# 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:** **JR029**

**DATE VERIFIED:** **June 12, 2012**

**QUALITY ASSURANCE TECHNICIAN:** **Leah Hardenbergh**

Leah Hardenbergh

**LOCATION: WILLIAMSBURG, VIRGINIA**

# Stormwater Division

## MEMORANDUM

**DATE:** March 11, 2010

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

**FROM:** Jo Anna Ripley, Stormwater

**PO:** 270712

**RE:** Files Approved for Scanning

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**General File ID or BMP ID:** JR029

**PIN:** 4320300023

**Subdivision, Tract, Business or Owner Name** (if known): Governors Land

**Property Description:** Lot 23 Nathaniels Green

**Site Address:** 1917 Miln House Road

*(For internal use only)* **Box** 14 **Drawer:** 7

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

Comments

JR-029

**Contents for Stormwater Management Facilities As-built Files**

Each file is to contain:

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

**James City County, Virginia**
**Environmental Division**

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

Between Lot 23+ Lot 24 Miln House Rd.

County Plan No.: S-6-92
Project Name: GOVLAND – MILN HOUSE ROAD BMP (NATHANIELS GREEN)
Stormwater Management Facility: Timber Crib
Phase: ☒ I ☐ II ☐ III

☒ Information Received. Date: 5/2/02 AES
☒ Administrative Check.
- ☒ Record Drawing Date: 10/00 AES
- ☐ Construction Certification Date: None Rqd. AB Only.
- ☐ RD/CC Standard Forms (Required after Feb 1st 2001 Only)
- ☐ Insp/Maint Agreement Info: Global
- ☐ BMP Maintenance Plan Location: na
- ☐ Other:

☒ Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review file.
☒ Yes ☐ No Location: Drawing #10, note 20
☒ Assign County BMP ID Code Code: JR029
☒ 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: 3/12/03 RIH.
☒ Record Drawing (RD) Review Date: 5/19/03 SJT
☐ Construction Certification (CC) Review Date: 5/19/03 SJT
☐ Actions:
- ☐ No comments.
- ☒ Comments. Letter Forwarded. Date: 5/19/03
  - ☐ Record Drawing (RD)
  - ☐ Construction Certification (CC)
  - ☐ Construction-Related (CR)
  - ☐ Site Issues (SI)
  - ☐ Other :

☐ Second Submission: 6/24/03 AES (RD)
☐ 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. (2) + AES Photos Riser Modif 6/26/03
☐ Add to JCC Hydrology & Hydraulic database (optional).

BMP Certification Information Acceptable

Plan Reviewer: Scott J. Thomas P.E. Date: 6/26/03

**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: GOVERNOR'S LAND AT TWO RIVERS - NATHANIEL'S GREEN
Structure/BMP Name: TIMBER STRUCTURE
Project Location: SOUTH OF TWO RIVERS ROAD
BMP Location: SOUTH OF MILN HOUSE ROAD
County Plan No.: S - 6 - 92

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

Tax Map/Parcel No.: (43-2)(3-0-23 & 24)
BMP ID Code (if known): JR029
Zoning District:: POWHATAN DISTRICT
Land Use: RESIDENTIAL
Site Area (sf or acres): _____

Brief Description of Stormwater Management/BMP Facility:
TIMBER WALL STRUCTURE

Nearest Visible Landmark to SWM/BMP Facility: MILL HOUSE ROAD TO NORTH
GOLF COURSE TO SOUTH.

Nearest Vertical Ground Control ( if known ):
☒ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☐ Other
Station Number or Name: 348
Datum or Reference Elevation: 12.79
Control Description: JCC MAIN STATION
Control Location from Subject Facility: 8000' FEET TO THE NORTHWEST

**Section 2 - Stormwater Management / BMP Facility Construction Information:**

PreConstruction Meeting Held for Construction of SWM/BMP Facility: ☐ Yes ☐ No ☒ Unknown
Approx. Construction Start Date for SWM/BMP Facility: SUMMER 1992
Facility Monitored by County Representative during Construction: ☐ Yes ☐ No ☒ Unknown
Name of Site Work Contractor Who Constructed Facility: —
Name of Professional Firm Who Routinely Monitored Construction: —
Date of Completion for SWM/BMP Facility: 1992
Date of Record Drawing/Construction Certification Submittal: MARCH 2002

***( 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: GOVERNOR'S LAND ASSOCIATES
Mailing Address: 9701 MILL POND RUN
TOANO, VIRGINIA
Business Phone: 757-234-5000 Fax: 757-234-5111
Contact Person: MR. JAMES H. BENNETT Title: VICE PRESIDENT - DEVELOPMENT

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: PROJECT ENGINEER
Plan Name: NATHANIEL'S GREEN
Firm's Project No. 7173-2-1
Plan Date:
Sheet No.'s Applicable to SWM/BMP Facility: 7 / 9 / / / /

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

Name:
Mailing Address:
Business Phone:
Fax:
Contact Person:
Site Foreman/Supervisor:
Specialty Subcontractors & Purpose (for BMP Construction Only):

**Section 4 - Professional Certifications:**

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

**Record Drawing and Construction Certifications for Stormwater Management / BMP Facilities**

**Record Drawing Certification**

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

Name: V. MARC BENNETT
Title: SENIOR PROJECT MANAGER

Signature: V. Marc Bennett
Date: 3/30/02

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

( Seal )

Virginia Registered Professional Engineer or Certified Land Surveyor

**Construction Certification**

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

Name: _____
Title: _____

Signature: _____
Date: _____

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

_____ ( Seal )

Virginia Registered Professional Engineer

## 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.

N/A 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.

INC 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.

N/A 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.

XY 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.

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

INC 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.

INC 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.**

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

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

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

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

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

N/A 18. Maintenance plan taken from approved design plan transposed onto record drawing set.

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

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

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

XY 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.

N/A 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.

N/A 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.

N/A 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.

N/A 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.

N/A 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 )*

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

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

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

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

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

N/A F6. Principal spillway and outlet barrel provided consisting of reinforced concrete pipe 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.

INC 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.

XY F9. Timbers properly reinforced or concrete footing provided if soil conditions were prohibitive.

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

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

N/A F12. Stilling basin or standard outlet protection provided at principal spillway outlet.

XY 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.

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

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

XY 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.

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

# STORMWATER MANAGEMENT / BMP FACILITIES
# RECORD DRAWING CHECKLIST

*( 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.

N/A 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



JR029_GOVERNORS_LAND_MILN_HOUSE_ROAD - 020

NOTE:
SEE SHEET 1 FOR CHANNEL LINING TREATMENT OF OUTFALL FOR STORM SEWER SYSTEM #7.

NOTE REGARDING BERMS

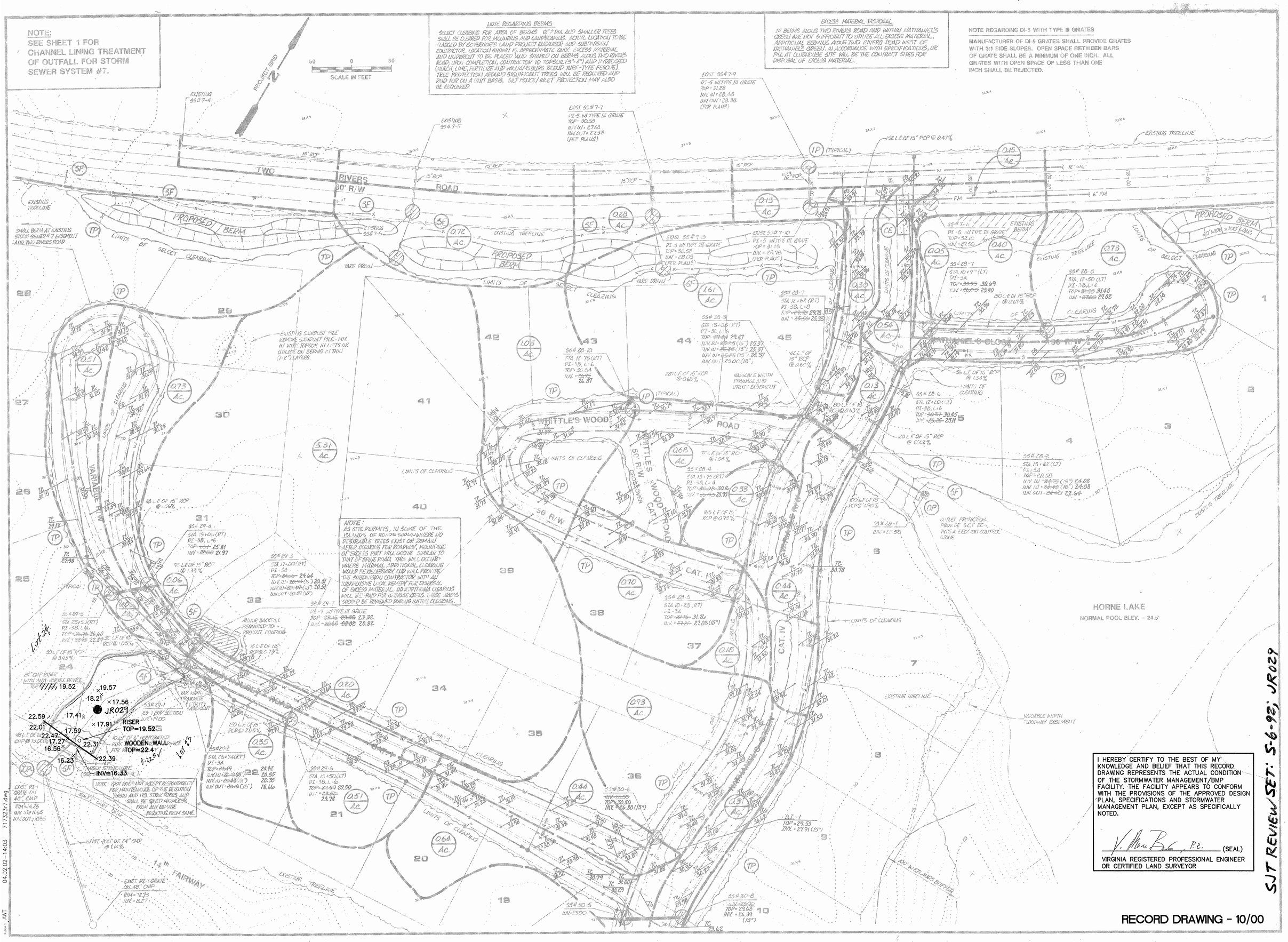
SELECT CLEARING FOR AREA OF BERMS 12" DIA AND SMALLER TREES SHALL BE CLEARED FOR MOUNDING AND LANDSCAPING. ACTUAL LOCATION TO BE STAKED BY GOVERNOR'S LAND PROJECT ENGINEER AND SUBDIVISION CONTRACTOR. LOCATION SHOWN IS APPROXIMATE ONLY. EXCESS MATERIAL AND UNDERCUT TO BE PLACED AND SHAPED ON BERMS ALONG TWO RIVERS ROAD. UPON COMPLETION, CONTRACTOR TO TOPSOIL (3"-4") AND HYDROSEED (MULCH, LIME, FERTILIZE AND WILDFLOWERS BLEND NVPF-TYPE FESCUES). TREE PROTECTION AROUND SIGNIFICANT TREES WILL BE REQUIRED AND PAID FOR ON A UNIT BASIS. SILT FENCE/INLET PROTECTION MAY ALSO BE REQUIRED.

EXCESS MATERIAL DISPOSAL

IF BERMS ALONG TWO RIVERS ROAD AND WITHIN NATHANIEL'S GREEN ARE NOT SUFFICIENT TO UTILIZE ALL EXCESS MATERIAL, ADDITIONAL BERMING ALONG TWO RIVERS ROAD WEST OF NATHANIEL'S GREEN, IN ACCORDANCE WITH SPECIFICATIONS, OR FILL AT CLEARWISE SITE WILL BE THE CONTRACT SITES FOR DISPOSAL OF EXCESS MATERIAL.

NOTE REGARDING DI-5 WITH TYPE III GRATES

MANUFACTURER OF DI-5 GRATES SHALL PROVIDE GRATES WITH 3:1 SIDE SLOPES. OPEN SPACE BETWEEN BARS OF GRATE SHALL BE A MINIMUM OF ONE INCH. ALL GRATES WITH OPEN SPACE OF LESS THAN ONE INCH SHALL BE REJECTED.




NOTE:
AS SITE PERMITS, IN SOME OF THE ISLANDS OF ROADS SHOWN WHERE NO DESIRABLE TREES EXIST OR REMAIN AFTER CLEARING FOR ROADWAY, MOUNDING OF EXCESS DIRT WILL OCCUR SIMILAR TO THAT OF SEVEN ROAD. THIS WILL OCCUR WHERE NORMAL TERRITORIAL CLEARING WOULD BE UNNECESSARY AND WILL PROVIDE THE SUBDIVISION CONTRACTOR WITH AN INEXPENSIVE LOCAL REMEDY FOR DISPOSAL OF EXCESS MATERIAL. NO ADDITIONAL CLEARING WILL BE PAID FOR IN THOSE AREAS. THESE AREAS SHOULD BE REMARKED DURING INITIAL CLEARING.

NOTE: VDOT DOES NOT ACCEPT RESPONSIBILITY FOR MAINTENANCE OF THE REGULATION FLOOD MAP ITS, STRUCTURES AND SHALL BE SAVED HARMLESS FROM ANY DAMAGE RESULTING FROM SAME.

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.

_____, P.E. (SEAL)
VIRGINIA REGISTERED PROFESSIONAL ENGINEER OR CERTIFIED LAND SURVEYOR

SJT REVIEW SET: S-6-92; JR029

RECORD DRAWING - 10/00

| No. | DATE | REVISION COMMENT / NOTE | BY |
|---|---|---|---|
| 3 | 10/00 | RECORD DRAWING | VMB |
| 2 | 5/97 | REVISED PER OWNER | VMB |
| 1 | 3/27/92 | REVISIONS PER ARC COMMENTS AND CHANGES | VMB |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(804) 253-0040
Fax (804) 220-8994
CONSULTING ENGINEERS


DRAINAGE AND EROSION CONTROL PLAN
NATHANIEL'S GREEN
THE GOVERNOR'S LAND
POWHATAN DISTRICT JAMES CITY COUNTY VIRGINIA

| | |
|---|---|
| Designed VMB/HWP | Drawn BJU |
| Scale 1"=50' | Date JAN. 1992 |
| Project No 7173 | |
| Drawing No. 7 | |

04.02.02-14:03 717323r7.dwg
Model: AWT

**NOTE:**
SEE SHEET 1 FOR CHANNEL LINING TREATMENT OF OUTFALL FOR STORM SEWER SYSTEM #7.

**NOTE REGARDING BERMS**

SELECT CLEARING FOR AREA OF BERMS. 12"± DIA. AND SMALLER TREES SHALL BE CLEARED FOR MOUNDING AND LANDSCAPING. ACTUAL LOCATION TO BE FLAGGED BY GOVERNORS' LAND PROJECT ENGINEER AND SUBDIVISION CONTRACTOR. LOCATION SHOWN IS APPROXIMATE ONLY. EXCESS MATERIAL AND UNDERCUT TO BE PLACED AND SHAPED ON BERMS ALONG TWO RIVERS ROAD. UPON COMPLETION, CONTRACTOR TO TOPSOIL (3"-4") AND HYDROSEED (MULCH, LIME, FERTILIZE AND WILLAMESBURG BLEND TURF-TYPE FESCUE). TREE PROTECTION AROUND SIGNIFICANT TREES WILL BE REQUIRED AND PAID FOR ON A UNIT BASIS. SILT FENCE/INLET PROTECTION MAY ALSO BE REQUIRED.

**EXCESS MATERIAL DISPOSAL**

IF BERMS ALONG TWO RIVERS ROAD AND WITHIN NATHANIEL'S GREEN ARE NOT SUFFICIENT TO UTILIZE ALL EXCESS MATERIAL, ADDITIONAL BERMS ALONG TWO RIVERS ROAD WEST OF NATHANIEL'S GREEN, IN ACCORDANCE WITH SPECIFICATIONS, OR FILL AT CLUBHOUSE SITE WILL BE THE CONTRACT SITES FOR DISPOSAL OF EXCESS MATERIAL.

**NOTE REGARDING DI-5 WITH TYPE III GRATES**

MANUFACTURER OF DI-5 GRATES SHALL PROVIDE GRATES WITH 3:1 SIDE SLOPES. OPEN SPACE BETWEEN BARS OF GRATE SHALL BE A MINIMUM OF ONE INCH. ALL GRATES WITH OPEN SPACE OF LESS THAN ONE INCH SHALL BE REJECTED.

**NOTE:**
AS SITE PERMITS, IN SOME OF THE ISLANDS OF ROADS SHOWN WHERE NO DESIRABLE TREES EXIST OR REMAIN AFTER CLEARING FOR ROADWAY, MOUNDING OF SOILS THAT WILL OCCUR SIMILAR TO THAT OF TWO RIVERS ROAD. THIS WILL OCCUR WHERE MINIMAL ADDITIONAL CLEARING WOULD BE NECESSARY AND WILL PROVIDE THE SUBDIVISION CONTRACTOR WITH AN INEXPENSIVE LOCAL REMOTE FILL DISPOSAL OF EXCESS MATERIAL. NO ADDITIONAL CLEARING WILL BE PAID FOR IN THOSE AREAS. THESE AREAS SHOULD BE REVIEWED DURING INITIAL CLEARING.

NOTE: VDOT DOES NOT ACCEPT RESPONSIBILITY FOR MAINTENANCE OF THE DETENTION BASIN AND ITS STRUCTURES AND SHALL BE SPARED HARMLESS FROM ANY DAMAGE RESULTING FROM SAME.

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.

P.E. (SEAL)
VIRGINIA REGISTERED PROFESSIONAL ENGINEER OR CERTIFIED LAND SURVEYOR

**RECORD DRAWING - 10/00**

| NO. | DATE | REVISION COMMENT / NOTE | BY |
|---|---|---|---|
| 3 | 10/00 | RECORD DRAWING | VMB |
| 2 | 5/97 | REVISED BERM CLEARING | |
| 1 | 5/97 | REVISED TREE LINE, ADD CONNECTS AND CHANGE | |


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ES CONSULTING ENGINEERS


DRAINAGE AND EROSION CONTROL PLAN
NATHANIEL'S GREEN
THE GOVERNOR'S LAND
JAMES CITY COUNTY
FOURTH DISTRICT
VIRGINIA

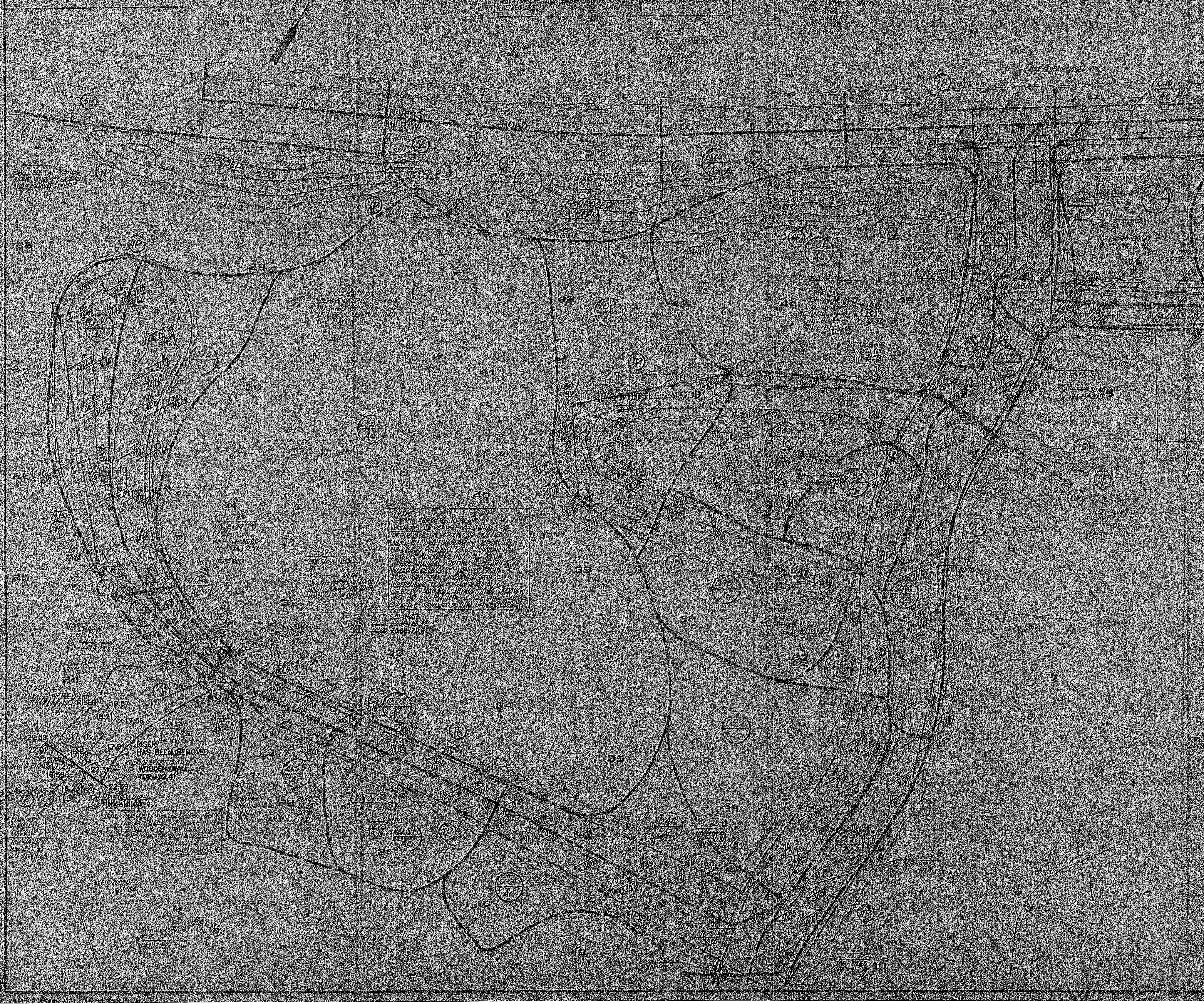
| | |
|---|---|
| Designed VMB/HWP | Drawn BJU |
| Scale 1"=50' | Date JAN. 1992 |
| Project No 7173 | |
| Drawing No. 7 | |

JR029_GOVERNORS_LAND_MILN_HOUSE_ROAD - 022

NOTE:
SEE SHEET 1 FOR CHANNEL LINING TREATMENT OF OUTFALL FOR STORM SEWER SYSTEM #7

NOTE REGARDING DI'S WITH TYPE II GRATES

MANUFACTURER OF DI'S GRATES SHALL PROVIDE GRATES WITH 1:1 SIDE SLOPES. OPEN SPACE BETWEEN BARS OF GRATE SHALL BE A MINIMUM OF ONE INCH. ALL GRATES WITH OPEN SPACE OF LESS THAN ONE INCH SHALL BE REJECTED.




APPROVED
James City County
Environmental Division
By:
Date: 6-26-03

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.

______________________ (SEAL)
VIRGINIA REGISTERED PROFESSIONAL ENGINEER OR CERTIFIED LAND SURVEYOR

RECORD DRAWING - 10/00

10/00 RECORD DRAWING

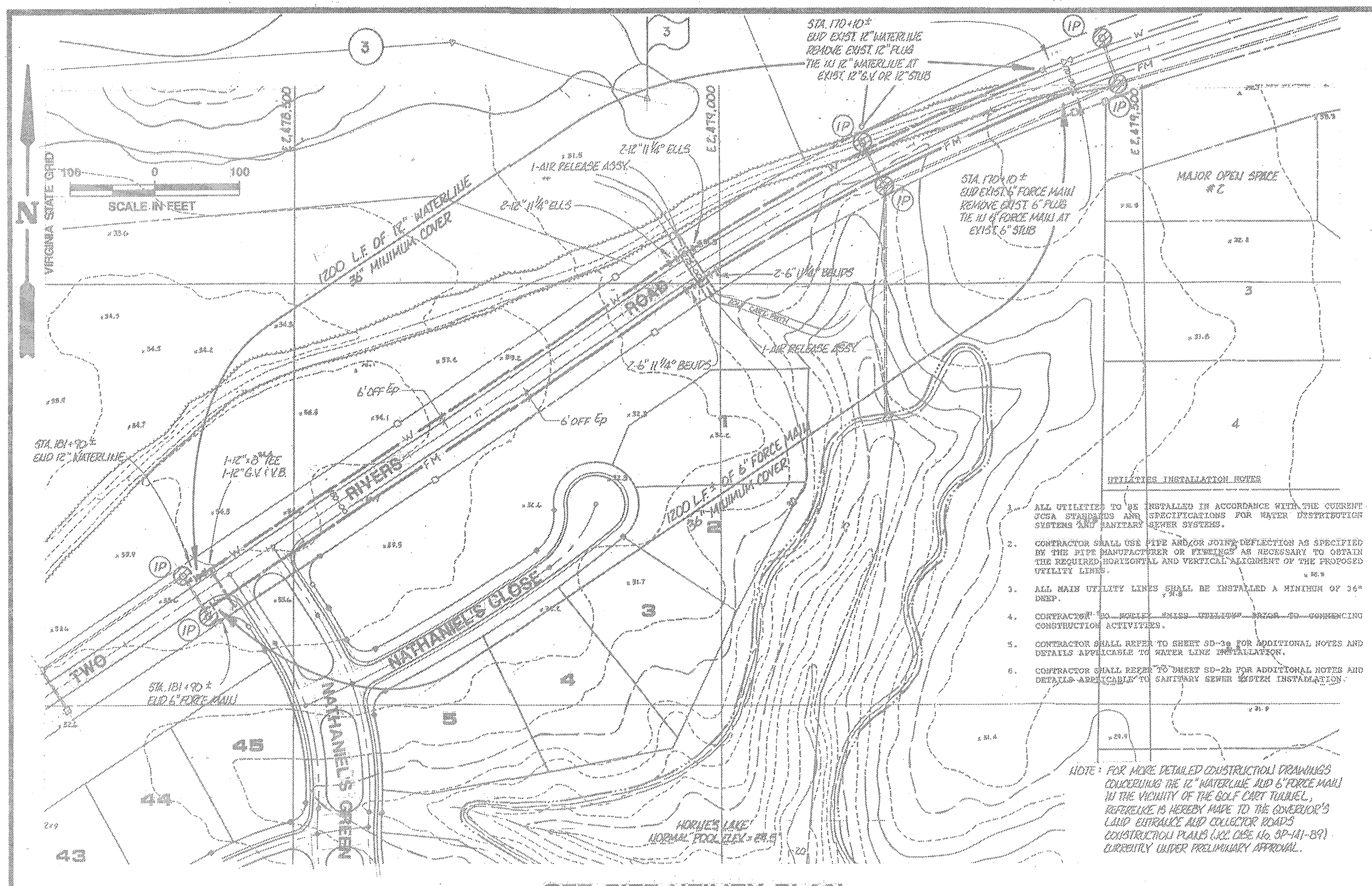
ES CONSULTING ENGINEERS

Williamsburg, Virginia 23188

DRAINAGE AND EROSION CONTROL PLAN
NATHANIEL'S GREEN
THE GOVERNOR'S LAND

JAN 1997

7



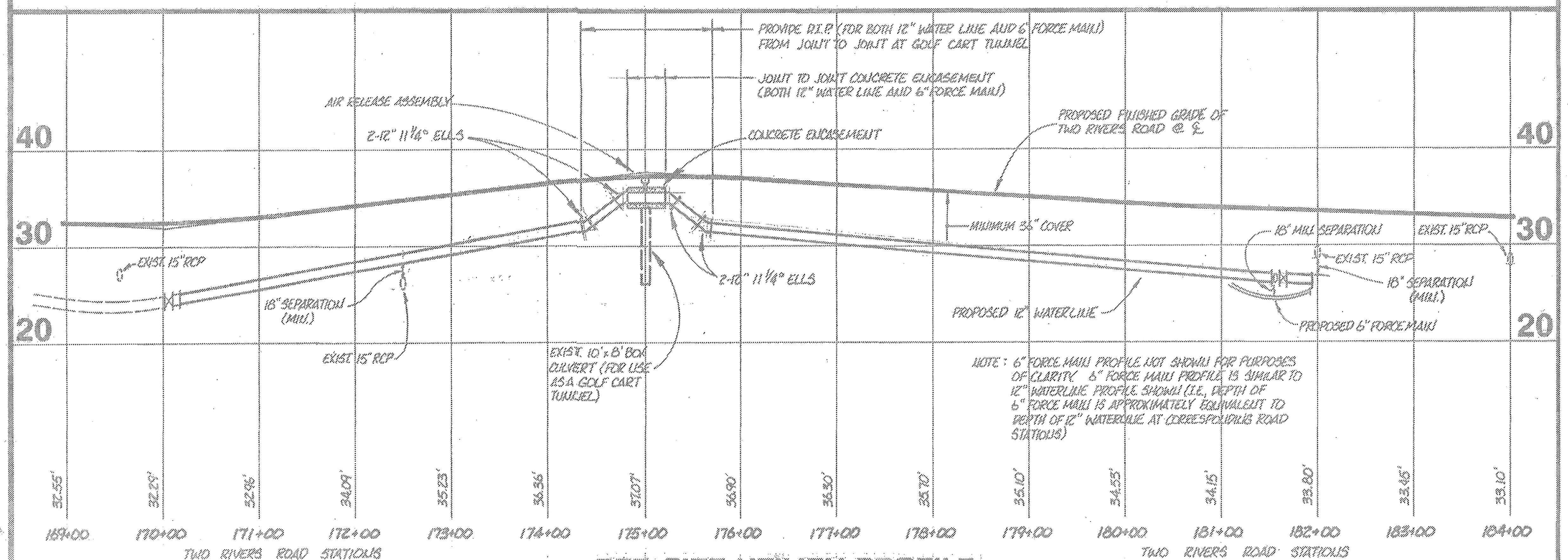

UTILITIES INSTALLATION NOTES

1. ALL UTILITIES TO BE INSTALLED IN ACCORDANCE WITH THE CURRENT JCSA STANDARDS AND SPECIFICATIONS FOR WATER DISTRIBUTION SYSTEMS AND SANITARY SEWER SYSTEMS.
2. CONTRACTOR SHALL USE PIPE AND/OR JOINT DEFLECTION AS SPECIFIED BY THE PIPE MANUFACTURER OR FITTINGS AS NECESSARY TO OBTAIN THE REQUIRED HORIZONTAL AND VERTICAL ALIGNMENT OF THE PROPOSED UTILITY LINES.
3. ALL MAIN UTILITY LINES SHALL BE INSTALLED A MINIMUM OF 36" DEEP.
4. ~~CONTRACTOR TO NOTIFY MISS UTILITY PRIOR TO COMMENCING~~ CONSTRUCTION ACTIVITIES.
5. CONTRACTOR SHALL REFER TO SHEET SD-3a FOR ADDITIONAL NOTES AND DETAILS APPLICABLE TO WATER LINE INSTALLATION.
6. CONTRACTOR SHALL REFER TO SHEET SD-2b FOR ADDITIONAL NOTES AND DETAILS APPLICABLE TO SANITARY SEWER SYSTEM INSTALLATION.

