres

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

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Wooded	0.62	73	45
2)	19-B Kempsville-Emporia Fine Sandy Loam	B	Wooded	0.16	60	10
3)	17 Johnston complex	D	Wooded	0.93	79	73
	Totals =			1.71		128
	Composite CN =					75

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	mainly wooded	
Manning's roughness coefficient., n (table 5-7)	0.4	
Length of overland flow, L	200	Feet
2-year 24-hour rainfall, P2	3.6	inches
Average slope of overland flow , s	0.0335	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.48	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved, wooded	
Length of shallow concentrated flow, L	247	Feet
Average slope of shallow concentrated flow, s	0.0335	feet per foot
Average velocity, v	0.5	feet per second
Travel time, Tt = L/(3600*v)	0.14	hours

3) Channel or Pipe Flow

Length of channel flow, L	0	Feet
Average velocity of channel flow, v	2.5	feet per second
Travel time, Tt = L/(3600*v)	0.00	hours
Total Time of Concentration =	0.62	hours
or	37	minutes

II. **POST-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for total site and Off-site Contributing Areas)**

A. Post-Development Drainage Area to Point of Concern = 3.83 Acres

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

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Parking & Material Storage	1.07	92	98
2)	11-C Craven-Uchee	C	Green Space	0.72	74	53
3)	19-B Kempsville-Emporia Fine Sandy Loam	B	Parking & Material Storage	0.22	90	20
4)	19-B Kempsville-Emporia Fine Sandy Loam	B	Green Space	0.14	61	9
5)	17 Johnston Complex	D	Parking & BMP Surface	1.00	93	93
6)	17 Johnston Complex	D	Green Space	0.68	80	54
	Total Adjusted CN =			3.83		327
	Composite CN =					85

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	impervious, commercial	
Manning's roughness coefficient., n (table 5-7)	0.2	
Length of overland flow, L	100	Feet
25-year 24-hour rainfall, P25	6.5	inches
Average slope of overland flow , s	0.01	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.19	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	impervious, commercial	
Length of shallow concentrated flow, L	200	Feet
Average slope of shallow concentrated flow, s	0.02	feet per foot
Average velocity, v	1.00	feet per second
Travel time, Tt = L/(3600*v)	0.06	hours

3) Channel or Pipe Flow

Length of channel flow, L	180	Feet
Average velocity of channel flow, v	2.5	feet per second
Travel time, Tt = L/(3600*v)	0.02	hours
Total Time of Concentration =	0.27	hours
or	16	minutes

III. PROPOSED ESTIMATED POND(S) VOLUME

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
83	0	1335	0	0	0	0
84	1	1965	1650	61	1650	61
85	1	2753	2359	87	4009	148
86	1	3812	3283	122	7292	270
87	1	9950	6881	255	14173	525
				Normal Pool 87.00 for 10 Point Wet ED Pond		
88	1	11777	10864	402	25036	927
				WSEL for Channel Protection in WET ED Pond is 88.62		
89	1	13729	12753	472	37789	1400
90	1	15842	14786	548	52575	1947
91	1	18287	17065	632	69639	2579

IV. DETERMINING WATER QUALITY VOLUMES

Impervious post development area

70% imperviousness On-Site of BMP Watershed 2.681 Ac.

Total areas of Imperviousness 2.681 Ac.

Water Quality Volume at 1.0-inch per impervious acre =
0.22 Ac. ft.
9732 cu. ft.
360 cu. yd.

Water Quality Volume at 1.5-inch per impervious acre =
0.34 Ac. ft.
14598 cu. ft.
541 cu. yd.
6 point BMP

Water Quality Volume at 2.0-inch per impervious acre =
0.45 Ac. ft.
19464 cu. ft.
721 cu. yd.
8 or 10 point BMP

Normal Pool Volume Required for Wet ED Pond = 9732 cubic feet
Normal Pool Volume Required for Wet Pond = 19464 cubic feet

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

Volume of 1-Year, 24-Hour Storm (based upon Hydrograph #1) =	19,272	cubic feet
Elevation of water surface associated with 1-Year, 24-Hour Storm Volume	88.7	
Elevation of Release Inlet for Channel Protection =	87.0	
Average Head, in feet, on Release Inlet =	0.8	

Average Release Rate Calculation

$$\frac{19{,}272 \text{ cubic feet}}{(24 \text{ hours} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/ minute})} = 0.2 \text{ cfs AVERAGE, Not Peak}$$

(Peak estimated at 2 * average, or 0.4 cfs)

Calculation of Size of Release Inlet

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

Diameter of Release Inlet = 0.30 feet, or 4 inches

USE 4" DIAMETER IN DESIGN
(one pipe size larger used in model, see Hydragraph #15 for justification)

VI. DETERMINING RELEASE RATE OF EXTENDED DETENTION WET POND VOLUME

Volume of Extended Detention for Wet ED Pond = 9,732 cubic feet

Elevation of water surface associated with Extended Extension Volume = 87.9

Elevation of Release Inlet for Channel Protection = 87.0

Average Head, in feet, on Release Inlet = 0.5

Average Release Rate Calculation

$$\frac{9{,}732 \text{ cubic feet}}{(24 \text{ hours} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/ minute})} = 0.1 \text{ cfs AVERAGE, Not Peak}$$

(Peak estimated at 2 * average, or 0.2 cfs)

Calculation of Size of Release Inlet

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

Diameter of Release Inlet = 0.30 feet, or 4 inches

USE 6" DIAMETER
(one pipe size larger per BMP Design Guidelines)

VII. DETERMINING MINIMUM PIPE SIZE FOR 24-HOUR DRAWDOWN OF NORMAL POOL

Volume of Water at Normal Pool Elevation = 14,173 cubic feet

Elevation of water surface associated with Normal Pool = 87.0

Elevation of Drawdown Pipe = 82.5

Average Head, in feet, on Release Inlet = 2.3

Average Release Rate Calculation

$$\frac{14{,}173 \text{ cubic feet}}{(24 \text{ hours} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/ minute})} = 0.2 \text{ cfs AVERAGE, Not Peak}$$

(Peak estimated at 2 * average, or 0.3 cfs)

Calculation of Size of Drawdown Pipe

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

Diameter of Release Inlet = 0.20 feet, or 3 inches

USE 4" DIAMETER
(one pipe size larger per BMP Design Guidelines)

JCSA TEWNING ROAD SITE

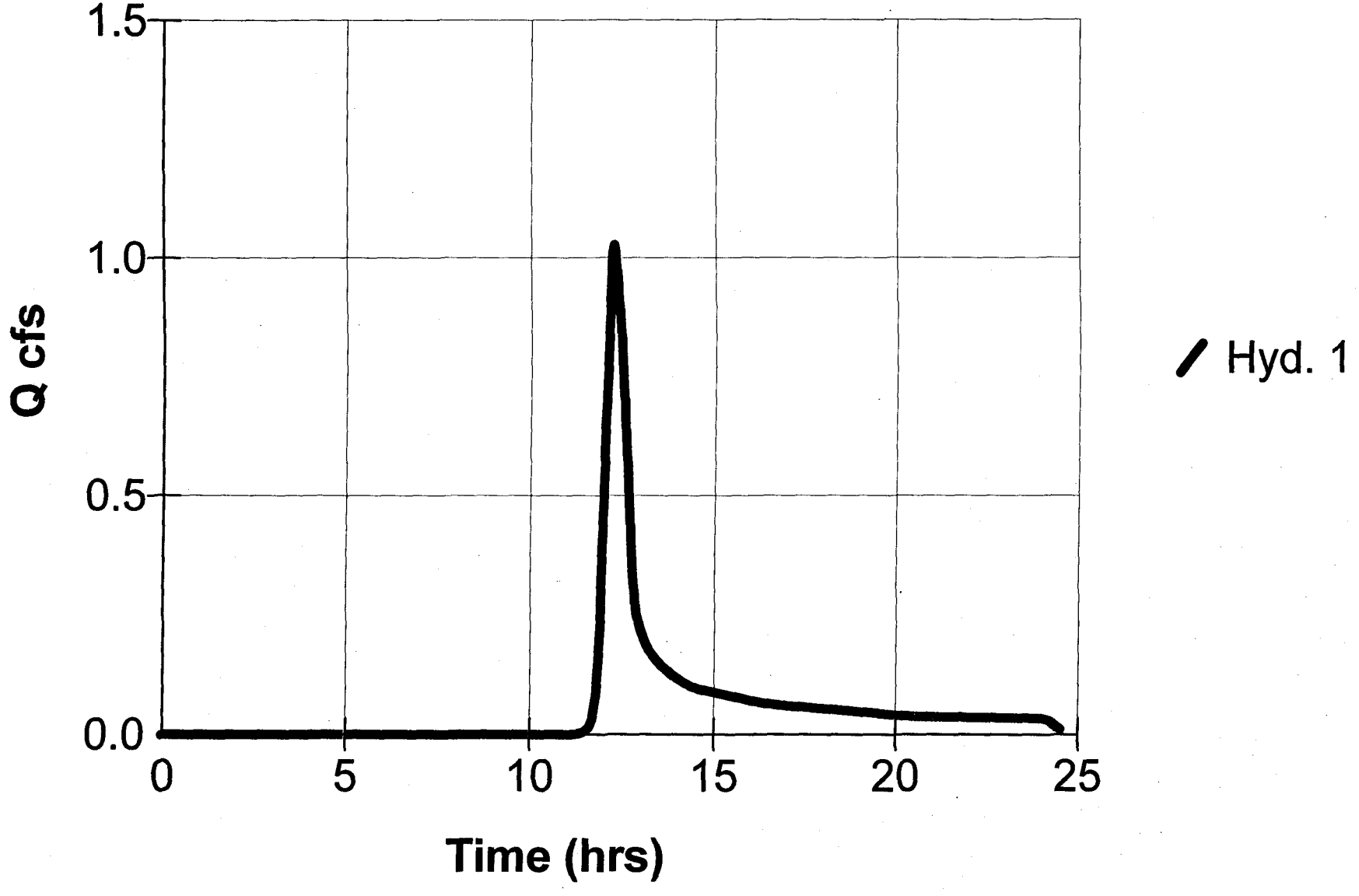
Hydrograph Summary Report

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	SCS Runoff	1.0	2	736	5,109	1	—	—	—	Pre-Development 1-yr
2	SCS Runoff	1.7	2	736	7,989	2	—	—	—	Pre-Development 2-yr
3	SCS Runoff	4.2	2	734	19,100	10	—	—	—	Pre-Development 10 yr
4	SCS Runoff	4.9	2	734	22,249	25	—	—	—	Pre-Development 25 yr
5	SCS Runoff	6.8	2	734	30,940	100	—	—	—	Pre-Development 100 yr
7	SCS Runoff	6.9	2	722	19,272	1	—	—	—	Post-Development 1 yr
8	SCS Runoff	9.7	2	722	27,333	2	—	—	—	Post-Development 2 yr
9	SCS Runoff	19.5	2	722	55,769	10	—	—	—	Post-Development 10 yr
10	SCS Runoff	22.1	2	722	63,453	25	—	—	—	Post-Development 25 yr
11	SCS Runoff	28.9	2	722	84,222	100	—	—	—	Post-Development 100 yr
15	Reservoir	0.4	2	816	16,081	1	7	88.01	25,111	1-Yr Routed
16	Reservoir	1.5	2	746	24,135	2	8	88.25	28,184	2-Yr Routed
17	Reservoir	3.6	2	740	52,558	10	9	89.26	41,648	10-Yr Routed
18	Reservoir	3.7	2	742	60,239	25	10	89.54	45,797	25-Yr Routed
19	Reservoir	3.9	2	748	81,005	100	11	90.27	57,227	100-Yr Routed
24	Reservoir	1.7	2	742	22,163	2	8	88.21	27,728	2-Yr, Sediment Basin
25	Reservoir	3.7	2	742	58,276	25	10	89.52	45,479	25-Yr, Sediment Basin

Proj. file: 865118.gpw | IDF file: Jcc.idf | Run date: 10-17-2000

JCSA Tewning Road Site
PRE - DEVELOPMENT

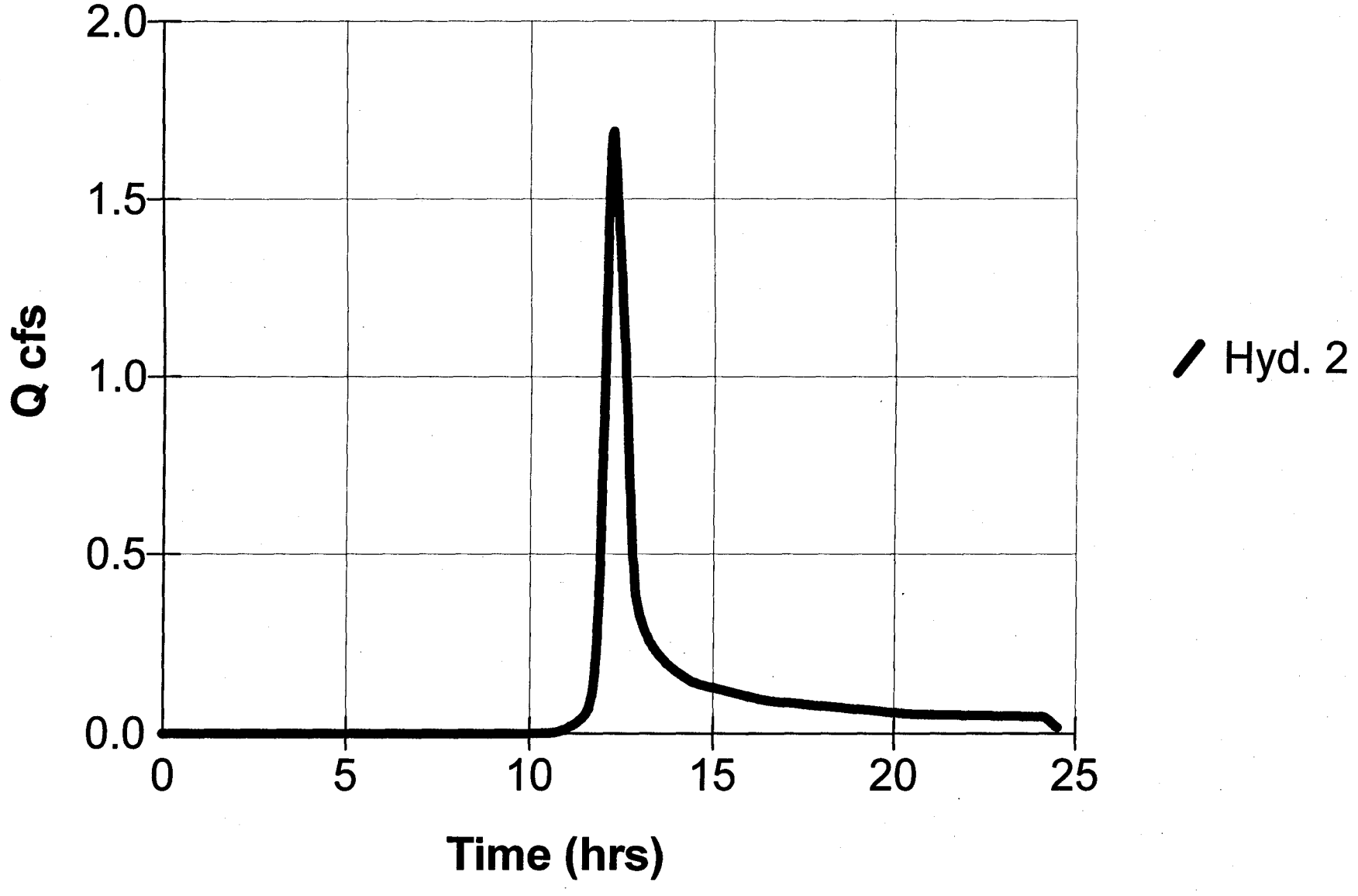
1 - SCS Runoff - 1 Yr - Qp = 1.03 cfs



10/17/00

JCSA TEWNING ROAD SITE
PRE-DEVELOPMENT

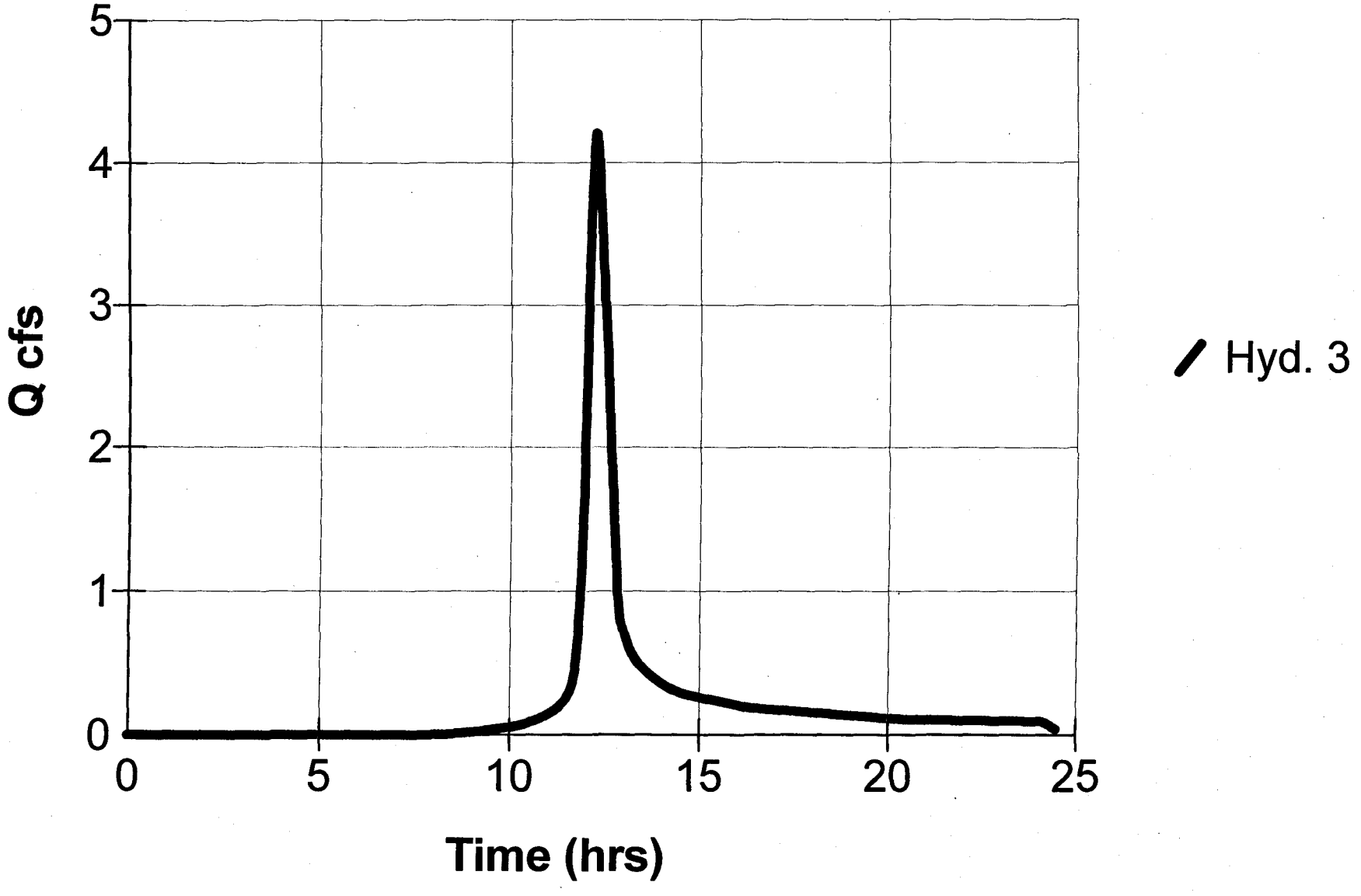
2 - SCS Runoff - 2 Yr - Qp = 1.69 cfs



10/17/00

JCSA TEWNING ROAD SITE
PRE-DEVELOPMENT

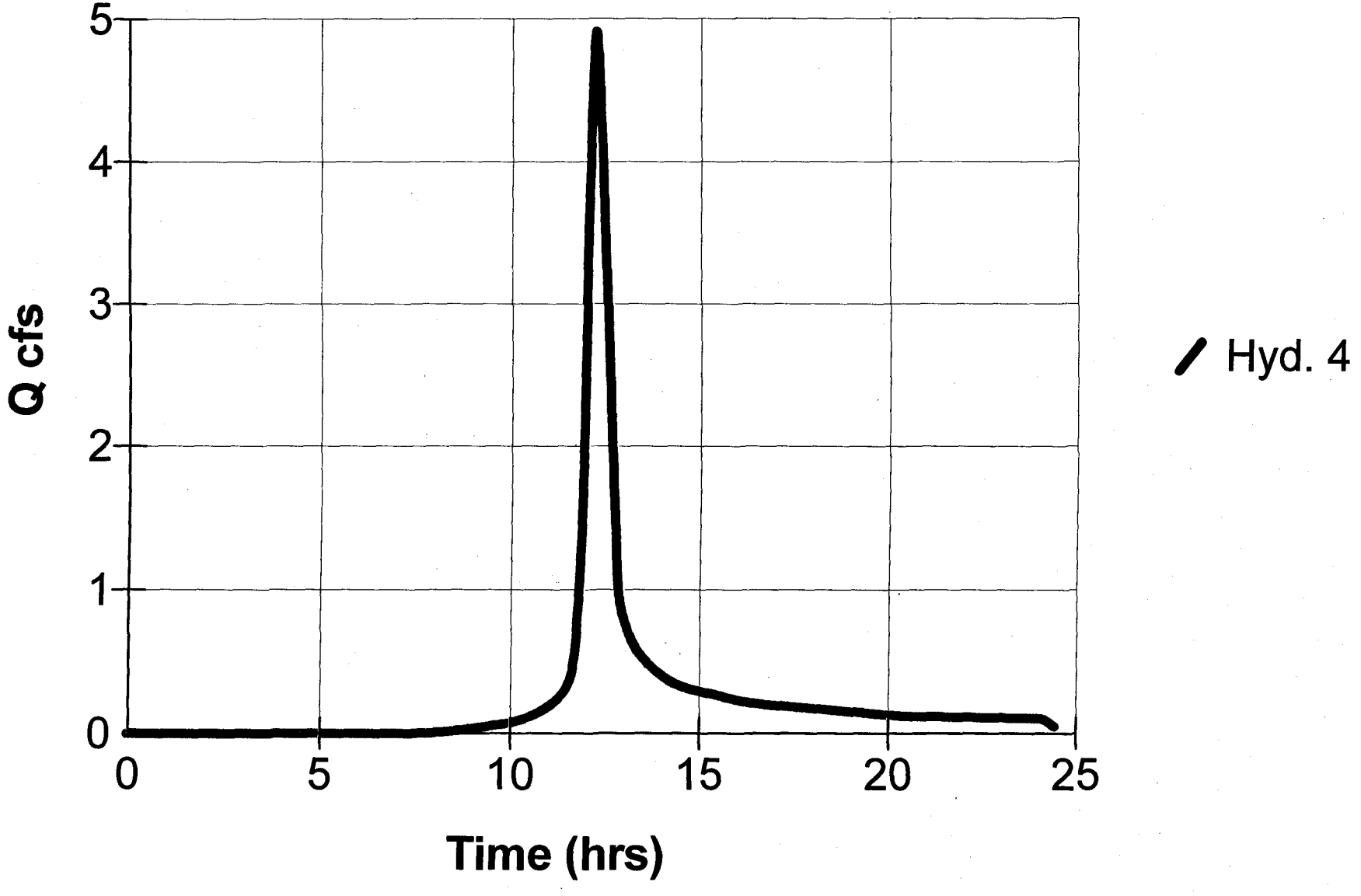
3 - SCS Runoff - 10 Yr - Qp = 4.21 cfs



10/17/00

JCSA TEWKHING ROAD SITE
PRE - DEVELOPMENT

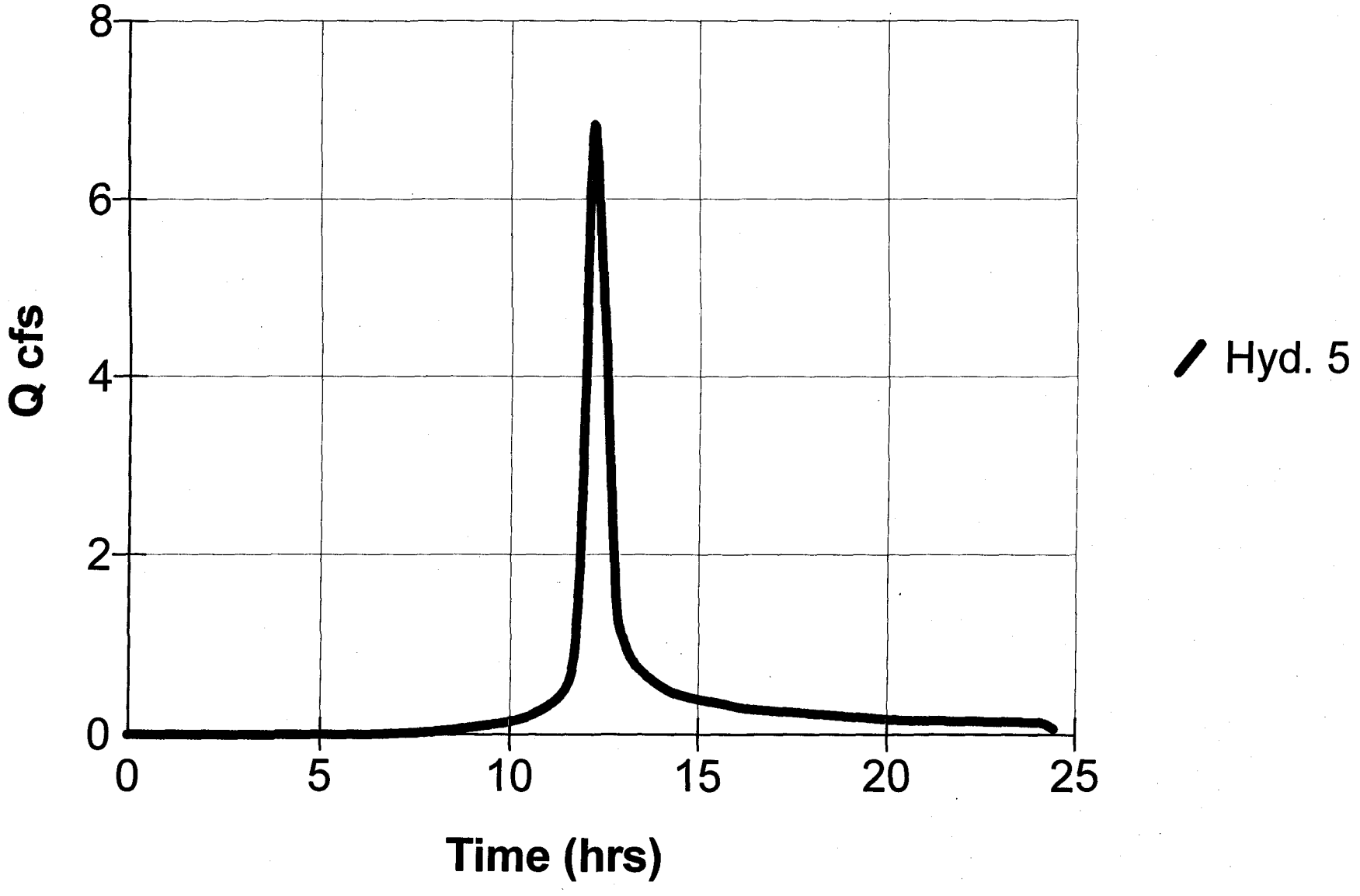
4 - SCS Runoff - 25 Yr - Qp = 4.91 cfs



10/17/00

JCSA TEWNING ROAD SITE
PRE-DEVELOPMENT

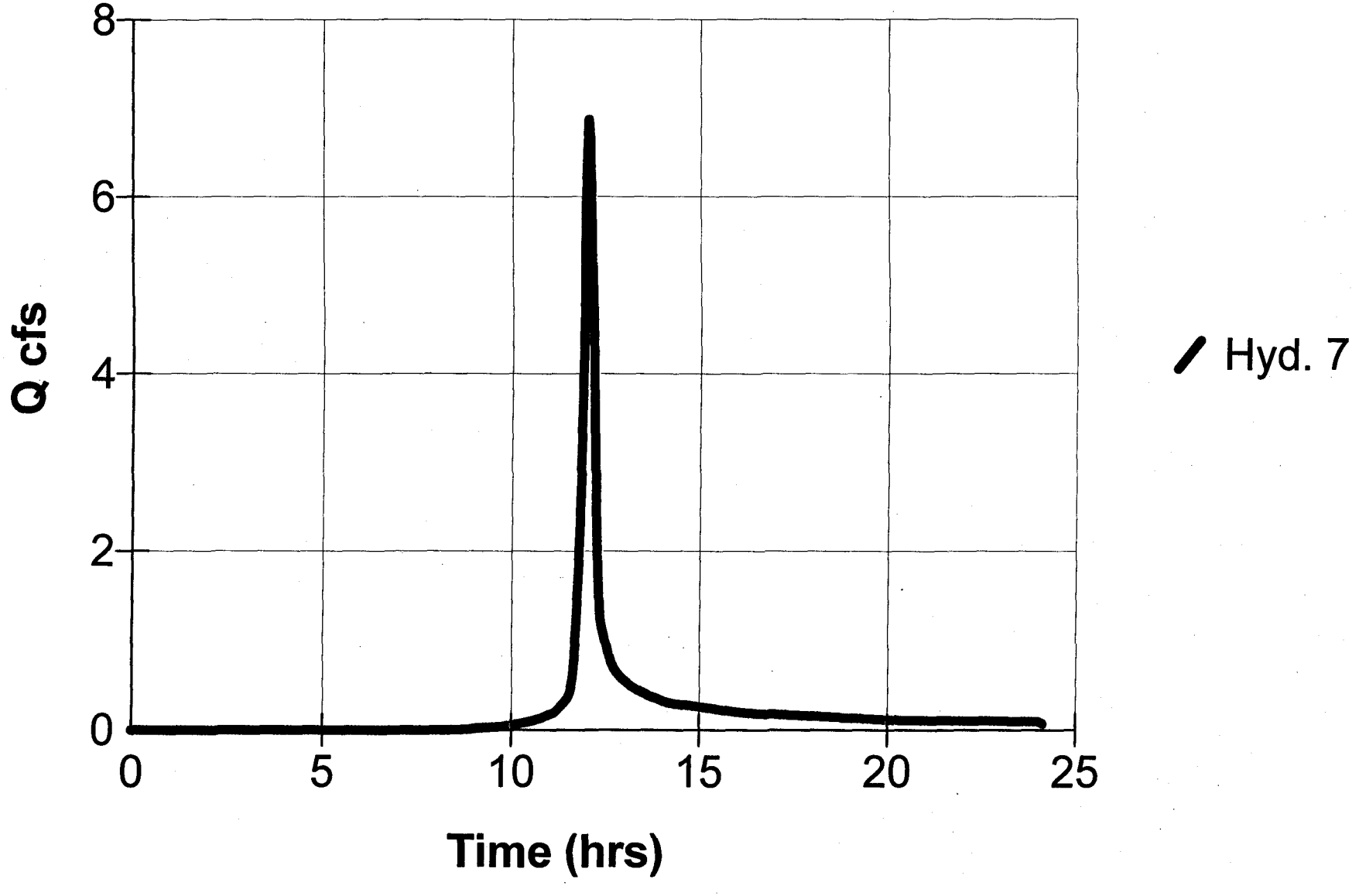
5 - SCS Runoff - 100 Yr - Qp = 6.83 cfs



10/17/00

JCSA Tewhing Road Site
POST - DEVELOPMENT

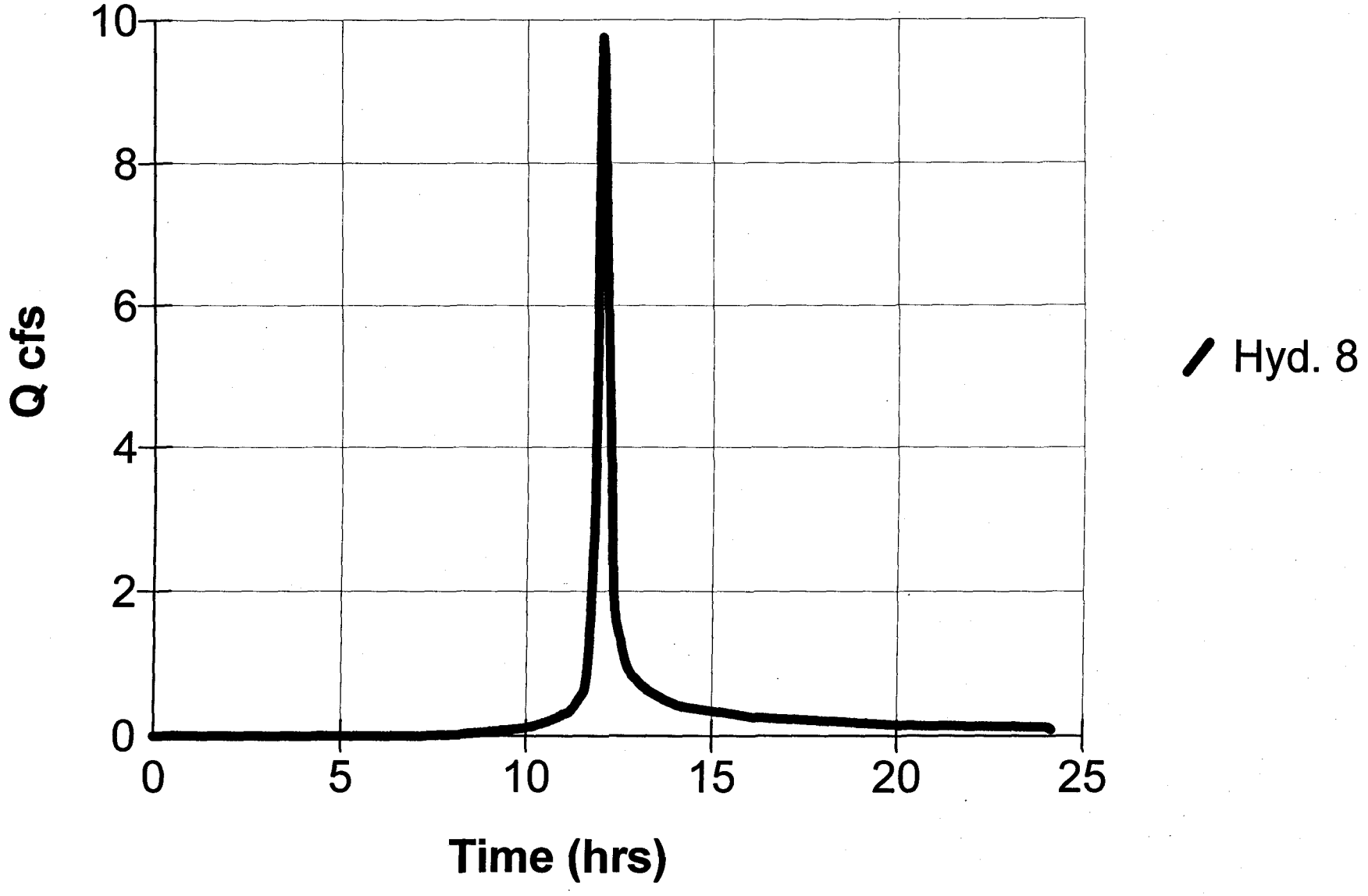
7 - SCS Runoff - 1 Yr - Qp = 6.87 cfs



10/17/00

JCSA TEWNING ROAD SITE
POST-DEVELOPMENT

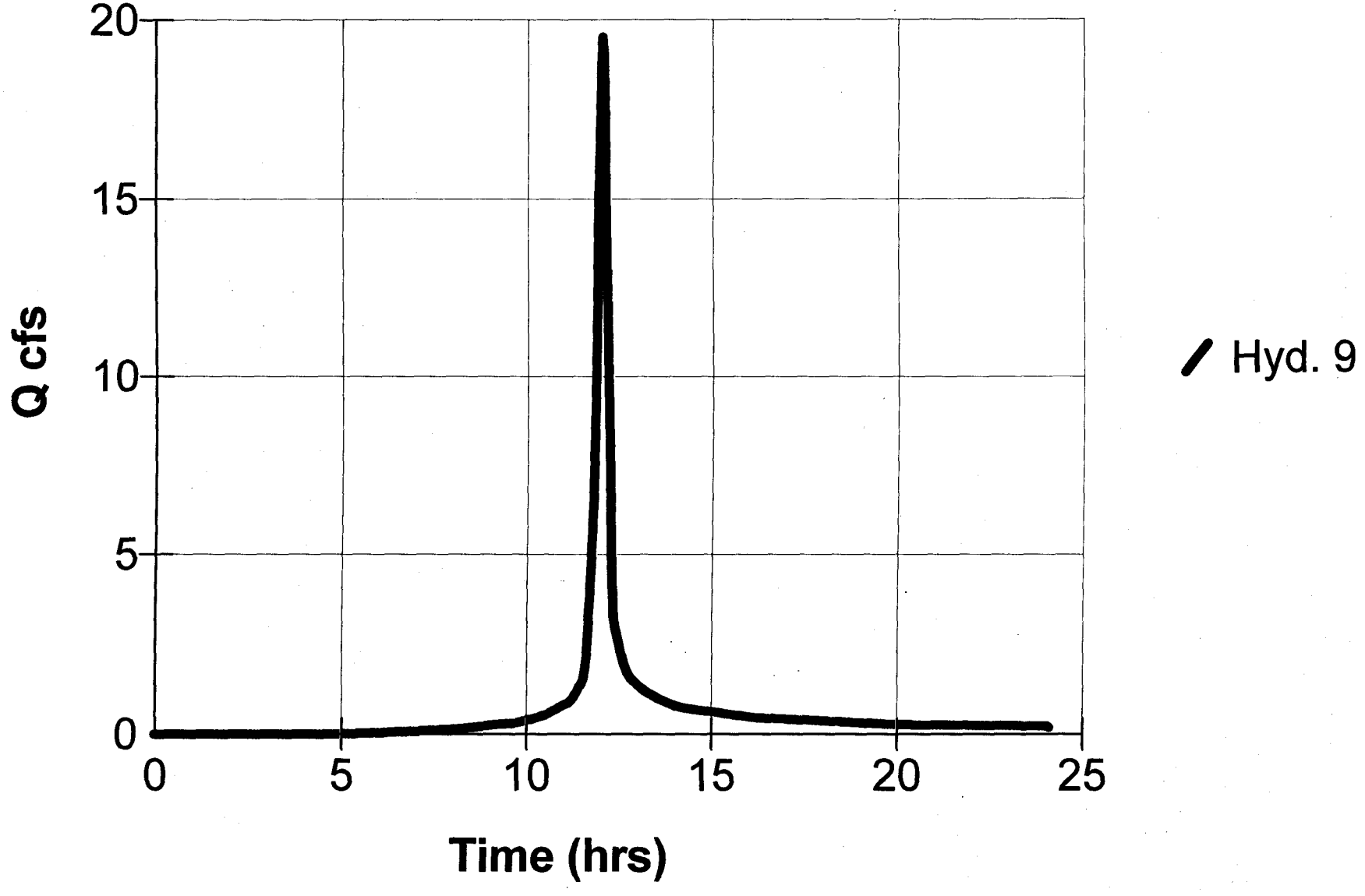
8 - SCS Runoff - 2 Yr - Qp = 9.74 cfs



10/17/00

JCSA Tewning Road Site
Post - Development

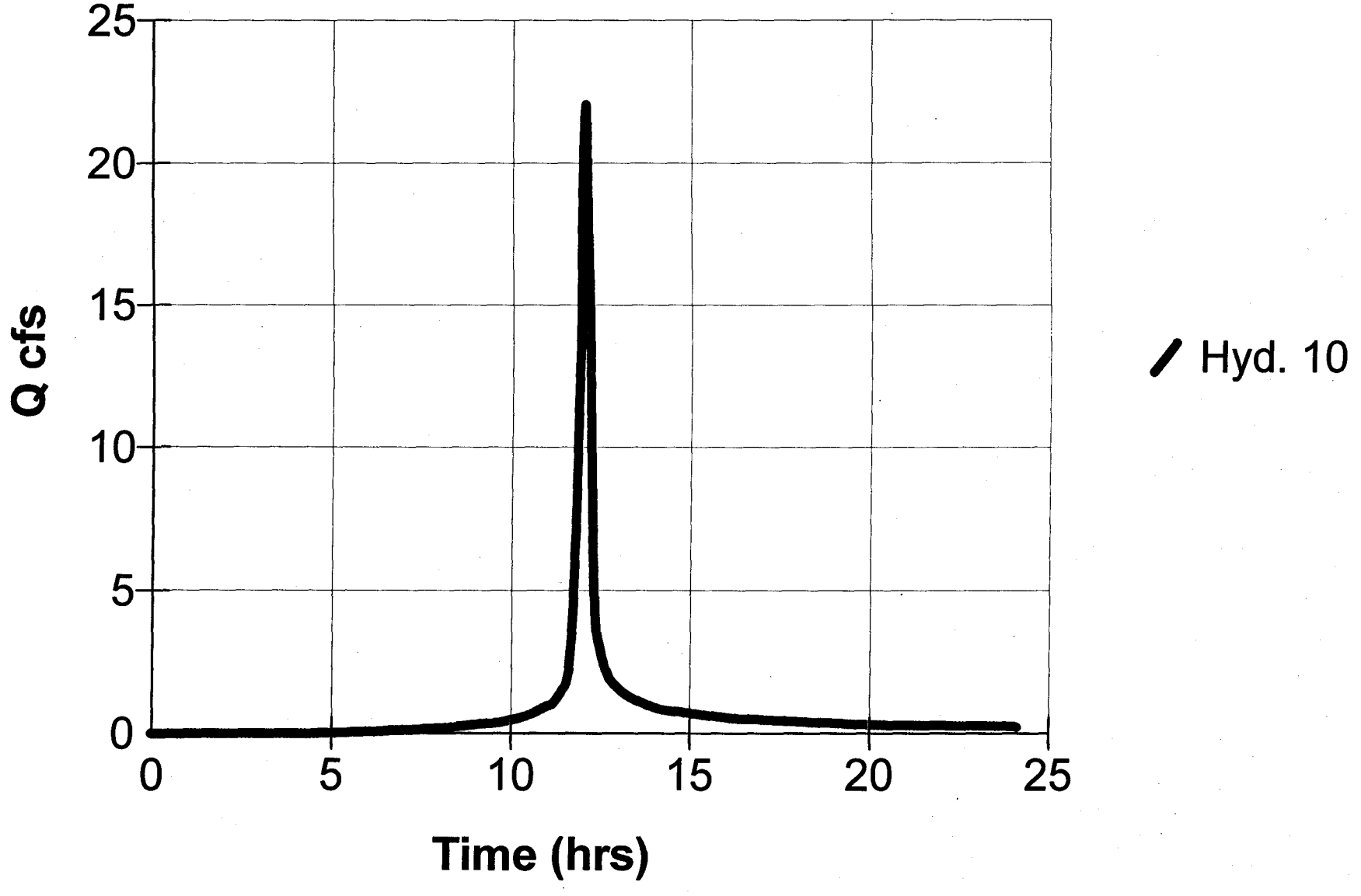
9 - SCS Runoff - 10 Yr - Qp = 19.51 cfs



10/17/00

JCSA TEWNING ROAD SITE
POST - DEVELOPMENT

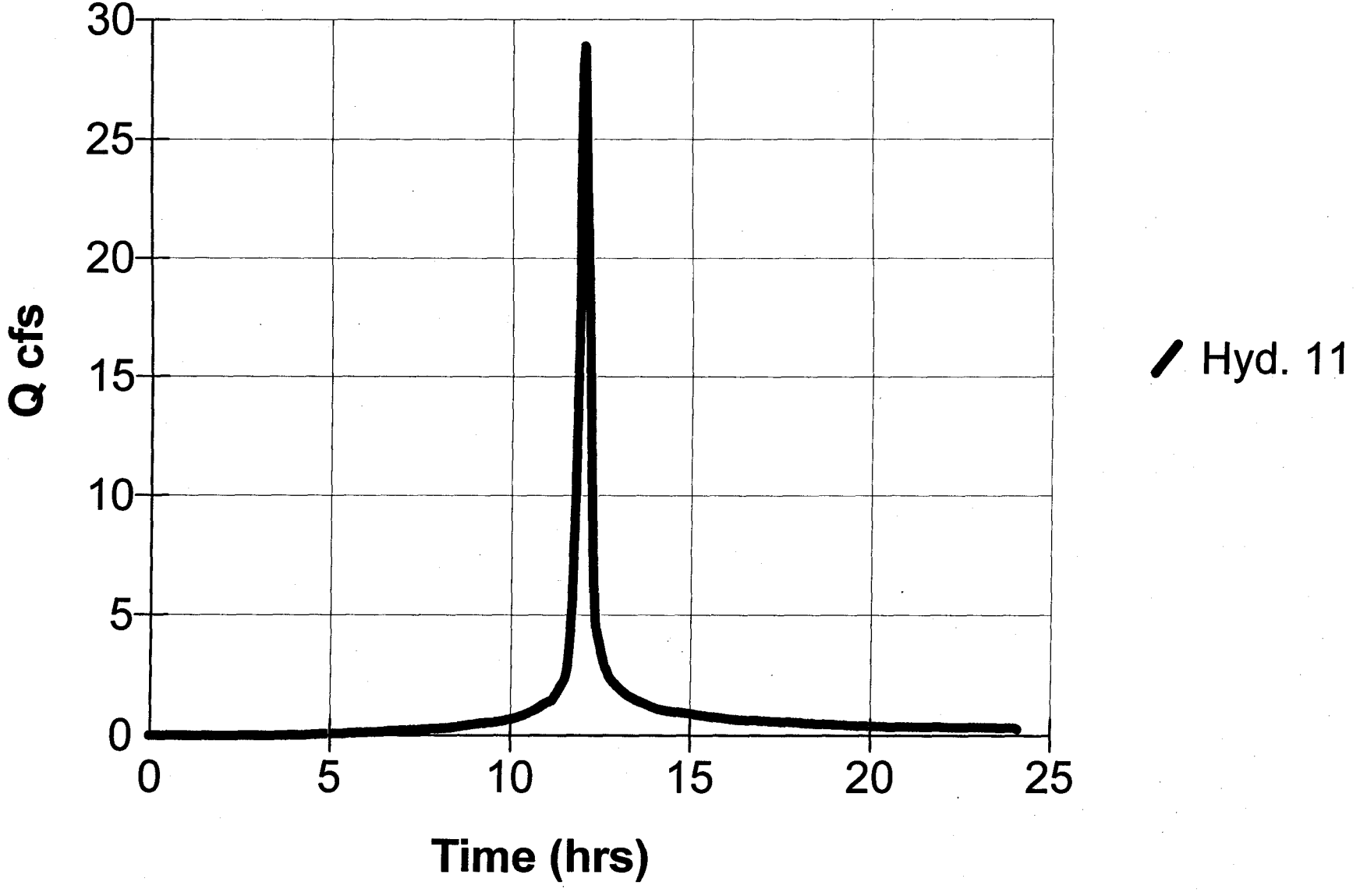
10 - SCS Runoff - 25 Yr - Qp = 22.07 cfs



10/17/00

JCSA Tewning Road Site
Post - Development

11 - SCS Runoff - 100 Yr - Qp = 28.89 cfs



10/17/00

JCSA TEWNING ROAD SITE

Reservoir Report

English

Reservoir No. 1 - Tewning Road BMP/SWM

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	83.00	1,335	0	0
1.00	84.00	1,965	1,650	1,650
2.00	85.00	2,753	2,359	4,009
3.00	86.00	3,812	3,283	7,292
4.00	87.00	9,950	6,881	14,173
5.00	88.00	11,777	10,864	25,037
6.00	89.00	13,729	12,753	37,790
7.00	90.00	15,842	14,786	52,576
8.00	91.00	18,287	17,065	69,641

Culvert / Orifice Structures

		[A]	[B]	[C]	[D]
Rise in	=	8.0	4.0	0.0	0.0
Span in	=	8.0	4.0	0.0	0.0
No. Barrels	=	1	1	0	0
Invert El. ft	=	82.50	87.00	0.00	0.00
Length ft	=	46.0	0.5	0.0	0.0
Slope %	=	1.35	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	=	3.0	5.0	250.0	0.0
Crest El. ft	=	88.01	90.30	91.00	0.00
Weir Coeff.	=	3.00	3.00	3.00	0.00
Eqn. Exp.	=	1.50	1.50	1.50	0.00
Multi-Stage	=	Yes	No	No	No

Tailwater Elevation = 82.67 ft ✓

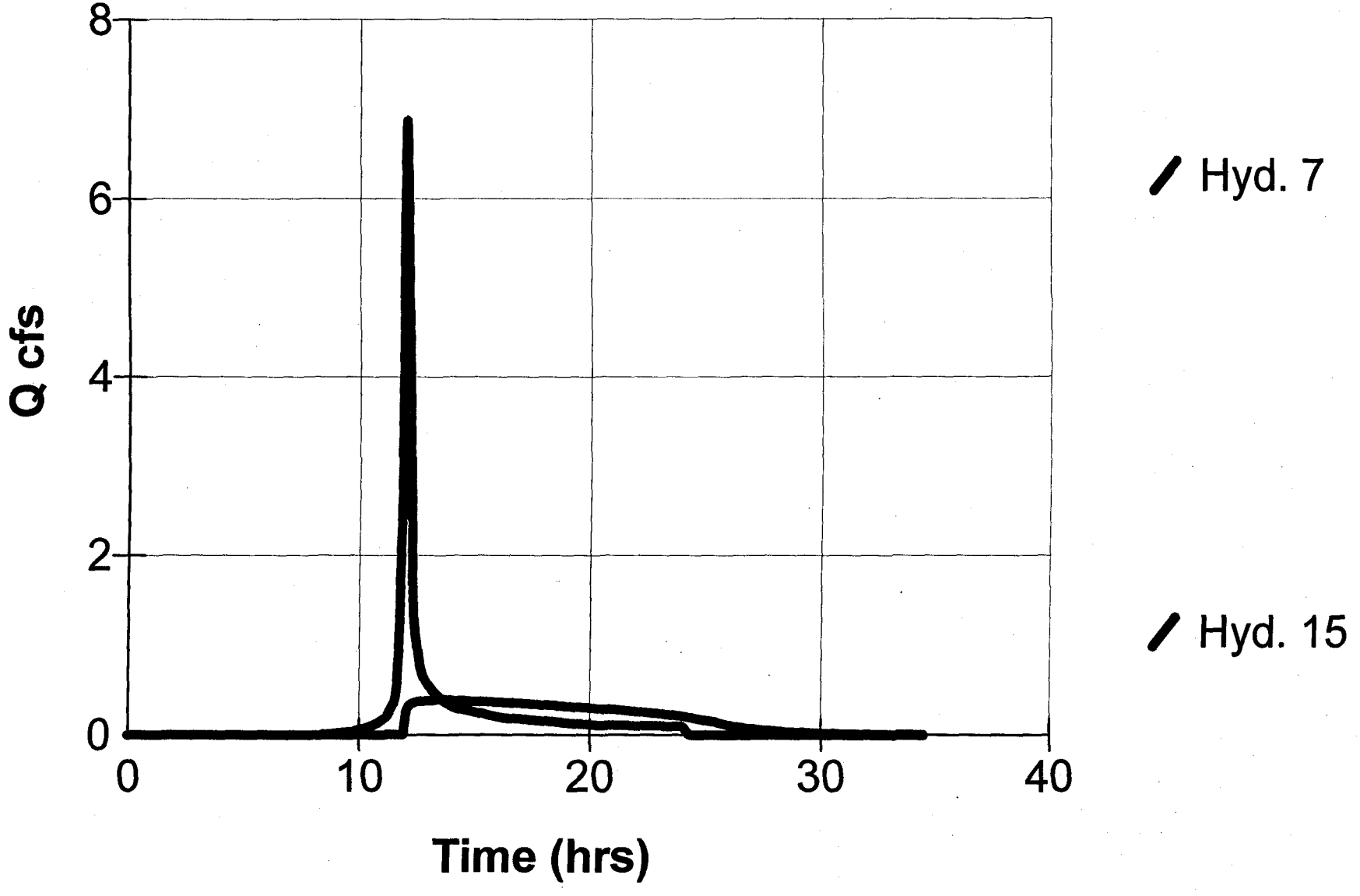
Note: All outflows have been analyzed under inlet and outlet control.

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	83.00	0.69	0.00	—	—	0.00	0.00	0.00	—	0.00
1.00	1,650	84.00	1.63	0.00	—	—	0.00	0.00	0.00	—	0.00
2.00	4,009	85.00	2.15	0.00	—	—	0.00	0.00	0.00	—	0.00
3.00	7,292	86.00	2.57	0.00	—	—	0.00	0.00	0.00	—	0.00
4.00	14,173	87.00	2.94	0.00	—	—	0.00	0.00	0.00	—	0.00
5.00	25,037	88.00	3.26	0.38	—	—	0.00	0.00	0.00	—	0.38
6.00	37,790	89.00	3.55	0.00	—	—	8.87	0.00	0.00	—	3.55
7.00	52,576	90.00	3.82	0.00	—	—	25.27	0.00	0.00	—	3.82
8.00	69,641	91.00	4.07	0.00	—	—	46.53	8.78	0.00	—	12.86

JCSA TEWNING ROAD SITE
POST-DEVELOPMENT ROUTED THRU BMP

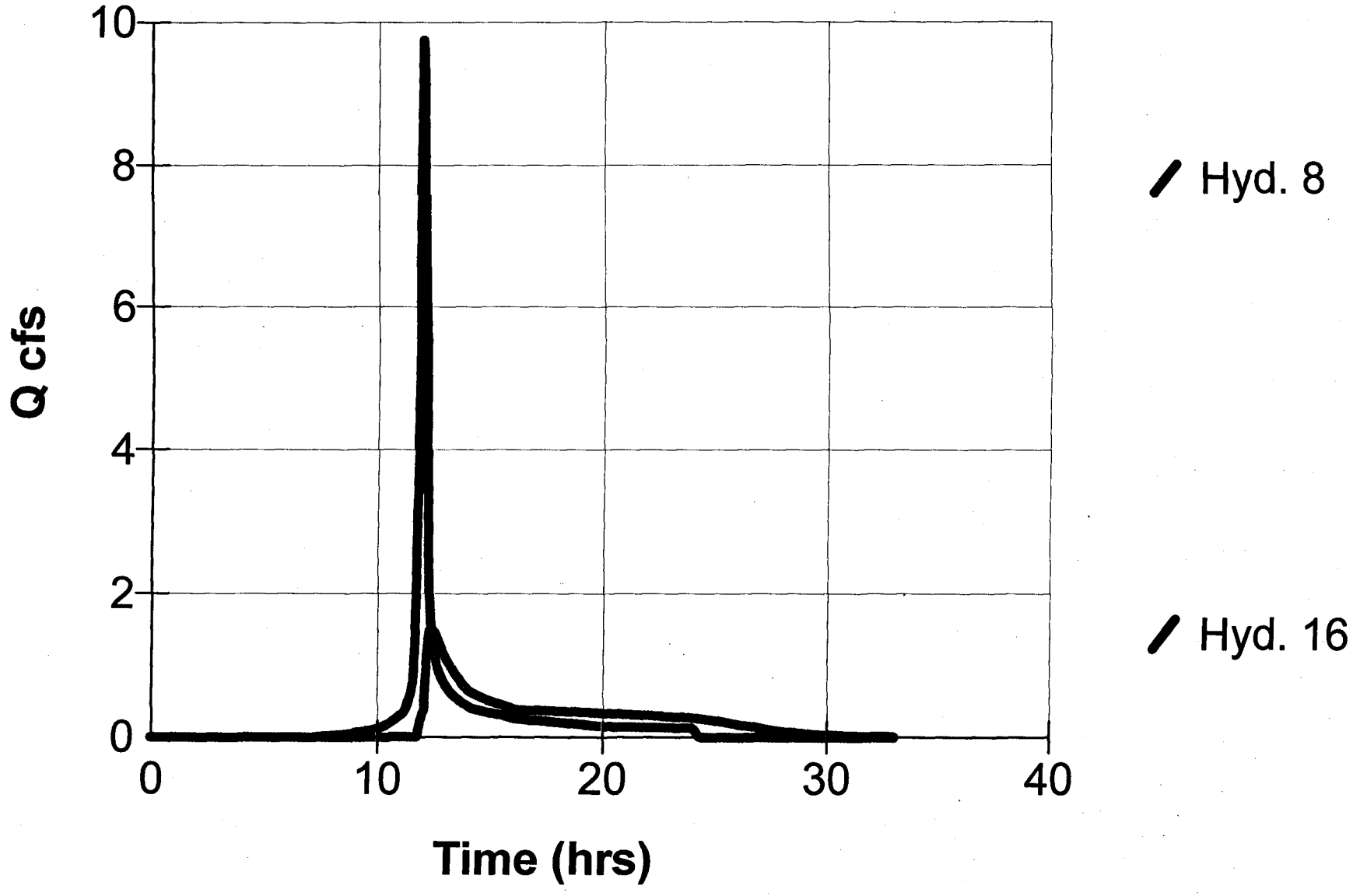
15 - Reservoir - 1 Yr - Qp = 0.40 cfs



10/17/00

JCSA Tewning Road Site
Post-Development Routed Thru BMP

16 - Reservoir - 2 Yr - Qp = 1.49 cfs



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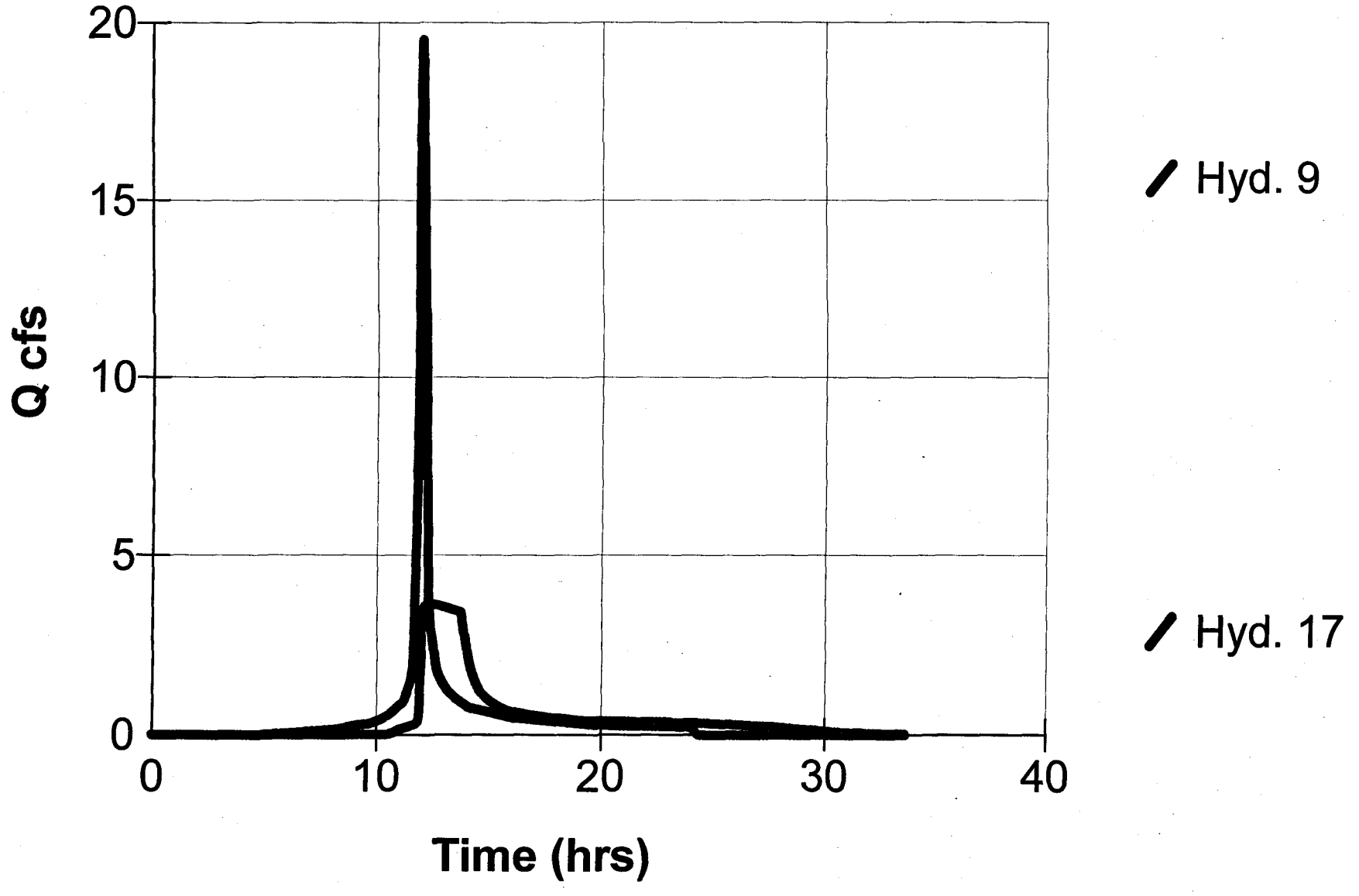
JCSA Tewning Road Site
Post-Development Routed Thru BMP

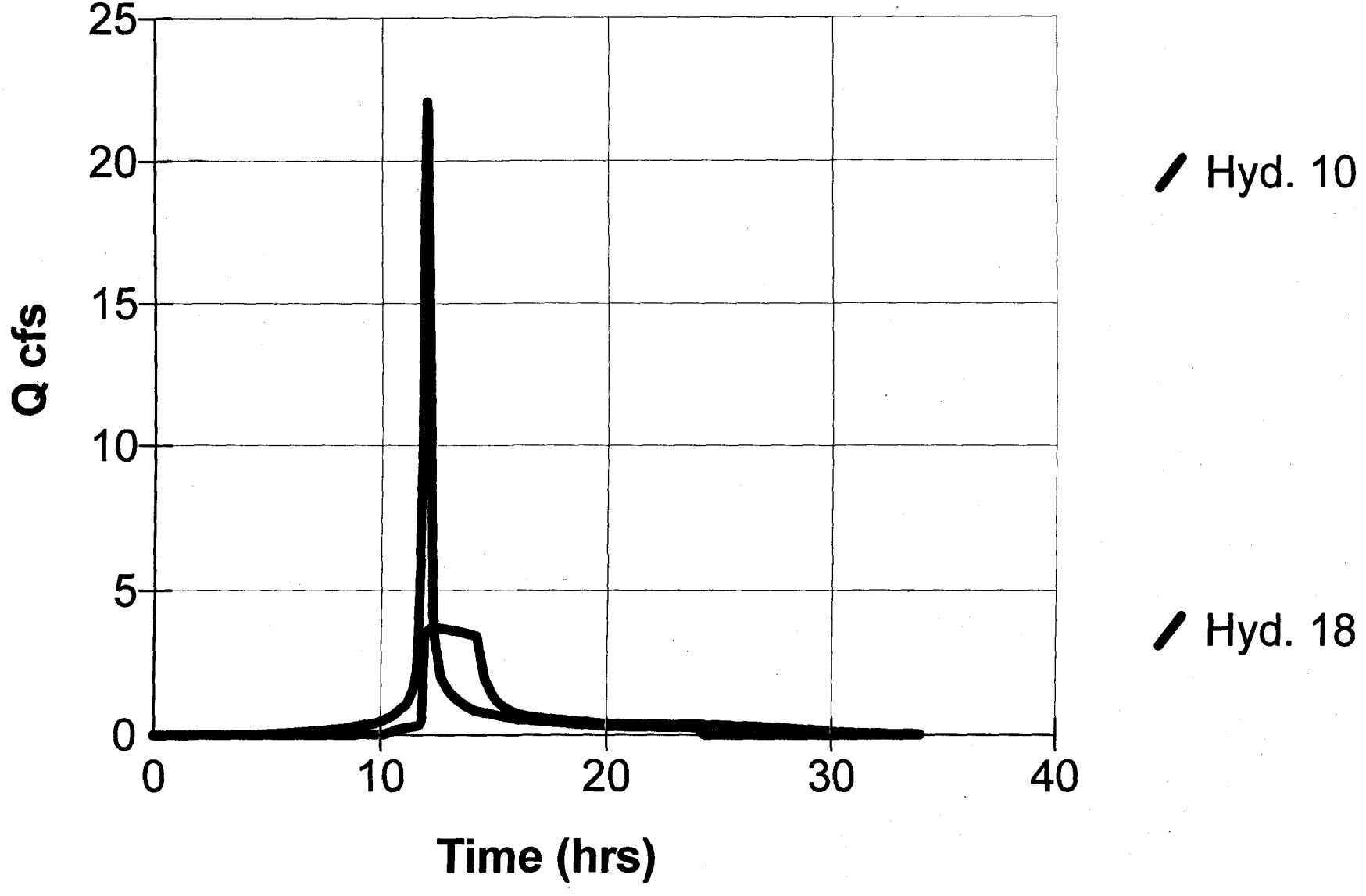
17 - Reservoir - 10 Yr - Qp = 3.62 cfs



10/17/00

JCSA Tewning Road Site
Post-Development Routed Thru BMP

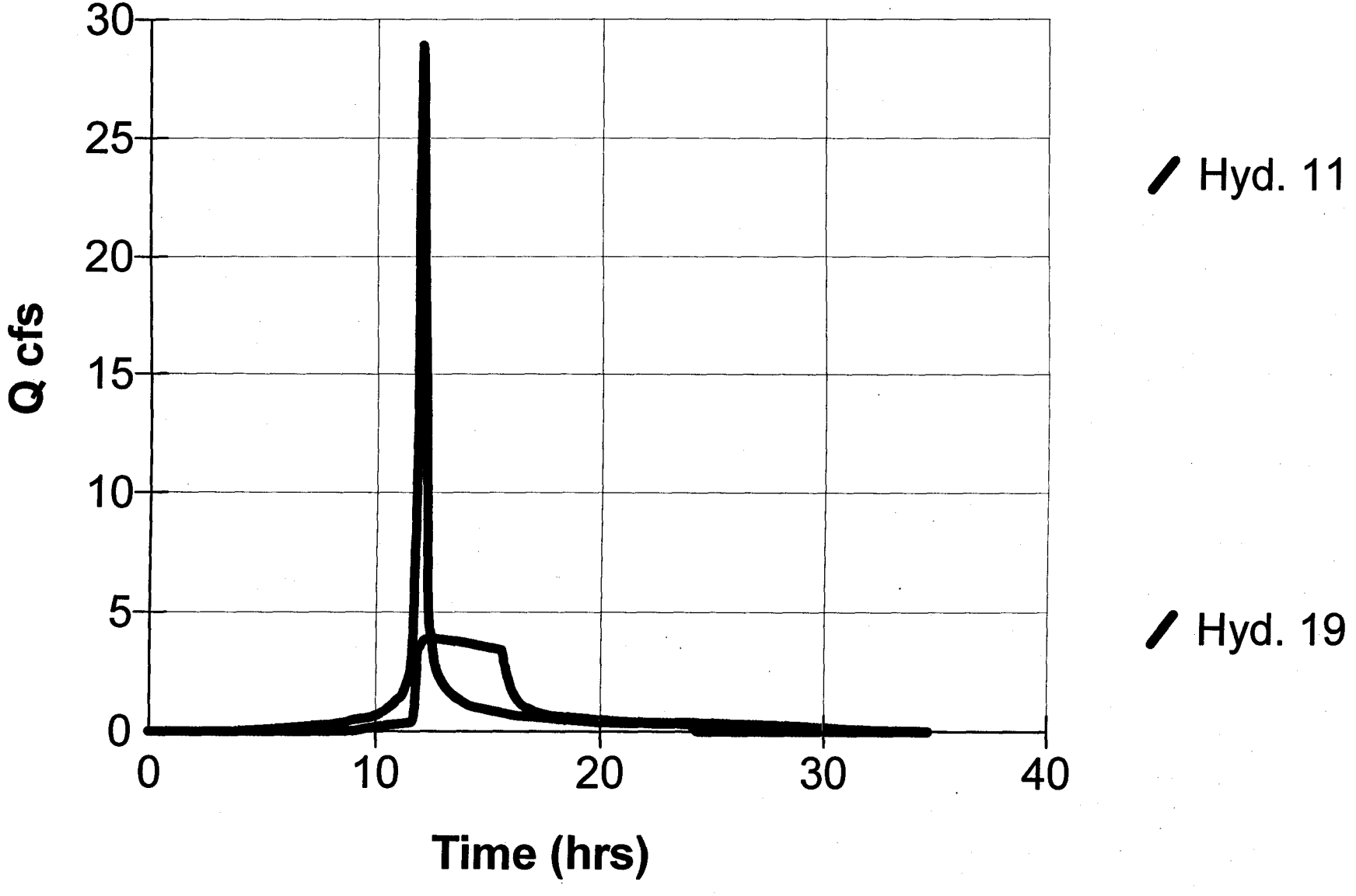
18 - Reservoir - 25 Yr - Qp = 3.70 cfs



10/17/00

JCSA Tewning Road Site
Post-Development Routed Thru BMP

19 - Reservoir - 100 Yr - Qp = 3.89 cfs



JCSA TEWNING ROAD SITE

Reservoir Report

English

Reservoir No. 10 - Tewning Rd. Sed. Basin

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	83.00	1,335	0	0
1.00	84.00	1,965	1,650	1,650
2.00	85.00	2,753	2,359	4,009
3.00	86.00	3,812	3,283	7,292
4.00	87.00	9,950	6,881	14,173
5.00	88.00	11,777	10,864	25,037
6.00	89.00	13,729	12,753	37,790
7.00	90.00	15,842	14,786	52,576
8.00	91.00	18,287	17,065	69,641

Culvert / Orifice Structures

		[A]	[B]	[C]	[D]
Rise in	=	8.0	6.0	0.0	0.0
Span in	=	8.0	6.0	0.0	0.0
No. Barrels	=	1	1	0	0
Invert El. ft	=	82.50	87.00	0.00	0.00
Length ft	=	46.0	0.5	0.0	0.0
Slope %	=	1.35	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	=	3.0	5.0	250.0	0.0
Crest El. ft	=	88.01	90.30	91.30	0.00
Weir Coeff.	=	3.00	3.00	3.00	0.00
Eqn. Exp.	=	1.50	1.50	1.50	0.00
Multi-Stage	=	Yes	No	No	No

Tailwater Elevation = 0.00 ft

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

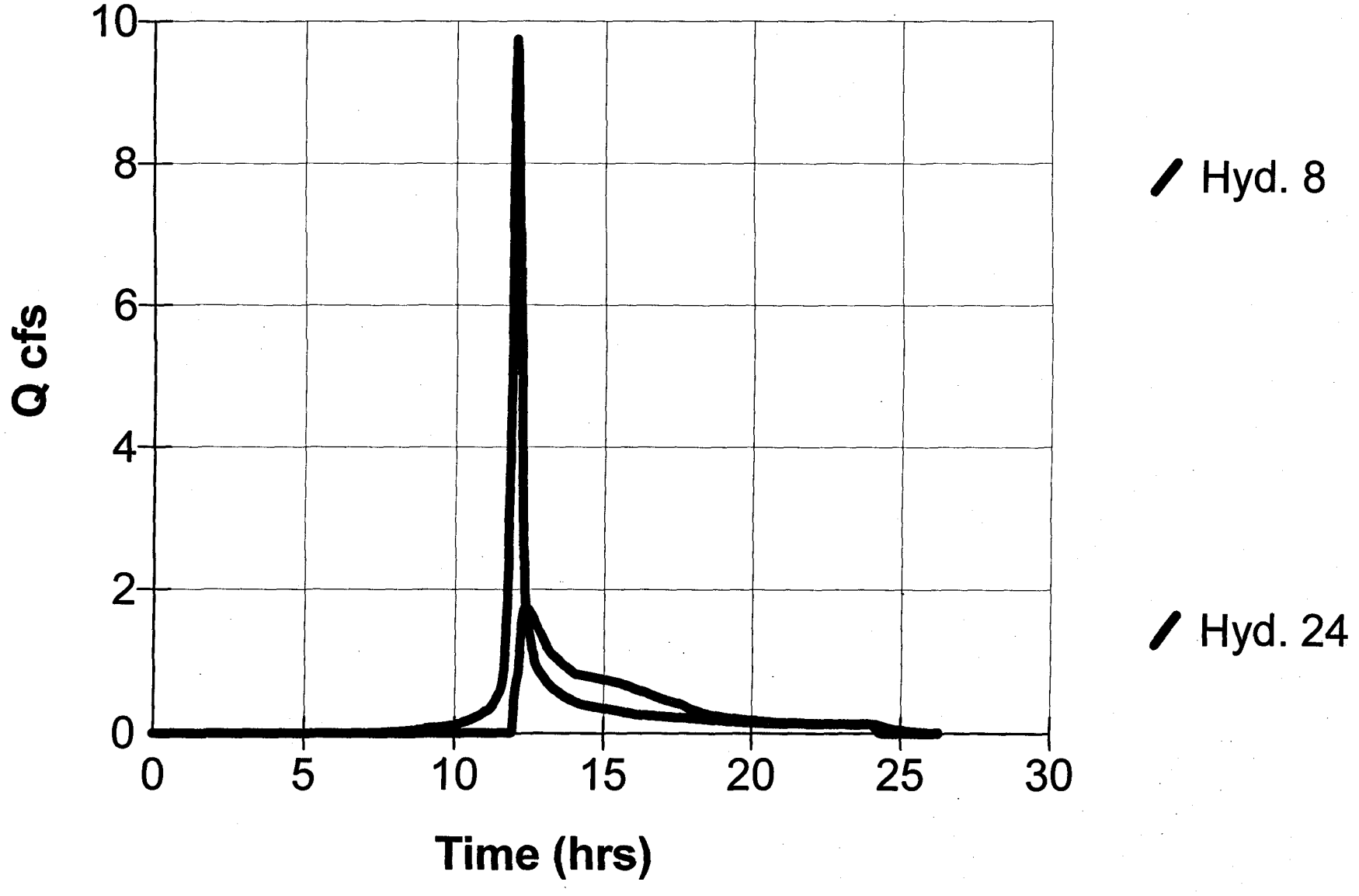
Stage / Storage / Discharge Table

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	83.00	0.69	0.00	—	—	0.00	0.00	0.00	—	0.00
1.00	1,650	84.00	1.70	0.00	—	—	0.00	0.00	0.00	—	0.00
2.00	4,009	85.00	2.21	0.00	—	—	0.00	0.00	0.00	—	0.00
3.00	7,292	86.00	2.62	0.00	—	—	0.00	0.00	0.00	—	0.00
4.00	14,173	87.00	2.98	0.00	—	—	0.00	0.00	0.00	—	0.00
5.00	25,037	88.00	3.29	0.82	—	—	0.00	0.00	0.00	—	0.82
6.00	37,790	89.00	3.58	0.00	—	—	8.87	0.00	0.00	—	3.58
7.00	52,576	90.00	3.85	0.00	—	—	25.27	0.00	0.00	—	3.85
8.00	69,641	91.00	4.10	0.00	—	—	46.53	8.78	0.00	—	12.89

TSB MODW

JCSA Tewning Road Site
Post - Development Routed Thru Sediment Basin

24 - Reservoir - 2 Yr - Qp = 1.74 cfs

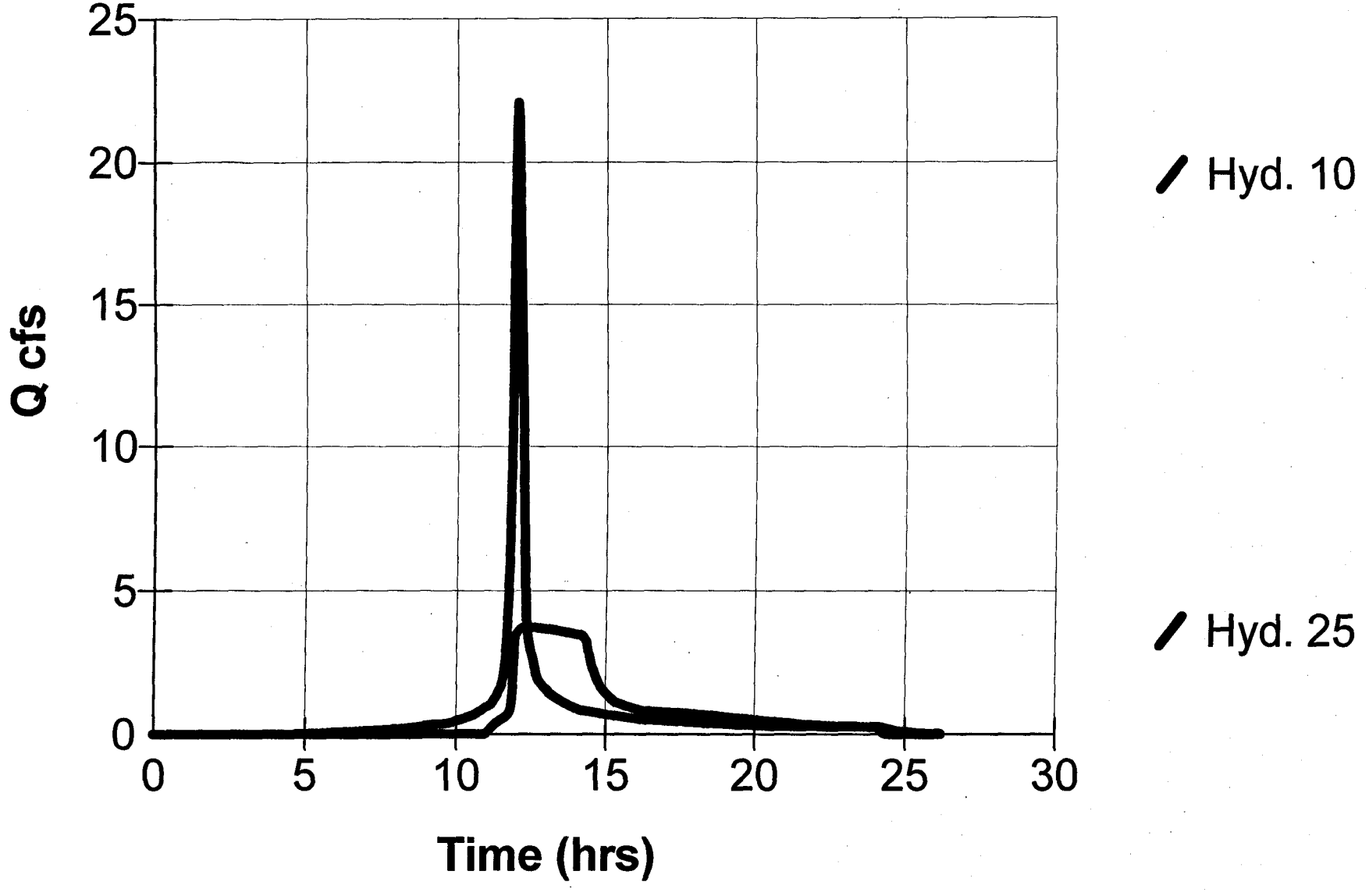


10/17/00

JCSA Tewning Road Site

Post-Development Routed Thru Sediment Basin

25 - Reservoir - 25 Yr - Qp = 3.73 cfs



10/17/00

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PROJECT JCSA TEWNING ROAD SITE
PROJECT NO. 8651-18
SUBJECT FOREBAY SIZING
SHEET NO. 1 OF 1
CALCULATED BY RDS DATE 1/9/01

FOREBAY TO BE SIZED TO CONTAIN 0.1 IN./IMPERVIOUS ACRE OF CONTRIBUTING DRAINAGE

FOREBAY #1

IMPERVIOUS AREA TO FOREBAY = 1.10 ACRES

REQUIRED VOLUME OF FOREBAY =

$$0.1 \text{ INCHES} \times \frac{1.0 \text{ IN.}}{12 \text{ FT}} \times \left(\frac{\text{IMPERVIOUS AREA}}{\text{IN ACRES}}\right) \times \frac{43560 \text{ SF}}{1 \text{ ACRE}} =$$

$$0.1 \times \frac{1}{12} \times 1.1 \text{ AC} \times \frac{43560 \text{ SF}}{\text{ACRE}} = \underline{\underline{399}} \text{ CF}$$

✓

VOLUME PROVIDED BY PLAN = 2760 CF

CLEANOUT ELEVATION OF FOREBAY

CLEANOUT ELEVATION SET TO EQUAL 1/2 WET STORAGE VOLUME (200 CF)

CLEANOUT ELEVATION = 88.87

✓

JAMES CITY SERVICE AUTHORITY
TEWNING ROAD SITE
SWM / BMP BOUYANCE CALCULATIONS
October 17, 2000

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

ELEVATIOIN OF RISER CREST = 88.0 ✓

ELEVATION OF INVERT OF RISER = 82.0 ✓
(AFTER GROUTING)

INSIDE DIMENSION OF RISER = 2.8 x 2.8 feet

OUTSIDE DIMENSION OF RISER = 3.5 x 3.5 feet

WEIGHT OF WATER DISPLACED BY AIR

Weight of water displaced by air Weight of water per cu. Ft. * 2.8 * 2.8* (El. Of Riser Creast - El. Of riser invert)

Weight of water displaced by air 2,935 lbs.

WEIGHT OF PRINCIPAL SPILLWAY / RISER

Weight of concrete of riser = (Weight of concrete per cu. Ft. * 3.5*3.5 * (El. Of Riser Creast - El. Of riser invert)) - (Weight of concrete per cu. Ft. * 2.8*2.8 * (El. Of Riser Creast - El. Of riser invert))

Weight of Concrete Riser = 3,969 lbs.

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

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PROJECT JCSA TEWING ROAD SITE
PROJECT NO. 8051-18
SUBJECT EMERGENCY SPILLWAY LINING
SHEET NO. 1 OF 1
CALCULATED BY RDS DATE 1/9/01

Q = 12.86 CFS (ELEV. 91.0)

SPILLWAY AVERAGE SLOPE = 11%

MANNING'S N = 0.05 (GRASSED LINED CHANNEL)

FROM FIG. 2.8.54 (VDOT DRAINAGE MANUAL-85 ED.)

Qn = 12.86 CFS × 0.05 (n-VALUE) = 0.643

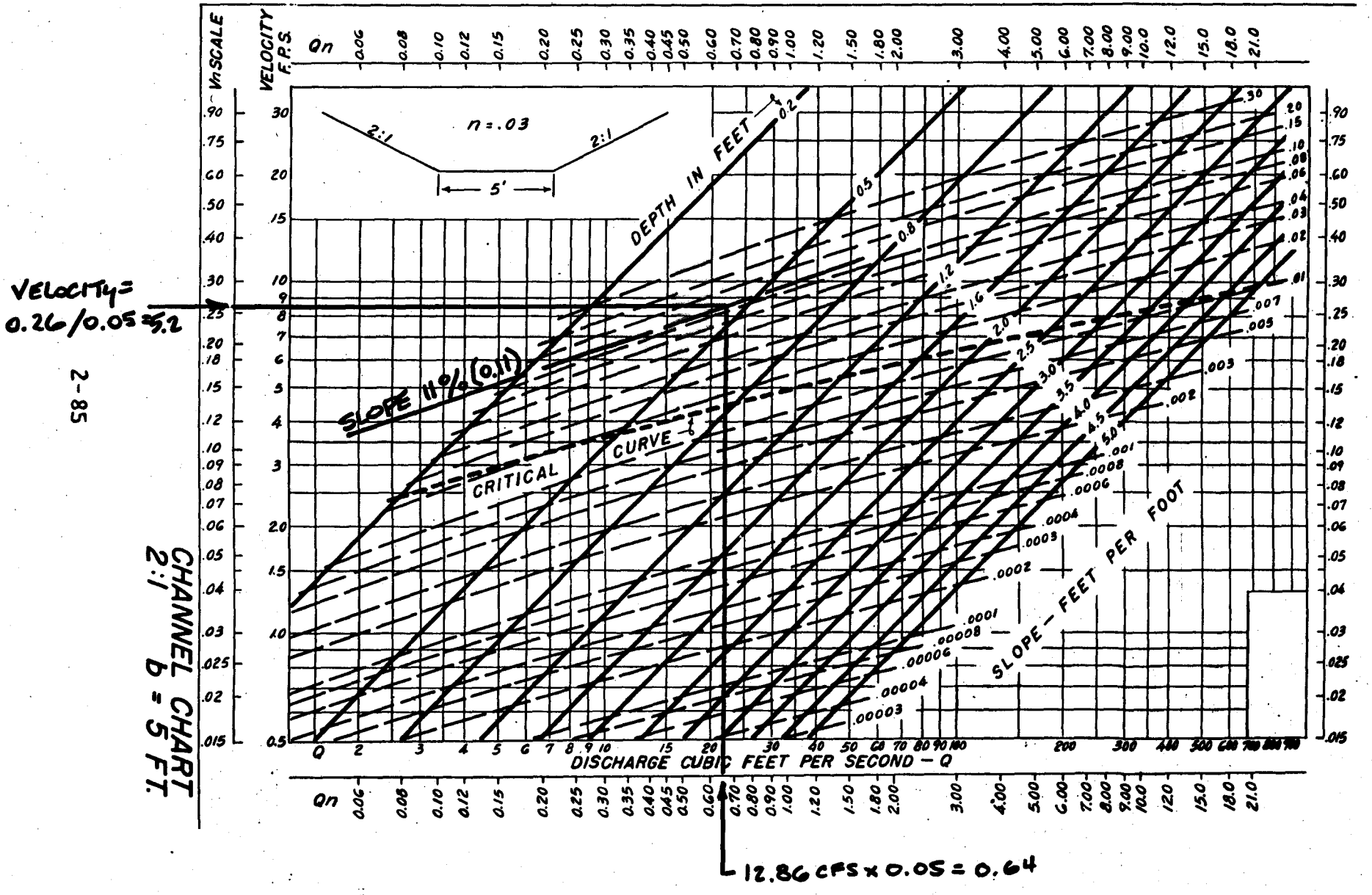
Vn = 0.26

VELOCITY = 0.26 ÷ 0.05 (n-VALUE) = 5.2 FPS ✓

VELOCITY EXCEEDS 2.5 FPS.

USE CHANNEL LINER: EC-3 VDOT STD.
TYPE A MATTE ✓
(MAX. VELOCITY = 7 FPS)

JCSA OPERATIONS CENTER SITE EXPANSION



CHANNEL CHART
2:1 b = 5 FT.

FIG. 2.8.54

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project JCSA Tewning Road Site Expansion

Basin # 1 Location Southwest Corner of Property

Total area draining to basin: 3.83 acres.

Basin Volume Design

Wet Storage:

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

   67 cu. yds. x 3.83 acres = 257 cu. yds.

2. Available basin volume = 524 cu. yds. at elevation 87. (From storage - elevation curve)

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

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

4. Available volume before cleanout required.

   33 cu. yds. x 3.83 acres = 126 cu. yds.

5. Elevation corresponding to cleanout level = 84.75.

   (From Storage - Elevation Curve)

6. Distance from invert of the dewatering orifice to cleanout level = 2.25 ft. (Min. = 1.0 ft.) ✓

Dry Storage:

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

   67 cu. yds. x 3.83 acres = 257 cu. yds.

8. Total available basin volume at crest of riser* = 927 cu. yds. at elevation 88. (From Storage - Elevation Curve)

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

S = 10881 CF (DRY STORAGE)
Q_e = 10881/21600 = 0.50 cfs
$A = \frac{0.50}{(64.23 \times 1/2)^{1/2}(0.6)} = 0.1$

9. Diameter of dewatering orifice = 6" in.

10. Diameter of flexible tubing = 8" in. (diameter of dewatering orifice plus 2 inches).

$d = 12 \times 2 \times \left(\frac{0.15}{3.14}\right)$
d = 5.2"
USE 6"

Preliminary Design Elevations

11. Crest of Riser = 88

Top of Dam = 91.3

Design High Water = 89.5 (25-YR STORM)

Upstream Toe of Dam = 83

Basin Shape

12. Length of Flow / Effective Width $\frac{L}{We} = \frac{115}{A/L} = \frac{115}{9950/115} = \frac{115}{86} = 1.3$

If > 2, baffles are not required _____

If < 2, baffles are required ✓ REQUIRED

Runoff

13. Q_2 = 9.7 cfs (From Chapter 5)

14. Q_{25} = 22.1 cfs (From Chapter 5)

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2$ = 9.7 cfs. (riser and barrel)

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

Anti-Seep Collar Design

23. Depth of water at principal spillway crest (Y) = 5 ft. (88 - 83)

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

Slope of principal spillway barrel (S_b) = 0.83 %

Length of barrel in saturated zone (L_s) = 37 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 = 91.3

Design High Water = 89.52 (25-YR STORM)

Emergency Spillway Crest = 90.3

Principal Spillway Crest = 88.0

Dewatering Orifice Invert = 82.5

Cleanout Elevation = 84.75

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

16. With emergency spillway:

Assumed available head (h) = 2.3 ft. (Using Q_2)

h = Crest of Emergency Spillway Elevation - Crest of Riser Elevation
90.3 - 88

Without emergency spillway:

Assumed available head (h) = N/A ft. (Using Q_{25})

h = Design High Water Elevation - Crest of Riser Elevation

17. Riser diameter (D_r) = 27 in. Actual head (h) = 0.6 ft.

(From Plate 3.14-8.) NOTE: DESIGNED RISER IS A 2.8 x 2.8 CHAMBER, EQUIVALENT TO A 38" DIA. RISER

Note: Avoid orifice flow conditions.

18. Barrel length (l) = 60 ft.

Head (H) on barrel through embankment = 8.3 ft. 90.3 - 82

(From Plate 3.14-7).

19. Barrel diameter = 8 in. (FROM DESIGN CALCULATIONS)

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

20. Trash rack and anti-vortex device

Diameter = N/A inches.

Height = N/A inches.

(From Table 3.14-D).

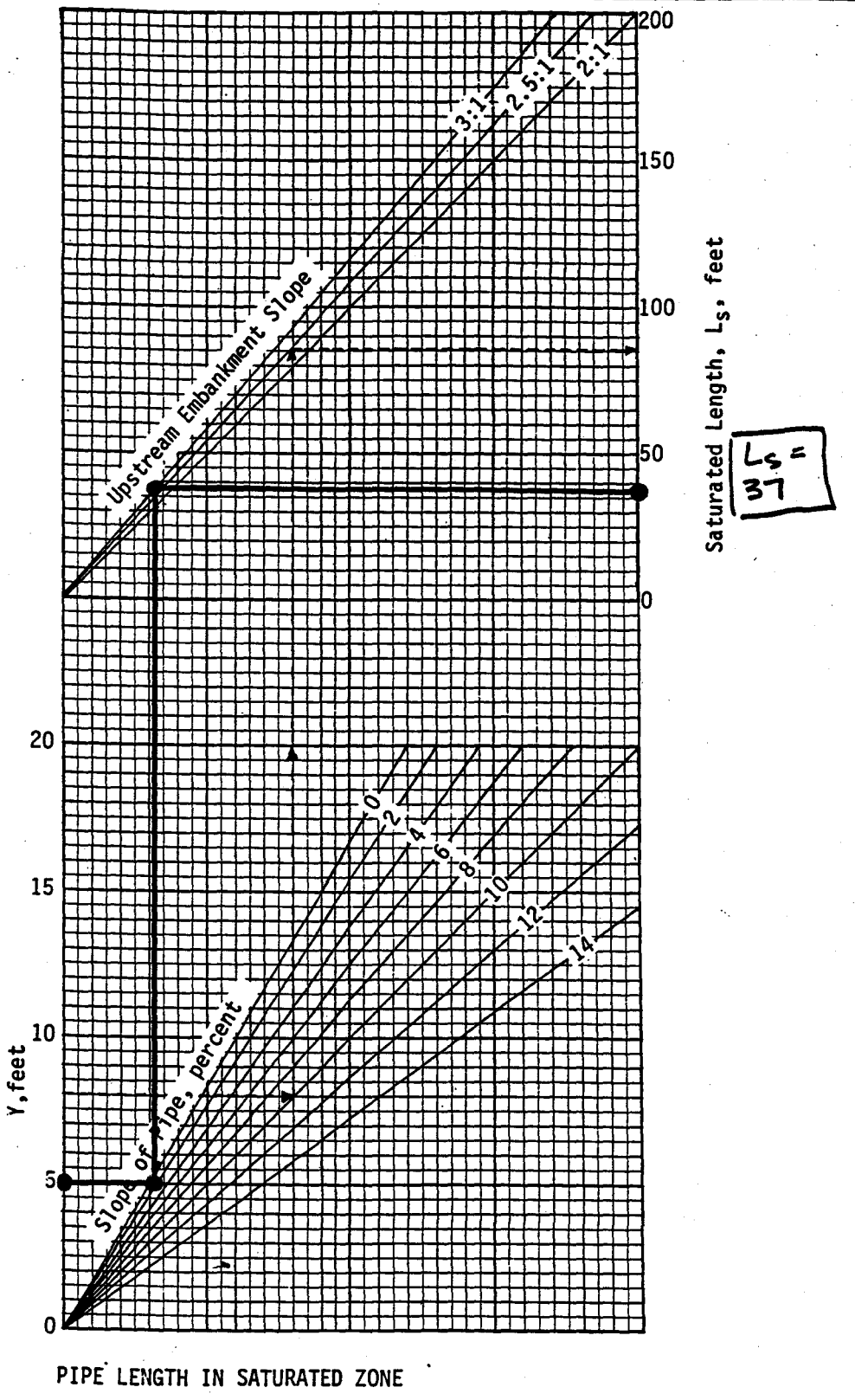
Emergency Spillway Design

21. Required spillway capacity $Q_e = Q_{25} - Q_p$ = 22.0 - 9.7 = 12.3 cfs.

22. Bottom width (b) = 5 ft.; the slope of the exit channel (s) = 3 ft./foot; and the minimum length of the exit channel (x) = 65 ft.
(From Table 3.14-C). (SEE PLANS)

JCSA Tewning Road Site
AES Project No 8651-18

10/17/00

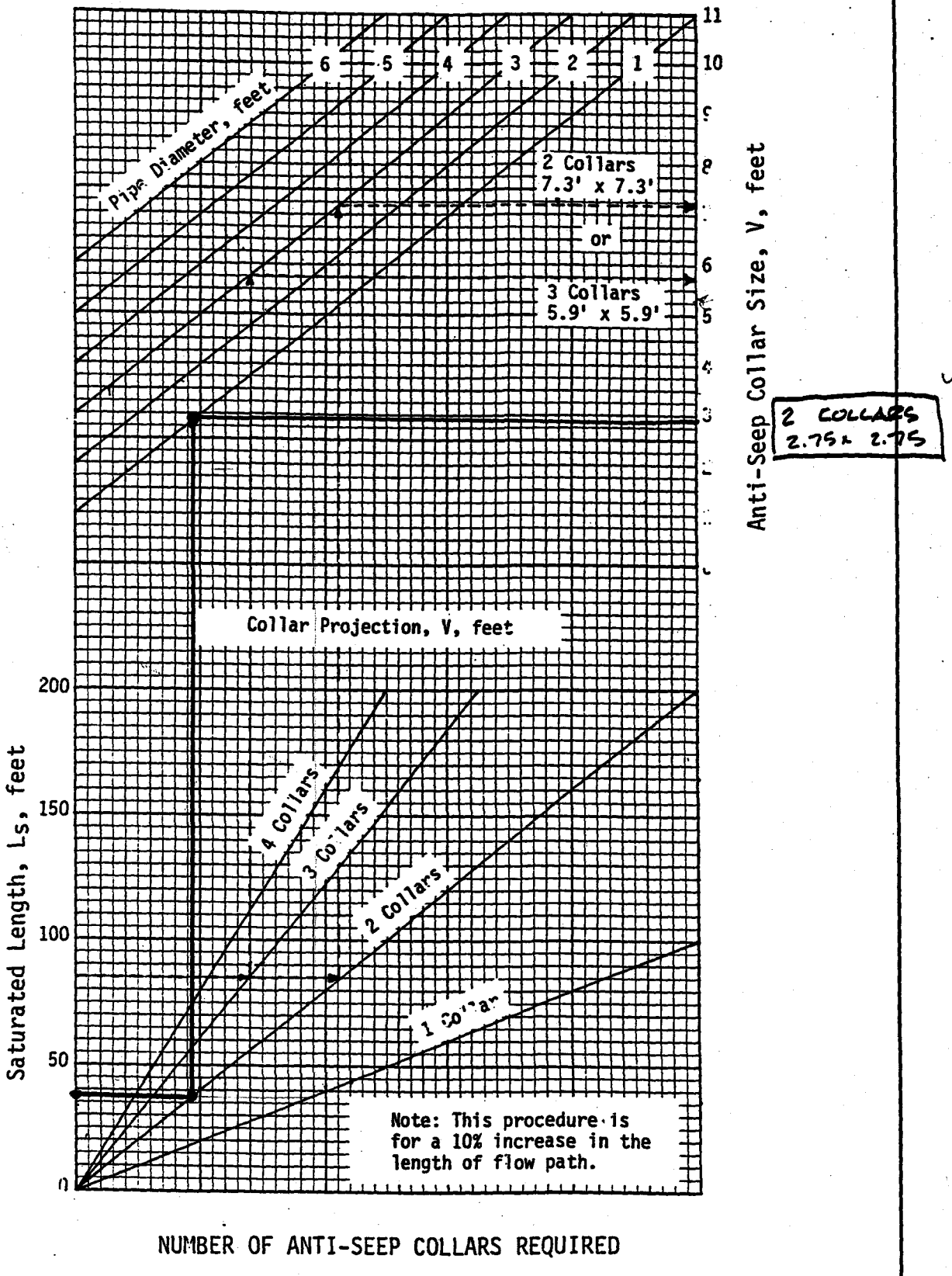


Source: USDA-SCS

Plate 3.14-11

JCSA Tewning Road Site
AES Project No. 8651-18

10/17/00



Source: USDA-SCS

Plate 3.14-12

Table 2

JCSA OPERATIONS CETER EXPANSION

PRELIMINARY

Worksheet for BMP Point System

A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP Points		Fraction of Site Served by BMP		Weighted BMP Points
WET ED POND (WQ$_v$=2.0)	10	x	3.83 Ac / 4.43 Ac	=	8.64
		x		=	
		x		=	
		x		=	

TOTAL WEIGHTED STRUCTURAL BMP POINTS: 8.64

B. NATURAL OPEN SPACE CREDIT

Fraction of Site		Natural Open Space Credit		Points for Natural Open Space
0.637 0.62 Ac / 4.43 Ac	x	0.1 x 100% (0.1 per 1%)	=	1.437
	x	(0.15 per 1%)	=	

TOTAL NATURAL OPEN SPACE CREDIT: 1.437

C. TOTAL WEIGHTED POINTS

8.6	+	1.4	=	10.0
Structural BMP Points		Natural Open Space Points		Total
8.64		1.437		10.07 ✓

[redacted] L[redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] PRO[redacted]CT [redacted]NIN[redacted]ICS/[redacted]ERA[redacted]S)

N/A SIDE — 3 — CUT — 3 — MED. — FILL

BY RDS DATE 1/8/01

STA. TO STA.	FLOW		C	A	C A INCR.	C A ACC.	Tc	I_2	Q_2	C or F	Slope Ft/Ft	ALLOW. VEL.	Earth n=.03 VEL.	Protective Lining n=.05 On	n=.05 VEL.	n=.05 DEP.	n=.015 On	n=.015 DEP.	I_{10}	Q_{10}	DEP.	REMARKS
DITCH @ CULV. #2 OUTFALL			0.7	0.55	0.39	0.39	5	5.6	2.16	C	0.02	2.5			2.05	6.1"			6.8	2.65	6.5"	GRASS (OK)
DITCH DUE SOUTH PARKING			0.7	0.14	0.10	0.10	5	5.6	0.55	C	0.023	2.5			1.5	3.7"			6.8	0.67	3.8"	GRASS (OK)
DITCH SW OF PARKING LOT			0.7	0.24	0.17	0.27	7.5	5.1	1.38	C	0.05	2.5			2.5	4.3"			6.8	1.84	4.9"	GRASS (OK)
														EC-3 LINED								
															✓	✓					✓	

PROJECT: JCSA OPERATIONS CENTER SITE EXPANSION	STATION: CULVERT #1 CULVERT @ ENTRANCE SHEET 1 OF 3	CULVERT DESIGN FORM DESIGNER / DATE: RDS / 1/09/01 REVIEWER / DATE: /

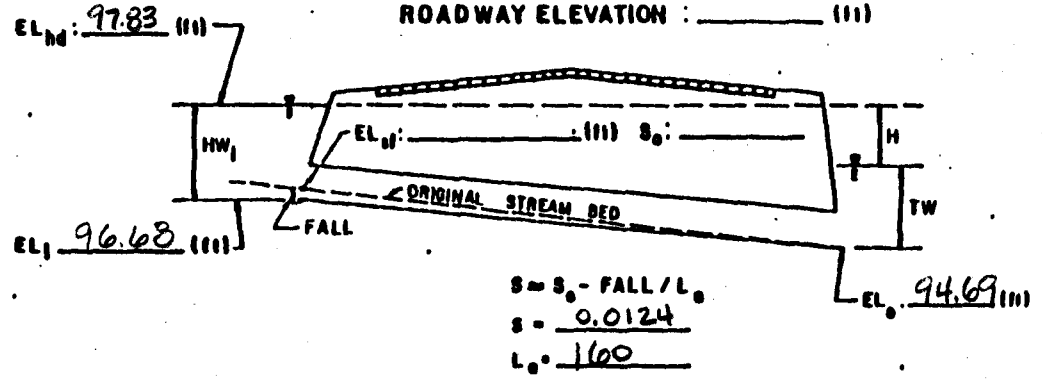
HYDROLOGICAL DATA

SEE ADD'L. SHTS.

- [x] METHOD: RATIONAL
- [x] DRAINAGE AREA: 0.25 [ ] STREAM SLOPE:
- [ ] CHANNEL SHAPE:
- [ ] ROUTING: [ ] OTHER.

DESIGN FLOWS/TAILWATER

R.I. (YEARS)	FLOW (cfs)	TW (ft)
10	1.19	1.0 (0.8 × CULV DIA.)



CULVERT DESCRIPTION: MATERIAL - SHAPE - SIZE - ENTRANCE	TOTAL FLOW Q (cfs)	FLOW PER BARREL Q/N (1)	HEADWATER CALCULATIONS: INLET CONTROL HW_i/D (2)	HW_i	FALL (3)	EL_{hi} (4)	OUTLET CONTROL TW (5)	d_c	$\frac{d_c+D}{2}$	h_o (6)	h_o	H (7)	EL_{ho} (8)	CONTROL HEADWATER ELEVATION	OUTLET VELOCITY	COMMENTS
RCP-CIR-15" GROOVED & PROJECTED	1.19	1.19	0.6	1.15	Ø	97.83	1.0	0.5	0.88	1.0	0.2	1.2	96.89	97.83	3.7	

TECHNICAL FOOTNOTES:

(1) USE Q/NB FOR BOX CULVERTS

(2) HW_i/D = HW /D OR HW_i/D FROM DESIGN CHARTS

(3) FALL = $HW_i - (EL_{hd} - EL_{ii})$; FALL IS ZERO FOR CULVERTS ON GRADE

(4) $EL_{hi} = HW_i + EL_i$ (INVERT OF INLET CONTROL SECTION)

(5) TW BASED ON DOWN STREAM CONTROL OR FLOW DEPTH IN CHANNEL.

(6) h_o = TW or $(d_c + D/2)$ (WHICHEVER IS GREATER)

(7) $H = \left[1 + h_o + (29n^2 L)/R^{1.33}\right] V^2/2g$

(8) $EL_{ho} = EL_o + H + h_o$

SUBSCRIPT DEFINITIONS:

- a. APPROXIMATE
- f CULVERT FACE
- hd. DESIGN HEADWATER
- hi. HEADWATER IN INLET CONTROL
- ho HEADWATER IN OUTLET CONTROL
- i INLET CONTROL SECTION
- o. OUTLET
- ii STREAMBED AT CULVERT FACE
- tw TAILWATER

COMMENTS / DISCUSSION:

$I_{10} = 6.8$ (NORFOLK)

$Q_{10} = C \cdot I_{10} \cdot A$

$Q_{10} = 0.7 \times 6.8 \times 0.25 = 1.19$ CFS

CULVERT BARREL SELECTED:

SIZE

SHAPE:

MATERIAL: n

ENTRANCE:

PROJECT: JCSA OPERATIONS CENTER SITE EXPANSION	STATION: CULVERT #2 (CULVERT @ PARKING LOT) SHEET 2 OF 3	CULVERT DESIGN FORM DESIGNER/DATE: RDS / 11/17/00 REVIEWER/DATE: /

HYDROLOGICAL DATA

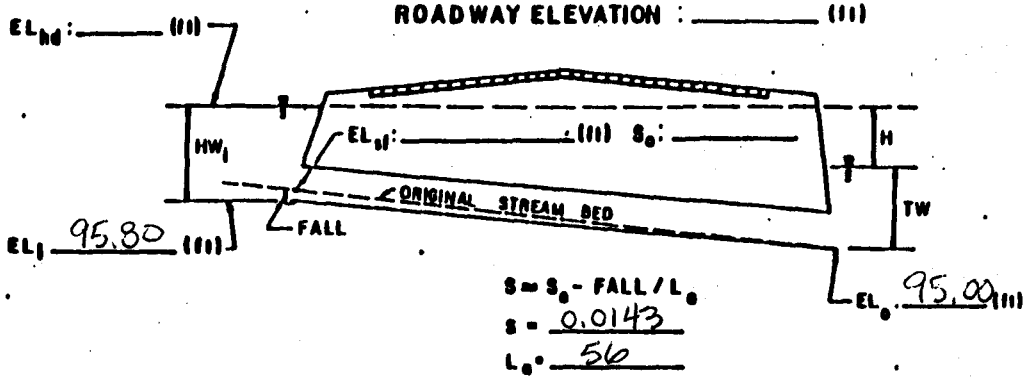
SEE ADD'L. SHTS.

- ☐ METHOD: RATIONAL
- ☐ DRAINAGE AREA: 0.17 ☐ STREAM SLOPE: _____
- ☐ CHANNEL SHAPE: "V"
- ☐ ROUTING: _____ ☐ OTHER: _____

DESIGN FLOWS/TAILWATER

R.I. (YEARS)	FLOW (cfs)	TW (ft)
10	0.6 CFS	0.8

ROADWAY ELEVATION: _____ (ft)



$S = S_o - FALL / L_o$

$S = 0.0143$

$L_o = 56$

CULVERT DESCRIPTION: MATERIAL - SHAPE - SIZE - ENTRANCE	TOTAL FLOW Q (cfs)	FLOW PER BARREL Q/N (1)	HEADWATER CALCULATIONS: INLET CONTROL HW_i/D (2)	HW_i	FALL (3)	EL_{hi} (4)	OUTLET CONTROL TW (5)	d_c	$\frac{d_c+D}{2}$	h_o (6)	h_o	H (7)	EL_{ho} (8)	CONTROL HEADWATER ELEVATION	OUTLET VELOCITY	COMMENTS
RCP/CIR./12"Ø/GROOVED & PROJECTED	0.6	0.6	0.5	0.92	Ø	96.72	0.8	0.4	0.7	0.7	0.2	0.4	96.10	96.72	3.5	OK

TECHNICAL FOOTNOTES:

(1) USE Q/NB FOR BOX CULVERTS

(2) $HW_i/D = HW/D$ OR HW_i/D FROM DESIGN CHARTS

(3) $FALL = HW_i - (EL_{hd} - EL_{ol})$; FALL IS ZERO FOR CULVERTS ON GRADE

(4) $EL_{hi} = HW_i + EL_i$ (INVERT OF INLET CONTROL SECTION)

(5) TW BASED ON DOWN STREAM CONTROL OR FLOW DEPTH IN CHANNEL.

(6) h_o = TW or $(d_c + D/2)$ (WHICHEVER IS GREATER)

(7) $H = \left[1 + h_o + (29n^2 L)/R^{1.33}\right] V^2/2g$

(8) $EL_{ho} = EL_o + H + h_o$

SUBSCRIPT DEFINITIONS:

- a. APPROXIMATE
- f CULVERT FACE
- hd. DESIGN HEADWATER
- hi. HEADWATER IN INLET CONTROL
- ho HEADWATER IN OUTLET CONTROL
- i INLET CONTROL SECTION
- o. OUTLET
- ol STREAMBED AT CULVERT FACE
- tw. TAILWATER

COMMENTS / DISCUSSION:

DRAINAGE AREA = 0.17

$I_{10} = 6.8$ IN/HR (NORFOLK)

$Q_{10} = C \cdot I_{10} \cdot A$

$Q_{10} = 0.5 \cdot 6.8 \cdot 0.17 = 0.6$ CFS

CULVERT BARREL SELECTED:

SIZE: 12"

SHAPE: CIRCULAR

MATERIAL: RCP n 0.13

ENTRANCE: GROOVED/PROJECTED

PROJECT: JCSA OPERATIONS CENTER SITE EXPANSION	STATION: CULVERT #3 (CULVERT @ FORE BAY)	CULVERT DESIGN FORM
	SHEET 3 OF 3	DESIGNER / DATE: RDS / 11/17/00
		REVIEWER / DATE: /

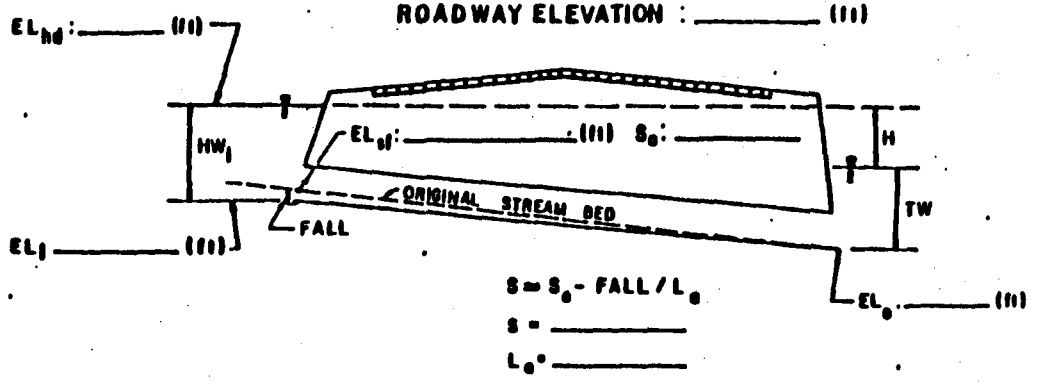
HYDROLOGICAL DATA

SEE ADD'L SHTS.

- ☐ METHOD: RATIONAL
- ☐ DRAINAGE AREA: 0.92 AC ☐ STREAM SLOPE:
- ☐ CHANNEL SHAPE: "V"
- ☐ ROUTING: ☐ OTHER:

DESIGN FLOWS/TAILWATER

R.I. (YEARS)	FLOW (cfs)	TW (ft)
10	4.89	0.8



CULVERT DESCRIPTION: MATERIAL - SHAPE - SIZE - ENTRANCE	TOTAL FLOW Q (cfs)	FLOW PER BARREL Q/N (1)	HEADWATER CALCULATIONS: INLET CONTROL HW_i/D (2)	HW_i	FALL (3)	EL_{hi} (4)	OUTLET CONTROL TW (5)	d_c	$\frac{d_c+D}{2}$	h_o (6)	h_o	H (7)	EL_{ho} (8)	CONTROL HEADWATER ELEVATION	OUTLET VELOCITY	COMMENTS
RCP/CIR./12"Ø/ GROOVED & PROJECTED	4.89	4.89	0.64	0.92	Ø	93.80	0.8	0.9	0.95	0.95	0.2	0.4	92.85	93.80	9.2	OK OUTLET PROTECT.

TECHNICAL FOOTNOTES:

(1) USE Q/NB FOR BOX CULVERTS

(2) HW_i/D = HW/D OR HW_i/D FROM DESIGN CHARTS

(3) FALL = $HW_i - (EL_{hd} - EL_{of})$; FALL IS ZERO FOR CULVERTS ON GRADE

(4) $EL_{hi} = HW_i + EL_i$ (INVERT OF INLET CONTROL SECTION)

(5) TW BASED ON DOWN STREAM CONTROL OR FLOW DEPTH IN CHANNEL.

(6) h_o = TW or $(d_c + D/2)$ (WHICHEVER IS GREATER)

(7) $H = \left[1 + h_o + (29n^2 L)/R^{1.33}\right] V^2/2g$

(8) $EL_{ho} = EL_o + H + h_o$

SUBSCRIPT DEFINITIONS:

a. APPROXIMATE
f CULVERT FACE
hd. DESIGN HEADWATER
hi. HEADWATER IN INLET CONTROL
ho HEADWATER IN OUTLET CONTROL
i INLET CONTROL SECTION
o. OUTLET
of STREAMBED AT CULVERT FACE
tw. TAILWATER

COMMENTS / DISCUSSION: DRAINAGE AREA = 0.92

I_{10} = 6.8 IN/HR (NORFOLK)

$Q_{10} = C \cdot I_{10} \cdot A$

$Q_{10} = 0.66 \cdot 6.8 \cdot 1.09 = 4.89$ CFS

CULVERT BARREL SELECTED:

SIZE: 12"

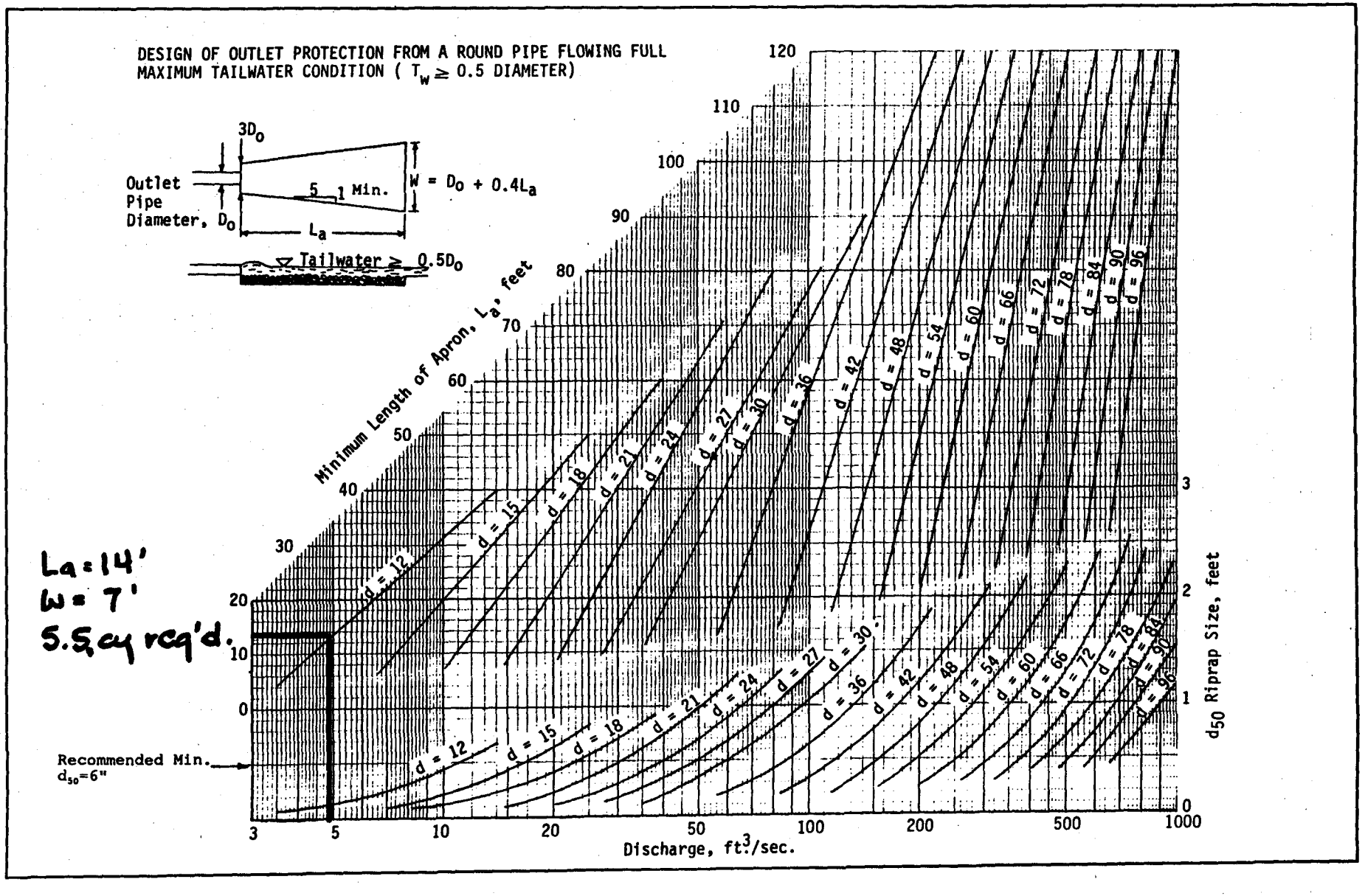
SHAPE: CIRCULAR

MATERIAL: RCP n 0.13

ENTRANCE: GROOVED / PROJECTED

JCSA OPERATIONS CENTER SITE EXPANSION

CULVERT #3

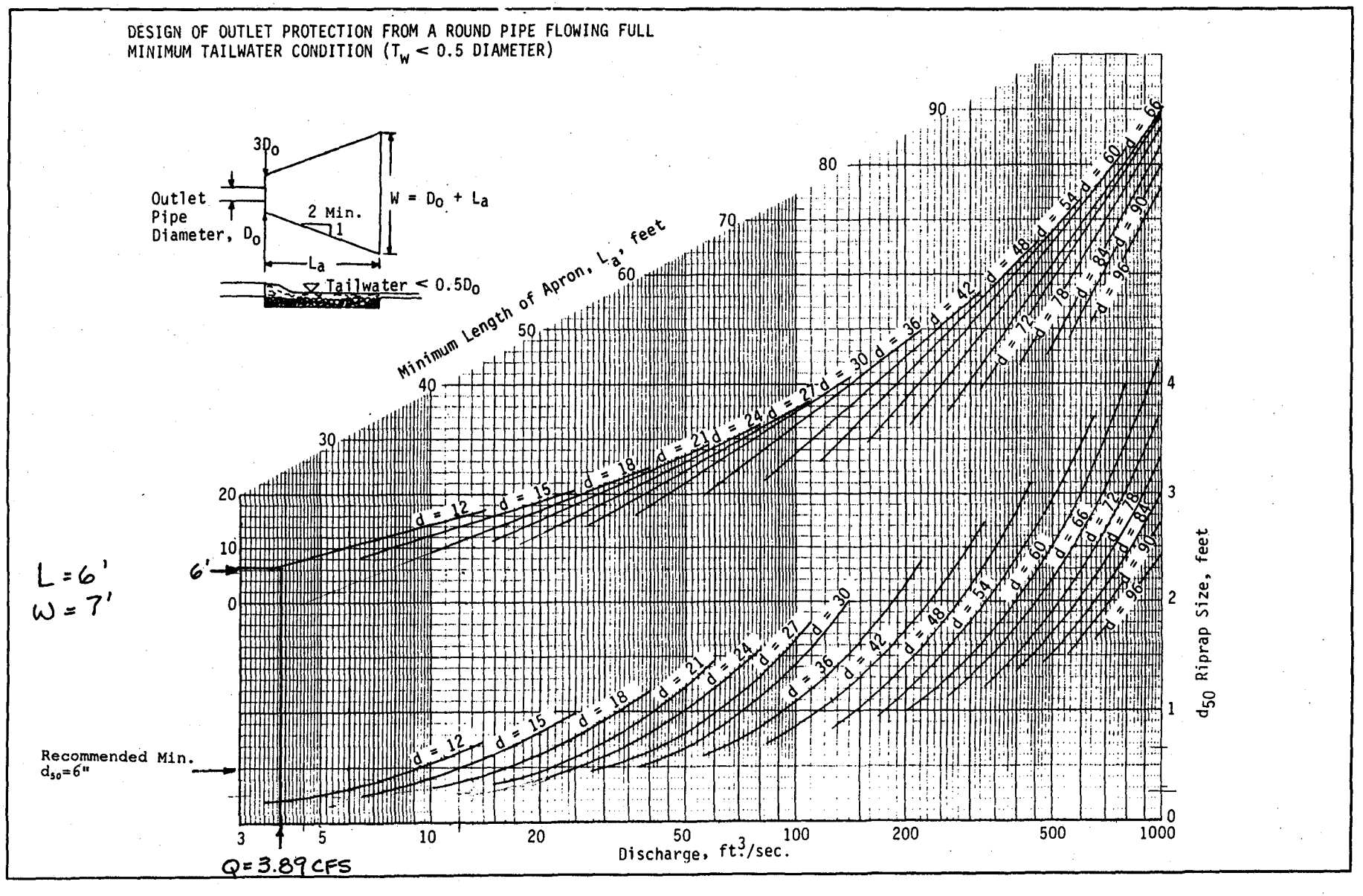


Source: USDA-SCS

Plate 3.18-4

JCSA OPERATIONS CENTER SITE EXPANSION

STILLING BASIN DESIGN AT BMP



Source: USDA-SCS

Plate 3.18-3

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

PROJECT JCSA TEWNING ROAD SITE
PROJECT NO. 8651-18
SUBJECT BMP POINTS
SHEET NO. 1 OF 1
CALCULATED BY VMB DATE 10/3/00

- AREA OF SITE SERVED BY BMP = 3.83 Ac
- TOTAL AREA OF PROJECT SITE = 4.43 Ac

A. STRUCTURAL BMP POINT ALLOCATION

BMP TYPE	BMP POINTS FOR TYPE		FRACTION OF SITE SERVED BY BMP		WEIGHTED BMP POINTS
WET ED POND WQ_v = 2.0 IN/IMP. ACRE	10	×	$\frac{3.83\ Ac}{4.43\ Ac}$	=	8.6

B. NATURAL OPEN SPACE CREDIT

POINTS NEEDED AS OPEN SPACE CREDIT
10 POINT − 8.6 (STRUCTURAL BMP POINTS) = 1.4 POINTS

→ IF OPEN SPACE "DISCONNECTED" FROM IMPERVIOUS SURFACES THEN OPEN SPACE CREDIT = 0.15 POINTS / 1% OF TOTAL SITE AREA

THUS $\frac{1.4\ \text{POINTS}}{0.15\ \text{POINTS} / 1\%\ \text{OF TOTAL SITE AREA}}$ = 9.3% OF TOTAL SITE AREA

⇒ 9.3% × 4.43 Ac = 0.41 ACRES OF OPEN SPACE REQ'D.

→ IF OPEN SPACE "NOT DISCONNECTED FROM IMPERVIOUS SURFACES, THEN OPEN SPACE CREDIT = 0.10 POINTS / 1% OF TOTAL SITE AREA

THUS $\frac{1.4\ \text{POINTS}}{0.1\ \text{POINTS} / 1\%\ \text{OF TOTAL SITE AREA}}$ = 14% OF TOTAL SITE AREA

⇒ 14% × 4.43 Ac = 0.62 ACRES OF OPEN SPACE REQ'D.

SP-140-00

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

JAN 2001
RECEIVED
PLANNING DEPARTMENT

October 31, 2000

Mr. Marc Bennett, PE
AES Consulting Engineers
5248 Olde Towne Road
Suite 1
Williamsburg, Virginia 23188

PRE-CON GEOTECH
HA-2 & HA-3
FINE SAND
ENCOUNTERED
NEEDS CLAY LINER
TO HOLD WATER. SAT.

Reference: JCSA Operations Center Site Expansion
Tewning Road
James City County, Virginia

ECS Project No. W5007

Dear Mr. Bennett:

As requested, ECS, Ltd. personnel performed four (4) hand auger borings to depths of 5.5 to 10 feet below the existing ground surface within the vicinity of the proposed parking lots and BMP/SWM as indicated on the attached Hand Auger Boring Location Diagram. The purposes of this exploration were to evaluate the soil and groundwater conditions at this site and provide recommendations to aid in the design of the stone parking/drive areas and the BMP/SWM.

At the time of this site visit, performed on October 9, 2000, the project site was generally wooded. A small area at the VDOT storage location area had been cleared near the front. The clearing had a mound of approximately 13 feet of unknown material that is likely topsoil. The topography of the parcel generally sloped down toward the west-southwest. It is our understanding that the proposed construction includes a new stone parking area on the east side of the parcel for automobiles, a stone parking/drive lane area on the west side of the parcel for material operations trucks and a BMP/SWM pond located near the southwest corner of the parcel for stormwater management.

The soil deposits encountered in the borings were classified in the field in general accordance with ASTM D-2488 (Description and Identification of Soils - Visual/Manual Procedures). Groundwater was encountered at a depth of 6 feet at the location of hand auger boring HA-3. This may be a perched groundwater condition, since it was not encountered in the other hand auger borings. Field classification indicated that the subsurface soils were generally arranged as shown on the attached hand auger boring logs.

The soil samples were returned to our Williamsburg laboratory for further visual classification and laboratory testing. The results of that testing are summarized in the following table:

Boring Number	Sample Number	Depth (feet)	% Passing #200 Sieve	Moisture Content (%)	Atterberg Limits LL/PL/PI	USCS Symbol
HA-2	S-2	2.0-4.0	58.6	17.1	25/16/9	CL
HA-2	S-3	4.0-8.0	45.9	18.5	Non-Plastic	SM
HA-3	S-2	1.5-4.5	38.7	21.7	29/20/9	SC
HA-3	S-3	4.5-5.5	34.1	23.6	Non-Plastic	SM

Based on the surficial soils encountered within this parcel that consisted of silty fine sands, we recommend a design CBR of 7 and a resiliency factor of 3 be considered for design purposes. This results in a soil support value of 21. With an ADT of 160 for the eastern parking area (2 trips per day per space), 6 inches of cement treated aggregate is the minimum recommended thickness. A minimum thickness of 8 inches of cement treated aggregate is recommended for the western operations area. These fine sands are moisture sensitive and will become unstable with moisture contents more than 3% over optimum. If these conditions exist during construction, a light duty geotextile fabric may need to be placed to provide a reliable separation of the soil and stone and aid in stabilizing the underlying subgrade soil. Cement treated aggregate must be moisture conditioned and compacted very quickly and not be allowed to "set-up" in an undercompacted state.

Based on the hand auger borings, we recommend that an initial site stripping cut of 10 inches be considered for planning purposes, to remove topsoil and rootmat material. Surficial silty sands appear to be suitable for reuse as engineered fill as needed, but may require moisture conditioning (drying or wetting) to facilitate compaction. Finish subgrade should be compacted to at least 95% of the material's maximum dry density, as obtained from the standard Proctor, ASTM D-698. Fill should be placed in 10 inch maximum loose lifts, moisture conditioned to within 3% of the optimum moisture content and compacted to at least 95% of the materials maximum dry density. The subgrade should also be proofrolled with a loaded tandem axle dump truck prior to placing cement treated aggregate, to identify any areas that may require reworking and recompaction.

If VDOT specifications are to applied for this project, the upper 6 inches of soil subgrade must be compacted to 100% of the material's maximum dry density obtained from the standard Proctor, ASTM D-698. Below a depth of 6 inches, 95% compaction still applies.

The keyway for the pond should be cut to a depth of approximately 3 feet to be within the clayey material. This depth should be fine-tuned in the field during construction by performing a shallow test pit. The width of the keyway should be a minimum of 3 feet, but will need to be wide enough to permit compaction equipment access. If the pond is desired to have a permanent

pool elevation, a clay liner may need to be placed within the basin to at least the desired pool elevation. This clay liner should have a minimum of 60% fines (clays and silts – materials passing the #200 sieve). Fill should be benched into existing slopes, placed in 10 inch maximum loose lifts and compacted to at least 95% of the material's maximum dry density obtained from the standard Proctor, ASTM D-698. Material proposed for the core should be observed, tested and approved by the geotechnical engineer prior to use on the project. Based on the hand auger borings, it appears likely that a suitable core material will need to be imported. All organics (topsoil and rootmat) should be completely removed from the earth dam footprint prior to fill placement.

We have appreciated the opportunity to be of service to AES Consulting Engineers on this project. Please call if we can be of any further assistance, such as providing field testing and inspection services during construction, or if you have any questions with regard to the information submitted herein.

Respectfully,

ENGINEERING CONSULTING SERVICES, LTD.

Mark L. Jenkins

Mark L. Jenkins, P.E.
Project Engineer
Williamsburg Branch Manager

COMMONWEALTH OF VIRGINIA
MARK L. JENKINS
No. 26153
PROFESSIONAL ENGINEER

Enclosures: Hand Auger Boring Location Diagram
Hand Auger Boring Logs
USCS Classification Summary

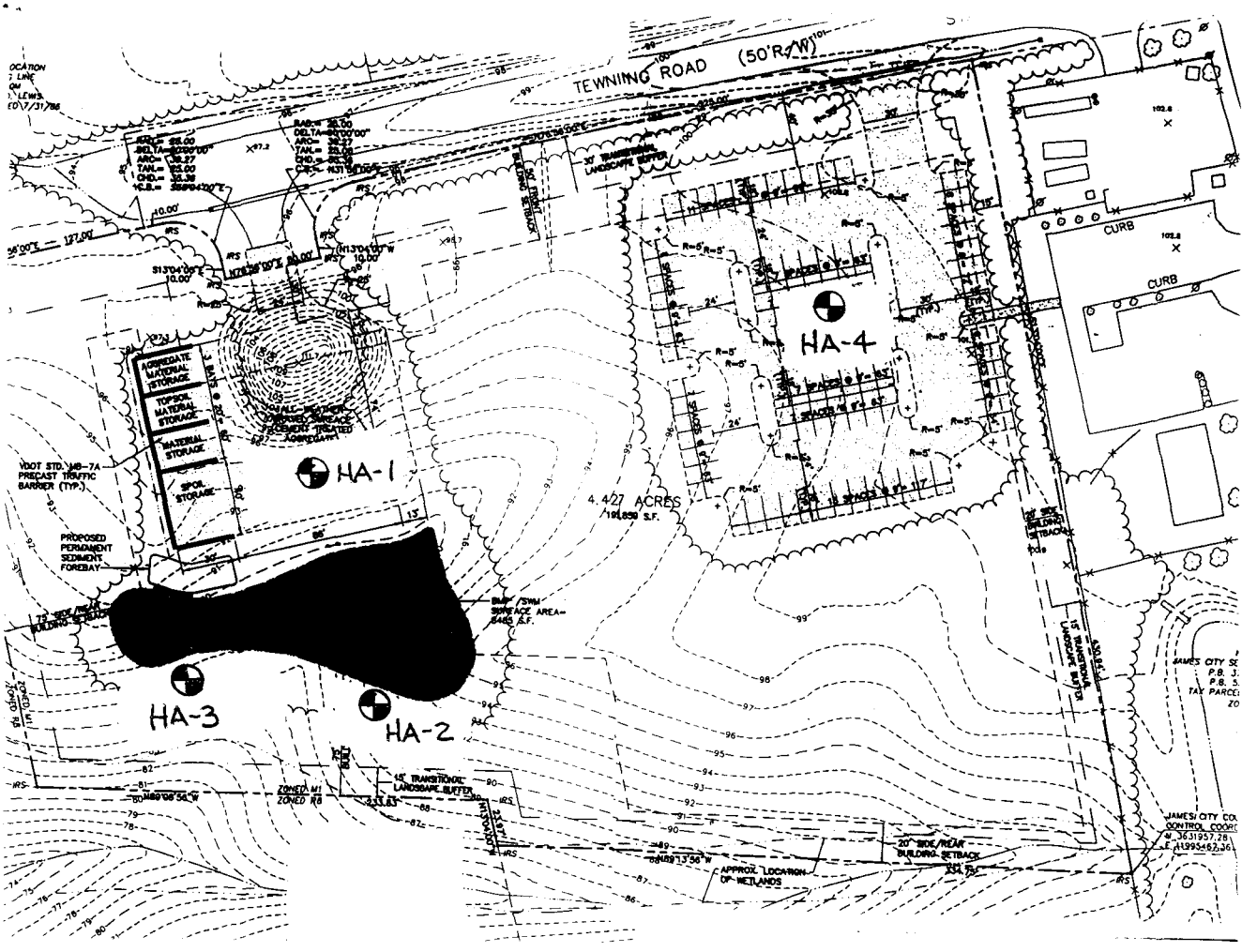
mlj\cd\jcsa-oc.doc

HAND AUGER BORING LOCATION DIAGRAM

ECS PROJECT #: W5007

PROJECT: JCSA OPERATIONS CENTER
LOCATION: TEWNING ROAD
COUNTY, STATE: JAMES CITY COUNTY, VIRGINIA
ADC MAP PAGE/GRID: VP/5/J-6

NOT TO SCALE



= Approximate hand auger boring location

HAND AUGER BORING LOGS

ECS PROJECT NO: W5007

PROJECT: JCSA OPERATIONS CENTER
LOCATION: TEWNING ROAD
COUNTY AND STATE: JAMES CITY COUNTY, VIRGINIA
ADC MAP PAGE/GRID: VP/5/J-6

DEPTH (inches)	BORING NUMBER: HA-1 DESCRIPTION OF MATERIALS
0-10	Topsoil
10-36	Light Brown, Moist, Silty Fine SAND (SM)
36-54	Light Brown, Moist, Fine Sandy CLAY (CL-SC), Trace Sand Lenses
54-66	Orangish Brown, Moist, Silty Fine SAND (SM)
	GROUNDWATER NOT ENCOUNTERED.
	END OF BORING AT 66 INCHES

DEPTH (inches)	BORING NUMBER: HA-2 DESCRIPTION OF MATERIALS
0-10	Topsoil
10-24	Light Brown, Moist, Silty Fine SAND (SM)
24-48	Light Brown, Moist, Fine Sandy CLAY (CL-SC), Trace Sand Lenses
48-96	Light Brown, Moist, Silty Fine SAND (SM)
96-120	Orangish Brown, Moist, Silty Fine SAND (SM)
	GROUNDWATER NOT ENCOUNTERED.
	END OF BORING AT 120 INCHES

Note: Soils were classified in general accordance with ASTM D-2488 (Description and Identification of Soils - Visual/Manual Procedures)

HAND AUGER BORING LOGS

ECS PROJECT NO: W5007

PROJECT: JCSA OPERATIONS CENTER
LOCATION: TEWNING ROAD
COUNTY AND STATE: JAMES CITY COUNTY, VIRGINIA
ADC MAP PAGE/GRID: VP/5/J-6

DEPTH (inches)	BORING NUMBER: HA-3 DESCRIPTION OF MATERIALS
0-10	Topsoil
10-18	Light Brown, Moist, Silty Fine SAND (SM)
18-54	Light Brown and Gray, Moist, Clayey Fine SAND (SC)
54-72	Orangish Brown, Moist to Wet, Silty Fine SAND (SM), Trace Clay
	GROUNDWATER ENCOUNTERED AT 6 FEET
	NO RECOVERY BEYOND 72 INCHES DUE TO GROUNWATER

DEPTH (inches)	BORING NUMBER: HA-4 DESCRIPTION OF MATERIALS
0-10	Topsoil
10-30	Light Brown, Moist, Silty Fine SAND (SM)
30-42	Orangish Brown, Moist, Fine Sandy CLAY (CL)
42-66	Light Brown, Moist, Silty Fine SAND (SM)
	GROUNDWATER NOT ENCOUNTERED.
	END OF BORING AT 66 INCHES

Note: Soils were classified in general accordance with ASTM D-2488 (Description and Identification of Soils - Visual/Manual Procedures)

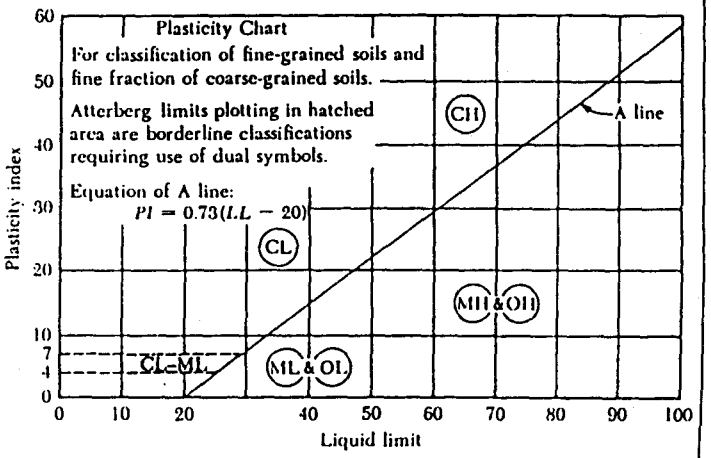
UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

Table Unified System of Classification

Major divisions			Group symbols	Typical names
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels 50% or more of coarse fraction retained on No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		Gravels with Fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sands More than 50% of coarse fraction passes No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		Sands with Fines	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
Fine-Grained Soils 50% or more passes No. 200 sieve	Silts and Clays Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck, and other highly organic soils

Table (Continued)

Classification criteria		
Classification on basis of percentage of fines Less than 5% pass No. 200 sieve: GW, GP, SW, SP More than 12% pass No. 200 sieve: GM, GC, SM, SC 5% to 12% pass No. 200 sieve: Borderline classification requiring use of dual symbols	$C_u = D_{60}/D_{10}$ Greater than 4 $C_z = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
	Not meeting both criteria for GW	
	Atterberg limits plot below "A" line or plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols
	Atterberg limits plot above "A" line and plasticity index greater than 7	
	$C_u = D_{60}/D_{10}$ Greater than 6 $C_z = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
	Not meeting both criteria for SW	
	Atterberg limits plot below "A" line or plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols
	Atterberg limits plot above "A" line and plasticity index greater than 7	



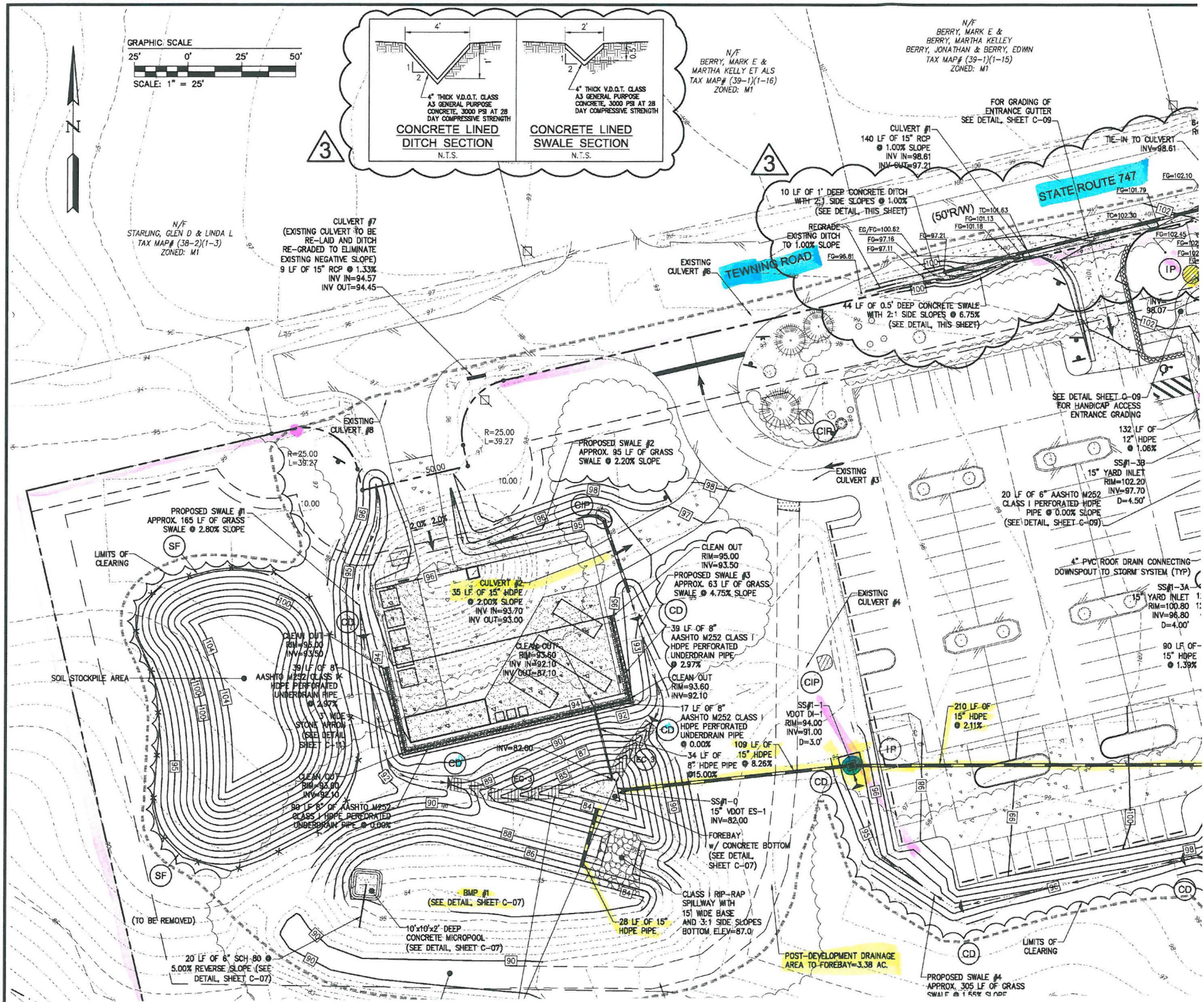
Visual-manual identification, see ASTM Designation D2488.

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 data they were added.