NOTE: FOR MORE DETAILED CONSTRUCTION DRAWINGS CONCERNING THE 12" WATERLINE AND 6" FORCE MAIN IN THE VICINITY OF THE GOLF CART TUNNEL, REFERENCE IS HEREBY MADE TO THE GOVERNOR'S LAND ENTRANCE AND COLLECTOR ROADS CONSTRUCTION PLANS (JCC CASE No. SP-141-89) CURRENTLY UNDER PRELIMINARY APPROVAL.

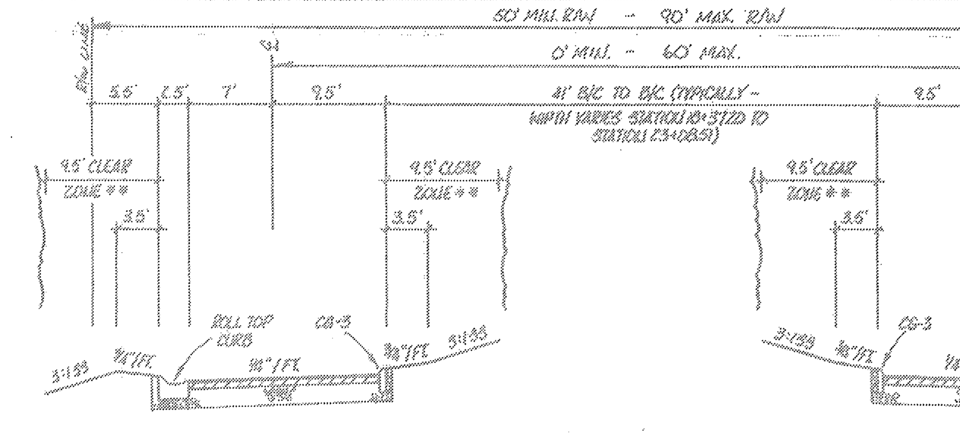
## OFF-SITE UTILITY PLAN

SCALE: 1"=100'




## OFF-SITE UTILITY PROFILE

SCALE: 1"=100' HORIZONTAL
1"=10' VERTICAL




### TYPICAL SECTION

NATHANIEL'S GREEN, 90' R/W (TYPICALLY), 50' R/W MIN.
STATION 10+00.00 TO STATION 19+48.22 - CATEGORY IV
STATION 19+48.22 TO STATION 23+08.51 - CATEGORY III

FOR CATEGORY III PORTION
STATION 19+48.22 TO STATION 23+08.51

1. PROVIDE 2-16' LANES, SLOPE = ¼"/FOOT.
2. PROVIDE 3.5' SHOULDER WIDTH, SLOPE = ¾"/FOOT.
3. PROVIDE CBR = 10 OR GREATER.
4. BASE: 10" SELECT MATERIAL, TYPE II (TOP 6" STAB. W/CEMENT)
5. SURFACE: TYPE C-1 BLOTTED SEAL COAT

ALTERNATE PAVEMENT STRUCTURE DESIGN APPROVED BY V.D.O.T. ON NOVEMBER 18, 1992.

BASE †: 6" AGGREGATE BASE MATERIAL.
SURFACE: 2½" BIT. CONC., IM-1A; TYPE D BLOTTED SEALCOAT

FOR CATEGORY IV PORTION
STATION 10+00.00 TO STATION 19+48.22

1. PROVIDE 2-16' LANES, SLOPE = ¼"/FOOT.
2. PROVIDE 3.5' SHOULDER WIDTH, SLOPE = ¾"/FOOT.
3. PROVIDE CBR = 10 OR GREATER.
4. SUBBASE: 8" AGGREGATE BASE MATERIAL *.
5. BASE: 2½" BITUMINOUS CONCRETE TYPE BM-2
6. SURFACE: 1½" BITUMINOUS CONCRETE TYPE SM-2A

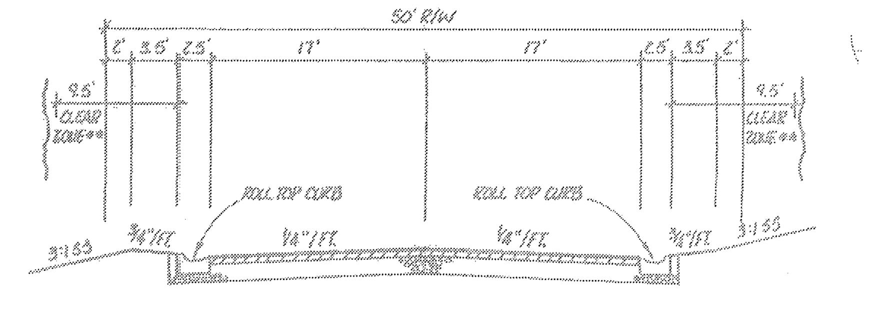
ALTERNATE PAVEMENT STRUCTURE DESIGN APPROVED BY V.D.O.T. ON NOVEMBER 18, 1992.

SUBBASE †: 8" AGGREGATE BASE MATERIAL
BASE: 2½" BIT. CONC., IM-1A
SURFACE: 1½" BIT. CONC., SM-2A; TYPE D BLOTTED SEALCOAT

* ALL UNTREATED AGGREGATE BASE OR SUBBASE MATERIAL SHALL BE 21B GRADATION. IF AGGREGATE IS CEMENT STABILIZED, USE 21A GRADATION. THE DEPTH OF AGGREGATE BASE MATERIAL SHALL BE 4" MINIMUM UNDER THE CURB & GUTTER AND SHALL EXTEND 1' BEHIND BACK OF CURB.
** ALL MAJOR TREES (GREATER THAN 4" IN BREAST HEIGHT DIAMETER) SHALL BE 9.5' FROM FACE OF CURB OR EDGE OF PAVEMENT.
† ALL PAVEMENT STRUCTURES MAY BEGIN WITH 4" OF SELECT MATERIAL PRIOR TO PLACEMENT OF BASE MATERIAL.

ROAD CONSTRUCTION NOTES

1. ALL ROADS AND DRAINAGE FACILITIES SHOULD BE CONSTRUCTED IN ACCORDANCE WITH CURRENT REGULATIONS, SPECIFICATIONS AND STANDARDS, AND SUBDIVISION STREET REQUIREMENTS OF THE VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT).
2. STANDARD PE-1 ENTRANCES WITH A MINIMUM OF 24' OF 15" CONCRETE CULVERT PIPE SHALL BE REQUIRED FOR ALL DRIVEWAYS. IF ENDWALLS ARE PROVIDED AT EITHER END OF DRIVEWAY CULVERT, THE MAXIMUM ALLOWABLE HEIGHT OF THE ENDWALL IS TWO BRICK COURSES ABOVE THE DIRECTLY ADJACENT EDGE OF THE MAIN ROADWAY PAVEMENT (OR APPROXIMATELY 5" TO 6").
3. ALL SHOULDERS, DITCHES AND BACKSLOPES MUST BE STABILIZED PRIOR TO ACCEPTANCE OF ROADS INTO THE STATE SECONDARY ROAD SYSTEM.
4. THE ROAD CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL ITEMS OF ROAD WORK & DRAINAGE WITH EXISTING AND PROPOSED UNDERGROUND UTILITIES (POWER, WATER, SEWER AND TELEPHONE) SUCH THAT NO DUPLICATION OF WORK EFFORT IS INCURRED.
5. UPON COMPLETION, INSPECTION AND ACCEPTANCE, ALL ROADS AND DRAINAGE FACILITIES SHALL BE DEDICATED TO VDOT FOR INCLUSION IN THE STATE SECONDARY ROAD SYSTEM.
6. ALL ITEMS OF ROADWORK AND DRAINAGE NECESSARY FOR THE ROADS TO BE ACCEPTED INTO THE STATE SECONDARY ROAD SYSTEM, WHETHER WRITTEN ON THESE PLANS OR NOT ARE HEREBY EXPRESSLY IMPLIED. NO OMISSIONS, ERRORS OR OVERSIGHTS ON THE PART OF THE ENGINEER OR OWNER SHALL DETRACT FROM THE CONTRACTORS RESPONSIBILITY OF COMPLETING ALL ITEMS OF ROADWORK & DRAINAGE SATISFACTORY IN EVERY RESPECT TO JAMES CITY COUNTY AND VDOT.
7. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE THE RESPONSIBILITY OF THE ROAD CONTRACTOR.
8. LATERAL UNDERDRAINS MAY BE REQUIRED WHERE FIELD CONDITIONS WARRANT. A CHANGE ORDER FOR SAME WILL BE EXECUTED IF REQUIRED BY VDOT, THE ENGINEER, COUNTY OR OWNER.
9. PAVED DITCHES MAY BE REQUIRED WHERE FIELD CONDITIONS WARRANT. GENERALLY, ALL DITCHES WITH SLOPES EXCEEDING 3% SHALL BE PAVED UNLESS OTHERWISE APPROVED BY THE ENGINEER, OWNER, VDOT AND THE LOCAL GOVERNING BODY.




### TYPICAL SECTION

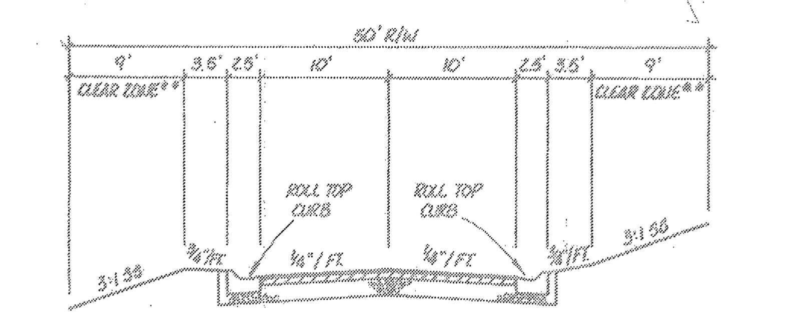
NATHANIEL'S GREEN, CAT. III, 50' R/W
STATION 23+08.51 TO STATION 28+30.00

1. PROVIDE 2-17' LANES, SLOPE = ¼"/FOOT.
2. PROVIDE 3.5' SHOULDER WIDTH, SLOPE = ¾"/FOOT.
3. PROVIDE CBR = 10 OR GREATER.
4. BASE: 10" SELECT MATERIAL, TYPE II (TOP 6" STAB. W/CEMENT.)
5. SURFACE: TYPE C-1 BLOTTED SEAL COAT

ALTERNATE PAVEMENT STRUCTURE DESIGN APPROVED BY V.D.O.T. ON NOVEMBER 18, 1992.

BASE †: 6" AGGREGATE BASE MATERIAL
SURFACE: 1½" BIT. CONC., IM-1A; TYPE D BLOTTED SEALCOAT

* ALL UNTREATED AGGREGATE BASE OR SUBBASE MATERIAL SHALL BE 21B GRADATION. IF AGGREGATE IS CEMENT STABILIZED, USE 21A GRADATION. THE DEPTH OF AGGREGATE BASE MATERIAL SHALL BE 4" MINIMUM UNDER THE CURB & GUTTER AND SHALL EXTEND 1' BEHIND BACK OF CURB.
** ALL MAJOR TREES (GREATER THAN 4" IN BREAST HEIGHT DIAMETER) SHALL BE 9.5' FROM FACE OF CURB OR EDGE OF PAVEMENT.
† ALL PAVEMENT STRUCTURES MAY BEGIN WITH 4" OF SELECT MATERIAL PRIOR TO PLACEMENT OF BASE OR SUBBASE.




### TYPICAL SECTION

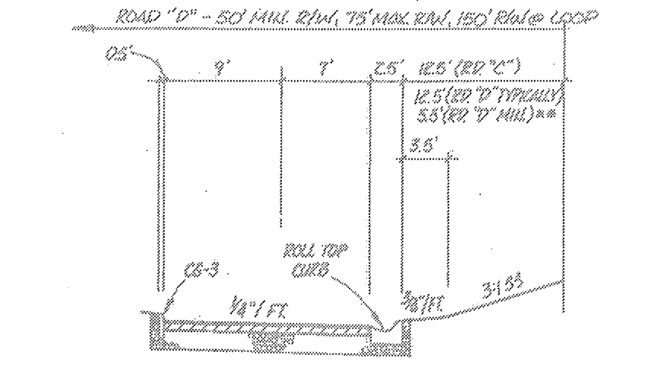
NATHANIEL'S CLOSE, CAT. I, 50' R/W
MILN HOUSE ROAD, CAT. I, 50' R/W (UNDIVIDED SECTION)

1. PROVIDE 2-10' LANES, SLOPE = ¼"/FOOT.
2. PROVIDE 3.5' SHOULDER WIDTH, SLOPE = ¾"/FOOT.
3. PROVIDE CBR = 10 OR GREATER.
4. BASE: 6" AGGREGATE BASE MATERIAL*
5. SURFACE: TYPE D BLOTTED SEAL COAT

ALTERNATE PAVEMENT STRUCTURE DESIGN APPROVED BY V.D.O.T. ON NOVEMBER 18, 1992.

BASE †: 6" AGGREGATE BASE MATERIAL
SURFACE: 1½" BIT. CONC., SM-2A; TYPE D BLOTTED SEALCOAT

* ALL UNTREATED AGGREGATE BASE OR SUBBASE MATERIAL SHALL BE 21B GRADATION. IF AGGREGATE IS CEMENT STABILIZED, USE 21A GRADATION. THE DEPTH OF AGGREGATE BASE MATERIAL SHALL BE 4" MINIMUM UNDER THE CURB & GUTTER AND SHALL EXTEND 1' BEHIND BACK OF CURB.
** ALL MAJOR TREES (GREATER THAN 4" IN BREAST HEIGHT DIAMETER) SHALL BE 9.5' FROM FACE OF CURB OR EDGE OF PAVEMENT.
† ALL PAVEMENT STRUCTURES MAY BEGIN WITH 4" OF SELECT MATERIAL PRIOR TO PLACEMENT OF BASE OR SUBBASE.




### TYPICAL SECTION

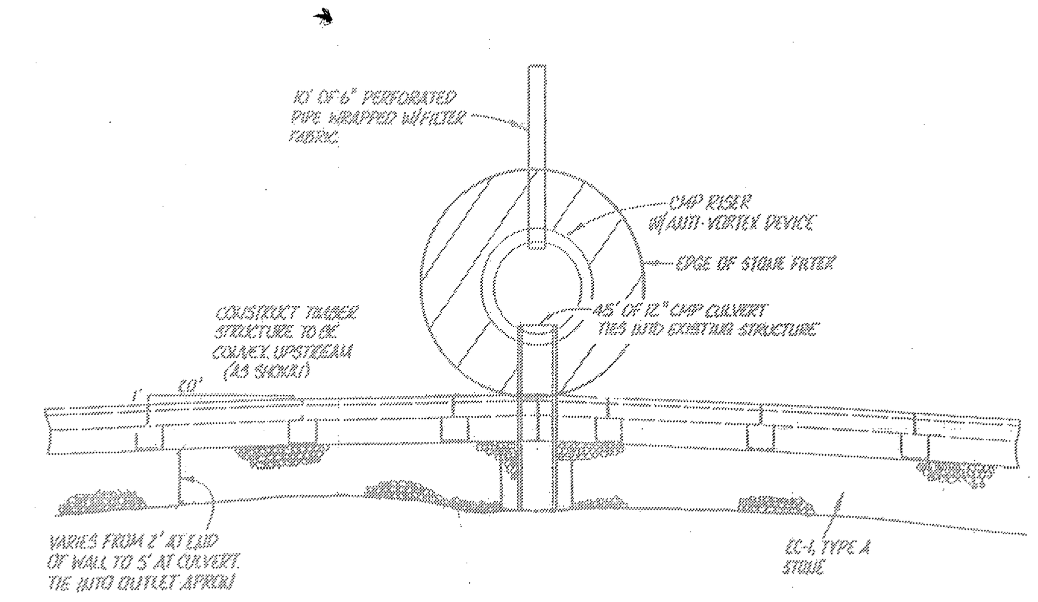
WHITTLE'S WOOD ROAD (ONE LANE / ONE WAY SECTION) - 50' R/W
MILN HOUSE ROAD (DIVIDED SECTION)
CAT. I, 50-75' R/W

1. PROVIDE 2- LANES, SLOPE = ¼"/FOOT.
2. PROVIDE 3.5' SHOULDER WIDTH, SLOPE = ¾"/FOOT.
3. PROVIDE CBR = 10 OR GREATER.
4. BASE: 6" AGGREGATE BASE MATERIAL*
5. SURFACE: TYPE D BLOTTED SEAL COAT

ALTERNATE PAVEMENT STRUCTURE DESIGN APPROVED BY V.D.O.T. ON NOVEMBER 18, 1992.

BASE †: 6" AGGREGATE BASE MATERIAL
SURFACE: 1½" BIT. CONC., SM-2A; TYPE D BLOTTED SEALCOAT

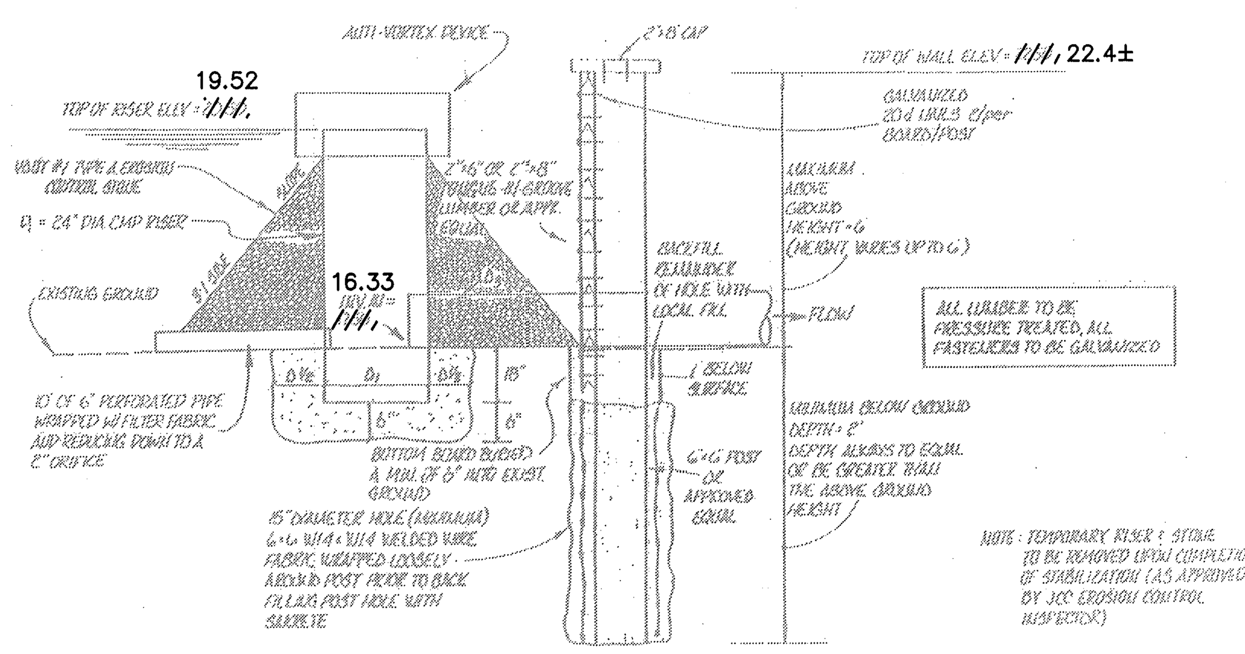
* ALL UNTREATED AGGREGATE BASE OR SUBBASE MATERIAL SHALL BE 21B GRADATION. IF AGGREGATE IS CEMENT STABILIZED, USE 21A GRADATION. THE DEPTH OF AGGREGATE BASE MATERIAL SHALL BE 4" MINIMUM UNDER THE CURB & GUTTER AND SHALL EXTEND 1' BEHIND BACK OF CURB.
** ALL MAJOR TREES (GREATER THAN 4" IN BREAST HEIGHT DIAMETER) SHALL BE 9.5' FROM FACE OF CURB OR EDGE OF PAVEMENT.
† ALL PAVEMENT STRUCTURES MAY BEGIN WITH 4" OF SELECT MATERIAL PRIOR TO PLACEMENT OF BASE OR SUBBASE.




## PLAN VIEW

## PRESSURE TREATED WOOD DRY DETENTION STRUCTURE

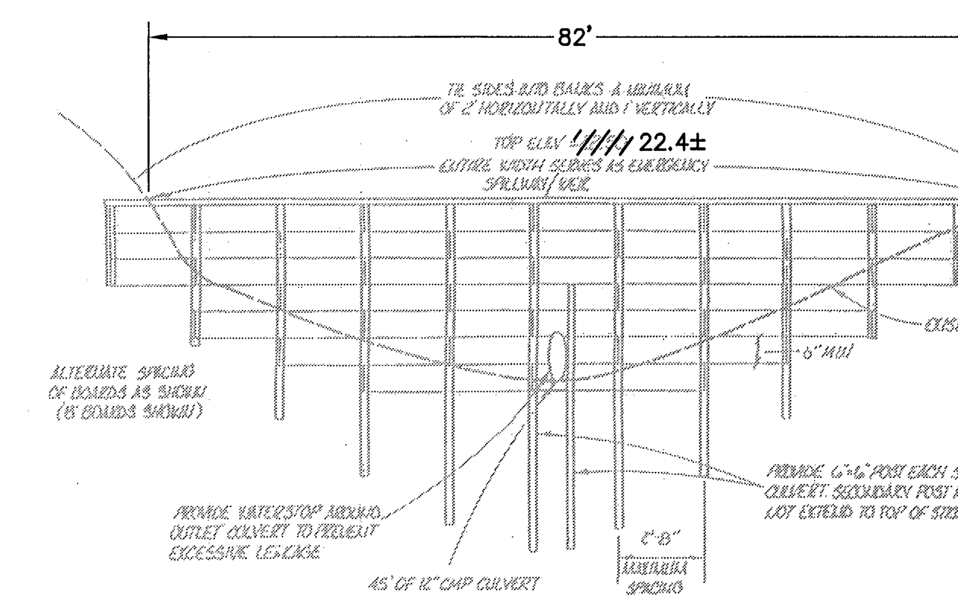
N.T.S.




## END VIEW

## PRESSURE TREATED WOOD DRY DETENTION STRUCTURE

N.T.S.




## UPSTREAM ELEVATION

## PRESSURE TREATED WOOD DRY DETENTION STRUCTURE

N.T.S.

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.

V. Marc Bennett, P.E. (SEAL)
VIRGINIA REGISTERED PROFESSIONAL ENGINEER OR CERTIFIED LAND SURVEYOR

RECORD DRAWING - 10/00

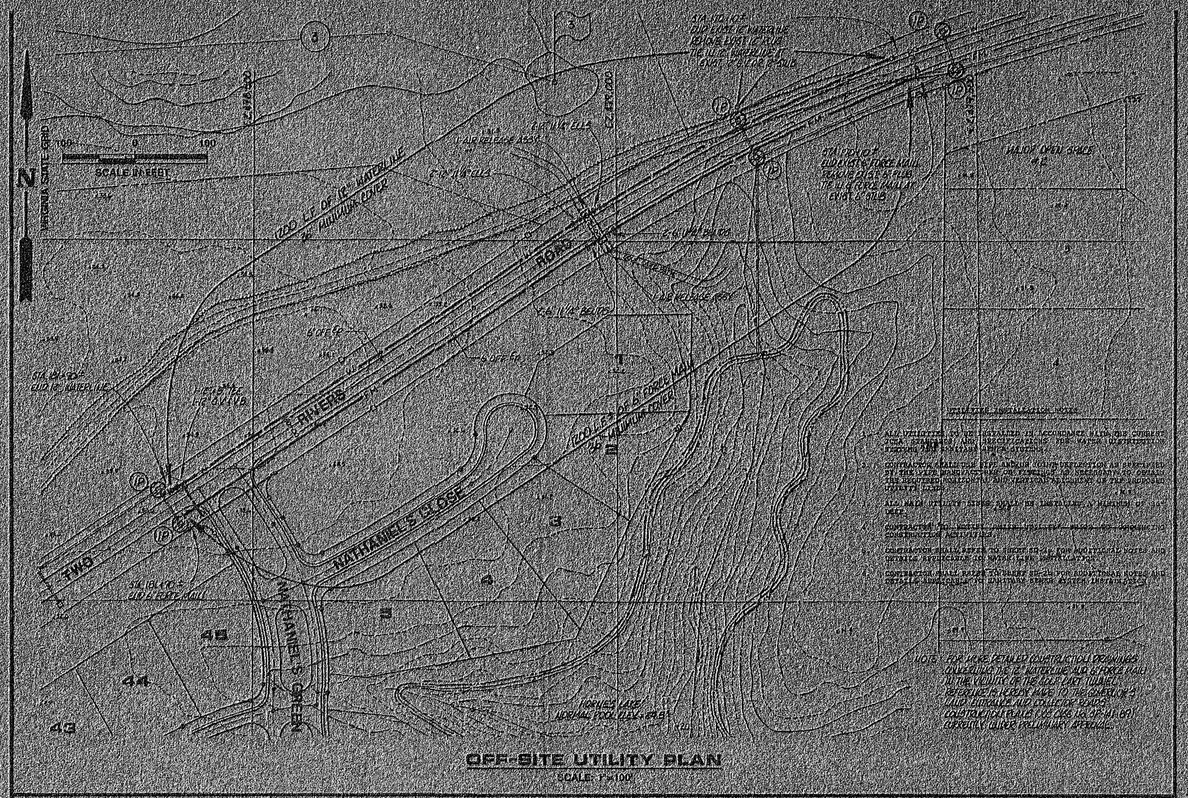
| No. | DATE | REVISION / COMMENT / NOTE | BY |
|---|---|---|---|
| 4 | 10/00 | RECORD DRAWING | VMB |
| 3 | 11/19/92 | ADDED APPROVED ALTERNATE PAVEMENT DESIGN | VMB |
| 2 | 5/29/92 | REVISED PER OWNER | VMB |
| 1 | 3/27/92 | REVISIONS PER JCC COMMENTS AND OWNER | VMB |


AES CONSULTING ENGINEERS
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(804) 253-0040
Fax (804) 220-8994


OFFSITE UTILITY PLAN/NOTES AND DETAILS
NATHANIEL'S GREEN
THE GOVERNOR'S LAND At Two Rivers
POWHATAN DISTRICT JAMES CITY COUNTY VIRGINIA

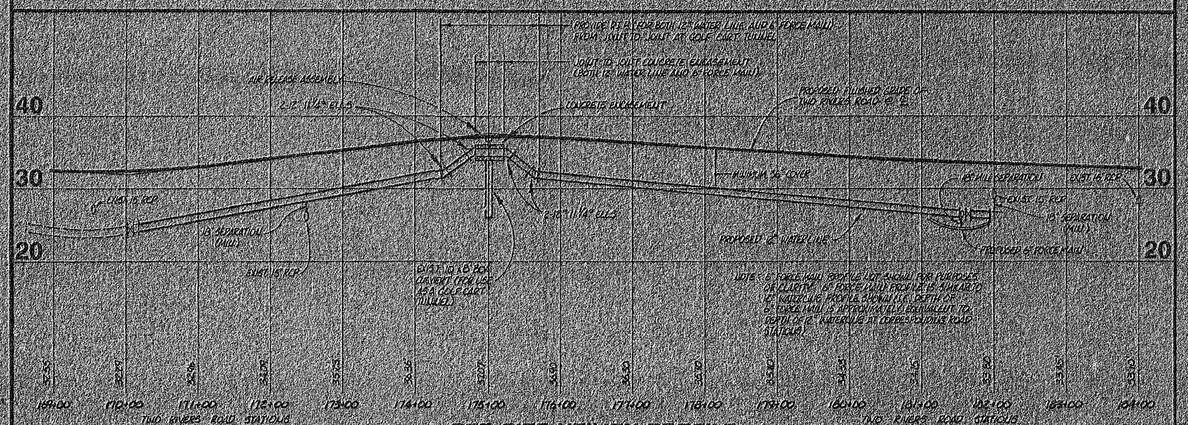
| | |
|---|---|
| Designed VMB | Drawn BJU |
| Scale | Date JAN. 1992 |
| Project No. 7173 | |
| Drawing No. 9 | |

04.02.02-14:03 717323r7.dwg AWT



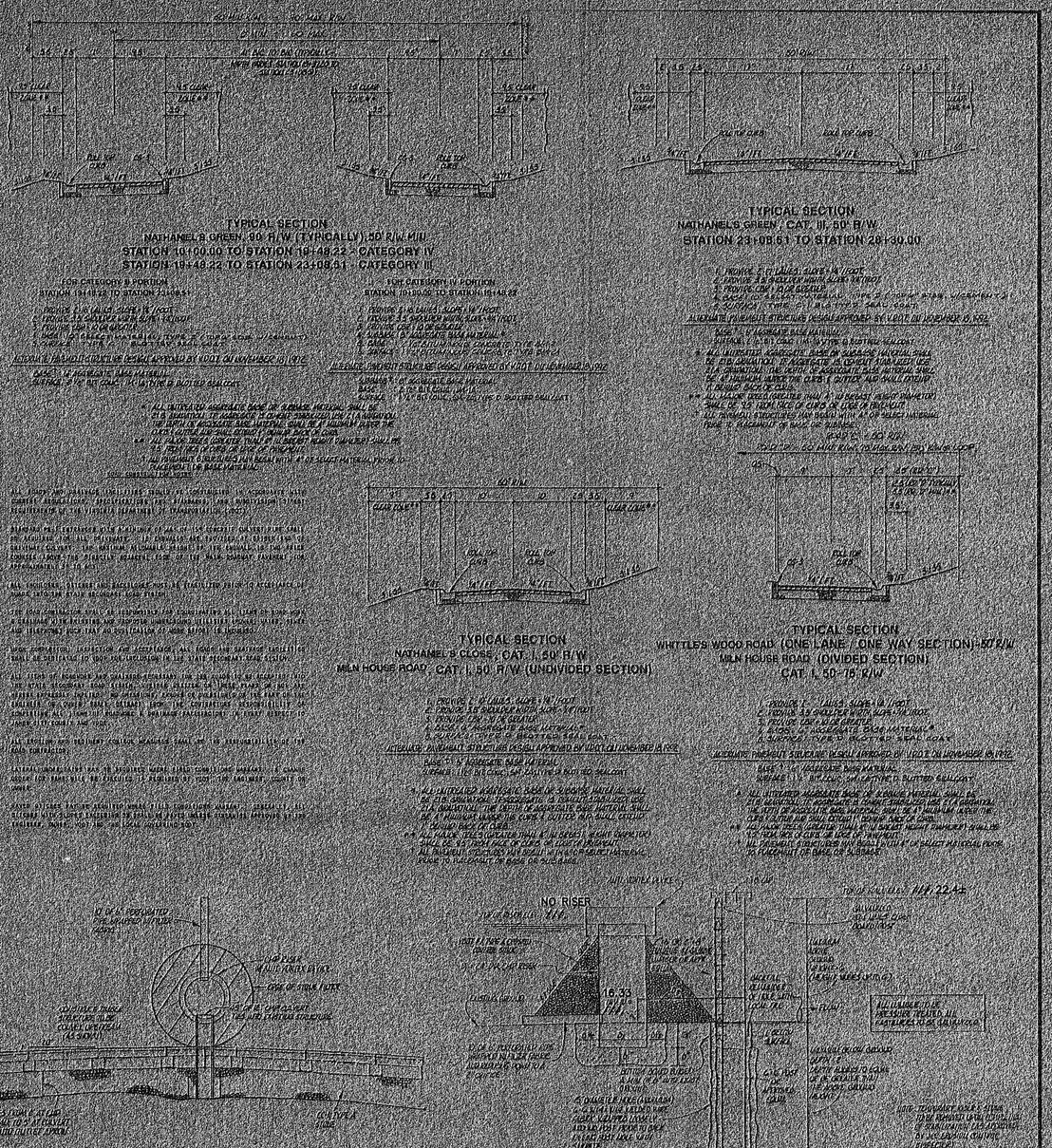

## OFF-SITE UTILITY PLAN

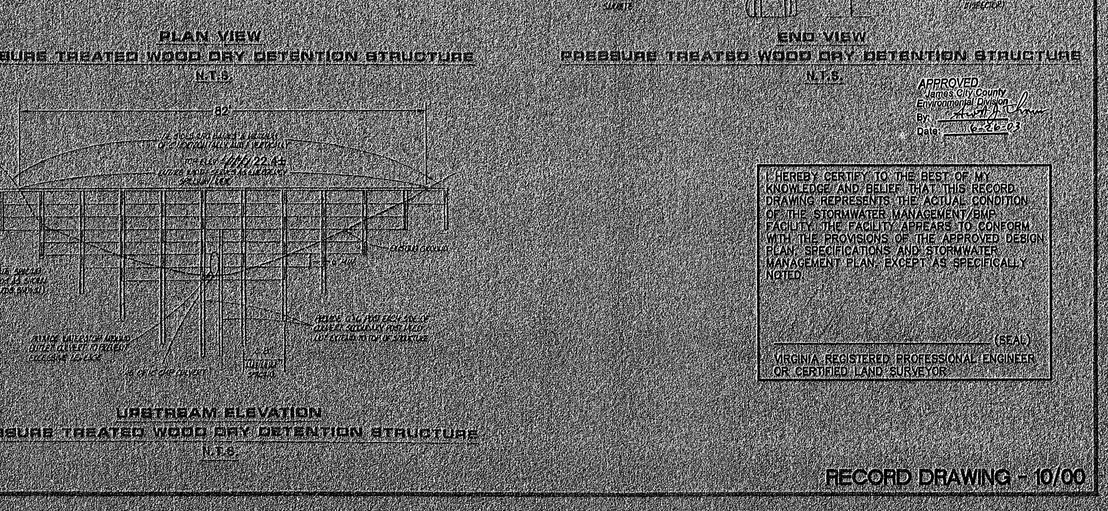
SCALE: 1"=100'




## OFF-SITE UTILITY PROFILE

SCALE: 1"=100' HORIZONTAL
1"=10' VERTICAL




APPROVED
James City County
Environmental Division
By: [signature]
Date: 6-28-03

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.

_____ (SEAL)
VIRGINIA REGISTERED PROFESSIONAL ENGINEER OR CERTIFIED LAND SURVEYOR

RECORD DRAWING - 10/00

| # | DATE | BY | DESCRIPTION |
|---|---|---|---|
| 1 | 10/00 | WMF | RECORD DRAWING |


5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(804) 253-0040
Fax (804) 220-8984
CONSULTING ENGINEERS


OFFSITE UTILITY PLAN/NOTES AND DETAILS
NATHANIEL'S GREEN
THE GOVERNOR'S LAND
JAMES CITY COUNTY, VIRGINIA

| | |
|---|---|
| DESIGNED BY WMF | DRAWN BY RJU |
| SCALE N/A | DATE APRIL 1999 |
| PROJECT NO. 7173 | |
| DRAWING NO. 9 | |

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

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

# LETTER OF TRANSMITTAL

| DATE | JOB NO. |
|---|---|
| 5/02/02 | 7173-00 |

ATTENTION

RE: GOVERNOR'S LAND BMP AS-BUILTS

TO JAMES CITY ENVIRONMENTAL DIVISION

5-6-92
JR029

RECEIVED MAY 2002 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 |
|---|---|---|---|
| 1 | | | EXCERPT FROM GEO-TECHNICAL REPORT FOR FOWLER'S LAKE |
| 1 | | | EXCERPT FROM GEO-TECHNICAL REPORT FOR WINGFIELD LAKE |
| 2 | | | RECORD DRAWINGS FOR TIMBER STRUCTURES #1, #2, #3, #4 IN PHASE 1 |
| 2 | | | RECORD DRAWINGS FOR WINGFIELD LAKE |
| 2 | | | RECORD DRAWINGS FOR HORNES LAKE |
| 2 | | | RECORD DRAWINGS FOR MARINA BMP |
| 2 | | | RECORD DRAWINGS FOR THE HARBOR BMP |
| 2 | | | RECORD DRAWINGS FOR WYTHE HAMLET BMP |
| 2 | | | RECORD DRAWINGS FOR NATHANIEL'S GREEN TIMBER STRUCTURE BMP |

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

THE RECORD DRAWINGS IN GOVERNOR'S LAND SHOULD BE THE FINISH OF THE BMP

COPY TO _____ SIGNED: V. Mac B

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

JR029_GOVERNORS_LAND_MILN_HOUSE_ROAD - 026

James City County, Virginia
Environmental Division

*Stormwater Management/BMP*
*Record Drawing Review Form*

County Plan No. 5-6-92

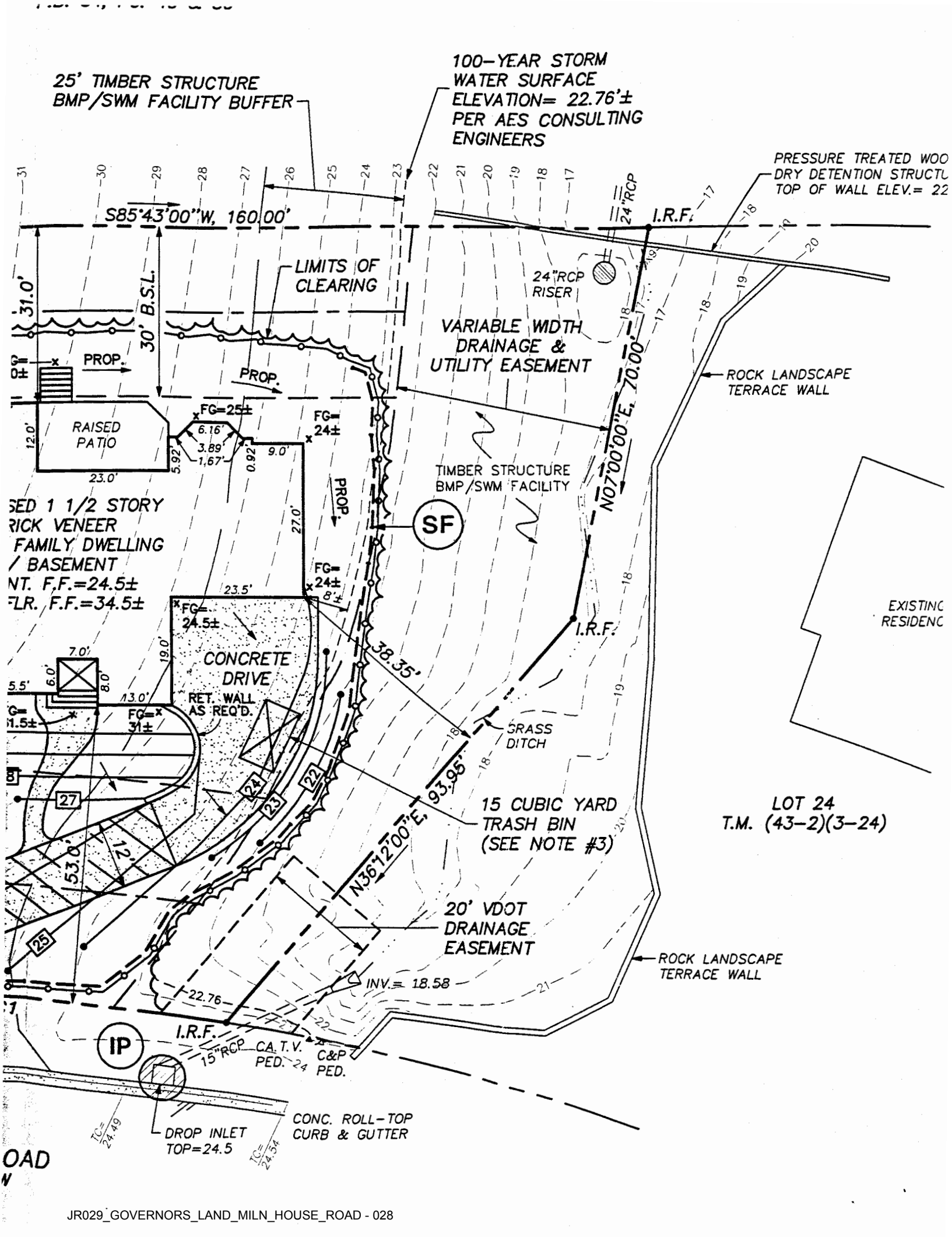
Project Name: Governor's Land - Miln House Road BMP

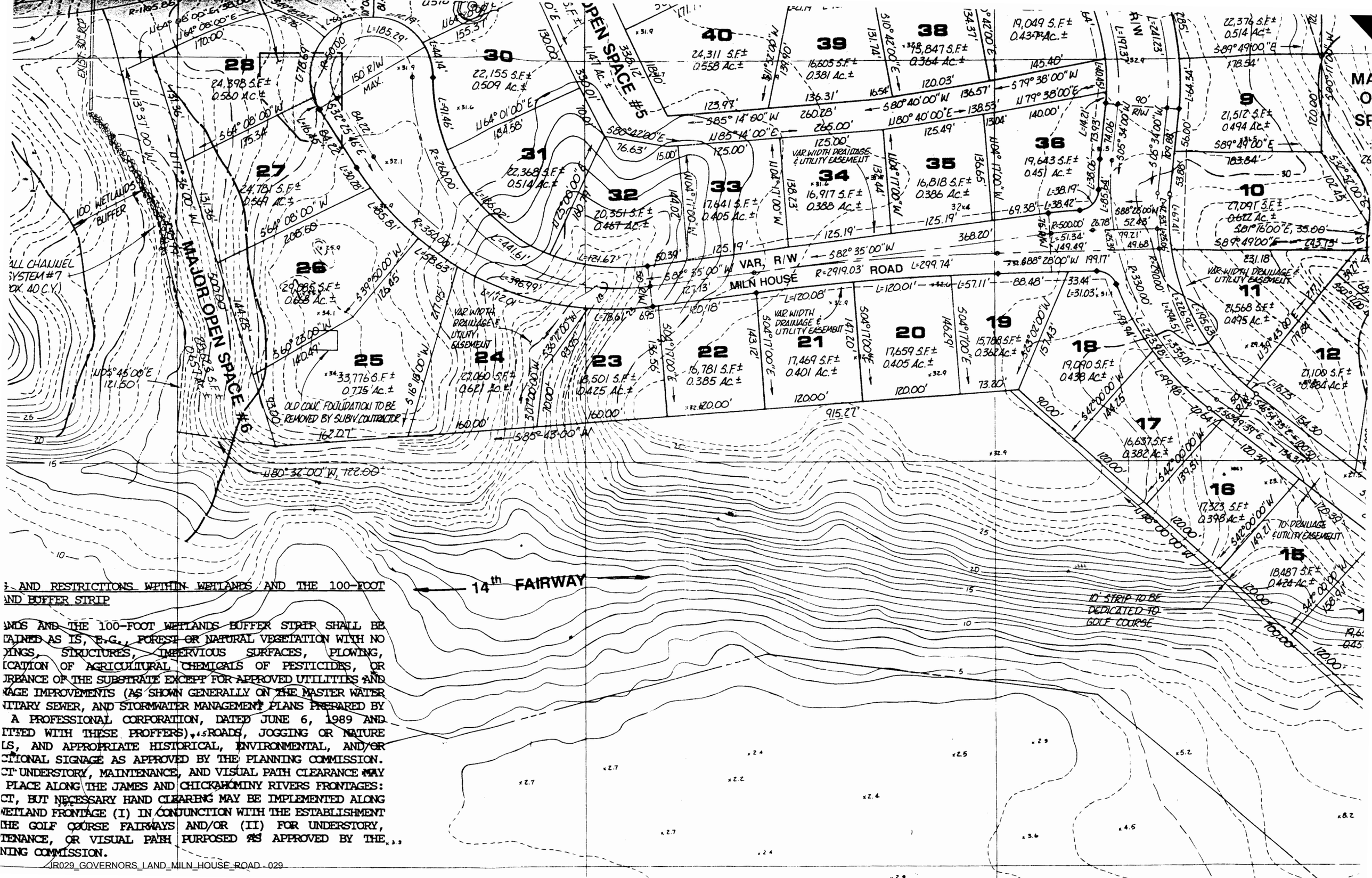
Stromwater Management Faciltiy: Timber Crib wall

| Component | Approved Plan | Record Drawing | OK |
|---|---|---|---|
| Top of dam (lowest point) | — | — | |
| Top of Dam (reported) | 22.50 | 22.4 | |
| Top width of dam | 8" | | |
| Crest of riser | 20.50 | 19.52 | |
| Crest of Emerg. Spillway | — | — | |
| Low Water elevation | DRY | — | |
| Normal Water level | — | — | |
| INVERT OUT Bottom of pond elevation | 17.5 | 16.33 | |
| Inflow Pipe size (1) | | | |
| Inflow Pipe size (2) | | | |
| Inflow Pipe size (3) | | | |
| Barrel Diameter (inches) | 12" CMP | | |
| 100 yr Storm Elevation | | | |
| Trash rack/anti-vortex type | | | |
| Forbay, baffle wall, etc. | — | — | |
| Pond drain elevation | | | |
| Length | 82' | | |

Date: 2/7/03

Name: R. Hall


25' TIMBER STRUCTURE BMP/SWM FACILITY BUFFER
100-YEAR STORM WATER SURFACE ELEVATION= 22.76'± PER AES CONSULTING ENGINEERS
PRESSURE TREATED WOO
DRY DETENTION STRUCTU
TOP OF WALL ELEV.= 22
S85°43'00"W, 160.00'
24"RCP
I.R.F.
LIMITS OF CLEARING
24"RCP RISER
VARIABLE WIDTH DRAINAGE & UTILITY EASEMENT
30' B.S.L.
31.0'
PROP.
ROCK LANDSCAPE TERRACE WALL
RAISED PATIO
FG=25±
FG= 24±
6.16'
3.89'
1.67'
5.92'
0.92'
9.0'
12.0'
23.0'
TIMBER STRUCTURE BMP/SWM FACILITY
N07°00'00"E, 70.00'
SF
27.0'
FG= 24±
8'±
23.5'
FG= 24.5±
38.35'
I.R.F.
EXISTING RESIDENC
7.0'
6.0'
8.0'
5.5'
19.0'
CONCRETE DRIVE
13.0'
RET. WALL AS REQ'D.
FG= 31±
GRASS DITCH
93.95'
15 CUBIC YARD TRASH BIN (SEE NOTE #3)
LOT 24
T.M. (43-2)(3-24)
N36°12'00"E,
53.0'
12.
20' VDOT DRAINAGE EASEMENT
ROCK LANDSCAPE TERRACE WALL
INV.= 18.58
22.76
IP
I.R.F.
15"RCP
CA.T.V. PED.
C&P PED.
CONC. ROLL-TOP CURB & GUTTER
DROP INLET TOP=24.5
TC= 24.49
TC= 24.54
OAD




; AND RESTRICTIONS WITHIN WETLANDS AND THE 100-FOOT AND BUFFER STRIP

ANDS AND THE 100-FOOT WETLANDS BUFFER STRIP SHALL BE TAINED AS IS, E.G., FOREST OR NATURAL VEGETATION WITH NO DINGS, STRUCTURES, IMPERVIOUS SURFACES, PLOWING, ICATION OF AGRICULTURAL CHEMICALS OF PESTICIDES, OR URBANCE OF THE SUBSTRATE EXCEPT FOR APPROVED UTILITIES AND NAGE IMPROVEMENTS (AS SHOWN GENERALLY ON THE MASTER WATER NITARY SEWER, AND STORMWATER MANAGEMENT PLANS PREPARED BY A PROFESSIONAL CORPORATION, DATED JUNE 6, 1989 AND ITTED WITH THESE PROFFERS), ROADS, JOGGING OR NATURE LS, AND APPROPRIATE HISTORICAL, ENVIRONMENTAL, AND/OR CTIONAL SIGNAGE AS APPROVED BY THE PLANNING COMMISSION. CT UNDERSTORY, MAINTENANCE, AND VISUAL PATH CLEARANCE MAY PLACE ALONG THE JAMES AND CHICKAHOMINY RIVERS FRONTAGES: CT, BUT NECESSARY HAND CLEARING MAY BE IMPLEMENTED ALONG WETLAND FRONTAGE (I) IN CONJUNCTION WITH THE ESTABLISHMENT THE GOLF COURSE FAIRWAYS AND/OR (II) FOR UNDERSTORY, TENANCE, OR VISUAL PATH PURPOSED AS APPROVED BY THE NING COMMISSION.

1. ALL ROADS AND DRAINAGE FACILITIES SHOULD BE CONSTRUCTED IN ACCORDANCE WITH CURRENT REGULATIONS, SPECIFICATIONS AND STANDARDS, AND SUBDIVISION STREET REQUIREMENTS OF THE VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT).

2. STANDARD PE-1 ENTRANCES WITH A MINIMUM OF 24' OF 15" CONCRETE CULVERT PIPE SHALL BE REQUIRED FOR ALL DRIVEWAYS. IF ENDWALLS ARE PROVIDED AT EITHER END OF DRIVEWAY CULVERT, THE MAXIMUM ALLOWABLE HEIGHT OF THE ENDWALL IS TWO BRICK COURSES ABOVE THE DIRECTLY ADJACENT EDGE OF THE MAIN ROADWAY PAVEMENT (OR APPROXIMATELY 5" TO 6").

3. ALL SHOULDERS, DITCHES AND BACKSLOPES MUST BE STABILIZED PRIOR TO ACCEPTANCE OF ROADS INTO THE STATE SECONDARY ROAD SYSTEM.

4. THE ROAD CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL ITEMS OF ROAD WORK & DRAINAGE WITH EXISTING AND PROPOSED UNDERGROUND UTILITIES (POWER, WATER, SEWER AND TELEPHONE) SUCH THAT NO DUPLICATION OF WORK EFFORT IS INCURRED.

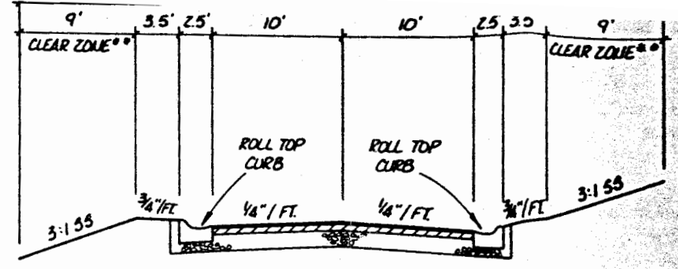
5. UPON COMPLETION, INSPECTION AND ACCEPTANCE, ALL ROADS AND DRAINAGE FACILITIES SHALL BE DEDICATED TO VDOT FOR INCLUSION IN THE STATE SECONDARY ROAD SYSTEM.

6. ALL ITEMS OF ROADWORK AND DRAINAGE NECESSARY FOR THE ROADS TO BE ACCEPTED INTO THE STATE SECONDARY ROAD SYSTEM, WHETHER WRITTEN ON THESE PLANS OR NOT ARE HEREBY EXPRESSLY IMPLIED. NO OMISSIONS, ERRORS OR OVERSIGHTS ON THE PART OF THE ENGINEER OR OWNER SHALL DETRACT FROM THE CONTRACTORS RESPONSIBILITY OF COMPLETING ALL ITEMS OF ROADWORK & DRAINAGE SATISFACTORY IN EVERY RESPECT TO JAMES CITY COUNTY AND VDOT.

7. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE THE RESPONSIBILITY OF THE ROAD CONTRACTOR.

8. LATERAL UNDERDRAINS MAY BE REQUIRED WHERE FIELD CONDITIONS WARRANT. A CHANGE ORDER FOR SAME WILL BE EXECUTED IF REQUIRED BY VDOT, THE ENGINEER, COUNTY OR OWNER.

9. PAVED DITCHES MAY BE REQUIRED WHERE FIELD CONDITIONS WARRANT. GENERALLY, ALL DITCHES WITH SLOPES EXCEEDING 3% SHALL BE PAVED UNLESS OTHERWISE APPROVED BY THE ENGINEER, OWNER, VDOT AND THE LOCAL GOVERNING BODY.

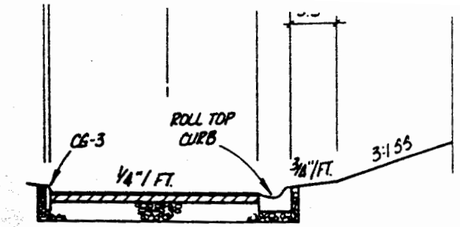



## TYPICAL SECTION
### NATHANIEL'S CLOSE, CAT. I, 50' R/W
### MILN HOUSE ROAD, CAT. I, 50' R/W (UNDIVIDED SECTION)

1. PROVIDE 2-10' LANES, SLOPE = 1/4"/FOOT.
2. PROVIDE 3.5' SHOULDER WIDTH, SLOPE = 3/4"/FOOT.
3. PROVIDE CBR = 10 OR GREATER.
4. BASE: 6" AGGREGATE BASE MATERIAL*
5. SURFACE: TYPE D BLOTTED SEAL COAT

* ALL UNTREATED AGGREGATE BASE OR SUBBASE MATERIAL SHALL BE 21B GRADATION. IF AGGREGATE IS CEMENT STABILIZED, USE 21A GRADATION. THE DEPTH OF AGGREGATE BASE MATERIAL SHALL BE 4" MINIMUM UNDER THE CURB & GUTTER AND SHALL EXTEND 1' BEHIND BACK OF CURB.

** ALL MAJOR TREES (GREATER THAN 4" IN BREAST HEIGHT DIAMETER) SHALL BE 9.5' FROM FACE OF CURB OR EDGE OF PAVEMENT.

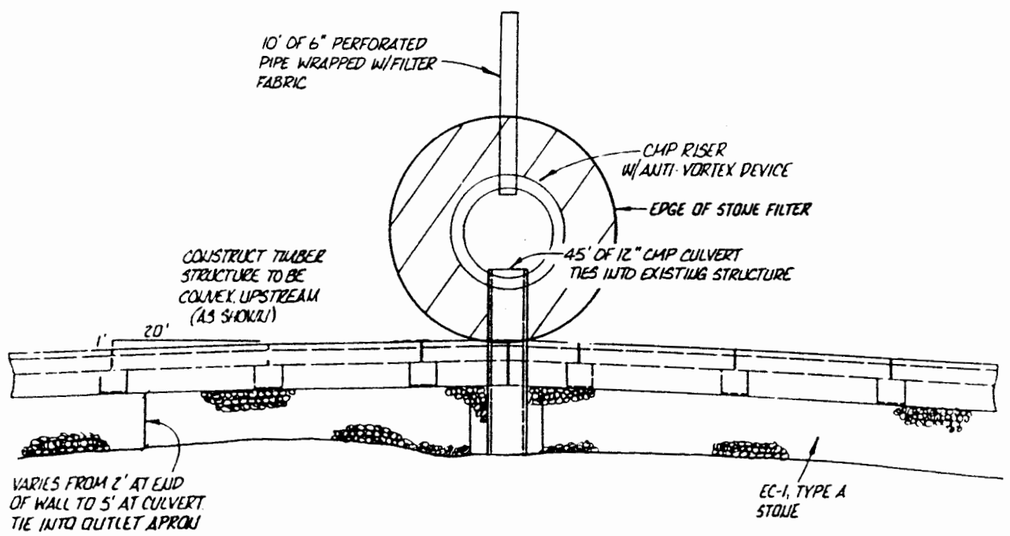



## TYPICAL SECTION
### WHITTLE'S WOOD ROAD (ONE LANE / ONE WAY SECTION)-50' R/W
### MILN HOUSE ROAD (DIVIDED SECTION)
### CAT. I, 50-75' R/W

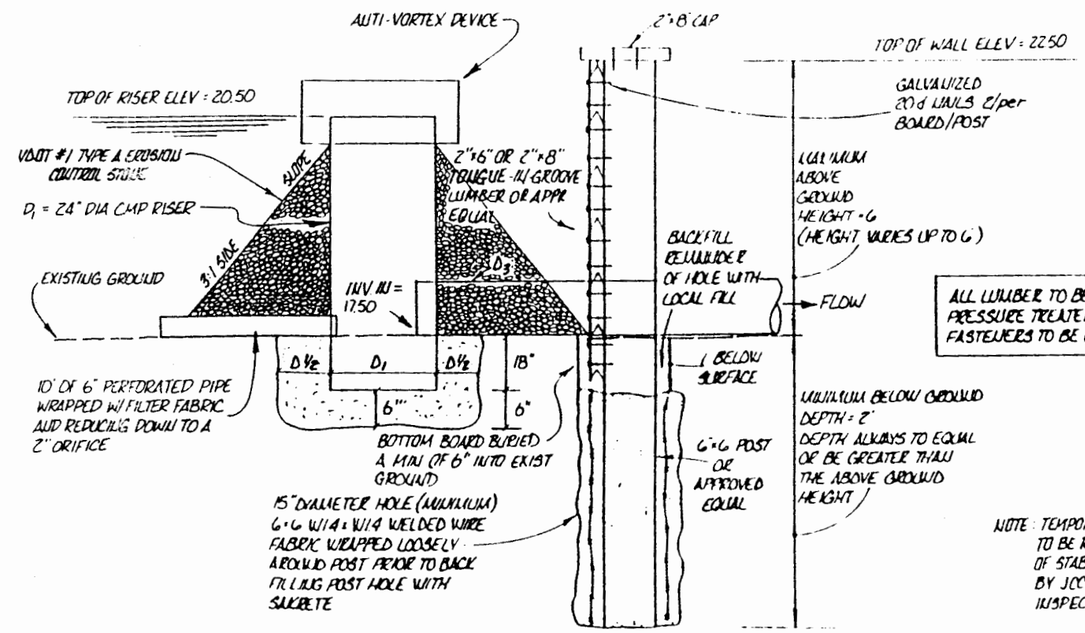
1. PROVIDE 2- ' LANES, SLOPE = 1/4"/FOOT.
2. PROVIDE 3.5' SHOULDER WIDTH, SLOPE = 3/4"/FOOT.
3. PROVIDE CBR = 10 OR GREATER.
4. BASE: 6" AGGREGATE BASE MATERIAL*
5. SURFACE: TYPE D BLOTTED SEAL COAT

* ALL UNTREATED AGGREGATE BASE OR SUBBASE MATERIAL SHALL BE 21B GRADATION. IF AGGREGATE IS CEMENT STABILIZED, USE 21A GRADATION. THE DEPTH OF AGGREGATE BASE MATERIAL SHALL BE 4" MINIMUM UNDER THE CURB & GUTTER AND SHALL EXTEND 1' BEHIND BACK OF CURB.