Name	Content	Date
Jo Anna Ripley	Grading and Drainage Plan JCSA Operations Center	05/09/2013

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	PC168 JCSA OPERATIONS CENTER GRADING AND DRAINAGE PLAN	1/14/2014


GRAPHIC SCALE
25' 0' 25' 50'
SCALE: 1" = 25'
N
4" THICK V.D.O.T. CLASS A3 GENERAL PURPOSE CONCRETE, 3000 PSI AT 28 DAY COMPRESSIVE STRENGTH
CONCRETE LINED DITCH SECTION
N.T.S.
4" THICK V.D.O.T. CLASS A3 GENERAL PURPOSE CONCRETE, 3000 PSI AT 28 DAY COMPRESSIVE STRENGTH
CONCRETE LINED SWALE SECTION
N.T.S.
N/F BERRY, MARK E & MARTHA KELLY ET ALS TAX MAP# (39-1)(1-16) ZONED: M1
N/F BERRY, MARK E & BERRY, MARTHA KELLY BERRY, JONATHAN & BERRY, EDWIN TAX MAP# (39-1)(1-15) ZONED: M1
N/F STARLING, GLEN D & LINDA L TAX MAP# (38-2)(1-3) ZONED: M1
FOR GRADING OF ENTRANCE GUTTER SEE DETAIL, SHEET C-09
CULVERT #1 140 LF OF 15" RCP @ 1.00% SLOPE INV IN=98.61 INV OUT=97.21
TIE-IN TO CULVERT INV=98.61
STATE ROUTE 747
10 LF OF 1' DEEP CONCRETE DITCH WITH 2:1 SIDE SLOPES @ 1.00% (SEE DETAIL, THIS SHEET)
(50'R/W)
REGRADE EXISTING DITCH TO 1.00% SLOPE
TEWNING ROAD
EXISTING CULVERT #6
44 LF OF 0.5' DEEP CONCRETE SWALE WITH 2:1 SIDE SLOPES @ 6.75% (SEE DETAIL, THIS SHEET)
CULVERT #7 (EXISTING CULVERT TO BE RE-LAID AND DITCH RE-GRADED TO ELIMINATE EXISTING NEGATIVE SLOPE) 9 LF OF 15" RCP @ 1.33% INV IN=94.57 INV OUT=94.45
EXISTING CULVERT #8
R=25.00 L=39.27
PROPOSED SWALE #2 APPROX. 95 LF OF GRASS SWALE @ 2.20% SLOPE
EXISTING CULVERT #3
SEE DETAIL SHEET C-09 FOR HANDICAP ACCESS ENTRANCE GRADING
132 LF OF 12" HDPE @ 1.06%
SS#1-3B 15" YARD INLET RIM=102.20 INV=97.70 D=4.50'
20 LF OF 6" AASHTO M252 CLASS I PERFORATED HDPE PIPE @ 0.00% SLOPE (SEE DETAIL, SHEET C-09)
PROPOSED SWALE #1 APPROX. 165 LF OF GRASS SWALE @ 2.80% SLOPE
LIMITS OF CLEARING
CLEAN OUT RIM=95.00 INV=93.50
PROPOSED SWALE #3 APPROX. 63 LF OF GRASS SWALE @ 4.75% SLOPE
CULVERT #2 35 LF OF 15" HDPE @ 2.00% SLOPE INV IN=93.70 INV OUT=93.00
EXISTING CULVERT #4
4" PVC ROOF DRAIN CONNECTING DOWNSPOUT TO STORM SYSTEM (TYP)
SS#1-3A 15" YARD INLET RIM=100.80 INV=96.80 D=4.00'
39 LF OF 8" AASHTO M252 CLASS I HDPE PERFORATED UNDERDRAIN PIPE @ 2.97%
CLEAN OUT RIM=93.60 INV IN=92.10 INV OUT=87.10
CLEAN OUT RIM=93.60 INV=92.10
SOIL STOCKPILE AREA
39 LF OF 8" AASHTO M252 CLASS I HDPE PERFORATED UNDERDRAIN PIPE @ 2.97%
17 LF OF 8" AASHTO M252 CLASS I HDPE PERFORATED UNDERDRAIN PIPE @ 0.00%
SS#1-1 VDOT DI-1 RIM=94.00 INV=91.00 D=3.0'
210 LF OF 15" HDPE @ 2.11%
90 LF OF 15" HDPE @ 1.39%
7' WIDE STONE ARROW (SEE DETAIL SHEET C-11)
INV=82.00
109 LF OF 15" HDPE @ 8.26%
34 LF OF 8" HDPE PIPE @ 15.00%
CLEAN OUT RIM=93.80 INV=92.10
80 LF 8" OF AASHTO M252 CLASS I HDPE PERFORATED UNDERDRAIN PIPE @ 0.00%
SS#1-0 15" VDOT ES-1 INV=82.00
FOREBAY w/ CONCRETE BOTTOM (SEE DETAIL, SHEET C-07)
BMP #1 (SEE DETAIL, SHEET C-07)
CLASS I RIP-RAP SPILLWAY WITH 15' WIDE BASE AND 3:1 SIDE SLOPES BOTTOM ELEV=87.0'
28 LF OF 15" HDPE PIPE
(TO BE REMOVED)
10'x10'x2' DEEP CONCRETE MICROPOOL (SEE DETAIL, SHEET C-07)
20 LF OF 6" SCH 80 @ 5.00% REVERSE SLOPE (SEE DETAIL, SHEET C-07)
POST-DEVELOPMENT DRAINAGE AREA TO FOREBAY=3.38 AC.
LIMITS OF CLEARING
PROPOSED SWALE #4 APPROX. 305 LF OF GRASS SWALE @ 1.55% SLOPE

TRANSMITTAL SHEET

ENGINEERING & RESOURCE PROTECTION → STORMWATER

Project: **JCSA Operations Center and Goodyear Tire (Piping only)**

County Plan No. **SP-110-10 and SP-112-1-1**

Assigned BMP No.: **PC-168 (JCSA OPERATIONS CENTER)**

BMP Type: **Wet Pond**

Information Enclosed:

X Record Drawings (Asbuilts)

X Construction Certification

X Computations

☐ Other:

Note: ***The JCSA Operations Center does have as built or record drawing. It has been accepted by the county as is.***

Name: Gregory B. Johnson

Date: February 15, 2013

Signature: _____

RECEIVED ON
FEB 15 '13
Stormwater Division

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

Project Name: JCSA OPERATIONS CENTER
County Plan No. (List any amendments): SP-53-09
Stormwater Management Facility Type: BMP
BMP Phase #: ☐ I ☐ II ☐ III

- ☒ Information Package Submittal Date: NO PACKET SUBMITTED SEE ATTACHED LETTER
- ☒ Completeness Check:
  - ☐ Record Drawing Date/By: ____
  - ☐ Construction Certification Date/By: ____
  - ☐ RD/CC Standard Forms (Ensure that all forms for the BMP type are included)
  - ☐ Insp/Maint Agreement # / Date: ____
  - ☐ BMP Maintenance Plan Location: ____
  - ☐ Special Considerations: ____
- ☒ Standard E&SC Notes on Approved Plan Requiring RD/CC or County comment in plan review
  Location (sheet #): ____
- ☒ **County BMP ID Code #:** PC-108
- ☐ Log into Division's "As-Built Tracking Log"
- ☐ Obtain basic site information (GPIN, Owner, Address, etc.)
- ☒ Log into Access Database (BMP ID #, Plan No., GPIN, Project Name, etc.)
- ☒ Copy from Active Project File (correspondence, H&H, design computations, etc.).
- ☒ Create As-Built File using Project File information (File label, folder, copy plan/details/design information, etc.).
- ☒ Inspector Review of RD/CC (consult with Chief Engineer prior to completion of comments).
- ☐ Record Drawing Review against Approved Plan prior to Field Inspection.
- ☐ Final Site Inspection (FI) Performed Date: 2/05/2013
- ☐ Record Drawing (RD) Review Date: ____
- ☐ Construction Certification (CC) Review Date: ____
- ☐ Actions:
  - ☐ No comments.
  - ☐ Comments. Letter Forwarded. Date:
  - ☐ Record Drawing (RD)
  - ☐ Construction Certification (CC)
  - ☐ Construction-Related (CR)
  - ☐ Site Issues (SI)
  - ☒ Other : SEE ATTACHED INSPECTION REPORT
- ☐ Resubmittal (# and date): ____
- ☐ Re-inspection (if necessary): ____
- ☐ Drainage System Information Acceptable (RD/CC/System Info). Ok for bond release.
- ☒ Complete "Surety Request Form".
- ☐ Final Inspection of active file copying any relevant information to "As-Built" file.
- ☐ On County BMP Inventory (Phase I, II or III).
- ☐ Copy Final Inspection Report into County BMP Inspection Program file.
- ☐ Provide Digital Photographs of BMP and save into County BMP Inventory.
- ☐ Request mylar/reproducible from As-Built plan preparer.
- ☐ Complete "As-built Tracking Log".
- ☐ Last check of BMP Access Database (County BMP Inventory).
- ☐ Add BMP to JCC Hydrology & Hydraulic database (optional).
- ☐ Add BMP to Municipal BMP list (if a County-owned facility)
- ☐ Add BMP to PRIDE BMP ratings database.

Final Sign-Off

Inspector: [signature] Date: 2/8/2013

Chief Engineer: ____ Date: ____

*** See separate checklist, if needed.

SP-53-09

Final Project Closeout Change Order
Full and Final Settlement of Contract Disputes

Project: **James City Service Authority Administration/Operations Building, JCSA Contract No. 10-3736**
Owner: **James City Service Authority**
Contractor: **Raymond Key Commercial Contracting, LLC**
Surety: **Fidelity and Deposit Company of Maryland**

This Final Project Closeout Change Order is agreed to by and between the Project Owner, James City Service Authority ("JCSA") and the Project Surety, Fidelity and Deposit Company of Maryland ("F&D"), as surety and also as assignee of the rights of the Project Contractor, Raymond Key Commercial Contracting, LLC ("RKCC"), in modification of the contract for this project in final and complete resolution of all project disputes, including but not limited to the contract balance and further performance obligations. The parties acknowledge good and valuable consideration exchanged for this change order, which includes the representation and promises herein.

Agreed modified contract closeout terms:

1. Final Contract Reconciliation: Attached hereto as Exhibit 1 is an agreed final contract reconciliation, which includes all additive and deductive claims of all parties. As set forth therein, it is agreed that the final contract sum, inclusive of all additive or deductive claims, is $2,148,075.02. The balance due of $89,299.13 shall be paid by JCSA to F&D, without offset, on or before January18, 2013.

2. Substantial Completion Date: The parties agree that the substantial completion date for the project is October 19, 2011. To the extent not already expired, project warranties run from that date, and nothing herein is intended to extend or add warranties. Except as may relate to any unexpired warranties, neither RKCC nor F&D have further completion or submission obligation, and the project and all required performance under the contract is accepted by JCSA as is.

3. Execution: This change order may be executed in one or more counterparts, including counterparts that are electronically or facsimile signed or transmitted. The parties signing this change order warrant they are authorized to sign this change order, including in the capacities noted.

WITNESS the following signatures and seals:

Larry M. Foster [SEAL]
James City Service Authority
By: Larry M. Foster, Manager and Authorized Agent

Carl C. Coe Jr. [SEAL]
Fidelity and Deposit Company of Maryland, as surety and also as assignee of the Rights of Raymond Key Commercial Contracting, LLC
By: Carl C. Coe, Jr., Senior Claims Counsel and Authorized Agent

Environmental Division
FEB 07 2013
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JCSA Final Contract Reconciliation - For Settlement Purposes

Original Contract	$	2,251,000.00
Prior Approved COs		
CO No. 01	$	17,126.01
CO No. 02	$	14,927.13
CO No. 02A	$	(11,350.00)
CO No. 03	$	8,798.07
CO No. 04	$	(9,592.51)
Subtotal =	$	19,908.70
Additional Adds/Deducts Agreed for Final CO		
No. 2R2 (Electrical Vaults)	$	1,500.00
No. 13 (Electrical for Ice Machine)	$	844.32
No. 25R (Rigid Wall & Batt Insulation)	$	7,800.00
No. 34 (Paving/Dumpster pad relocation)	$	4,000.00
TVSS credit	$	(3,000.00)
COP 33 (Deletion of Altro Flooring) credit	$	(12,178.00)
Sitework credit	$	(7,300.00)
Paint Generator Room credit	$	(1,000.00)
As-built drawing issue credit	$	(5,000.00)
Other closeout document issue credit	$	(1,000.00)
Time impact credit	$	(107,500.00)
Subtotal =	$	(122,833.68)
Revised Contract Value =	$	2,148,075.02
Paid to date =	$	(2,058,775.89)
Balance due F&D =	$	89,299.13

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James City County
VIRGINIA
Jamestown 1607

RECEIVED ON
FEB 15 '13
Stormwater Division

Development Management
101-A Mounts Bay Road
P.O. Box 8784
Williamsburg, VA 23187-8784
P: 757-253-6671
F. 757-253-6822
devman@james-city.va.us

jamescitycountyva.gov

Building Safety and Permits 757-253-6620
Engineering and Resource Protection 757-253-6670
Planning 757-253-6685
Zoning Enforcement 757-253-6671

INSPECTION REPORT – EROSION AND SEDIMENT CONTROL

Date:	**3/14/2012**	**Permittee: Bernie Farmer** **JCC General Services**
Project:	**JCC/JCSA Ops**	
Phone:	**757-259-4117**	
Fax:		

An inspection of the above-referenced project was conducted on **1/04/2013**the following represents an evaluation of that project's compliance with James City County's Environmental Regulations. Items identified below as "Needs Repair" are deficiencies that must be corrected.

IN COMPLIANCE	NEEDS REPAIR	
	X	Rt front of rip rap (four bay) erosion occurring. Needs back filled and stabilized
	X	Up slope drainage into four bay needs stabilized. This has been a reoccurring problem. Stormwater is washing out the slope entering the BMP. Numerous repairs have been attempted each with negative results
	X	Rip rap obstructing the flare end of the downstream end of pipe running under roadway
	X	Undercutting under front of flare from the upslope pipe running under the roadway.
	X	Remove all SF from project
	X	Run off from parking lot eroding and washing over/around timbers. This also has been an on going problem.
	X	Stabilize slopes of the sides of swale. Also stabilize areas on slopes of BMP and any other areas needed on project.
	X	Remove inlet protection

Notice is hereby given that those deficiencies listed shall be corrected in accordance with James City County's Environmental Requirements ***on or before 1/18/2013***. The site will be reinspected at that time and you are invited to accompany the inspector on that date. Failure to comply with this report will result in Enforcement Actions.

Gregory B. Johnson
Environmental Inspector

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AUG 2 4 2009
ENVIRONMENTAL
DIVISION

JCSA Operations Center Expansion

Calculations
For
James City County Environmental Division

Prepared by

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

Calculations Packet for VDOT
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Stormwater Management and Drainage Design Report
JCSA Operations Center

AES Project Number 9801-E-19
June 2009

Project Description

The JCSA Tewning Road project is a 12.33 acre site plan. The project consists of a relocated convenience center, a 1-1/2 story office building (approximately 13,000 sq.ft.) for JCSA, a large vehicle parking area, a materials storage area, and the expansion of an existing parking lot. The stormwater management for each portion of the project collects in an existing dry pond. This dry pond will be expanded to increase capacity appropriately and will have a forebay added. In an effort to evaluate the stormwater management, runoff to the dry pond was evaluated for pre- and post-development conditions. The drainage area to the dry pond is bounded by Tewning Road, the entrance road to the current JCSA Operations Center site, and the southern limits of disturbance, and is approximately 3.79 acres.

Description of Site Drainage

This JCSA project has one existing stormwater management facility (The existing dry pond BMP). The predevelopment area evaluation of the existing conditions includes the existing parking lot and the convenience center (at the current location). The stormwater currently sheet flows off the parking lot, is collected in an existing culvert, and is piped to the BMP.

To retain the New Town Stormwater Master Plan, the BMP will be expanded and will retain the 4-point extended detention dry pond design. A forebay will be added. The proposed watershed for this facility will include the JCSA office building, the relocated convenience center, the large vehicle parking area, the materials storage facility, and the expanded parking lot.

Hydrology and Hydraulics

Topographic information used in the engineering calculations was field verified during site plan development. Hydrology and hydraulic modeling was performed using computer spreadsheets generated in-house, and modeling for hydrology was done using Hydraflow software. The SCS (for site runoff and pond design) methodology was used in calculating run-offs for this project. 1-year, 2-year, 10-year, and 100-year storm events where evaluated.

Precipitation data for James City County was resourced as it appears in Appendix 4B of the Virginia Stormwater Management Handbook. The values of SCS Type II rainfall distributions used in the calculations are as follows:

Design Storm Frequency (in years)	Rainfall, in inches (for 24-hr. period)
1	2.8
2	3.5
10	5.8
100	8.0

Stormwater Management/Best Management Practices

The drainage area to the dry pond is bounded on the north side by Tewning Road, on the east side by the current JCSA Operations site entrance, on the south side by wetlands, and on the west side by topography. This area contains an existing 81 space parking lot and a convenience center. The pond will be expanded to provide capacity for relocated staff. Along with the expansion of the pond, a forebay will be added to allow runoff of different specific gravities to separate naturally (assisting in collection and disposal). The forebay will have a reverse slope pipe connecting from two feet above the bottom of the forebay four feet above the bottom of the dry pond. There will be four feet of standing water in the forebay at all times. This will allow any accumulated sediment to collect at the bottom of the forebay while any pollutants from the Convenience Center runoff will float on the top of the pond. During higher flow events, the water will flow through a 15' wide rip-rap spillway into the dry pond. The existing modified EW-11 will be removed and replaced with a two foot deep concrete micropool. A reverse slope pipe will connect from 1' foot above the bottom of the micropool into the existing riser. This will allow for sediment accumulation and collection. The stormwater management facility is located outside of the wetlands and no part of the work required for the expansion will impact any wetlands.

During the construction process of the site, the BMP will serve as a temporary sediment basin to prevent sediment-laden run-off from being transported to downstream locations.

All the run-off from the site shall be directed towards the SWM/BMP during construction, and at completion of site construction. The SWM/BMP is designed to manage flooding, protect down stream channels, as well as providing adequate stormwater quality. The SWM/BMP is designed as extended detention dry pond and will release the runoff generated by the 2-year and 10-year 24-hour post-development conditions storm at/or below the pre-development rates. 2-year and 10-year rates were determined based on the predevelopment areas as presented in the calculations.

Storm Sewer Systems

Directing runoff to the SWM/BMPs will be a combination of grass swales, ditches, culverts, overland flow, and a storm sewer system. The storm system will collect the flow from the JCSA building, the large vehicle parking area, the materials storage area, and the parking lot addition. Using Hydraflow software, the storm sewer system is designed to effectively transport the 10-year storm. Flow on the northern portion of the site is directed by existing and proposed culverts and swales into the proposed forebay of the SWM/BMP. The swales are designed to effectively transport the 10-year storm. The desire in the design of the culverts is to prevent the embankments from overtopping during storm events (in this case, the 100-year 24-hour post-development storm event). The existing and proposed culverts all do so. To prevent pollutants from entering downstream, the sheet flow from the proposed convenience center will be collected and pre-treated in a stone apron with 8" perforated pipe before emptying into the forebay.

Modeling Results

A table of pre- and post-development flows in cubic feet per second for 1-year, 2-year, 10-year, and 100-year storm events is provided below. This table summarizes the hydrographs and pond routings that are included in the calculations packet.

	PRE-DEVELOPMENT	PRE-DEVELOPMENT ROUTED THROUGH EXISTING POND	PRE-DEVELOPMENT ROUTED THROUGH SEDIMENT BASIN	POST-DEVELOPMENT	POST-DEVELOPMENT ROUTED THROUGH SEDIMENT BASIN	POST-DEVELOPMENT ROUTED THROUGH FINAL BMP
1 YEAR	1.5	0.3	0.1	5.1	0.2	0.1
2 YEAR	3	0.5	0.2	7.9	0.2	0.2
10 YEAR	9.6	3.2	0.9	18.5	2.7	2.9
100 YEAR	16.9	8	3.2	29.2	5.8	7.5

Note: All flow values provided in table are in cubic feet per second (cfs)

From the modeling results, the proposed changes made to the BMP will attenuate the post-development runoff for each storm event.

Water Quality Calculations

On this site, the existing percent impervious cover is greater than the average land cover condition. Based on the Performance-Based Water Quality Calculations from the Virginia Stormwater Management Handbook, the pollutant discharge post-development shall not exceed the pollutant discharge based on existing conditions less 10% or the pollutant discharge based on the average land cover condition, whichever is greater. For this site, the pollutant discharge post-development is 2.3 lbs/yr. This is less than the greater of the two values which is the pollutant discharge based on existing conditions less 10% (2.6 lbs/yr) Since it the less the BMP is in compliance for pollutant removal.

Conclusion

From the computer modeling to the proposed facilities associated with the site improvements, both state and local regulations are honored. Stormwater runoff from the proposed improvements is attenuated to below pre-development stormwater runoff rates, thereby minimizing the effects of the proposed land development on adjacent stream channels.

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JCSA Operations Center
CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR BMP #1
Project No. 9801-E-19
7-May-09
Revision Date

I. **PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN**

A. Pre-Development Drainage Area to Point of Concern = 3.84 Acres

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

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	19B - Kempsville-Emporia	B	Pavement and Roofs (Com.)	1.19	98	117
2)	19B - Kempsville-Emporia	B	Open Space (Good)	1.75	61	107
3)	11C - Craven-Uchee Complex	A	Pavement and Roofs (Com.)	0.00	98	0
4)	11C - Craven-Uchee Complex	A	Open Space (Good)	0.90	39	35
5)					0	0
6)					0	0
7)					0	0
	Totals =			3.84		258
	Composite CN =					67

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	Woods (light underbrush)	
Manning's roughness coefficient., n (table 5-7)	0.4	
Length of overland flow, L	85	Feet
2-year 24-hour rainfall, P2	3.6	inches
Average slope of overland flow , s	0.02	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.30	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved	
Length of shallow concentrated flow, L	200	Feet
Average slope of shallow concentrated flow, s	0.025	feet per foot
Average velocity, v	2.4	feet per second
Travel time, Tt = L/(3600*v)	0.02	hours

3) Channel or Pipe Flow

Length of channel flow, L	300	Feet
Average velocity of channel flow, v	2.5	feet per second
Travel time, Tt = L/(3600*v)	0.03	hours
Total Time of Concentration =	0.35	hours
or	21	minutes

JCSA Operations Center
CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR BMP #1
Project No. 9801-E-19
7-May-09
Revision Date

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

A. Post-Development Drainage Area to Point of Concern = 3.79 Acres

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

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	19B - Kempsville-Emporia	B	Pavement and Roofs (Com.)	1.34	98	131
2)	19B - Kempsville-Emporia	B	Open Space (Good)	1.3	61	79
3)	11C - Craven-Uchee Complex	A	Pavement and Roofs (Com.)	0.63	98	62
4)	11C - Craven-Uchee Complex	A	Open Space (Good)	0.52	39	20
5)					0	0
6)					0	0
7)					0	0
8)					0	0
9)					0	0
10)					0	0
11)					0	0
	Total Adjusted CN =			3.79		293
	Composite CN =					77

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	Dense grasses	
Manning's roughness coefficient., n (table 5-7)	0.24	
Length of overland flow, L	60	Feet
25-year 24-hour rainfall, P25	6.4	inches
Average slope of overland flow , s	0.02	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.11	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	paved	
Length of shallow concentrated flow, L	0	Feet
Average slope of shallow concentrated flow, s	0	feet per foot
Average velocity, v	0.0	feet per second
Travel time, Tt = L/(3600*v)	0.00	hours

3) Channel or Pipe Flow

Length of channel flow, L	550	Feet
Average velocity of channel flow, v	2.5	feet per second
Travel time, Tt = L/(3600*v)	0.06	hours
Total Time of Concentration =	0.17	hours
or	10	minutes

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project JCSA Operations Center

Basin # 1 Location Southwest corner of site

Total area draining to basin 3.84 acres.

Basin Volume Design

Wet Storage:

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

   67 cu. yds. x 3.84 acres = 257.28 cu. yds.

2. Available basin volume = 570 cu. yds. at elevation 86. (From storage - elevation curve)

3. Excavate 570 cu. yds. to obtain required volume*.

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

4. Available volume before cleanout required.

   33 cu. yds. x 3.84 acres = 126.72 cu. yds.

5. Elevation corresponding to cleanout level = 84.5 DETAIL @5.05'

   (From Storage - Elevation Curve)

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

SB BOTTOM @ 84'

Dry Storage:

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

   67 cu. yds. x 3.84 acres = 257.28 cu. yds.

7

SEE STEP 4 1

8. Total available basin volume at crest of riser* = 564 cu. yds. at elevation 87 . (From Storage - Elevation Curve)

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

9. Diameter of dewatering orifice = 3 in.

10. Diameter of flexible tubing = 5 in. (diameter of dewatering orifice plus 2 inches).

Preliminary Design Elevations

11. Crest of Riser = 86.85

Top of Dam = 90

Design High Water = 87.45

Upstream Toe of Dam = 84

Basin Shape

12. $\frac{\text{Length of Flow}}{\text{Effective Width}}$ $\frac{L}{We}$ = 4

If > 2, baffles are not required ✓

If < 2, baffles are required _____

Runoff

13. Q_2 = 7.93 cfs (From Chapter 5)

14. Q_{25} = 21.39 cfs (From Chapter 5)

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2$ = 7.93 cfs. (riser and barrel)

Without emergency spillway, required spillway capacity $Q_p = Q_{25}$ 21.39 cfs. (riser and barrel)

8

16. With emergency spillway:

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

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

Without emergency spillway:

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

h = Design High Water Elevation - Crest of Riser Elevation

17. Riser diameter (D_r) = 24 in. Actual head (h) = 0.5 ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = 36 ft.

Head (H) on barrel through embankment = 5.55 ft.

(From Plate 3.14-7).

19. Barrel diameter = 10 in.

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

20. Trash rack and anti-vortex device

Diameter = n/a inches.

Height = n/a inches.

(From Table 3.14-D).

Emergency Spillway Design

21. Required spillway capacity $Q_e = Q_{25} - Q_p$ = 13.46 cfs.

22. Bottom width (b) = 5 ft.; the slope of the exit channel (s) = 0.11 ft./foot; and the minimum length of the exit channel (x) = 60 ft.
(From Table 3.14-C)

9

Anti-Seep Collar Design

23. Depth of water at principal spillway crest (Y) = 2.85 ft.

Slope of upstream face of embankment (Z) = 4 :1.

Slope of principal spillway barrel (S_b) = 0.57 %

Length of barrel in saturated zone (L_s) = 25 ft.

24. Number of collars required = 2 dimensions = 3' x 3'

(From Plate 3.14-12).

Final Design Elevations

25. Top of Dam = 90

Design High Water = 87.45

Emergency Spillway Crest = 88.5

Principal Spillway Crest = 86.85

Dewatering Orifice Invert = 86

Cleanout Elevation = 84.5

Elevation of Upstream Toe of Dam or Excavated Bottom of "Wet Storage Area" (if excavation was performed) = 84

5-5 CHART
5B

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Pond No. 4 - Existing Dry Pond (Temp Basin)

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 84.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	84.00	6,507	0	0
1.00	85.00	7,664	7,077	7,077
2.00	86.00	8,977	8,311	15,388
3.00	87.00	10,307	9,633	25,021
4.00	88.00	11,837	11,062	36,083
5.00	89.00	13,404	12,611	48,695
6.00	90.00	14,919	14,153	62,848

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 10.00	2.00	0.00	0.00
Span (in)	= 10.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 82.11	86.00	0.00	0.00
Length (ft)	= 37.00	6.00	0.00	0.00
Slope (%)	= 0.57	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

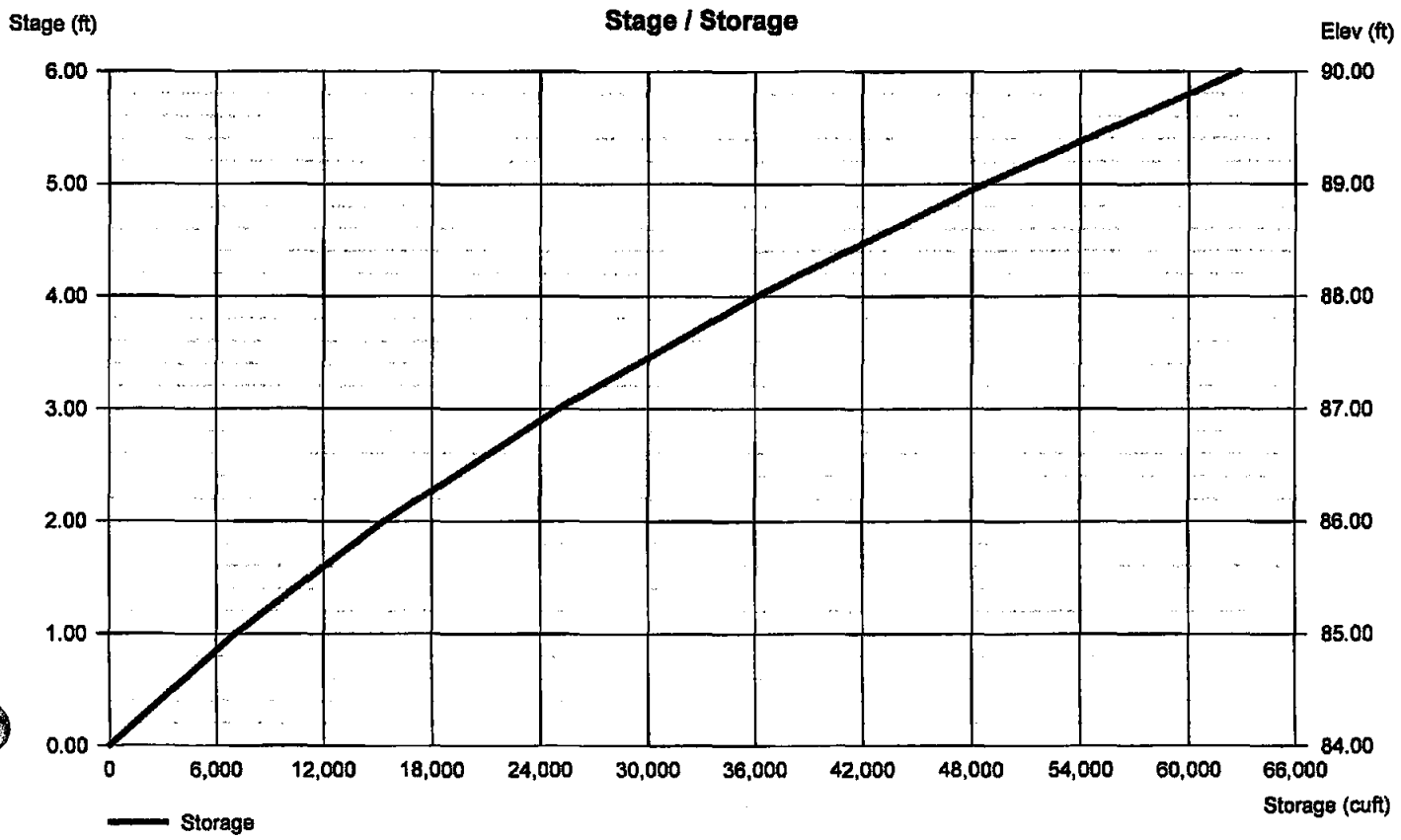
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	5.00	0.00	0.00
Crest El. (ft)	= 86.85	88.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	—	—
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Pond No. 6 - Forebay

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 82.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	82.00	105	0	0
1.00	83.00	299	194	194
2.00	84.00	592	437	631
3.00	85.00	968	772	1,403
4.00	86.00	1,451	1,201	2,604
5.00	87.00	2,021	1,728	4,332
6.00	88.00	2,642	2,324	6,657

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	0.00	0.00	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 86.00	0.00	0.00	0.00
Length (ft)	= 28.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

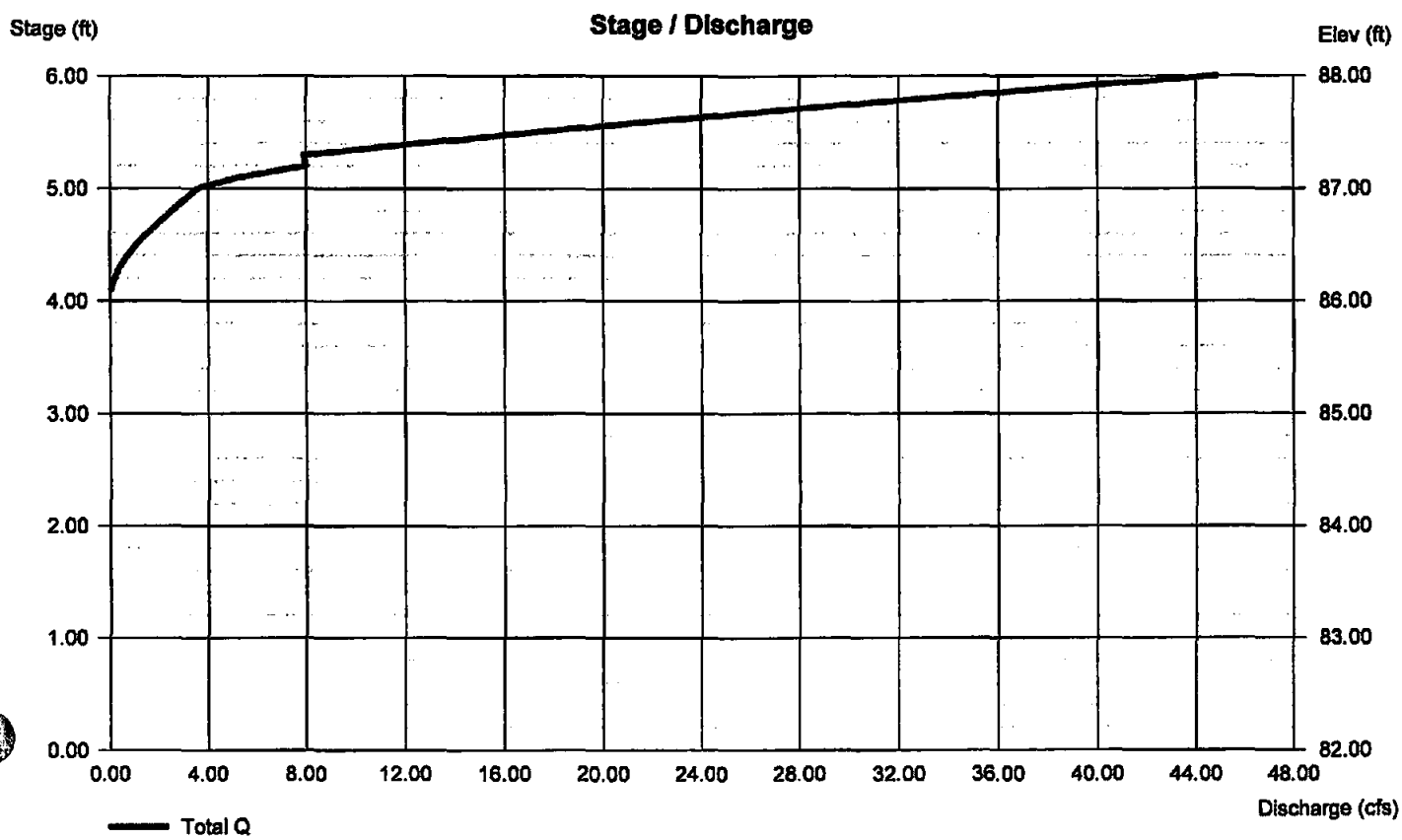
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.00	0.00	0.00	0.00
Crest El. (ft)	= 87.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Pond No. 7 - BMP

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 84.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	84.00	2,955	0	0
1.00	85.00	3,929	3,430	3,430
2.00	86.00	6,504	5,162	8,592
3.00	87.00	8,233	7,351	15,943
4.00	88.00	10,190	9,193	25,136
5.00	89.00	12,521	11,334	36,471
6.00	90.00	14,719	13,604	50,075

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 10.00	2.00	0.00	0.00
Span (in)	= 10.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 82.41	84.00	0.00	0.00
Length (ft)	= 37.00	6.00	0.00	0.00
Slope (%)	= 1.35	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

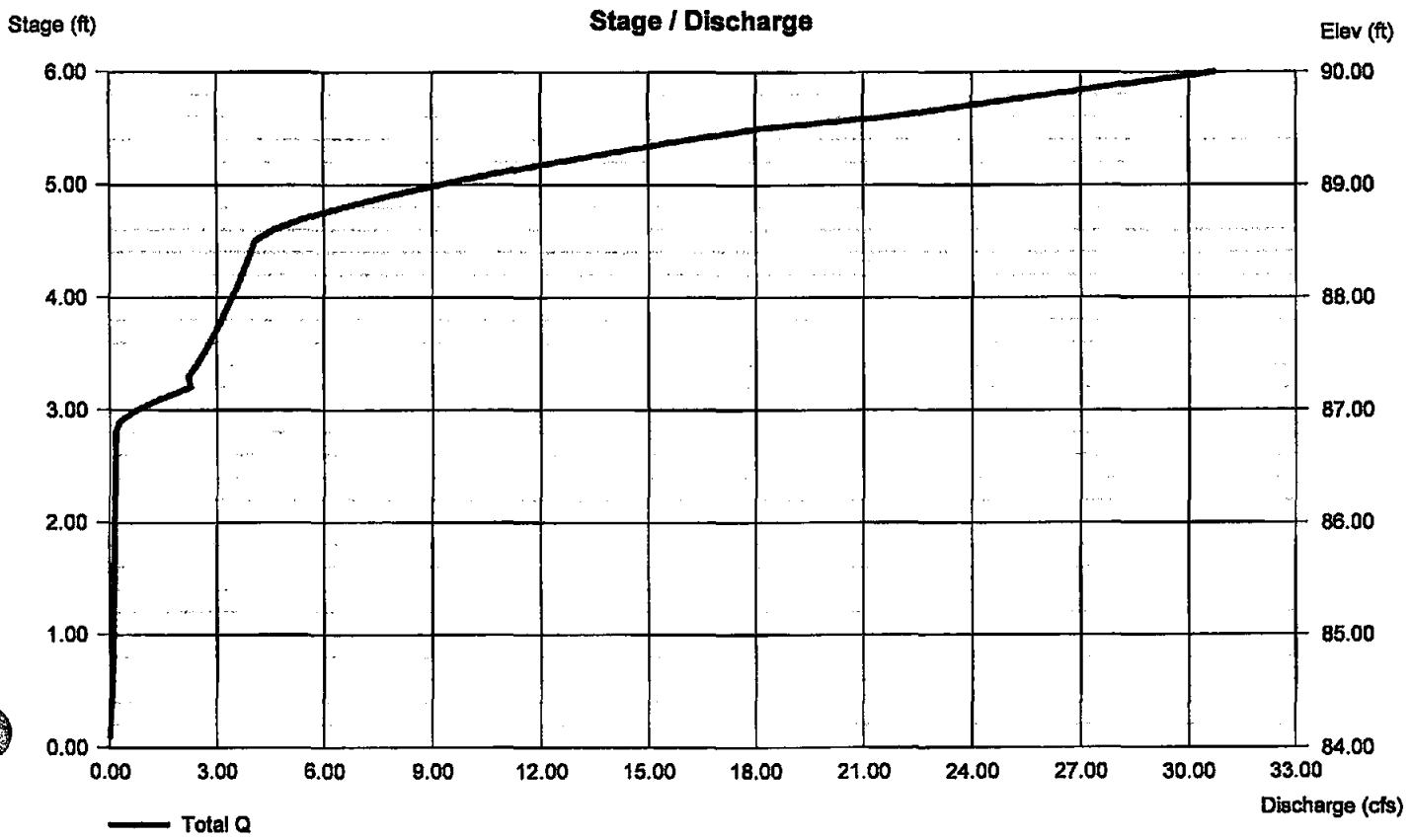
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	5.00	0.00	0.00
Crest El. (ft)	= 86.85	88.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	—	—
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



5-5 CHART

POND 1

VOL<5P - FOREBAY

AES CONSULTING ENGINEERS
Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040

Project	JCSA Operations Center
Project No.	9801-E-19
Subject	Pond # 1
Sheet No.	1 of 1
Calculated By	GVC Date 5/7/09

Channel Protection Volume:

Drainage Area	=	3.79 Acres
Runoff Curve No.	=	77
1-Yr, 24-Hr Storm Volume	=	2.8 inches

Direct Runoff (From TR55 Equations 2-3 & 2-4)
Q = 0.93 inches

Channel Protection Volume = DA * Q * 60% (Virginia Stormwater Managment Handbook section 5-8.2 - Method 2)

Vcp = 3.54 Ac-in = 7,717 cubic feet

Determine Volume of Pond by Contour (starting at normal pool):

Elevation	Incremental Depth	Area (sq. ft.)	Volume (cu. ft.)	Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)	Incremental Avg Head[1] (feet)	Incremental Avg Flow[1] (feet)	Incremental Drawdown Time[1] (hrs)
84.0	0.0	3,550	-	-	-	-			
85.0	1.0	4,867	4,209	156	4,209	156	0.5	0.07	17.24
86.0	1.0	6,503	5,685	211	9,894	366	1.3085503	0.12	8.38
87.0	1.0	8,516	7,510	278	17,403	645	0	0.00	0.00
88.0	1.0	10,444	9,480	351	26,883	996	0	0.00	0.00
89.0	1.0	12,620	11,532	427	38,415	1,423	0	0.00	0.00
90.0	1.0	14,167	13,394	496	51,809	1,919	0.00	0.00	0.00
		Total	51,809	1,919					25.62

[1] Incremental values computed from Channel Protection Volume Elevation

Elevation of Normal Pool	=	84.00	feet
Elevation of 1-yr, 24-hr Storage Volume	=	85.62	feet
Size of Orifice	=	2.00	inches
Total Average Drawdown Time	=	**25.62**	**hrs**

>24 HRS, OK

Note: By calculations, drawdown orifice size to be 2-inch diameter. Suggested minimum size is 3-inch diameter. A 3-inch diameter orifice shall be implemented in actual designs.

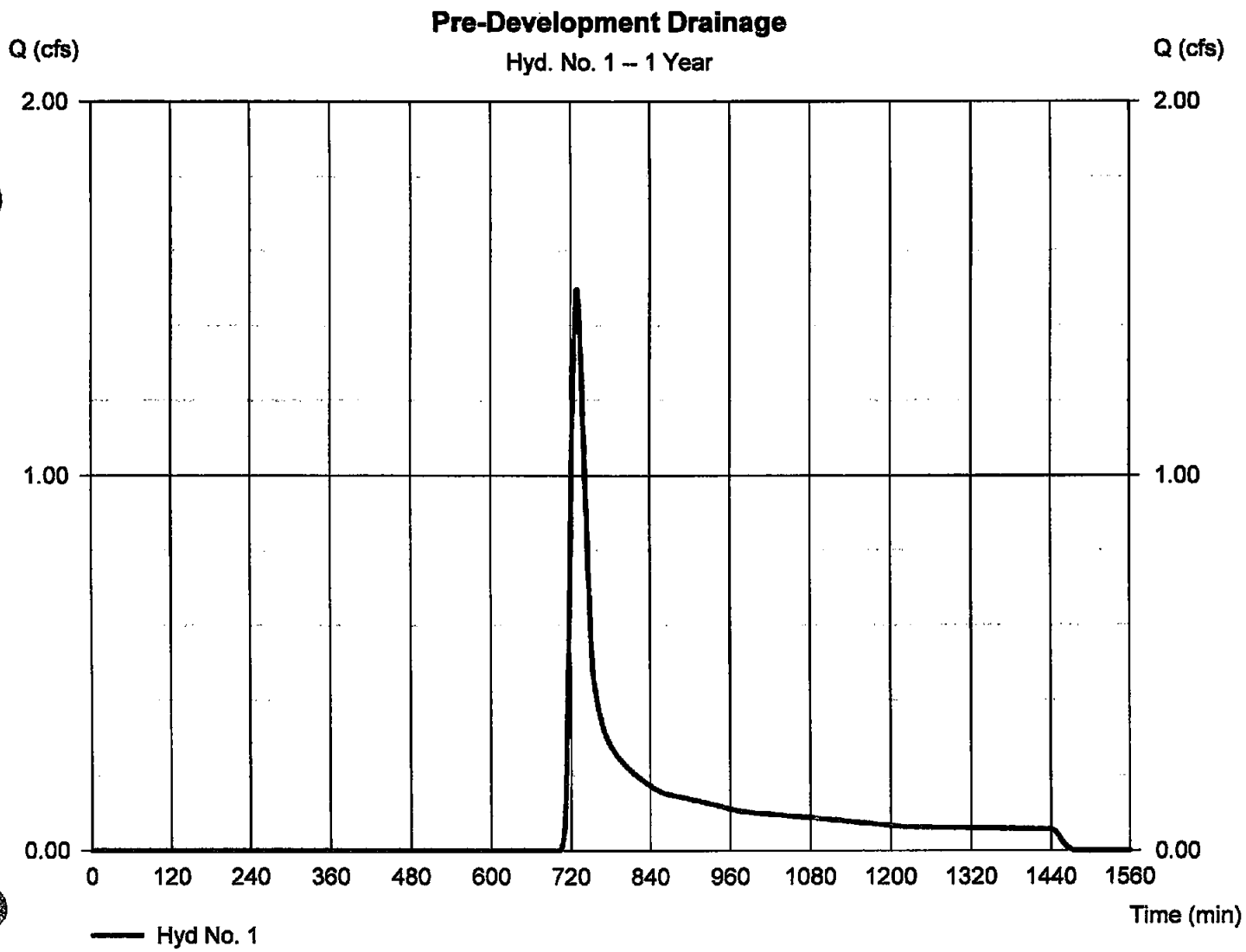
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 1

Pre-Development Drainage

Hydrograph type	= SCS Runoff	Peak discharge	= 1.498 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 6,934 cuft
Drainage area	= 3.840 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 21.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



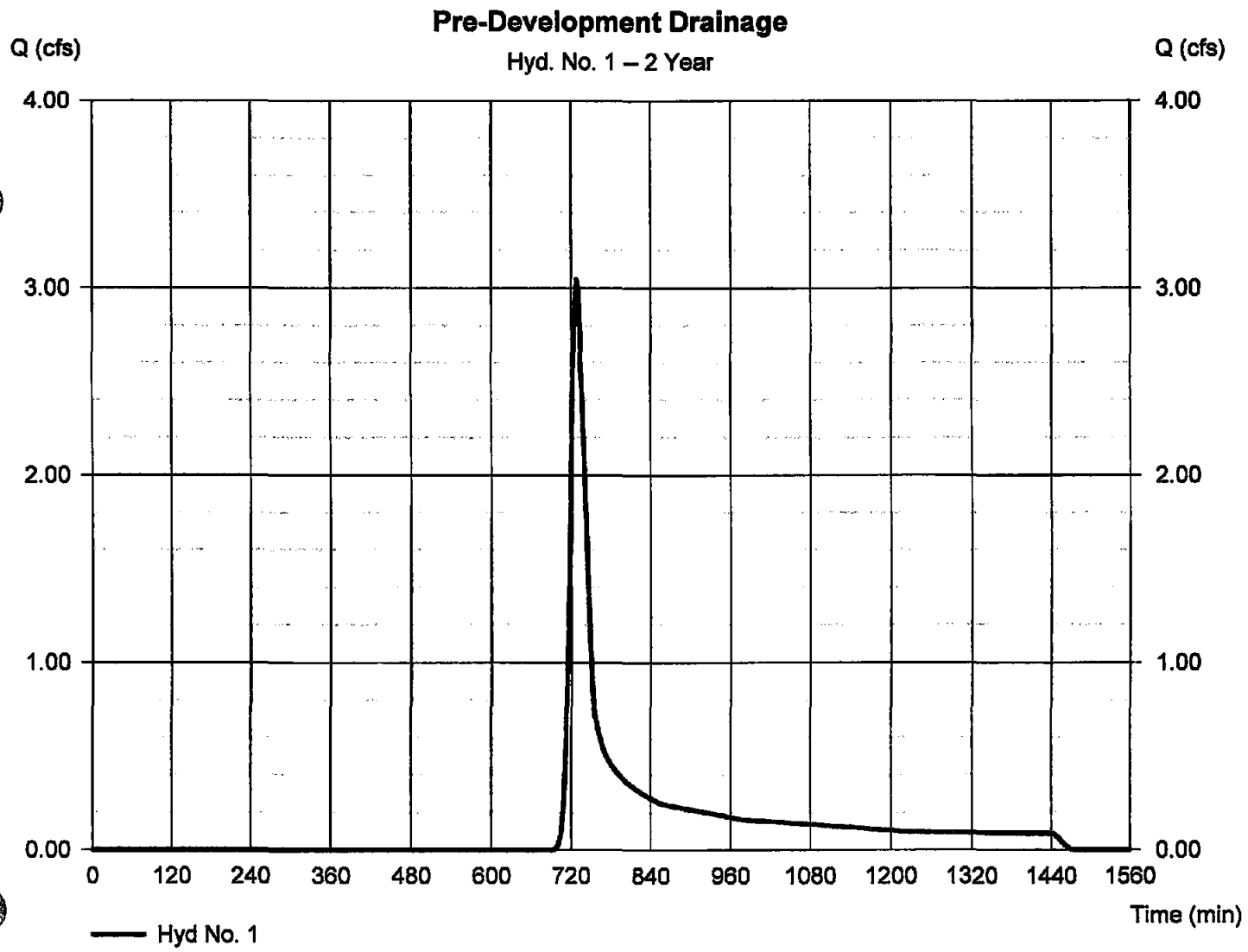
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 1

Pre-Development Drainage

Hydrograph type	= SCS Runoff	Peak discharge	= 3.046 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 12,061 cuft
Drainage area	= 3.840 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 21.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



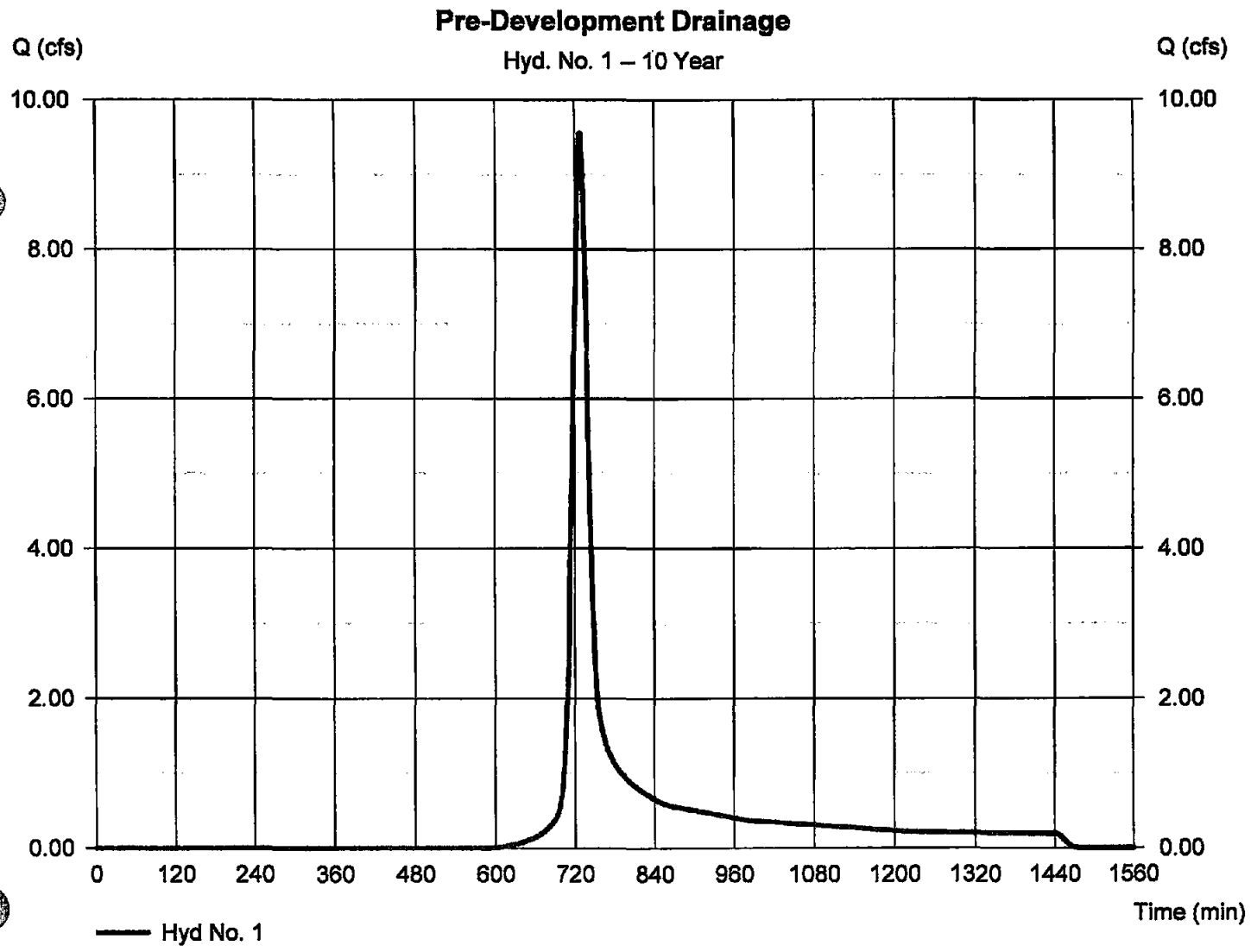
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 1

Pre-Development Drainage

Hydrograph type	= SCS Runoff	Peak discharge	= 9.562 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 33,770 cuft
Drainage area	= 3.840 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 21.00 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



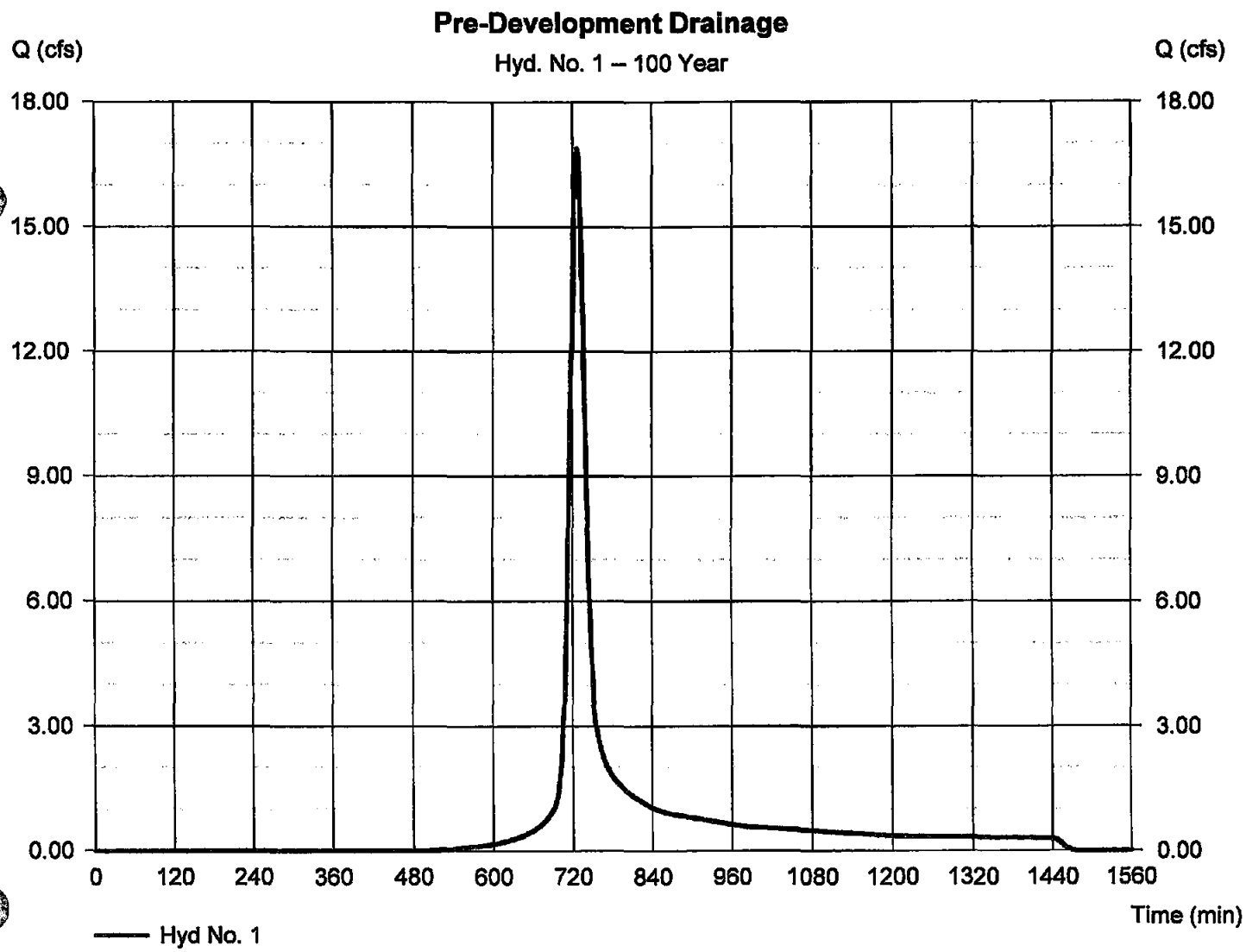
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 1

Pre-Development Drainage

Hydrograph type	= SCS Runoff	Peak discharge	= 16.88 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 58,473 cuft
Drainage area	= 3.840 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 21.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

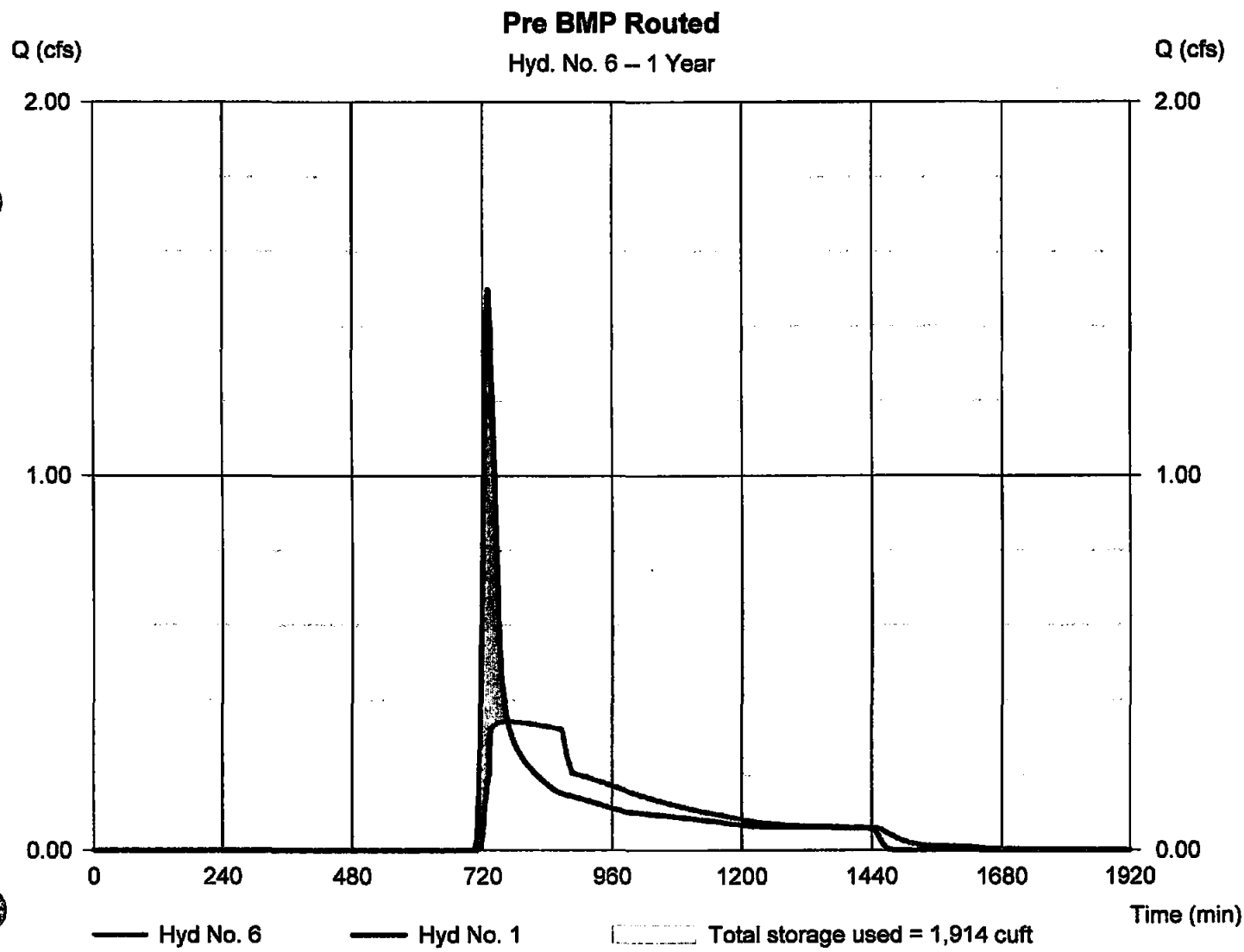
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 6

Pre BMP Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.343 cfs
Storm frequency	= 1 yrs	Time to peak	= 766 min
Time interval	= 2 min	Hyd. volume	= 6,925 cuft
Inflow hyd. No.	= 1 - Pre-Development Drainage	Max. Elevation	= 86.25 ft
Reservoir name	= Existing Dry Pond	Max. Storage	= 1,914 cuft

Storage Indication method used.



Hydrograph Report

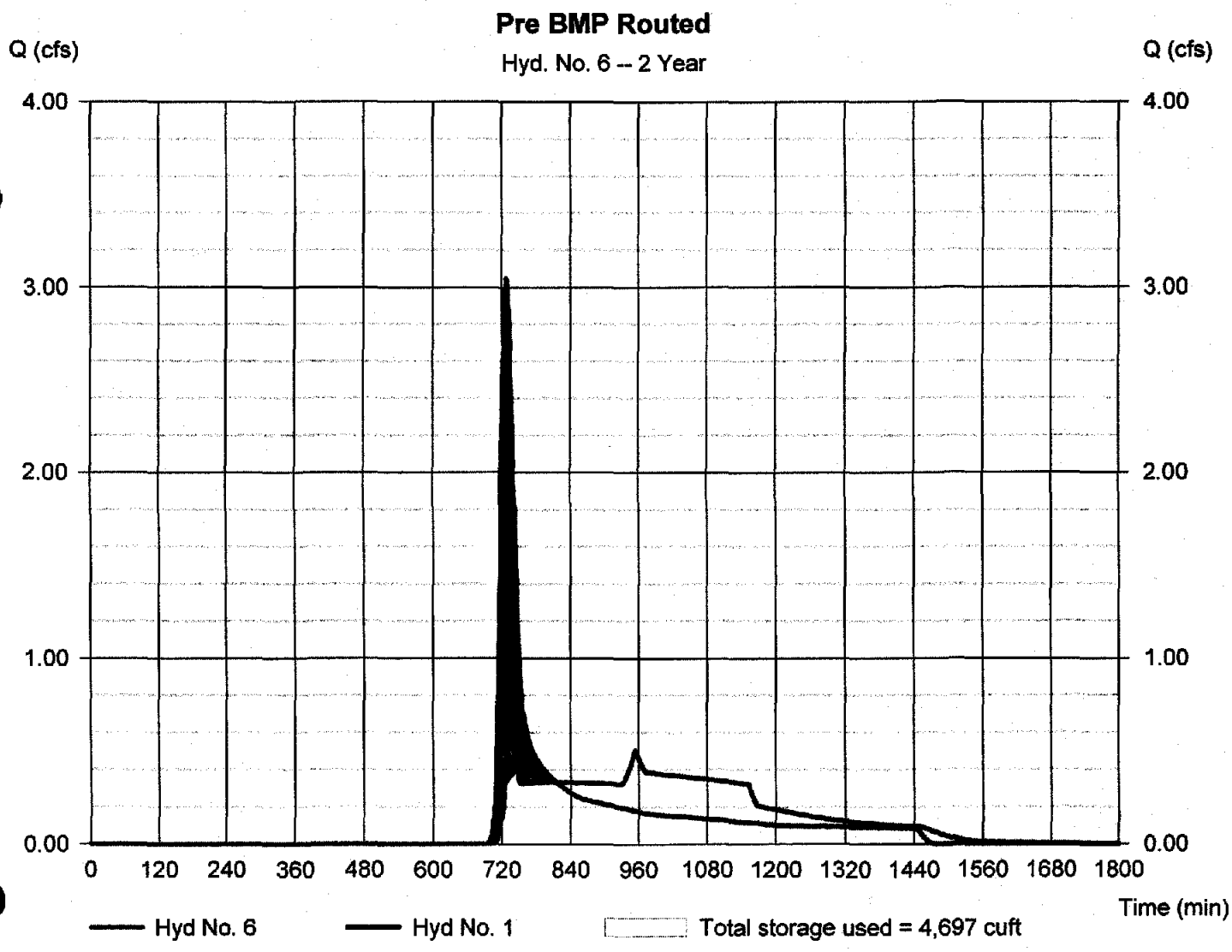
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 6

Pre BMP Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.503 cfs
Storm frequency	= 2 yrs	Time to peak	= 954 min
Time interval	= 2 min	Hyd. volume	= 12,052 cuft
Inflow hyd. No.	= 1 - Pre-Development Drainage	Max. Elevation	= 86.90 ft
Reservoir name	= Existing Dry Pond	Max. Storage	= 4,697 cuft

Storage Indication method used.



Hydrograph Report

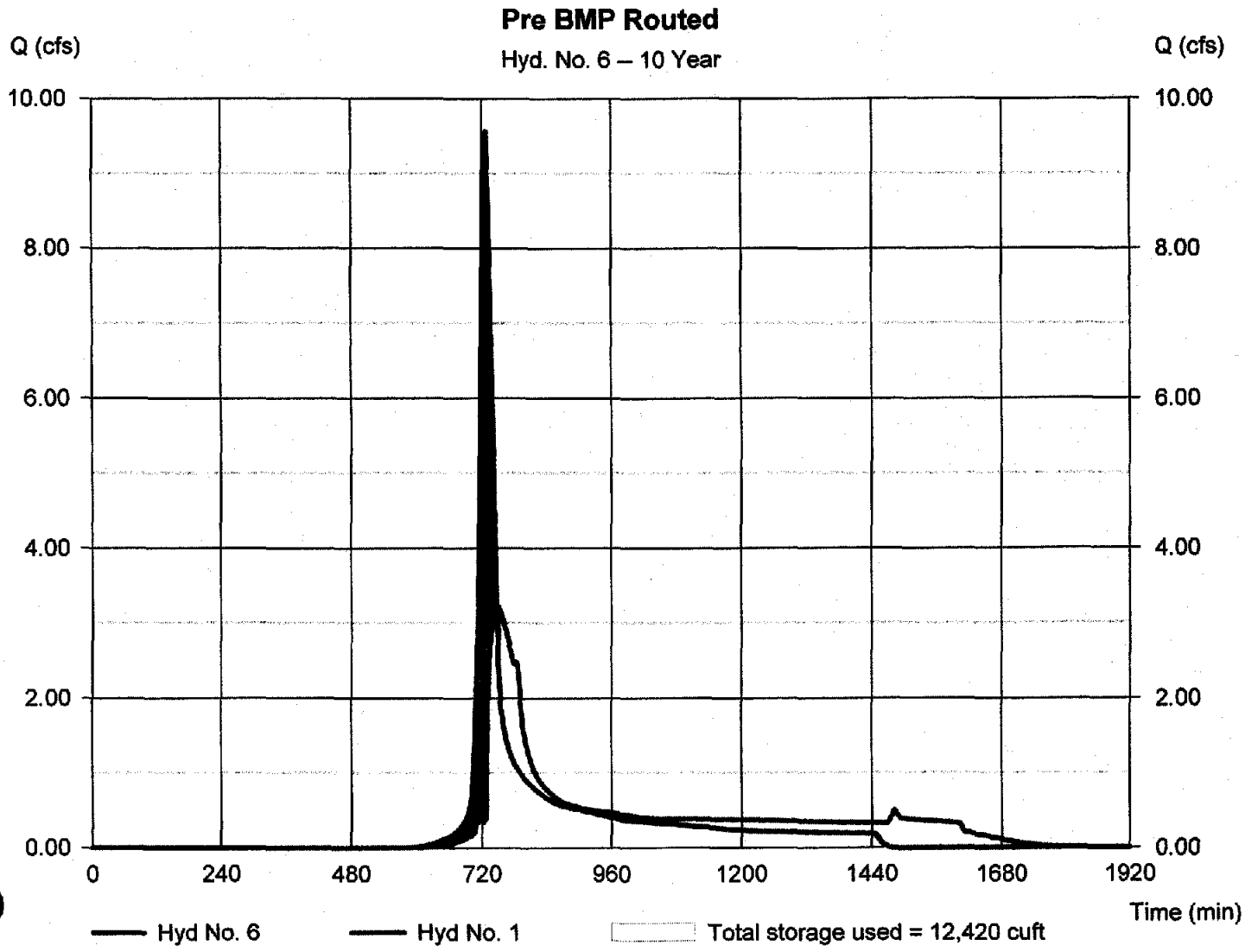
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 6

Pre BMP Routed

Hydrograph type	= Reservoir	Peak discharge	= 3.227 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 33,761 cuft
Inflow hyd. No.	= 1 - Pre-Development Drainage	Max. Elevation	= 87.71 ft
Reservoir name	= Existing Dry Pond	Max. Storage	= 12,420 cuft

Storage Indication method used.



Hydrograph Report

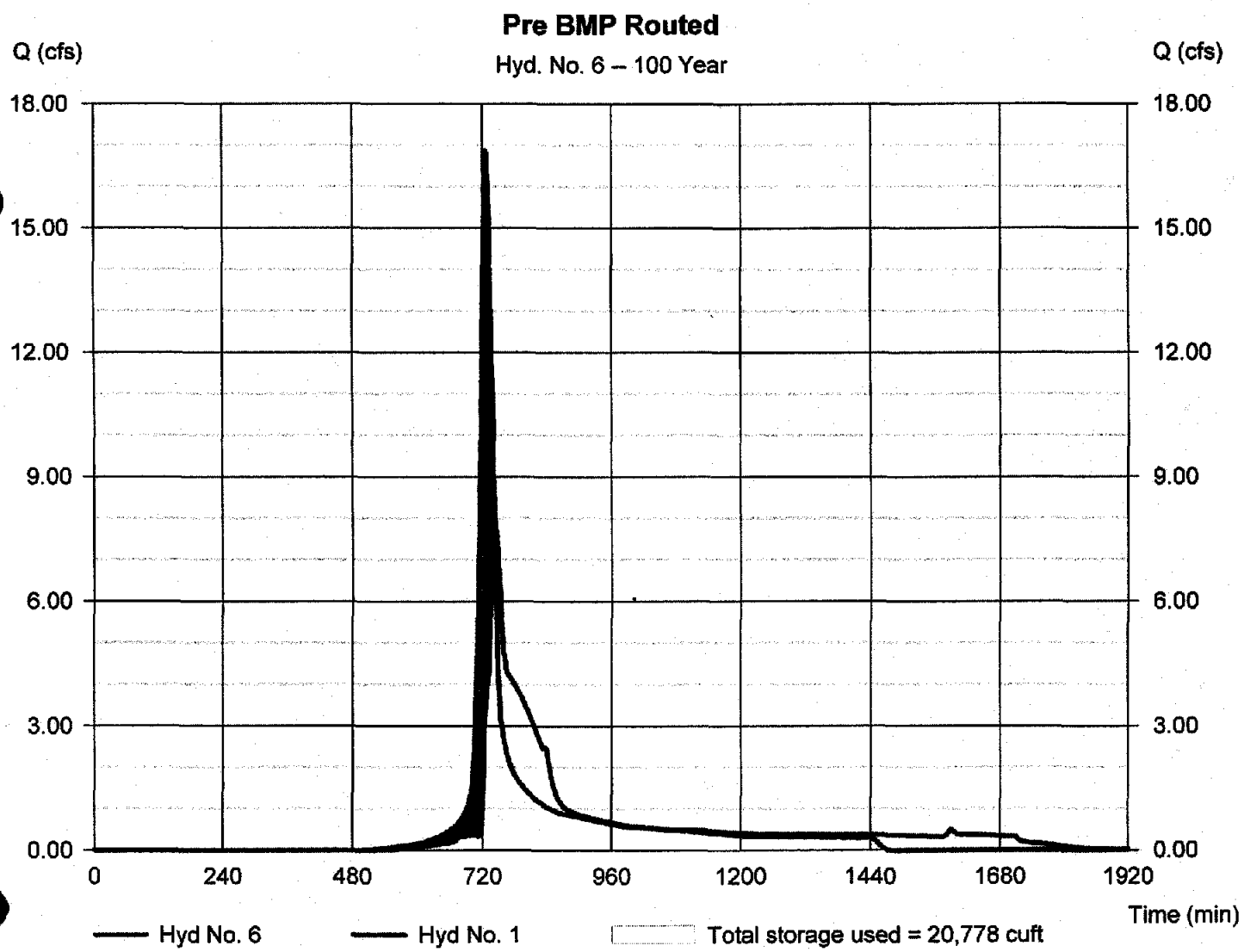
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 6

Pre BMP Routed

Hydrograph type	= Reservoir	Peak discharge	= 7.995 cfs
Storm frequency	= 100 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 58,464 cuft
Inflow hyd. No.	= 1 - Pre-Development Drainage	Max. Elevation	= 88.90 ft
Reservoir name	= Existing Dry Pond	Max. Storage	= 20,778 cuft

Storage Indication method used.



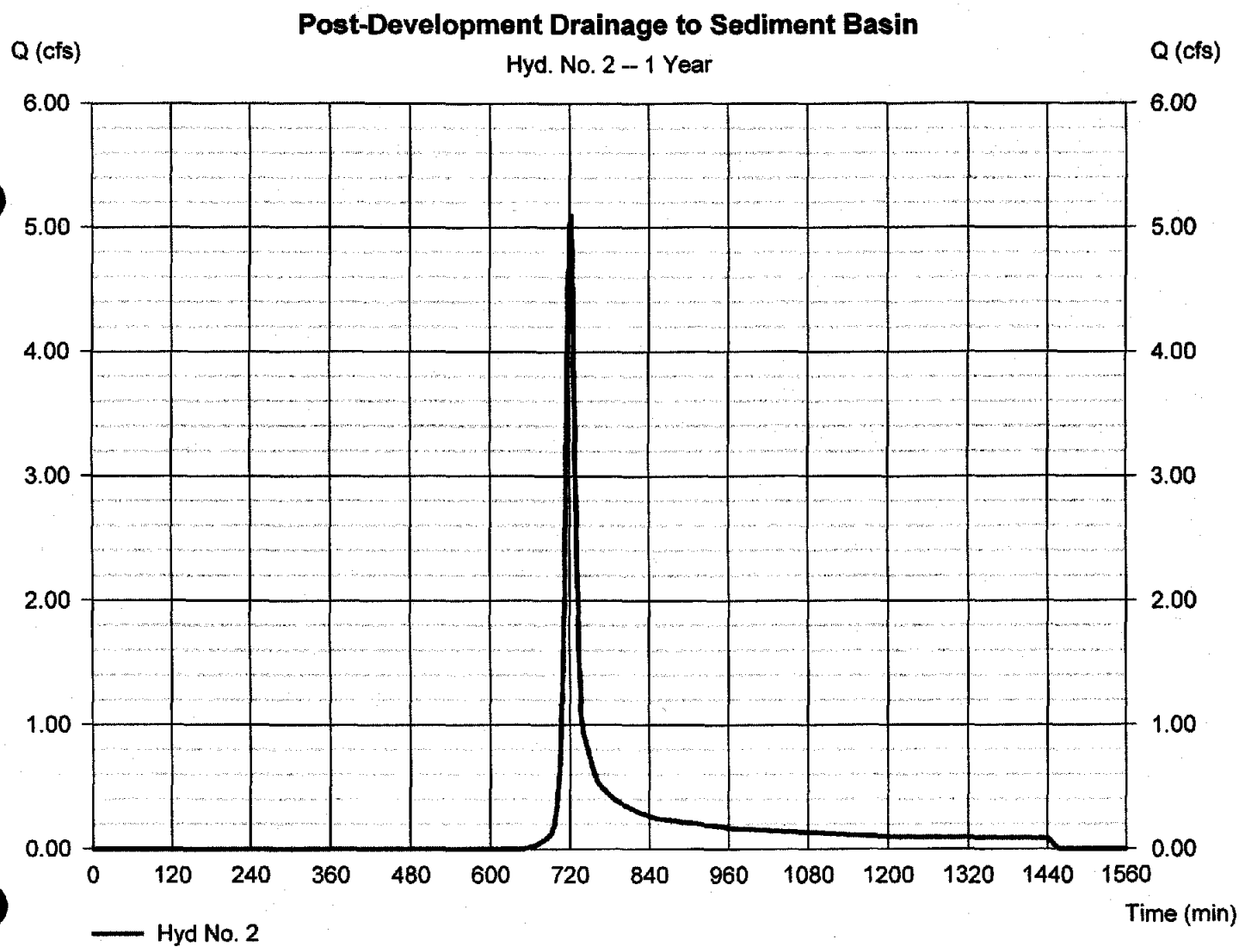
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 2

Post-Development Drainage to Sediment Basin

Hydrograph type	= SCS Runoff	Peak discharge	= 5.097 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 13,578 cuft
Drainage area	= 3.880 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



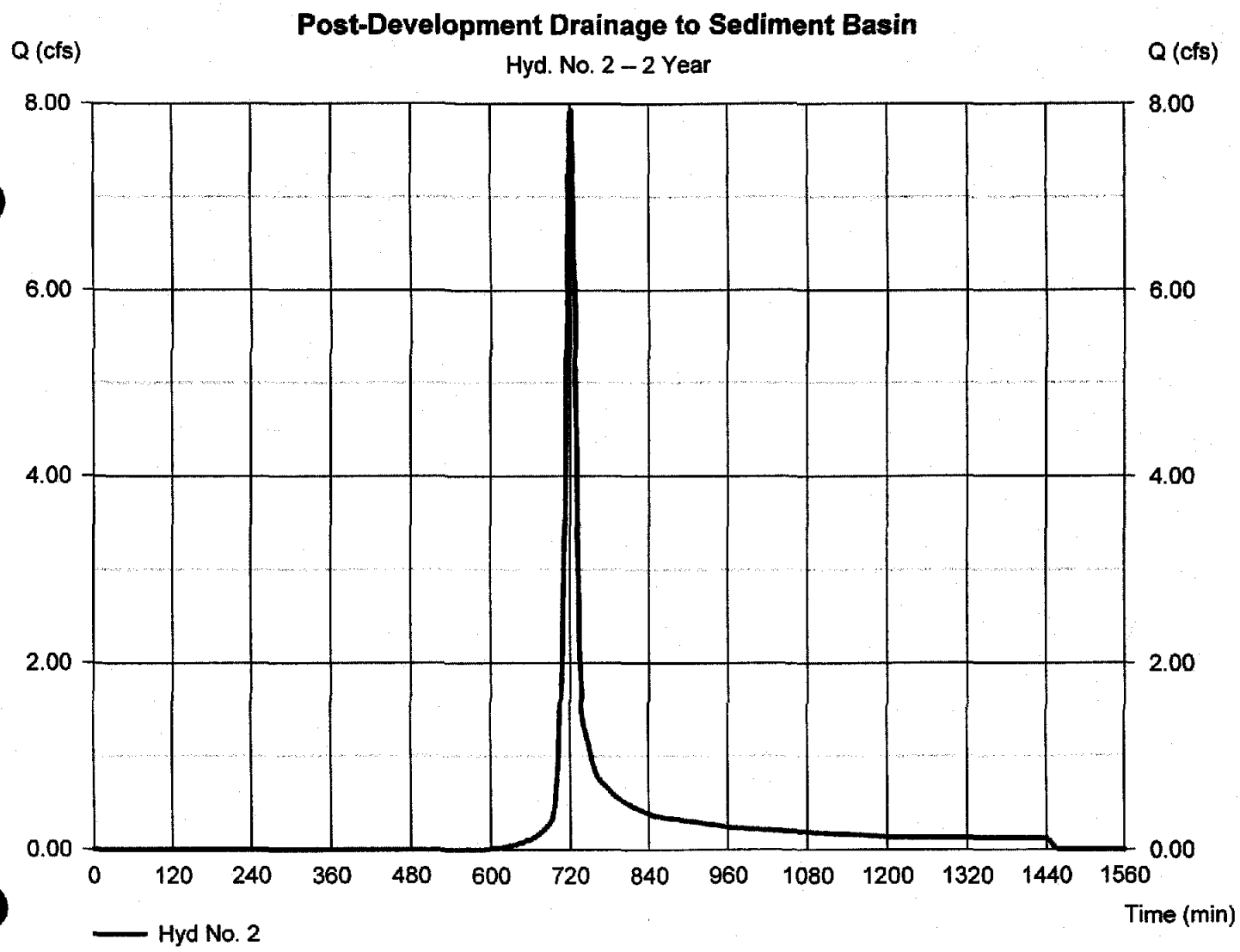
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 2

Post-Development Drainage to Sediment Basin

Hydrograph type	= SCS Runoff	Peak discharge	= 7.926 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 20,777 cuft
Drainage area	= 3.880 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



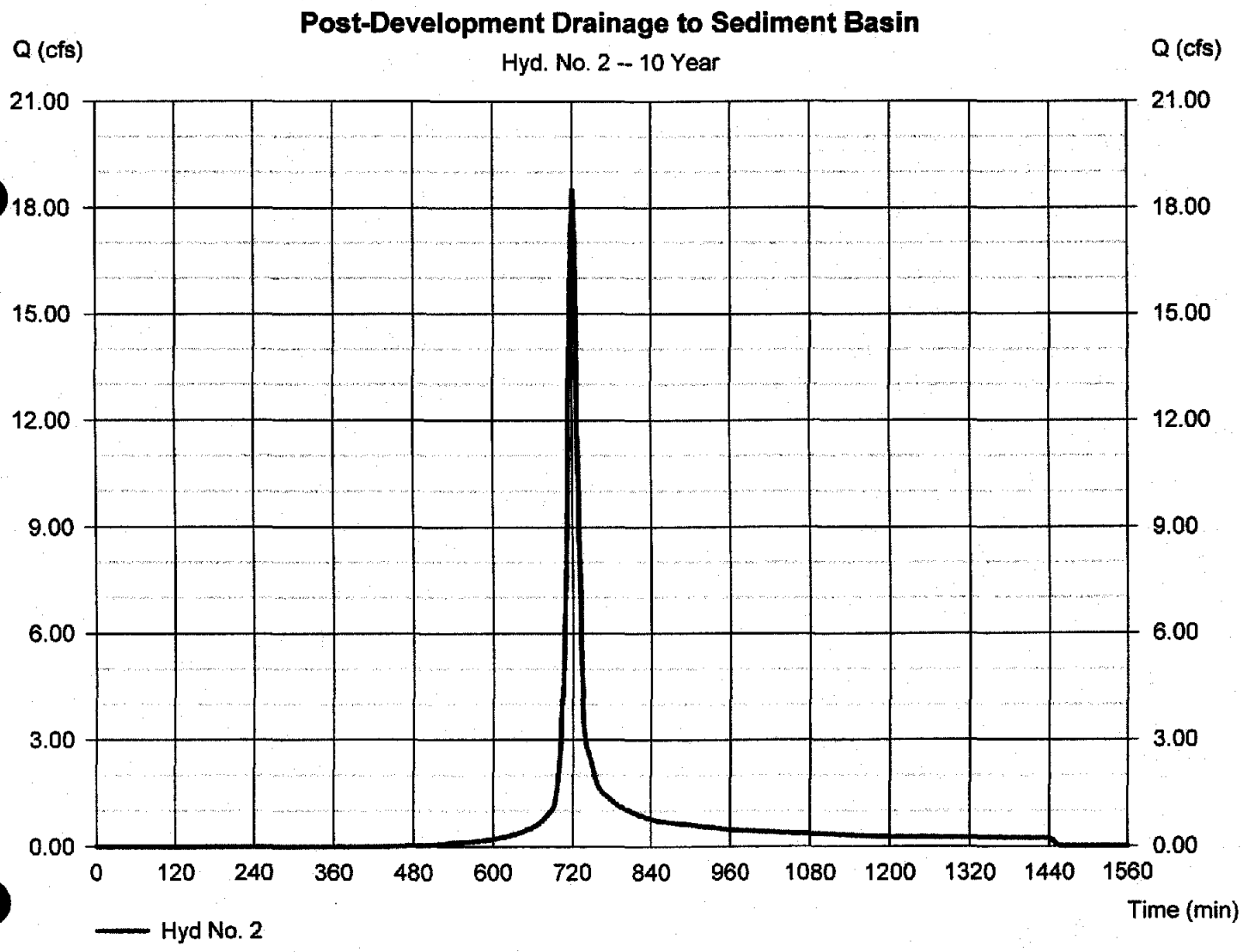
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 2

Post-Development Drainage to Sediment Basin

Hydrograph type	= SCS Runoff	Peak discharge	= 18.50 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 48,004 cuft
Drainage area	= 3.880 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



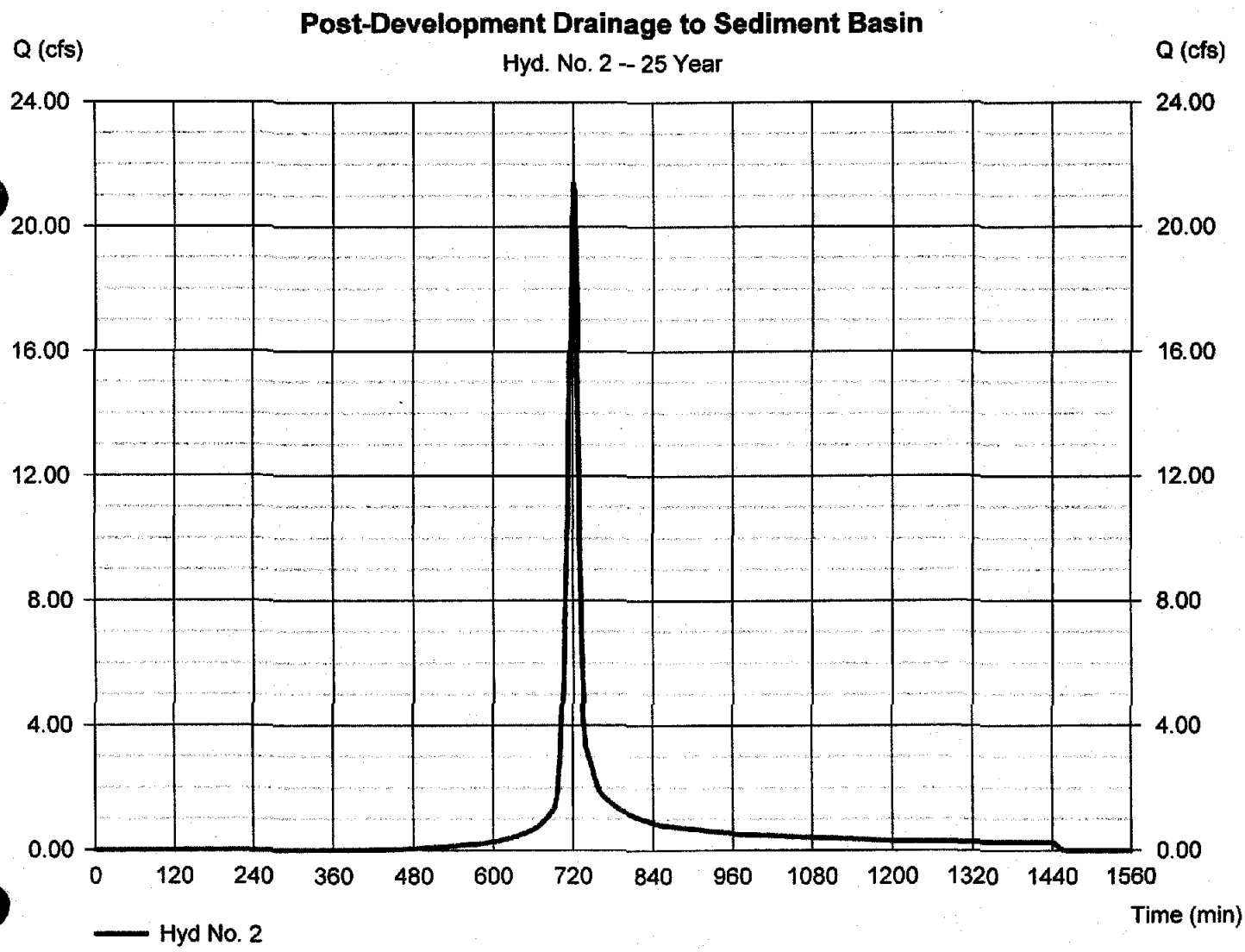
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 2

Post-Development Drainage to Sediment Basin

Hydrograph type	= SCS Runoff	Peak discharge	= 21.39 cfs
Storm frequency	= 25 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 55,639 cuft
Drainage area	= 3.880 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



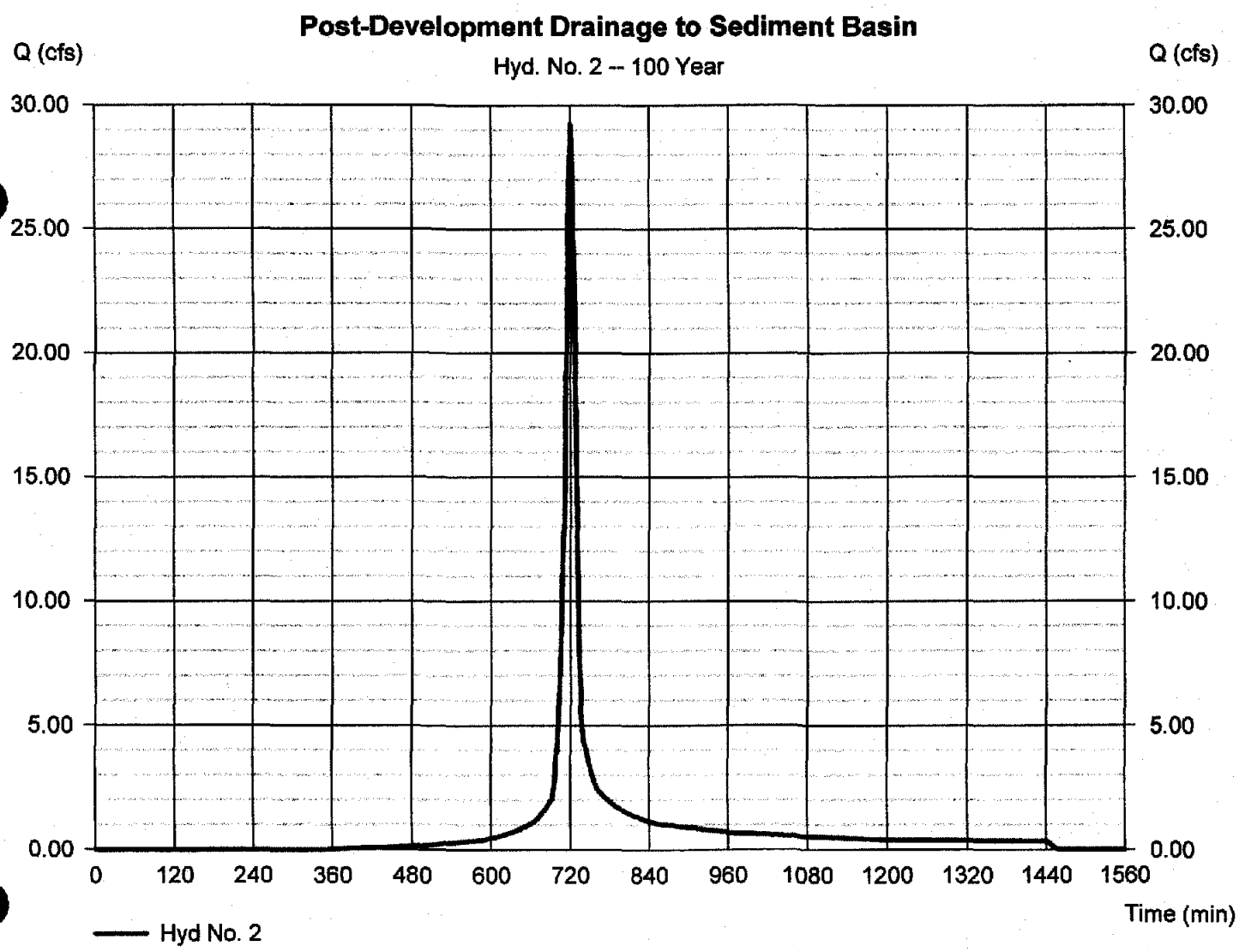
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 2

Post-Development Drainage to Sediment Basin

Hydrograph type	= SCS Runoff	Peak discharge	= 29.22 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 76,608 cuft
Drainage area	= 3.880 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

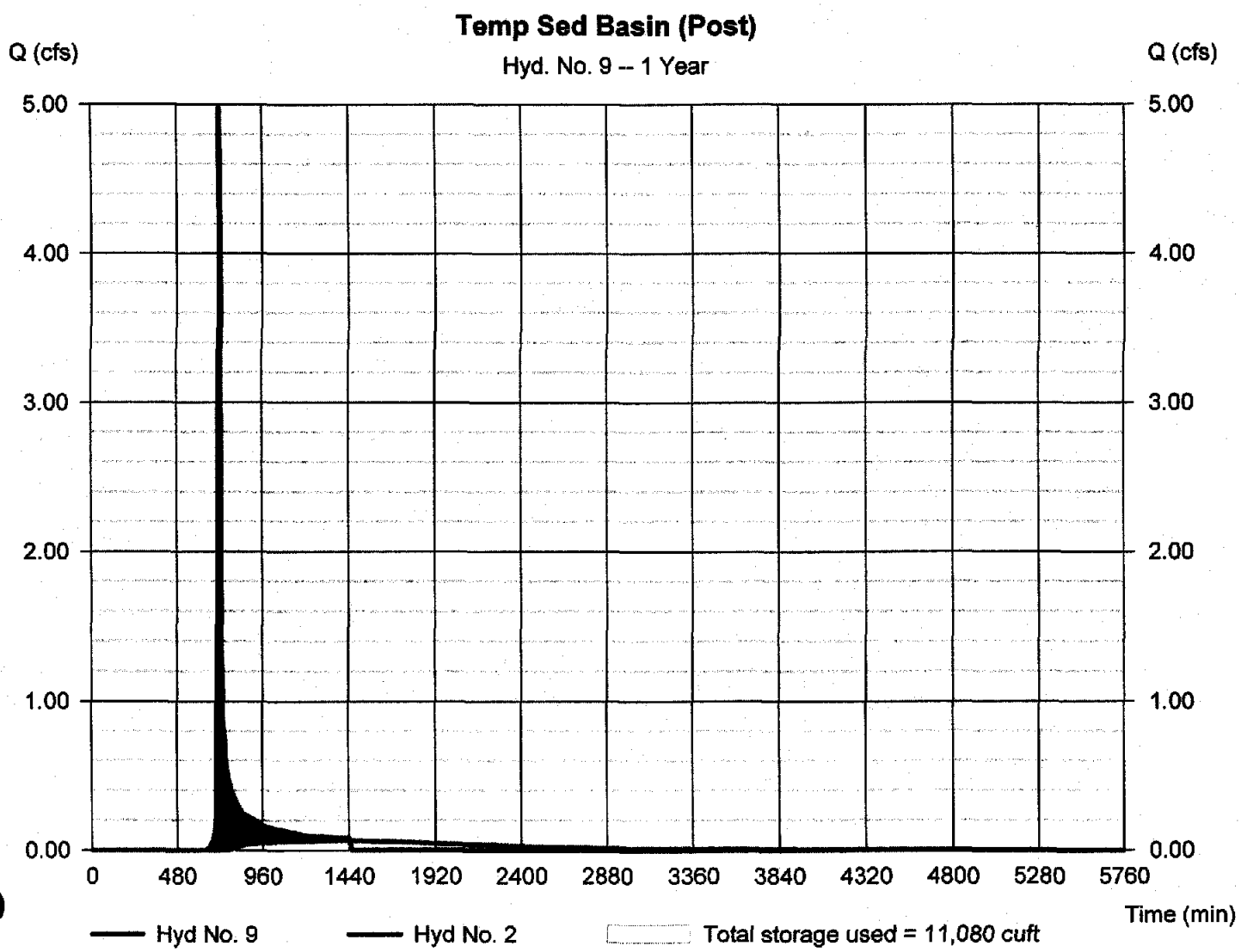
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 9

Temp Sed Basin (Post)

Hydrograph type	= Reservoir	Peak discharge	= 0.066 cfs
Storm frequency	= 1 yrs	Time to peak	= 1444 min
Time interval	= 2 min	Hyd. volume	= 6,130 cuft
Inflow hyd. No.	= 2 - Post-Development Drainage	Max. Elevation	= 86.48 ft
Reservoir name	= Existing Dry Pond (Temp Basin)	Max. Storage	= 11,080 cuft

Storage Indication method used.



Hydrograph Report

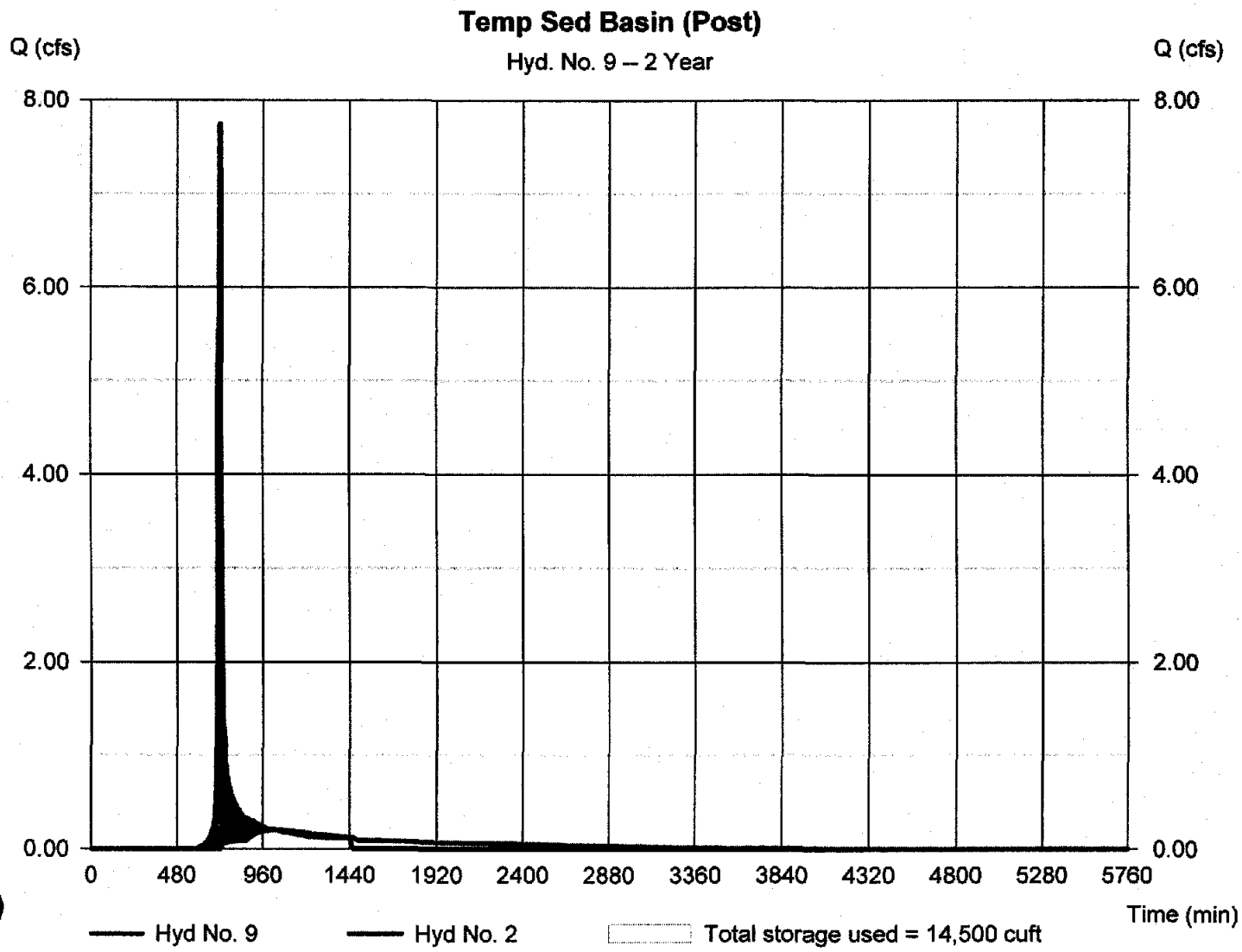
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 9

Temp Sed Basin (Post)

Hydrograph type	= Reservoir	Peak discharge	= 0.199 cfs
Storm frequency	= 2 yrs	Time to peak	= 1034 min
Time interval	= 2 min	Hyd. volume	= 13,151 cuft
Inflow hyd. No.	= 2 - Post-Development Drainage	Max. Elevation	= 86.89 ft
Reservoir name	= Existing Dry Pond (Temp Basin)	Max. Storage	= 14,500 cuft

Storage Indication method used.



Hydrograph Report

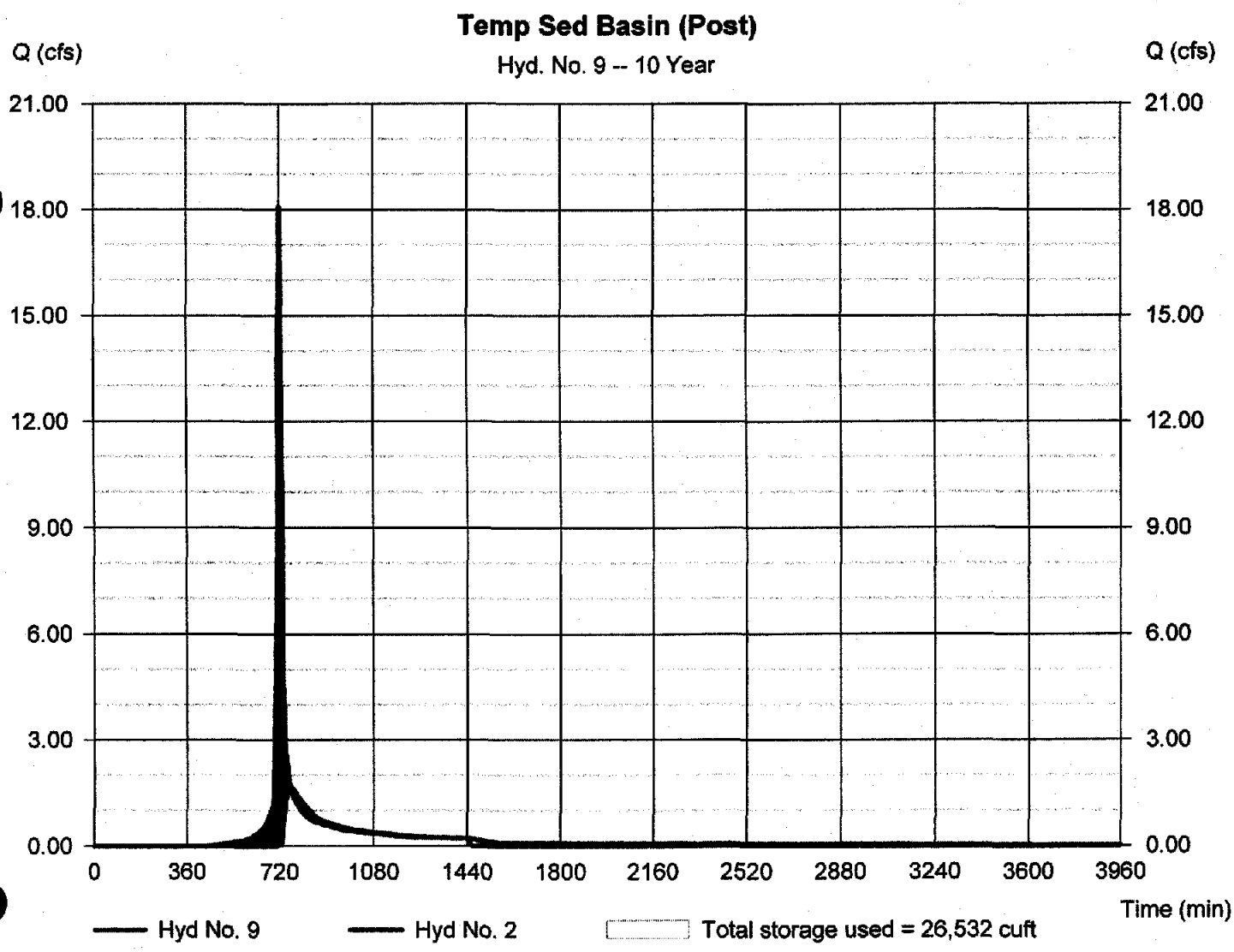
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 9

Temp Sed Basin (Post)

Hydrograph type	= Reservoir	Peak discharge	= 1.656 cfs
Storm frequency	= 10 yrs	Time to peak	= 760 min
Time interval	= 2 min	Hyd. volume	= 31,345 cuft
Inflow hyd. No.	= 2 - Post-Development Drainage	Max. Elevation	= 87.14 ft
Reservoir name	= Existing Dry Pond (Temp Basin)	Max. Storage	= 26,532 cuft

Storage Indication method used.



Hydrograph Report

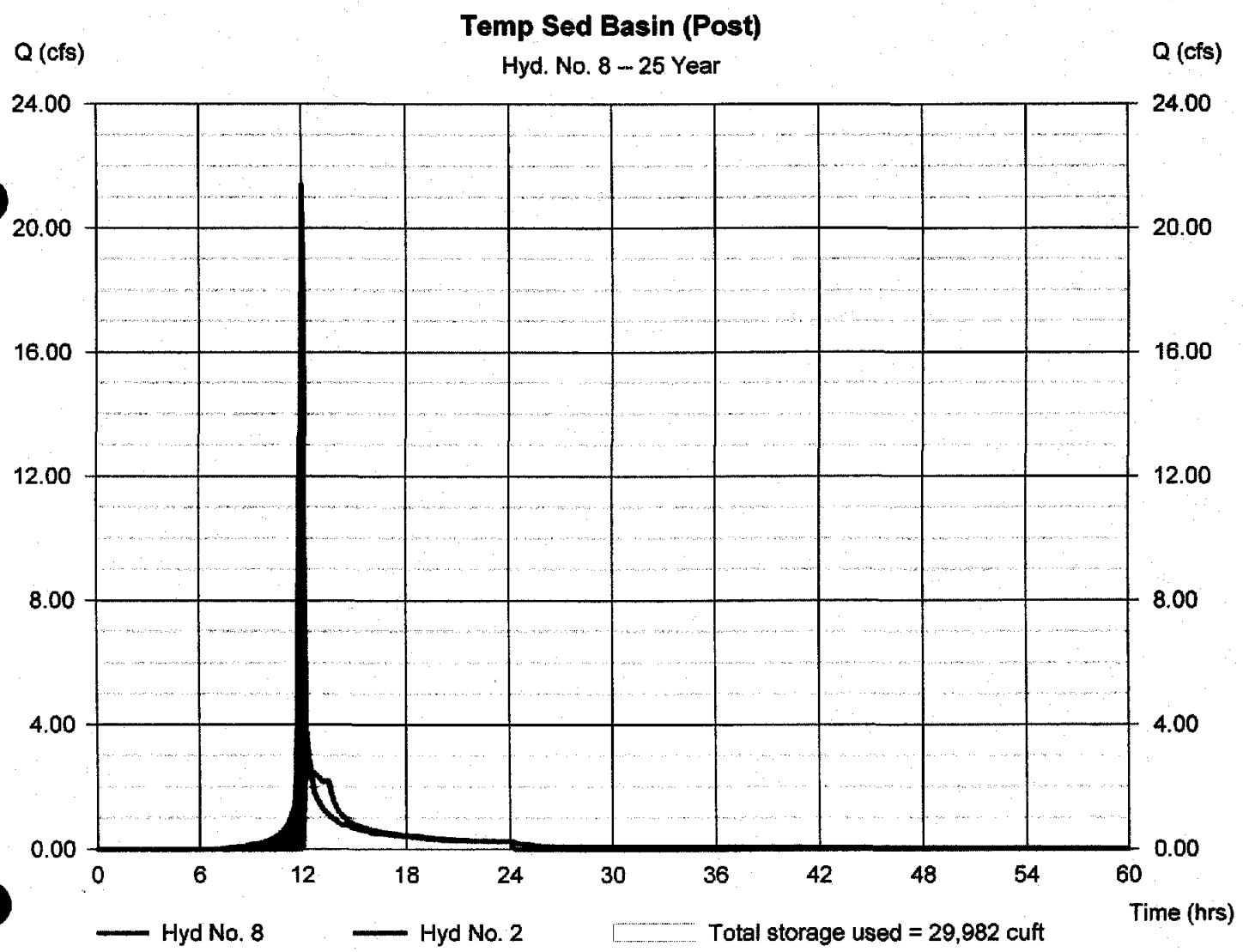
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 8

Temp Sed Basin (Post)

Hydrograph type	= Reservoir	Peak discharge	= 2.460 cfs
Storm frequency	= 25 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 40,093 cuft
Inflow hyd. No.	= 2 - Post-Development Drainage to Sedi	Max. Elevation	= 87.45 ft
Reservoir name	= Existing Dry Pond (Temp Basin)	Max. Storage	= 29,982 cuft

Storage Indication method used.



Hydrograph Report

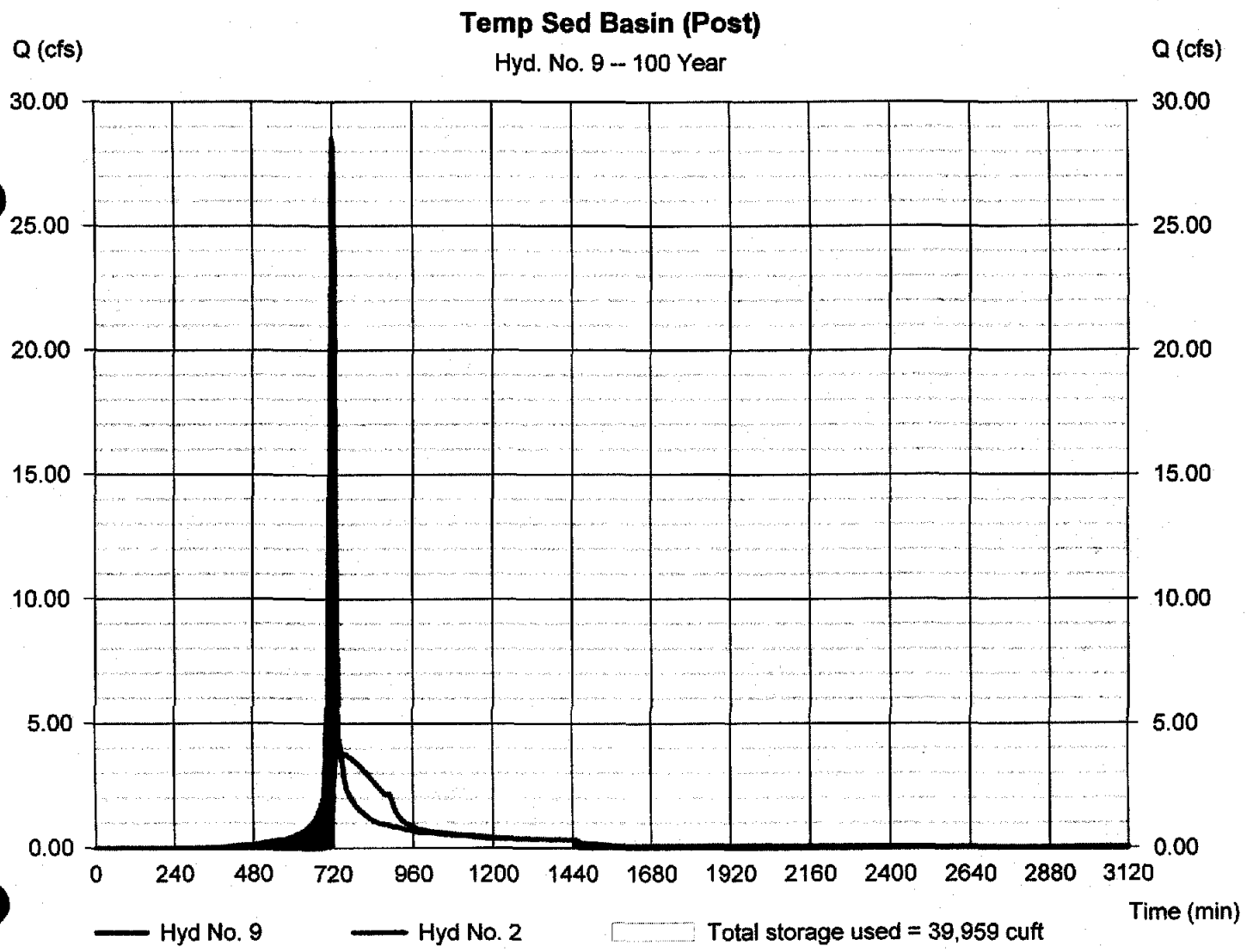
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 9

Temp Sed Basin (Post)

Hydrograph type	= Reservoir	Peak discharge	= 3.807 cfs
Storm frequency	= 100 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 59,283 cuft
Inflow hyd. No.	= 2 - Post-Development Drainage	Max. Elevation	= 88.31 ft
Reservoir name	= Existing Dry Pond (Temp Basin)	Max. Storage	= 39,959 cuft

Storage Indication method used.



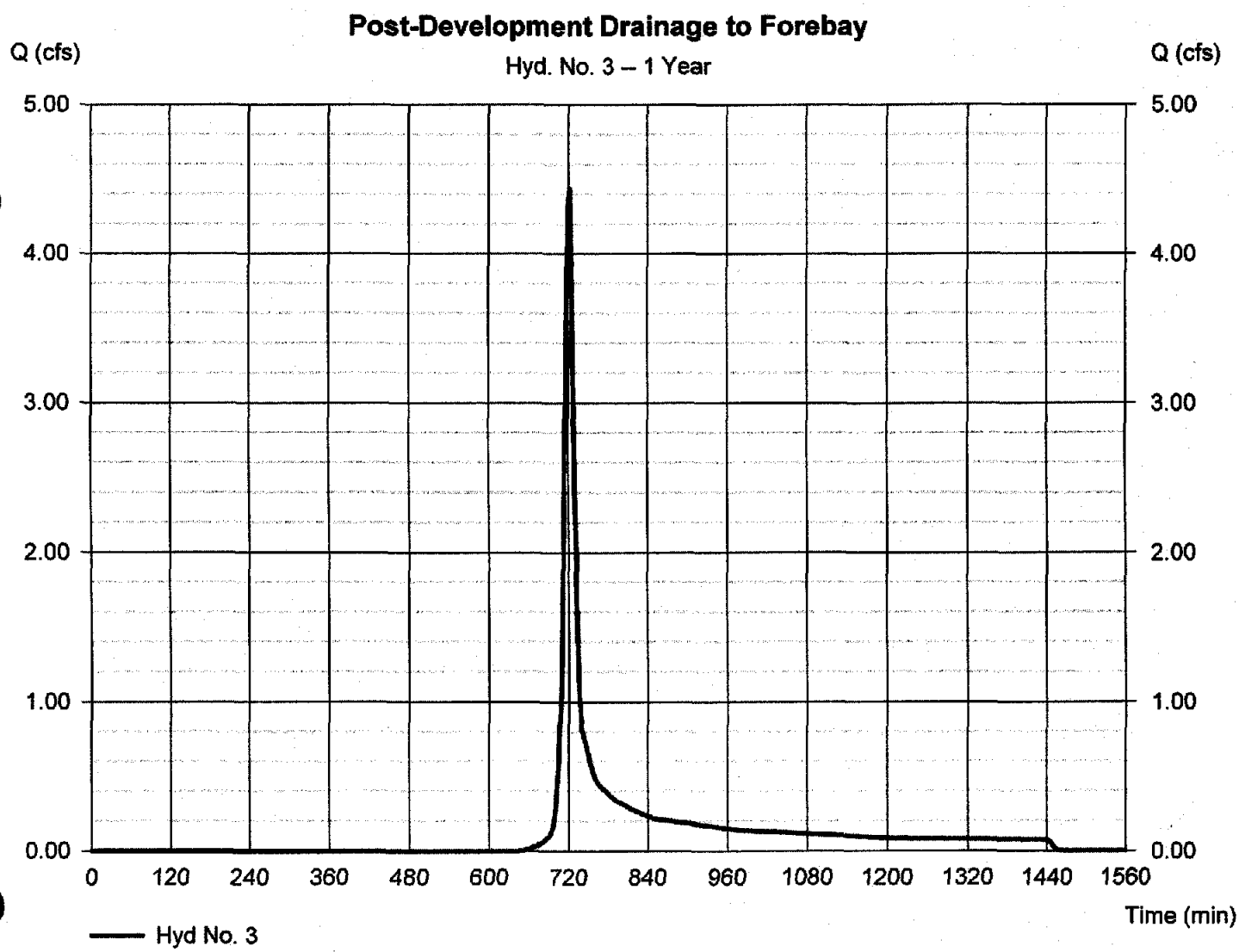
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 3

Post-Development Drainage to Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 4.440 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 11,828 cuft
Drainage area	= 3.380 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



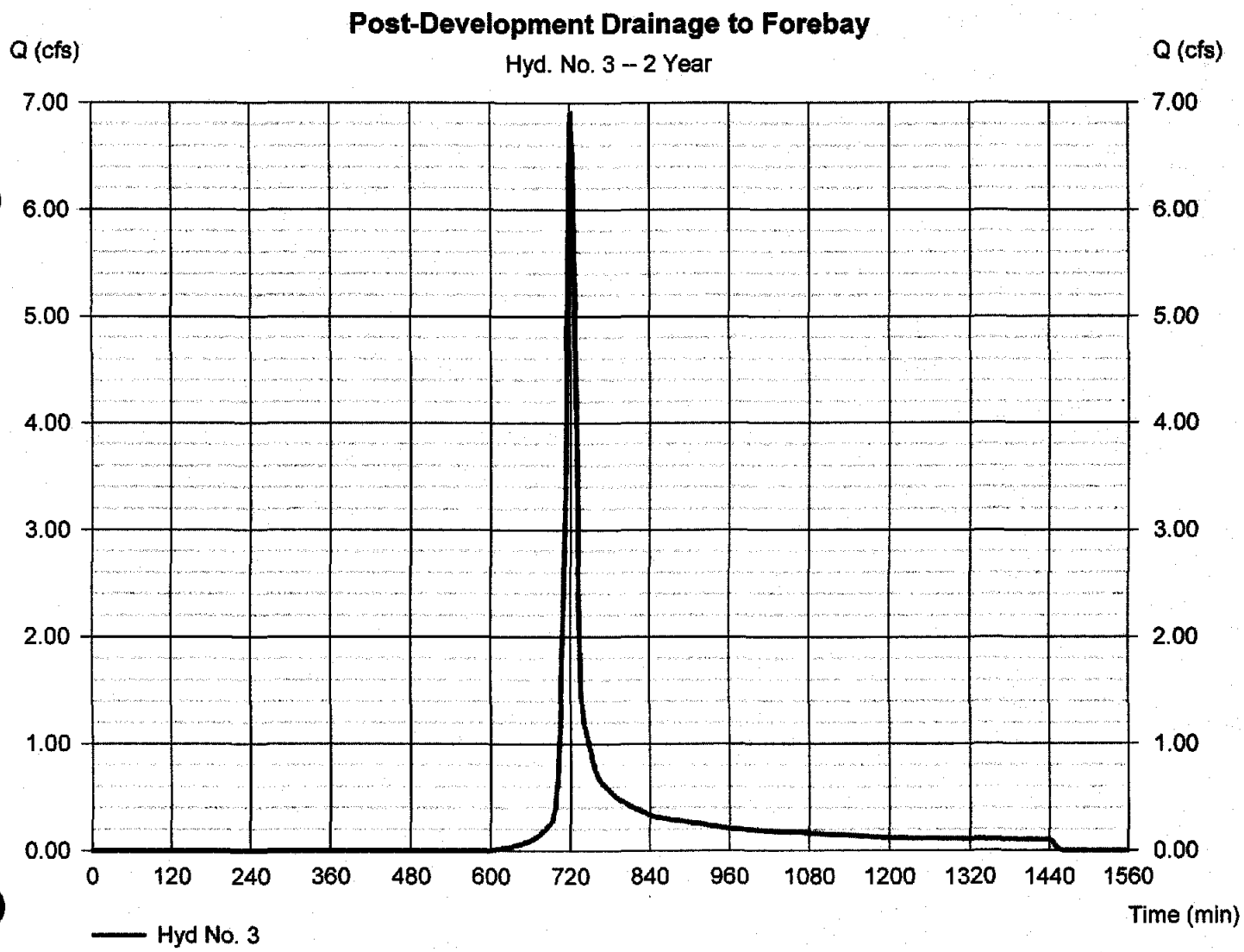
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 3

Post-Development Drainage to Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 6.905 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 18,100 cuft
Drainage area	= 3.380 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



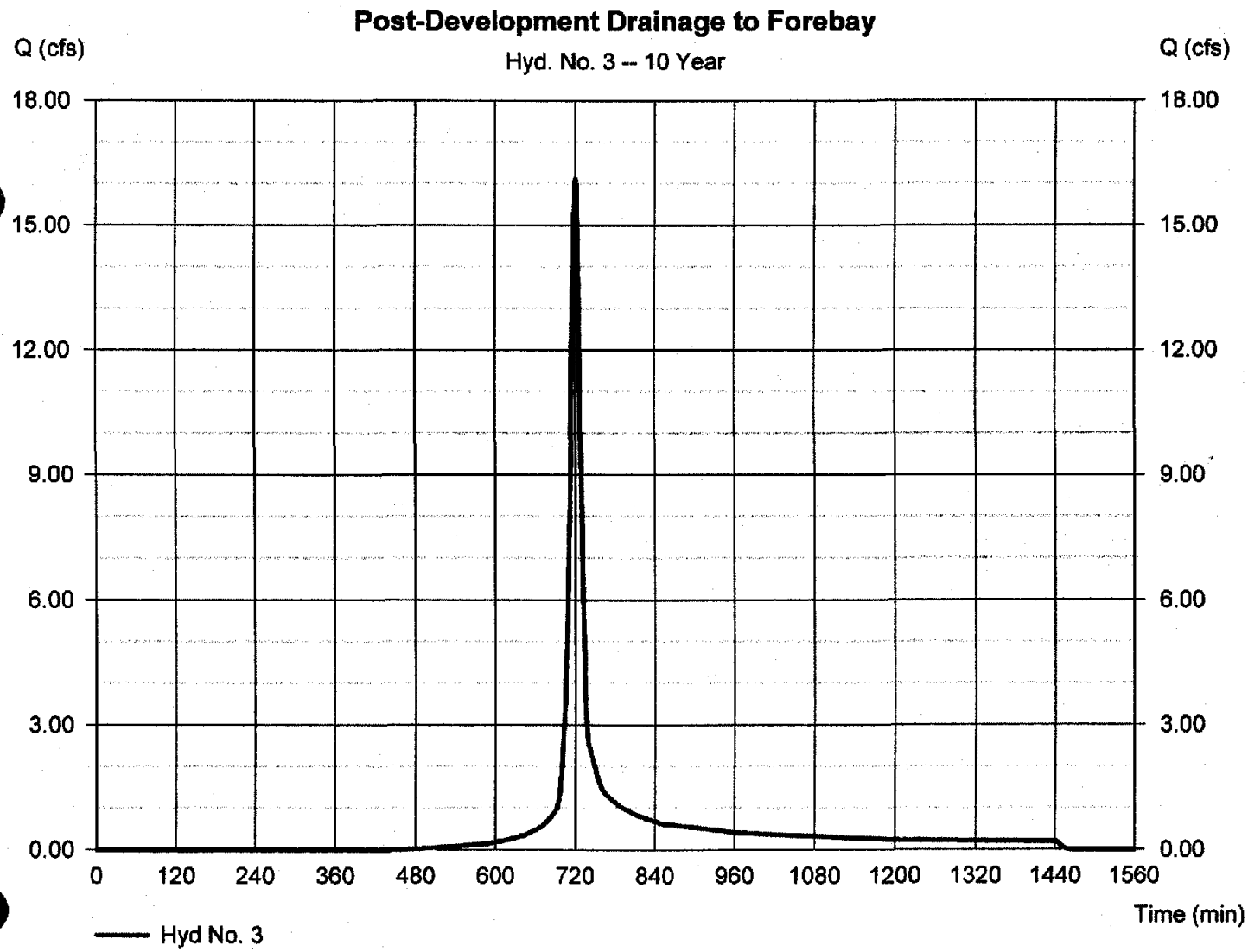
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 3

Post-Development Drainage to Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 16.11 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 41,818 cuft
Drainage area	= 3.380 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



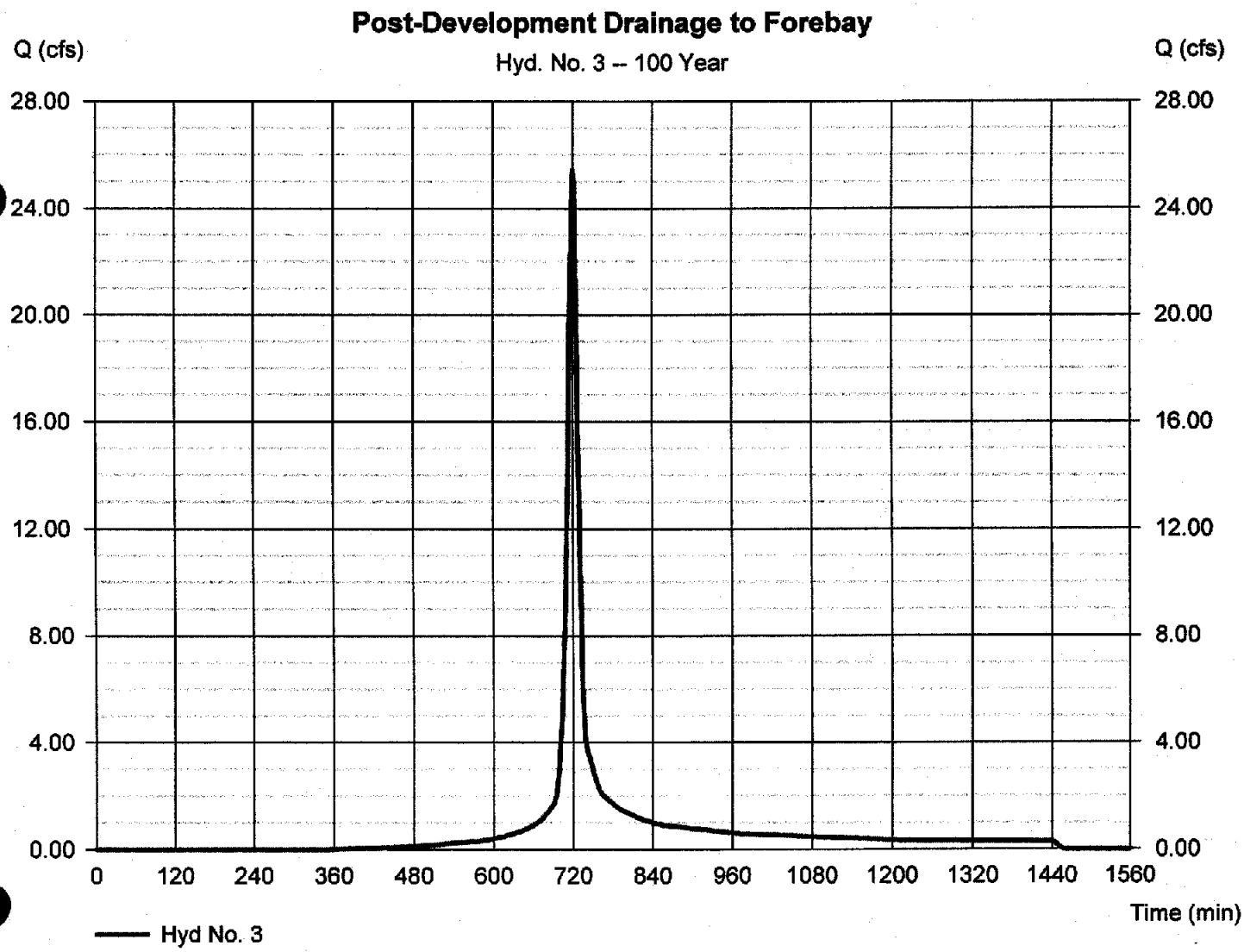
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 3

Post-Development Drainage to Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 25.45 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 66,735 cuft
Drainage area	= 3.380 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

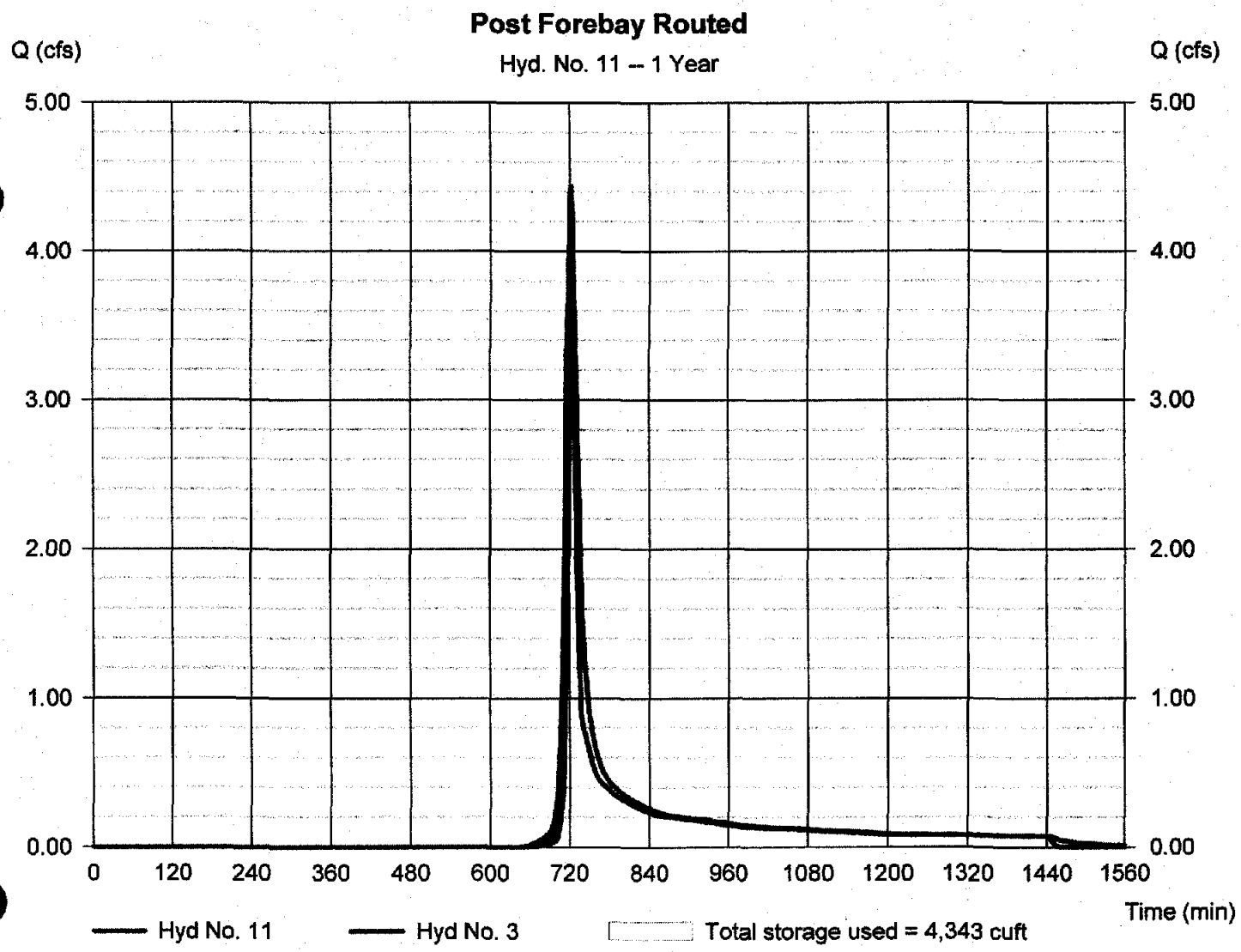
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 11

Post Forebay Routed

Hydrograph type	= Reservoir	Peak discharge	= 3.662 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 11,825 cuft
Inflow hyd. No.	= 3 - Post-Development Drainage to Forebay	Max. Elevation	= 87.01 ft
Reservoir name	= Forebay	Max. Storage	= 4,343 cuft

Storage Indication method used. Wet pond routing start elevation = 86.00 ft.



Hydrograph Report

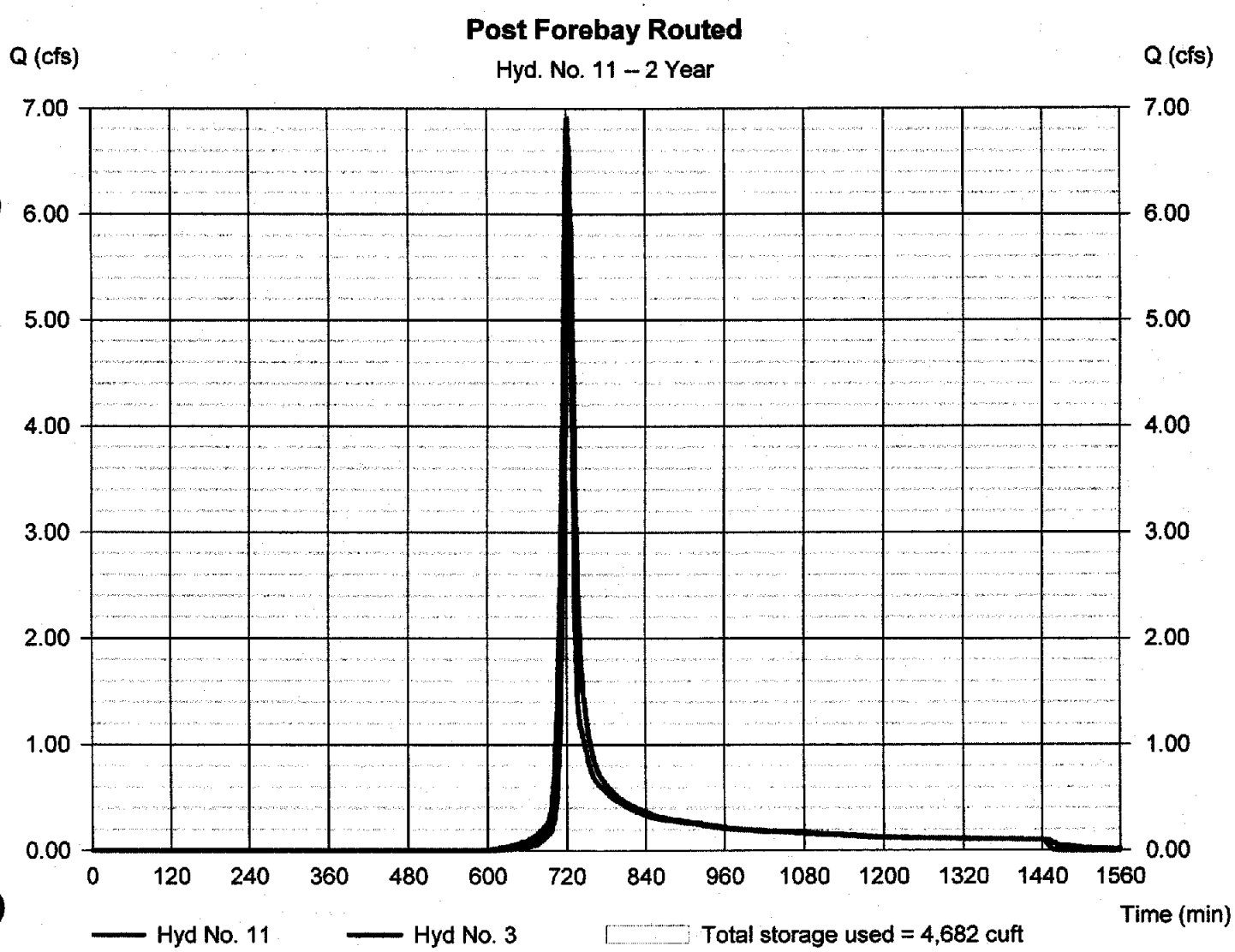
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 11

Post Forebay Routed

Hydrograph type	= Reservoir	Peak discharge	= 6.676 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 18,096 cuft
Inflow hyd. No.	= 3 - Post-Development Drainage to Forebay	Max. Elevation	= 87.16 ft
Reservoir name	= Forebay	Max. Storage	= 4,682 cuft

Storage Indication method used. Wet pond routing start elevation = 86.00 ft.



Hydrograph Report

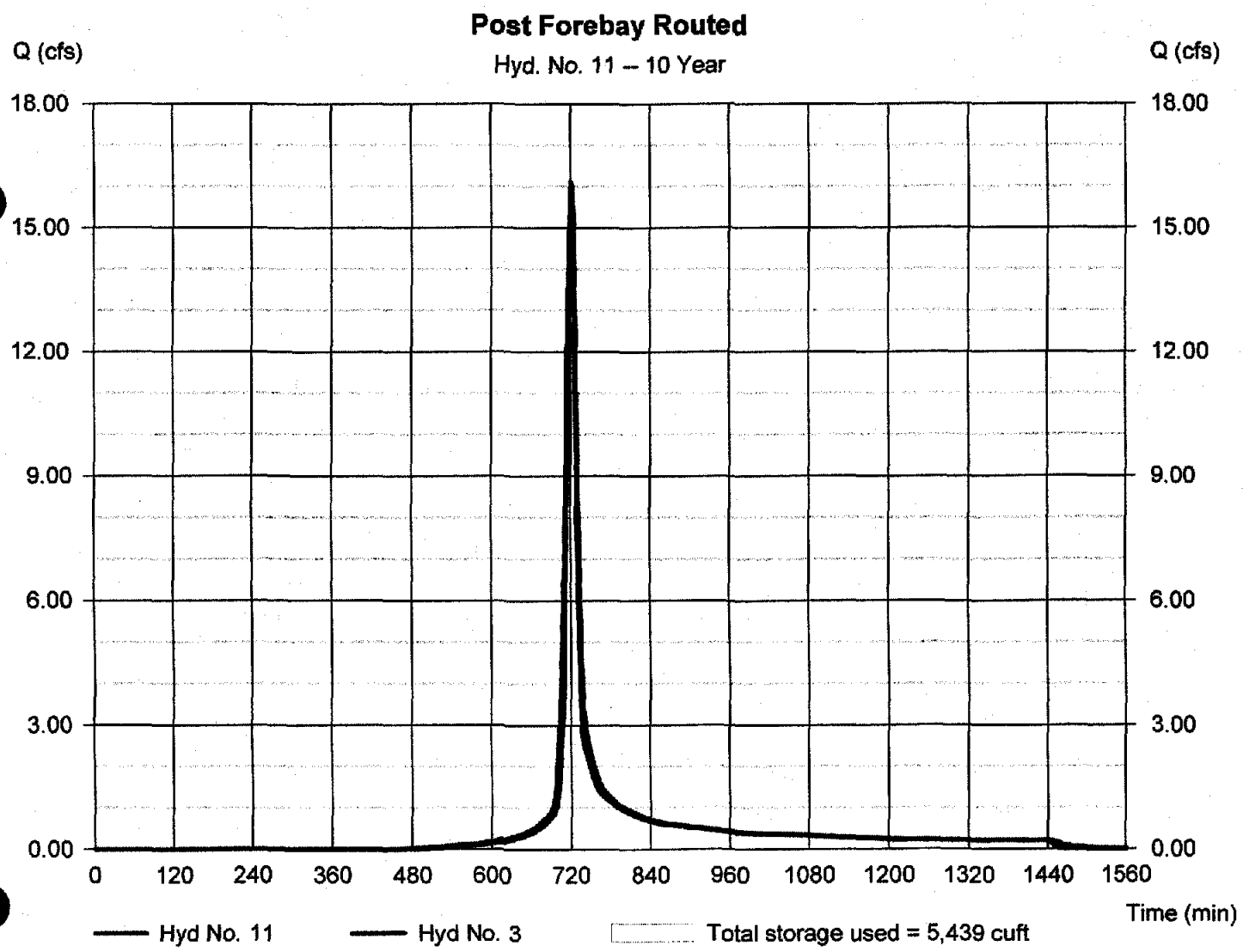
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 11

Post Forebay Routed

Hydrograph type	= Reservoir	Peak discharge	= 16.03 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 41,815 cuft
Inflow hyd. No.	= 3 - Post-Development Drainage to Forebay	Max. Elevation	= 87.48 ft
Reservoir name	= Forebay	Max. Storage	= 5,439 cuft

Storage Indication method used. Wet pond routing start elevation = 86.00 ft.



Hydrograph Report

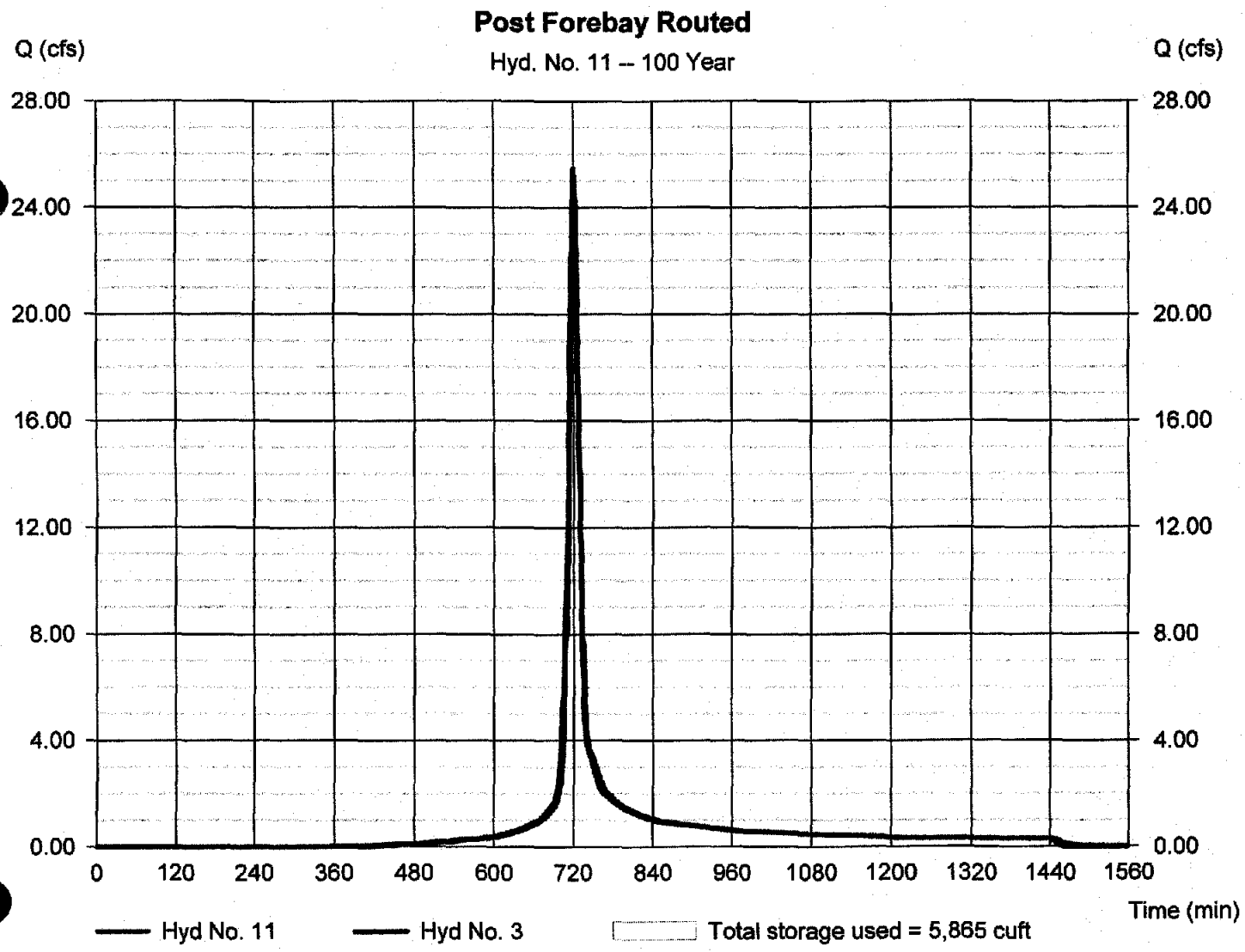
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 11

Post Forebay Routed

Hydrograph type	= Reservoir	Peak discharge	= 25.22 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 66,732 cuft
Inflow hyd. No.	= 3 - Post-Development Drainage to Forebay	Max. Elevation	= 87.67 ft
Reservoir name	= Forebay	Max. Storage	= 5,865 cuft

Storage Indication method used. Wet pond routing start elevation = 86.00 ft.