** ALL MAJOR TREES (GREATER THAN 4" IN BREAST HEIGHT DIAMETER) SHALL BE 9.5' FROM FACE OF CURB OR EDGE OF PAVEMENT.




## PLAN VIEW
## PRESSURE TREATED WOOD DRY DETENTION STRUCTURE
N.T.S.



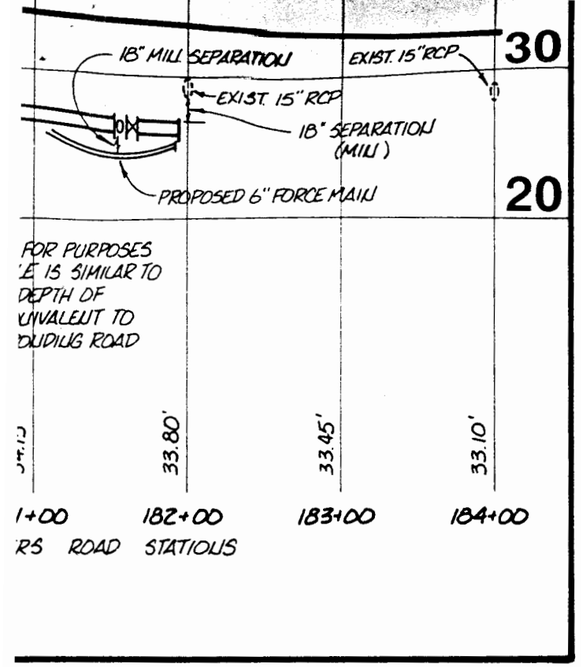

D.H.W 21.18
REV 22.76 PER AES 11/22/00

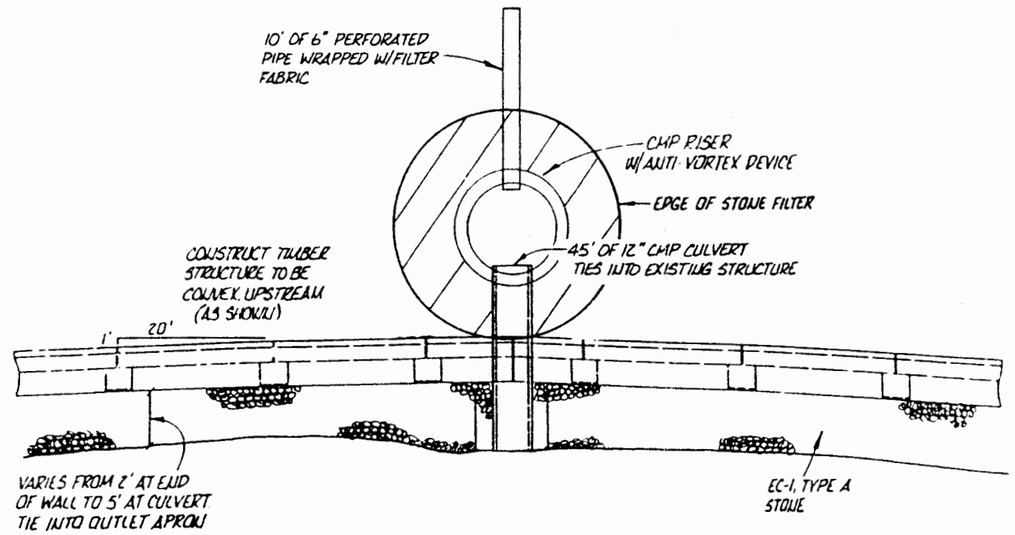
## END VIEW
## PRESSURE TREATED WOOD DRY DETENTION STRUCTURE
N.T.S.

JR029_GOVERNORS_LAND_MILN_HOUSE_ROAD - 030

5248 Olde Towne Road, Suite 1

NOTES AND DETAILS

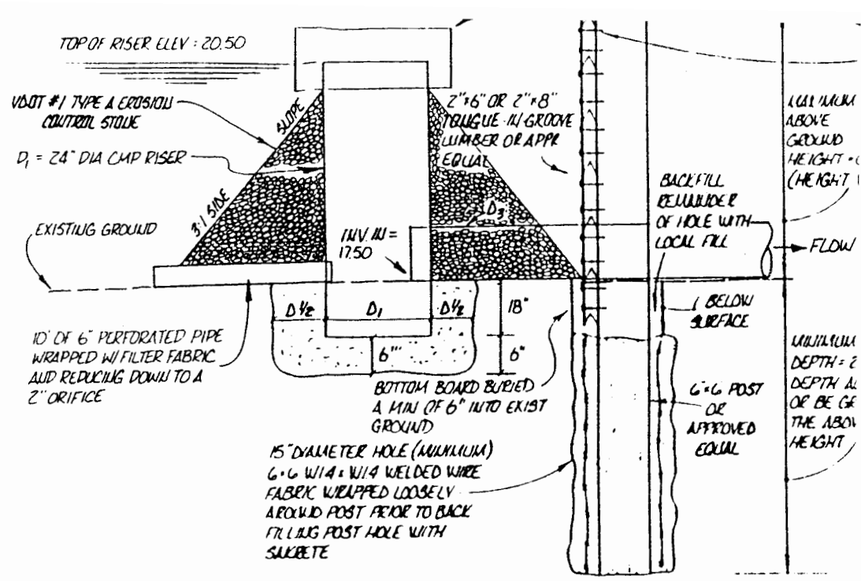



## PLAN VIEW

## PRESSURE TREATED WOOD DRY DETENTION STRUCTURE

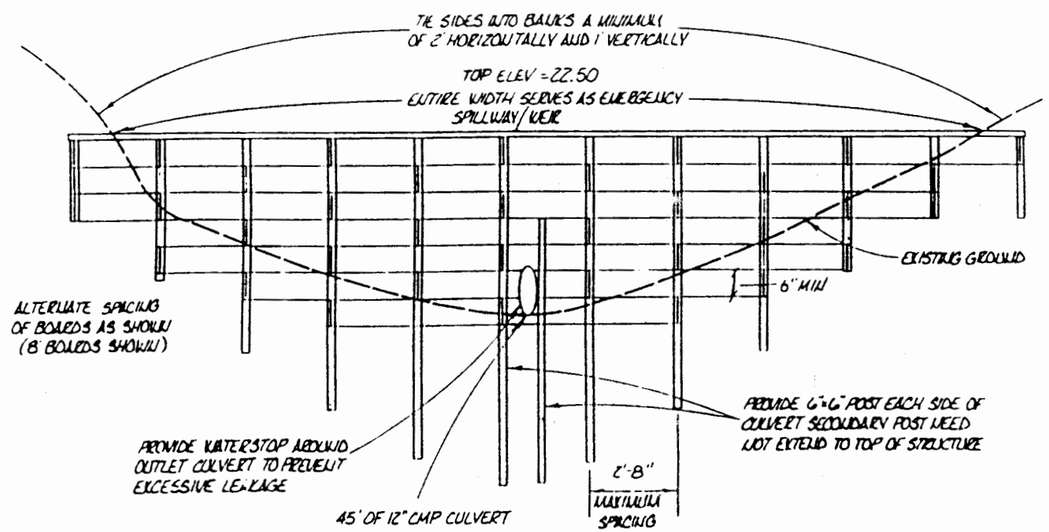
N.T.S.




## END VIEW

## PRESSURE TREATED WOOD DRY DE

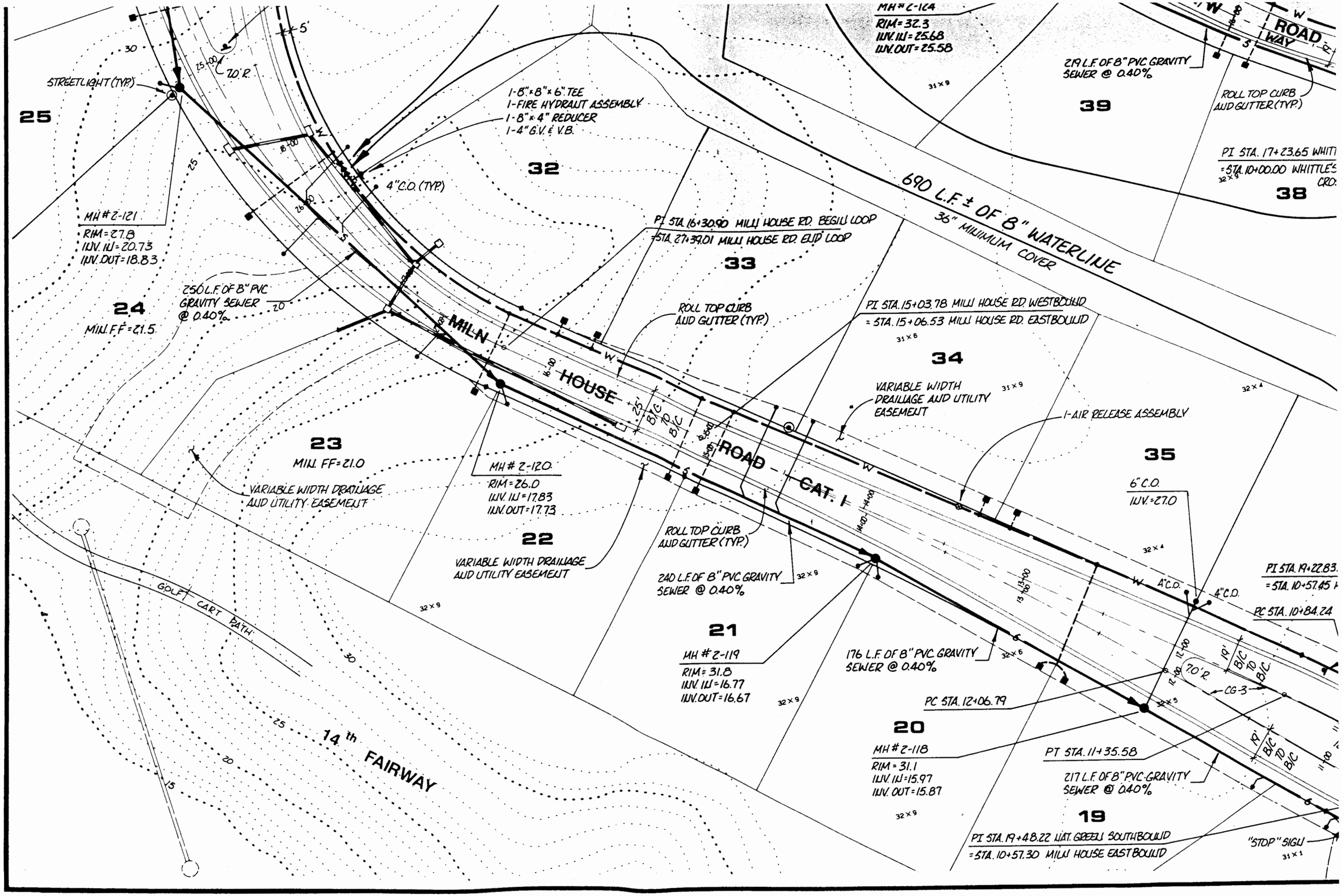
N.T.S.




## UPSTREAM ELEVATION

## PRESSURE TREATED WOOD DRY DETENTION STRUCTURE

N.T.S.


MILN HOUSE ROAD - CAT. I
690 L.F. ± OF 8" WATERLINE
36" MINIMUM COVER
STREETLIGHT (TYP.)
1-8"x8"x6" TEE
1-FIRE HYDRANT ASSEMBLY
1-8"x4" REDUCER
1-4" G.V. & V.B.
4" C.O. (TYP.)
MH # 2-121
RIM = 27.8
INV. IN = 20.73
INV. OUT = 18.83
250 L.F. OF 8" PVC GRAVITY SEWER @ 0.40%
MIN. F.F = 21.5
PI STA. 16+30.90 MILN HOUSE RD. BEGIN LOOP
= STA. 27+39.01 MILN HOUSE RD. END LOOP
ROLL TOP CURB AND GUTTER (TYP.)
PI STA. 15+03.78 MILN HOUSE RD. WESTBOUND
= STA. 15+06.53 MILN HOUSE RD. EASTBOUND
VARIABLE WIDTH DRAINAGE AND UTILITY EASEMENT
1-AIR RELEASE ASSEMBLY
6" C.O.
INV. = 27.0
MIN. FF = 21.0
MH # 2-120
RIM = 26.0
INV. IN = 17.83
INV. OUT = 17.73
VARIABLE WIDTH DRAINAGE AND UTILITY EASEMENT
ROLL TOP CURB AND GUTTER (TYP.)
240 L.F. OF 8" PVC GRAVITY SEWER @ 0.40%
MH # 2-119
RIM = 31.8
INV. IN = 16.77
INV. OUT = 16.67
176 L.F. OF 8" PVC GRAVITY SEWER @ 0.40%
PC STA. 12+06.79
MH # 2-118
RIM = 31.1
INV. IN = 15.97
INV. OUT = 15.87
PT STA. 11+35.58
217 L.F. OF 8" PVC GRAVITY SEWER @ 0.40%
PI STA. 19+48.22 MAT. GREEN SOUTHBOUND
= STA. 10+57.30 MILN HOUSE EASTBOUND
"STOP" SIGN
PI STA. 19+22.83
= STA. 10+57.45
PC STA. 10+84.24
4" C.O.
CG-3
7.0' R.
GOLF CART PATH
14th FAIRWAY
ROAD WAY
219 L.F. OF 8" PVC GRAVITY SEWER @ 0.40%
ROLL TOP CURB AND GUTTER (TYP.)
PI STA. 17+23.65 WHITT
= STA. 10+00.00 WHITTLE'S
CRO
25
24
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22
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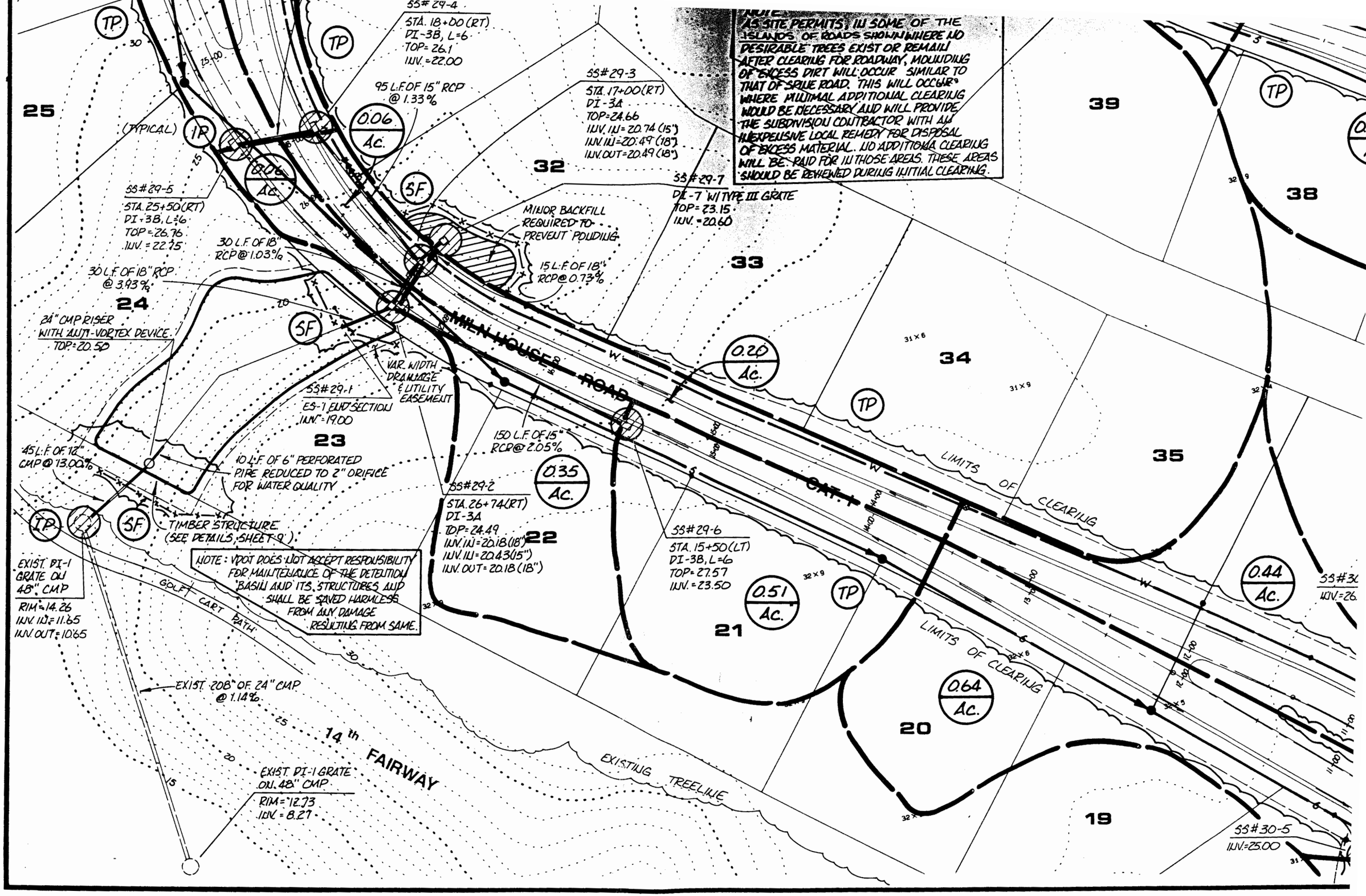
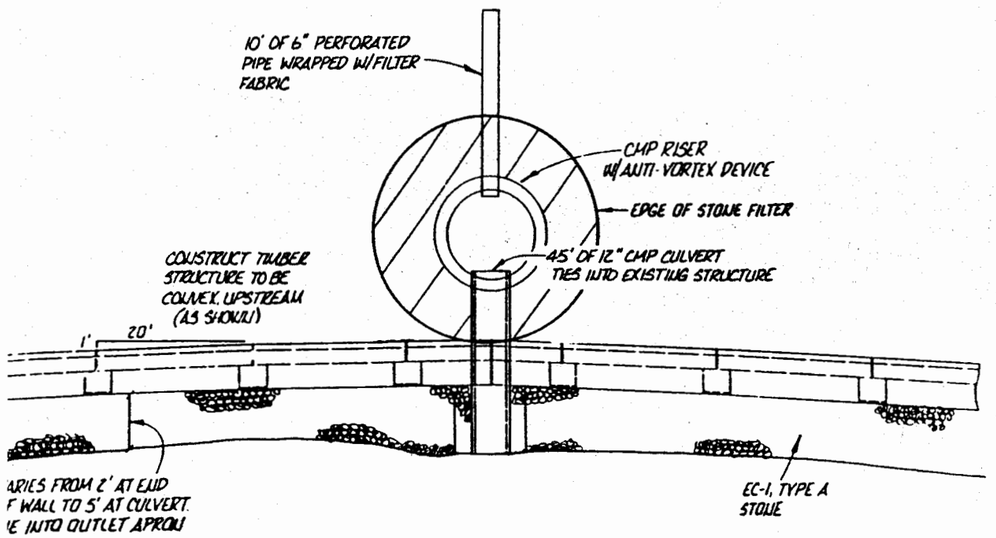
160845

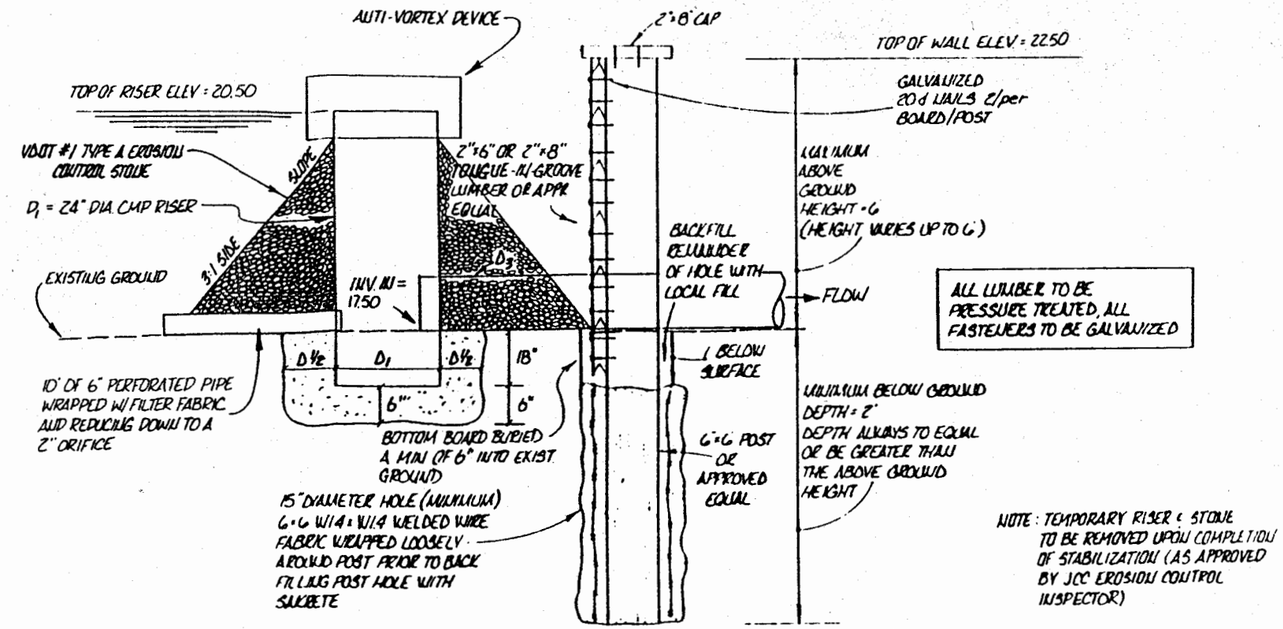

NOTE:
AS SITE PERMITS, IN SOME OF THE ISLANDS OF ROADS SHOWN WHERE NO DESIRABLE TREES EXIST OR REMAIN AFTER CLEARING FOR ROADWAY, MOUNDING OF EXCESS DIRT WILL OCCUR SIMILAR TO THAT OF SPINE ROAD. THIS WILL OCCUR WHERE MINIMAL ADDITIONAL CLEARING WOULD BE NECESSARY AND WILL PROVIDE THE SUBDIVISION CONTRACTOR WITH AN INEXPENSIVE LOCAL REMEDY FOR DISPOSAL OF EXCESS MATERIAL. NO ADDITIONAL CLEARING WILL BE PAID FOR IN THOSE AREAS. THESE AREAS SHOULD BE REVIEWED DURING INITIAL CLEARING.
SS# 29-4
STA. 18+00 (RT)
DI-3B, L=6
TOP= 26.1
INV.=22.00
95 L.F. OF 15" RCP @ 1.33%
SS# 29-3
STA. 17+00 (RT)
DI-3A
TOP=24.66
INV. IN= 20.74 (15")
INV. IN= 20.49 (18")
INV. OUT=20.49 (18")
SS# 29-7
DI-7 W/ TYPE III GRATE
TOP= 23.15
INV.=20.60
SS# 29-5
STA. 25+50 (RT)
DI-3B, L=6
TOP=26.76
INV.=22.75
30 L.F. OF 18" RCP @ 1.03%
30 L.F. OF 18" RCP @ 3.93%
MINOR BACKFILL REQUIRED TO PREVENT PONDING
15 L.F. OF 18" RCP @ 0.73%
24" CMP RISER WITH ANTI-VORTEX DEVICE
TOP=20.50
VAR. WIDTH DRAINAGE & UTILITY EASEMENT
SS# 29-1
ES-1 END SECTION
INV.=19.00
45 L.F. OF 12" CMP @ 13.00%
10 L.F. OF 6" PERFORATED PIPE REDUCED TO 2" ORIFICE FOR WATER QUALITY
TIMBER STRUCTURE (SEE DETAILS, SHEET 9)
150 L.F. OF 15" RCP @ 2.05%
SS# 29-2
STA. 26+74 (RT)
DI-3A
TOP=24.49
INV. IN=20.18 (18")
INV. IN=20.43 (15")
INV. OUT=20.18 (18")
SS# 29-6
STA. 15+50 (LT)
DI-3B, L=6
TOP=27.57
INV.=23.50
EXIST. DI-1 GRATE ON 48" CMP
RIM=14.26
INV. IN=11.65
INV. OUT=10.65
NOTE: VDOT DOES NOT ACCEPT RESPONSIBILITY FOR MAINTENANCE OF THE DETENTION BASIN AND ITS STRUCTURES AND SHALL BE SAVED HARMLESS FROM ANY DAMAGE RESULTING FROM SAME.
EXIST. 208' OF 24" CMP @ 1.14%
EXIST. DI-1 GRATE ON 48" CMP
RIM=12.73
INV.=8.27
SS# 30-5
INV.=25.00
MILN HOUSE ROAD
CUT-1
LIMITS OF CLEARING
GOLF CART PATH
14th FAIRWAY
EXISTING TREELINE
0.06 Ac.
0.20 Ac.
0.35 Ac.
0.51 Ac.
0.64 Ac.
0.44 Ac.
TP
SF
IP
(TYPICAL)
25
24
23
22
21
20
19
32
33
34
35
38
39
160845




## PLAN VIEW

## SSURE TREATED WOOD DRY DETENTION STRUCTURE

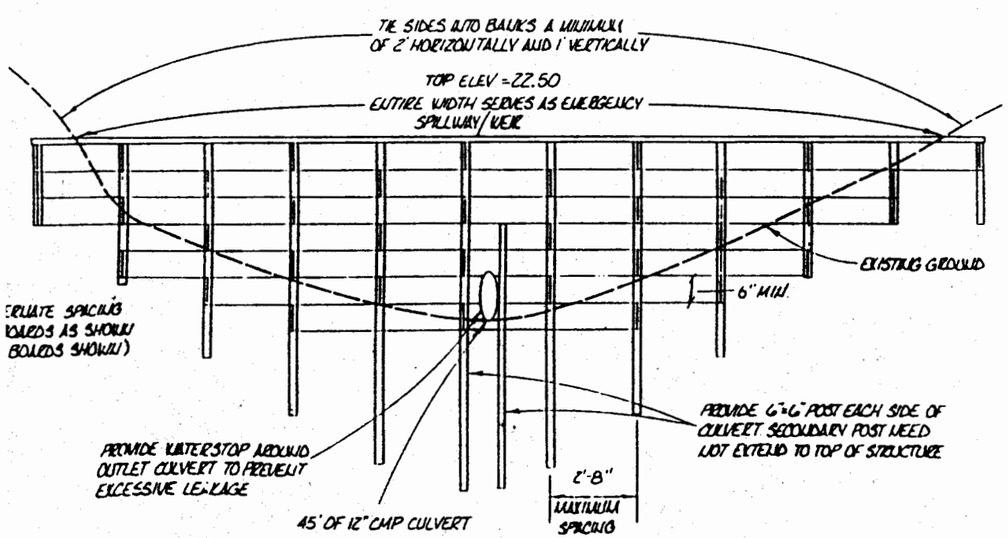
N.T.S.




## END VIEW

## PRESSURE TREATED WOOD DRY DETENTION STRUCTURE

N.T.S.




## UPSTREAM ELEVATION

## ESSURE TREATED WOOD DRY DETENTION STRUCTURE

N.T.S.