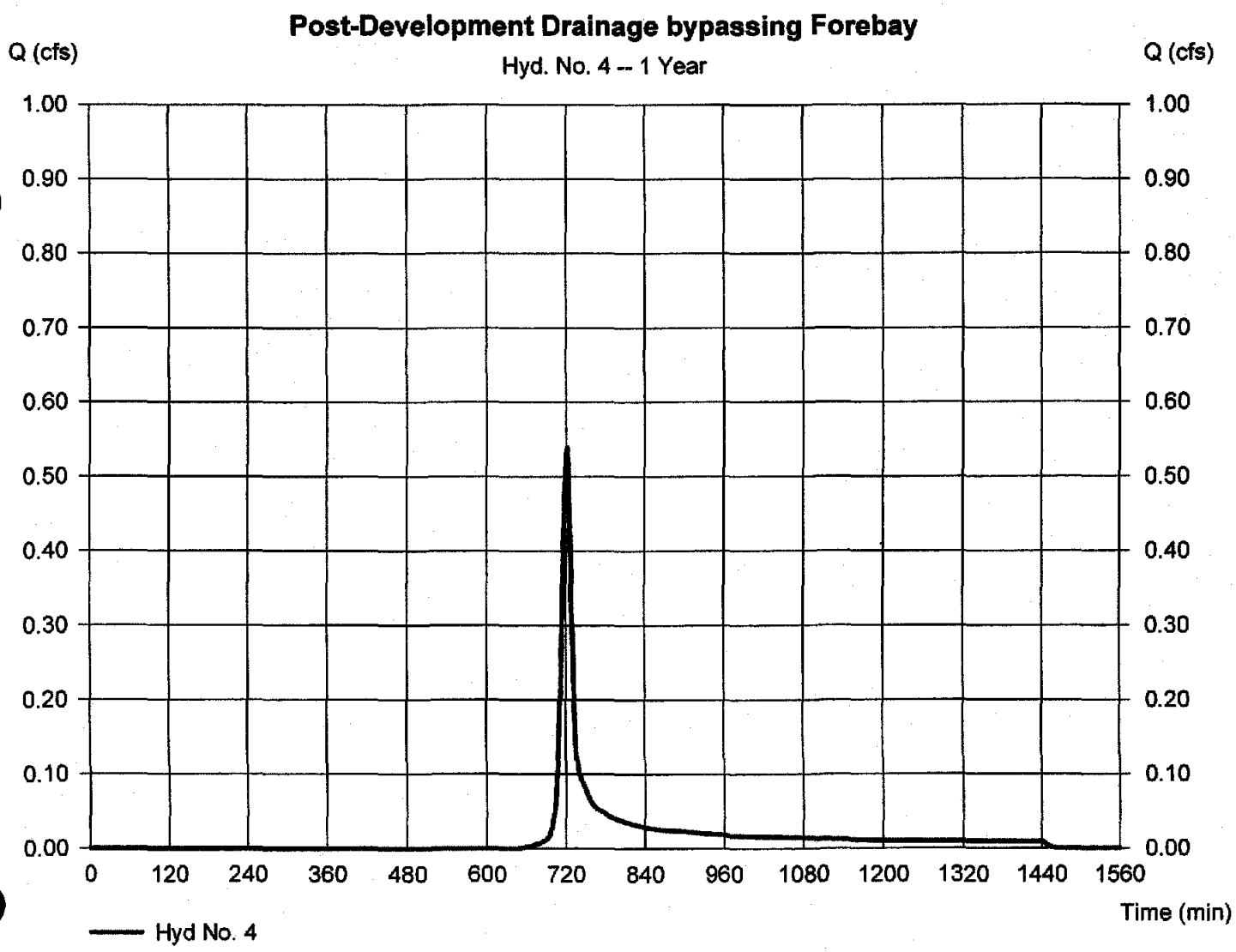
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 4

Post-Development Drainage bypassing Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 0.539 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 1,435 cuft
Drainage area	= 0.410 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



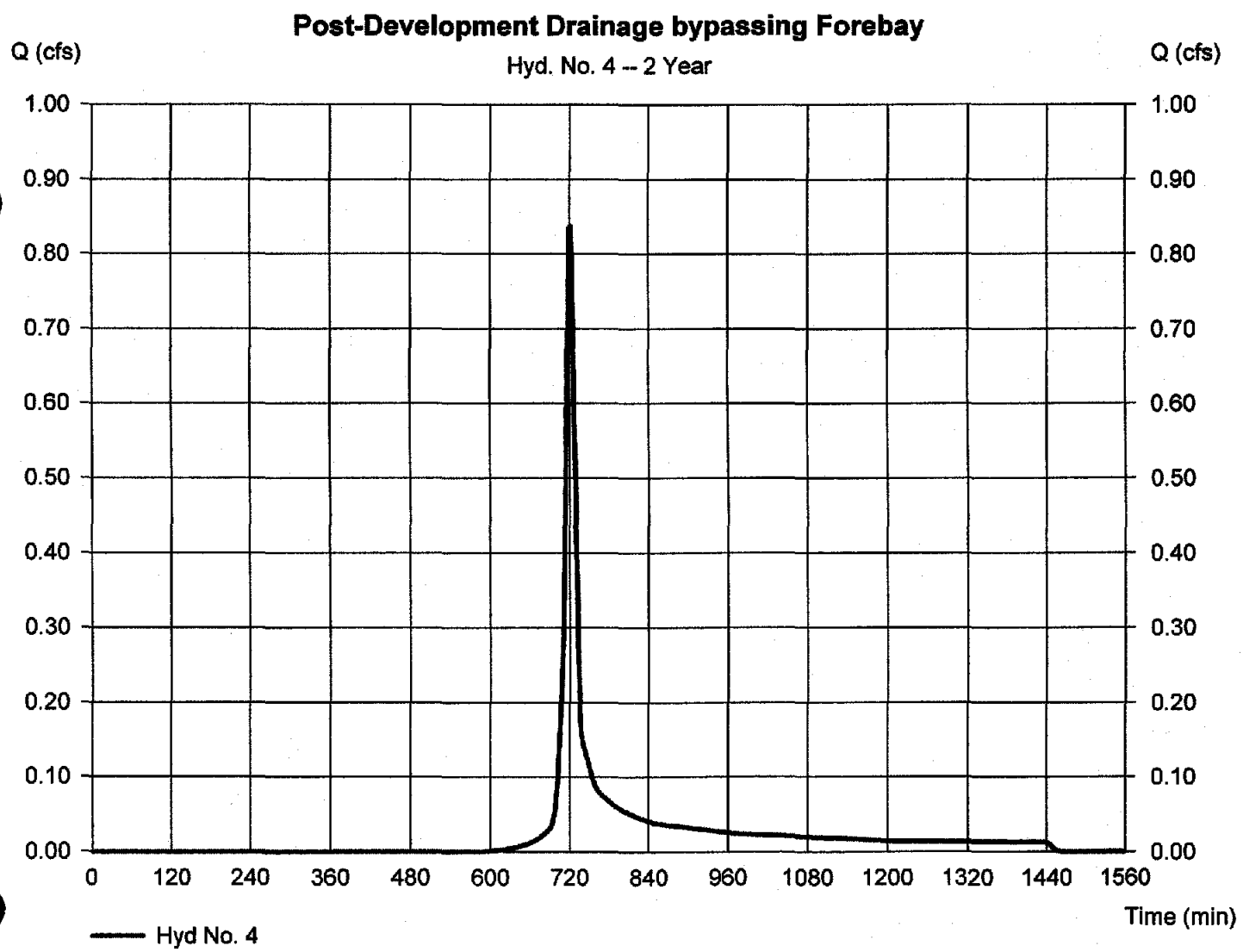
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 4

Post-Development Drainage bypassing Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 0.838 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 2,196 cuft
Drainage area	= 0.410 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



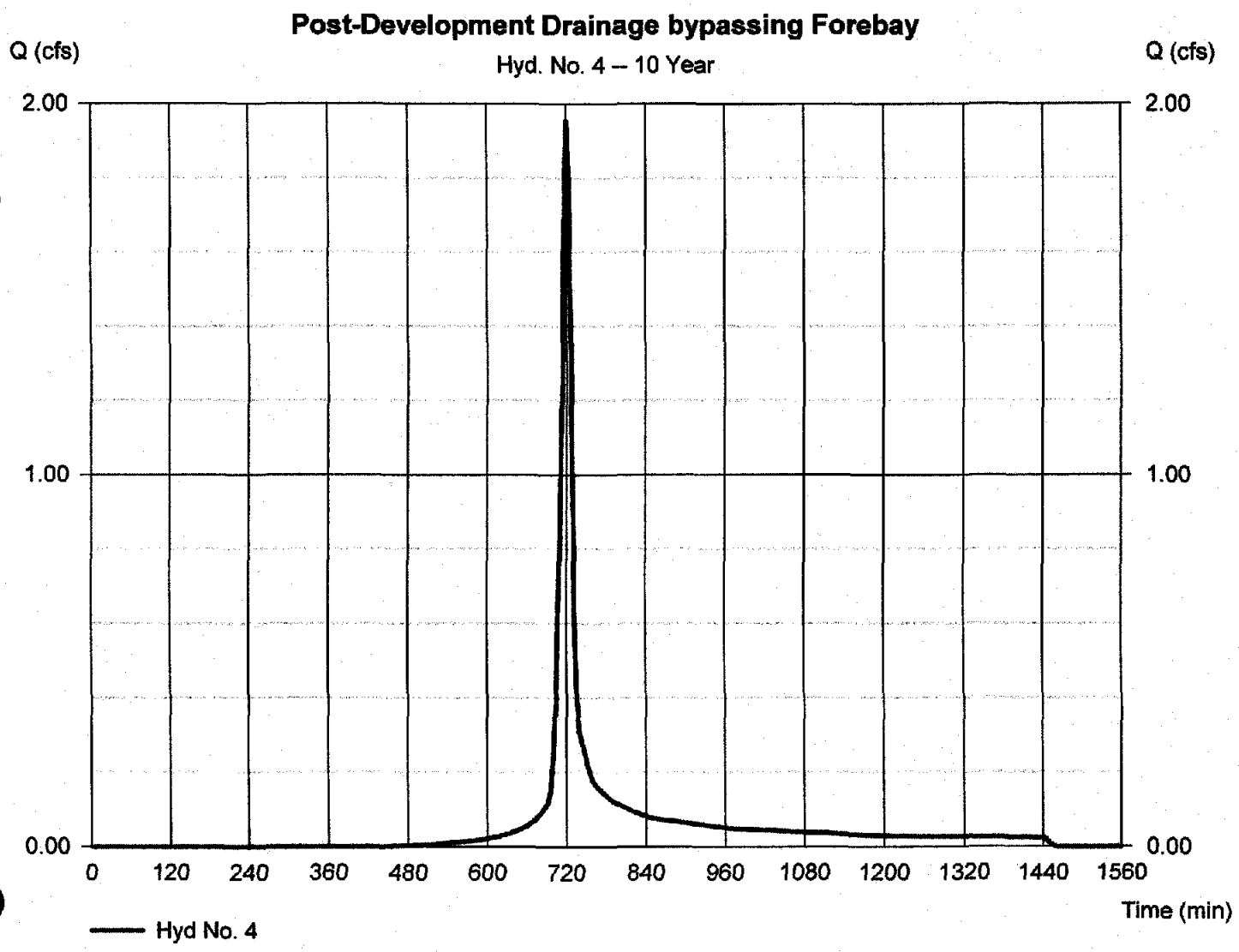
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 4

Post-Development Drainage bypassing Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 1.955 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 5,073 cuft
Drainage area	= 0.410 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



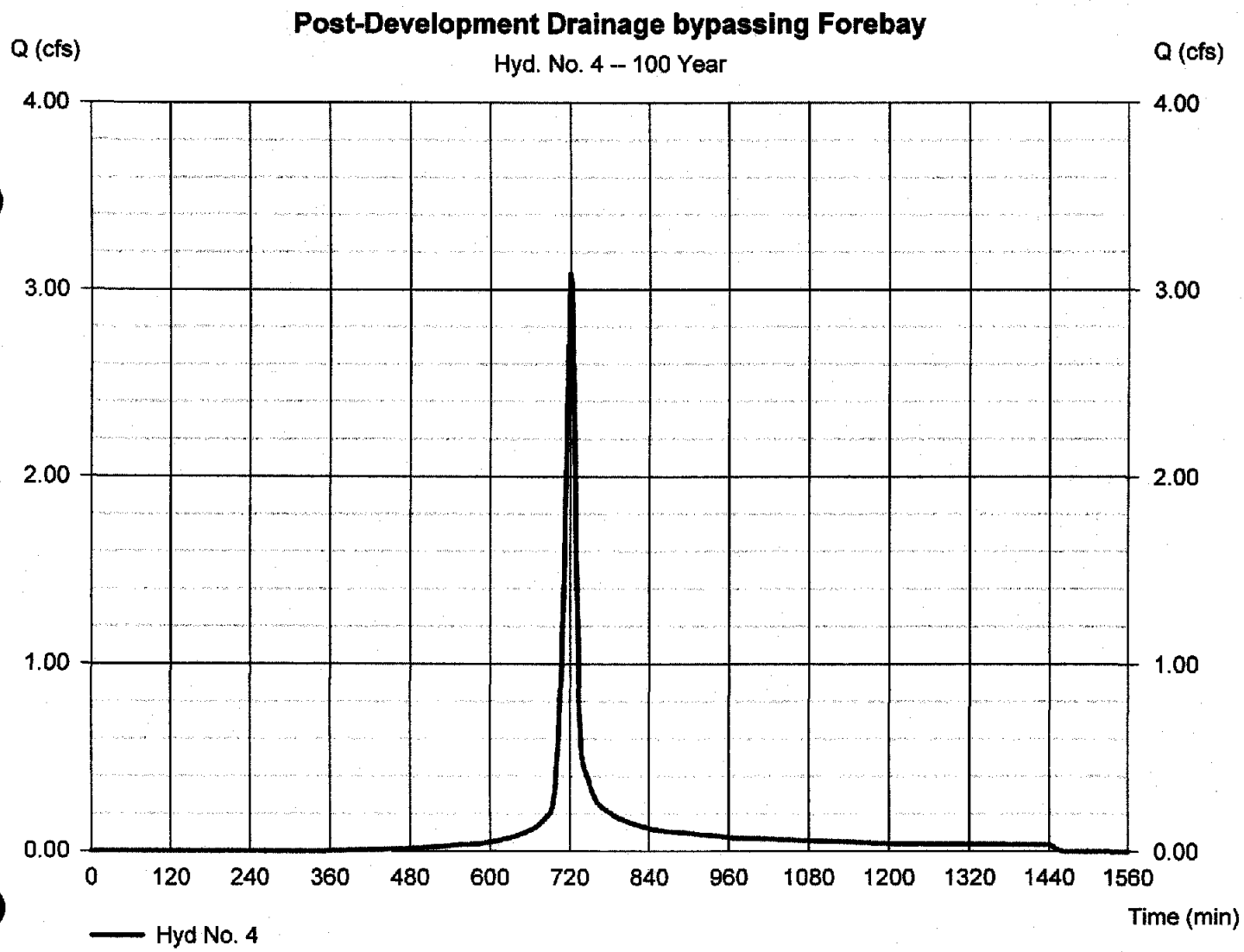
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 4

Post-Development Drainage bypassing Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 3.088 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 8,095 cuft
Drainage area	= 0.410 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



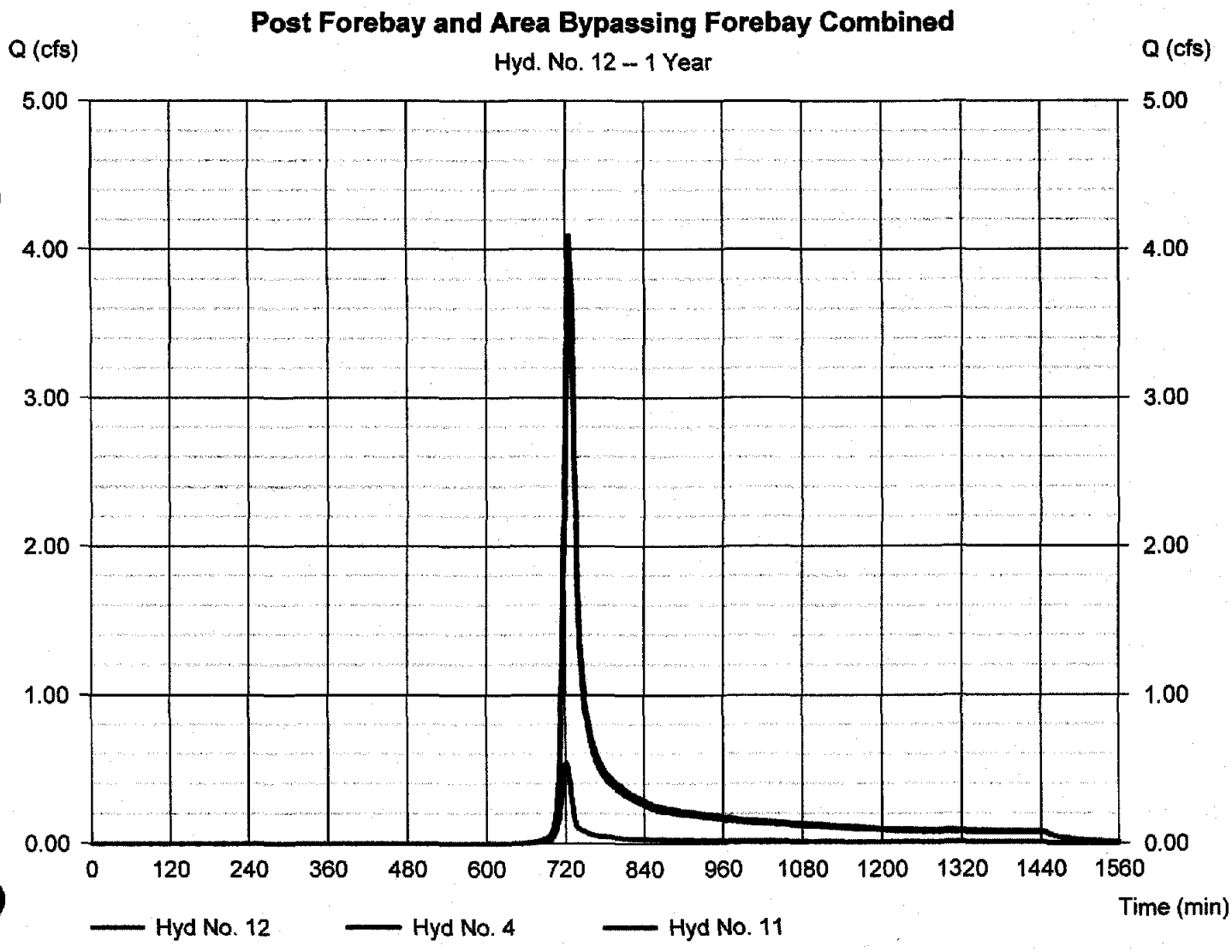
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 12

Post Forebay and Area Bypassing Forebay Combined

Hydrograph type	= Combine	Peak discharge	= 4.093 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 13,260 cuft
Inflow hyds.	= 4, 11	Contrib. drain. area	= 0.410 ac



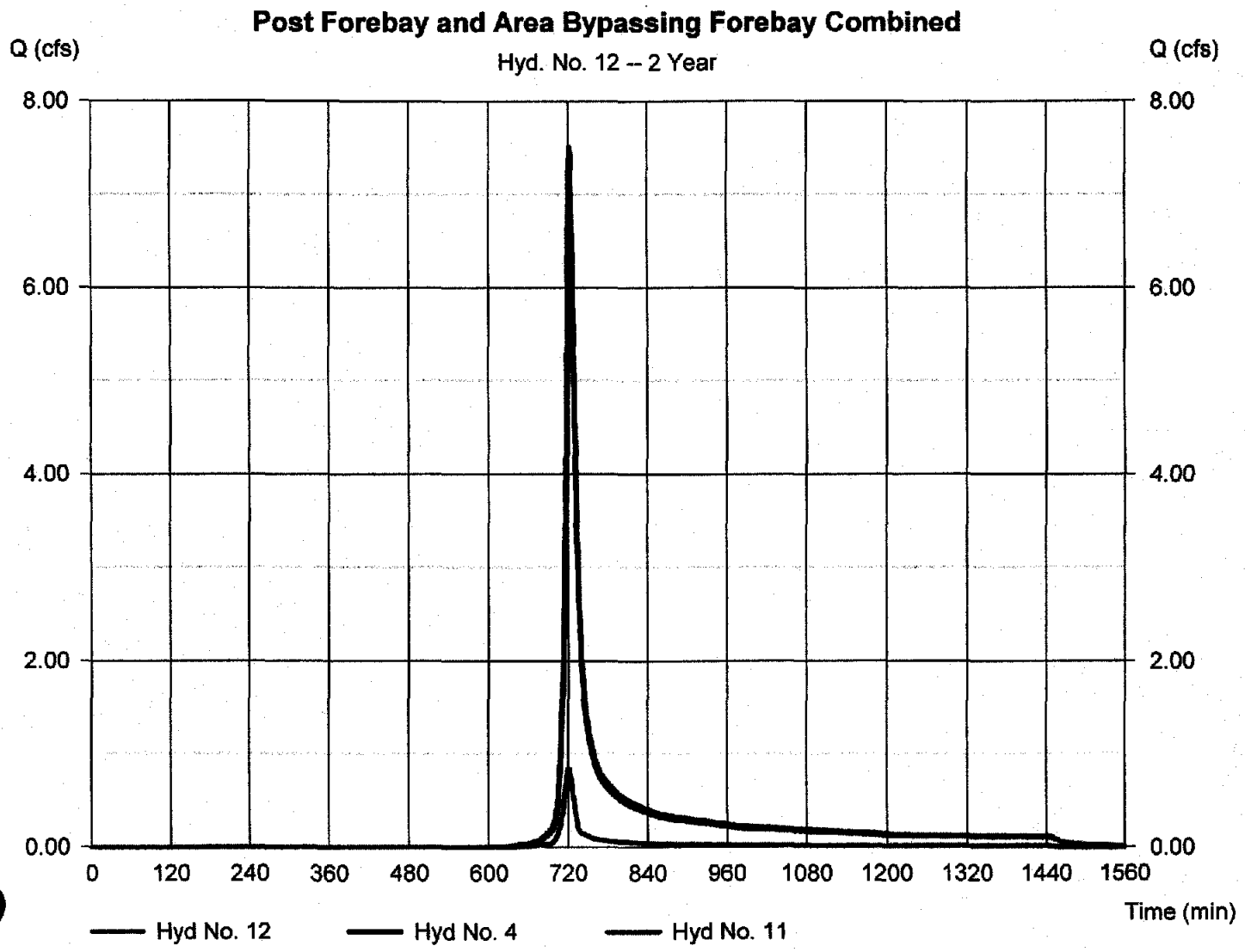
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 12

Post Forebay and Area Bypassing Forebay Combined

Hydrograph type	= Combine	Peak discharge	= 7.514 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 20,292 cuft
Inflow hyds.	= 4, 11	Contrib. drain. area	= 0.410 ac



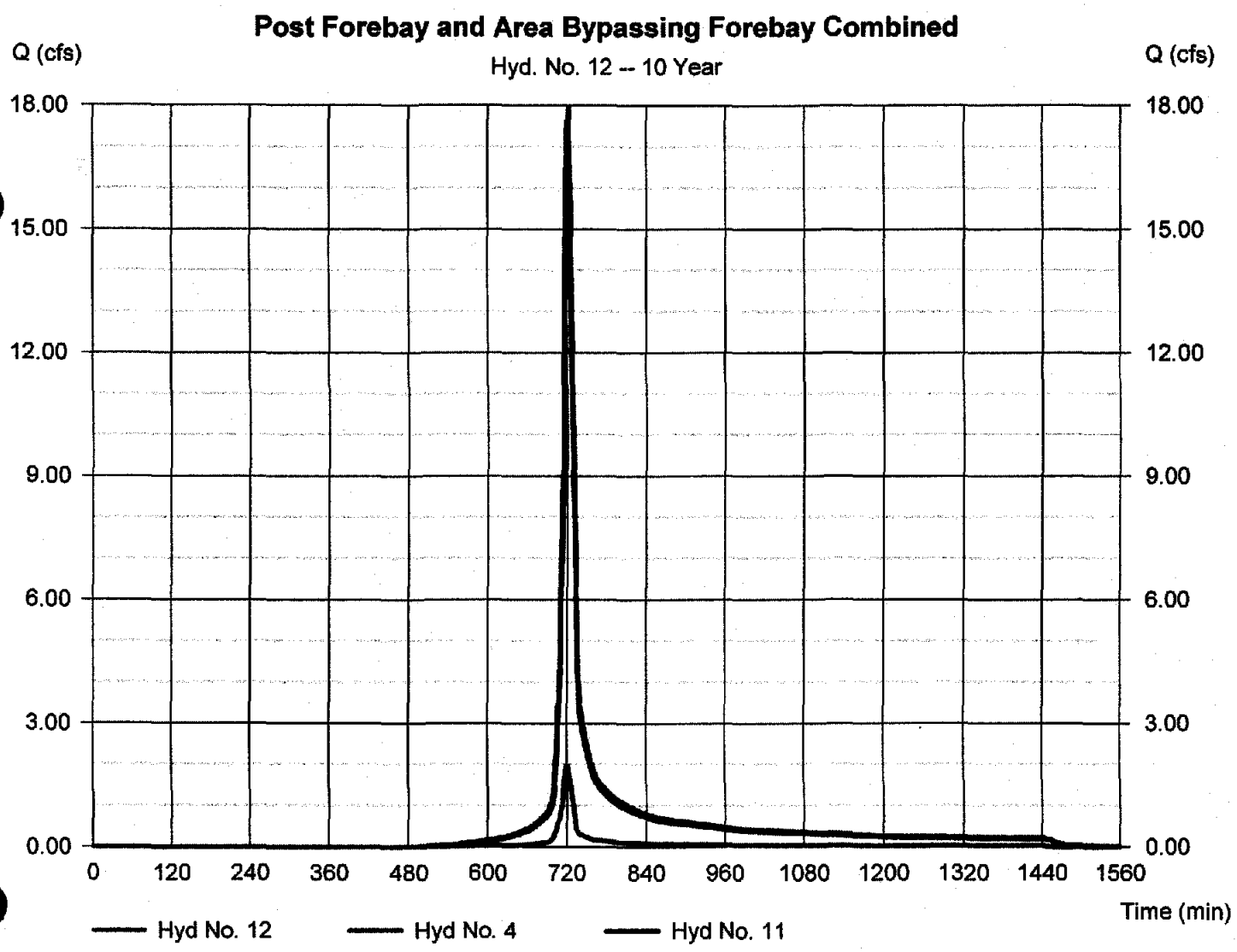
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 12

Post Forebay and Area Bypassing Forebay Combined

Hydrograph type	= Combine	Peak discharge	= 17.96 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 46,887 cuft
Inflow hyds.	= 4, 11	Contrib. drain. area	= 0.410 ac



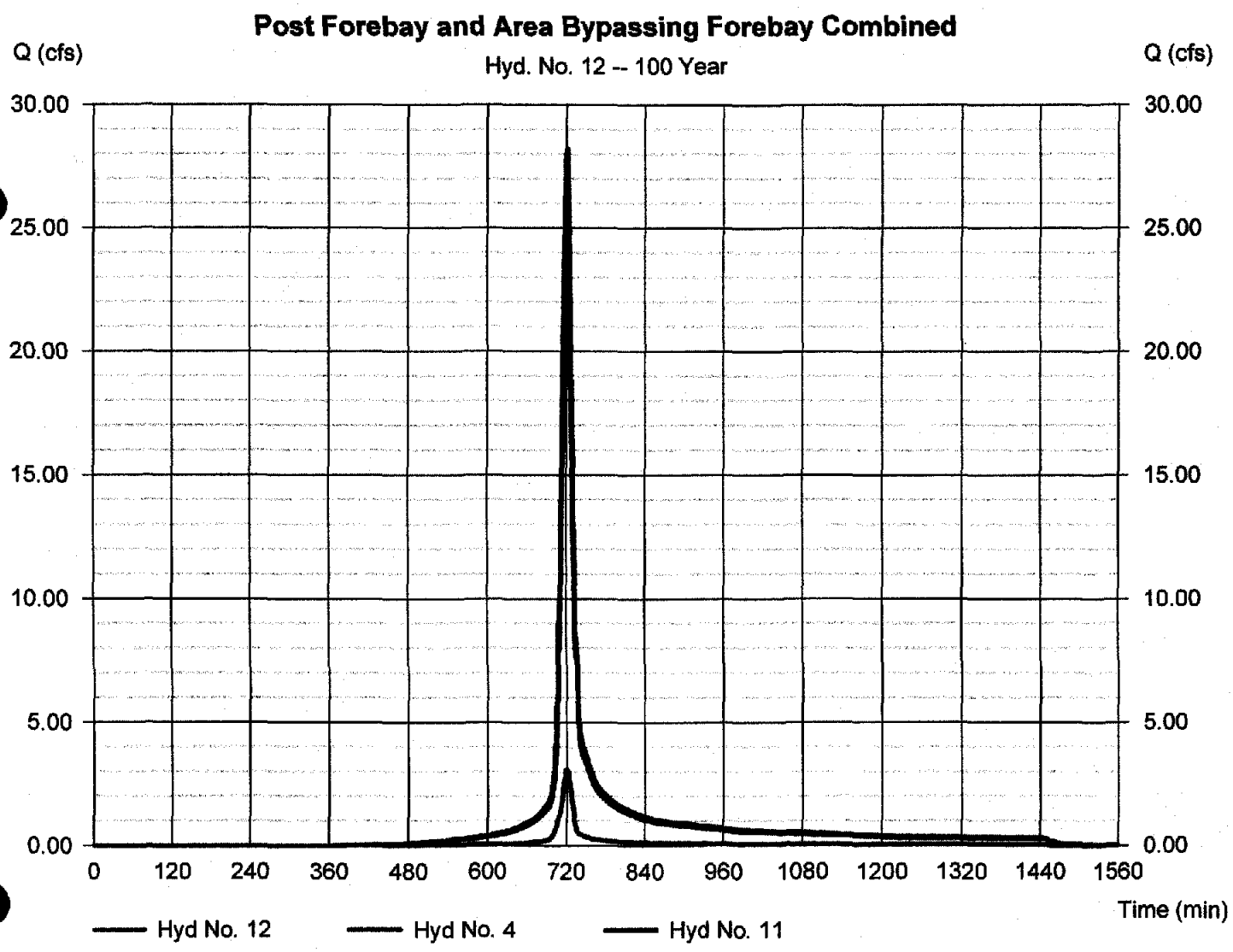
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 12

Post Forebay and Area Bypassing Forebay Combined

Hydrograph type	= Combine	Peak discharge	= 28.24 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 74,827 cuft
Inflow hyds.	= 4, 11	Contrib. drain. area	= 0.410 ac



Hydrograph Report

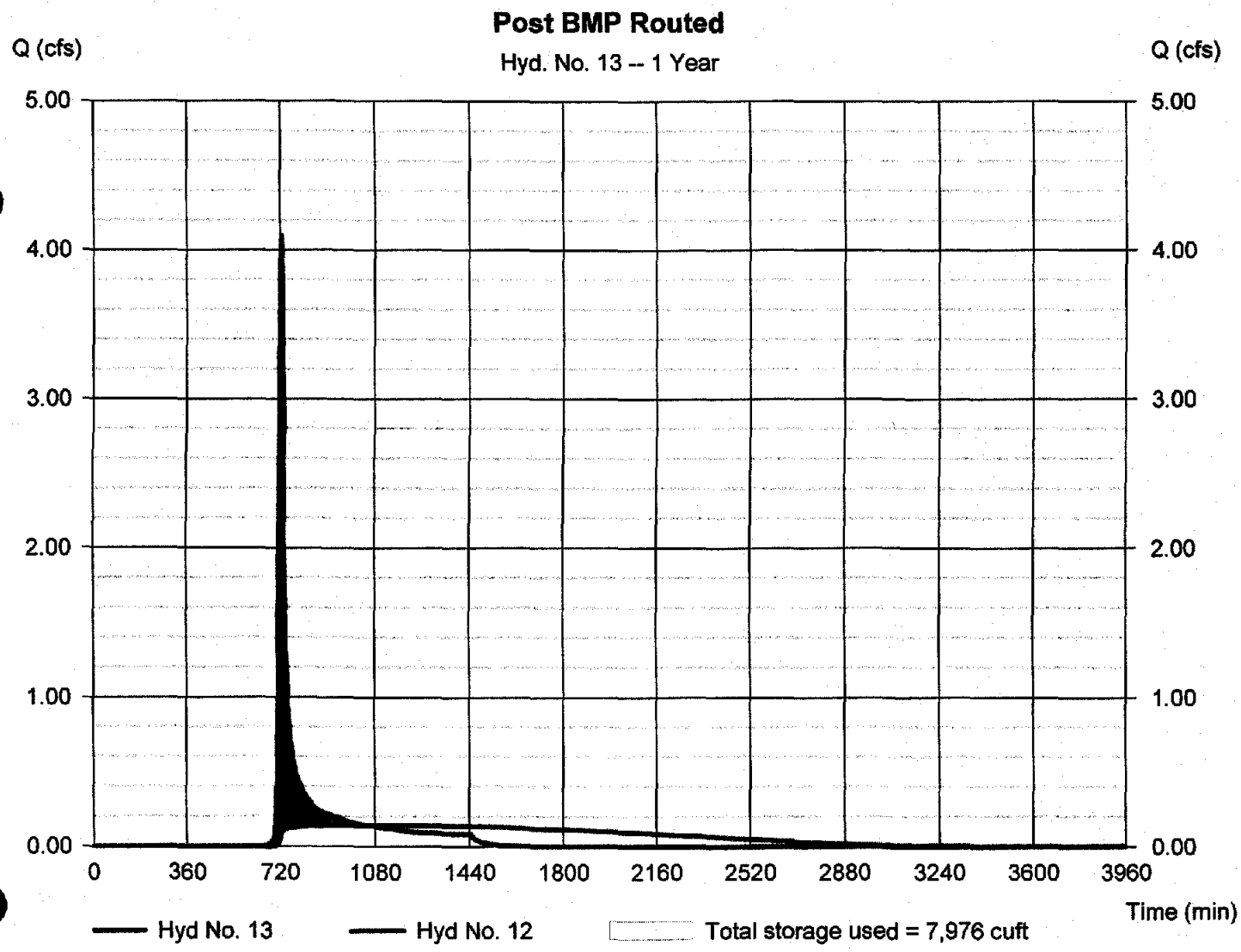
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 13

Post BMP Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.141 cfs
Storm frequency	= 1 yrs	Time to peak	= 1054 min
Time interval	= 2 min	Hyd. volume	= 13,236 cuft
Inflow hyd. No.	= 12 - Post Forebay and Area Bypassing Manhole Combined	Max. Elevation	= 85.88 ft
Reservoir name	= BMP	Max. Storage	= 7,976 cuft

Storage Indication method used.



Hydrograph Report

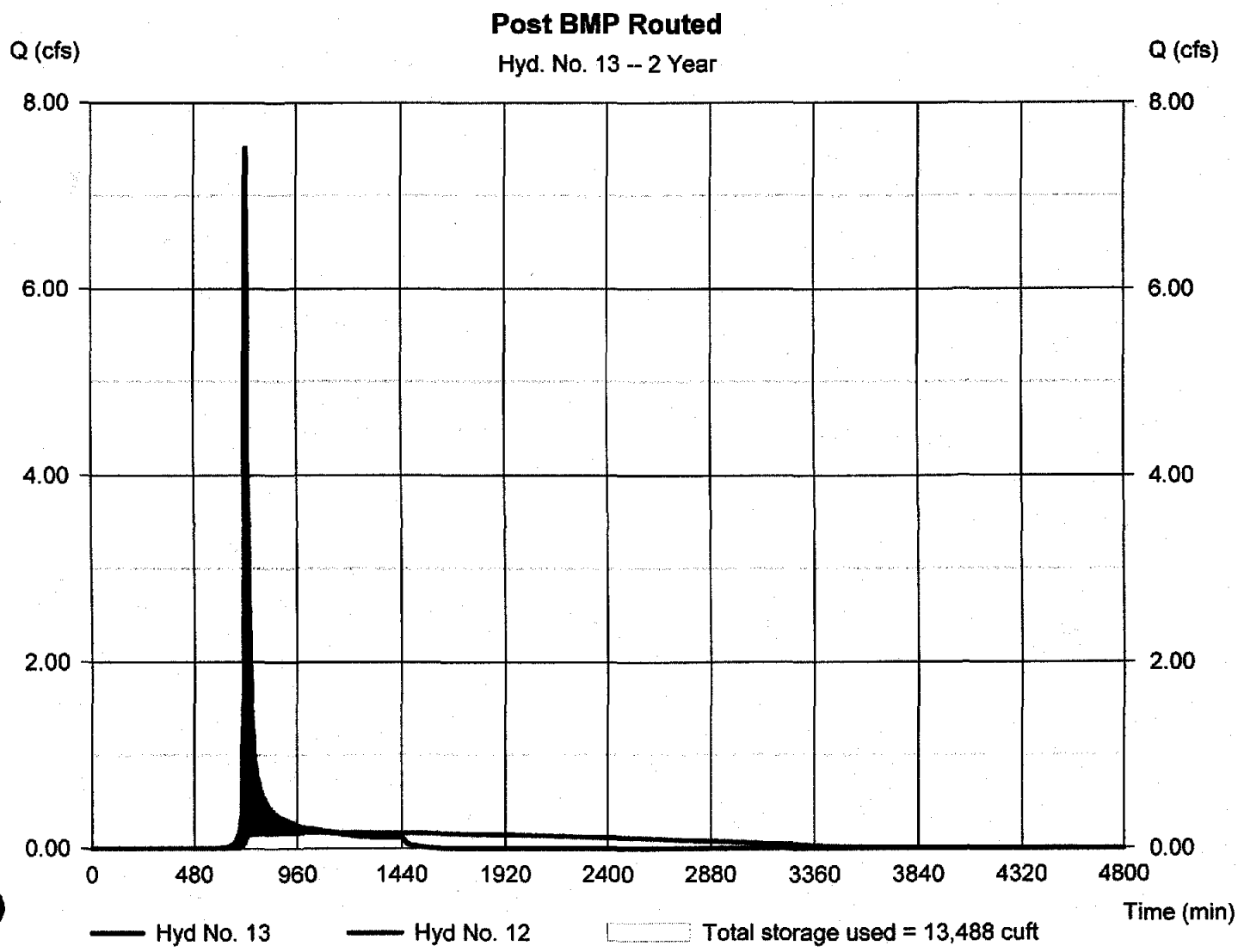
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 13

Post BMP Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.169 cfs
Storm frequency	= 2 yrs	Time to peak	= 1130 min
Time interval	= 2 min	Hyd. volume	= 20,269 cuft
Inflow hyd. No.	= 12 - Post Forebay and Area Bypassing Max. Elevation	Max. Elevation	= 86.67 ft
Reservoir name	= BMP	Max. Storage	= 13,488 cuft

Storage Indication method used.



Hydrograph Report

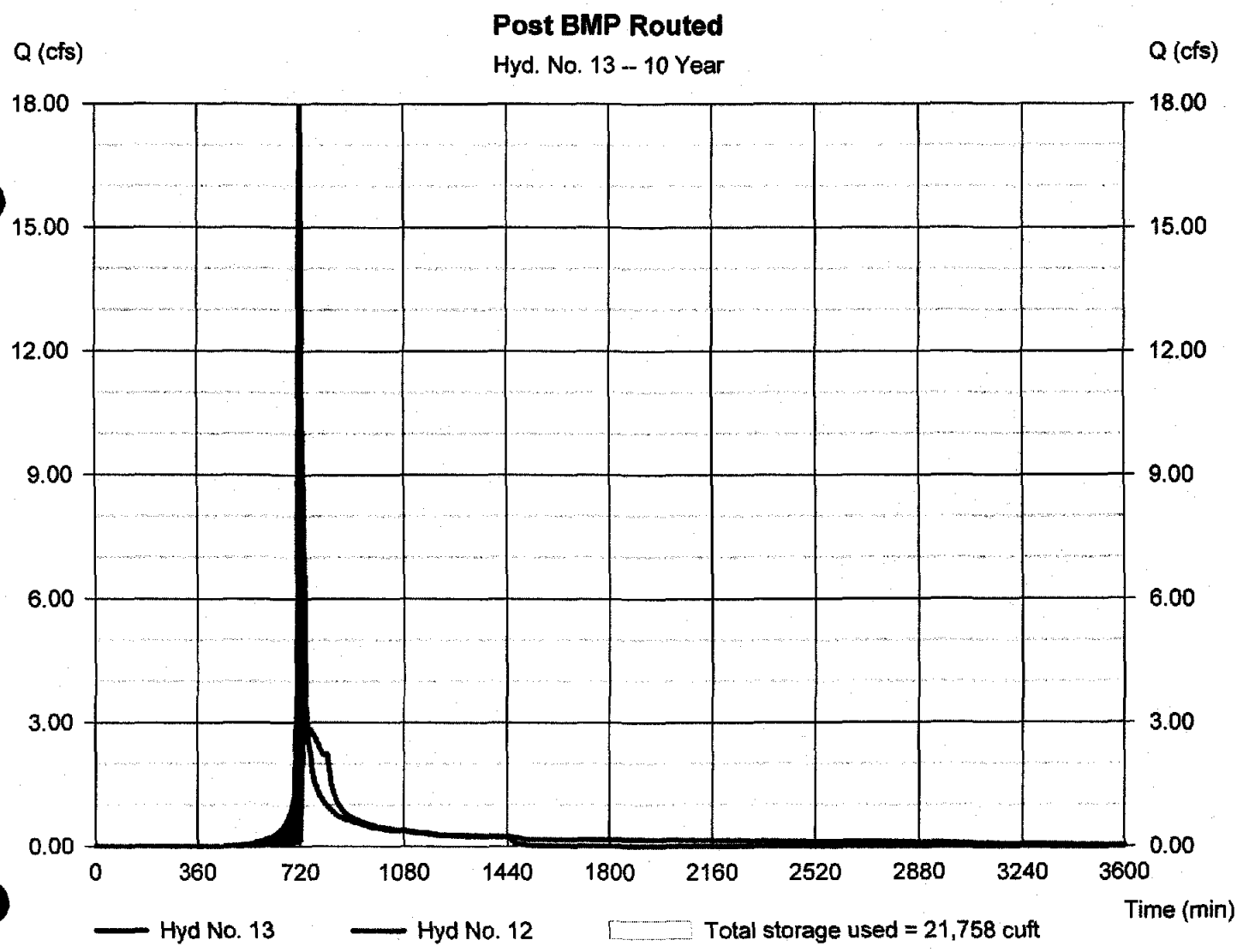
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 13

Post BMP Routed

Hydrograph type	= Reservoir	Peak discharge	= 2.872 cfs
Storm frequency	= 10 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 46,864 cuft
Inflow hyd. No.	= 12 - Post Forebay and Area Bypassing Forebay Combined	Max. Elevation	= 87.63 ft
Reservoir name	= BMP	Max. Storage	= 21,758 cuft

Storage Indication method used.



Hydrograph Report

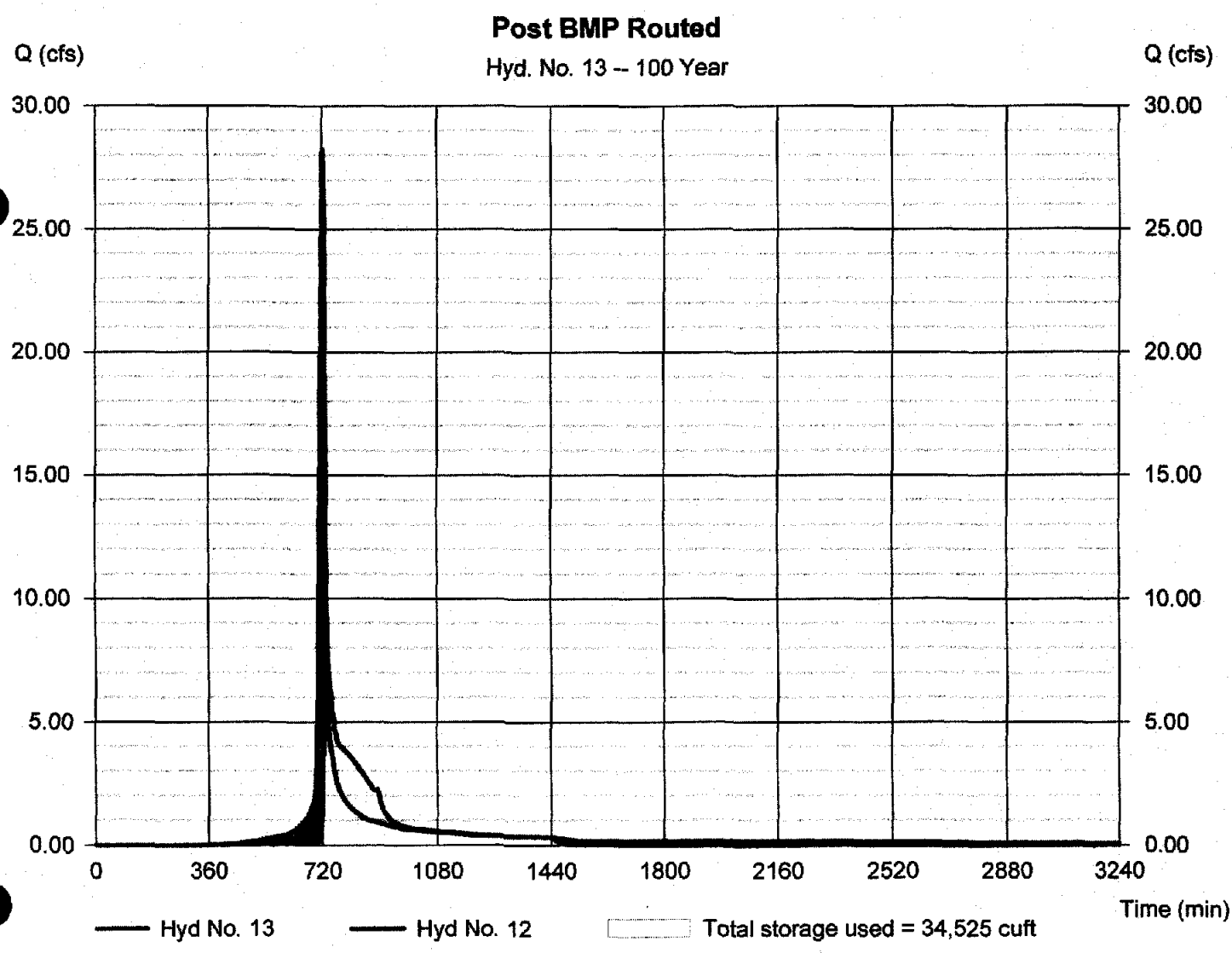
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 25, 2009

Hyd. No. 13

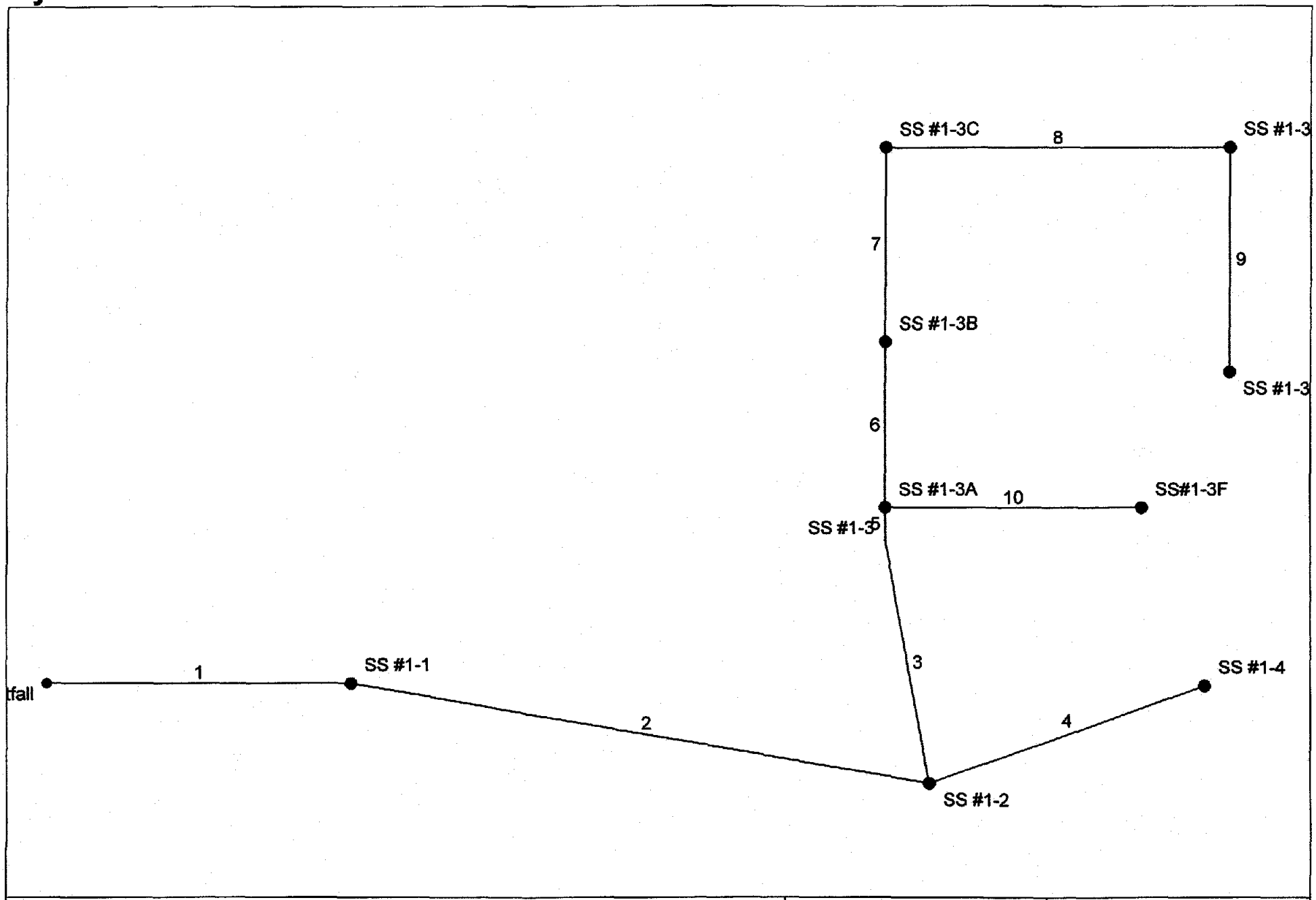
Post BMP Routed

Hydrograph type	= Reservoir	Peak discharge	= 6.899 cfs
Storm frequency	= 100 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 74,804 cuft
Inflow hyd. No.	= 12 - Post Forebay and Area Bypassing Forebay Combined	Max. Elevation	= 88.83 ft
Reservoir name	= BMP	Max. Storage	= 34,525 cuft

Storage Indication method used.



Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2009 Plan



Project File: Storm System #1.stm	Number of lines: 10	Date: 08-14-2009

Hydraflow Storm Sewers Extension v6.066

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	109.000	0.49	1.27	0.90	0.44	1.14	5.0	8.6	6.4	7.31	18.56	6.22	15	8.26	82.00	91.00	86.00	92.08	84.00	94.00	1-1 to 1-0
2	1	210.000	0.10	0.78	0.90	0.09	0.70	5.0	7.4	6.7	4.71	9.38	4.67	15	2.11	91.00	95.43	92.08	96.30	94.00	102.25	1-2 to 1-1
3	2	90.000	0.19	0.59	0.90	0.17	0.53	5.0	6.9	6.9	3.64	7.61	4.32	15	1.39	95.43	96.68	96.30	97.44	102.25	101.80	1-3 to 1-2
4	2	104.000	0.09	0.09	0.90	0.08	0.08	5.0	5.0	7.5	0.61	6.55	1.60	15	1.03	95.43	96.50	96.30	96.81	102.25	102.89	1-4 to 1-3
5	3	12.000	0.07	0.40	0.90	0.06	0.36	5.0	6.9	6.9	2.47	3.56	4.14	12	1.00	96.68	96.80	97.44	97.47	101.80	100.80	1-3A to 1-3
6	5	61.000	0.07	0.22	0.90	0.06	0.20	5.0	6.5	7.0	1.38	3.68	2.43	12	1.07	96.80	97.45	97.93	98.00	100.80	102.20	1-3B to 1-3A
7	6	71.000	0.04	0.15	0.90	0.04	0.14	5.0	6.1	7.1	0.96	3.66	2.48	12	1.06	97.45	98.20	98.08	98.62	102.20	0.00	1-3C to 1-3B
8	7	122.000	0.07	0.11	0.90	0.06	0.10	5.0	5.5	7.3	0.73	3.30	2.60	12	0.86	98.20	99.25	98.62	99.61	0.00	102.00	1-3D to 1-3C
9	8	82.000	0.04	0.04	0.90	0.04	0.04	5.0	5.0	7.5	0.27	3.99	1.58	12	1.26	99.25	100.28	99.61	100.50	102.00	102.28	1-3E to 1-3D
10	5	91.000	0.11	0.11	0.90	0.10	0.10	5.0	5.0	7.5	0.74	6.78	2.43	12	3.63	97.45	100.75	97.93	101.12	100.80	102.75	1-3F to 1-3A

Project File: Storm System #1.stm | Number of lines: 10 | Run Date: 08-14-2009

NOTES: Intensity = 55.61 / (Inlet time + 10.00) ^ 0.74; Return period = 10 Yrs. ; c = cir e = ellip b = box

54

Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Thursday, Jun 25 2009

O.K

A=0.26 AC (INCLUDES CULV#5 AREA)
i_{100}=9.3
C=0.69 (WEIGHTED)

Culvert #1

Invert Elev Dn (ft)	=	97.21
Pipe Length (ft)	=	140.00
Slope (%)	=	1.00
Invert Elev Up (ft)	=	98.61
Rise (in)	=	15.0
Shape	=	Cir
Span (in)	=	15.0
No. Barrels	=	1
n-Value	=	0.013
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

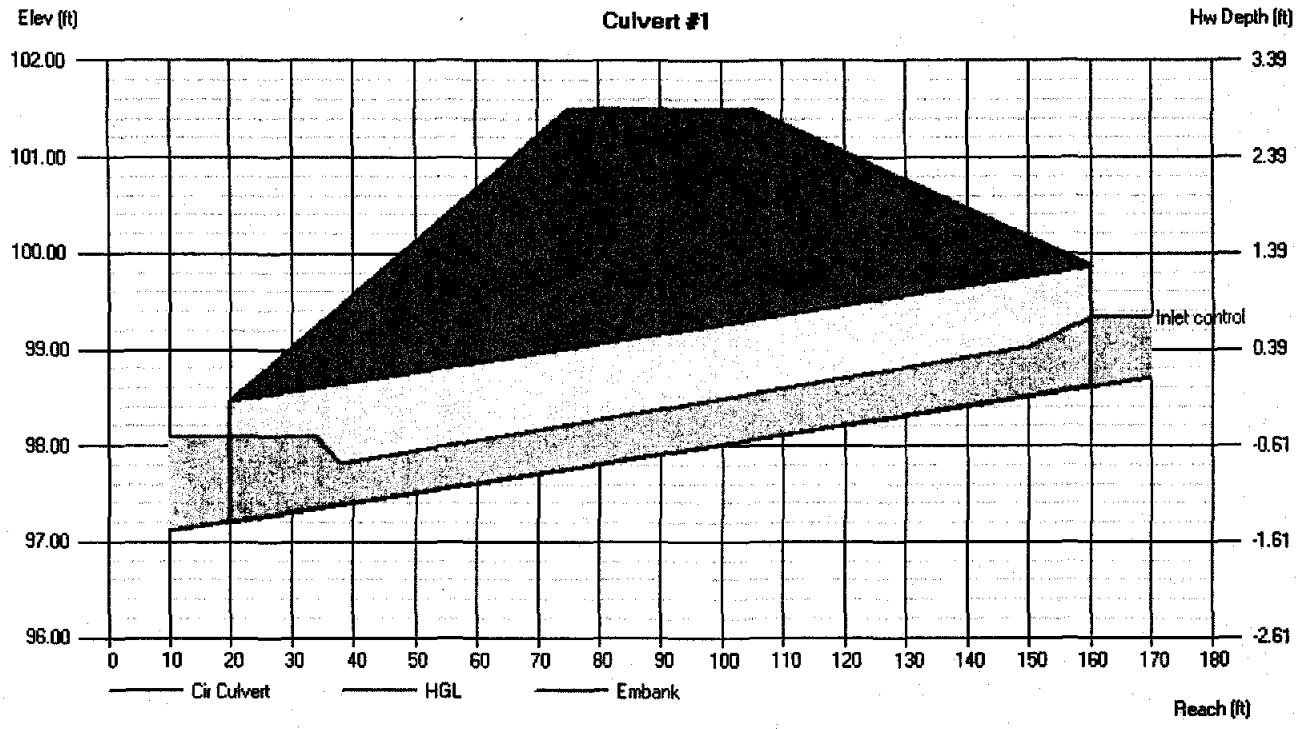
Top Elevation (ft)	=	101.50
Top Width (ft)	=	30.00
Crest Width (ft)	=	15.00

Calculations

Qmin (cfs)	=	1.67
Qmax (cfs)	=	1.67
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	1.67
Qpipe (cfs)	=	1.67
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.80
Veloc Up (ft/s)	=	3.50
HGL Dn (ft)	=	98.09
HGL Up (ft)	=	99.13
Hw Elev (ft)	=	99.32
Hw/D (ft)	=	0.57
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Thursday, Jun 25 2009

A=0.28 AC
i_{100}=9.3 8.1<
C=0.70

Culvert #2

Invert Elev Dn (ft)	=	93.00
Pipe Length (ft)	=	35.00
Slope (%)	=	2.00
Invert Elev Up (ft)	=	93.70
Rise (in)	=	15.0
Shape	=	Cir
Span (in)	=	15.0
No. Barrels	=	1
n-Value	=	0.013
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

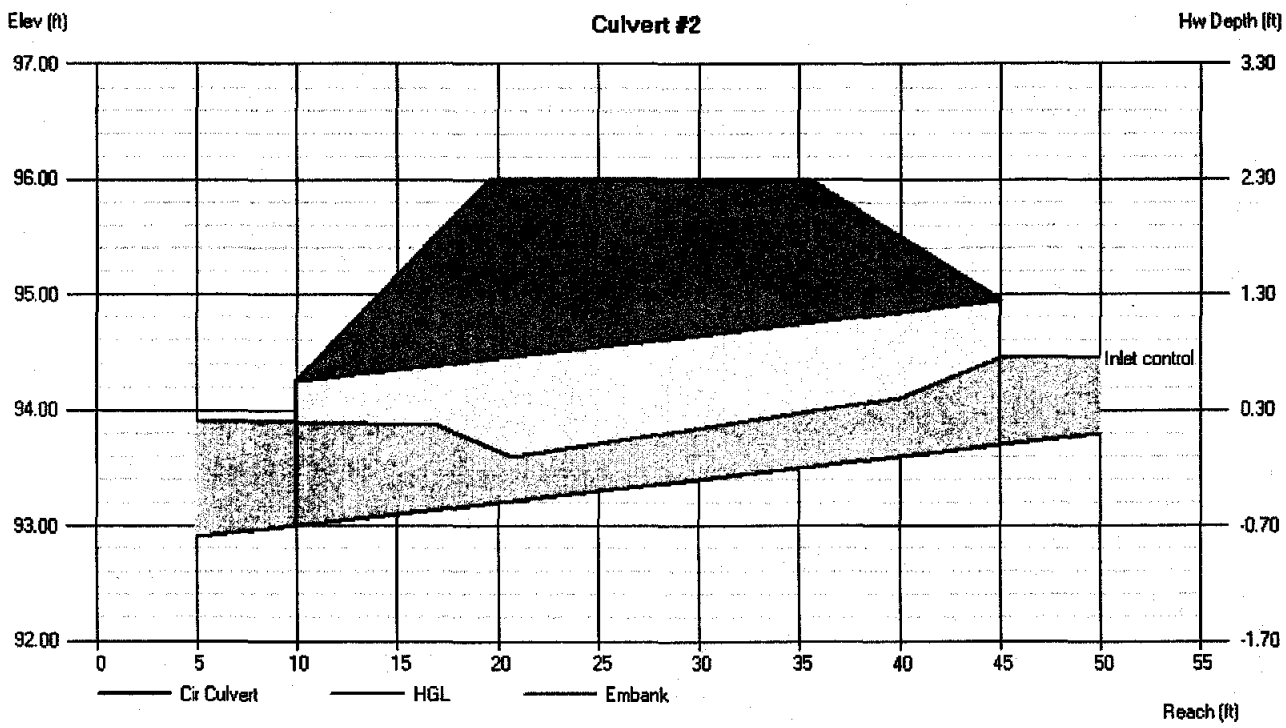
Top Elevation (ft)	=	96.00
Top Width (ft)	=	16.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	1.82
Qmax (cfs)	=	1.82
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	1.82
Qpipe (cfs)	=	1.82
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.94
Veloc Up (ft/s)	=	3.58
HGL Dn (ft)	=	93.90
HGL Up (ft)	=	94.24
Hw Elev (ft)	=	94.45
Hw/D (ft)	=	0.60
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Thursday, Jun 25 2009

A = 0.16 AC
i_{100} = 9.3
C = 0.65 x . K

Ex. Culvert #3

Invert Elev Dn (ft)	=	95.00
Pipe Length (ft)	=	60.00
Slope (%)	=	1.92
Invert Elev Up (ft)	=	96.15
Rise (in)	=	12.0
Shape	=	Cir
Span (in)	=	12.0
No. Barrels	=	1
n-Value	=	0.013
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

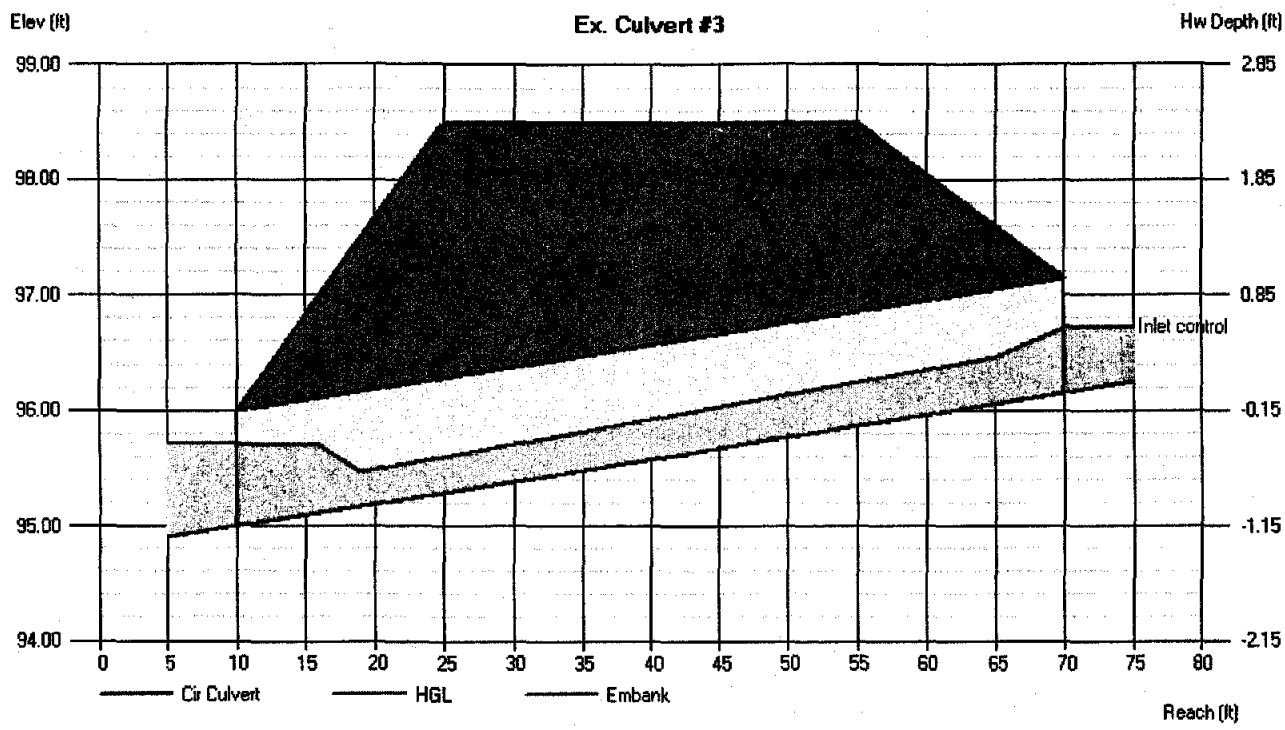
Top Elevation (ft)	=	98.50
Top Width (ft)	=	30.00
Crest Width (ft)	=	15.00

Calculations

Qmin (cfs)	=	0.97
Qmax (cfs)	=	0.97
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	0.97
Qpipe (cfs)	=	0.97
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.63
Veloc Up (ft/s)	=	3.15
HGL Dn (ft)	=	95.71
HGL Up (ft)	=	96.57
Hw Elev (ft)	=	96.73
Hw/D (ft)	=	0.58
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Thursday, Jun 25 2009

A = 1.12 AC (INCLUDES CULV#3 AREA)
100 = 8.3
C = 0.85 (WEIGHTED) O.K

Ex. Culvert #4

Invert Elev Dn (ft)	=	91.41
Pipe Length (ft)	=	35.00
Slope (%)	=	6.80
Invert Elev Up (ft)	=	93.79
Rise (in)	=	15.0
Shape	=	Cir
Span (in)	=	15.0
No. Barrels	=	1
n-Value	=	0.013
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

Top Elevation (ft)	=	96.50
Top Width (ft)	=	30.00
Crest Width (ft)	=	15.00

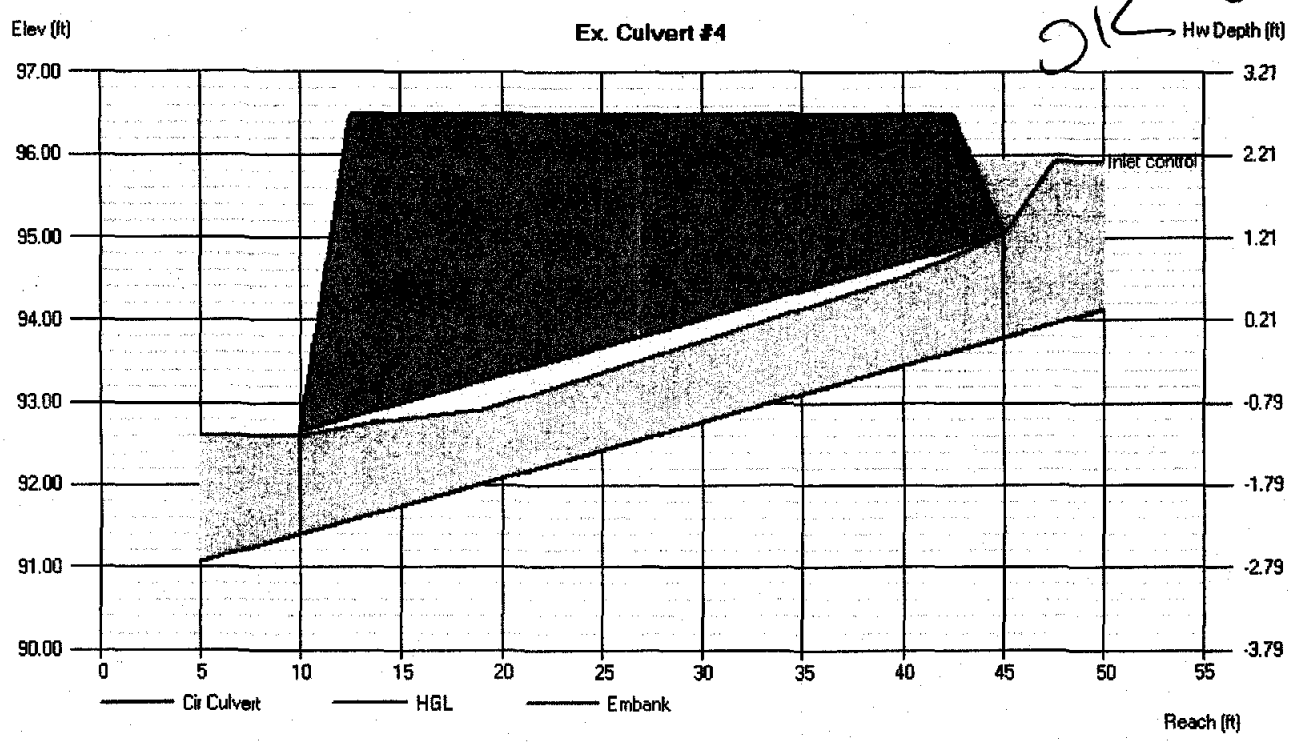
Calculations

Qmin (cfs)	=	7.89
Qmax (cfs)	=	7.89
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	7.89
Qpipe (cfs)	=	7.89
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	6.57
Veloc Up (ft/s)	=	6.84
HGL Dn (ft)	=	92.59
HGL Up (ft)	=	94.90
Hw Elev (ft)	=	95.92
Hw/D (ft)	=	1.70
Flow Regime	=	Inlet Control

OK 100



Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Thursday, Jun 25 2009

A= 0.11 AC
i_{100} = 9.3
C= 0.75

Ex. Culvert #5

Invert Elev Dn (ft)	=	100.48
Pipe Length (ft)	=	101.00
Slope (%)	=	0.40
Invert Elev Up (ft)	=	100.88
Rise (in)	=	15.0
Shape	=	Cir
Span (in)	=	15.0
No. Barrels	=	1
n-Value	=	0.013
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

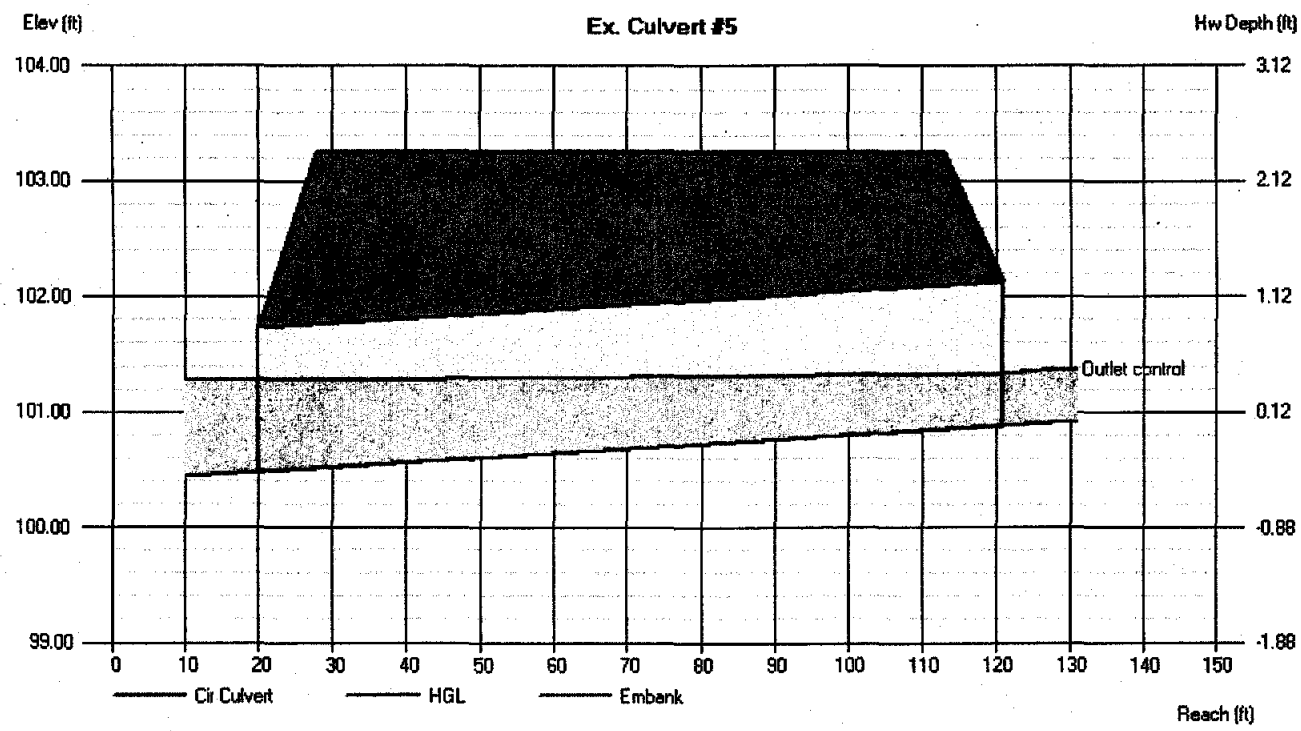
Top Elevation (ft)	=	103.25
Top Width (ft)	=	85.00
Crest Width (ft)	=	25.00

Calculations

Qmin (cfs)	=	0.77
Qmax (cfs)	=	0.77
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	0.77
Qpipe (cfs)	=	0.77
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	0.93
Veloc Up (ft/s)	=	1.89
HGL Dn (ft)	=	101.28
HGL Up (ft)	=	101.34
Hw Elev (ft)	=	101.37
Hw/D (ft)	=	0.39
Flow Regime	=	Outlet Control



Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Thursday, Jun 25 2009

A=0.36 AC (INCLUDES CULV#5+1 AREAS)
i_{100}=9.3
C=0.73 (WEIGHTED)

Ex. Culvert #6

Invert Elev Dn (ft)	=	94.78
Pipe Length (ft)	=	162.00
Slope (%)	=	1.25
Invert Elev Up (ft)	=	96.81
Rise (in)	=	15.0
Shape	=	Cir
Span (in)	=	15.0
No. Barrels	=	1
n-Value	=	0.013
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

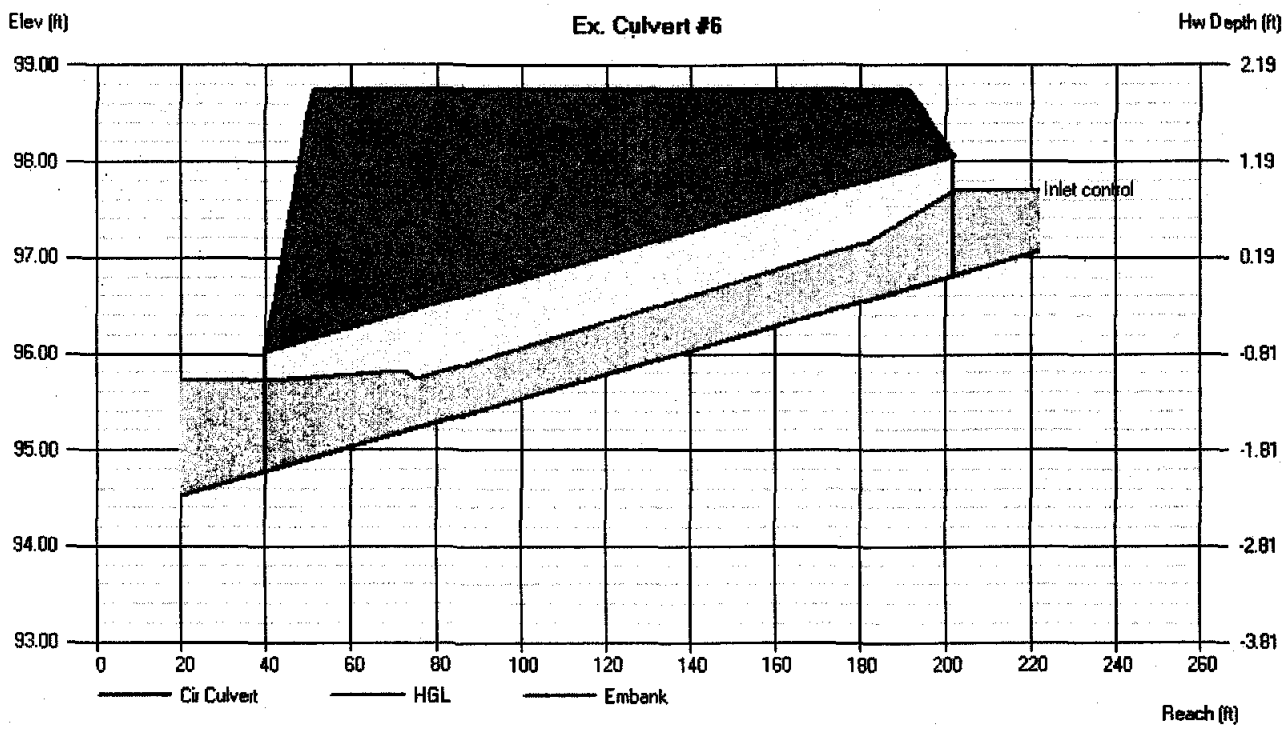
Top Elevation (ft)	=	98.75
Top Width (ft)	=	140.00
Crest Width (ft)	=	25.00

Calculations

Qmin (cfs)	=	2.44
Qmax (cfs)	=	2.44
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	2.44
Qpipe (cfs)	=	2.44
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.47
Veloc Up (ft/s)	=	3.96
HGL Dn (ft)	=	95.72
HGL Up (ft)	=	97.44
Hw Elev (ft)	=	97.70
Hw/D (ft)	=	0.71
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Thursday, Jun 25 2009

A= 0.41 AC (INCLUDES CULV #5, 1, + 6 AREAS)
i_{100} = 9.3
C = 0.73 (WEIGHTED)

Culvert #7

Invert Elev Dn (ft)	=	94.45
Pipe Length (ft)	=	9.00
Slope (%)	=	1.33
Invert Elev Up (ft)	=	94.57
Rise (in)	=	15.0
Shape	=	Cir
Span (in)	=	15.0
No. Barrels	=	1
n-Value	=	0.013
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

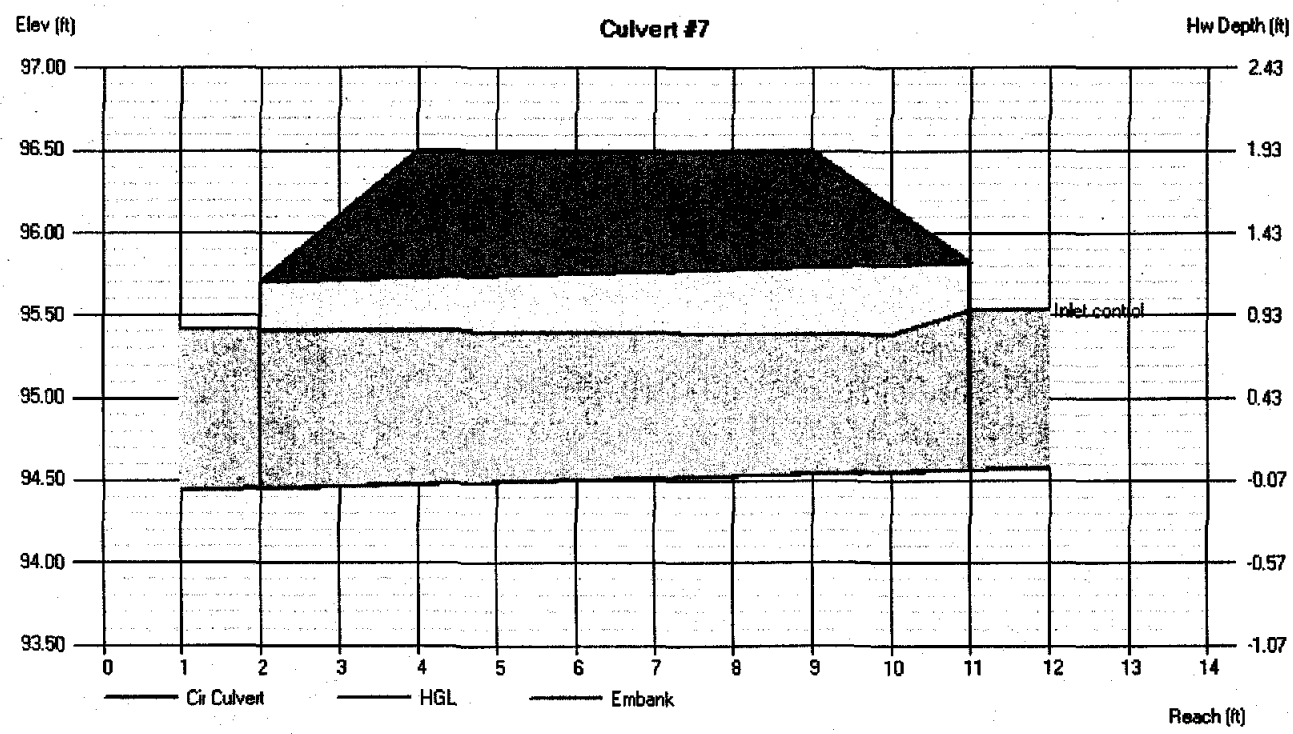
Top Elevation (ft)	=	96.50
Top Width (ft)	=	5.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	2.78
Qmax (cfs)	=	2.78
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	2.78
Qpipe (cfs)	=	2.78
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.75
Veloc Up (ft/s)	=	3.28
HGL Dn (ft)	=	95.41
HGL Up (ft)	=	95.39
Hw Elev (ft)	=	95.53
Hw/D (ft)	=	0.77
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Thursday, Jun 25 2009

A: 0.47 AC (INCLUDES CULV #5, 1, 6, + 7 AREAS)
I_{100} = 9.3
C = 0.74 (WEIGHTED)

Ex. Culvert #8

Invert Elev Dn (ft)	=	93.60
Pipe Length (ft)	=	48.00
Slope (%)	=	1.54
Invert Elev Up (ft)	=	94.34
Rise (in)	=	15.0
Shape	=	Cir
Span (in)	=	15.0
No. Barrels	=	1
n-Value	=	0.013
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

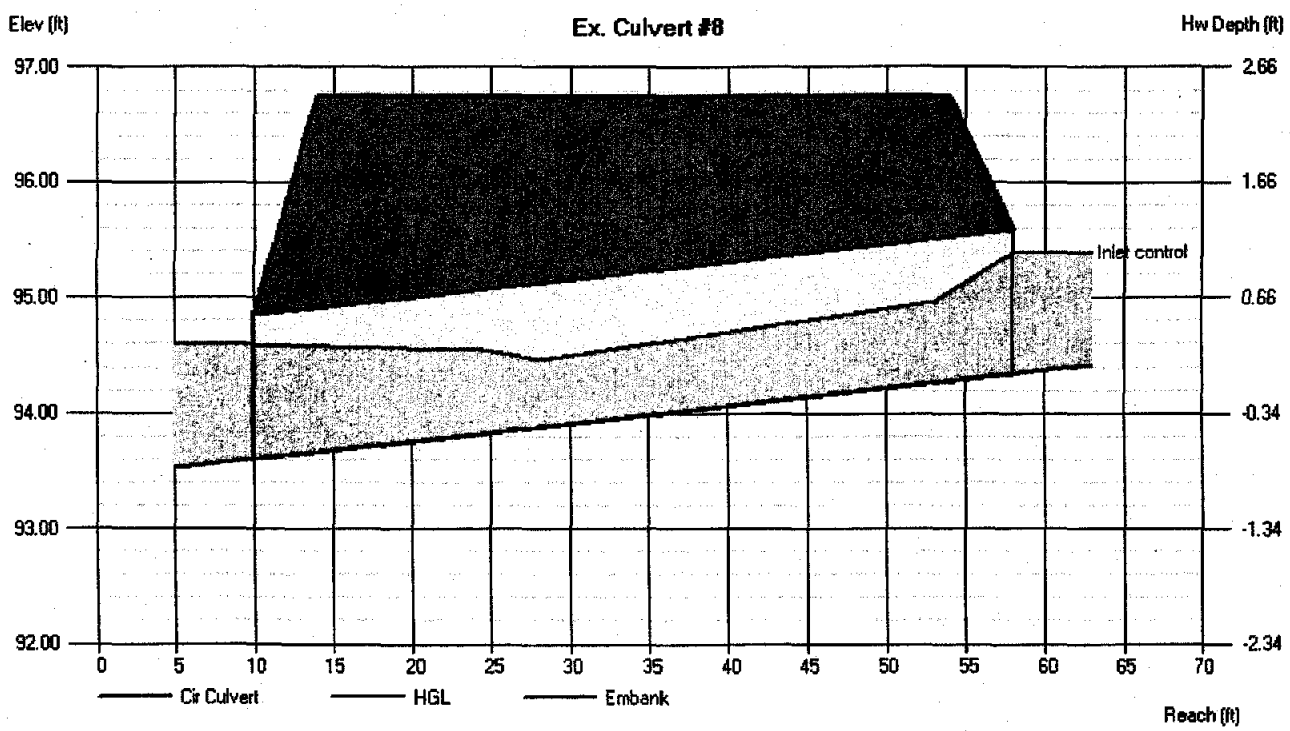
Top Elevation (ft)	=	96.75
Top Width (ft)	=	40.00
Crest Width (ft)	=	25.00

Calculations

Qmin (cfs)	=	3.23
Qmax (cfs)	=	3.23
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	3.23
Qpipe (cfs)	=	3.23
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.10
Veloc Up (ft/s)	=	4.36
HGL Dn (ft)	=	94.59
HGL Up (ft)	=	95.07
Hw Elev (ft)	=	95.39
Hw/D (ft)	=	0.84
Flow Regime	=	Inlet Control



AES CONSULTING ENGINEERS
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Richmond (804) 330-8040
Fredericksburg (540) 710-6606

Project:	JCSA Operations Center
Project No.:	9801-E-19
Subject:	Channel Design
Date:	June 24, 2009
Calculated By:	GVC

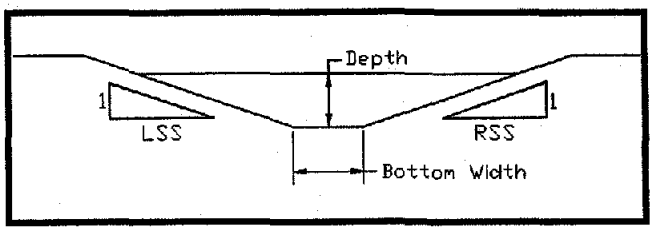
Design Point: **Swale #1**

2 Year Storm - Velocity Check

Drainage Area	=	0.15	Acres	(Area draining to Design Point)
C	=	0.80		(Runoff Coefficient)
I	=	5.60	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)
= 0.80 x 5.60 x 0.15
= 0.67 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	1.00	Ft.
Channel Slope	=	2.80	%
Mannings (n)	=	0.150	**Short grass**

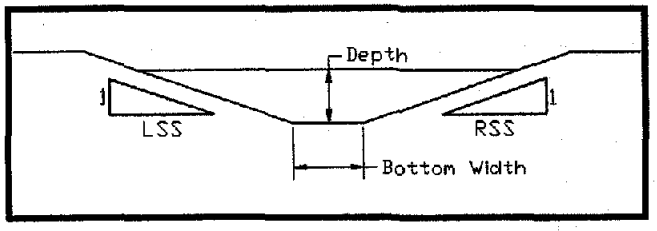
Depth of Flow	=	0.57	Ft.	
Area	=	0.97	SF	Wetted Perimeter = 3.59 Ft.
Hydraulic Radius	=	0.27	Ft.	
Velocity (V)	=	0.69	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	0.67	CFS	(From Continuity Equation Q=AV)

10 Year Storm - Capacity Check

Drainage Area	=	0.15	Acres	(Area draining to Design Point)
C	=	0.80		(Runoff Coefficient)
I	=	7.00	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)
= 0.80 x 7.00 x 0.15
= 0.84 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	1.00	Ft.
Channel Slope	=	2.80	%
Mannings (n)	=	0.150	**Short grass**

Depth of Flow	=	0.62	Ft.	
Area	=	1.15	SF	Wetted Perimeter = 3.91 Ft.
Hydraulic Radius	=	0.29	Ft.	
Velocity (V)	=	0.73	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	0.84	CFS	(From Continuity Equation Q=AV)

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Project:	JCSA Operations Center
Project No.:	9801-E-19
Subject:	Channel Design
Date:	June 24, 2009
Calculated By:	GVC

Design Point: **Swale #2**

2 Year Storm - Velocity Check

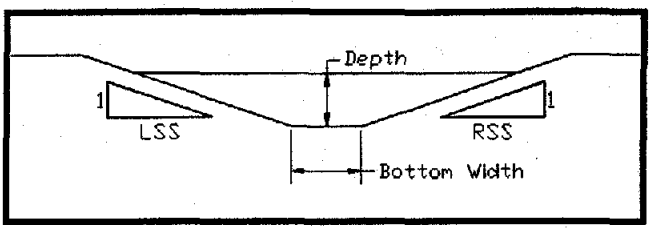
Drainage Area	=	0.12	Acres	(Area draining to Design Point)
C	=	0.60		(Runoff Coefficient)
I	=	5.60	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)

= 0.60 x 5.60 x 0.12

= 0.40 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	1.00	Ft.
Channel Slope	=	2.20	%
Mannings (n)	=	0.150	**Short grass**

Depth of Flow	=	0.49	Ft.	
Area	=	0.72	SF	Wetted Perimeter = 3.11 Ft.
Hydraulic Radius	=	0.23	Ft.	
Velocity (V)	=	0.56	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	0.40	CFS	(From Continuity Equation Q=AV)

10 Year Storm - Capacity Check

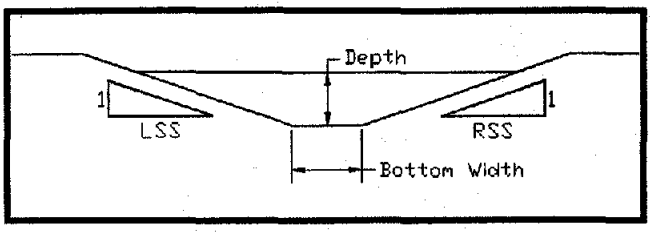
Drainage Area	=	0.12	Acres	(Area draining to Design Point)
C	=	0.60		(Runoff Coefficient)
I	=	7.00	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)

= 0.60 x 7.00 x 0.12

= 0.50 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	1.00	Ft.
Channel Slope	=	2.20	%
Mannings (n)	=	0.150	**Short grass**

Depth of Flow	=	0.53	Ft.	
Area	=	0.86	SF	Wetted Perimeter = 3.38 Ft.
Hydraulic Radius	=	0.25	Ft.	
Velocity (V)	=	0.59	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	0.50	CFS	(From Continuity Equation Q=AV)

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Project:	JCSA Operations Center
Project No.:	9801-E-19
Subject:	Channel Design
Date:	June 24, 2009
Calculated By:	GVC

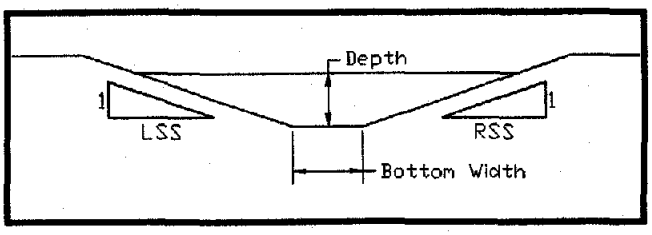
Design Point: **Swale #3**

2 Year Storm - Velocity Check

Drainage Area	=	0.07	Acres	(Area draining to Design Point)
C	=	0.80		(Runoff Coefficient)
I	=	5.60	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)
= 0.80 x 5.60 x 0.07
= 0.31 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	1.00	Ft.
Channel Slope	=	4.75	%
Mannings (n)	=	0.150	**Short grass**

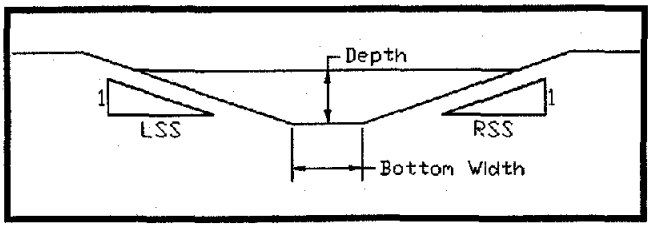
Depth of Flow	=	0.39	Ft.	
Area	=	0.45	SF	Wetted Perimeter = 2.45 Ft.
Hydraulic Radius	=	0.18	Ft.	
Velocity (V)	=	0.70	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	0.31	CFS	(From Continuity Equation Q=AV)

10 Year Storm - Capacity Check

Drainage Area	=	0.07	Acres	(Area draining to Design Point)
C	=	0.80		(Runoff Coefficient)
I	=	7.00	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)
= 0.80 x 7.00 x 0.07
= 0.39 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	1.00	Ft.
Channel Slope	=	4.75	%
Mannings (n)	=	0.150	**Short grass**

Depth of Flow	=	0.42	Ft.	
Area	=	0.53	SF	Wetted Perimeter = 2.66 Ft.
Hydraulic Radius	=	0.20	Ft.	
Velocity (V)	=	0.74	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	0.39	CFS	(From Continuity Equation Q=AV)

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Project:	JCSA Operations Center
Project No.:	9801-E-19
Subject:	Channel Design
Date:	June 24, 2009
Calculated By:	GVC

Design Point: **Swale #4**

2 Year Storm - Velocity Check

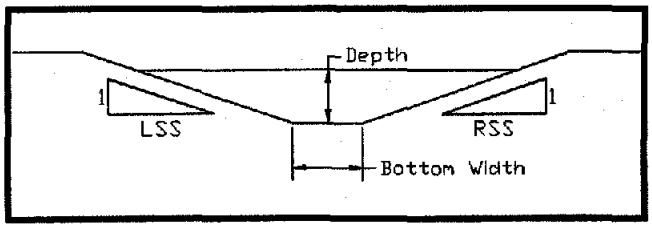
Drainage Area	=	0.49	Acres	(Area draining to Design Point)
C	=	0.90		(Runoff Coefficient)
I	=	5.40	in/hr	(Design Rainfall Intensity) **TC = 7 minutes**

Q = C I A (Peak Flow)

= 0.90 x 5.40 x 0.49

= 2.38 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	1.50	Ft.
Channel Slope	=	2.85	%
Mannings (n)	=	0.150	**Short grass**

Depth of Flow	=	0.91	Ft.	
Area	=	2.49	SF	Wetted Perimeter = 5.76 Ft.
Hydraulic Radius	=	0.43	Ft.	
Velocity (V)	=	0.96	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	2.38	CFS	(From Continuity Equation Q=AV)

10 Year Storm - Capacity Check

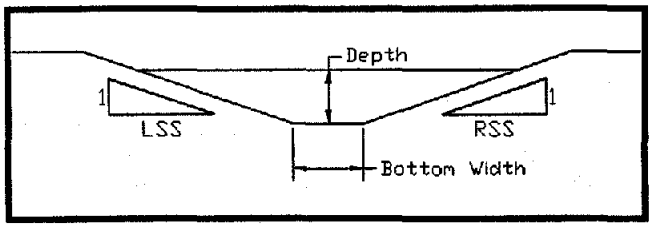
Drainage Area	=	0.49	Acres	(Area draining to Design Point)
C	=	0.90		(Runoff Coefficient)
I	=	6.80	in/hr	(Design Rainfall Intensity) **TC = 7 minutes**

Q = C I A (Peak Flow)

= 0.90 x 6.80 x 0.49

= 3.00 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	1.50	Ft.
Channel Slope	=	2.85	%
Mannings (n)	=	0.150	**Short grass**

Depth of Flow	=	0.99	Ft.	
Area	=	2.96	SF	Wetted Perimeter = 6.28 Ft.
Hydraulic Radius	=	0.47	Ft.	
Velocity (V)	=	1.01	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	2.99	CFS	(From Continuity Equation Q=AV)

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Gloucester (804) 693-4450
Richmond (804) 330-8040
Fredericksburg (540) 710-6606

Project:	JCSA Operations Center
Project No.:	9801-E-19
Subject:	Channel Design
Date:	June 24, 2009
Calculated By:	GVC

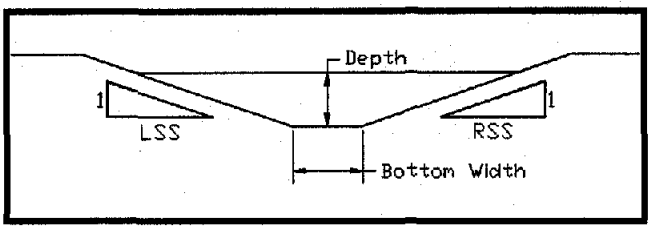
Design Point: **Swale #5**

2 Year Storm - Velocity Check

Drainage Area	=	0.15	Acres	(Area draining to Design Point)
C	=	0.65		(Runoff Coefficient)
I	=	5.60	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)
= 0.65 x 5.60 x 0.15
= 0.55 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	2.00	Ft.
Channel Slope	=	1.55	%
Mannings (n)	=	0.150	**Short grass**

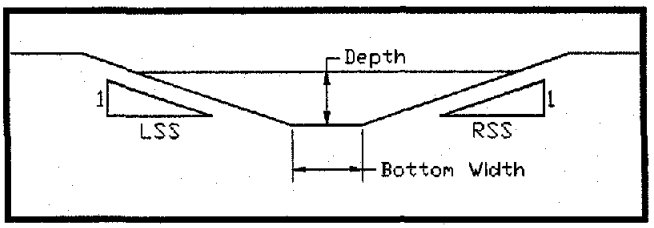
Depth of Flow	=	0.59	Ft.	
Area	=	1.03	SF	Wetted Perimeter = 3.71 Ft.
Hydraulic Radius	=	0.28	Ft.	
Velocity (V)	=	0.53	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	0.54	CFS	(From Continuity Equation Q=AV)

10 Year Storm - Capacity Check

Drainage Area	=	0.15	Acres	(Area draining to Design Point)
C	=	0.65		(Runoff Coefficient)
I	=	7.00	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)
= 0.65 x 7.00 x 0.15
= 0.68 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	2.00	Ft.
Channel Slope	=	1.55	%
Mannings (n)	=	0.150	**Short grass**

Depth of Flow	=	0.64	Ft.	
Area	=	1.22	SF	Wetted Perimeter = 4.04 Ft.
Hydraulic Radius	=	0.30	Ft.	
Velocity (V)	=	0.56	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	0.68	CFS	(From Continuity Equation Q=AV)

JAMES CITY COUNTY STORMWATER DIVISION
STORMWATER FACILITY INSPECTION REPORT

287 Mclaws Circle, Suite 1 Williamsburg, VA 23185 (757)259-1460

DATE/TIME:		PROJECT NAME:	JCSA/JCC Operations Building
WEATHER:	Sunny/Cold	ADDRESS:	
CONTRACTOR:		CONTRACTOR PHONE:	
INSPECTOR: (Please print)	G. Johnson	TIME ON SITE:	
PHOTOS TAKEN:	YES ☐ NO ☐	P.O. #	
PROJECT DESC.	Cleaning ☐ TV Inspection ☐ Repair ☐ New Construction ☒ Replacement ☐		

SITE PREPARATION & MATERIALS (amount, type & condition) are on site in accordance with plan requirements	
Item	*Corrective Action*
Pipe	(Benchmark)
Structures	(Benchmark)
SWMF Site Properly Prepared/Protected	OK
Other	
EXCAVATION / GRADING	
Compaction Testing	Yes
Excavation/Grading conform to plan	(Benchmark) Yes
Other	
INSTALLATION (consistent with plan requirements)	
Pretreatment	NA
Liner	(Benchmark) NA
Riser/Outlet Assembly	(Benchmark) NA
Inlets	
Underdrain system	(Benchmark) NA
Underground chamber	(Benchmark) NA
Filter Bed composition	(Benchmark) NA
Emergency Overflow	NA
Bedding	NOT REQUIRED
Pipe Placement, Joints, Lift holes	OK
Backfill & Compaction	95-98% per Geo Tech
Outfall Protection	NA
Other	
VEGETATION	
Complies with Plan	
Remove Woody Vegetation	Where needed
Other	

Notice is hereby given that the deficiencies listed above shall be corrected in accordance with James City County Subdivision and/or Site Plan Requirements on or before , when the site will be reinspected. Failure to comply will result in further enforcement.

DAILY CONSTRUCTION INSPECTOR REPORT (Continued)

Received by: _____ Print Name: _____

Inspector signature: _____

Comments:

Inspector:	

Stormwater Management and Drainage Design Report
JCSA Operations Center

AES Project Number 9801-E-19
June 2009

Project Description

The JCSA Tewning Road project is a 12.33 acre site plan. The project consists of a relocated convenience center, a 1-1/2 story office building (approximately 13,000 sq.ft.) for JCSA, a large vehicle parking area, a materials storage area, and the expansion of an existing parking lot. The stormwater management for each portion of the project collects in an existing dry pond. This dry pond will be expanded to increase capacity appropriately and will have a forebay added. In an effort to evaluate the stormwater management, runoff to the dry pond was evaluated for pre- and post-development conditions. The drainage area to the dry pond is bounded by Tewning Road, the entrance road to the current JCSA Operations Center site, and the southern limits of disturbance, and is approximately 3.79 acres.

Description of Site Drainage

This JCSA project has one existing stormwater management facility (The existing dry pond BMP). The predevelopment area evaluation of the existing conditions includes the existing parking lot and the convenience center (at the current location). The stormwater currently sheet flows off the parking lot, is collected in an existing culvert, and is piped to the BMP.

To retain the New Town Stormwater Master Plan, the BMP will be expanded and will retain the 4-point extended detention dry pond design. A forebay will be added. The proposed watershed for this facility will include the JCSA office building, the relocated convenience center, the large vehicle parking area, the materials storage facility, and the expanded parking lot.

Hydrology and Hydraulics

Topographic information used in the engineering calculations was field verified during site plan development. Hydrology and hydraulic modeling was performed using computer spreadsheets generated in-house, and modeling for hydrology was done using Hydraflow software. The SCS (for site runoff and pond design) methodology was used in calculating run-offs for this project. 1-year, 2-year, 10-year, and 100-year storm events where evaluated.

Precipitation data for James City County was resourced as it appears in Appendix 4B of the Virginia Stormwater Management Handbook. The values of SCS Type II rainfall distributions used in the calculations are as follows:

Design Storm Frequency (in years)	Rainfall, in inches (for 24-hr. period)
1	2.8
2	3.5
10	5.8
100	8.0

Stormwater Management/Best Management Practices

The drainage area to the dry pond is bounded on the north side by Tewning Road, on the east side by the current JCSA Operations site entrance, on the south side by wetlands, and on the west side by topography. This area contains an existing 81 space parking lot and a convenience center. The pond will be expanded to provide capacity for relocated staff. Along with the expansion of the pond, a forebay will be added to allow runoff of different specific gravities to separate naturally (assisting in collection and disposal). The forebay will have a reverse slope pipe connecting from two feet above the bottom of the forebay four feet above the bottom of the dry pond. There will be four feet of standing water in the forebay at all times. This will allow any accumulated sediment to collect at the bottom of the forebay while any pollutants from the Convenience Center runoff will float on the top of the pond. During higher flow events, the water will flow through a 15' wide rip-rap spillway into the dry pond. The existing modified EW-11 will be removed and replaced with a two foot deep concrete micropool. A reverse slope pipe will connect from 1' foot above the bottom of the micropool into the existing riser. This will allow for sediment accumulation and collection. The stormwater management facility is located outside of the wetlands and no part of the work required for the expansion will impact any wetlands.

During the construction process of the site, the BMP will serve as a temporary sediment basin to prevent sediment-laden run-off from being transported to downstream locations.

All the run-off from the site shall be directed towards the SWM/BMP during construction, and at completion of site construction. The SWM/BMP is designed to manage flooding, protect down stream channels, as well as providing adequate stormwater quality. The SWM/BMP is designed as extended detention dry pond and will release the runoff generated by the 2-year and 10-year 24-hour post-development conditions storm at/or below the pre-development rates. 2-year and 10-year rates were determined based on the predevelopment areas as presented in the calculations.

Storm Sewer Systems

Directing runoff to the SWM/BMPs will be a combination of grass swales, ditches, culverts, overland flow, and a storm sewer system. The storm system will collect the flow from the JCSA building, the large vehicle parking area, the materials storage area, and the parking lot addition. Using Hydraflow software, the storm sewer system is designed to effectively transport the 10-year storm. Flow on the northern portion of the site is directed by existing and proposed culverts and swales into the proposed forebay of the SWM/BMP. The swales are designed to effectively transport the 10-year storm. The desire in the design of the culverts is to prevent the embankments from overtopping during storm events (in this case, the 100-year 24-hour post-development storm event). The existing and proposed culverts all do so. To prevent pollutants from entering downstream, the sheet flow from the proposed convenience center will be collected and pre-treated in a stone apron with 8" perforated pipe before emptying into the forebay.

Modeling Results

A table of pre- and post-development flows in cubic feet per second for 1-year, 2-year, 10-year, and 100-year storm events is provided below. This table summarizes the hydrographs and pond routings that are included in the calculations packet.

	PRE-DEVELOPMENT	PRE-DEVELOPMENT ROUTED THROUGH EXISTING POND	PRE-DEVELOPMENT ROUTED THROUGH SEDIMENT BASIN	POST-DEVELOPMENT	POST-DEVELOPMENT ROUTED THROUGH SEDIMENT BASIN	POST-DEVELOPMENT ROUTED THROUGH FINAL BMP
1 YEAR	1.5	0.3	0.1	5.1	0.2	0.2
2 YEAR	3	0.5	0.2	7.9	0.2	0.3
10 YEAR	9.6	3.2	0.9	18.5	2.7	2.5
100 YEAR	16.9	8	3.2	29.2	5.8	4.2

Note: All flow values provided in table are in cubic feet per second (cfs)

From the modeling results, the proposed changes made to the BMP will attenuate the post-development runoff for each storm event.

Water Quality Calculations

On this site, the existing percent impervious cover is greater than the average land cover condition. Based on the Performance-Based Water Quality Calculations from the Virginia Stormwater Management Handbook, the pollutant discharge post-development shall not exceed the pollutant discharge based on existing conditions less 10% or the pollutant discharge based on the average land cover condition, whichever is greater. For this site, the pollutant discharge post-development is 2.3 lbs/yr. This is less than the greater of the two values which is the pollutant discharge based on existing conditions less 10% (2.6 lbs/yr) Since it the less the BMP is in compliance for pollutant removal.

Conclusion

From the computer modeling to the proposed facilities associated with the site improvements, both state and local regulations are honored. Stormwater runoff from the proposed improvements is attenuated to below pre-development stormwater runoff rates, thereby minimizing the effects of the proposed land development on adjacent stream channels.

S:\Jobs\9801\E-Engineering\19-JCSA Tewning Road Site Plan\Admin\Reports\Eng\9801-E-19-Stormwater Management Report.doc

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Planning Department

JCSA Operations Center Site Plan Amendment

Stormwater Calculations

Environmental Division
NOV 24 2010
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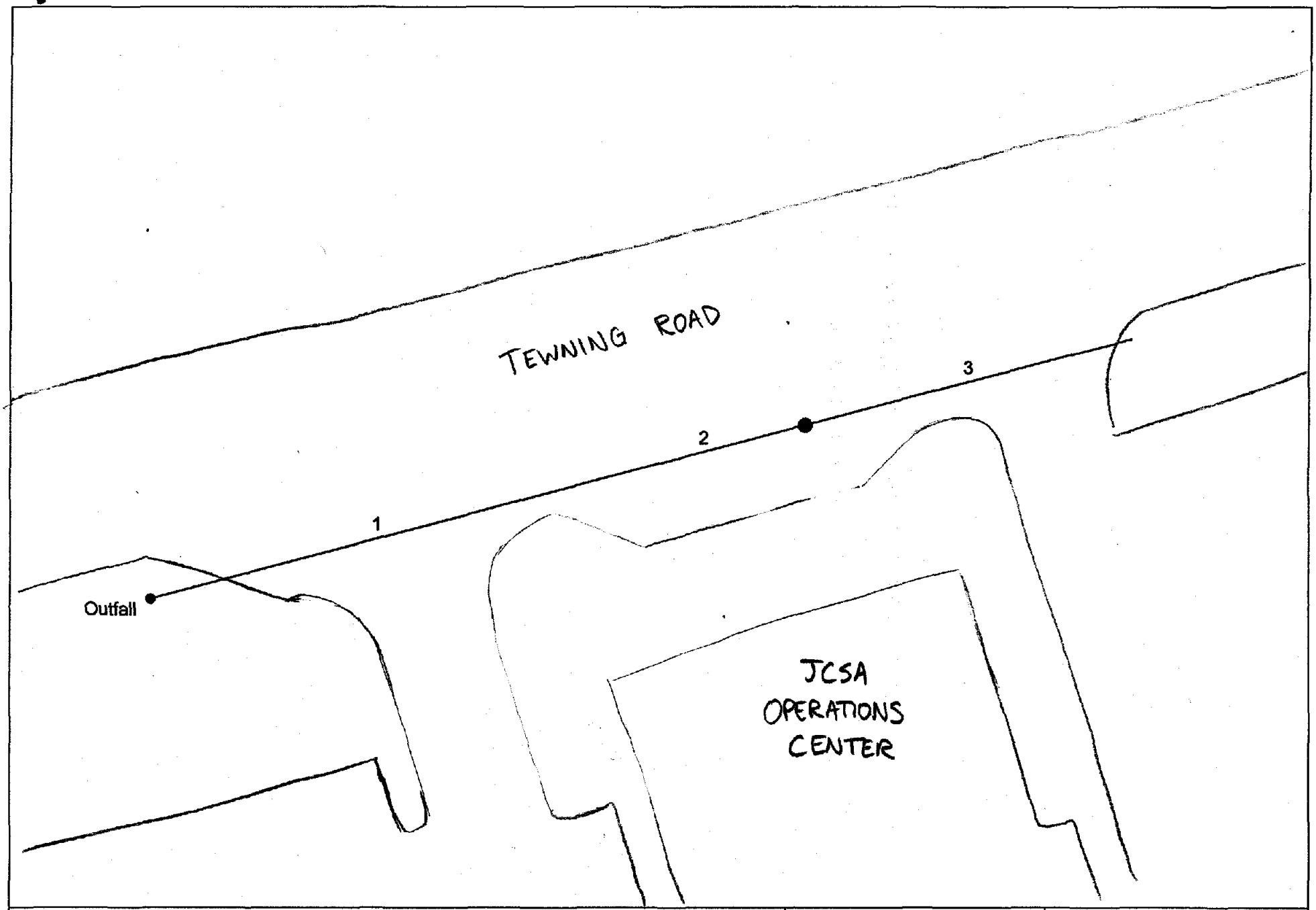
SP-110-10
AMENDMENT
(AMENDS SP-53-09)

Prepared by

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

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2009 Plan



Project File: 9801-E-19_Amendment Storm System.stm	Number of lines: 3	Date: 11-22-2010

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Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	140.000	0.00	0.15	0.00	0.00	0.14	0.0	6.1	7.1	0.99	6.46	2.93	15	1.00	97.21	98.61	97.61	99.01	97.21	102.40	
2	1	64.000	0.07	0.15	0.90	0.06	0.14	5.0	5.7	7.3	1.01	9.72	2.96	15	2.27	98.61	100.06	99.01	100.46	102.40	102.73	
3	2	101.000	0.08	0.08	0.95	0.08	0.08	5.0	5.0	7.5	0.57	4.06	2.34	15	0.40	100.48	100.88	100.78	101.21	102.73	100.88	

Project File: 9801-E-19_Amendment Storm System.stm | Number of lines: 3 | Run Date: 11-22-2010

NOTES: Intensity = 55.61 / (Inlet time + 10.00) ^ 0.74; Return period = 10 Yrs. ; c = cir e = ellip b = box

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Richmond (804) 330-8040
Fredericksburg (540) 710-6606

Project:	JCSA Operations Center
Project No.:	9801-E-19
Subject:	Channel Design
Date:	November 5, 2010
Calculated By:	GVC

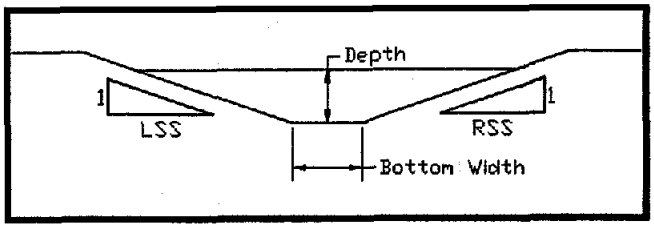
Design Point: **Concrete Ditch**

2 Year Storm - Velocity Check

Drainage Area	=	0.32	Acres	(Area draining to Design Point)
C	=	0.90		(Runoff Coefficient)
I	=	5.60	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)
= 0.90 x 5.60 x 0.32
= 1.61 CFS

Channel Characteristics



Rt. Sideslope	=	2.00	:1
Lt. Sideslope	=	2.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	1.00	Ft.
Channel Slope	=	1.00	%
Mannings (n)	=	0.013	**Concrete**

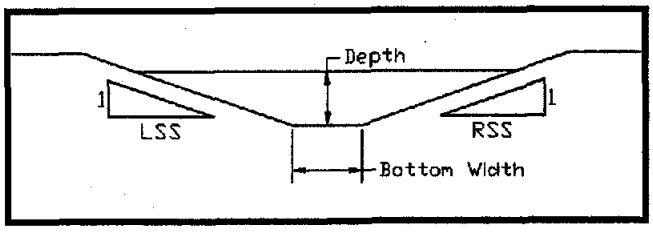
Depth of Flow	=	0.45	Ft.	
Area	=	0.41	SF	Wetted Perimeter = 2.02 Ft.
Hydraulic Radius	=	0.20	Ft.	
Velocity (V)	=	3.94	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	1.61	CFS	(From Continuity Equation Q=AV)

10 Year Storm - Capacity Check

Drainage Area	=	0.32	Acres	(Area draining to Design Point)
C	=	0.90		(Runoff Coefficient)
I	=	7.00	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)
= 0.90 x 7.00 x 0.32
= 2.02 CFS

Channel Characteristics



Rt. Sideslope	=	2.00	:1
Lt. Sideslope	=	2.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	1.00	Ft.
Channel Slope	=	1.00	%
Mannings (n)	=	0.013	**Concrete**

Depth of Flow	=	0.49	Ft.	
Area	=	0.48	SF	Wetted Perimeter = 2.20 Ft.
Hydraulic Radius	=	0.22	Ft.	
Velocity (V)	=	4.16	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	2.01	CFS	(From Continuity Equation Q=AV)

Environmental Division

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CONSULTING ENGINEERS
Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040
Fredericksburg (540) 710-6606

Project:	JCSA Operations Center
Project No.:	9801-E-19
Subject:	Channel Design
Date:	November 5, 2010
Calculated By:	GVC

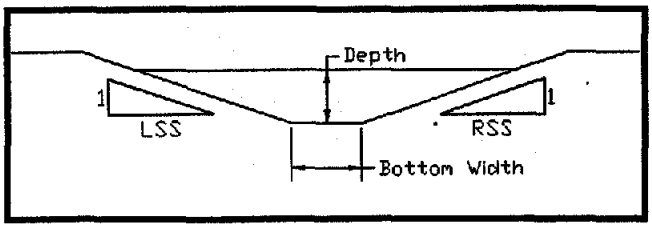
Design Point: **Concrete Swale**

2 Year Storm - Velocity Check

Drainage Area	=	0.18	Acres	(Area draining to Design Point)
C	=	0.85		(Runoff Coefficient)
I	=	5.60	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)
= 0.85 x 5.60 x 0.18
= 0.86 CFS

Channel Characteristics



Rt. Sideslope	=	2.00	:1
Lt. Sideslope	=	2.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	0.50	Ft.
Channel Slope	=	6.75	%
Mannings (n)	=	0.013	**Concrete**

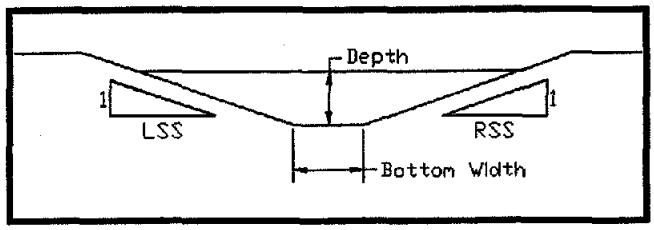
Depth of Flow	=	0.25	Ft.	
Area	=	0.12	SF	Wetted Perimeter = 1.11 Ft.
Hydraulic Radius	=	0.11	Ft.	
Velocity (V)	=	6.87	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	0.85	CFS	(From Continuity Equation Q=AV)

10 Year Storm - Capacity Check

Drainage Area	=	0.18	Acres	(Area draining to Design Point)
C	=	0.85		(Runoff Coefficient)
I	=	7.00	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)
= 0.85 x 7.00 x 0.18
= 1.07 CFS

Channel Characteristics



Rt. Sideslope	=	2.00	:1
Lt. Sideslope	=	2.00	:1
Base Width	=	0.00	Ft.
Max. Depth	=	0.50	Ft.
Channel Slope	=	6.75	%
Mannings (n)	=	0.013	**Concrete**

Depth of Flow	=	0.27	Ft.	
Area	=	0.15	SF	Wetted Perimeter = 1.21 Ft.
Hydraulic Radius	=	0.12	Ft.	
Velocity (V)	=	7.27	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	1.07	CFS	(From Continuity Equation Q=AV)

Environmental Division

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JCSA Operations Center Expansion

Calculations
For
James City County Environmental Division

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ENVIRONMENTAL DIVISION

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Planning Department

SP-53-09
Final Comps

Prepared by

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

Stormwater Management and Drainage Design Report
JCSA Operations Center

AES Project Number 9801-E-19
June 2009

Project Description

The JCSA Tewning Road project is a 12.33 acre site plan. The project consists of a relocated convenience center, a 1-1/2 story office building (approximately 13,000 sq.ft.) for JCSA, a large vehicle parking area, a materials storage area, and the expansion of an existing parking lot. The stormwater management for each portion of the project collects in an existing dry pond. This dry pond will be expanded to increase capacity appropriately and will have a forebay added. In an effort to evaluate the stormwater management, runoff to the dry pond was evaluated for pre- and post-development conditions. The drainage area to the dry pond is bounded by Tewning Road, the entrance road to the current JCSA Operations Center site, and the southern limits of disturbance, and is approximately 3.79 acres.

Description of Site Drainage

This JCSA project has one existing stormwater management facility (The existing dry pond BMP). The predevelopment area evaluation of the existing conditions includes the existing parking lot and the convenience center (at the current location). The stormwater currently sheet flows off the parking lot, is collected in an existing culvert, and is piped to the BMP.

To retain the New Town Stormwater Master Plan, the BMP will be expanded and will retain the 4-point extended detention dry pond design. A forebay will be added. The proposed watershed for this facility will include the JCSA office building, the relocated convenience center, the large vehicle parking area, the materials storage facility, and the expanded parking lot.

Hydrology and Hydraulics

Topographic information used in the engineering calculations was field verified during site plan development. Hydrology and hydraulic modeling was performed using computer spreadsheets generated in-house, and modeling for hydrology was done using Hydraflow software. The SCS (for site runoff and pond design) methodology was used in calculating run-offs for this project. 1-year, 2-year, 10-year, and 100-year storm events where evaluated.

Precipitation data for James City County was resourced as it appears in Appendix 4B of the Virginia Stormwater Management Handbook. The values of SCS Type II rainfall distributions used in the calculations are as follows:

Design Storm Frequency (in years)	Rainfall, in inches (for 24-hr. period)
1	2.8
2	3.5
10	5.8
100	8.0

Stormwater Management/Best Management Practices

The drainage area to the dry pond is bounded on the north side by Tewning Road, on the east side by the current JCSA Operations site entrance, on the south side by wetlands, and on the west side by topography. This area contains an existing 81 space parking lot and a convenience center. The pond will be expanded to provide capacity for relocated staff. Along with the expansion of the pond, a forebay will be added to allow runoff of different specific gravities to separate naturally (assisting in collection and disposal). The forebay will have a reverse slope pipe connecting from two feet above the bottom of the forebay four feet above the bottom of the dry pond. There will be four feet of standing water in the forebay at all times. This will allow any accumulated sediment to collect at the bottom of the forebay while any pollutants from the Convenience Center runoff will float on the top of the pond. During higher flow events, the water will flow through a 15' wide rip-rap spillway into the dry pond. The existing modified EW-11 will be removed and replaced with a two foot deep concrete micropool. A reverse slope pipe will connect from 1' foot above the bottom of the micropool into the existing riser. This will allow for sediment accumulation and collection. The stormwater management facility is located outside of the wetlands and no part of the work required for the expansion will impact any wetlands.

During the construction process of the site, the BMP will serve as a temporary sediment basin to prevent sediment-laden run-off from being transported to downstream locations.

All the run-off from the site shall be directed towards the SWM/BMP during construction, and at completion of site construction. The SWM/BMP is designed to manage flooding, protect down stream channels, as well as providing adequate stormwater quality. The SWM/BMP is designed as extended detention dry pond and will release the runoff generated by the 2-year and 10-year 24-hour post-development conditions storm at/or below the pre-development rates. 2-year and 10-year rates were determined based on the predevelopment areas as presented in the calculations.

Storm Sewer Systems

Directing runoff to the SWM/BMPs will be a combination of grass swales, ditches, culverts, overland flow, and a storm sewer system. The storm system will collect the flow from the JCSA building, the large vehicle parking area, the materials storage area, and the parking lot addition. Using Hydraflow software, the storm sewer system is designed to effectively transport the 10-year storm. Flow on the northern portion of the site is directed by existing and proposed culverts and swales into the proposed forebay of the SWM/BMP. The swales are designed to effectively transport the 10-year storm. The desire in the design of the culverts is to prevent the embankments from overtopping during storm events (in this case, the 100-year 24-hour post-development storm event). The existing and proposed culverts all do so. To prevent pollutants from entering downstream, the sheet flow from the proposed convenience center will be collected and pre-treated in a stone apron with 8" perforated pipe before emptying into the forebay.

Modeling Results

A table of pre- and post-development flows in cubic feet per second for 1-year, 2-year, 10-year, and 100-year storm events is provided below. This table summarizes the hydrographs and pond routings that are included in the calculations packet.

	PRE-DEVELOPMENT	PRE-DEVELOPMENT ROUTED THROUGH EXISTING POND	PRE-DEVELOPMENT ROUTED THROUGH SEDIMENT BASIN	POST-DEVELOPMENT	POST-DEVELOPMENT ROUTED THROUGH SEDIMENT BASIN	POST-DEVELOPMENT ROUTED THROUGH FINAL BMP
1 YEAR	1.5	0.3	0.1	5.1	0.2	0.2
2 YEAR	3	0.5	0.2	7.9	0.2	0.3
10 YEAR	9.6	3.2	0.9	18.5	2.7	2.5
100 YEAR	16.9	8	3.2	29.2	5.8	4.2

Note: All flow values provided in table are in cubic feet per second (cfs)

From the modeling results, the proposed changes made to the BMP will attenuate the post-development runoff for each storm event.

Water Quality Calculations

On this site, the existing percent impervious cover is greater than the average land cover condition. Based on the Performance-Based Water Quality Calculations from the Virginia Stormwater Management Handbook, the pollutant discharge post-development shall not exceed the pollutant discharge based on existing conditions less 10% or the pollutant discharge based on the average land cover condition, whichever is greater. For this site, the pollutant discharge post-development is 2.3 lbs/yr. This is less than the greater of the two values which is the pollutant discharge based on existing conditions less 10% (2.6 lbs/yr) Since it the less the BMP is in compliance for pollutant removal.

Conclusion

From the computer modeling to the proposed facilities associated with the site improvements, both state and local regulations are honored. Stormwater runoff from the proposed improvements is attenuated to below pre-development stormwater runoff rates, thereby minimizing the effects of the proposed land development on adjacent stream channels.

S:\Jobs\9801\E-Engineering\19-JCSA Tewning Road Site Plan\Admin\Reports\Eng\9801-E-19-Stormwater Management Report.doc

BMP#1

CALCULATIONS

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Sep 24, 2009

Pond No. 6 - Forebay

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 82.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	82.00	105	0	0
1.00	83.00	299	194	194
2.00	84.00	592	437	631
3.00	85.00	968	772	1,403
4.00	86.00	1,451	1,201	2,604
5.00	87.00	2,021	1,728	4,332
6.00	88.00	2,642	2,324	6,657
7.00	89.00	12,521	6,971	13,628
8.00	90.00	14,719	13,604	27,231

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	0.00	0.00	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 86.00	0.00	0.00	0.00
Length (ft)	= 28.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

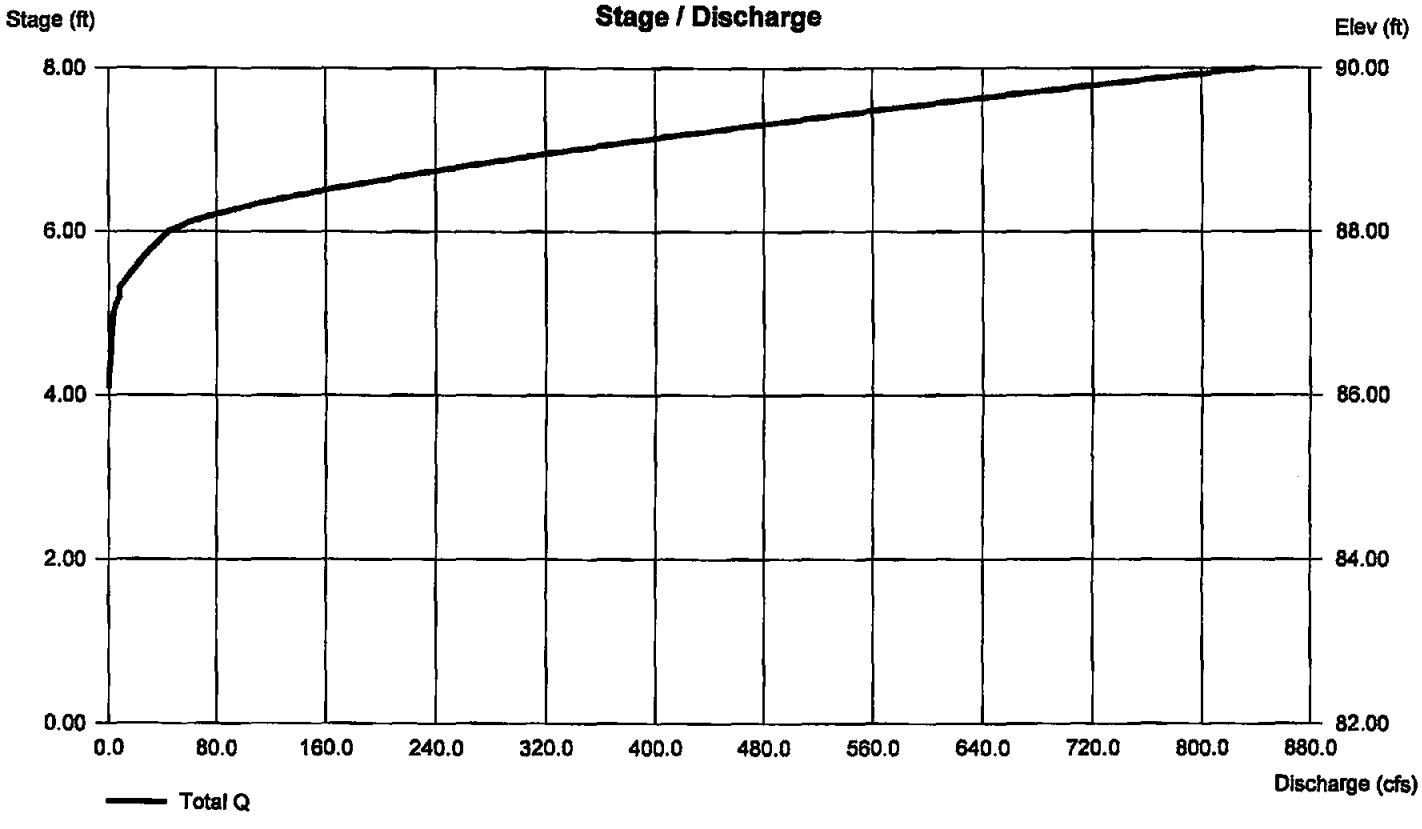
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.00	85.00	0.00	0.00
Crest El. (ft)	= 87.00	88.00	0.00	0.00
Weir Coeff.	= 2.60	2.60	3.33	3.33
Weir Type	= Broad	Broad	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Friday, Sep 25, 2009

Pond No. 7 - BMP

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 84.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	84.00	2,955	0	0
1.00	85.00	3,929	3,430	3,430
2.00	86.00	6,504	5,162	8,592
3.00	87.00	8,233	7,351	15,943
4.00	88.00	10,190	9,193	25,136
5.00	89.00	12,521	11,334	36,471
6.00	90.00	14,719	13,604	50,075

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 10.00	3.00	0.00	0.00
Span (in)	= 10.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 82.41	84.00	0.00	0.00
Length (ft)	= 37.00	0.00	0.00	0.00
Slope (%)	= 1.35	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

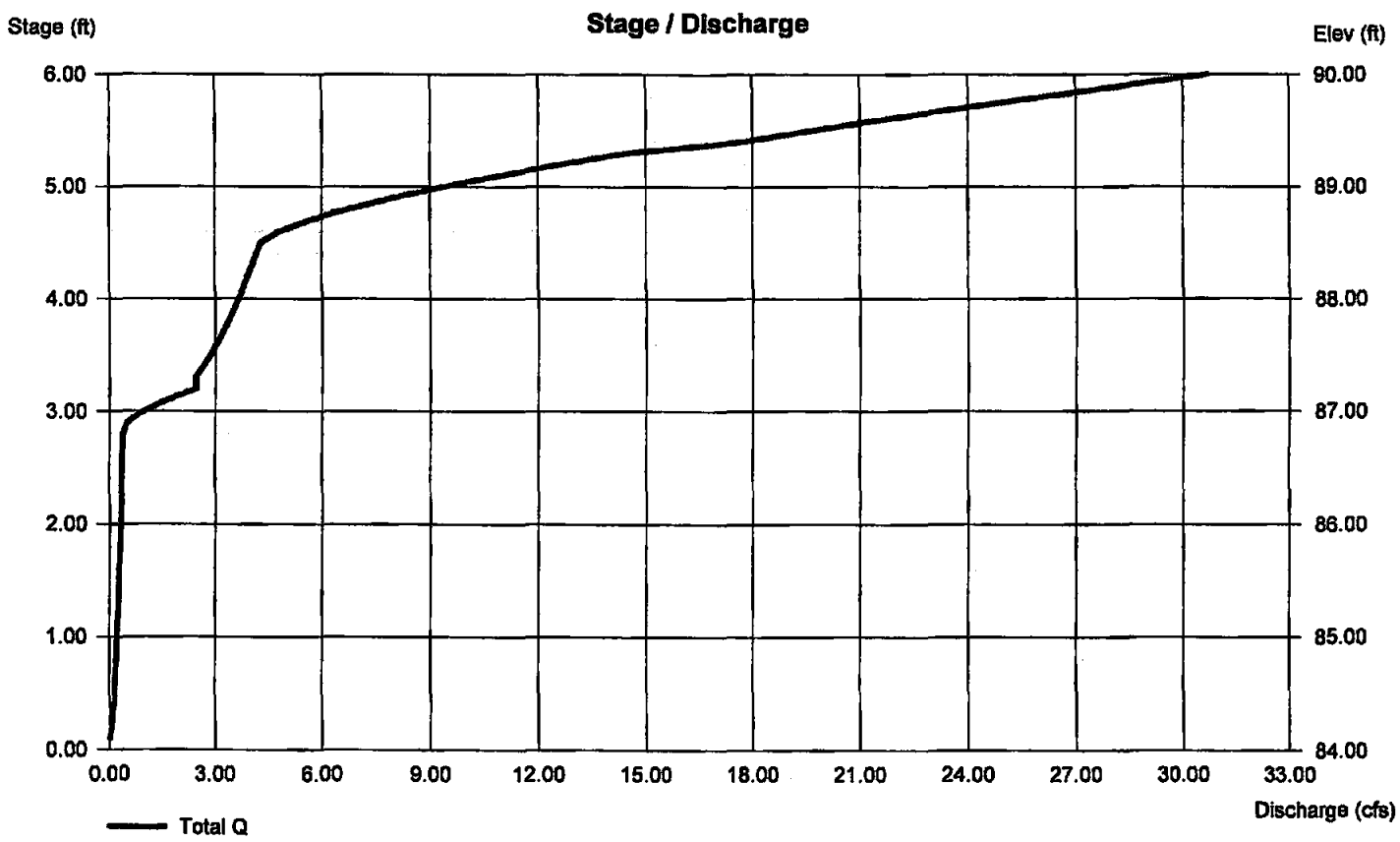
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	5.00	0.00	0.00
Crest El. (ft)	= 86.85	88.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



AES CONSULTING ENGINEERS
Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040

Project	JCSA Operations Center
Project No.	9801-E-19
Subject	Pond # 1
Sheet No.	1 of 1
Calculated By	GVC Date 5/7/09

Channel Protection Volume:

Drainage Area	=	3.79 Acres
Runoff Curve No.	=	77
1-Yr, 24-Hr Storm Volume	=	2.8 inches

Direct Runoff (From TR55 Equations 2-3 & 2-4)
Q = 0.93 inches

Channel Protection Volume = DA * Q * 60% (Virginia Stormwater Managment Handbook section 5-6.2 - Method 2)

Vcp = 3.54 Ac-in = 7,717 cubic feet

Determine Volume of Pond by Contour (starting at normal pool):

Elevation	Incremental Depth	Area (sq. ft.)	Volume (cu. ft.)	Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)	Incremental Avg Head[1] (feet)	Incremental Avg Flow[1] (cfs)	Incremental Drawdown Time[1] (hrs)
84.0	0.0	2,955	-	-	-	-			
85.0	1.0	3,929	3,442	127	3,442	127	0.5	0.07	14.24
86.0	1.0	6,504	5,217	193	8,659	321	1.4097304	0.12	9.91
87.0	1.0	8,233	7,369	273	16,027	594	0	0.00	0.00
88.0	1.0	10,190	9,212	341	25,239	935	0	0.00	0.00
89.0	1.0	12,521	11,356	421	36,594	1,355	0	0.00	0.00
90.0	1.0	14,719	13,620	504	50,214	1,860	0.00	0.00	0.00
		Total	50,214	1,860					24.15

[1] Incremental values computed from Channel Protection Volume Elevation

Elevation of Normal Pool	=	84.00	feet
Elevation of 1-yr, 24-hr Storage Volume	=	85.82	feet
Size of Orifice	=	2	inches
Total Average Drawdown Time	=	**24.15**	**hrs**

>24 HRS, OK

Note: By calculations, drawdown orifice size to be 2-inch diameter. Suggested minimum size is 3-inch diameter. A 3-inch diameter orifice shall be implemented in actual designs.

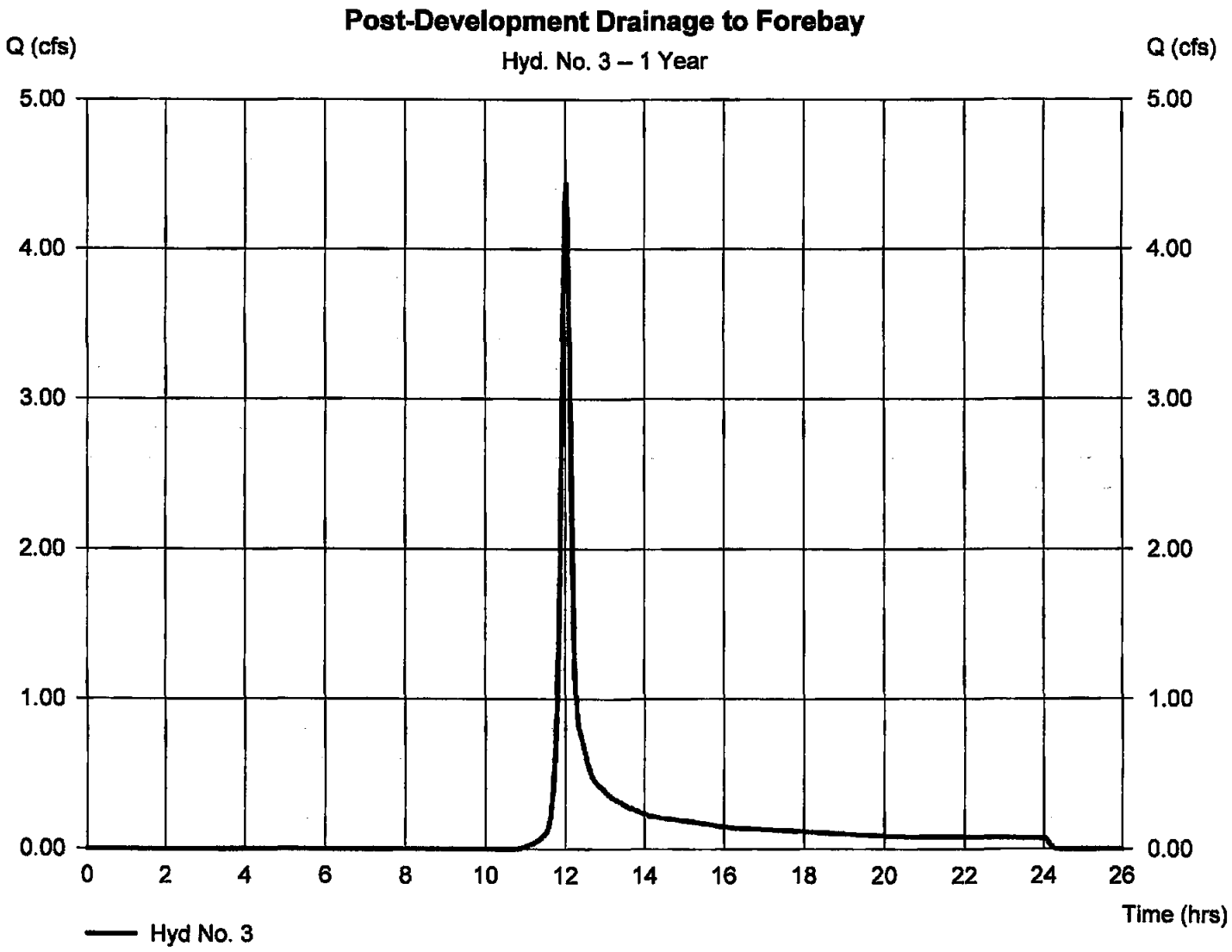
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Wednesday, Sep 23, 2009

Hyd. No. 3

Post-Development Drainage to Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 4.440 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 11,828 cuft
Drainage area	= 3.380 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



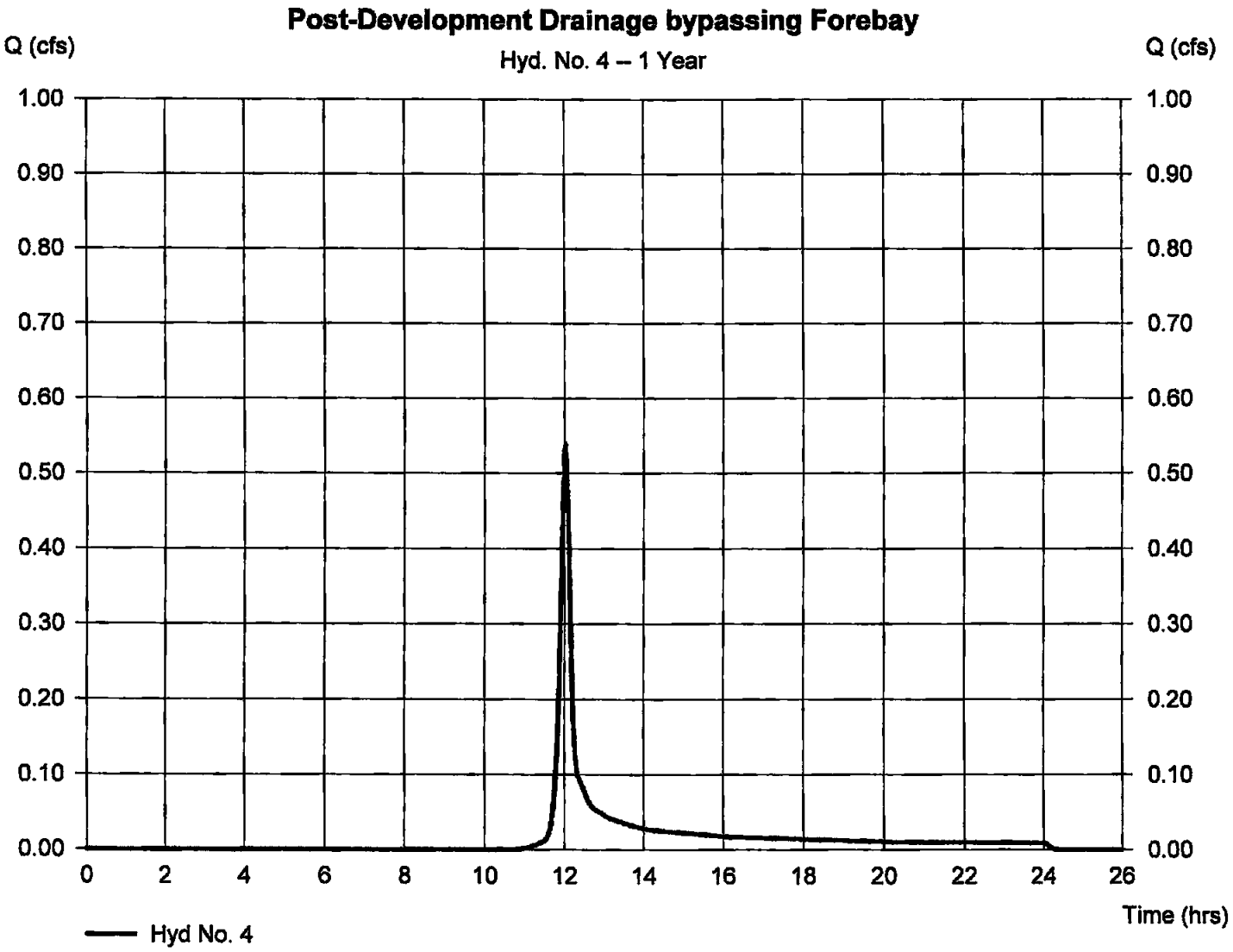
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Wednesday, Sep 23, 2009

Hyd. No. 4

Post-Development Drainage bypassing Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 0.539 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 1,435 cuft
Drainage area	= 0.410 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

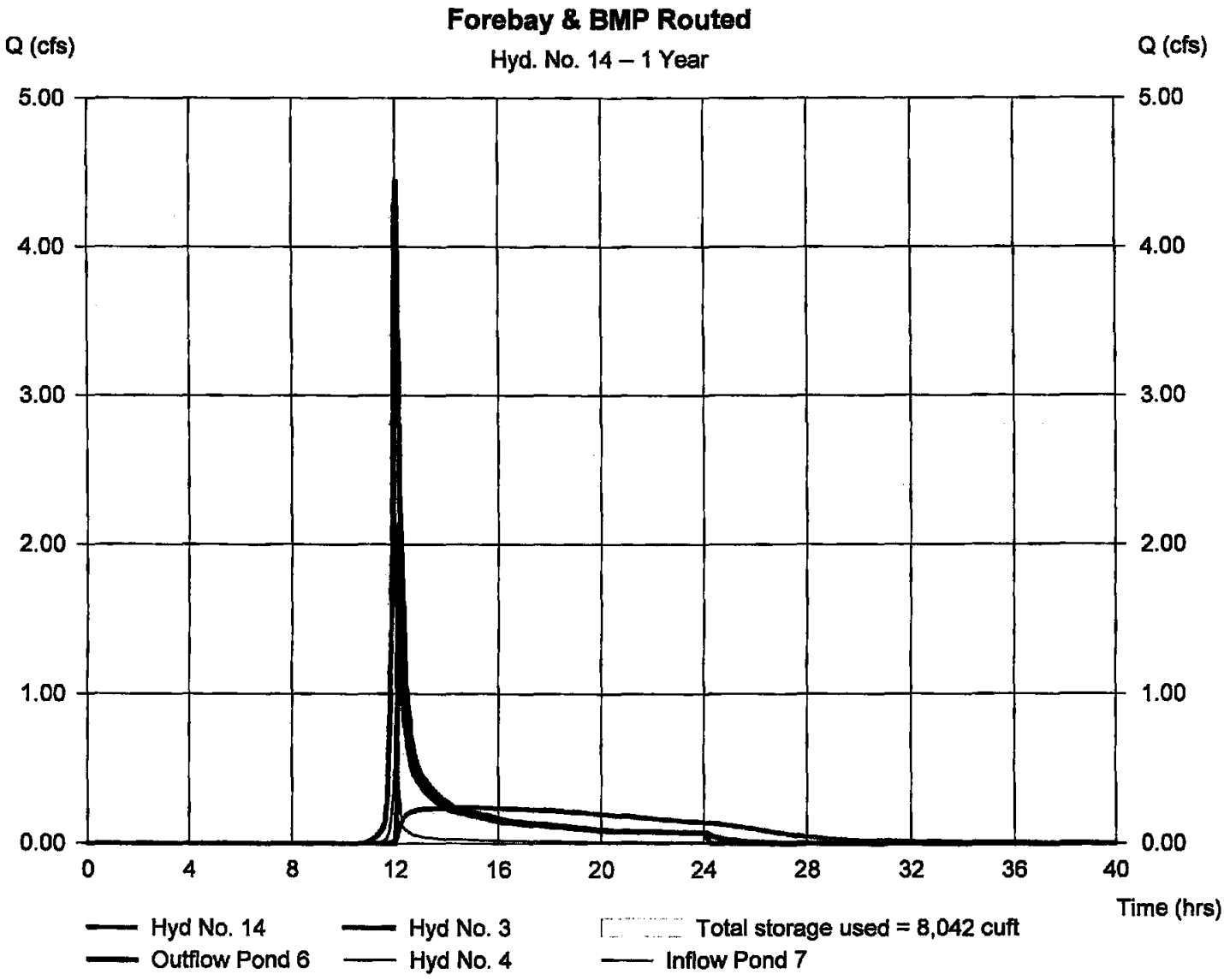
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Sep 24, 2009

Hyd. No. 14

Forebay & BMP Routed

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.238 cfs
Storm frequency	= 1 yrs	Time to peak	= 870 min
Time interval	= 2 min	Hyd. volume	= 10,641 cuft
Upper Pond		**Lower Pond**	
Pond name	= Forebay	Pond name	= BMP
Inflow hyd.	= 3 - Post-Development Drainage to Fore	Other Inflow hyd.	= 4 - Post-Develo
Max. Elevation	= 86.74 ft	Max. Elevation	= 85.14 ft
Max. Storage	= 3,869 cuft	Max. Storage	= 4,173 cuft

Interconnected Pond Routing. Storage Indication method used.