Mill House

Nathaniels Green

On LH side Mill House Rd

Between 6th & 7th lot

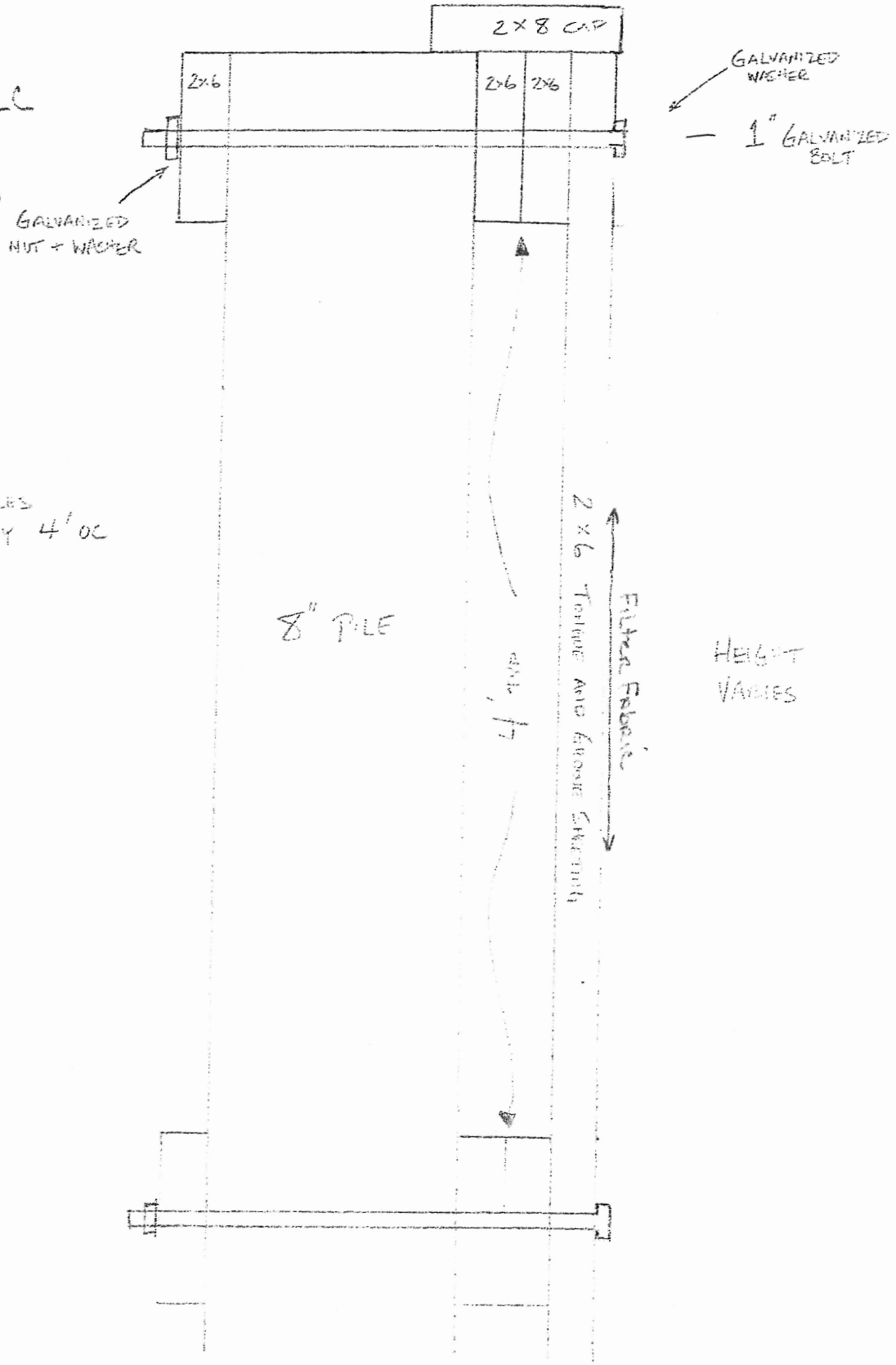
**OFFSITE UTILITY PLAN/NOTES AND DETAILS**

NATHANIEL'S GREEN

THE GOVERNOR'S LAND

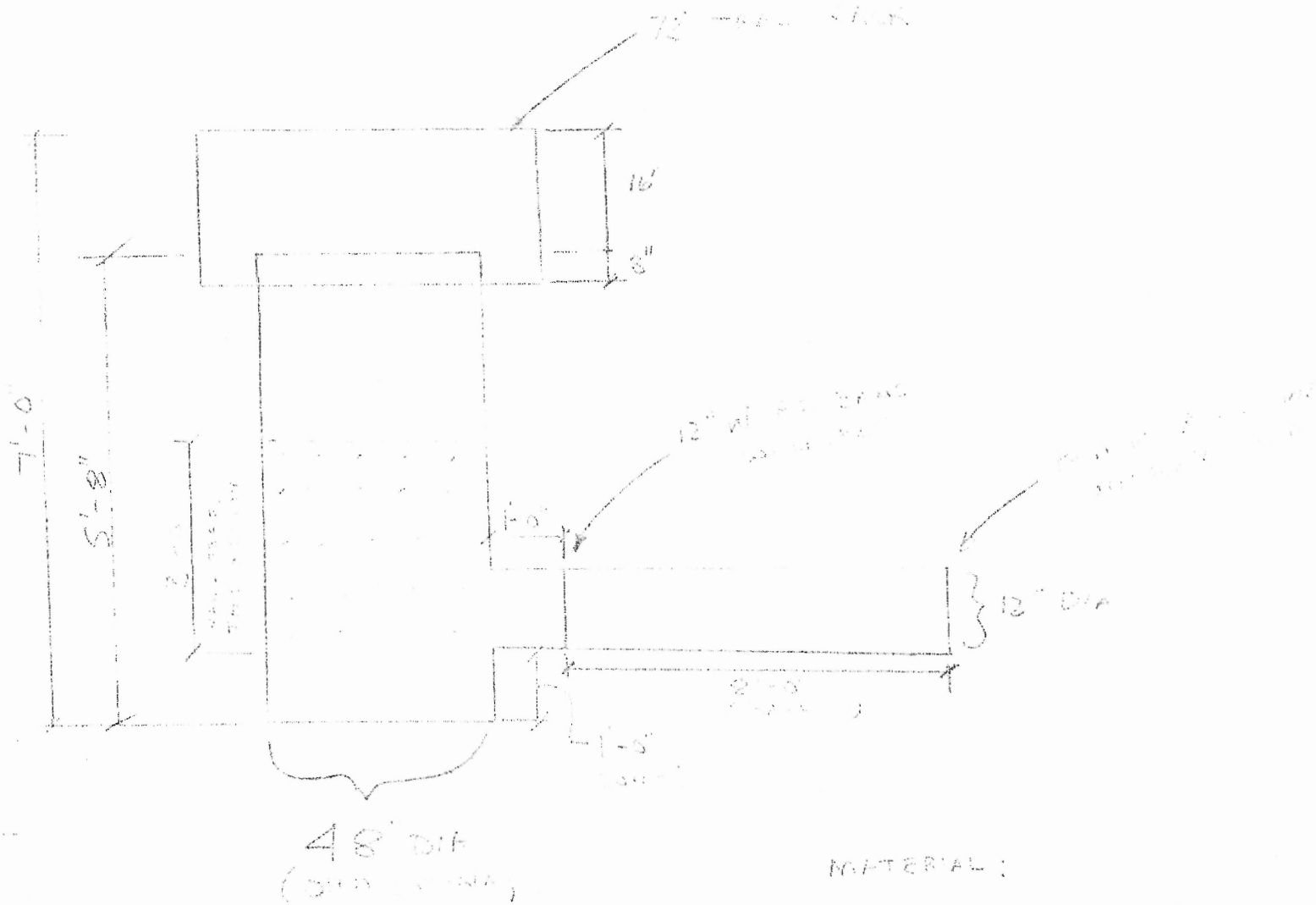
| | |
|---|---|
| Designed VMB | Dr |
| Scale | Da JA |
| Project 7173 | |
| Drawing 9 | |

Gilley Construction LLC
Governor's Land
Timber Wall Repairs
4-26-2012




* CONNECTION TO PILES TO BE MADE EVERY 4' OC

1" = 5"




PERF PATTERN

1" DIA HOLES

MATERIAL:

PROJECT: HOA

CONTRACTOR: EDWARD GOLDER

W. SHADE ENGR.

(SIGNATURE)

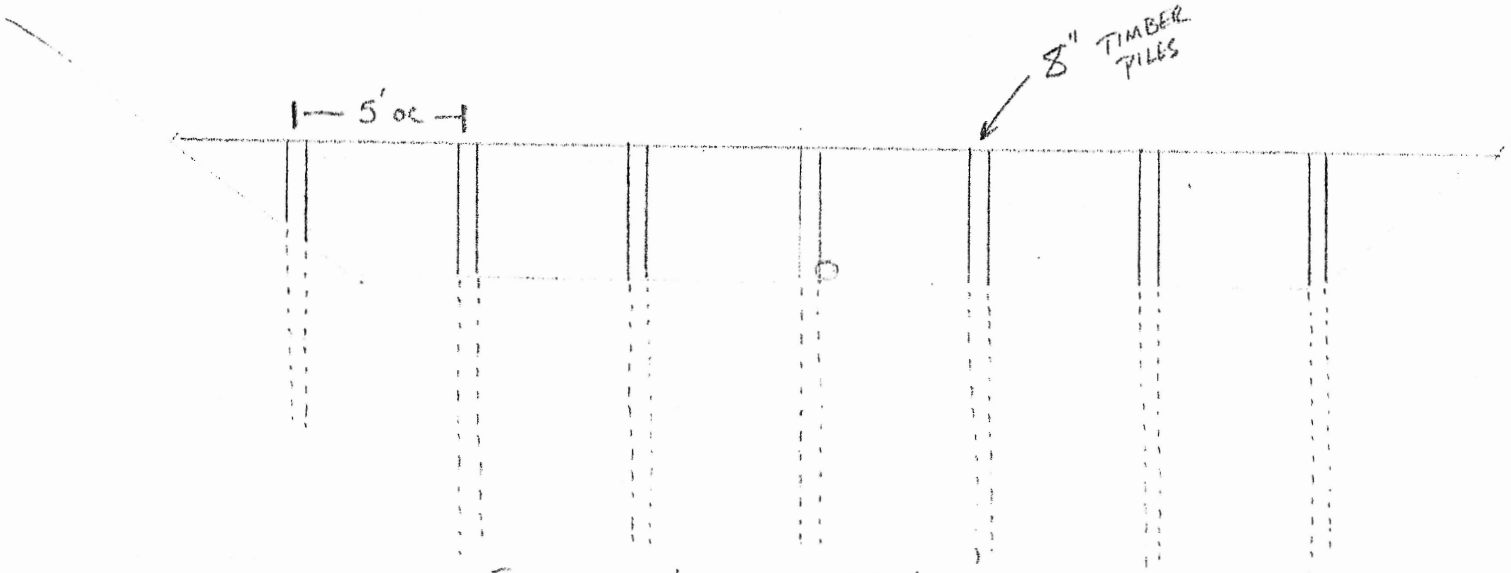
X

CONTRACTOR

(SIGNATURE)

ELEVATION
GOVERNOR'S LAND
TIMBER WALL REPAIRS

WIDTH VARIES




EMBEDMENT LENGTH = 2X VISIBLE LENGTH
FOR BOTH PILES AND SHEETING

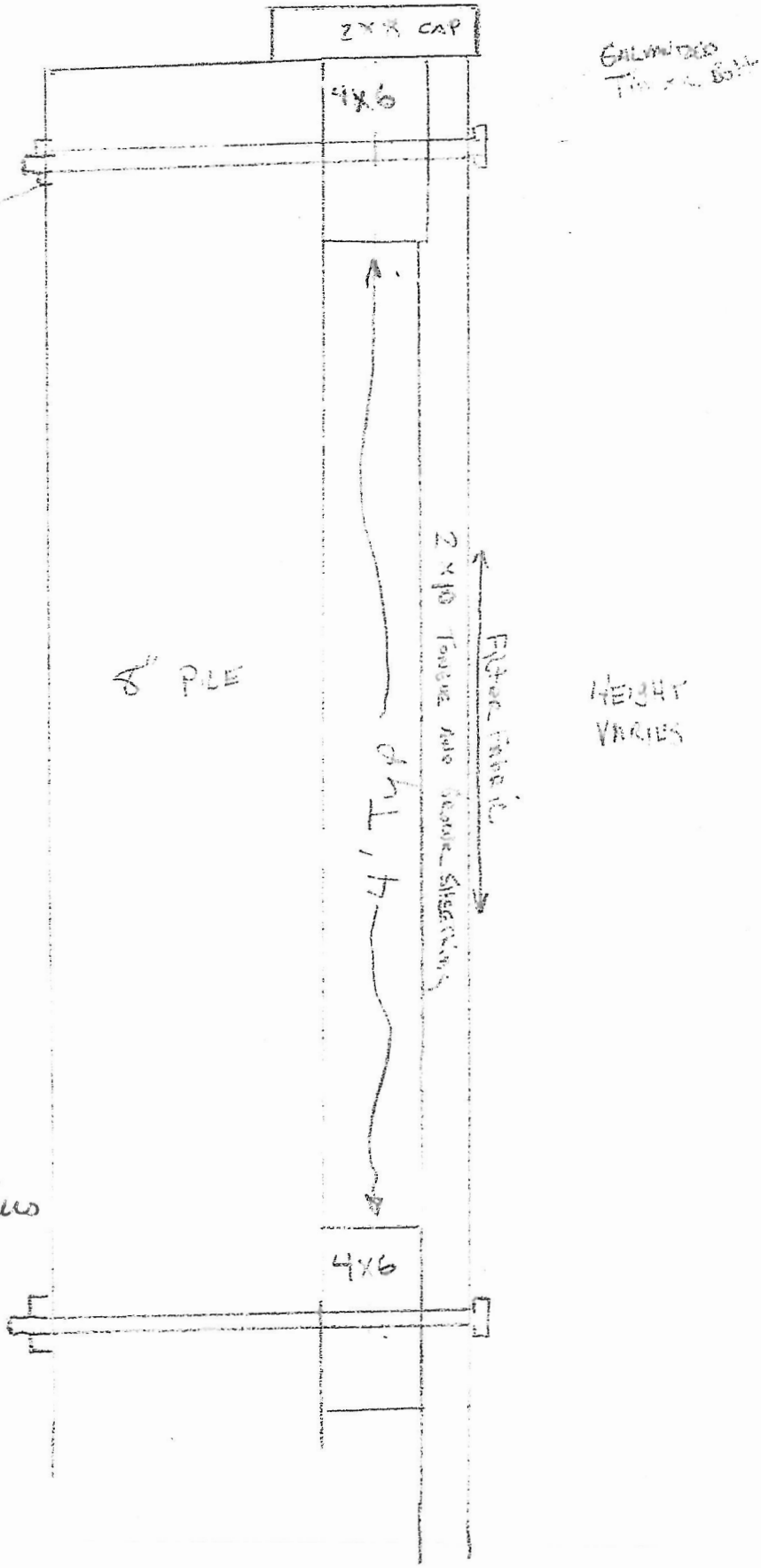
Gilley Construction LLC
Governor's Land
Timber Wall Repair
4-26-2012

SEE CROSS SECTION
FOR WALL DETAILS

1" = 10'

Founders Hill JR-029

Gilley Construction LLC
Governor's Land
Timber Wall Repairs



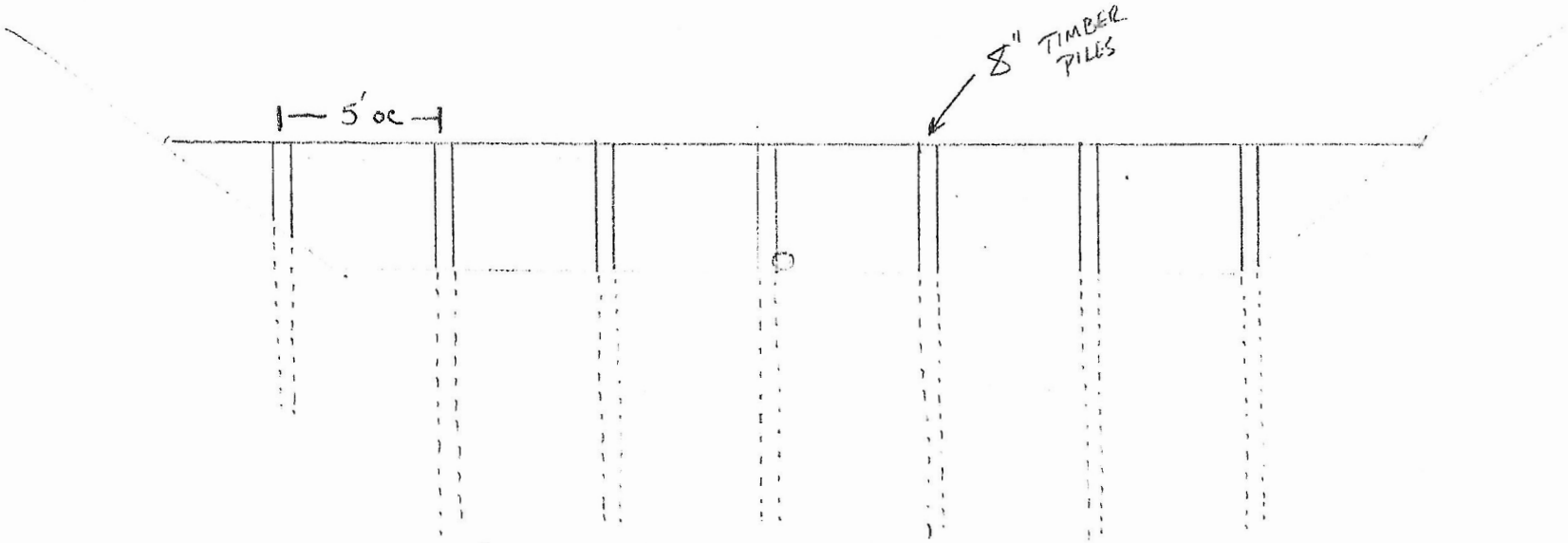

STORMWATER BMP Repairs
Approved by. PM
8/30/12

1" = 5'

ELEVATION
GOVERNOR'S LAND
TIMBER WALL REPAIRS

# Founders Hill

WIDTH VARIES

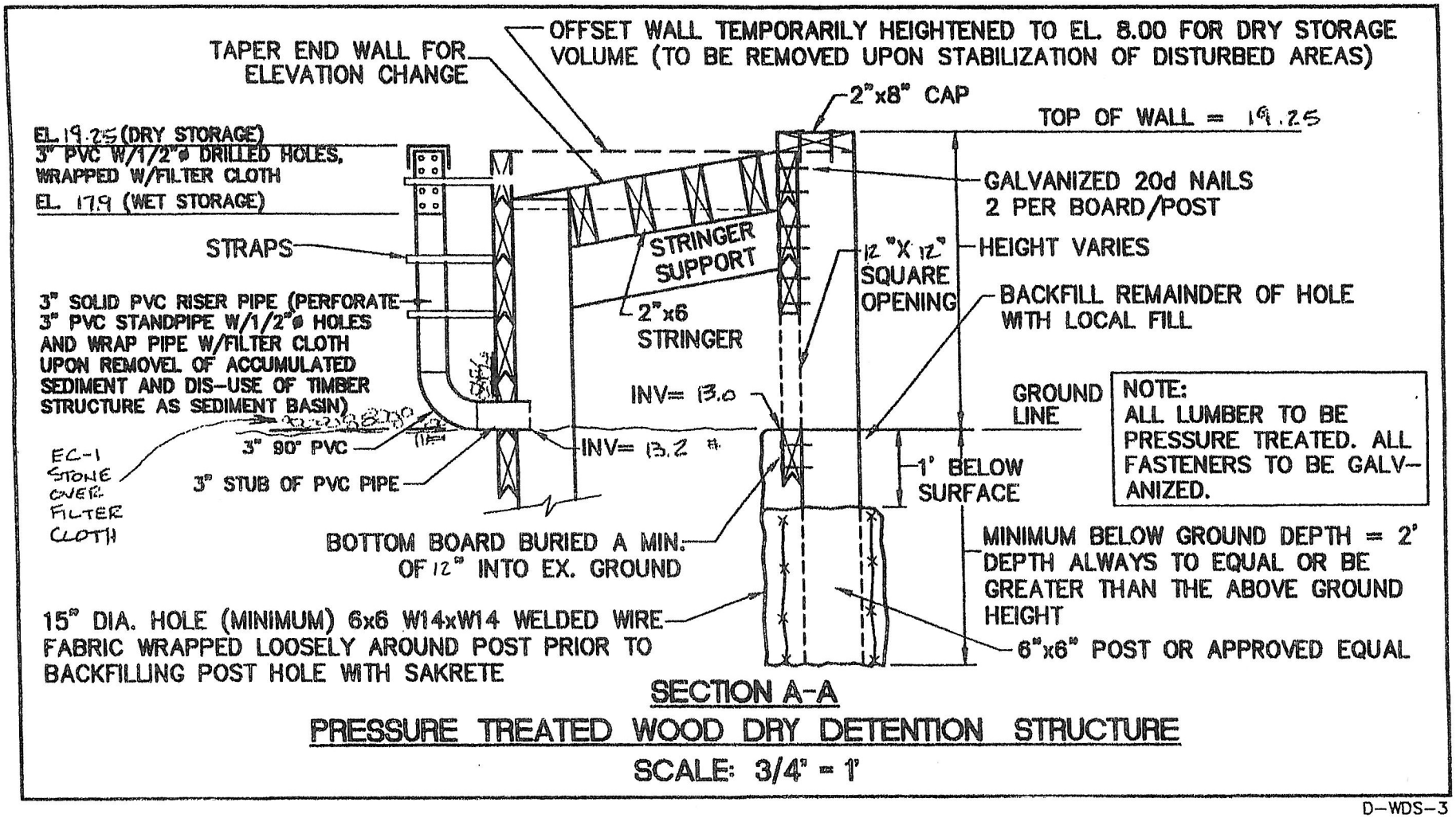



EMBEDMENT LENGTH = 2X VISIBLE LENGTH
FOR BOTH PILES AND SHEETING

Gilley Construction LLC
Governor's Land
Timber Wall Repair
8-20-2012

SEE CROSS SECTION
FOR WALL DETAILS

1" = 10'



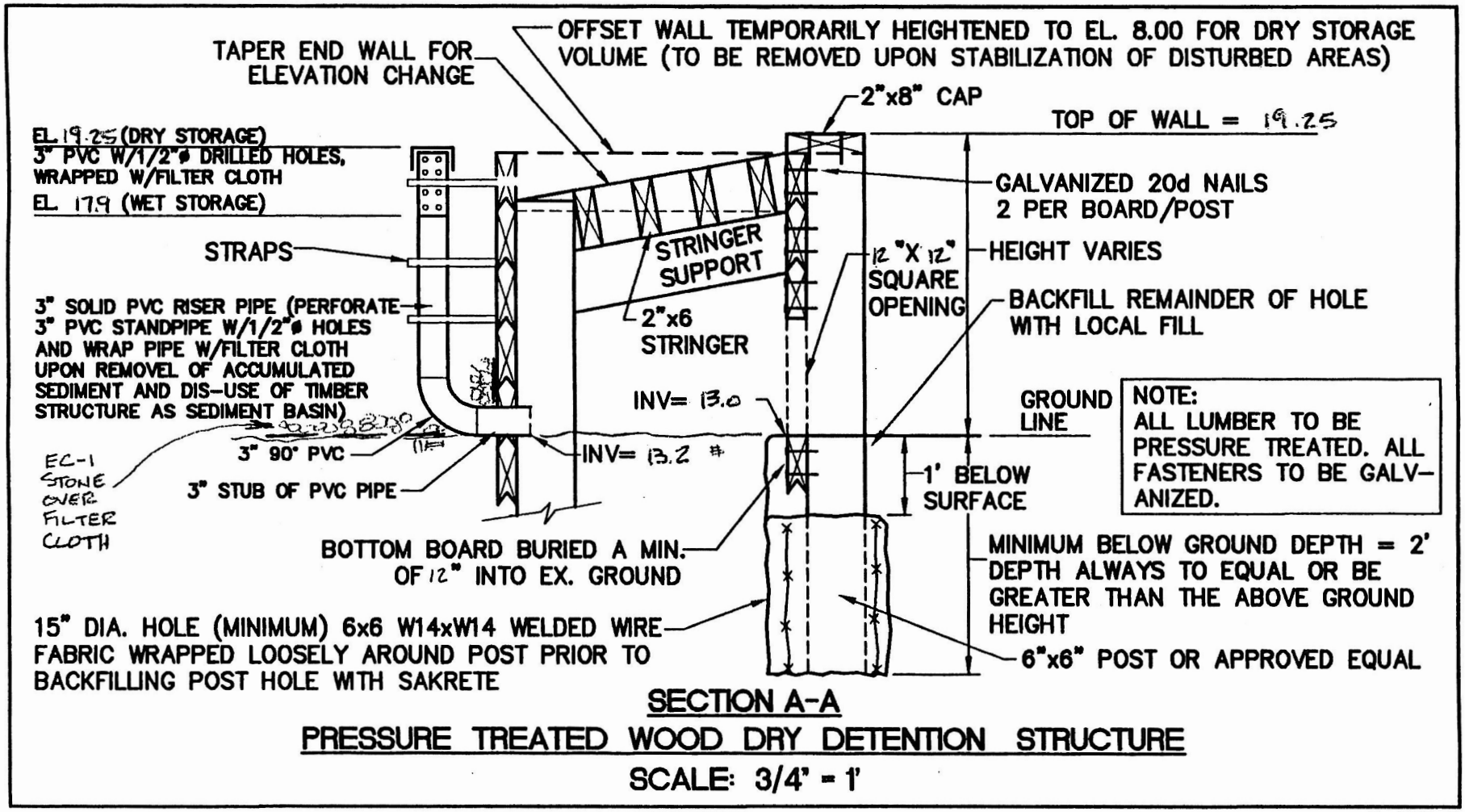

SECTION A-A

PRESSURE TREATED WOOD DRY DETENTION STRUCTURE

SCALE: 3/4" = 1'

D-WDS-3

FOUNDER'S HILL
8-20-2012



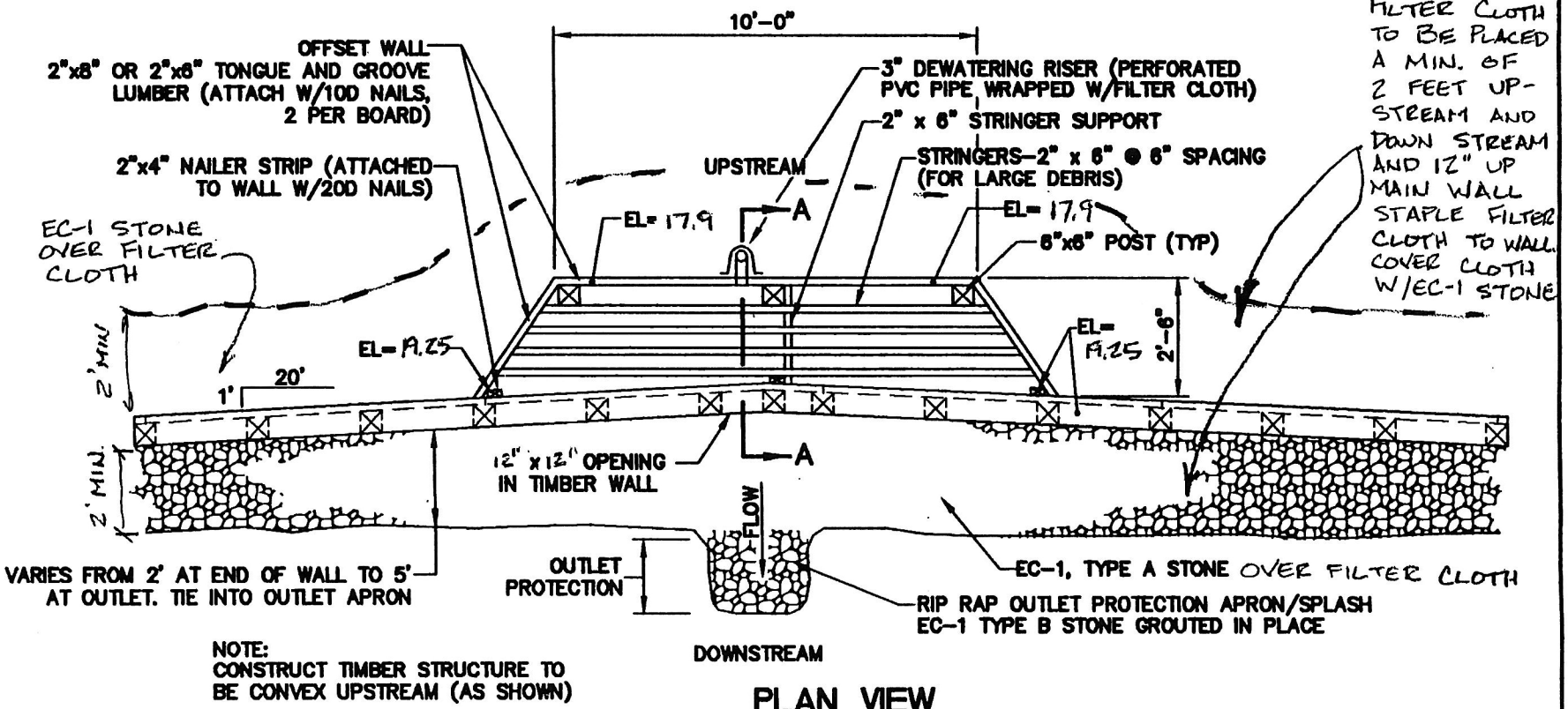

**SECTION A-A**

**PRESSURE TREATED WOOD DRY DETENTION STRUCTURE**

SCALE: 3/4" = 1'

D-WDS-3

FOUNDER'S HILL
6/14/95




NOTE:
CONSTRUCT TIMBER STRUCTURE TO BE CONVEX UPSTREAM (AS SHOWN)

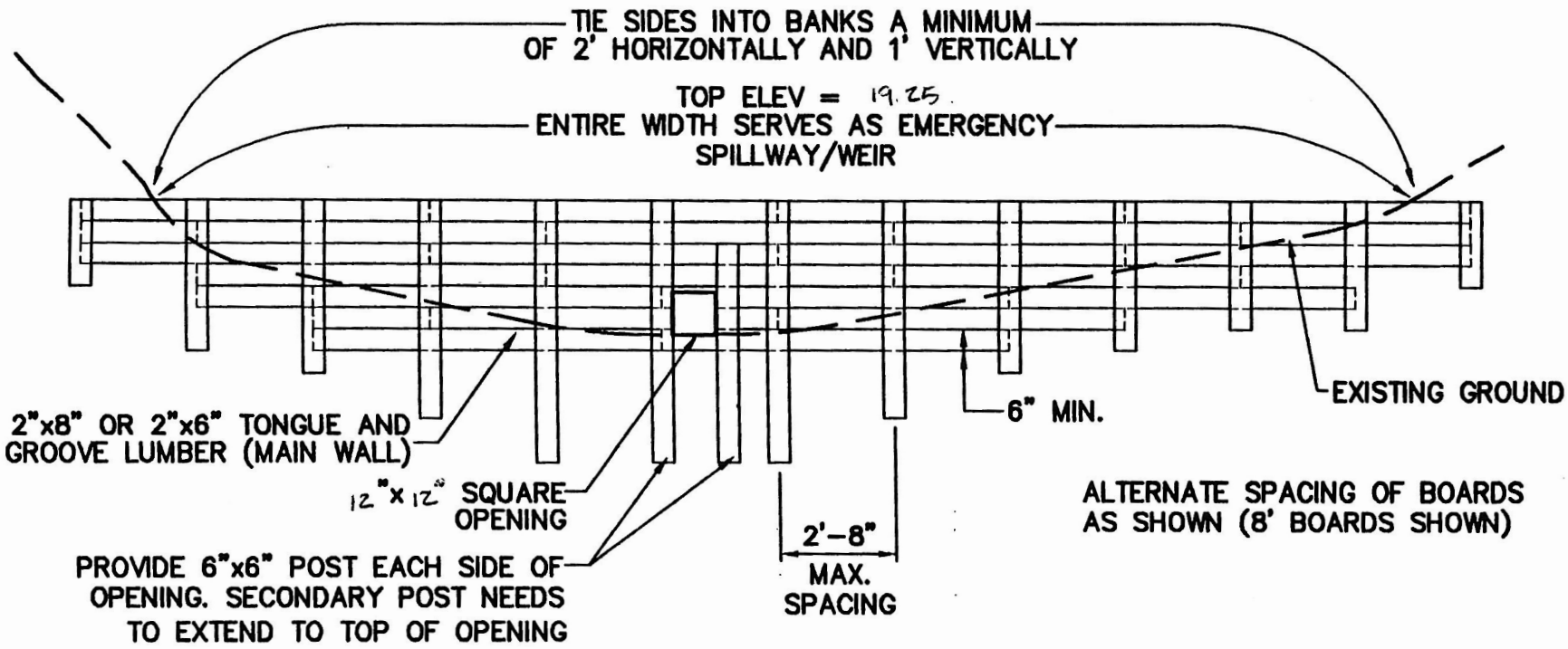
## PLAN VIEW

## PRESSURE TREATED WOOD DRY DETENTION STRUCTURE

SCALE: 1/4" = 1'