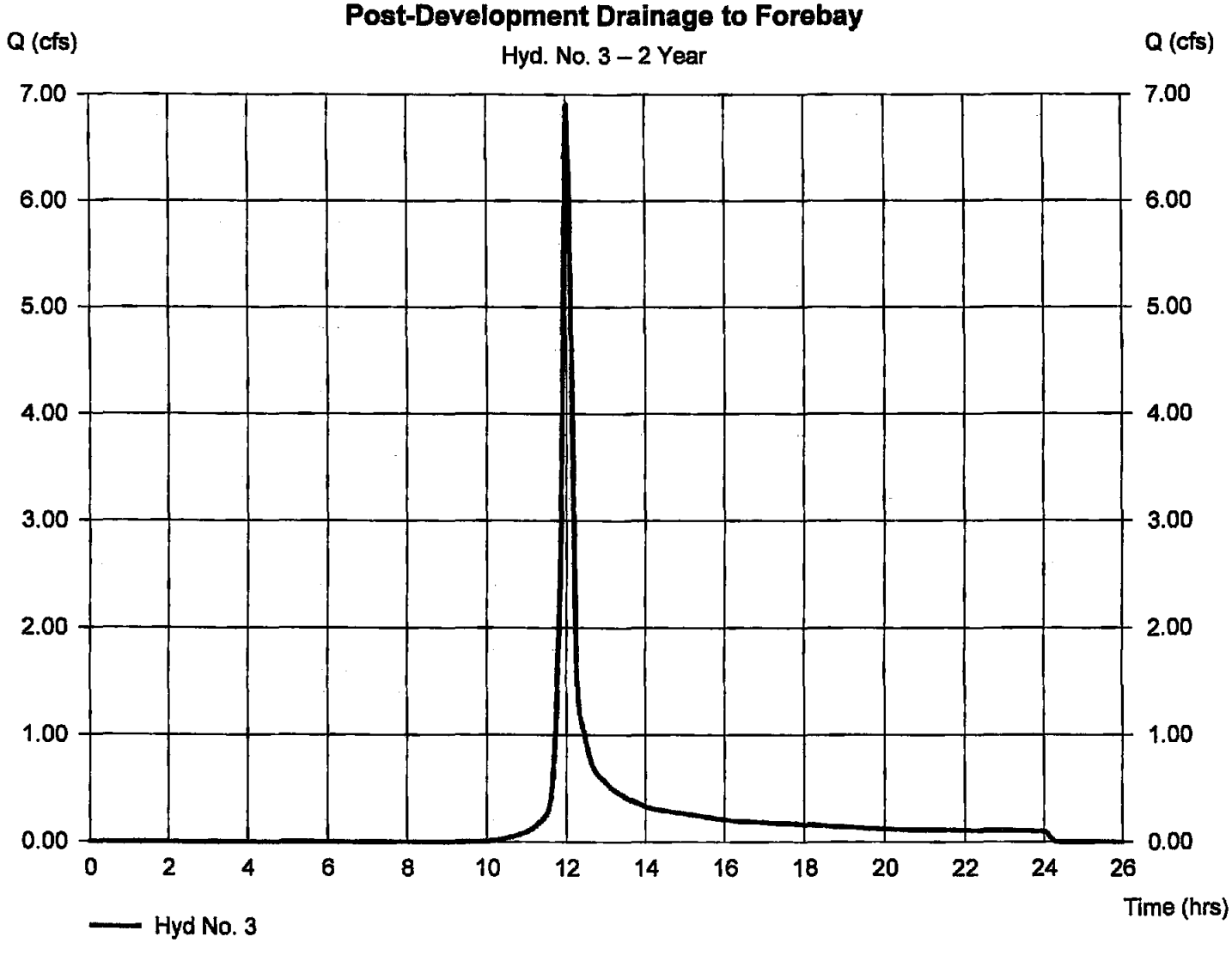
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Wednesday, Sep 23, 2009

Hyd. No. 3

Post-Development Drainage to Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 6.905 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 18,100 cuft
Drainage area	= 3.380 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



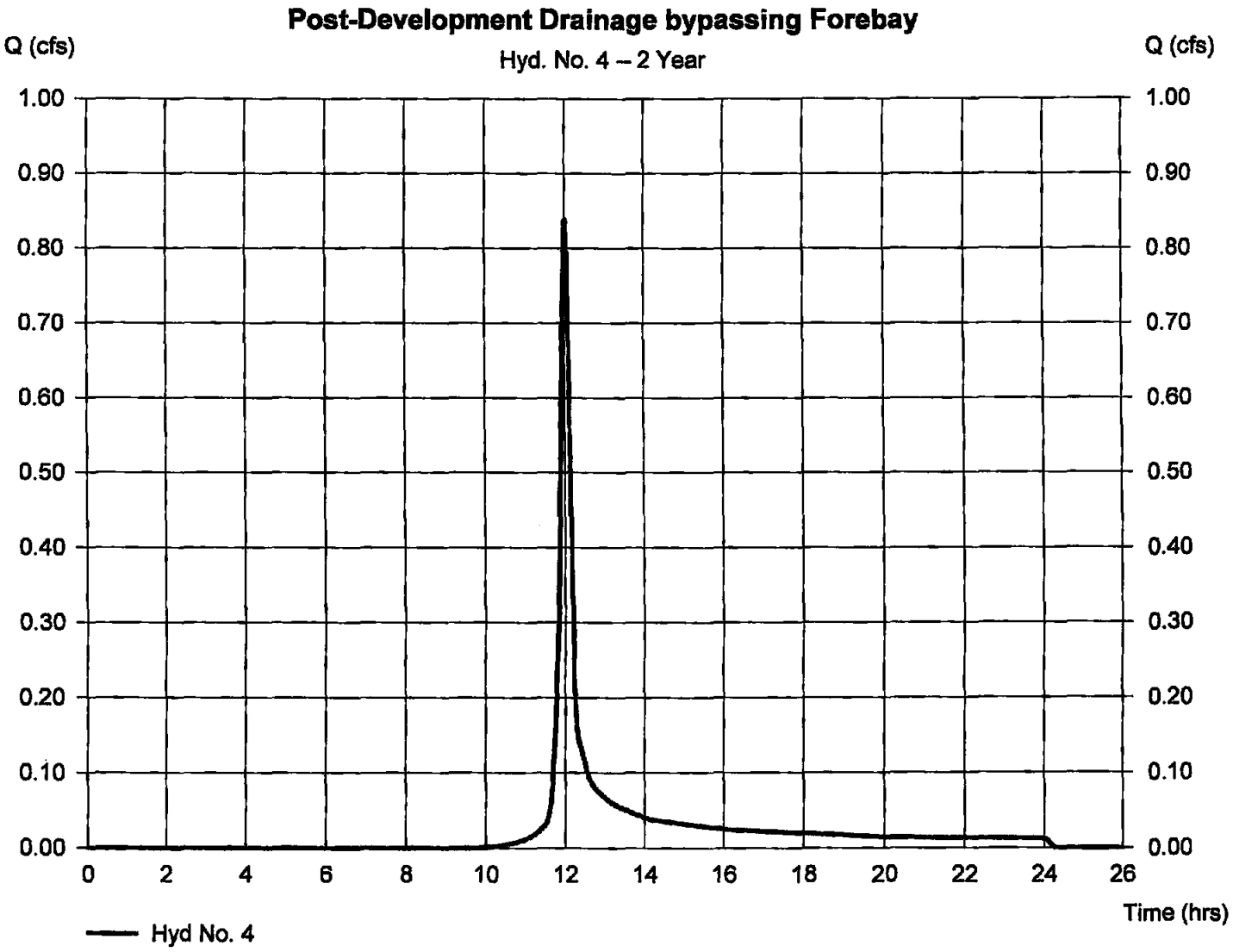
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Wednesday, Sep 23, 2009

Hyd. No. 4

Post-Development Drainage bypassing Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 0.838 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 2,196 cuft
Drainage area	= 0.410 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

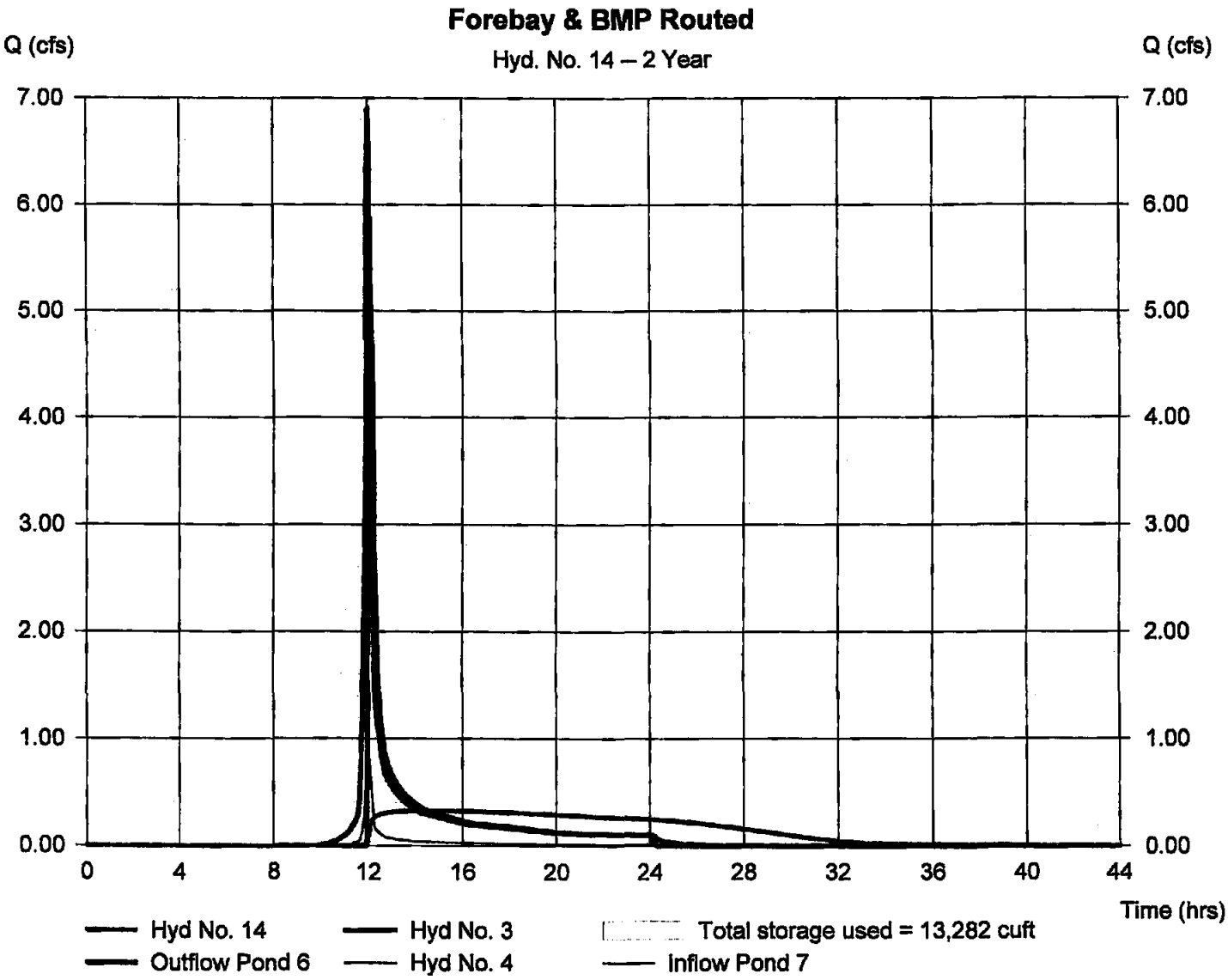
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 — Thursday, Sep 24, 2009

Hyd. No. 14

Forebay & BMP Routed

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.324 cfs
Storm frequency	= 2 yrs	Time to peak	= 884 min
Time interval	= 2 min	Hyd. volume	= 17,740 cuft
Upper Pond		**Lower Pond**	
Pond name	= Forebay	Pond name	= BMP
Inflow hyd.	= 3 - Post-Development Drainage to Fore	Other Inflow hyd.	= 4 - Post-Develo
Max. Elevation	= 87.13 ft	Max. Elevation	= 86.01 ft
Max. Storage	= 4,613 cuft	Max. Storage	= 8,669 cuft

Interconnected Pond Routing. Storage Indication method used.



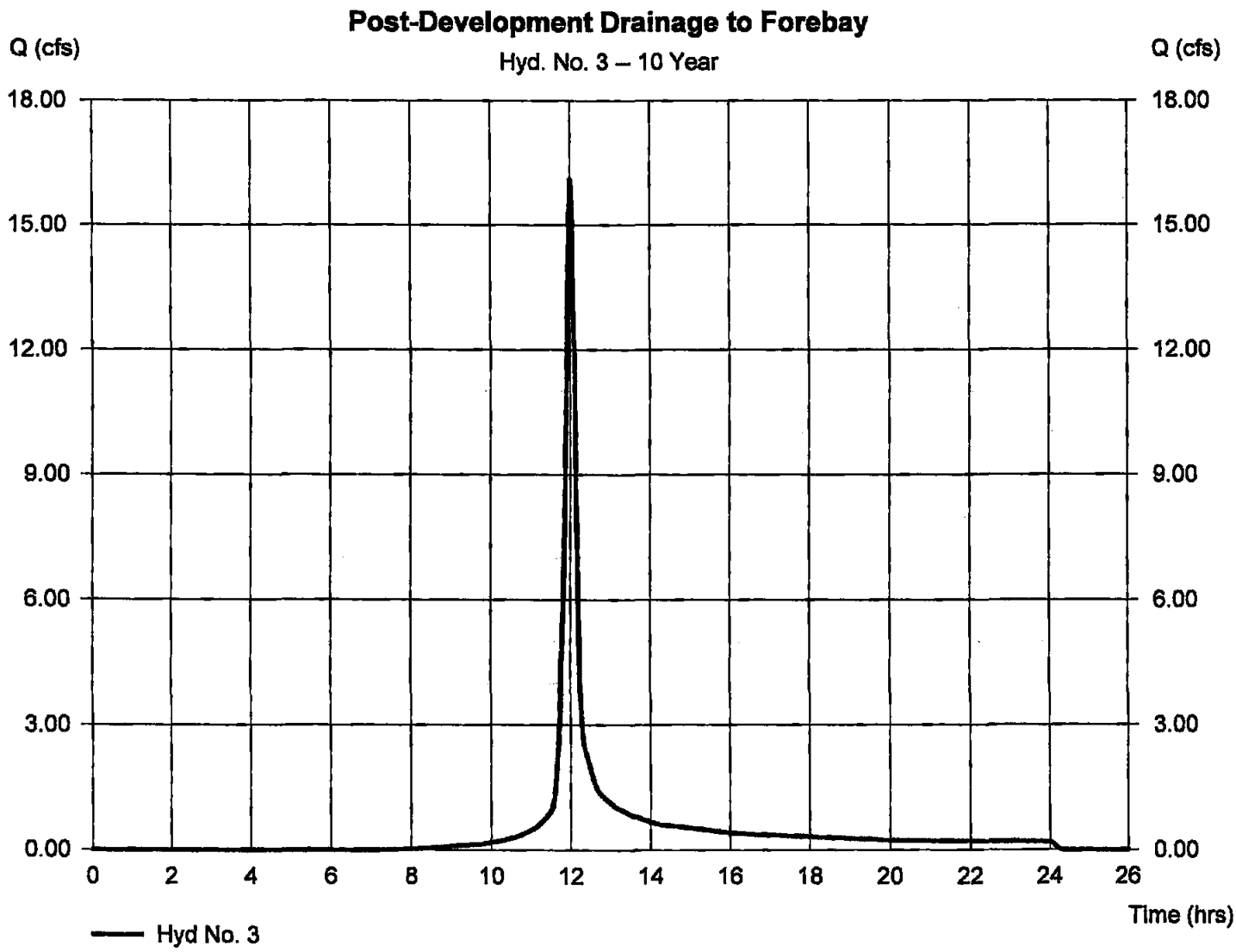
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Wednesday, Sep 23, 2009

Hyd. No. 3

Post-Development Drainage to Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 16.11 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 41,818 cuft
Drainage area	= 3.380 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



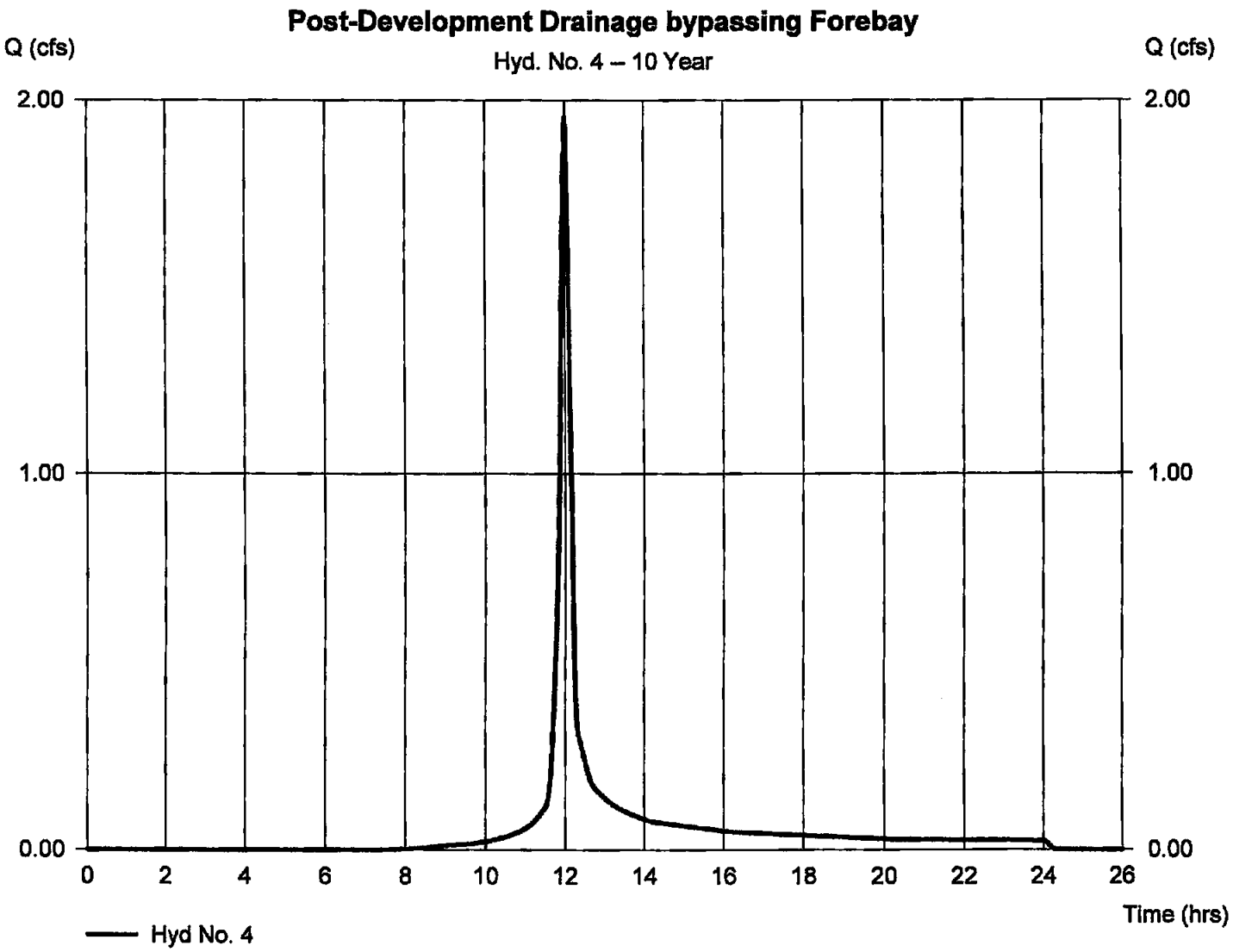
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Wednesday, Sep 23, 2009

Hyd. No. 4

Post-Development Drainage bypassing Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 1.955 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 5,073 cuft
Drainage area	= 0.410 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

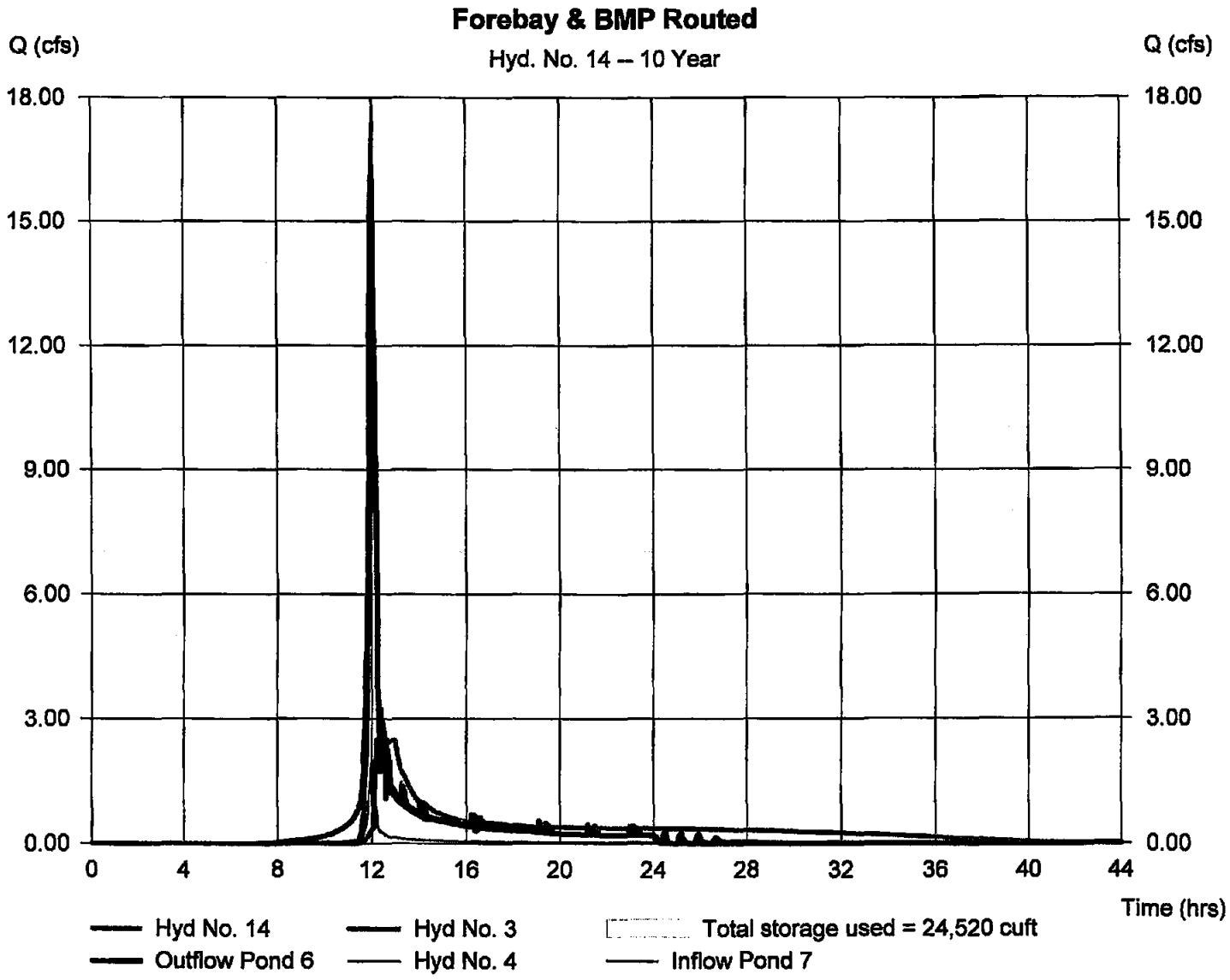
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Sep 24, 2009

Hyd. No. 14

Forebay & BMP Routed

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 2.541 cfs
Storm frequency	= 10 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 44,374 cuft
Upper Pond		**Lower Pond**	
Pond name	= Forebay	Pond name	= BMP
Inflow hyd.	= 3 - Post-Development Drainage to Fore	Other Inflow hyd.	= 4 - Post-Develo
Max. Elevation	= 87.48 ft	Max. Elevation	= 87.34 ft
Max. Storage	= 5,439 cuft	Max. Storage	= 19,081 cuft

Interconnected Pond Routing. Storage Indication method used.



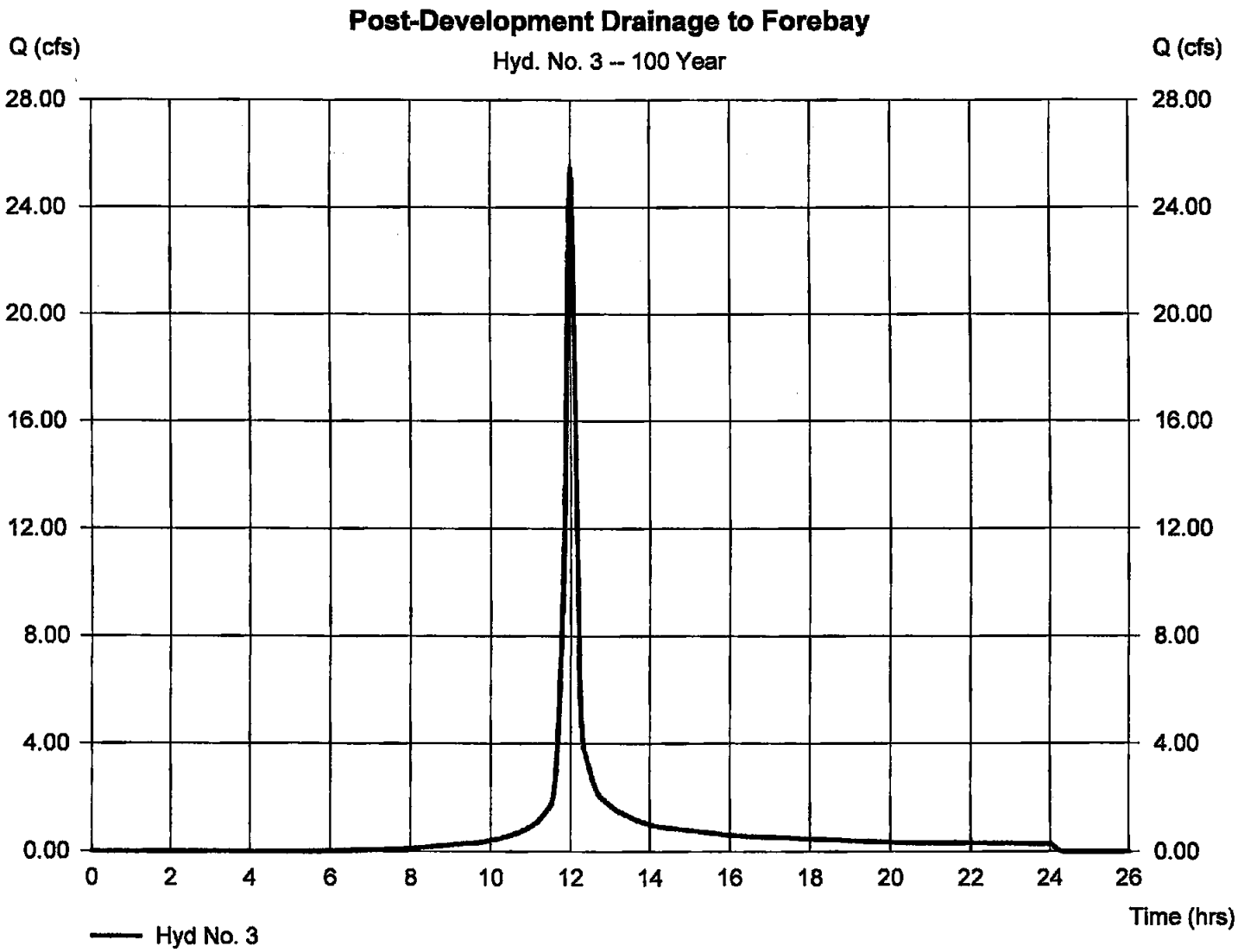
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Wednesday, Sep 23, 2009

Hyd. No. 3

Post-Development Drainage to Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 25.45 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 66,735 cuft
Drainage area	= 3.380 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



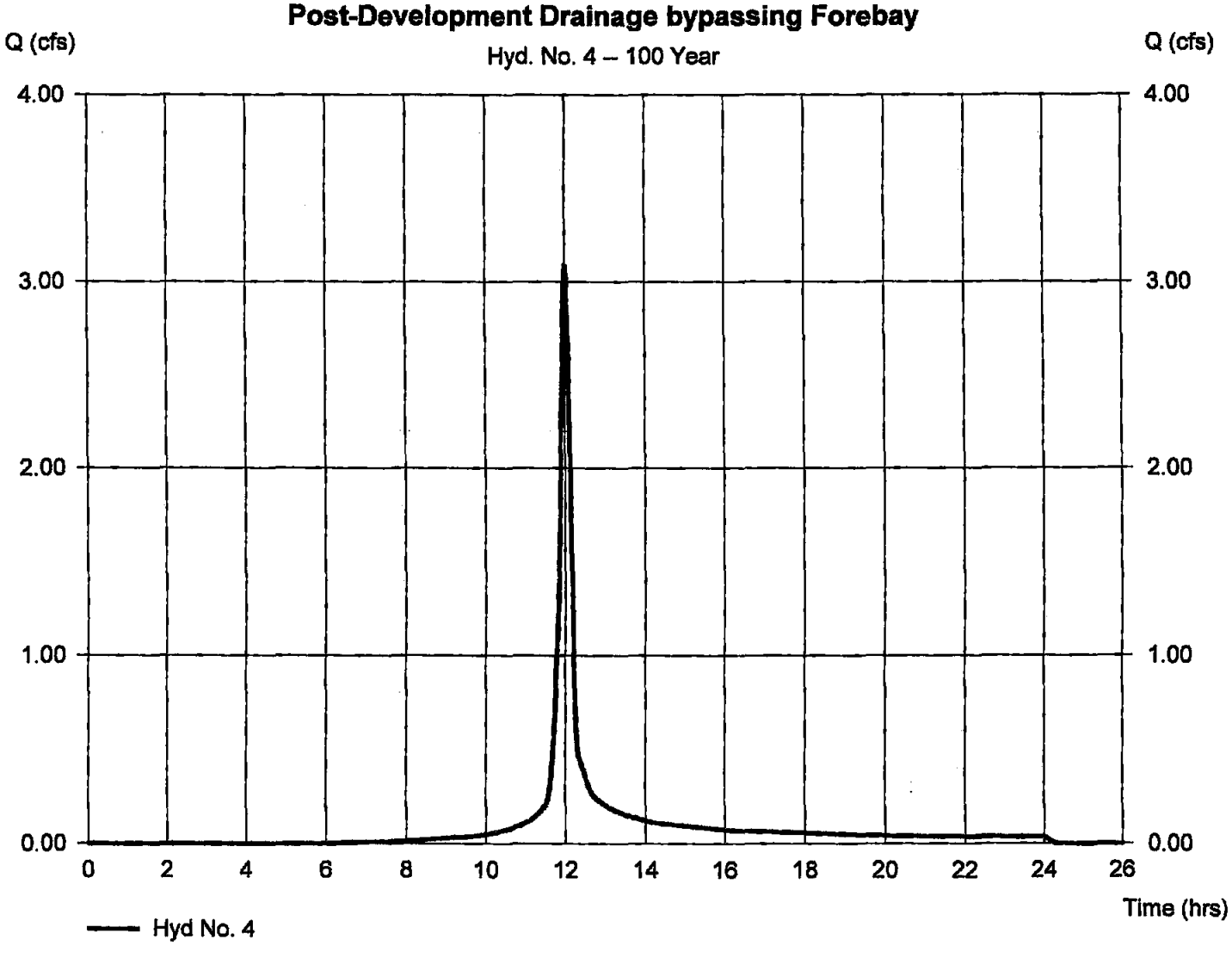
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Wednesday, Sep 23, 2009

Hyd. No. 4

Post-Development Drainage bypassing Forebay

Hydrograph type	= SCS Runoff	Peak discharge	= 3.088 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 8,095 cuft
Drainage area	= 0.410 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

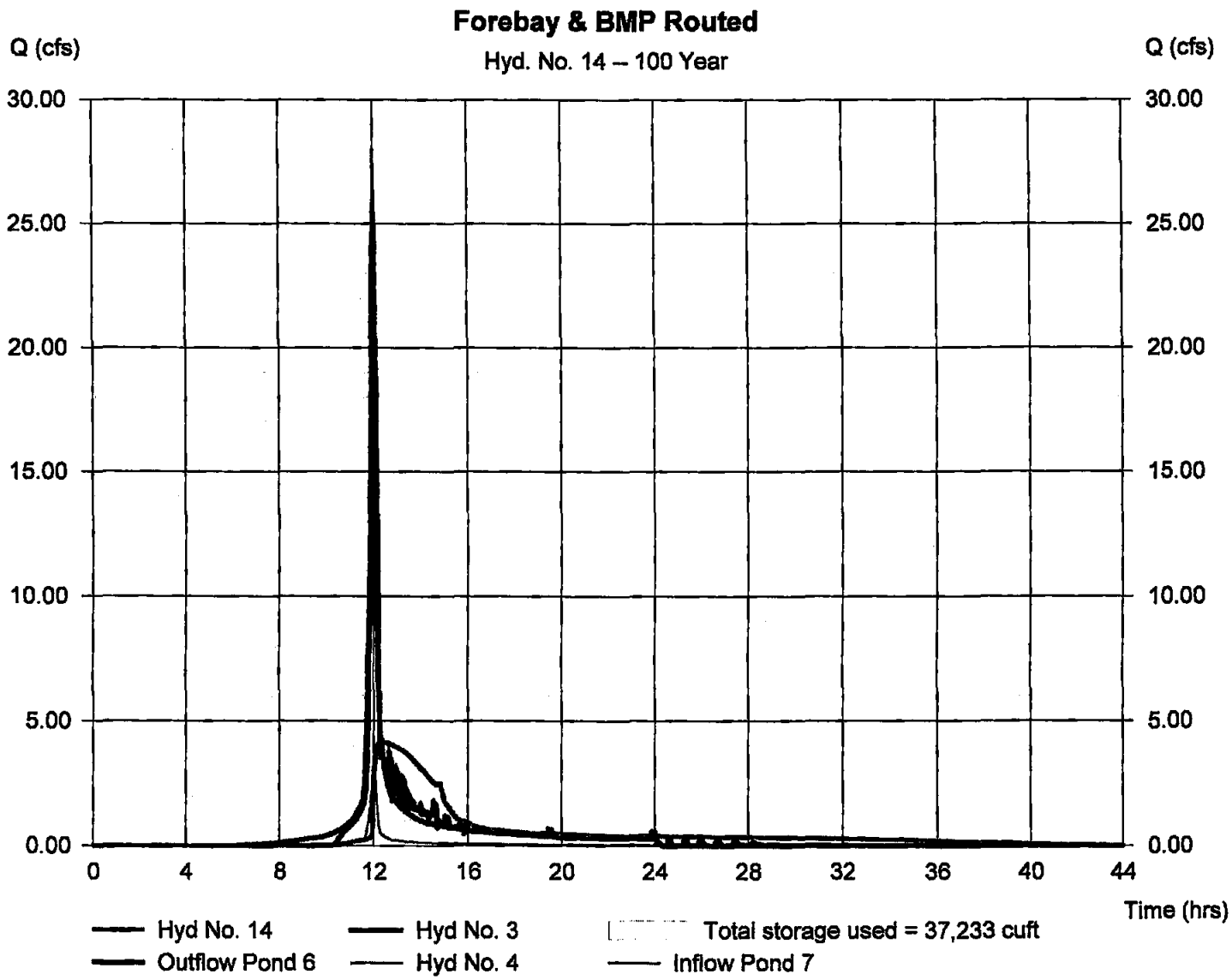
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Sep 24, 2009

Hyd. No. 14

Forebay & BMP Routed

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 4.153 cfs
Storm frequency	= 100 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 72,353 cuft
Upper Pond		**Lower Pond**	
Pond name	= Forebay	Pond name	= BMP
Inflow hyd.	= 3 - Post-Development Drainage to Fore	Other Inflow hyd.	= 4 - Post-Develo
Max. Elevation	= 88.33 ft	Max. Elevation	= 88.38 ft
Max. Storage	= 7,742 cuft	Max. Storage	= 29,491 cuft

Interconnected Pond Routing. Storage Indication method used.



TEMPORARY SEDIMENT BASIN CALCULATIONS

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Tuesday, Sep 22, 2009

Pond No. 4 - Existing Dry Pond (Temp Basin)

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 84.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	84.00	6,507	0	0
1.00	85.00	7,664	7,077	7,077
2.00	86.00	8,977	8,311	15,388
3.00	87.00	10,307	9,633	25,021
4.00	88.00	11,837	11,062	36,083
5.00	89.00	13,404	12,611	48,695
6.00	90.00	14,919	14,153	62,848

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 10.00	2.00	0.00	0.00
Span (in)	= 10.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 82.11	86.00	0.00	0.00
Length (ft)	= 37.00	6.00	0.00	0.00
Slope (%)	= 0.57	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

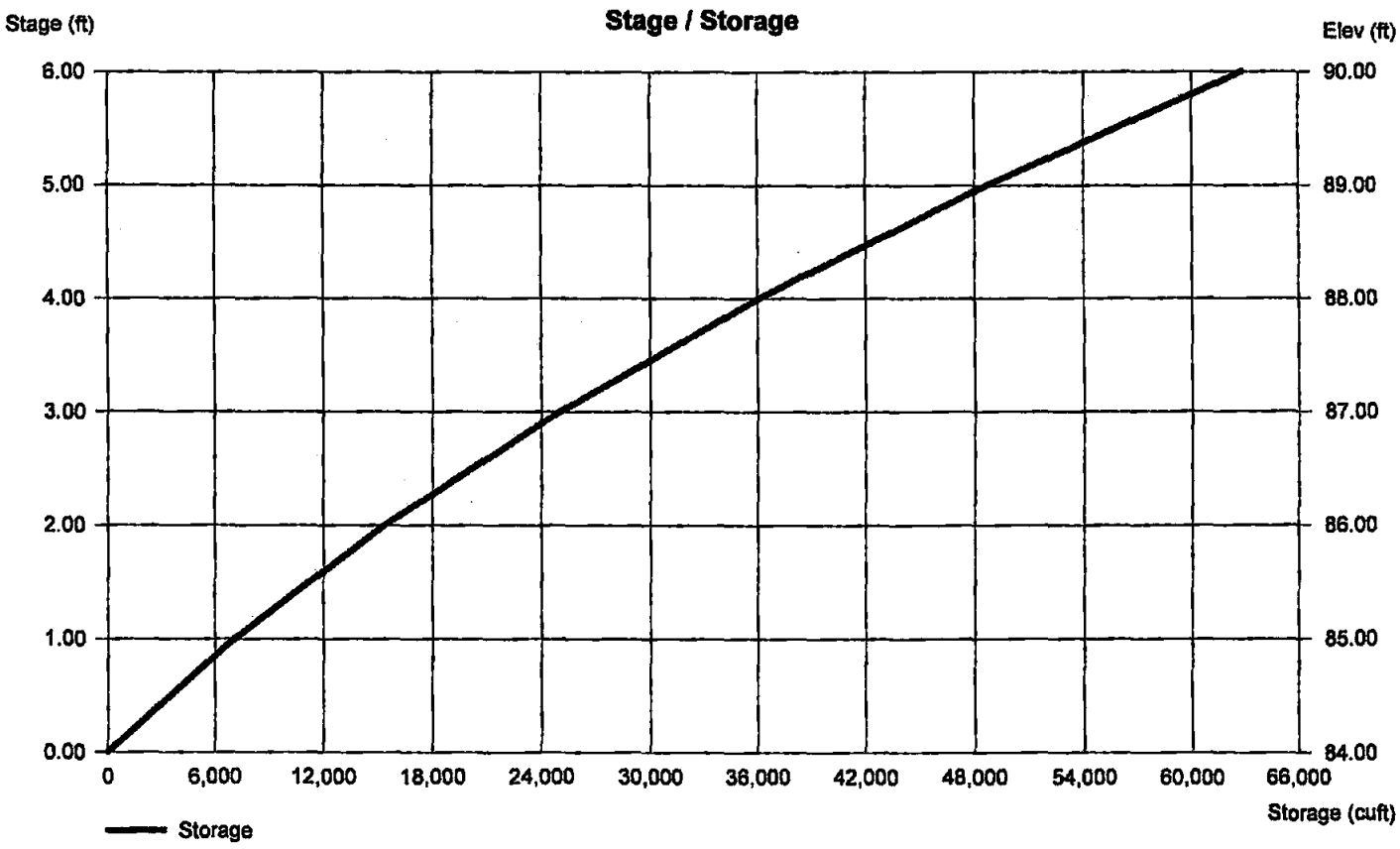
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	5.00	0.00	0.00
Crest El. (ft)	= 86.85	88.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project JCSA Operations Center

Basin # 1 Location Southwest corner of site

Total area draining to basin 3.84 acres.

Basin Volume Design

Wet Storage:

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

   67 cu. yds. x 3.84 acres = 257.28 cu. yds.

2. Available basin volume = 570 cu. yds. at elevation 86 . (From storage - elevation curve)

3. Excavate 570 cu. yds. to obtain required volume*.

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

4. Available volume before cleanout required.

   33 cu. yds. x 3.84 acres = 126.72 cu. yds.

5. Elevation corresponding to cleanout level = 84.5 .

   (From Storage - Elevation Curve)

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 3.84 acres = 257.28 cu. yds.

8. Total available basin volume at crest of riser* = 570 cu. yds. at elevation 86 . (From Storage - Elevation Curve)

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

9. Diameter of dewatering orifice = 3 in.

10. Diameter of flexible tubing = 5 in. (diameter of dewatering orifice plus 2 inches).

Preliminary Design Elevations

11. Crest of Riser = 86.85

Top of Dam = 90

Design High Water = 87.45

Upstream Toe of Dam = 84

Basin Shape

12. $\frac{\text{Length of Flow}}{\text{Effective Width}}$ $\frac{L}{We}$ = 4

If > 2, baffles are not required ✓

If < 2, baffles are required _____

Runoff

13. Q_2 = 7.93 cfs (From Chapter 5)

14. Q_{25} = 21.39 cfs (From Chapter 5)

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2$ = 7.93 cfs. (riser and barrel)

Without emergency spillway, required spillway capacity $Q_p = Q_{25}$ 21.39 cfs. (riser and barrel)

16. With emergency spillway:

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

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

Without emergency spillway:

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

h = Design High Water Elevation - Crest of Riser Elevation

17. Riser diameter (D_r) = 24 in. Actual head (h) = 0.5 ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = 36 ft.

Head (H) on barrel through embankment = 5.55 ft.

(From Plate 3.14-7).

19. Barrel diameter = 10 in.

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

20. Trash rack and anti-vortex device

Diameter = n/a inches.

Height = n/a inches.

(From Table 3.14-D).

Emergency Spillway Design

21. Required spillway capacity $Q_e = Q_{25} - Q_p$ = 13.46 cfs.

22. Bottom width (b) = 5 ft.; the slope of the exit channel (s) = 0.11 ft./foot; and the minimum length of the exit channel (x) = 60 ft.
(From Table 3.14-C)

Anti-Seep Collar Design

23. Depth of water at principal spillway crest (Y) = 2.85 ft.

Slope of upstream face of embankment (Z) = 4 :1.

Slope of principal spillway barrel (S_b) = 0.57 %

Length of barrel in saturated zone (L_s) = 25 ft.

24. Number of collars required = 2 dimensions = 3' x 3'

(From Plate 3.14-12).

Final Design Elevations

25. Top of Dam = 90

Design High Water = 87.45

Emergency Spillway Crest = 88.5

Principal Spillway Crest = 86.85

Dewatering Orifice Invert = 86

Cleanout Elevation = 84.5

Elevation of Upstream Toe of Dam or Excavated Bottom of "Wet Storage Area" (if excavation was performed) = 84

FLUME CALCULATIONS

CONSULTING ENGINEERS
Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040
Fredericksburg (540) 710-6606

Project:	JCSA Operations Center
Project No.:	9801-E-19
Subject:	Channel Design
Date:	June 24, 2009
Calculated By:	GVC

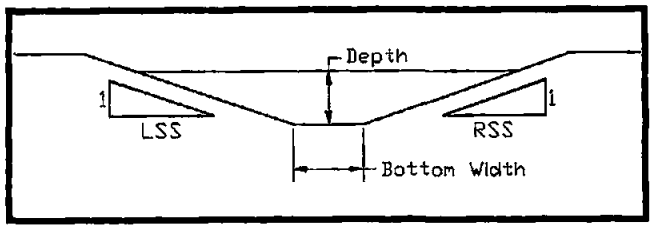
Design Point: **Swale #3 - Forebay Flume**

2 Year Storm - Velocity Check

Drainage Area	=	1.47	Acres	(Area draining to Design Point)
C	=	0.85		(Runoff Coefficient)
I	=	5.60	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)
= 0.85 x 5.60 x 1.47
= 7.00 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	1.00	Ft.
Max. Depth	=	1.00	Ft.
Channel Slope	=	25.00	%
Mannings (n)	=	0.050	**EC-3 Matting**

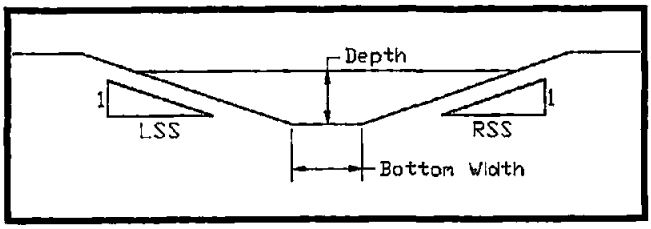
Depth of Flow	=	0.46	Ft.				
Area	=	1.10	SF	Wetted Perimeter	=	3.92	Ft.
Hydraulic Radius	=	0.28	Ft.				
Velocity (V)	=	6.37	Ft./sec.	(From Manning's Equation)			
Flow (Q)	=	7.00	CFS	(From Continuity Equation Q=AV)			

10 Year Storm - Capacity Check

Drainage Area	=	1.47	Acres	(Area draining to Design Point)
C	=	0.85		(Runoff Coefficient)
I	=	7.00	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)
= 0.85 x 7.00 x 1.47
= 8.75 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	1.00	Ft.
Max. Depth	=	1.00	Ft.
Channel Slope	=	25.00	%
Mannings (n)	=	0.050	**EC-3 Matting**

Depth of Flow	=	0.51	Ft.				
Area	=	1.29	SF	Wetted Perimeter	=	4.23	Ft.
Hydraulic Radius	=	0.31	Ft.				
Velocity (V)	=	6.75	Ft./sec.	(From Manning's Equation)			
Flow (Q)	=	8.73	CFS	(From Continuity Equation Q=AV)			

CONSULTING ENGINEERS
Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040
Fredericksburg (540) 710-6606

Project:	JCSA Operations Center
Project No.:	9801-E-19
Subject:	Channel Design
Date:	June 24, 2009
Calculated By:	GVC

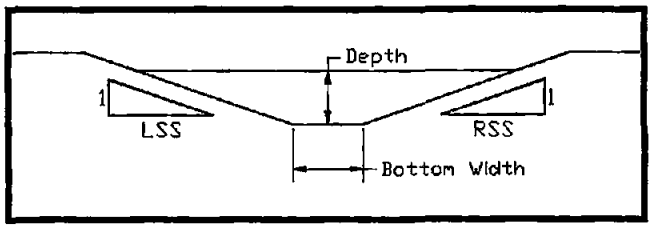
Design Point: **Swale #1 - Forebay Flume**

2 Year Storm - Velocity Check

Drainage Area	=	0.15	Acres	(Area draining to Design Point)
C	=	0.85		(Runoff Coefficient)
I	=	5.60	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)
= 0.85 x 5.60 x 0.15
= 0.71 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	1.00	Ft.
Max. Depth	=	1.00	Ft.
Channel Slope	=	13.10	%
Mannings (n)	=	0.050	**EC-3 Matting**

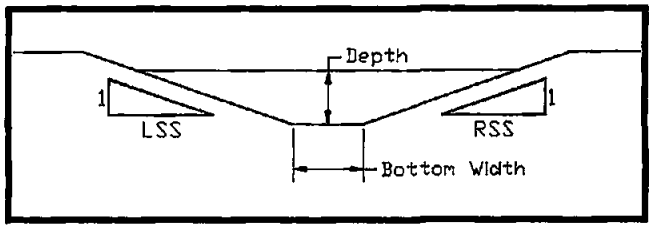
Depth of Flow	=	0.17	Ft.	
Area	=	0.26	SF	Wetted Perimeter = 2.09 Ft.
Hydraulic Radius	=	0.13	Ft.	
Velocity (V)	=	2.70	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	0.71	CFS	(From Continuity Equation Q=AV)

10 Year Storm - Capacity Check

Drainage Area	=	0.15	Acres	(Area draining to Design Point)
C	=	0.85		(Runoff Coefficient)
I	=	7.00	in/hr	(Design Rainfall Intensity) **TC = 5 minutes**

Q = C I A (Peak Flow)
= 0.85 x 7.00 x 0.15
= 0.89 CFS

Channel Characteristics



Rt. Sideslope	=	3.00	:1
Lt. Sideslope	=	3.00	:1
Base Width	=	1.00	Ft.
Max. Depth	=	1.00	Ft.
Channel Slope	=	13.10	%
Mannings (n)	=	0.050	**EC-3 Matting**

Depth of Flow	=	0.20	Ft.	
Area	=	0.31	SF	Wetted Perimeter = 2.23 Ft.
Hydraulic Radius	=	0.14	Ft.	
Velocity (V)	=	2.88	Ft./sec.	(From Manning's Equation)
Flow (Q)	=	0.89	CFS	(From Continuity Equation Q=AV)

RECEIVED
AUG 2009
Planning Department

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

SP-143-00
3910100156

County BMP ID Code (if known): PC 168

Name of Facility: JCSA Parking Lot Expansion BMP No.: 1 of 1 Date: 10/4/02

Location: 149 Tewning Road

Name of Owner: James City Service Authority

Name of Inspector: SJ Thomas

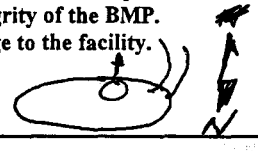
Type of Facility: Dry ED Pond w/ Forebay

Weather Conditions: Sunny, Warm 70's Type: ☒ Final Inspection ☐ County BMP Inspection Program ☐ Owner Inspection
(Note: Bond Released prior to F.I.)

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

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

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



Facility Item	O.K.	Routine	Urgent	Comments
Embankments and Side Slopes:				Earth Embank 8-10' High; 2H:1V SS DS; 3H:1V U/S.
Grass Height	✓			Good grass stand
Vegetation Condition	✓			4" High cover weeds.
Tree Growth	✓			None. See Note.
Erosion	✓			~~Bare soil~~
Trash & Debris	✓			
Seepage	✓			None Observed.
Fencing or Benches	NA			Top dam 10' wide.
Interior Landscaping/Planted Areas:	☐ None	☐ Constructed Wetland/Shallow Marsh		☒ Naturally Established Vegetation
Vegetated Conditions	✓			Grass + weeds
Trash & Debris	✓			
Floating Material	✓			
Erosion	✓			Some bottom erosion.
Sediment	✓			< 2"
Dead Plant	✓			
Aesthetics	✓			
Other				Bare Soil area NW corner interior SS.
Notes: Serves Parking Lot Expansion Area.				

Facility Item	O.K.	Routine	Urgent	Comments
Water Pools: ☐ Permanent Pool (Retention Basin) ☐ Shallow Marsh (Detention Basin) ☒ None, Dry (Detention Basin)				
Shoreline Erosion				
Algae	✓			
Trash & Debris	✓			
Sediment	✓			< 2" depth
Aesthetics				
Other				Pond totally dry.
Inflows (Describe Types/Locations): Channel at middle of north side. Shallow-parabolic				
Condition of Structure	✓			Matting in channel.
Erosion	✓			None
Trash and Debris	✓			Some in outlet rock.
Sediment	✓			
Outlet Protection				Yes. 40' long x 15' wide, CL I
Other				
Principal Flow Control Structure - Riser, Intake, etc. (Describe Type): 6' deep 01-7 sloped device.				
Condition of Structure	✓			01-7 bars, 7
Corrosion	✓			
Trash and Debris	✓			
Sediment	✓			None. 6" standing water
Vegetation	✓			Some around LF and bot.
Other	✓			LFO. EW-11 with 2" orifice.
Principal Outlet Structure - Barrel, Conduit, etc. : 15" D.I.P. barrel.				
Condition of Structure	✓			
Settlement	✓			
Trash & Debris	✓			Some debris at outfall.
Erosion/Sediment	✓			
Outlet Protection	✓			12'x12' stilling basin. CL I
Other				
Emergency Spillway (Overflow): 6' wide; 3H:1V SS; 2-5' deep				
Vegetation	✓			
Lining	✓			
Erosion	✓			
Trash & Debris	✓			
Other	✓			
Notes:				

Facility Item	O.K.	Routine	Urgent	Comments
Nuisance Type Conditions:				
Mosquito Breeding	✓			
Animal Burrows	✓			
Graffiti	✓			
Other				
Surrounding Perimeter Conditions:	North & South Woods; East Parking; West Woods.			
Land Uses	✓			Parking Lot Exp.
Vegetation	✓			
Trash & Debris	✓			
Aesthetics	✓			Easy Access.
Access /Maintenance Roads or Paths				Gravel Road From Parking Area #57 10' wide.
Other				

Remarks:

Note: Shrubbery Allowed for buffering waiver
Approx 25 - 3' high shrubs @ 4' spacing.
Not situated on dam at outlet barrel. (20' width.)

- Baffle: 50' Long x 4' high x 8' wide
  CLASS I riprap. Angled & centered
  within BMP bottom.

- Overall Good Condition. Rock baffle is excessive size.
  Keep ~~[illegible]~~ shrubbery on dam slope maintained.
  Remove if growth becomes excessive.

Overall Environmental Division Internal Rating: 4

Signature: Scott Thomm P.E. **Date:** 10/4/02.

Title: CIVIL ENGINEER ENV DIV

SWMProg\BMP\CoInspProg\DetRet.wpd

WATERSHED	PC
BMP ID NO	168
PLAN NO	SP-143-00
TAX PARCEL	(39-01)(01-156)
PIN NO	
CONSTRUCTION DATE	11/1/2001
PROJECT NAME	JCSA Oper Center Park Lot Expansion
FACILITY LOCATION	
CITY-STATE	Williamsburg, Va. 23188
CURRENT OWNER	James City Service Authority
OWNER ADDRESS	
OWNER ADDRESS 2	
CITY-STATE-ZIP CODE	
OWNER PHONE	
MAINT AGREEMENT	Yes
EMERG ACTION PLAN	No

Get Last BMP No

Return to Menu

MAINTENANCE PLAN	Yes
SITE AREA acre	4.4
LAND USE	
old BMP TYP	
JCC BMP CODE	A3 Wet ED Pond
POINT VALUE	10
SVC DRAIN AREA acres	2.45
SERVICE AREA DESCRI	Parking area & Offsite
IMPERV AREA acres	2.68
RECV STREAM	UT of Powhatan Creek
EXT DET-WQ-CTRL	Yes
WTR QUAL VOL acre-ft	
CHAN PROT CTRL	Yes
CHAN PROT VOL acre-ft	
SW/FLOOD CONTROL	Yes
GEOTECH REPORT	Yes

CTRL STRUC DESC	DI-7 Conc B
CTRL STRUC SIZE inches	34" x 36
OTLT BARRL DESC	DIP Barrel
OTLT BARRL SIZE inch	10
EMERG SPILLWAY	Yes
DESIGN HW ELEV	88.4
PERM POOL ELE	84.02
2-YR OUTFLOW cfs	0.40
10-YR OUTFLOW cfs	3.80
REC DRAWING	Yes
CONSTR CERTI	Yes
LAST INSP DATE	
INTERNAL RATING	

MISC/COMMENTS

Landscaping on d/s embank requires rout maint.

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

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

LETTER OF TRANSMITTAL

TO James City County Environmental

DATE	JOB NO.
August 1, 2001	8651-18

ATTENTION Mr. Scott Thomas

RE: JCSA Operations Center Site Expansion

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

☐ Shop drawings ☐ Prints ☑ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
2			Revisions to Landscape Plan

RECEIVED AUG 2001 ENVIRONMENTAL DIVISION

THESE ARE TRANSMITTED as checked below:

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

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

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

☐ For review and comment ☐ _____

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

REMARKS

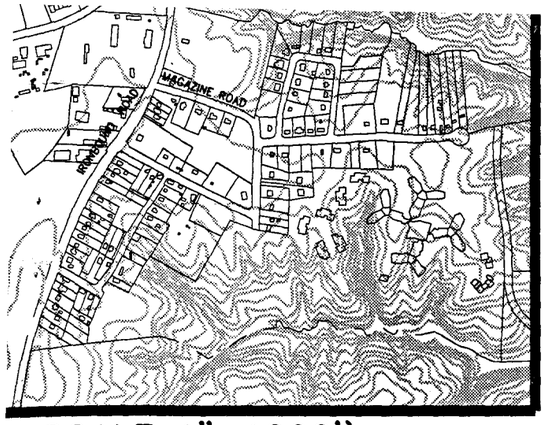
Scott,

These plans replace the sheets in the plan set for the "Downsized" BMP.

Thanks for your help on this

COPY TO Lee Schnappinger (Planning) SIGNED: V. Marc Bo

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



. SCALE 1"=1000')

7, 2000
NO.: 8651-18

COMMONWEALTH OF VIRGINIA
JAMES S. PETERS
No. 000393
1/16/01
CERTIFIED LANDSCAPE ARCHITECT

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

80 80

(NUMBER OF SPACES REQUIRED WAS DETERMINED BY THE J.C.S.A.)

LAND USE SUMMARY TABLE

	S.F.	AC.	%
TOTAL SITE AREA	192,859	4.427	100.00
IMPERVIOUS TOTAL:	32,515	0.746	16.86
BUILDING	N/A	N/A	N/A
SIDEWALKS	265	0.006	0.14
PARKING	32,250	0.740	16.72
OPEN SPACE/GREEN AREA	160,344	3.681	83.14
DISTURBED WETLANDS	931	0.021	0.48
DISTURBED AREA	89,000	2.043	46.15
OPEN SPACE–CONSERVATION EASEMENT	27,747	0.637	14.39

PROPERTY ZONED – M1 LIMITED BUSINESS/INDUSTRIAL
TAX MAP PARCEL (39–1)(1–156)

NOTES:

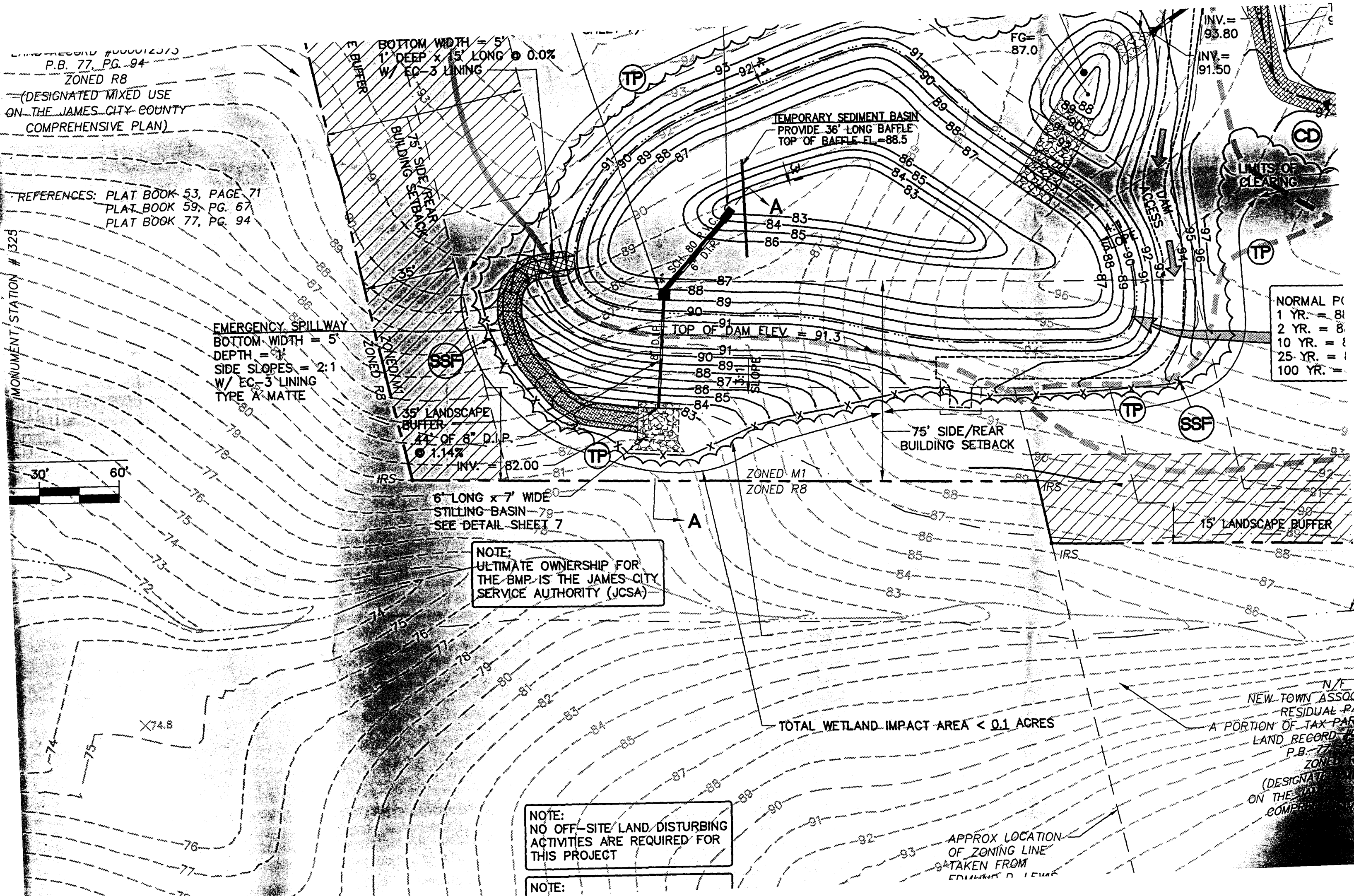
1. The Planning Director has granted a modification to Section 24-98 (a) of the James City County Zoning Ordinance to allow construction of the stormwater management facility within a portion of the 35-foot transitional buffer. Due to the reduced natural buffer in the area adjacent to the stormwater management facility, any future plans for a building on the site may require additional landscaping with particular attention to the materials used adjacent to the building.

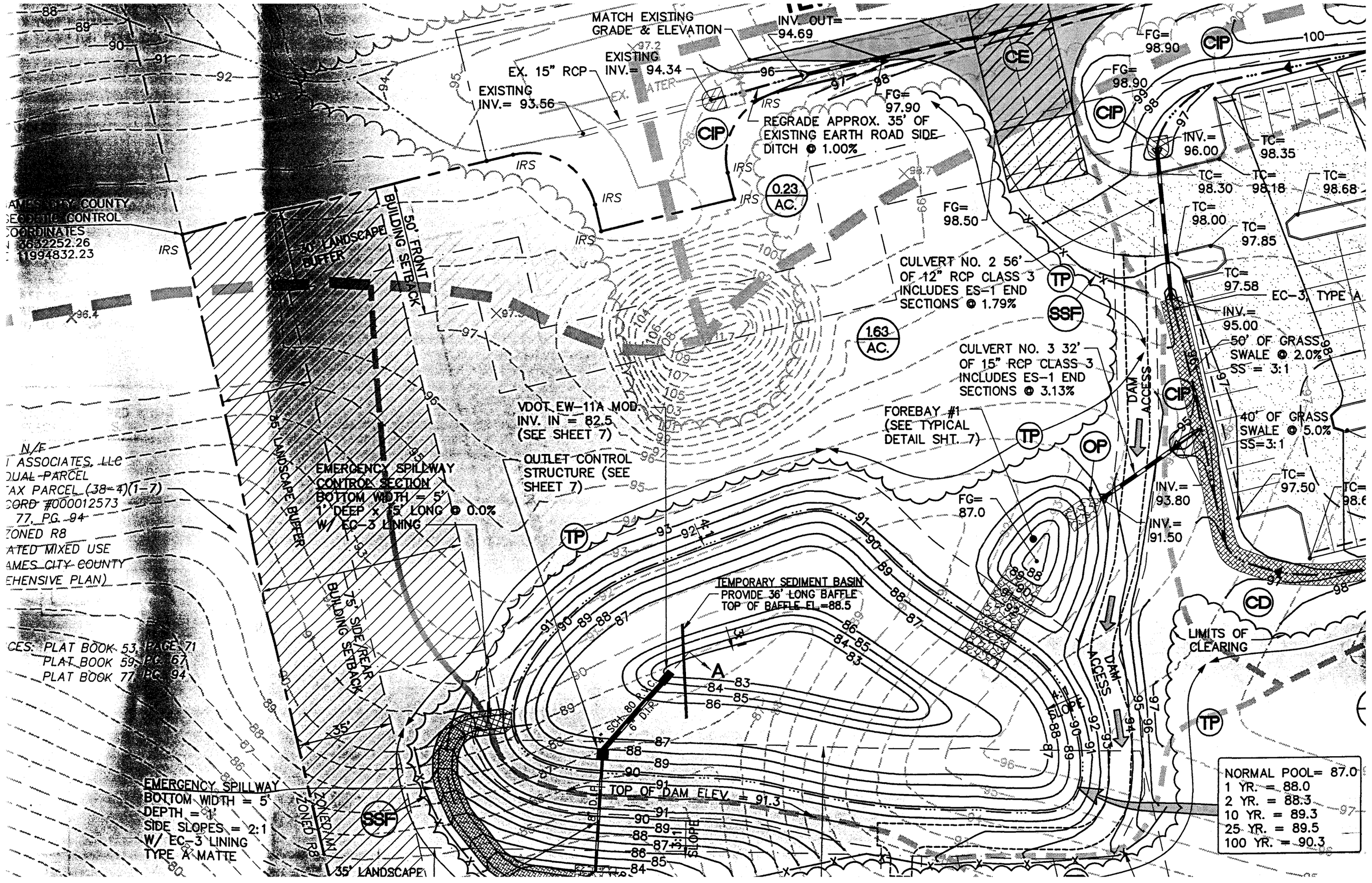
2. The stormwater management facility shown on Drawing #5, Landscape and Lighting Plan, is the design which was reviewed and approved by the Environmental Division.

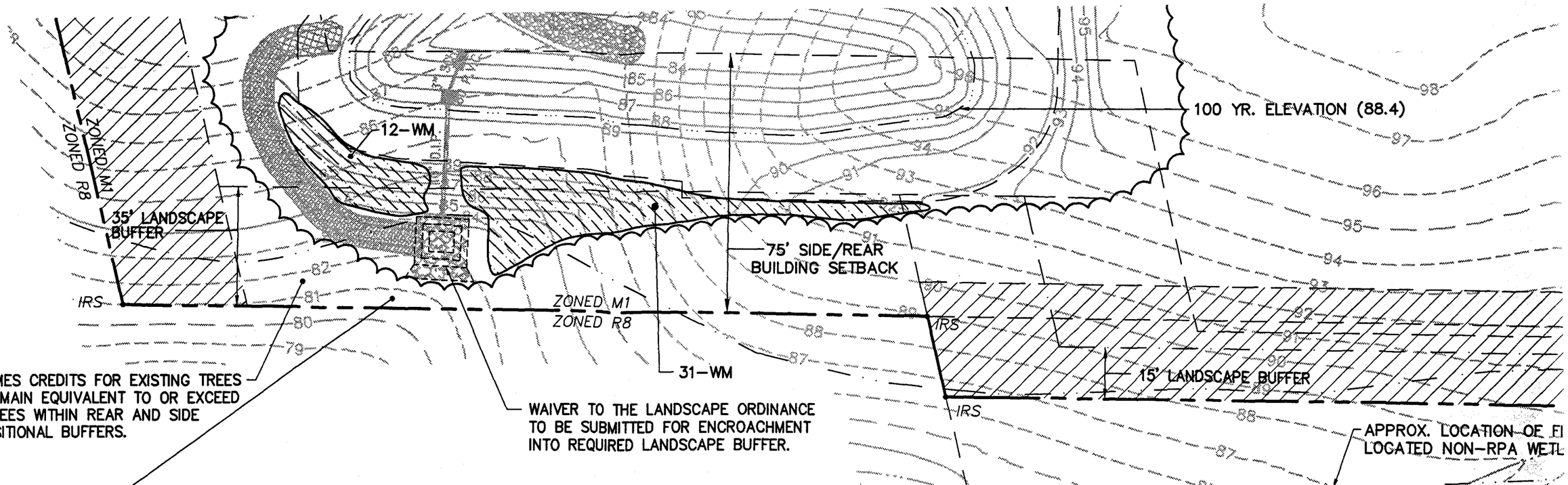
SP-143-00

[redacted]

APPROVAL DATE	No.	DATE	REVISION / COMMENT / NOTE	BY
	1	1/11/01	REVISED PER JAMES CITY COUNTY COMMENT LETTER DATED 1/12/01	VMB


LAND RECORD #0000012575
P.B. 77, PG. 94
ZONED R8
(DESIGNATED MIXED USE ON THE JAMES CITY COUNTY COMPREHENSIVE PLAN)
REFERENCES: PLAT BOOK 53, PAGE 71
PLAT BOOK 59, PG. 67
PLAT BOOK 77, PG. 94
MONUMENT STATION # 325
BOTTOM WIDTH = 5'
1' DEEP x 15' LONG @ 0.0%
W/ EC-3 LINING
35' BUFFER
75' SIDE/REAR BUILDING SETBACK
TEMPORARY SEDIMENT BASIN
PROVIDE 36' LONG BAFFLE
TOP OF BAFFLE EL.=88.5
SCH. 80 P.V.C.
6" D.I.P.
8" D.I.P.
TOP OF DAM ELEV = 91.3
3:1 SLOPE
FG= 87.0
INV.= 93.80
INV.= 91.50
DAM ACCESS
LIMITS OF CLEARING
NORMAL P
1 YR. = 8
2 YR. = 8
10 YR. =
25 YR. =
100 YR. =
EMERGENCY SPILLWAY
BOTTOM WIDTH = 5'
DEPTH = 1'
SIDE SLOPES = 2:1
W/ EC-3 LINING
TYPE A MATTE
ZONED M1
ZONED R8
35' LANDSCAPE BUFFER
44' OF 8" D.I.P.
@ 1.14%
INV. = 82.00
6" LONG x 7' WIDE
STILLING BASIN
SEE DETAIL SHEET 7
75' SIDE/REAR BUILDING SETBACK
15' LANDSCAPE BUFFER
IRS
TP
SSF
CD
A
30'
60'
NOTE:
ULTIMATE OWNERSHIP FOR THE BMP IS THE JAMES CITY SERVICE AUTHORITY (JCSA)
TOTAL WETLAND IMPACT AREA < 0.1 ACRES
NOTE:
NO OFF-SITE LAND DISTURBING ACTIVITIES ARE REQUIRED FOR THIS PROJECT
NOTE:
N/F
NEW TOWN ASSOC
RESIDUAL P
A PORTION OF TAX PAR
LAND RECORD
P.B. 77
ZONE
(DESIGNA
ON THE
COMPR
APPROX LOCATION OF ZONING LINE TAKEN FROM
X74.8


MATCH EXISTING GRADE & ELEVATION
INV. OUT= 94.69
EXISTING INV.= 94.34
EX. 15" RCP
EXISTING INV.= 93.56
REGRADE APPROX. 35' OF EXISTING EARTH ROAD SIDE DITCH @ 1.00%
FG= 97.90
FG= 98.50
FG= 98.90
FG= 98.90
INV.= 96.00
TC= 98.35
TC= 98.30
TC= 98.18
TC= 98.68
TC= 98.00
TC= 97.85
TC= 97.58
EC-3, TYPE A
INV.= 95.00
50' OF GRASS SWALE @ 2.0% SS = 3:1
40' OF GRASS SWALE @ 5.0% SS=3:1
TC= 97.50
INV.= 93.80
INV.= 91.50
FG= 87.0
CULVERT NO. 2 56' OF 12" RCP CLASS 3 INCLUDES ES-1 END SECTIONS @ 1.79%
CULVERT NO. 3 32' OF 15" RCP CLASS 3 INCLUDES ES-1 END SECTIONS @ 3.13%
FOREBAY #1 (SEE TYPICAL DETAIL SHT. 7)
DAM ACCESS
LIMITS OF CLEARING
0.23 AC.
1.63 AC.
50' FRONT BUILDING SETBACK
10' LANDSCAPE BUFFER
35' LANDSCAPE BUFFER
75' SIDE/REAR BUILDING SETBACK
VDOT EW-11A MOD. INV. IN = 82.5 (SEE SHEET 7)
OUTLET CONTROL STRUCTURE (SEE SHEET 7)
EMERGENCY SPILLWAY CONTROL SECTION BOTTOM WIDTH = 5' 1' DEEP x 15' LONG @ 0.0% W/ EC-3 LINING
TEMPORARY SEDIMENT BASIN PROVIDE 36' LONG BAFFLE TOP OF BAFFLE EL.=88.5
SCH. 80 P.V.C. 6" DIA.
TOP OF DAM ELEV = 91.3
EMERGENCY SPILLWAY BOTTOM WIDTH = 5' DEPTH = 1' SIDE SLOPES = 2:1 W/ EC-3 LINING TYPE A MATTE
NORMAL POOL= 87.0
1 YR. = 88.0
2 YR. = 88.3
10 YR. = 89.3
25 YR. = 89.5
100 YR. = 90.3
N/F
ASSOCIATES, LLC
DUAL PARCEL
AX PARCEL (38-4)(1-7)
CORD #000012573
77, PG. 94
ZONED R8
ATED MIXED USE
AMES CITY COUNTY
EHENSIVE PLAN)
CES: PLAT BOOK 53, PAGE 71
PLAT BOOK 59, PG. 67
PLAT BOOK 77, PG. 94
ZONED M1
ZONED R8
CIP
CE
TP
SSF
OP
CD
IRS



N OF "BUFFER AREA TO REMAIN"

WING: THE TREE CANOPY
S CONSISTENT THROUGHOUT THIS
PE ARCHITECT OUTLINED IN THE
ICAL AREA AND COUNTED 8
R GREATER DIAMETER), 3
REES OF 3" DIAMETER AND 5
ENTAL TREES. ASSUMING THE
TENT THE AREA OF TREES TO
) CONTAINS 12 MATURE TREES,
TREES @ 3" DIAMETER AND 7
ENTALS. THE REQUIRED TREE
ITY GUIDELINES FOR THE BUFFER
WOULD BE 15 TREES. THIS
EXISTING TREES TO REMAIN
MENTS FOR THE AFFECTED
SHRUBS HAVE BEEN ADDED PER
IES CITY COUNTY PLANNING.

STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT IN TO THE FACTILITY, 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 OF THESE NEWLY DISTRIBUTED AREAS AS WELL AS INSPECTIONS FOR ACCUMULATED SEDIMENTS AT TWO BMP FACILITY.

A DESIGNATED REPRESENTATIVE OF THE OWNER WILL INSPECT THE BMP STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING WORKING DAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF 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. KEYS TO LOCKED ACCESS POINTS SHALL BE MADE AVAILABLE TO COUNTY INSPECTION PERSONNEL UPON REQUEST.

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

1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. SEDIMENT REMOVAL IS REQUIRED USING A RUBBER-WHEELED BACKHOE. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, THE RISER BOTTOM AND OUTLET PIPE SHALL BE CLEANED OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA. SEDIMENT SHALL NOT BE ALLOWED TO ACCUMULATE IN DEPTHS GREATER THAN 1-FOOT. NO SEDIMENT SHALL BE ALLOWED TO ACCUMULATE TO PREVENT THE PROPER FUNCTION OF ANY PIPE OR CULVERT.

2. PERFORM MAINTENANCE MOWING OF GRASSED AREAS AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ON ANY PART OF THE GRADED EMBANKMENT.

3. PERFORM SOIL SAMPLING ON STABILIZED BMP SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.

4. IN STABILIZED BMP AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACES, LIME 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 SURFACES, LIME FERTILIZE AND OVERSEED IN ACCORDANCE WITH CURRENT SEEDLING RECOMMENDATIONS.

5. PERFORM QUARTERLY INSPECTIONS OF THE RELEASE STRUCTURES, 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. DURING QUARTERLY INSPECTIONS, THE POND DRAIN VALVE, USUALLY LEFT IN THE VALVE "CLOSED" POSITION, SHALL BE INSPECTED AND OPERATED THROUGH TWO COMPLETE FULL-OPEN TO FULL-CLOSE TO FULL-OPEN CYCLES.

6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, ORIFICE/ WEIR(S), OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE CONTINUED INTEGRITY OF THE STRUCTURE.

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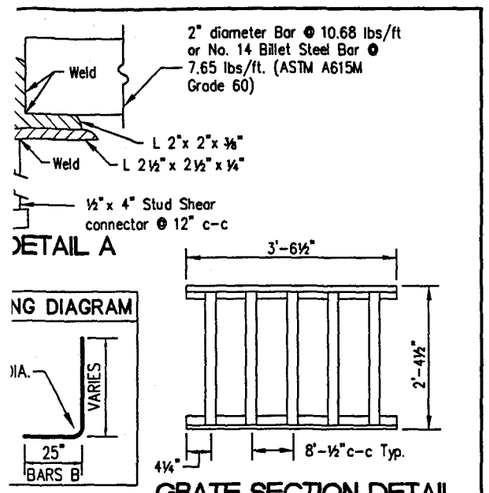
FACILITY

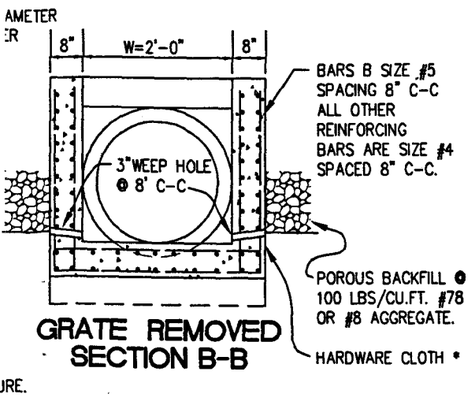
INTO EARTH SURFACE

MEASURES UPON SITE STABILIZATION. INSTALL ALL PERMANENT SEEDING,
AFTER OBTAINING J.C.C. ENVIRONMENTAL DIVISON APPROVAL.

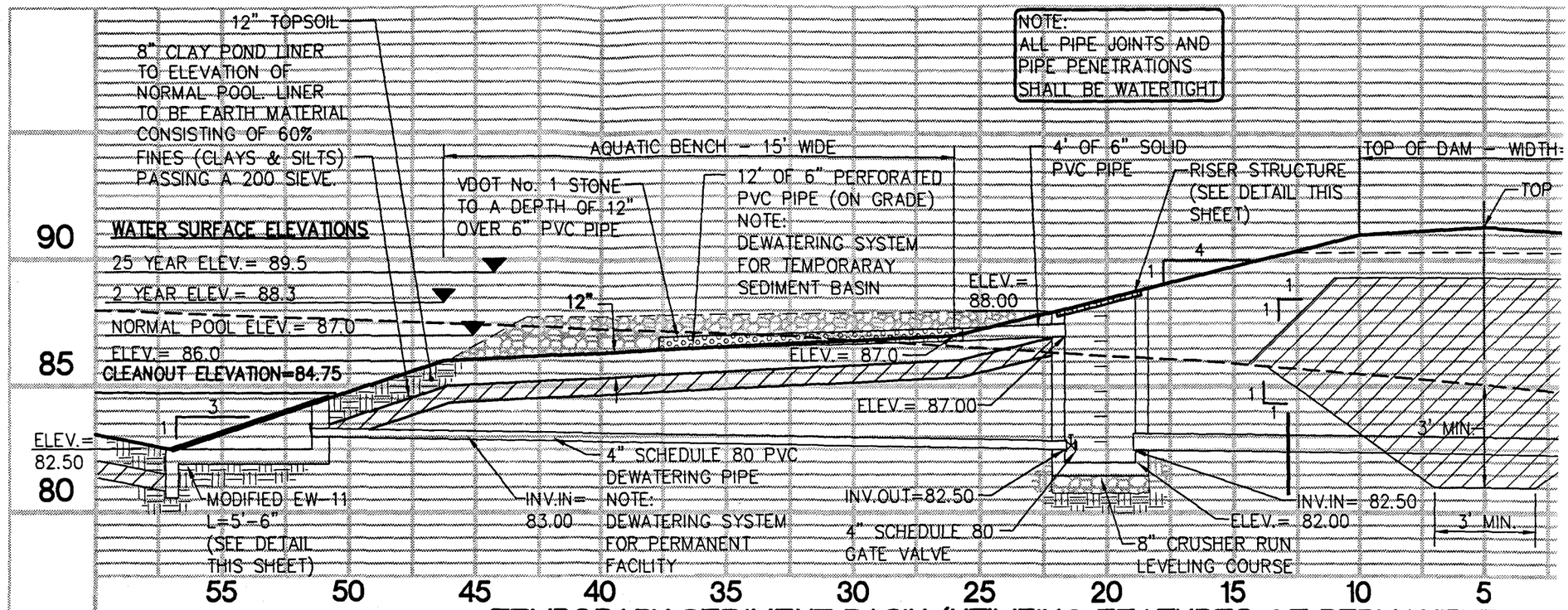
TAIL



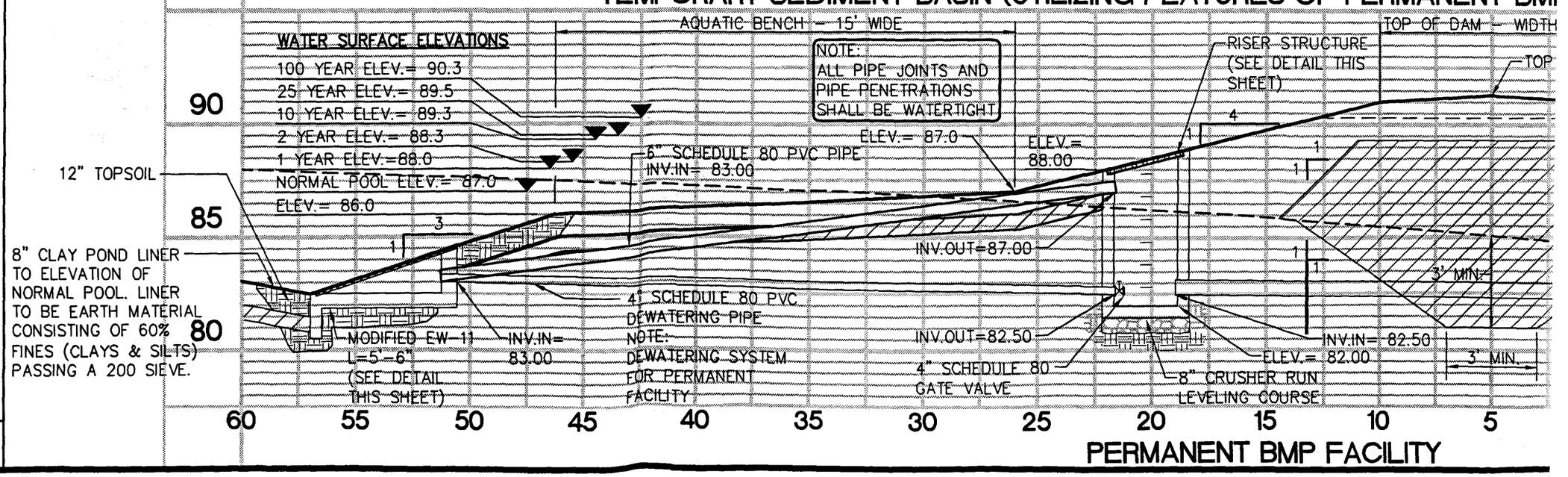
CONCRETE TO BE CLASS A3. FOR PRECAST USE 4,000 PSI MIN.
TO HAVE A MINIMUM 1" COVER.
DIMENSIONS AND QUANTITIES SEE SHEET 3 OF 3.
PRECAST OR CAST IN PLACE.
E, STRUCTURAL TUBING, AND RELATED HARDWARE TO BE GALV.
DIMENSIONS AND QUANTITIES SEE SHEET 3 OF 3.
O BE INSTALLED SO THE GRATE CONFIGURATION IS ALWAYS
THE EDGE OF SHOULDER.



ING GRATE EW-11A



TEMPORARY SEDIMENT BASIN (UTILIZING FEATURES OF PERMANENT BMI



PERMANENT BMP FACILITY

AFTER OBTAINING D.C.C. ENVIRONMENTAL DIVISION APPROVAL.

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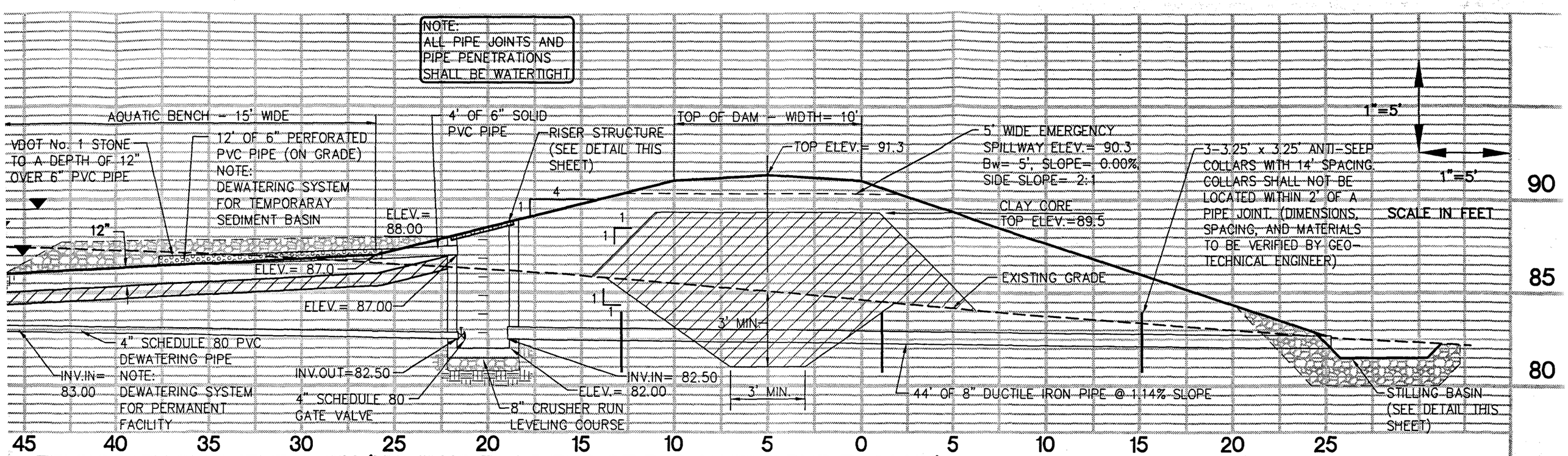
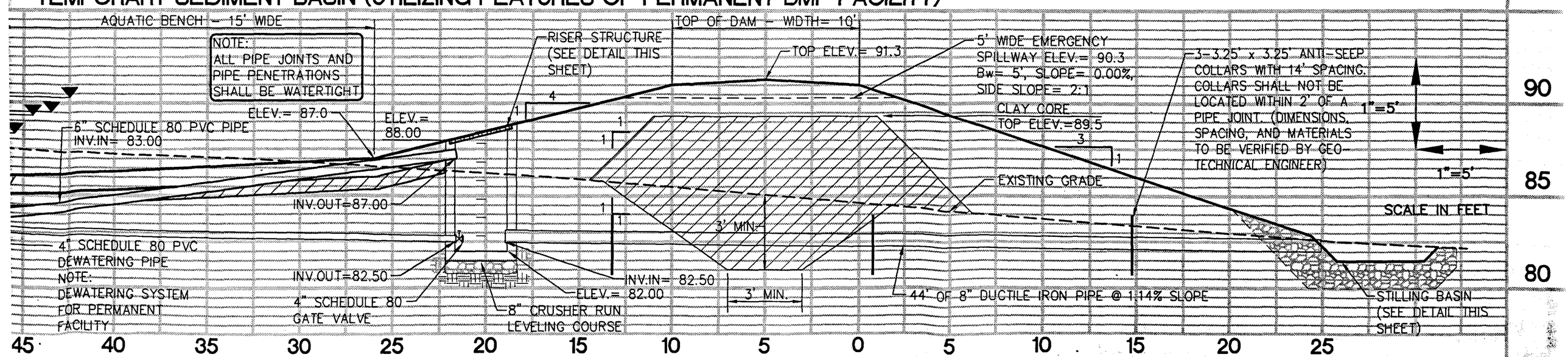


TEMPORARY SEDIMENT BASIN (UTILIZING FEATURES OF PERMANENT BMP FACILITY)



PERMANENT BMP FACILITY

NERAL NOTES FOR CONSTRUCTION OF STORMWATER BASINS

:ONTRACTOR SHALL PROVIDE ALL WORK AND MATERIALS NEEDED
STRUCT THE STORMWATER BASIN, STORMWATER
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AND SEDIMENT TRAPS. THE WORK SHALL INCLUDE ALL LABOR,
LS, EQUIPMENT AND MATERIALS NEEDED FOR THE
TION OF GRADING AND EARTHWORK ASSOCIATED WITH THE
JCTION.

CONTRACTOR SHALL CONSULT AND PROVIDE FOR THE SERVICES
EOTECHNICAL ENGINEER. THE GEOTECHNICAL ENGINEER SHALL
TEST RESULTS ON PLACED DAM MATERIALS, IDENTIFYING
ASSIFICATION, PERMEABILITY, PLASTICITY INDEX, AND
TION. ALL TESTS SHALL BE IN CONFORMANCE WITH ASTM
RDS. THE COST OF THE SERVICES OF THE GEOTECHNICAL
R SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
CTORY GEOTECHNICAL REULTS ARE NEEDED PRIOR TO FINAL APPROVAL.

INSPECTIONS REQUIRED FOR THE WORK SHALL BE PERFORMED BY
ECHNICAL ENGINEER AT THE EXPENSE OF THE GENERAL
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SITE EXCAVATED MATERIAL, IF DETERMINED SUITABLE FOR USE IN
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M CONSTRUCTION. SHOULD ADDITIONAL MATERIAL BE
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AL DETERMINED BY THE GEOTECHNICAL ENGINEER TO BE
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CKFILLING SHALL EITHER BE DEPOSITED ON SITE AND SPREAD
CONTRACTOR, OR SHALL BE DEPOSITED IN AN AREA ON THE
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JRES NEEDED TO CONTROL AS PER THE VESCH THIRD EDITION.

ERCUT FOR THE FOUNDATION OF THE DAM EMBANKMENT SHALL
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4. IN STABILIZED BMP 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 RELEASE STRUCTURES, 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. DURING QUARTERLY INSPECTIONS, THE POND DRAIN VALVE, USUALLY LEFT IN THE VALVE "CLOSED" POSITION, SHALL BE INSPECTED AND OPERATED THROUGH TWO COMPLETE FULL-OPEN TO FULL-CLOSE TO FULL-OPEN CYCLES.

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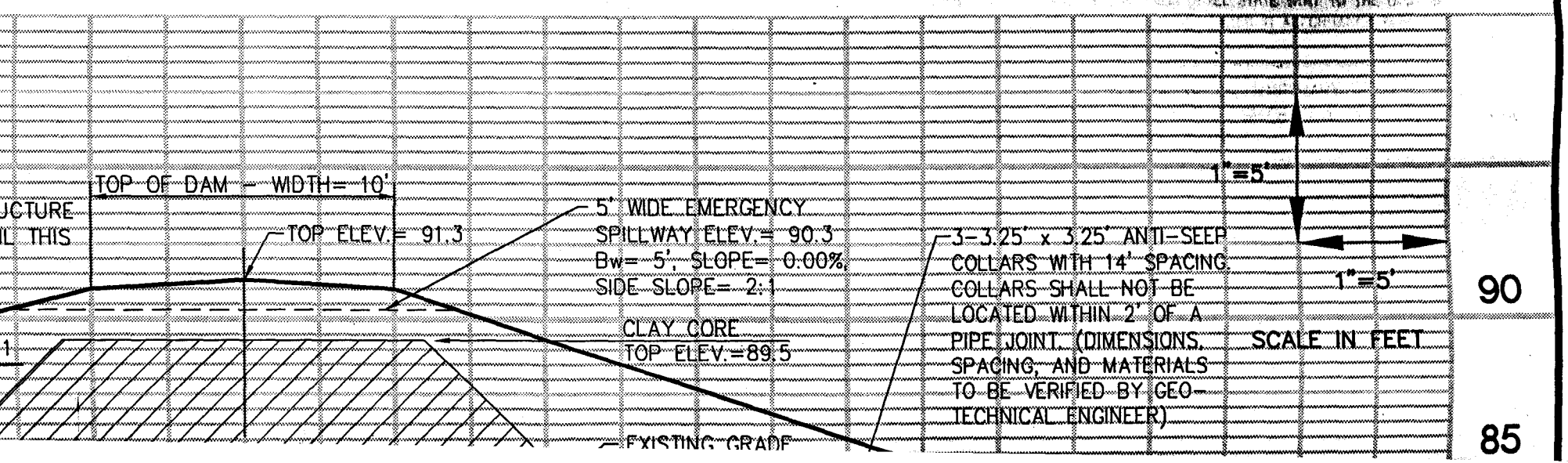
7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE FACILITY FOR SIGNS OF ANIMAL/ RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE [illegible] MANUFACTURER'S INSTRUCTIONS. NO SLOPE SHALL BE CREATED [illegible]

8. RECORD KEEPING. THE LANDOWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OR INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/ OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.

9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.

[redacted]



N DETAIL S

EROSION AND SEDIMENT CONTROL NARRATIVE

PROJECT DESCRIPTION

THIS PROJECT IS DESIGNED AS AN EXPANSION OF THE EXISTING JCSA OPERATIONS CENTER TO THE WEST OF THE SITE, CONTAINING A PARKING LOT . THE ADDRESS FOR THE PROJECT IS 107 TEWNING ROAD.

EXISTING SITE CONDITIONS

THE SITE FOR THIS SUBDIVISION IS PRESENTLY WOODED WITH MODERATELY SLOPING LANDFORMS. WOODED RAVINES EXIST TO THE SOUTHWEST.
WETLAND AREAS ARE LOCATED TO THE SOUTH OF THE SITE. THE EXISTING JCSA OPERATIONS CENTER SITE IS CURRENTLY LOCATED TO THE EAST.

ADJACENT PROPERTY

THE SITE FOR THESE IMPROVEMENTS IS LOCATED ADJACENT TO THE NEW TOWN PLANNED DEVELOPMENT, TO THE WEST AND SOUTH. THE EXISTIND JCSA OPERATIONS CENTER, TO THE EAST. TEWNING ROAD TO THE NORTH.

CRITICAL EROSION AREAS

CRITICAL EROSION AREAS, OR HIGHLY ERODIBLE AREAS HAVE BEEN IDENTIFIED ON SHEET 2 OF THE PLAN SET.

PRACTICES USED IN THESE PLANS

THE FOLLOWING EROSION AND SEDIMENT CONTROL PRACTICES ARE TO BE UTILIZED DURING CONSTRUCTION:

TREE PROTECTION – TO BE INSTALLED PRIOR TO ANY GRADING AND LAND DISTURBING ACTIVITIES

TEMPORARY SEDIMENT BASINS – ONE IS REQUIRED FOR THIS SITE. THE SEDIMENT BASIN IS TO BE CONSTRUCTED ACROSS A NATURAL SWALE, DETAILS INDICATING THE DIMENSIONS OF THESE FACILITIES ARE SHOWN ON THE PLANS.

OUTLET PROTECT – CLASS 1 RIP-RAP SHALL BE UTILIZED IN ALL STILLING BASINS AND STORM SEWER OUTFALLS

SILT FENCE – SILT FENCE BARRIERS SHALL BE INSTALLED AT ALL DOWNSTREAM LOCATIONS OF GRADING AND LAND DISTURBING ACTIVITIES

TEMPORARY CONSTRUCTION ENTRANCE – A STONE TEMPORARY CONSTRUCTION ENTRANCE IS PROVIDED AT THE ENTRANCE TO THE SITE. THE TRACKING OF MUD AND DEBRIS FROM THE SITE BY CONSTRUCTION EQUIPMENT SHALL NOT BE PERMITTED.

CULVERT INLET PROTECTION – CULVERT INLET PROTECTION SHALL BE INSTALLED AT THE INLETS OF ALL CULVERTS

ROCK CHECK DAMS – CHECK DAMS SHALL BE PROVIDED IN ALL ROADSIDE DITCHES AT 100-FOOT INTERVALS

PERMANENT SEEDING – PERMANENT SEEDING SHALL BE APPLIED TO ALL DENUDED AREAS AFTER FINAL GRADING AND TOPSOILING HAS BEEN COMPLETED

ALL EROSION AND SEDIMENT CONTROL MEASURES, WHETHER STRUCTURAL OR NON-STRUCTURAL, SHALL BE MAINTAINED BY THE CONTRACTOR. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE THE EROSION AND SEDIMENT CONTROL MEASURES ARE FUNCTIONAL UNTIL THE ENTIRE SITE HAS BEEN PERMANENTLY STABILIZED.

SEQUENCE OF CONSTRUCTION

1 – CLEAR PERIMETER, (THE NEW PARKING LOT, MATERIALS STORAGE LOT, AND BMP), THEN INSTALL TREE PROTECTION AND SILT FENCE.

2 – INSTALL STONE CONSTRUCTION ENTRANCE (NEW PARKING LOT).

3 – STRIP TOPSOIL FROM CLEARED AREAS FOR EARTHWORK OPERATIONS, AND STOCKPILE ON SITE AS INDICATED ON THE PLAN. CONSTRUCT TEMPORARY SEDIMENT BASIN IN CONJUNCTION WITH THE EARTHWORKS OPERATIONS.

4 – CONTINUE SITE EARTHWORK OPERATIONS (SUB-GRADE GRADING); INSTALL DRIVEWAY CULVERTS.

5 – COMPLETE PARKING CONSTRUCTION WITH FINE GRADING, CEMENT TREATED AGGREGATE (CTA) FINAL SURFACE.

6 – TOPSOIL DENUDED AREAS AND PERMANENTLY SEED.

7 – REMOVE ALL ACCUMULATED SEDIMENT IN TEMPORARY SEDIMENT BASIN CONSTRUCT PERMANENT MODIFICATION TO BMP. REMOVE EROSION CONTROL MEASURES UPON SITE STABILIZATION. INSTALL ALL PERMANENT STILLING, AFTER OBTAINING J.C.C. ENVIRONMENTAL DIVISON APPROVAL.

GENERAL NOTES FOR CONSTRUCTION OF STORMWATER BASINS

1. THE CONTRACTOR SHALL PROVIDE ALL WORK AND MATERIALS NEEDED TO CONSTRUCT THE STORMWATER BASIN, STORMWATER MANAGEMENT PONDS, BEST MANAGEMENT PRACTICES, SEDIMENT BASINS AND SEDIMENT TRAPS. THE WORK SHALL INCLUDE ALL LABOR, MATERIALS, EQUIPMENT AND MATERIALS NEEDED FOR THE COMPLETION OF GRADING AND EARTHWORK ASSOCIATED WITH THE CONSTRUCTION.

2. THE CONTRACTOR SHALL CONSULT AND PROVIDE FOR THE SERVICES OF A GEOTECHNICAL ENGINEER. THE GEOTECHNICAL ENGINEER SHALL PROVIDE TEST RESULTS ON PLACED DAM MATERIALS, IDENTIFYING SOIL CLASSIFICATION, PERMEABILITY, PLASTICITY INDEX, AND COMPACTION. ALL TESTS SHALL BE IN CONFORMANCE WITH ASTM STANDARDS. THE COST OF THE SERVICES OF THE GEOTECHNICAL ENGINEER SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SATISFACTORY GEOTECHNICAL REULTS ARE NEEDED PRIOR TO FINAL APPRO

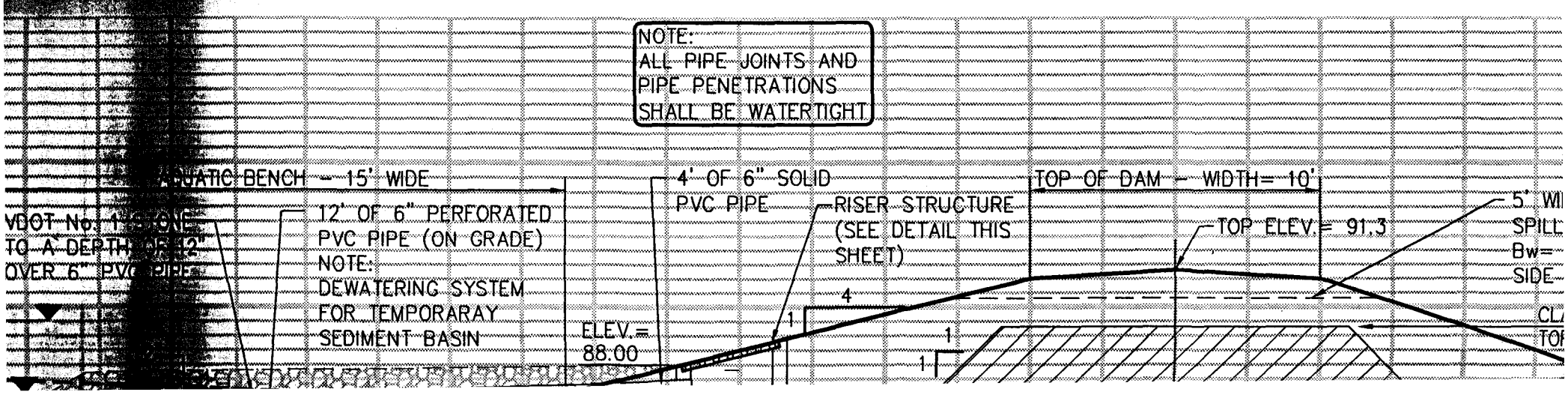
3. ALL INSPECTIONS REQUIRED FOR THE WORK SHALL BE PERFORMED BY A GEOTECHNICAL ENGINEER AT THE EXPENSE OF THE GENERAL CONTRACTOR.

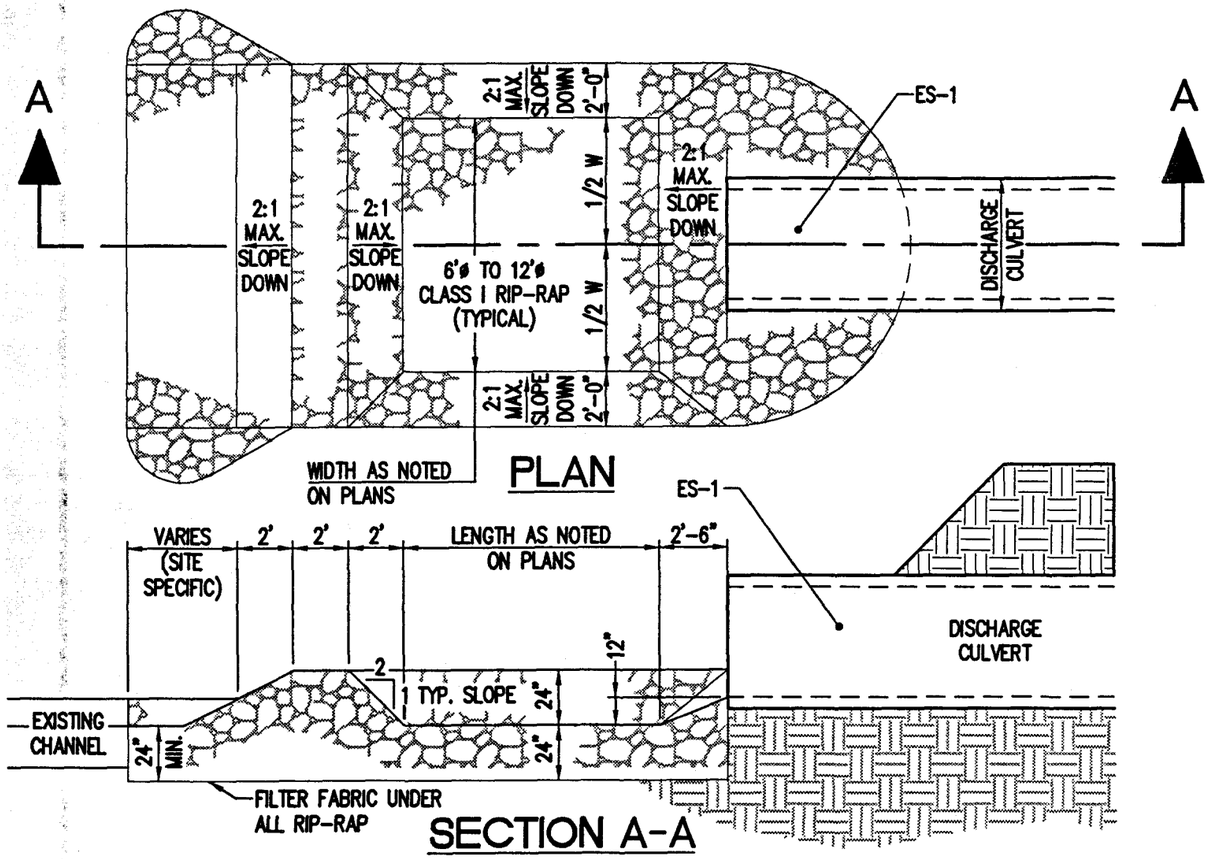
4. ON-SITE EXCAVATED MATERIAL, IF DETERMINED SUITABLE FOR USE IN DAM CONSTRUCTION BY A GEOTECHNICAL ENGINEER, MAY BE USED FOR DAM CONSTRUCTION. SHOULD ADDITIONAL MATERIAL BE REQUIRED, THE CONTRACTOR SHALL IDENTIFY THE NEED FOR MATERIAL TO THE OWNER, AS ADDITIONAL BORROW MATERIAL MAY BE AVAILABLE ON THE STONEHOUSE PROPERTY. ALL EXCAVATED MATERIAL DETERMINED BY THE GEOTECHNICAL ENGINEER TO BE UNSUITABLE SHALL BE DISPOSED OF PROPERLY AT THE CONTRACTOR'S EXPENSE. ALL EXCAVATED MATERIAL NOT REQUIRED FOR BACKFILLING SHALL EITHER BE DEPOSITED ON SITE AND SPREAD BY THE CONTRACTOR, OR SHALL BE DEPOSITED IN AN AREA ON THE SITE AS DIRECTED BY THE OWNER. THE CONTRACTOR SHALL PROVIDE PROPER STABILIZATION, AND EROSION AND SEDIMENT CONTROL MEASURES NEEDED TO CONTROL AS PER THE VESCH THIRD EDITION.

5. UNDERCUT FOR THE FOUNDATION OF THE DAM EMBANKMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. THE FOUNDATION SHALL BE BACKFILLED WITH SOILS CLASSIFIED AS SM, SC, OR CL UNDER THE UNIFIED SOIL CLASSIFICATION SYSTEM. SOILS SHALL HAVE A MINIMUM OF 15% BY WEIGHT FINES, HAVING A PLASTICITY INDEX OF 30% AND A PERMEABILITY OF 0.0004 IN./SEC. OR LESS. FILL SHALL BE COMPACTED IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO A DRY DENSITY OF 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). EXCAVATION FOR THE DAM KEY SHALL BE IN ACCORDANCE TO THE GEOTECHNICAL ENGINEER'S RECOMMENDATION. HEIGHT, DEPTH, AND WIDTH OF THE KEY SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. THE KEY SHALL BE FORMED USING SOILS CLASSIFIED AS SC OR CL, WITH A PERMEABILITY OF 0.0004 IN./SEC. OR LESS.

6. THE DAM CORE SHALL BE AS CONSTRUCTED WITH NON-EXPANSIVE SC OR CL CLAYEY MATERIAL WITH PERMEABILITY OF 0.0004 IN./SEC. OR LESS. THE FILL OF THE CORE SHALL BE MADE IN 12-INCH LIFTS, OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER, TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D-698). SIZE, SHAPE, WIDTH, DEPTH, AND HEIGHT OF THE DAM CORE SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS. TO COVER THE DAM CORE, A SILTY FINE SAND OR CLAYEY SOIL (SM, SC, OR CL) SHALL BE PLACED. A VEGETATIVE COVER USING VDOT EC-2 EROSION CONTROL BLANKETS SHALL BE PLACED ON DAM SLOPES AND CREST TO PREVENT EROSION.

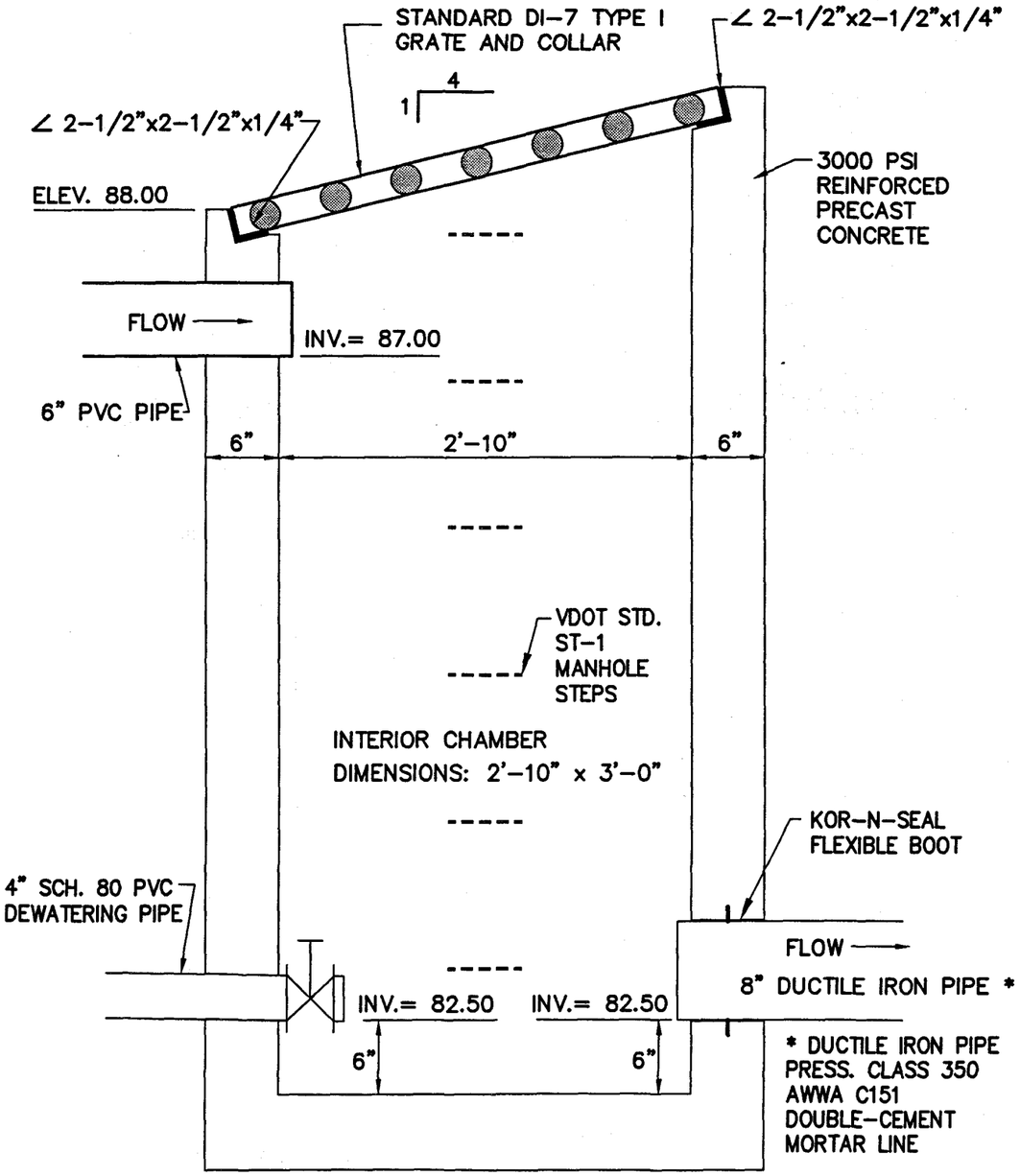
7. UPON COMPLETION, THE CONSTRUCTION OF THE THE DAM WILL BE CERTIFIED BY A GEOTECHNICAL ENGINEER WHO HAS INSPECTED THE STRUCTURE DURING CONSTRUCTION.





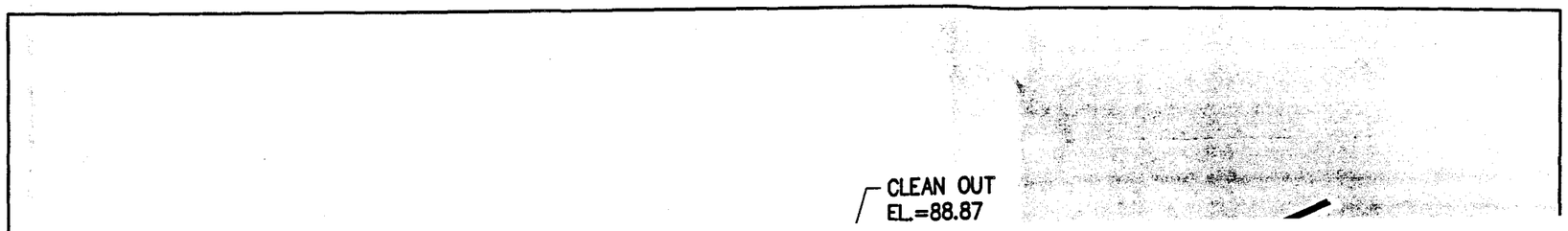
STILLING BASIN DETAIL

NOT TO SCALE



OUTLET CONTROL STRUCTURE DETAIL

SCALE: 1" = 1'-0"



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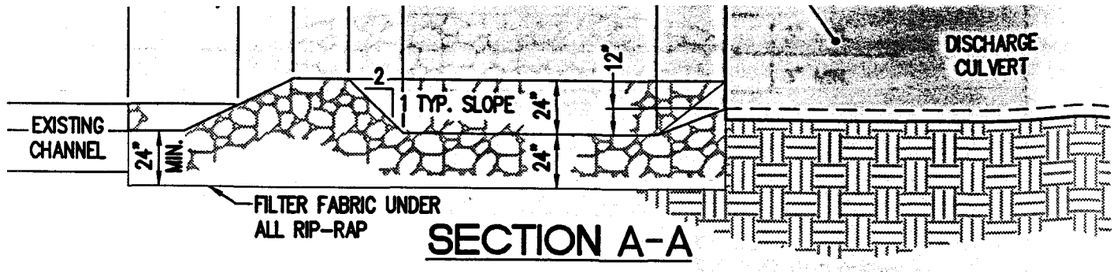

SECTION A-A

STILLING BASIN DETAIL

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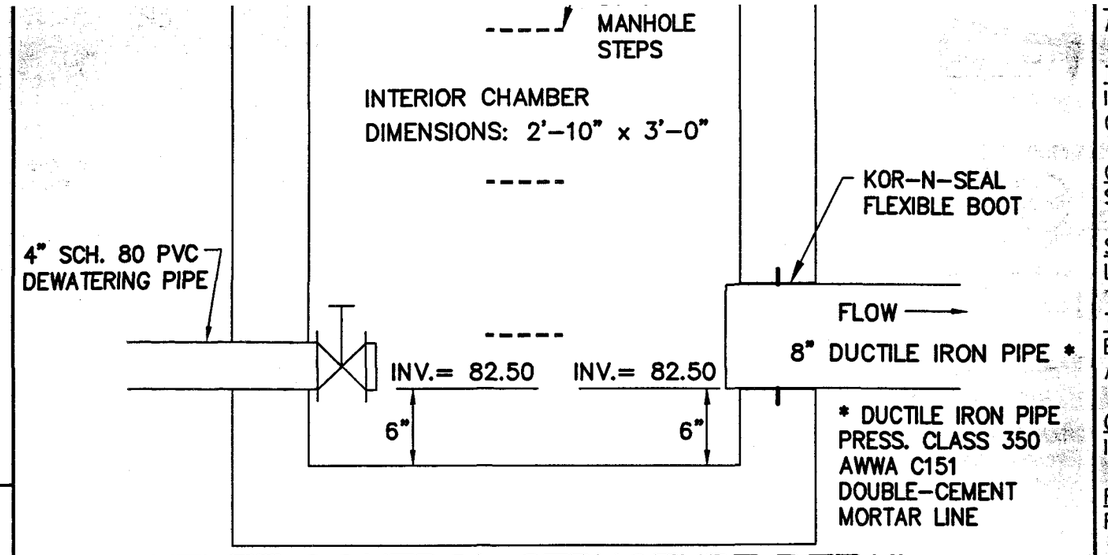
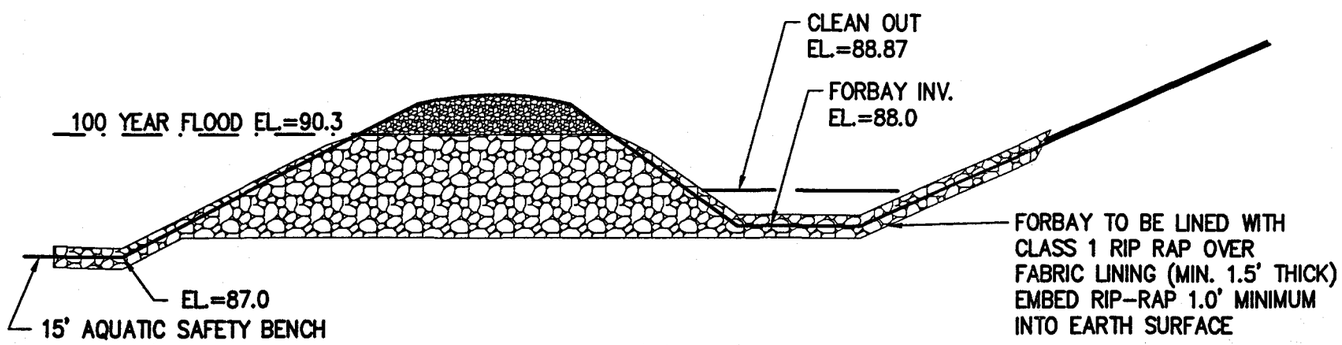


OUTLET CONTROL STRUCTURE DETAIL

SCALE: 1" = 1'-0"



TYPICAL FOREBAY RIPRAP DETAIL

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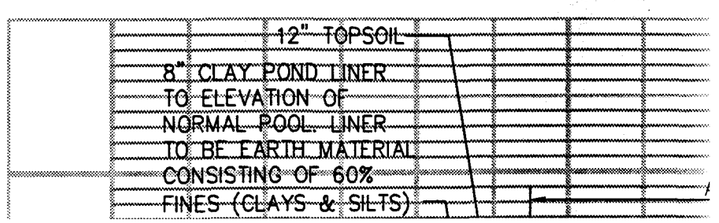
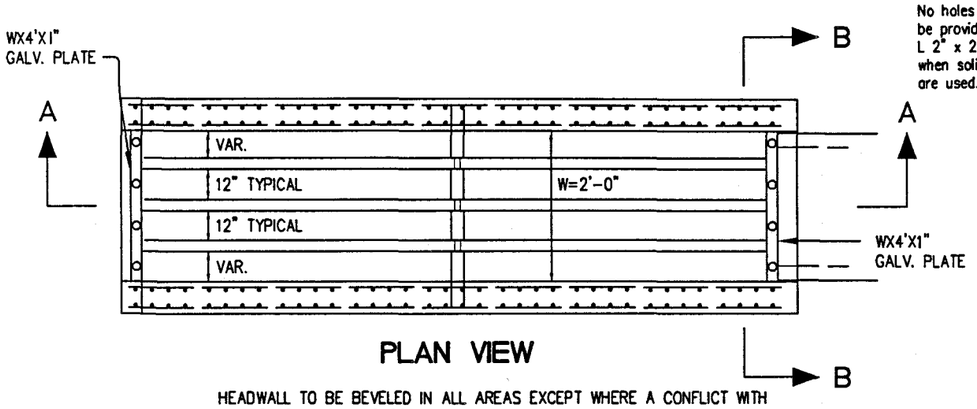


TYPICAL FOREBAY RIPRAP DETAIL

N.T.S.

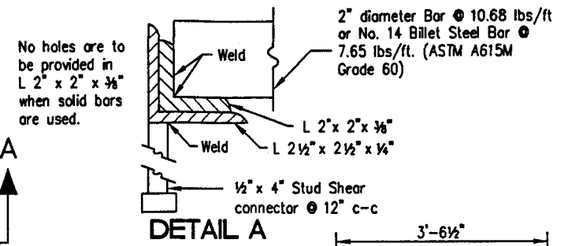
EW-11



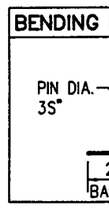
PLAN VIEW

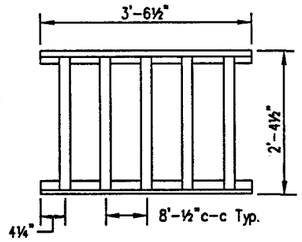
HEADWALL TO BE BEVELED IN ALL AREAS EXCEPT WHERE A CONFLICT WITH INVERT OR WINGWALLS OCCUR.
BEVEL EDGE IS REQUIRED ON THE HEADWALL AT THE INLET AND OF THE CULVERT (WHERE THE FLOW ENTERS THE CULVERT).
HEADWALL AT THE OUTLET END OF THE CULVERT MAY BE EITHER SQUARE EDGE OR BEVEL EDGE.

* SLOPE AS SPECIFIED ON TYPICAL SECTION.



DETAIL A

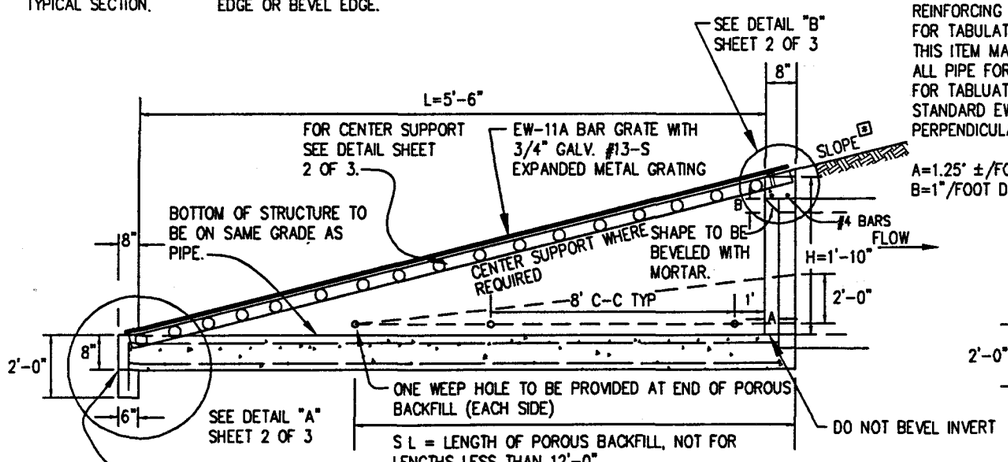




GRATE SECTION DETAIL

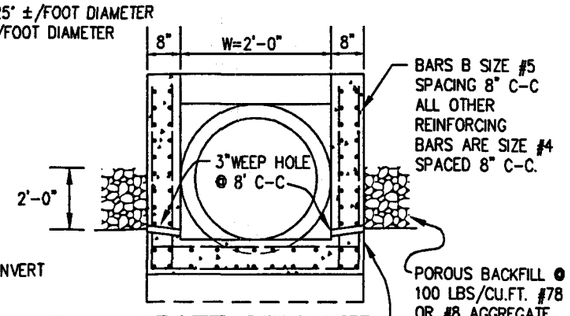
NOTES

ALL CAST IN PLACE CONCRETE TO BE CLASS A3. FOR PRECAST USE 4,000 PSI MIN.
REINFORCING STEEL TO HAVE A MINIMUM 1" COVER.
FOR TABULATION OF DIMENSIONS AND QUANTITIES SEE SHEET 3 OF 3.
THIS ITEM MAY BE PRECAST OR CAST IN PLACE.
ALL PIPE FOR GRATE, STRUCTURAL TUBING, AND RELATED HARDWARE TO BE GALV.
FOR TABLUATION OF DIMENSIONS AND QUANTITIES SEE SHEET 3 OF 3.
STANDARD EW-11 TO BE INSTALLED SO THE GRATE CONFIGURATION IS ALWAYS PERPENDICULAR TO THE EDGE OF SHOULDER.



SECTION A-A

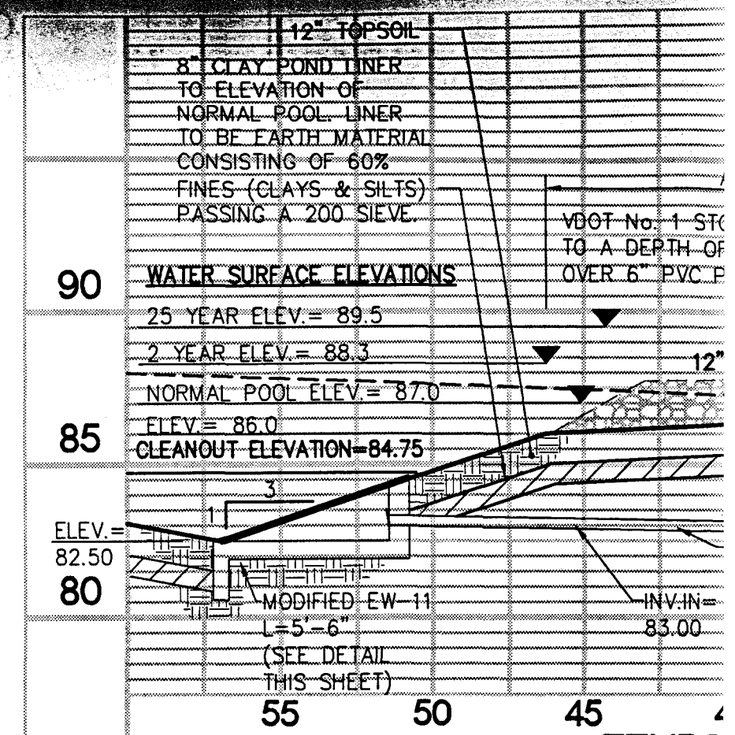
A=1.25' ±/FOOT DIAMETER
B=1"/FOOT DIAMETER

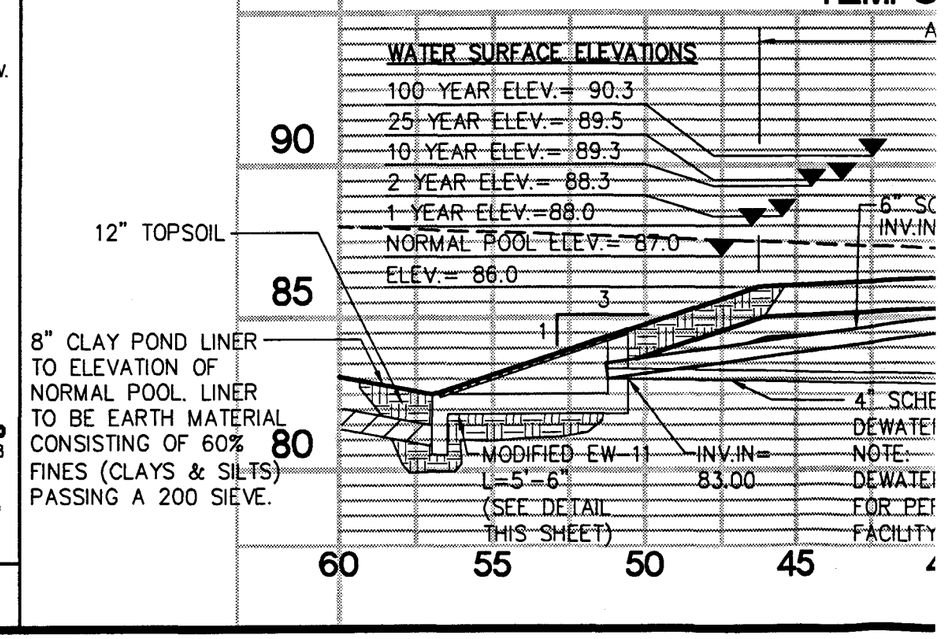


GRATE REMOVED
SECTION B-B

☆ WEEP HOLE WITH 12"X12" PLASTIC HARDWARE CLOTH MESH OR GALVANIZED STEEL WIRE, MIN WIRE DIA 0.03INCH. NUMBER 4 MESH HARDWARE CLOTH ANCHORED FIRMLY TO OUTSIDE OF STRUCTURE.

PIPE ENDWALL (EW-11 MOD.) WITH LOAD - CARRYING GRATE EW-11A





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STANDARD
EROSION AND SEDIMENT CONTROL NOTES
FOR JAMES CITY COUNTY, VIRGINIA
REVISED 10/9/2000

THE PURPOSE OF THE EROSION CONTROL MEASURES SHOWN ON THESE PLANS SHALL BE TO PRECLUDE THE TRANSPORT OF ALL WATERBORNE SEDIMENTS RESULTING FROM CONSTRUCTION ACTIVITIES FROM ENTERING ONTO ADJACENT PROPERTIES OR STATE WATERS. IF FIELD INSPECTION REVEALS THE INADEQUACY OF THE PLAN TO CONFINE SEDIMENT TO THE PROJECT SITE, APPROPRIATE MODIFICATIONS WILL BE MADE TO CORRECT ANY PLAN DEFICIENCIES. IN ADDITION TO THESE NOTES, ALL PROVISIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS SHALL APPLY TO THIS PROJECT.

1. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE "VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK". THE CONTRACTOR SHALL BE THOROUGHLY FAMILIAR WITH ALL APPLICABLE MEASURES CONTAINED THEREIN WHICH MAY BE PERTINENT TO THIS PROJECT.

2. ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS SHALL BE PROTECTED BY A TEMPORARY CONSTRUCTION ENTRANCE TO PREVENT TRACKING OF MUD ONTO PUBLIC RIGHT-OF-WAYS. AN ENTRANCE PERMIT FROM VDOT IS REQUIRED PRIOR TO ANY CONSTRUCTION ACTIVITIES WITHIN STATE RIGHTS-OF-WAYS. WHERE SEDIMENT IS TRANSPORTED ONTO A PUBLIC ROAD SURFACE, THE ROAD SHALL BE THOROUGHLY CLEANED AT THE END OF EACH DAY.

3. A PRECONSTRUCTION MEETING SHALL BE HELD ON SITE BETWEEN THE COUNTY, THE DEVELOPER, THE PROJECT ENGINEER, AND THE CONTRACTOR PRIOR TO ISSUANCE OF THE LAND DISTURBING PERMIT. THE CONTRACTOR SHALL SUBMIT A SEQUENCE OF CONSTRUCTION TO THE COUNTY FOR APPROVAL PRIOR TO THE PRECONSTRUCTION MEETING. THE CONTRACTOR WILL SUPPLY THE ENVIRONMENTAL DIVISION WITH THE NAME OF THE INDIVIDUAL WHO WILL BE RESPONSIBLE FOR ENSURING MAINTENANCE OF INSTALLED MEASURES ON A DAILY BASIS.

4. SEDIMENT BASINS AND TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS AND OTHER MEASURES INTENDED TO TRAP SEDIMENT ON-SITE MUST BE CONSTRUCTED AS A FIRST STEP IN GRADING AND BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE. EARTHEN STRUCTURES SUCH AS DAMS, DIKES, AND DIVERSIONS MUST BE SEEDED AND MULCHED IMMEDIATELY AFTER INSTALLATION. PERIODIC INSPECTIONS OF THE EROSION CONTROL MEASURES SHALL BE MADE TO ASSESS THEIR CONDITION. ANY NECESSARY MAINTENANCE OF THE MEASURES SHALL BE ACCOMPLISHED IMMEDIATELY UPON NOTIFICATION BY THE COUNTY AND SHALL INCLUDE THE REPAIR OF MEASURES DAMAGED BY ANY SUBCONTRACTOR INCLUDING THOSE OF THE PUBLIC UTILITY COMPANIES.

5. SURFACE FLOWS OVER CUT AND FILL SLOPES SHALL BE CONTROLLED BY EITHER REDIRECTING FLOWS FROM TRANSVERSING THE SLOPES OR BY INSTALLING MECHANICAL DEVICES TO SAFELY LOWER WATER DOWNSLOPE WITHOUT CAUSING EROSION. A TEMPORARY FILL DIVERSION (STD. & SPEC. 3.10) SHALL BE INSTALLED PRIOR TO THE END OF EACH WORKING DAY.

6. SEDIMENT CONTROL MEASURES MAY REQUIRE MINOR FIELD ADJUSTMENTS AT TIME OF CONSTRUCTION TO INSURE THEIR INTENDED PURPOSE IS ACCOMPLISHED. ENVIRONMENTAL DIVISION APPROVAL WILL BE REQUIRED FOR OTHER DEVIATIONS FROM THE APPROVED PLANS.

7. THE CONTRACTOR SHALL PLACE SOIL STOCKPILES AT THE LOCATIONS SHOWN ON THIS PLAN OR AS DIRECTED BY THE ENGINEER. SOIL STOCKPILES SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. OFF-SITE WASTE OR BORROW AREAS SHALL BE APPROVED BY THE ENVIRONMENTAL DIVISION PRIOR TO THE IMPORT OF ANY BORROW OR EXPORT OF ANY WASTE TO OR FROM THE PROJECT SITE.

8. THE CONTRACTOR SHALL COMPLETE DRAINAGE FACILITIES WITHIN 30 DAYS FOLLOWING COMPLETION OF ROUGH GRADING AT ANY POINT WITHIN THE PROJECT. THE INSTALLATION OF DRAINAGE FACILITIES SHALL TAKE PRECEDENCE OVER ALL UNDERGROUND UTILITIES. OUTFALL DITCHES FROM DRAINAGE STRUCTURES SHALL BE STABILIZED IMMEDIATELY AFTER CONSTRUCTION OF SAME. THIS INCLUDES INSTALLATION OF EROSION CONTROL STONE OR PAVED DITCHES WHERE REQUIRED. ANY DRAINAGE OUTFALLS REQUIRED FOR A STREET MUST BE COMPLETED BEFORE STREET GRADING OR UTILITY INSTALLATION BEGINS.

9. PERMANENT OR TEMPORARY SOIL STABILIZATION MUST BE APPLIED TO ALL DENUDED AREAS WITHIN 7 DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. SOIL STABILIZATION MUST ALSO BE APPLIED TO DENUDED AREAS WHICH MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT (UNDISTURBED) FOR LONGER THAN 30 DAYS. SOIL STABILIZATION MEASURES INCLUDE VEGETATIVE ESTABLISHMENT, MULCHING AND THE EARLY APPLICATION OF GRAVEL BASE MATERIAL ON AREAS TO BE PAVED.

10. NO MORE THAN 300 FEET OF SANITARY SEWER, STORM SEWER, WATERLINES, OR UNDERGROUND UTILITY LINES ARE TO BE OPEN AT ONE TIME. FOLLOWING INSTALLATION OF ANY PORTION OF THESE ITEMS, ALL DISTURBED AREAS ARE TO BE IMMEDIATELY STABILIZED (I.E., THE SAME DAY).

11. IF DISTURBED AREA STABILIZATION IS TO BE ACCOMPLISHED DURING THE MONTHS OF DECEMBER, JANUARY, OR FEBRUARY, STABILIZATION SHALL CONSIST OF MULCHING IN ACCORDANCE WITH SPECIFICATION 3.35. SEEDING WILL THEN TAKE PLACE AS SOON AS THE SEASON PERMITS.

12. THE TERM SEEDING, FINAL VEGETATIVE COVER OR STABILIZATION, ON THIS SITE PLAN SHALL MEAN THE SUCCESSFUL GERMINATION AND ESTABLISHMENT OF A STABLE GRASS COVER FROM A PROPERLY PREPARED SEEDBED CONTAINING THE SPECIFIED AMOUNTS OF SEED, LIME, AND FERTILIZER IN ACCORDANCE WITH SPECIFICATION 3.32, PERMANENT SEEDING. IRRIGATION SHALL BE REQUIRED AS NECESSARY TO ENSURE ESTABLISHMENT OF GRASS COVER.

13. ALL SLOPES STEEPER THAN 3:1 SHALL REQUIRE THE USE OF EROSION CONTROL BLANKETS SUCH AS EXCELSIOR BLANKETS TO AID IN THE ESTABLISHMENT OF A VEGETATIVE COVER. INSTALLATION SHALL BE IN ACCORDANCE WITH SPECIFICATION 3.35, MULCHING AND MANUFACTURER'S INSTRUCTIONS. NO SLOPES SHALL BE CREATED STEEPER THAN 2:1.

14. INLET PROTECTION IN ACCORDANCE WITH SPECIFICATION 3.07 SHALL BE PROVIDED FOR ALL STORM DRAIN INLETS AS SOON AS PRACTICAL FOLLOWING CONSTRUCTION OF SAME.

15. TEMPORARY LINERS, SUCH AS POLYETHYLENE SHEETS, SHALL BE PROVIDED FOR ALL PAVED DITCHES UNTIL THE PERMANENT CONCRETE LINER IS INSTALLED.

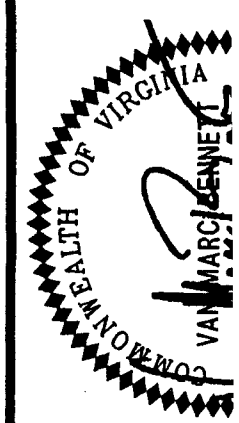
16. PAVED DITCHES SHALL BE REQUIRED WHEREVER EROSION IS EVIDENT. PARTICULAR ATTENTION SHALL BE PAID TO THOSE AREAS WHERE GRADES EXCEED 3 PERCENT.

17. TEMPORARY EROSION CONTROL MEASURES SUCH AS SILT FENCE ARE NOT TO BE REMOVED UNTIL ALL DISTURBED AREAS ARE STABILIZED. AFTER STABILIZATION IS COMPLETE, MEASURES SHALL BE REMOVED WITHIN 30 DAYS. TRAPPED SEDIMENT SHALL BE SPREAD AND SEEDED.

18. ALL SEDIMENT TRAPS AND BASINS MUST REMAIN IN PLACE AND FUNCTION UNTIL 75 PERCENT OF AFFECTED LOTS HAVE BEEN SOLD TO A THIRD PARTY (UNRELATEDTO THE DEVELOPER) FOR THE CONSTRUCTION OF HOMES; OR CONSTRUCTION HAS BEEN COMPLETED AND SOIL STABILIZED ON 60 PERCENT OF THE AFFECTED LOTS. A BULK SALE OF THE LOTS TO ANOTHER BUILDER WOULD NOT SATISFY THIS PROVISION.

19. AS-BUILT DRAWINGS MUST BE PROVIDED FOR ALL DETENTION/BMP FACILITIES. ALSO UPON COMPLETION, THE CONSTRUCTION OF ALL DETENTION/BMP FACILITIES SHALL BE CERTIFIED BY A PROFESSIONAL ENGINEER WHO INSPECTED THE STRUCTURE DURING CONSTRUCTION. THE CERTIFICATION SHALL STATE THAT, TO THE BEST OF HIS/HER JUDGMENT, KNOWLEDGE, AND BELIEF, THE STRUCTURE WAS CONSTRUCTED IN ACCORDANCE WITH THE APPROVAL PLANS AND SPECIFICATIONS.

SPECIAL NOTE: (SPECIFICALLY FOR THESE PLANS) UPON REMOVAL OF THE TEMPORARY SEDIMENT BASIN, THE CONTRACTOR SHALL REMOVE, AND PROPERLY DISPOSE OF ANY TREES WHICH HAVE PERISHED OR BECOME PERMANENTLY DAMAGED BY INUNDATION CAUSED BY THE SEDIMENT BASIN.



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

DETAILS

Record Drawing/Construction Certification Submittal for a BMP Facility

Date: 02/11/02

Inspector:
- ☑ Pat Menichino
- ☐ Gerry Lewis
- ☐ Beth Davis
- ☐ Mike Woolson
- ☐ Joe Buchite
- ☐ Other: _____

Project: UCSA OPERATIONS CENTER PARKING LOT EXPANSION
BMP Facility: EXT DET DRY POND SW Corner of SITE.
Plan No. SP-143-00
BMP ID Code: PC 168 (PHASE III)

I have received a transmittal for a ☑ Record Drawing and ☑ Construction Certification for the above referenced facility on FEB 08 2002. Prior to full engineering review of these items and a 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 the review 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. Let me know if any outstanding site issues remain.

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

NOTE: THIS IS ONLY COPY OF AB PLAN. RETURN TO ME. SJT

SWMProg\BMP\ConInsp\Insp.trans

JCSA Operations Center
Parking Lot Expansion Site
PC168