D-WDS-2

FOUNDER'S HILL
6/14/95




## UPSTREAM ELEVATION

## PRESSURE TREATED WOOD DRY DETENTION STRUCTURE

SCALE: 1/4" = 1'

D-WDS-1

FOUNDER'S HILL
6/14/95

# HYDRAULIC REPORT FOR

GOVERNOR'S LAND

Job No. 7173

TWO RIVERS ROAD

SYSTEM 7(BAY 2,POD 3)

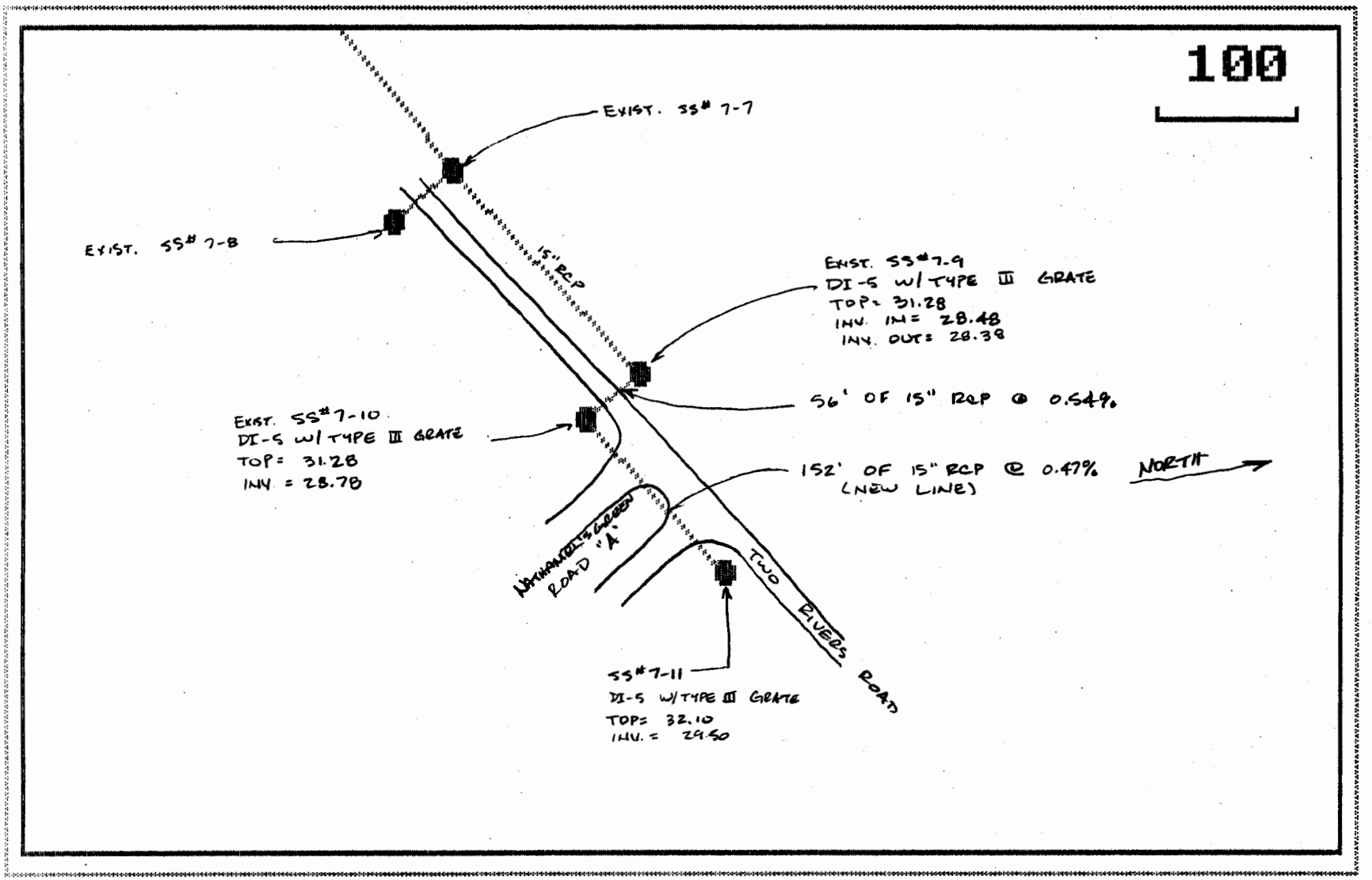
prepared by

AES CONSULTING ENGINEERS

5248 Olde Towne Rd., St. 1

Williamsburg, VA 23188

Revised Date: 12/23/91




[← ↑ → ↓] Move [Spc] #'s [Home] Reset

[PgUp] Enlarge [PgDn] Reduce [Esc] Exit

Run date: 12-23-1991
File: a:SYSTEM7.ST3

Return Period = 10 Yrs
Rainfall file: JAMES CITY CO.....

**LINE 1 / Q = 20.8 / HT = 30 / WID = 30 / N = .013 / L = 170 / JLC = .94**

LINE 1.SS#7-1 - SS#7-2 / Outfall

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 22.59 | 19.13 | 21.00 | 6.04 | 23.16 | 28.39 | -1.5 | 3.45 |
| UPSTRM | 23.35 | 21.58 | 21.55 | 5.51 | 23.82 | 26.96 | .9 | 3.78 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = 1.24 | Slope of invert (%) | = 0.324 |
| Runoff coefficient | = .7 | Slope energy grade line (%) | = 0.387 |
| Time of conc (min) | = 31 | Critical depth (in) | = 19.13 |
| Inlet time (min) | = 5 | Req'd length curb inlet (ft) | = 0.0 |
| Intensity (in/hr) | = 3.56 | Req'd grate area (sf) | = 0.0 |
| Cumulative C*A | = 5.8 | Depth at inlet opening (in) | = 0 |
| Flow contrib (cfs) | = 3 | Confluence angle (deg) | = 0 |
| Default Q (cfs) | = 0 | Natural ground elev (ft) | = 24.95 |
| Line capac. (cfs) | = 23.3 | Line storage (cuft) | = 614 |

**LINE 2 / Q = 17.8 / HT = 30 / WID = 30 / N = .013 / L = 56 / JLC = 1.7**

LINE 2.SS#7-2 - SS#7-3 / DNLN = 1

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 23.79 | 25.69 | 21.65 | 3.94 | 24.03 | 20.26 | .8 | 4.53 |
| UPSTRM | 23.86 | 23.89 | 21.87 | 4.25 | 24.14 | 24.17 | .57 | 4.19 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = 8.7 | Slope of invert (%) | = 0.393 |
| Runoff coefficient | = .35 | Slope energy grade line (%) | = 0.196 |
| Time of conc (min) | = 31 | Critical depth (in) | = 17.67 |
| Inlet time (min) | = 31 | Req'd length curb inlet (ft) | = 10.0 |
| Intensity (in/hr) | = 3.58 | Req'd grate area (sf) | = 2.9 |
| Cumulative C*A | = 5.0 | Depth at inlet opening (in) | = 6 |
| Flow contrib (cfs) | = 10.9 | Confluence angle (deg) | =-17 |
| Default Q (cfs) | = 0 | Natural ground elev (ft) | = 24.95 |
| Line capac. (cfs) | = 25.7 | Line storage (cuft) | = 244 |

**LINE 3 / Q = 7.8 / HT = 18 / WID = 18 / N = .013 / L = 240 / JLC = .9**

LINE 3.SS#7-3 - SS#7-4 / DNLN = 2

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 24.34 | 17.62 | 22.87 | 4.42 | 24.64 | 5.17 | .57 | 1.76 |
| UPSTRM | 25.81 | 13.58 | 24.68 | 5.44 | 26.27 | 15.49 | 2.6 | 1.43 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = 1.2 | Slope of invert (%) | = 0.754 |
| Runoff coefficient | = .3 | Slope energy grade line (%) | = 0.679 |
| Time of conc (min) | = 25 | Critical depth (in) | = 13.54 |
| Inlet time (min) | = 25 | Req'd length curb inlet (ft) | = 0.0 |
| Intensity (in/hr) | = 4.03 | Req'd grate area (sf) | = 0.0 |
| Cumulative C*A | = 1.9 | Depth at inlet opening (in) | = 0 |
| Flow contrib (cfs) | = 1.4 | Confluence angle (deg) | = 90 |
| Default Q (cfs) | = 0 | Natural ground elev (ft) | = 28.78 |
| Line capac. (cfs) | = 9.1 | Line storage (cuft) | = 383 |

**LINE 4 / Q = 6.6 / HT = 18 / WID = 18 / N = .013 / L = 295 / JLC = .98**

LINE 4.SS#7-4 - SS#7-5 / DNLN = 3

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 26.22 | 17.34 | 24.78 | 3.79 | 26.45 | 6.03 | 2.5 | 1.75 |
| UPSTRM | 27.27 | 14.90 | 26.03 | 4.25 | 27.55 | 13.60 | 2 | 1.56 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = 1 | Slope of invert (%) | = 0.424 |
| Runoff coefficient | = .3 | Slope energy grade line (%) | = 0.374 |
| Time of conc (min) | = 23 | Critical depth (in) | = 12.33 |
| Inlet time (min) | = 22 | Req'd length curb inlet (ft) | = 0.0 |
| Intensity (in/hr) | = 4.22 | Req'd grate area (sf) | = 0.0 |
| Cumulative C*A | = 1.6 | Depth at inlet opening (in) | = 0 |
| Flow contrib (cfs) | = 1.2 | Confluence angle (deg) | =-10 |
| Default Q (cfs) | = 0 | Natural ground elev (ft) | = 29.53 |
| Line capac. (cfs) | = 6.8 | Line storage (cuft) | = 489 |

**LINE 5 / Q = 1.7 / HT = 15 / WID = 15 / N = .013 / L = 56 / JLC = .33**

LINE 5. SS#7-5 - SS#7-6 / DNLN = 4

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 27.55 | 15.00 | 26.28 | 1.39 | 27.58 | 0.00 | 2 | 1.23 |
| UPSTRM | 27.64 | 6.71 | 27.03 | 3.21 | 27.80 | 14.92 | 1.25 | 0.53 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = .72 | Slope of invert (%) | = 1.339 |
| Runoff coefficient | = .4 | Slope energy grade line (%) | = 0.404 |
| Time of conc (min) | = 10 | Critical depth (in) | = 6.60 |
| Inlet time (min) | = 10 | Req'd length curb inlet (ft) | = 0.0 |
| Intensity (in/hr) | = 5.93 | Req'd grate area (sf) | = 0.0 |
| Cumulative C*A | = 0.3 | Depth at inlet opening (in) | = 0 |
| Flow contrib (cfs) | = 1.7 | Confluence angle (deg) | = 90 |
| Default Q (cfs) | = 0 | Natural ground elev (ft) | = 29.53 |
| Line capac. (cfs) | = 7.5 | Line storage (cuft) | = 49 |

**LINE 6 / Q = 4.3 / HT = 15 / WID = 15 / N = .013 / L = 296 / JLC = 1**

LINE 6. SS#7-5 - SS#7-7 / DNLN = 4

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 27.55 | 15.00 | 26.28 | 3.52 | 27.74 | 0.00 | 2 | 1.23 |
| UPSTRM | 28.82 | 14.88 | 27.58 | 3.52 | 29.01 | 2.64 | 1.75 | 1.23 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = .9 | Slope of invert (%) | = 0.439 |
| Runoff coefficient | = .3 | Slope energy grade line (%) | = 0.431 |
| Time of conc (min) | = 21 | Critical depth (in) | = 10.28 |
| Inlet time (min) | = 20 | Req'd length curb inlet (ft) | = 0.0 |
| Intensity (in/hr) | = 4.38 | Req'd grate area (sf) | = 0.0 |
| Cumulative C*A | = 1.0 | Depth at inlet opening (in) | = 0 |
| Flow contrib (cfs) | = 1.1 | Confluence angle (deg) | =-11 |
| Default Q (cfs) | = 0 | Natural ground elev (ft) | = 30.58 |
| Line capac. (cfs) | = 4.3 | Line storage (cuft) | = 363 |

**LINE 7 / Q = 0.7 / HT = 15 / WID = 15 / N = .013 / L = 56 / JLC = .33**

LINE 7.....SS#7-7 - SS#7-8 / DNLN = 6

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 29.01 | 15.00 | 27.68 | 0.54 | 29.02 | 0.00 | 1.64 | 1.23 |
| UPSTRM | 29.02 | 11.25 | 28.08 | 0.67 | 29.03 | 12.99 | 1.25 | 0.99 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | .28 | Slope of invert (%) | = 0.714 |
| Runoff coefficient = | .4 | Slope energy grade line (%) | = 0.018 |
| Time of conc (min) = | 10 | Critical depth (in) | = 4.10 |
| Inlet time (min) = | 10 | Req'd length curb inlet (ft) | = 0.0 |
| Intensity (in/hr) = | 5.93 | Req'd grate area (sf) | = 0.0 |
| Cumulative C*A = | 0.1 | Depth at inlet opening (in) | = 0 |
| Flow contrib (cfs) = | .6 | Confluence angle (deg) | = 88 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) | = 30.58 |
| Line capac. (cfs) = | 5.5 | Line storage (cuft) | = 62 |

**LINE 8 / Q = 2.7 / HT = 15 / WID = 15 / N = .013 / L = 200 / JLC = 1.7**

LINE 8.....SS#7-7 - SS#7-9 / DNLN = 6

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 29.01 | 15.00 | 27.68 | 2.21 | 29.09 | 0.00 | 1.64 | 1.23 |
| UPSTRM | 29.35 | 11.64 | 28.38 | 2.65 | 29.46 | 12.51 | 1.65 | 1.02 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | 1.4 | Slope of invert (%) | = 0.350 |
| Runoff coefficient = | .3 | Slope energy grade line (%) | = 0.185 |
| Time of conc (min) = | 20 | Critical depth (in) | = 8.47 |
| Inlet time (min) = | 20 | Req'd length curb inlet (ft) | = 0.0 |
| Intensity (in/hr) = | 4.50 | Req'd grate area (sf) | = 0.0 |
| Cumulative C*A = | 0.6 | Depth at inlet opening (in) | = 0 |
| Flow contrib (cfs) = | 1.8 | Confluence angle (deg) | =-4 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) | = 31.28 |
| Line capac. (cfs) = | 3.8 | Line storage (cuft) | = 225 |

**LINE 9 / Q = 1.2 / HT = 15 / WID = 15 / N = .013 / L = 56 / JLC = .33**

LINE 9.SS#7-9 - SS#7-10 / DNLN = 8

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 29.54 | 12.66 | 28.48 | 1.12 | 29.55 | 10.67 | 1.55 | 1.11 |
| UPSTRM | 29.54 | 9.17 | 28.78 | 1.59 | 29.58 | 14.62 | 1.25 | 0.79 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = .13 | Slope of invert (%) | = 0.536 |
| Runoff coefficient | = .65 | Slope energy grade line (%) | = 0.051 |
| Time of conc (min) | = 6 | Critical depth (in) | = 5.49 |
| Inlet time (min) | = 5 | Req'd length curb inlet (ft) | = 0.0 |
| Intensity (in/hr) | = 6.86 | Req'd grate area (sf) | = 0.0 |
| Cumulative C*A | = 0.2 | Depth at inlet opening (in) | = 0 |
| Flow contrib (cfs) | = .5 | Confluence angle (deg) | = 90 |
| Default Q (cfs) | = 0 | Natural ground elev (ft) | = 31.28 |
| Line capac. (cfs) | = 4.7 | Line storage (cuft) | = 53 |

**LINE 10 / Q = 0.7 / HT = 15 / WID = 15 / N = .013 / L = 152 / JLC = .9**

LINE 10.SS#7-10 - SS#7-11 / DNLN = 9

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 29.56 | 9.32 | 28.78 | 0.84 | 29.57 | 14.42 | 1.25 | 0.83 |
| UPSTRM | 29.93 | 4.13 | 29.50 | 2.51 | 30.03 | 13.40 | 1.34 | 0.27 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = .15 | Slope of invert (%) | = 0.474 |
| Runoff coefficient | = .65 | Slope energy grade line (%) | = 0.246 |
| Time of conc (min) | = 5 | Critical depth (in) | = 4.10 |
| Inlet time (min) | = 5 | Req'd length curb inlet (ft) | = 0.0 |
| Intensity (in/hr) | = 7.09 | Req'd grate area (sf) | = 0.0 |
| Cumulative C*A | = 0.1 | Depth at inlet opening (in) | = 0 |
| Flow contrib (cfs) | = .6 | Confluence angle (deg) | =-90 |
| WARNING! JLC of Line 9 too small. | | | |
| Line capac. (cfs) | = 4.4 | Line storage (cuft) | = 84 |

# HYDRAULIC REPORT FOR

GOVERNOR'S LAND

NATHANIEL'S GREEN

JOB NO. 7173

SYSTEM 28 (BAY 2, POD 3)

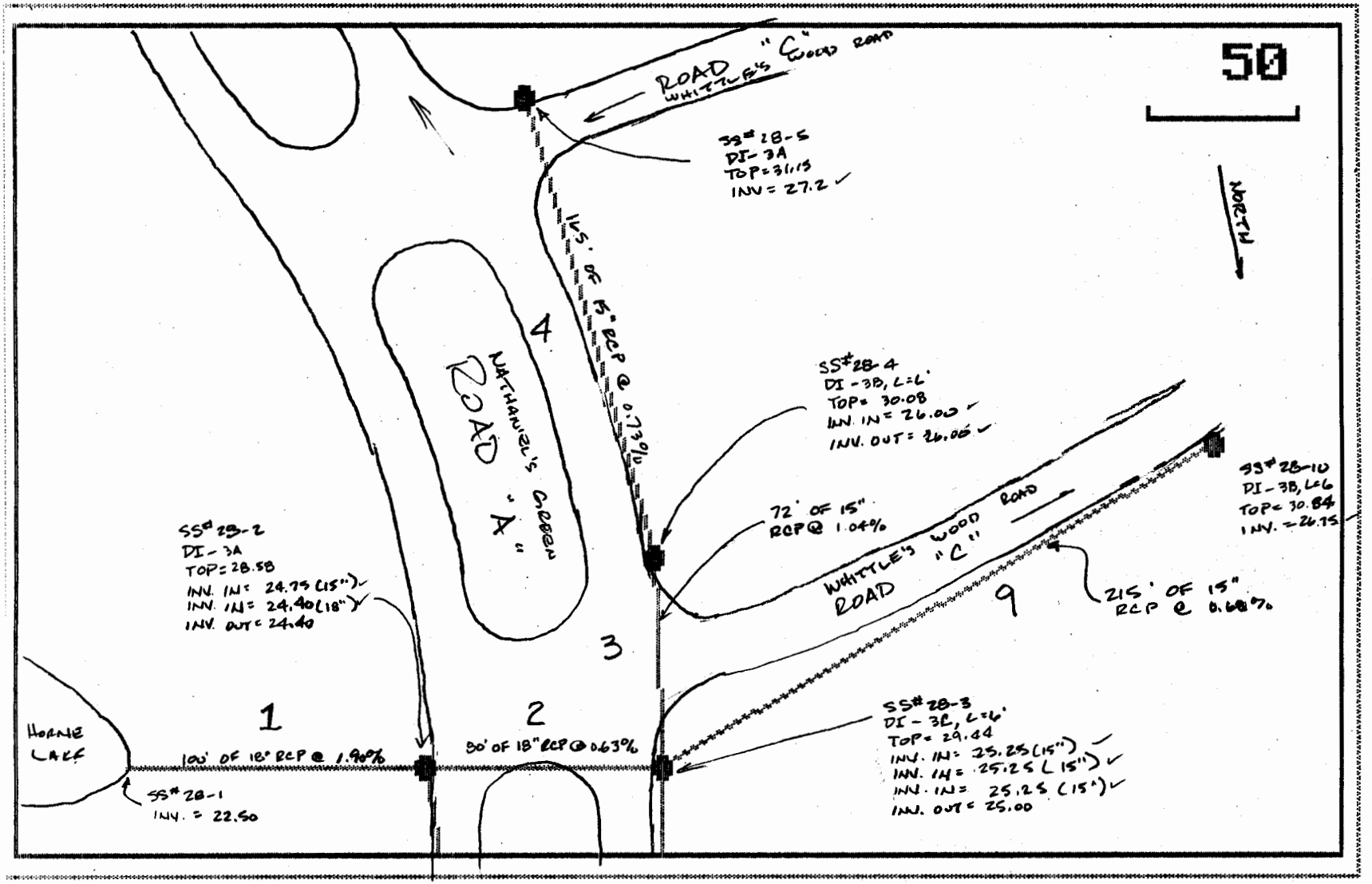
prepared by:

AES CONSULTING ENGINEERS

5248 Olde Towne Rd.Suite 1

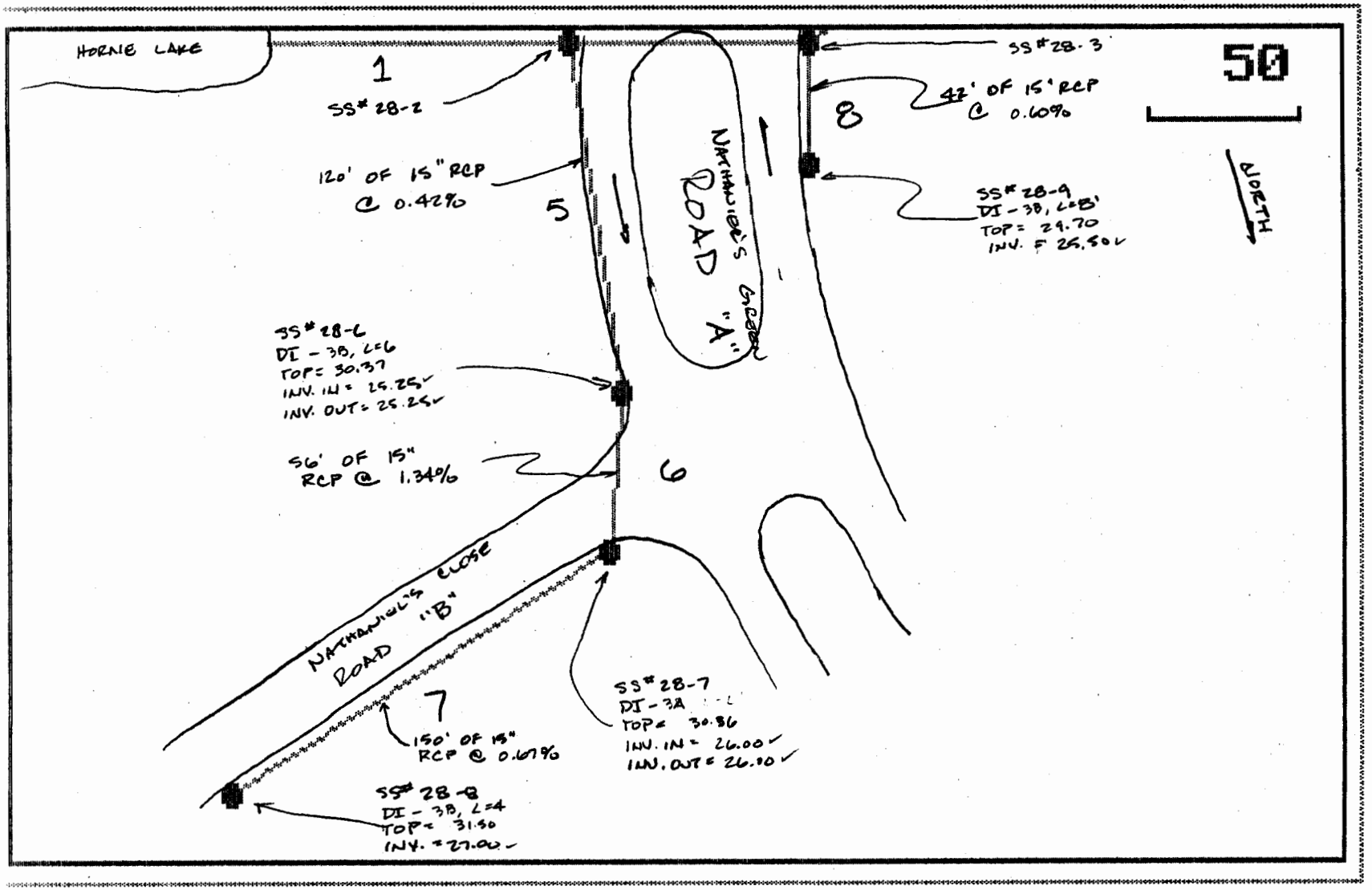
Williamsburg, VA. 23188

Revised Date: 3/25/92




[← ↑ → ↓] Move [Spc] #'s [Home] Reset

[PgUp] Enlarge [PgDn] Reduce [Esc] Exit




[← ↑ → ↓] Move [Spc] #'s [Home] Reset

[PgUp] Enlarge [PgDn] Reduce [Esc] Exit

# HYDRAULIC ANALYSIS

Run date: 03-25-1992
File: a:system28.ST3

Return Period = 10 Yrs
Rainfall file: JAMES CITY COUNTY

**LINE 1 / Q = 12.0 / HT = 18 / WID = 18 / N = .013 / L = 100 / JLC = 1.2**

SS#28-2/SS#28-1.. / Outfall

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 26.46 | 18.00 | 22.50 | 6.79 | 27.18 | 0.00 | 3 | 1.77 |
| UPSTRM | 27.77 | 18.00 | 24.40 | 6.79 | 28.48 | 0.00 | 2.68 | 1.77 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = .57 | Slope of invert (%) | = 1.900 |
| Runoff coefficient | = .55 | Slope energy grade line (%) | = 1.305 |
| Time of conc (min) | = 25 | Critical depth (in) | = 15.93 |
| Inlet time (min) | = 5 | Req'd length curb inlet (ft) | = 2.1 |
| Intensity (in/hr) | = 4.05 | Req'd grate area (sf) | = 0.4 |
| Cumulative C*A | = 3.0 | Depth at inlet opening (in) | = 4 |
| Flow contrib (cfs) | = 1.2 | Confluence angle (deg) | = 0 |
| Default Q (cfs) | = 0 | Natural ground elev (ft) | = 28.58 |
| Line capac. (cfs) | = 14.5 | Line storage (cuft) | = 177 |

**LINE 2 / Q = 7.7 / HT = 18 / WID = 18 / N = .013 / L = 80 / JLC = 1.2**

SS#28-3/SS#28-2.. / DNLN = 1

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 28.62 | 18.00 | 24.40 | 4.34 | 28.92 | 0.00 | 2.68 | 1.77 |
| UPSTRM | 29.05 | 18.00 | 25.00 | 4.34 | 29.34 | 0.00 | 2.94 | 1.77 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = 2.29 | Slope of invert (%) | = 0.750 |
| Runoff coefficient | = .35 | Slope energy grade line (%) | = 0.533 |
| Time of conc (min) | = 25 | Critical depth (in) | = 13.15 |
| Inlet time (min) | = 25 | Req'd length curb inlet (ft) | = 5.5 |
| Intensity (in/hr) | = 4.08 | Req'd grate area (sf) | = 1.1 |
| Cumulative C*A | = 1.9 | Depth at inlet opening (in) | = 4 |
| Flow contrib (cfs) | = 3.2 | Confluence angle (deg) | = 0 |
| Default Q (cfs) | = 0 | Natural ground elev (ft) | = 29.44 |
| Line capac. (cfs) | = 9.1 | Line storage (cuft) | = 141 |

**LINE 3 / Q = 2.5 / HT = 15 / WID = 15 / N = .013 / L = 72 / JLC = 1.1**

SS#28-4/SS#28-3.. / DNLN = 2

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 29.40 | 15.00 | 25.25 | 2.00 | 29.46 | 0.00 | 2.94 | 1.23 |
| UPSTRM | 29.51 | 15.00 | 26.00 | 2.00 | 29.57 | 0.00 | 2.83 | 1.23 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | .33 | Slope of invert (%) = | 1.042 |
| Runoff coefficient = | .4 | Slope energy grade line (%) = | 0.144 |
| Time of conc (min) = | 16 | Critical depth (in) = | 7.72 |
| Inlet time (min) = | 11 | Req'd length curb inlet (ft) = | 1.1 |
| Intensity (in/hr) = | 5.06 | Req'd grate area (sf) = | 0.2 |
| Cumulative C*A = | 0.5 | Depth at inlet opening (in) = | 4 |
| Flow contrib (cfs) = | .6 | Confluence angle (deg) = | -92 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) = | 30.08 |
| Line capac. (cfs) = | 6.6 | Line storage (cuft) = | 88 |

**LINE 4 / Q = 1.8 / HT = 15 / WID = 15 / N = .013 / L = 165 / JLC = 1.1**

SS#28-5/SS#28-4.. / DNLN = 3

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 29.57 | 15.00 | 26.00 | 1.49 | 29.61 | 0.00 | 2.83 | 1.23 |
| UPSTRM | 29.74 | 15.00 | 27.20 | 1.49 | 29.78 | 0.00 | 2.69 | 1.23 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | .88 | Slope of invert (%) = | 0.727 |
| Runoff coefficient = | .4 | Slope energy grade line (%) = | 0.103 |
| Time of conc (min) = | 15 | Critical depth (in) = | 6.97 |
| Inlet time (min) = | 15 | Req'd length curb inlet (ft) = | 3.1 |
| Intensity (in/hr) = | 5.19 | Req'd grate area (sf) = | 0.6 |
| Cumulative C*A = | 0.4 | Depth at inlet opening (in) = | 4 |
| Flow contrib (cfs) = | 1.8 | Confluence angle (deg) = | -13 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) = | 31.15 |
| Line capac. (cfs) = | 5.5 | Line storage (cuft) = | 202 |

**LINE 5 / Q = 3.5 / HT = 15 / WID = 15 / N = .013 / L = 120 / JLC = 1.1**

SS#28-6/SS#28-2.. / DNLN = 1

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 28.62 | 15.00 | 24.75 | 2.87 | 28.75 | 0.00 | 2.58 | 1.23 |
| UPSTRM | 28.98 | 15.00 | 25.25 | 2.87 | 29.11 | 0.00 | 3.87 | 1.23 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | .54 | Slope of invert (%) = | 0.417 |
| Runoff coefficient = | .55 | Slope energy grade line (%) = | 0.297 |
| Time of conc (min) = | 20 | Critical depth (in) = | 9.57 |
| Inlet time (min) = | 6 | Req'd length curb inlet (ft) = | 2.3 |
| Intensity (in/hr) = | 4.55 | Req'd grate area (sf) = | 0.4 |
| Cumulative C*A = | 0.8 | Depth at inlet opening (in) = | 4 |
| Flow contrib (cfs) = | 1.3 | Confluence angle (deg) = | 82 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) = | 30.37 |
| Line capac. (cfs) = | 4.2 | Line storage (cuft) = | 147 |

**LINE 6 / Q = 2.2 / HT = 15 / WID = 15 / N = .013 / L = 56 / JLC = 1.1**

SS#28-7/SS#28-6.. / DNLN = 5

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 29.12 | 15.00 | 25.25 | 1.78 | 29.17 | 0.00 | 3.87 | 1.23 |
| UPSTRM | 29.19 | 15.00 | 26.00 | 1.78 | 29.23 | 0.00 | 3.11 | 1.23 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | .45 | Slope of invert (%) = | 1.339 |
| Runoff coefficient = | .41 | Slope energy grade line (%) = | 0.114 |
| Time of conc (min) = | 20 | Critical depth (in) = | 7.34 |
| Inlet time (min) = | 15 | Req'd length curb inlet (ft) = | 1.4 |
| Intensity (in/hr) = | 4.58 | Req'd grate area (sf) = | 0.3 |
| Cumulative C*A = | 0.5 | Depth at inlet opening (in) = | 4 |
| Flow contrib (cfs) = | .8 | Confluence angle (deg) = | 12 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) = | 30.36 |
| Line capac. (cfs) = | 7.5 | Line storage (cuft) = | 69 |

**LINE 7 / Q = 1.4 / HT = 15 / WID = 15 / N = .013 / L = 150 / JLC = .9**

SS#28-8/SS#28-7.. / DNLN = 6

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 29.24 | 15.00 | 26.00 | 1.11 | 29.26 | 0.00 | 3.11 | 1.23 |
| UPSTRM | 29.32 | 15.00 | 27.00 | 1.11 | 29.34 | 0.00 | 3.25 | 1.23 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | .73 | Slope of invert (%) = | 0.667 |
| Runoff coefficient = | .4 | Slope energy grade line (%) = | 0.056 |
| Time of conc (min) = | 19 | Critical depth (in) = | 5.86 |
| Inlet time (min) = | 19 | Req'd length curb inlet (ft) = | 2.3 |
| Intensity (in/hr) = | 4.68 | Req'd grate area (sf) = | 0.4 |
| Cumulative C*A = | 0.3 | Depth at inlet opening (in) = | 4 |
| Flow contrib (cfs) = | 1.3 | Confluence angle (deg) = | 53 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) = | 31.5 |
| Line capac. (cfs) = | 5.3 | Line storage (cuft) = | 184 |

**LINE 8 / Q = 1.1 / HT = 15 / WID = 15 / N = .013 / L = 42 / JLC = .9**

SS#28-9/SS#28-3.. / DNLN = 2

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 29.40 | 15.00 | 25.25 | 0.92 | 29.41 | 0.00 | 2.94 | 1.23 |
| UPSTRM | 29.43 | 15.00 | 25.50 | 0.92 | 29.44 | 0.00 | 2.95 | 1.23 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | .3 | Slope of invert (%) = | 0.595 |
| Runoff coefficient = | .6 | Slope energy grade line (%) = | 0.059 |
| Time of conc (min) = | 9 | Critical depth (in) = | 5.49 |
| Inlet time (min) = | 9 | Req'd length curb inlet (ft) = | 1.9 |
| Intensity (in/hr) = | 6.26 | Req'd grate area (sf) = | 0.4 |
| Cumulative C*A = | 0.2 | Depth at inlet opening (in) = | 4 |
| Flow contrib (cfs) = | 1.1 | Confluence angle (deg) = | 90 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) = | 29.7 |
| Line capac. (cfs) = | 5.0 | Line storage (cuft) = | 52 |

**LINE 9 / Q = 2.1 / HT = 15 / WID = 15 / N = .013 / L = 220 / JLC = .9**

SS#28-10/SS#28-3 / DNLN = 2

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 29.40 | 15.00 | 25.25 | 1.74 | 29.45 | 0.00 | 2.94 | 1.23 |
| UPSTRM | 29.69 | 15.00 | 26.75 | 1.74 | 29.73 | 0.00 | 2.84 | 1.23 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | 1.03 | Slope of invert (%) | = 0.682 |
| Runoff coefficient = | .4 | Slope energy grade line (%) | = 0.110 |
| Time of conc (min) = | 15 | Critical depth (in) | = 7.34 |
| Inlet time (min) = | 15 | Req'd length curb inlet (ft) | = 3.6 |
| Intensity (in/hr) = | 5.19 | Req'd grate area (sf) | = 0.7 |
| Cumulative C*A = | 0.4 | Depth at inlet opening (in) | = 4 |
| Flow contrib (cfs) = | 2.1 | Confluence angle (deg) | =-31 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) | = 30.84 |
| Line capac. (cfs) = | 5.3 | Line storage (cuft) | = 270 |

# HYDRAULIC REPORT FOR

GOVERNOR'S LAND

NATHANIEL'S GREEN

JOB NO. 7173

SYSTEM 29 (BAY 2, POD 3)

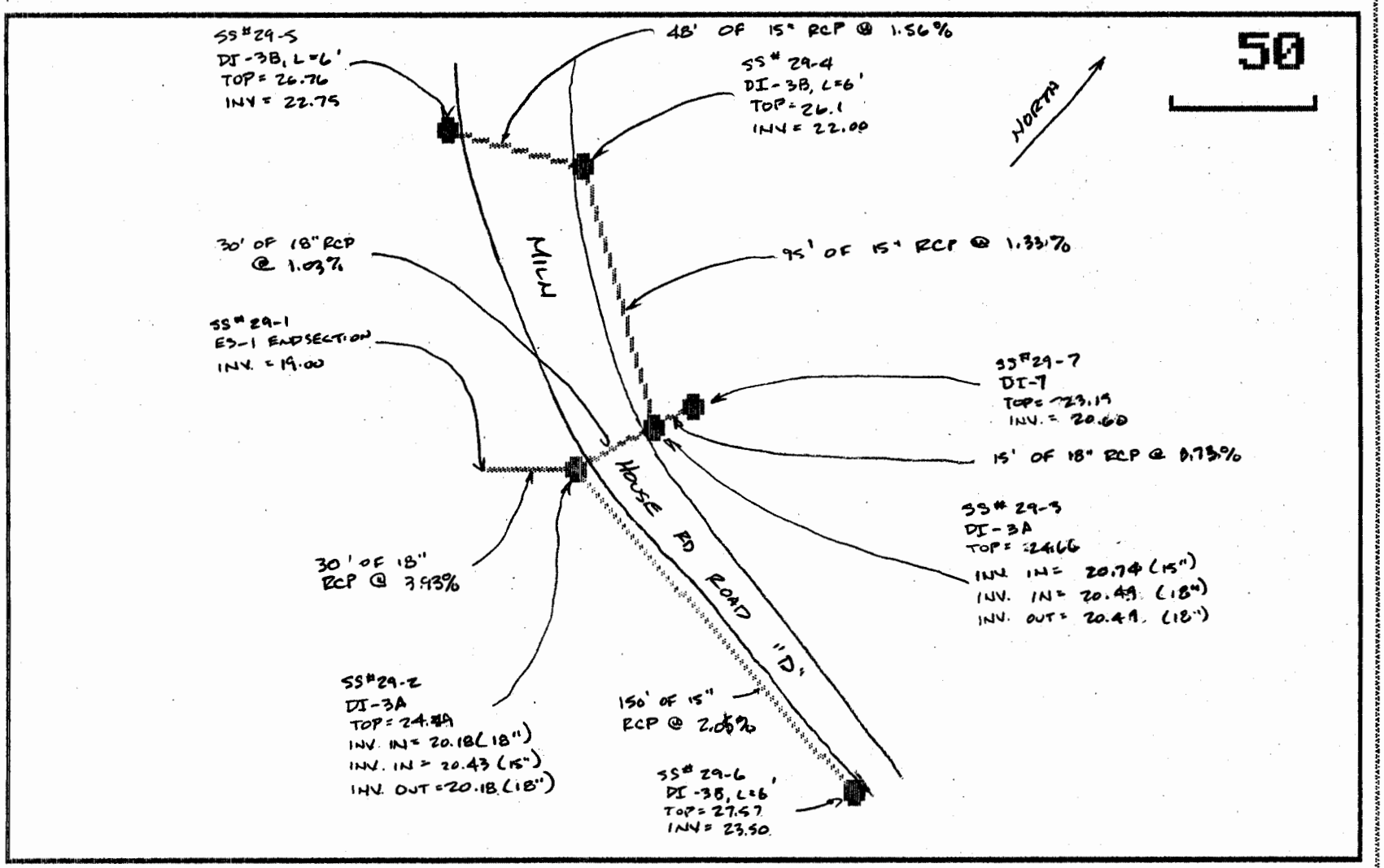
prepared by:

AES CONSULTING ENGINEERS

5248 Olde Towne Rd.Suite 1

Williamsburg, VA. 23188

Revised Date: 3/24/92




[← ↑ → ↓] Move [Spc] #'s [Home] Reset

[PgUp] Enlarge [PgDn] Reduce [Esc] Exit

Run date: 03-25-1992
File: a:system29.ST3

Return Period = 10 Yrs
Rainfall file: JAMES CITY COUNTY

**LINE 1 / Q = 9.9 / HT = 18 / WID = 18 / N = .013 / L = 30 / JLC = 1.1**

SS#29-2/SS#29-1.. / Outfall

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 21.18 | 18.00 | 19.00 | 5.58 | 21.66 | 0.00 | -2.5 | 1.77 |
| UPSTRM | 21.43 | 15.03 | 20.18 | 6.26 | 22.04 | 13.36 | 2.8 | 1.58 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | .41 | Slope of invert (%) = | 3.933 |
| Runoff coefficient = | .41 | Slope energy grade line (%) = | 1.255 |
| Time of conc (min) = | 30 | Critical depth (in) = | 15.00 |
| Inlet time (min) = | 10 | Req'd length curb inlet (ft) = | 1.0 |
| Intensity (in/hr) = | 3.69 | Req'd grate area (sf) = | 0.2 |
| Cumulative C*A = | 2.7 | Depth at inlet opening (in) = | 4 |
| Flow contrib (cfs) = | .6 | Confluence angle (deg) = | 0 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) = | 24.49 |
| Line capac. (cfs) = | 20.8 | Line storage (cuft) = | 50 |

**LINE 2 / Q = 8.5 / HT = 18 / WID = 18 / N = .013 / L = 30 / JLC = 1.1**

SS#29-3/SS#29-2.. / DNLN = 1

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 22.10 | 18.00 | 20.18 | 4.82 | 22.46 | 0.00 | 2.8 | 1.77 |
| UPSTRM | 22.30 | 18.00 | 20.49 | 4.82 | 22.66 | 0.00 | 2.67 | 1.77 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | .26 | Slope of invert (%) = | 1.033 |
| Runoff coefficient = | .55 | Slope energy grade line (%) = | 0.658 |
| Time of conc (min) = | 30 | Critical depth (in) = | 13.93 |
| Inlet time (min) = | 5 | Req'd length curb inlet (ft) = | 0.9 |
| Intensity (in/hr) = | 3.70 | Req'd grate area (sf) = | 0.2 |
| Cumulative C*A = | 2.3 | Depth at inlet opening (in) = | 4 |
| Flow contrib (cfs) = | .5 | Confluence angle (deg) = | -30 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) = | 24.66 |
| Line capac. (cfs) = | 10.7 | Line storage (cuft) = | 53 |

**LINE 3 / Q = 2.9 / HT = 15 / WID = 15 / N = .013 / L = 95 / JLC = 1.1**

SS#29-4/SS#29-3.. / DNLN = 2

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 22.69 | 15.00 | 20.74 | 2.40 | 22.78 | 0.00 | 2.67 | 1.23 |
| UPSTRM | 22.87 | 10.38 | 22.00 | 3.25 | 23.03 | 13.85 | 2.85 | 0.91 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = .73 | Slope of invert (%) | = 1.326 |
| Runoff coefficient | = .4 | Slope energy grade line (%) | = 0.258 |
| Time of conc (min) | = 15 | Critical depth (in) | = 8.84 |
| Inlet time (min) | = 15 | Req'd length curb inlet (ft) | = 2.6 |
| Intensity (in/hr) | = 5.19 | Req'd grate area (sf) | = 0.5 |
| Cumulative C*A | = 0.6 | Depth at inlet opening (in) | = 4 |
| Flow contrib (cfs) | = 1.5 | Confluence angle (deg) | =-74 |
| Default Q (cfs) | = 0 | Natural ground elev (ft) | = 26.1 |
| Line capac. (cfs) | = 7.4 | Line storage (cuft) | = 101 |

**LINE 4 / Q = 2.0 / HT = 15 / WID = 15 / N = .013 / L = 48 / JLC = .9**

SS#29-5/SS#29-4.. / DNLN = 3

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 23.05 | 12.55 | 22.00 | 1.81 | 23.10 | 10.67 | 2.85 | 1.11 |
| UPSTRM | 23.52 | 7.38 | 22.75 | 3.35 | 23.70 | 15.00 | 2.76 | 0.60 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = .51 | Slope of invert (%) | = 1.563 |
| Runoff coefficient | = .54 | Slope energy grade line (%) | = 1.248 |
| Time of conc (min) | = 5 | Critical depth (in) | = 7.34 |
| Inlet time (min) | = 5 | Req'd length curb inlet (ft) | = 3.4 |
| Intensity (in/hr) | = 7.30 | Req'd grate area (sf) | = 0.6 |
| Cumulative C*A | = 0.3 | Depth at inlet opening (in) | = 4 |
| Flow contrib (cfs) | = 2 | Confluence angle (deg) | =-61 |
| Default Q (cfs) | = 0 | Natural ground elev (ft) | = 26.76 |
| Line capac. (cfs) | = 8.1 | Line storage (cuft) | = 41 |

# HYDRAULIC ANALYSIS

Run date: 03-25-1992
File: a:system29.ST3

Return Period = 10 Yrs
Rainfall file: JAMES CITY COUNTY

**LINE 5 / Q = 1.2 / HT = 15 / WID = 15 / N = .013 / L = 150 / JLC = .9**

SS#29-6/SS#29-2.. / DNLN = 1

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 22.10 | 15.00 | 20.43 | 1.01 | 22.12 | 0.00 | 2.8 | 1.23 |
| UPSTRM | 24.09 | 5.53 | 23.50 | 3.01 | 24.23 | 14.47 | 2.81 | 0.41 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | .51 | Slope of invert (%) | = 2.047 |
| Runoff coefficient = | .4 | Slope energy grade line (%) | = 1.407 |
| Time of conc (min) = | 10 | Critical depth (in) | = 5.49 |
| Inlet time (min) = | 10 | Req'd length curb inlet (ft) | = 2.1 |
| Intensity (in/hr) = | 6.05 | Req'd grate area (sf) | = 0.4 |
| Cumulative C*A = | 0.2 | Depth at inlet opening (in) | = 4 |
| Flow contrib (cfs) = | 1.2 | Confluence angle (deg) | = 50 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) | = 27.57 |
| Line capac. (cfs) = | 9.2 | Line storage (cuft) | = 123 |

**LINE 6 / Q = 5.9 / HT = 18 / WID = 18 / N = .013 / L = 15 / JLC = .9**

SS#29-7/SS#29-3.. / DNLN = 2

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 22.69 | 18.00 | 20.49 | 3.34 | 22.87 | 0.00 | 2.67 | 1.77 |
| UPSTRM | 22.90 | 18.00 | 20.60 | 3.34 | 23.07 | 0.00 | 1.04 | 1.77 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | 5.31 | Slope of invert (%) | = 0.733 |
| Runoff coefficient = | .3 | Slope energy grade line (%) | = 0.316 |
| Time of conc (min) = | 30 | Critical depth (in) | = 11.48 |
| Inlet time (min) = | 30 | Req'd length curb inlet (ft) | = 0.0 |
| Intensity (in/hr) = | 3.70 | Req'd grate area (sf) | = 0.0 |
| Cumulative C*A = | 1.6 | Depth at inlet opening (in) | = 0 |
| Flow contrib (cfs) = | 5.8 | Confluence angle (deg) | = 5 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) | = 23.15 |
| Line capac. (cfs) = | 9.0 | Line storage (cuft) | = 27 |

# HYDRAULIC REPORT FOR

GOVERNOR'S LAND

NATHANIEL'S GREEN

JOB NO. 7173

SYSTEM 30 (BAY 2, POD 3)

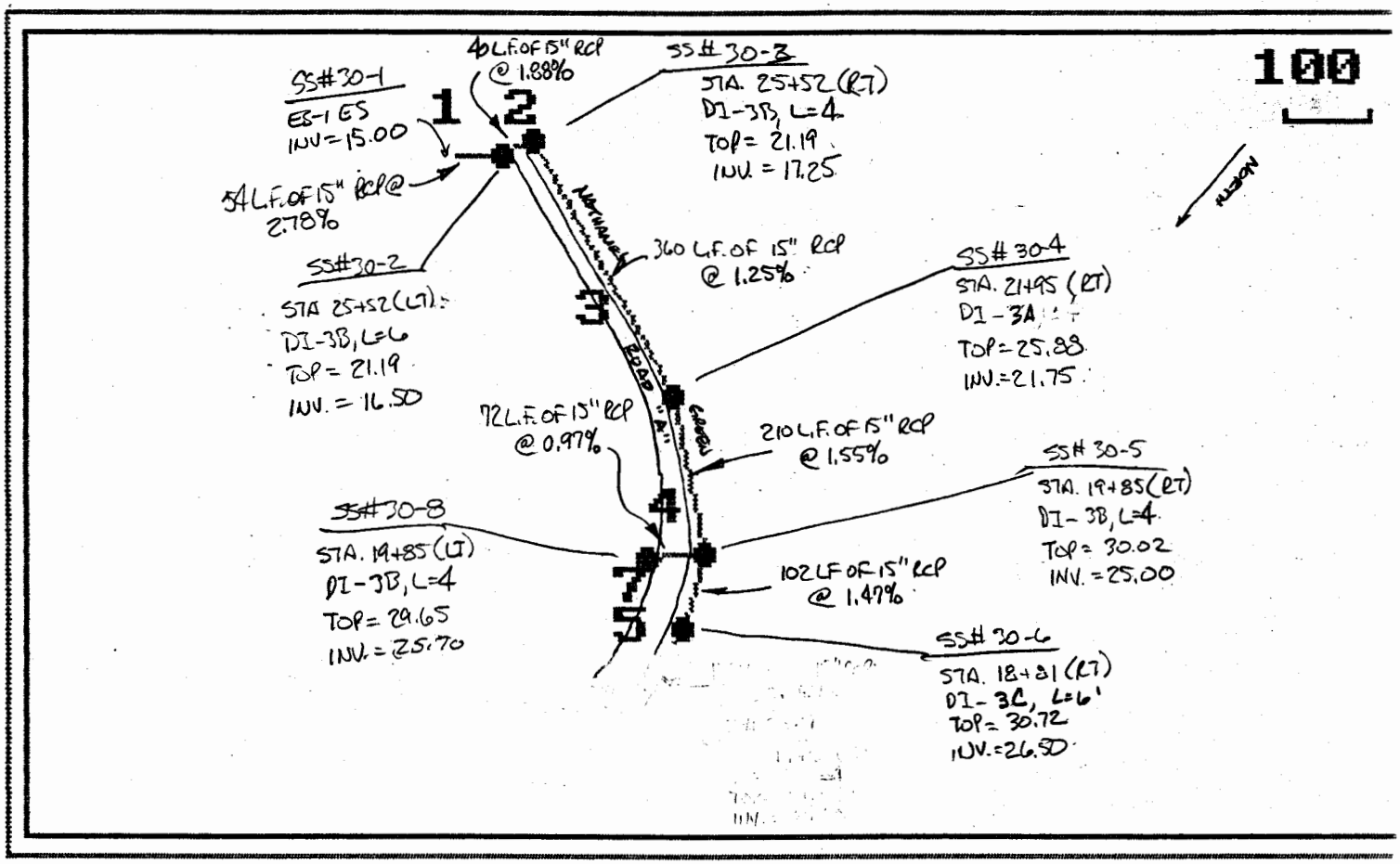
prepared by:

AES CONSULTING ENGINEERS

5248 Olde Towne Rd.Suite 1

Williamsburg, VA. 23188

Revised Date: 3/25/92

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[PgUp] Enlarge [PgDn] Reduce [Esc] Exi

Run date: 03-25-1992
File: a:system30.ST3

Return Period = 10 Yrs
Rainfall file: JAMES CITY COUNTY

**LINE 1 / Q = 7.2 / HT = 15 / WID = 15 / N = .013 / L = 54 / JLC = 1.1**

SS#30-2/SS#30-1.. / Outfall

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 16.56 | 15.00 | 15.00 | 5.85 | 17.09 | 0.00 | -1.25 | 1.23 |
| UPSTRM | 17.59 | 13.06 | 16.50 | 6.33 | 18.21 | 10.08 | 3.44 | 1.13 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | .51 | Slope of invert (%) | = 2.778 |
| Runoff coefficient = | .55 | Slope energy grade line (%) | = 2.072 |
| Time of conc (min) = | 20 | Critical depth (in) | = 13.03 |
| Inlet time (min) = | 7 | Req'd length curb inlet (ft) | = 2.2 |
| Intensity (in/hr) = | 4.57 | Req'd grate area (sf) | = 0.4 |
| Cumulative C*A = | 1.6 | Depth at inlet opening (in) | = 4 |
| Flow contrib (cfs) = | 1.2 | Confluence angle (deg) | = 0 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) | = 21.19 |
| Line capac. (cfs) = | 10.8 | Line storage (cuft) | = 64 |

**LINE 2 / Q = 5.9 / HT = 15 / WID = 15 / N = .013 / L = 40 / JLC = 1.1**

SS#30-3/SS#30-2.. / DNLN = 1

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 18.27 | 15.00 | 16.50 | 4.83 | 18.63 | 0.00 | 3.44 | 1.23 |
| UPSTRM | 18.61 | 15.00 | 17.25 | 4.83 | 18.97 | 0.00 | 2.69 | 1.23 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | .21 | Slope of invert (%) | = 1.875 |
| Runoff coefficient = | .55 | Slope energy grade line (%) | = 0.842 |
| Time of conc (min) = | 20 | Critical depth (in) | = 12.21 |
| Inlet time (min) = | 7 | Req'd length curb inlet (ft) | = 0.9 |
| Intensity (in/hr) = | 4.59 | Req'd grate area (sf) | = 0.2 |
| Cumulative C*A = | 1.3 | Depth at inlet opening (in) | = 4 |
| Flow contrib (cfs) = | .5 | Confluence angle (deg) | =-26 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) | = 21.19 |
| Line capac. (cfs) = | 8.8 | Line storage (cuft) | = 49 |

**LINE 3 / Q = 5.7 / HT = 15 / WID = 15 / N = .013 / L = 360 / JLC = 1.1**

SS#30-4/SS#30-3.. / DNLN = 2

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 19.01 | 15.00 | 17.25 | 4.62 | 19.34 | 0.00 | 2.69 | 1.23 |
| UPSTRM | 22.75 | 11.94 | 21.75 | 5.41 | 23.20 | 12.08 | 2.87 | 1.05 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | .17 | Slope of invert (%) = | 1.250 |
| Runoff coefficient = | .55 | Slope energy grade line (%) = | 1.073 |
| Time of conc (min) = | 18 | Critical depth (in) = | 11.91 |
| Inlet time (min) = | 12 | Req'd length curb inlet (ft) = | 0.8 |
| Intensity (in/hr) = | 4.83 | Req'd grate area (sf) = | 0.1 |
| Cumulative C*A = | 1.2 | Depth at inlet opening (in) = | 4 |
| Flow contrib (cfs) = | .4 | Confluence angle (deg) = | 90 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) = | 25.88 |
| Line capac. (cfs) = | 7.2 | Line storage (cuft) = | 409 |

**LINE 4 / Q = 5.4 / HT = 15 / WID = 15 / N = .013 / L = 210 / JLC = 1.2**

SS#30-5/SS#30-4.. / DNLN = 3

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 23.25 | 15.00 | 21.75 | 4.38 | 23.54 | 0.00 | 2.87 | 1.23 |
| UPSTRM | 25.97 | 11.64 | 25.00 | 5.26 | 26.40 | 12.51 | 3.77 | 1.02 |

| | | | |
|---|---|---|---|
| Drainage area (ac) = | .64 | Slope of invert (%) = | 1.548 |
| Runoff coefficient = | .45 | Slope energy grade line (%) = | 1.360 |
| Time of conc (min) = | 17 | Critical depth (in) = | 11.61 |
| Inlet time (min) = | 10 | Req'd length curb inlet (ft) = | 2.4 |
| Intensity (in/hr) = | 4.98 | Req'd grate area (sf) = | 0.5 |
| Cumulative C*A = | 1.1 | Depth at inlet opening (in) = | 4 |
| Flow contrib (cfs) = | 1.4 | Confluence angle (deg) = | 15 |
| Default Q (cfs) = | 0 | Natural ground elev (ft) = | 30.02 |
| Line capac. (cfs) = | 8.0 | Line storage (cuft) = | 236 |

**LINE 5 / Q = 2.9 / HT = 15 / WID = 15 / N = .013 / L = 102 / JLC = 1.1**

SS#30-6/SS#30-5.. / DNLN = 4

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 26.49 | 15.00 | 25.00 | 2.37 | 26.57 | 0.00 | 3.77 | 1.23 |
| UPSTRM | 27.49 | 8.50 | 26.50 | 4.05 | 27.74 | 14.87 | 2.96 | 0.72 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = 1.37 | Slope of invert (%) | = 1.471 |
| Runoff coefficient | = .42 | Slope energy grade line (%) | = 1.147 |
| Time of conc (min) | = 16 | Critical depth (in) | = 8.47 |
| Inlet time (min) | = 16 | Req'd length curb inlet (ft) | = 4.9 |
| Intensity (in/hr) | = 5.05 | Req'd grate area (sf) | = 0.9 |
| Cumulative C*A | = 0.6 | Depth at inlet opening (in) | = 4 |
| Flow contrib (cfs) | = 2.9 | Confluence angle (deg) | = 26 |
| Default Q (cfs) | = 0 | Natural ground elev (ft) | = 30.72 |
| Line capac. (cfs) | = 7.8 | Line storage (cuft) | = 99 |

**LINE 6 / Q = 1.6 / HT = 15 / WID = 15 / N = .013 / L = 72 / JLC = .9**

SS#30-8/SS#30-5.. / DNLN = 4

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 26.49 | 15.00 | 25.00 | 1.29 | 26.51 | 0.00 | 3.77 | 1.23 |
| UPSTRM | 26.56 | 9.75 | 25.70 | 1.88 | 26.62 | 14.31 | 2.69 | 0.84 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = .31 | Slope of invert (%) | = 0.972 |
| Runoff coefficient | = .7 | Slope energy grade line (%) | = 0.077 |
| Time of conc (min) | = 5 | Critical depth (in) | = 6.23 |
| Inlet time (min) | = 5 | Req'd length curb inlet (ft) | = 2.7 |
| Intensity (in/hr) | = 7.30 | Req'd grate area (sf) | = 0.5 |
| Cumulative C*A | = 0.2 | Depth at inlet opening (in) | = 4 |
| Flow contrib (cfs) | = 1.5 | Confluence angle (deg) | = 93 |
| Default Q (cfs) | = 0 | Natural ground elev (ft) | = 29.65 |
| Line capac. (cfs) | = 6.4 | Line storage (cuft) | = 75 |

TORM WATER INLET COMPUTATIONSS
ON GRADE, ROLL TOP CURB AND GUTTER SECTION

ROUTE: ROUTE 5
PROJECT: GOVERNOR'S LAND AT TWO RIVERS, NATHANIEL'S GREEN (BAY 2, POD 3)
JOB NO.: 7173
DATE: 3/23/92

Prepared by: AES Consulting Engineers

| No. | Type | Length (ft) | Station | Drainage Area (Ac.) | C | CA | SUM CA | I (In./Hr.) | Q incr (cfs) | Q carryover (cfs) | Qt Gutter Flow (cfs) | S Gutter Slope (ft/ft) | Sx Cross Slope (ft/ft) | T Spread (ft) | W (ft) | W/T | Sw (ft/ft) | Sw/Sx | Eo (#10) | a (in.) | Sw = a/(12W) | Se = Sx + SwEo (ft/ft) | Lt (ft) 15 | L/Lt | E (#16) | Q Intercept (cfs) | Qb Carryover (cfs) | REMARK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -----ROAD "D"----- | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29-5 | DI-3B | 6.0 | 25+50 R | 0.5 | 0.55 | 0.28 | 0.28 | 3.5 | 0.98 | 0.0 | 1.0 | 0.0304 | 0.0208 | 3.9 | 1.5 | 0.38 | 0.0833 | 4.00 | 0.87 | 3.1 | 0.174 | 0.1718 | 7.5 | 0.80 | 0.95 | 0.93 | 0.05 | |
| 29-6 | DI-3B | 6.0 | 15+50 L | 0.5 | 0.40 | 0.20 | 0.20 | 3.5 | 0.71 | 0.00 | 0.71 | 0.0371 | 0.0208 | 2.6 | 1.5 | 0.58 | 0.0833 | 4.00 | 0.98 | 3.1 | 0.174 | 0.1909 | 6.5 | 0.92 | 0.99 | 0.71 | 0.01 | |
| 29-4 | DI-3B | 6.0 | 18+00 R | 0.7 | 0.40 | 0.29 | 0.29 | 3.5 | 1.02 | 0.00 | 1.02 | 0.0321 | 0.0208 | 3.9 | 1.5 | 0.38 | 0.0833 | 4.00 | 0.87 | 3.1 | 0.174 | 0.1718 | 7.7 | 0.78 | 0.93 | 0.95 | 0.07 | |
| -----ROAD "A"----- | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30-8 | DI-3B | 4.0 | 19+85 L | 0.3 | 0.55 | 0.17 | 0.17 | 3.5 | 0.60 | 0.00 | 0.60 | 0.0067 | 0.0208 | 4.6 | 1.5 | 0.33 | 0.0833 | 4.00 | 0.81 | 3.1 | 0.174 | 0.1614 | 4.0 | 1.00 | 1.00 | 0.60 | 0.00 | |
| 0-2 | DI-3B | 6.0 | 25+52 L | 0.5 | 0.55 | 0.28 | 0.28 | 3.5 | 0.98 | 0.00 | 0.98 | 0.0300 | 0.0208 | 4.0 | 1.5 | 0.38 | 0.0833 | 4.00 | 0.87 | 3.1 | 0.174 | 0.1718 | 7.4 | 0.81 | 0.95 | 0.93 | 0.05 | |
| 30-5 | DI-3B | 4.0 | 19+85 R | 0.6 | 0.40 | 0.26 | 0.26 | 3.5 | 0.90 | 0.00 | 0.90 | 0.0056 | 0.0208 | 6.1 | 1.5 | 0.25 | 0.0833 | 4.00 | 0.72 | 3.1 | 0.174 | 0.1458 | 4.8 | 0.84 | 0.96 | 0.86 | 0.03 | |
| 30-4 | DI-3B | 2.5 | 21+95 R | 0.2 | 0.55 | 0.09 | 0.09 | 3.5 | 0.33 | 0.03 | 0.36 | 0.0040 | 0.0208 | 3.6 | 1.5 | 0.42 | 0.0833 | 4.00 | 0.90 | 3.1 | 0.174 | 0.1770 | 2.6 | 0.96 | 1.00 | 0.36 | 0.00 | |
| 30-3 | DI-3B | 4.0 | 25+52 R | 0.2 | 0.55 | 0.12 | 0.12 | 3.5 | 0.40 | 0.00 | 0.40 | 0.0300 | 0.0208 | 1.2 | 1.5 | 1.25 | 0.0833 | 4.00 | 1.00 | 3.1 | 0.174 | 0.1944 | 4.8 | 0.84 | 0.96 | 0.39 | 0.01 | |
| 28-6 | DI-3B | 6.0 | 12+20 L | 0.5 | 0.55 | 0.30 | 0.30 | 3.5 | 1.04 | 0.00 | 1.04 | 0.0177 | 0.0208 | 4.7 | 1.5 | 0.32 | 0.0833 | 4.00 | 0.80 | 3.1 | 0.174 | 0.1597 | 6.8 | 0.88 | 0.98 | 1.02 | 0.02 | |
| 28-4 | DI-3B | 4.0 | 13+75 R | 0.3 | 0.40 | 0.13 | 0.13 | 3.5 | 0.46 | 0.00 | 0.46 | 0.0140 | 0.0208 | 2.8 | 1.5 | 0.54 | 0.0833 | 4.00 | 0.96 | 3.1 | 0.174 | 0.1875 | 4.1 | 0.98 | 1.00 | 0.46 | 0.00 | |
| 28-9 | DI-3B | 8.0 | 12+62 R | (2.34 cfs - 0.90 cfs = 1.44 cfs) FLANKING INLET | | | | | | | 1.44 | 0.0177 | 0.0208 | 6.0 | 1.5 | 0.25 | 0.0833 | 4.00 | 0.87 | 3.1 | 0.174 | 0.1718 | 7.5 | 1.07 | 1.00 | 1.44 | 0.00 | |
| -----ROAD "B"----- | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-8 | DI-3B | 4.0 | 12+50 L | 0.7 | 0.40 | 0.29 | 0.29 | 3.5 | 1.02 | 0.00 | 1.02 | 0.0035 | 0.0208 | 7.3 | 1.5 | 0.21 | 0.0833 | 4.00 | 0.6 | 3.1 | 0.174 | 0.1250 | 4.8 | 0.83 | 0.96 | 0.98 | 0.04 | |
| -----ROAD "C"----- | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-10 | DI-3B | 6.0 | 12+75 R | 1.0 | 0.40 | 0.41 | 0.41 | 3.5 | 1.44 | 0.00 | 1.44 | 0.0047 | 0.0208 | 8.0 | 1.5 | 0.19 | 0.0833 | 4.00 | 0.55 | 3.1 | 0.174 | 0.1163 | 6.3 | 0.95 | 1.00 | 1.43 | 0.01 | Tmax= 10.5 |

NOTE : MAXIMUM SPREAD ( T max) IS COMPUTED TO BE EQUIVALENT TO
ONE-HALF OF THE WIDTH OF THE TRAVEL LANE PLUS
THE WIDTH OF THE GUTTER.

"a" IS TOTAL DEPRESSION AT INLET, I.E.,
a = 12W(Sw-Sx) + LOCAL DEPRESSION IN INCHES

STORM WATER INLET COMPUTATIONSS
AT SAGS, ROLL TOP CURB AND GUTTER SECTION

ROUTE: ROUTE 5
PROJECT: GOVERNOR'S LAND AT TWO RIVERS, NATHANIEL'S GREEN (BAY 2, POD 3)
JOB NO.: 7173
DATE: 3/24/92

Prepared by: AES Consulting Engineers

| No. | Type | Length (ft) | Station | Drainage Area (Ac.) | C | CA | SUM CA | I (In./Hr.) | Q incr (cfs) | Q carryover (cfs) | Qt Gutter Flow (cfs) | S Gutter Slope (ft/ft) | Sx Cross Slope (ft/ft) | T Spread (ft) | W (ft) | W/T | Sw (ft/ft) | Sw/Sx | Eo (#10) | a (in.) | Sw = a/(12W) | Se = Sx + WEo (ft/ft) | P effec Length (ft) | d (ft) | h (ft) | d/h (ft) ( < 1.2) | T spread @ sag (ft) | REMARK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ----- ROAD "A"---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-2 | DI-3A | 2.5 | 13+42 L | 0.57 | 0.55 | 0.31 | 0.31 | 3.5 | 1.10 | 0.02 | 1.12 | | 0.0208 | | 1.5 | | 0.0833 | 4.00 | | 3.1 | 0.388 | 0.0208 | 5.5 | 0.19 | 0.29 | 0.7 | 9.1 | @ sag |
| 28-2 | DI-3A | 2.5 | 13+42 L | 0.44 | 0.55 | 0.24 | 0.24 | 3.5 | 0.85 | 0.00 | 0.85 | 0.0010 | 0.0208 | 9.0 | 1.5 | 0.17 | | | | | | | FLOW APPROACHING FROM STATIONING BACK | | | | | Tmax = |
| 28-2 | DI-3A | 2.5 | 13+42 L | 0.13 | 0.55 | 0.07 | 0.07 | 3.5 | 0.25 | 0.02 | 0.27 | 0.0010 | 0.0208 | 5.0 | 1.5 | 0.30 | | | | | | | FLOW APPROACHING FROM STATIONING AHEAD | | | | | 9.5 |
| 28-3 | DI-3A | 6.0 | 13+05 R | 1.91 | 0.35 | 0.67 | 0.67 | 3.5 | 2.34 | 0.01 | 2.35 | 0.0015 | 0.0208 | 13.5 | USE FLANKING INLET, DESIGNED AS SS#28-9 *SEE BELOW | | | | | | | | | | | | | Tmax = |
| 28-3 | DI-3A | 6.0 | 13+05 R | 0.68 | 0.40 | 0.27 | 0.27 | 3.5 | 0.95 | 0.00 | 0.95 | 0.0015 | 0.0208 | 8.8 | 1.5 | 0.17 | | | | | | | FLOW APPROACHING FROM STATIONING AHEAD | | | | | 9.5 |
| | | | | | | | | | | | | | | | *SPACING X= (200*D*K)^0.5 = (200*0.27*32.6)^0.5 = 41.96' AT T = 9.5', DI-3A WILL CARRY 0.90 cfs | | | | | | | | | | | | |
| 30-6 | DI-3C | 6.0 | 18+81 R | 1.37 | 0.40 | 0.55 | 0.55 | 3.5 | 1.92 | 0.00 | 1.92 | | 0.0208 | | 1.5 | | 0.0833 | 4.00 | | 3.1 | 0.388 | 0.0208 | 9.0 | 0.19 | 0.29 | 0.7 | 9.1 | @ sag |
| 30-6 | DI-3C | 6.0 | 18+81 R | 0.93 | 0.40 | 0.37 | 0.37 | 3.5 | 1.30 | 0.00 | 1.30 | 0.0020 | 0.0208 | 9.5 | 1.5 | 0.16 | | | | | | | FLOW APPROACHING FROM STATIONING BACK | | | | | Tmax = |
| 30-6 | DI-3C | 6.0 | 18+81 R | 0.44 | 0.46 | 0.20 | 0.20 | 3.5 | 0.71 | 0.00 | 0.71 | 0.0020 | 0.0208 | 7.2 | 1.5 | 0.21 | | | | | | | FLOW APPROACHING FROM STATIONING AHEAD | | | | | 9.5 |
| 31-2 | DI-4D | 4.0 | 27+20 R | 0.16 | 0.70 | 0.11 | 0.11 | 3.5 | 0.39 | 0.01 | 0.40 | | 0.0208 | | 1.5 | | 0.0833 | 4.00 | | 3.1 | 0.388 | 0.0208 | 7.0 | 0.13 | 0.29 | 0.4 | 6.3 | @ sag |
| 31-2 | DI-4D | 4.0 | 27+20 R | 0.09 | 0.70 | 0.06 | 0.06 | 3.5 | 0.22 | 0.01 | 0.23 | 0.0100 | 0.0208 | 4.8 | 1.5 | 0.31 | | | | | | | FLOW APPROACHING FROM STATIONING BACK | | | | | Tmax = |
| 31-2 | DI-4D | 4.0 | 27+20 R | 0.06 | 0.70 | 0.04 | 0.04 | 3.5 | 0.15 | 0.00 | 0.15 | 0.0010 | 0.0208 | 4.2 | 1.5 | 0.36 | | | | | | | FLOW APPROACHING FROM STATIONING AHEAD | | | | | 9.5 |
| 31-3 | DI-4D | 4.0 | 27+15 L | 0.15 | 0.70 | 0.10 | 0.10 | 3.5 | 0.37 | 0.05 | 0.42 | | 0.0208 | | 1.5 | | 0.0833 | 4.00 | | 3.1 | 0.388 | 0.0208 | 7.0 | 0.14 | 0.29 | 0.5 | 6.7 | @ sag |
| 31-3 | DI-4D | 4.0 | 27+15 L | 0.08 | 0.70 | 0.06 | 0.06 | 3.5 | 0.20 | 0.00 | 0.20 | 0.0100 | 0.0208 | 4.2 | 1.5 | 0.36 | | | | | | | FLOW APPROACHING FROM STATIONING BACK | | | | | Tmax = |
| 31-3 | DI-4D | 4.0 | 27+15 L | 0.07 | 0.70 | 0.05 | 0.05 | 3.5 | 0.17 | 0.05 | 0.22 | 0.0100 | 0.0208 | 4.0 | 1.5 | 0.38 | | | | | | | FLOW APPROACHING FROM STATIONING AHEAD | | | | | 9.5 |
| ----- ROAD "C"---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-5 | DI-3A | 2.5 | 18+23 R | 0.88 | 0.40 | 0.35 | 0.35 | 3.5 | 1.23 | 0.00 | 1.23 | | 0.0208 | | 1.5 | | 0.0833 | 4.00 | | 3.1 | 0.388 | 0.0208 | 5.5 | 0.20 | 0.29 | 0.7 | 9.6 | @ sag |
| 28-5 | DI-3A | 2.5 | 18+23 R | 0.70 | 0.38 | 0.27 | 0.27 | 3.5 | 0.93 | 0.00 | 0.93 | 0.0010 | 0.0208 | 9.4 | 1.5 | 0.16 | | | | | | | FLOW APPROACHING FROM STATIONING BACK | | | | | Tmax = |
| 28-5 | DI-3A | 2.5 | 18+23 R | 0.18 | 0.50 | 0.09 | 0.09 | 3.5 | 0.32 | 0.00 | 0.32 | 0.0010 | 0.0208 | 4.8 | 1.5 | 0.31 | | | | | | | FLOW APPROACHING FROM STATIONING AHEAD | | | | | 9.5 |
| ----- ROAD "B"---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-7 | DI-3A | 2.5 | 10+97 L | 0.45 | 0.41 | 0.18 | 0.18 | 3.5 | 0.65 | 0.04 | 0.69 | | 0.0208 | | 1.5 | | 0.0833 | 4.00 | | 3.1 | 0.388 | 0.0208 | 5.5 | 0.14 | 0.29 | 0.5 | 6.7 | @ sag |
| 28-7 | DI-3A | 2.5 | 10+97 L | 0.05 | 0.75 | 0.04 | 0.04 | 3.5 | 0.13 | 0.00 | 0.13 | 0.0015 | 0.0208 | 2.4 | 1.5 | 0.63 | | | | | | | FLOW APPROACHING FROM STATIONING BACK | | | | | Tmax = |
| 28-7 | DI-3A | 2.5 | 10+97 L | 0.40 | 0.40 | 0.16 | 0.16 | 3.5 | 0.56 | 0.04 | 0.60 | 0.0015 | 0.0208 | 6.7 | 1.5 | 0.22 | | | | | | | FLOW APPROACHING FROM STATIONING AHEAD | | | | | 6.5 |
| ----- ROAD "D"---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29-3 | DI-3A | 2.5 | 17+00 R | 0.26 | 0.60 | 0.16 | 0.16 | 3.5 | 0.55 | 0.07 | 0.62 | | 0.0208 | | 1.5 | | 0.0833 | 4.00 | | 3.1 | 0.388 | 0.0208 | 5.5 | 0.13 | 0.29 | 0.4 | 6.3 | @ sag |
| 29-3 | DI-3A | 2.5 | 17+00 R | 0.20 | 0.55 | 0.11 | 0.11 | 3.5 | 0.39 | 0.00 | 0.39 | 0.0010 | 0.0208 | 6.5 | 1.5 | 0.23 | | | | | | | FLOW APPROACHING FROM STATIONING BACK | | | | | Tmax = |
| 29-3 | DI-3A | 2.5 | 17+00 R | 0.06 | 0.70 | 0.04 | 0.04 | 3.5 | 0.15 | 0.00 | 0.15 | 0.0010 | 0.0208 | 3.4 | 1.5 | 0.44 | | | | | | | FLOW APPROACHING FROM STATIONING AHEAD | | | | | 6.5 |
| 29-2 | DI-3A | 2.5 | 26+74 R | 0.41 | 0.42 | 0.17 | 0.17 | 3.5 | 0.60 | 0.06 | 0.66 | | 0.0208 | | 1.5 | | 0.0833 | 4.00 | | 3.1 | 0.388 | 0.0208 | 5.5 | 0.14 | 0.29 | 0.5 | 6.7 | @ sag |
| 29-2 | DI-3A | 2.5 | 26+74 R | 0.06 | 0.65 | 0.04 | 0.04 | 3.5 | 0.14 | 0.05 | 0.19 | 0.0015 | 0.0208 | 4.2 | 1.5 | 0.36 | | | | | | | FLOW APPROACHING FROM STATIONING BACK | | | | | Tmax = |
| 29-2 | DI-3A | 2.5 | 26+74 R | 0.35 | 0.40 | 0.14 | 0.14 | 3.5 | 0.49 | 0.01 | 0.50 | 0.0015 | 0.0208 | 6.5 | 1.5 | 0.23 | | | | | | | FLOW APPROACHING FROM STATIONING AHEAD | | | | | 6.5 |

NOTE : MAXIMUM SPREAD (T max) IS COMPUTED TO BE EQUIVALENT TO
ONE-HALF OF THE WIDTH OF THE TRAVEL LANE
PLUS THE WIDTH OF THE GUTTER.

a" IS TOTAL DEPRESSION AT INLET, I.E.,
a = 12W(Sw-Sx0 + LOCAL DEPRESSION IN INCHES

LD-269
Rev 3-81

22(5-18)

Project GOVERNOR'S LAND AT TWO RIVERS
ROAD "A" STA. 27+15

Plan Sheet No. 8 Designer VMB
Rev. Date _____ Date 1/22/92

Sheet 1 of 1

HYDROLOGICAL DATA:
D.A. = _____ AC.

BY STORM 10 YEAR STORM ROUTING OF UPSTREAM WATERSHED $Q_{10\ PEAK}$ = 45.6 CFS

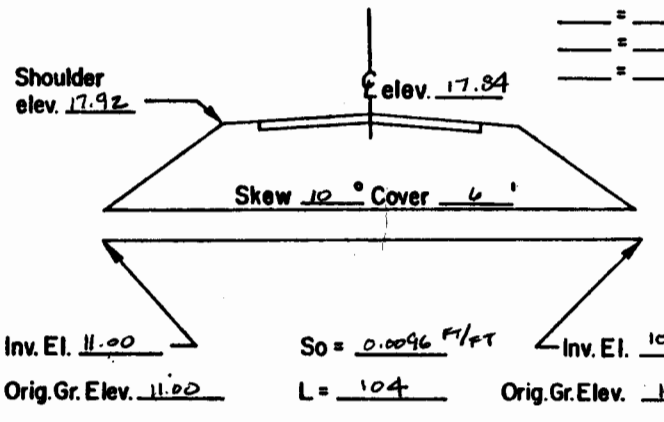
BECAUSE OF VERY LIMITED AMOUNT RUNOFF COLLECTED BY SS#31-2 & SS#31-3, SYSTEM 31 IS MORE CORRECTLY EVALUATED AS A CULVERT

A 24"x 38" RCP WILL BE USED

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

STATION: 27+15

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




DISCHARGES USED
Q ____ = _____ CFS
Q ____ = _____ CFS
Q ____ = _____ CFS
Q ____ = _____ CFS
Q ____ = _____ CFS

RISK ASSESSMENT
ADT 470 (PROPOSED)
Detours Available _____, Length _____
Overtopping Stage _____
Flood Plain Management _____
Criteria and Significant Impact _____

| CULVERT TYPE & SIZE | Q | Q/B | HEADWATER COMPUTATIONS: INLET CONT. HW/D | INLET CONT. HW | OUTLET CONTROL Ke | dc | $\frac{dc+D}{2}$ | ho | H | LSo | HW | CONT. HW. ELEV. | OUTLET VELOCITY C.M. | OUTLET VELOCITY Smooth | End Treat. | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24"x38" | 45.6 | | 1.9 | 3.8 | 0.5 | 1.9 | 2.11 | 2.11 | 2.8 | 1.0 | 3.92 | 3.92 | | | ES-1 | INADEQUATE SIZE $Q_{10\ (OUT)}$ = 36.6 CFS (from 10 year Storm Routing) |

USE 24"x38" PIPE, DISCHARGE WILL BE $Q_{10}$ = 36.6 CFS < $Q_{2\ PROPOSED}$ = 38.5 CFS

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

SUMMARY & RECOMMENDATIONS:

(Rev. 1/85)

# Hydrograph Summary Report



| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Volume (cuft) | Return period (yrs) | Inflow hyd(s) | Maximum elevation (ft) | Maximum storage (cuft) | Hydrograph description |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Rational | 28.9 | 1 | 18 | 54,430 | 10 | — | — | — | 10-yr Post-Develop |
| 2 | Rational | 39.7 | 1 | 18 | 74,733 | 100 | — | — | — | 100-yr Post Develo |
| 4 | Reservoir | 20.1 | 1 | 31 | 53,719 | 10 | 1 | 22.65 | 24,954 | 10-Year |
| 5 | Reservoir | 33.8 | 1 | 25 | 73,757 | 100 | 2 | 22.76 | 25,872 | 100-Year |

Proj. file: lot23.GPW | IDF file: JCChydrographs.IDF | Run date: 11-22-2000

# Hydrograph Plot

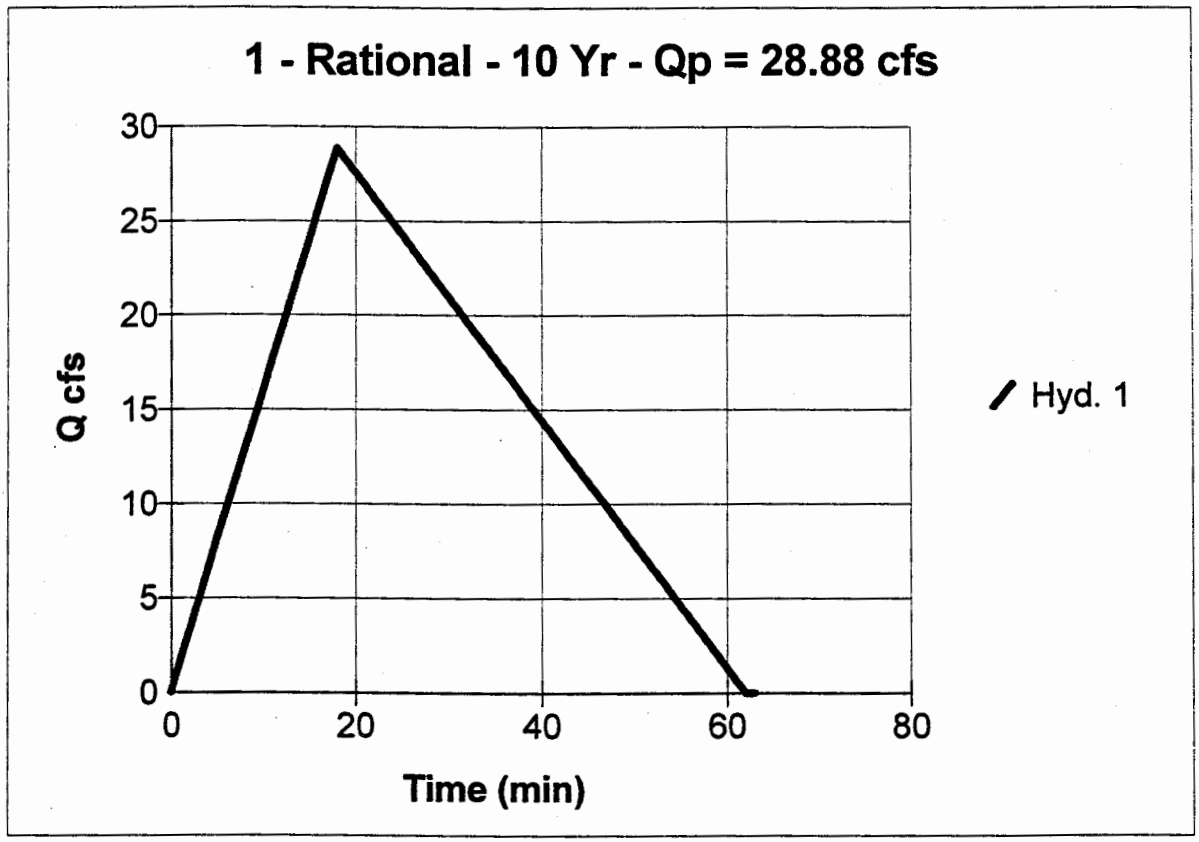
English

## Hyd. No. 1

10-yr Post-Development

| | | | |
|---|---|---|---|
| Hydrograph type | = Rational | Peak discharge | = 28.88 cfs |
| Storm frequency | = 10 yrs | Time interval | = 1 min |
| Drainage area | = 8.9 ac | Runoff coeff. | = 0.68 |
| Intensity | = 4.75 in | Time of conc. (Tc) | = 18 min |
| I-D-F Curve | = JCChydrographs.IDF | Reced. limb factor | = 2.49 |

Total Volume = 54,430 cuft



# Hydrograph Plot

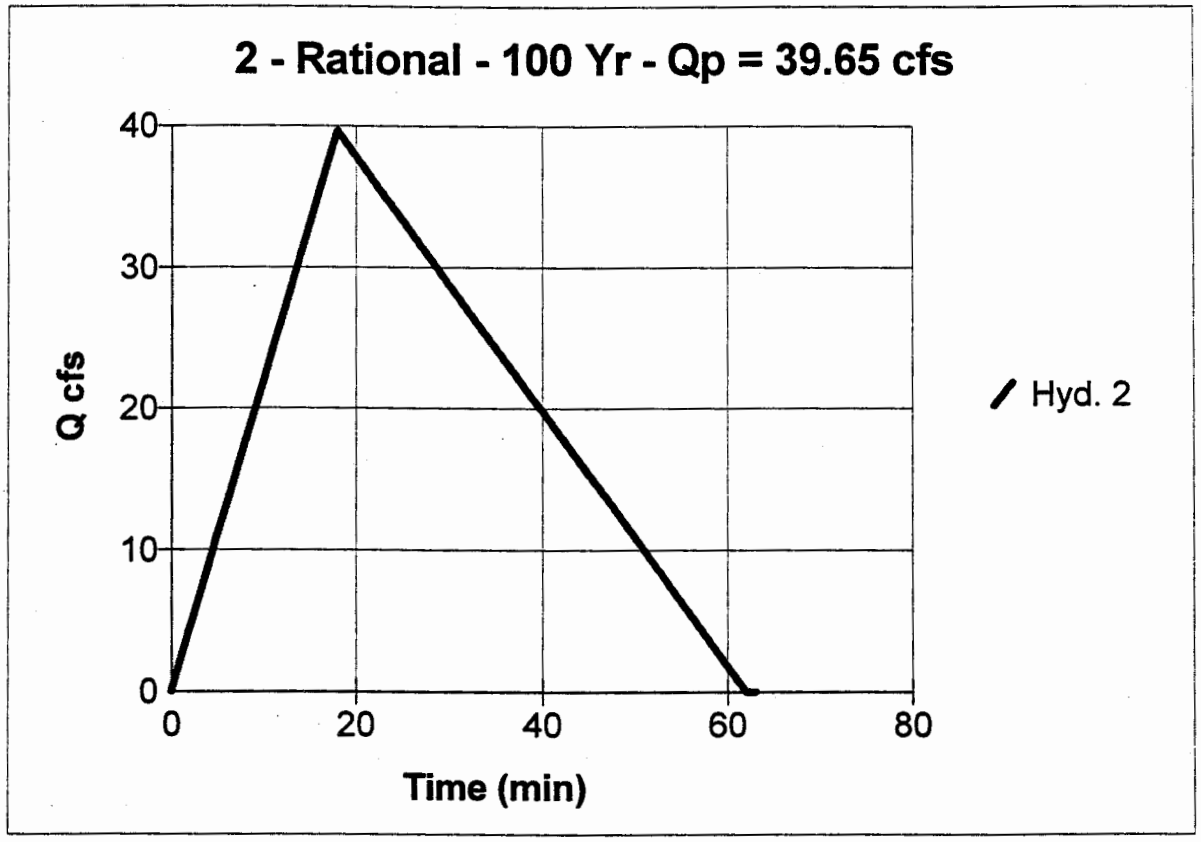
English

## Hyd. No. 2

100-yr Post Development

| | | | |
|---|---|---|---|
| Hydrograph type | = Rational | Peak discharge | = 39.65 cfs |
| Storm frequency | = 100 yrs | Time interval | = 1 min |
| Drainage area | = 8.9 ac | Runoff coeff. | = 0.68 |
| Intensity | = 6.52 in | Time of conc. (Tc) | = 18 min |
| I-D-F Curve | = JCChydrographs.IDF | Reced. limb factor | = 2.49 |

Total Volume = 74,733 cuft



# Reservoir Report



English

## Reservoir No. 1 - Timber BMP

### 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 | 16.00 | 44 | 0 | 0 |
| 1.00 | 17.00 | 397 | 221 | 221 |
| 2.00 | 18.00 | 1,654 | 1,026 | 1,247 |
| 3.00 | 19.00 | 3,250 | 2,452 | 3,699 |
| 4.00 | 20.00 | 4,731 | 3,991 | 7,690 |
| 5.00 | 21.00 | 6,013 | 5,372 | 13,062 |
| 6.00 | 22.00 | 7,262 | 6,638 | 19,700 |
| 7.00 | 23.00 | 9,005 | 8,134 | 27,834 |

### Culvert / Orifice Structures

| | | [A] | [B] | [C] | [D] |
|---|---|---|---|---|---|
| Rise in | = | 12.0 | 2.0 | 0.0 | 0.0 |
| Span in | = | 12.0 | 2.0 | 0.0 | 0.0 |
| No. Barrels | = | 1 | 1 | 0 | 0 |
| Invert El. ft | = | 16.00 | 16.00 | 0.00 | 0.00 |
| Length ft | = | 45.0 | 0.5 | 0.0 | 0.0 |
| Slope % | = | 13.00 | 1.00 | 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 24" RISER WALL

| | | [A] | [B] | [C] | [D] |
|---|---|---|---|---|---|
| Crest Len ft | = | 6.3 | 60.0 | 0.0 | 0.0 |
| Crest El. ft | = | 20.50 | 22.50 | 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 |

(NOT ASBUILT DATA)

Tailwater Elevation = 12.45 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 | 16.00 | 0.00 | 0.00 | — | — | 0.00 | 0.00 | — | — | 0.00 |
| 1.00 | 221 | 17.00 | 2.67 | 0.10 | — | — | 0.00 | 0.00 | — | — | 0.10 |
| 2.00 | 1,247 | 18.00 | 4.63 | 0.15 | — | — | 0.00 | 0.00 | — | — | 0.15 |
| 3.00 | 3,699 | 19.00 | 5.98 | 0.18 | — | — | 0.00 | 0.00 | — | — | 0.18 |
| 4.00 | 7,690 | 20.00 | 7.07 | 0.21 | — | — | 0.00 | 0.00 | — | — | 0.21 |
| 5.00 | 13,062 | 21.00 | 8.02 | 0.23 | — | — | 6.68 | 0.00 | — | — | 6.92 |
| 6.00 | 19,700 | 22.00 | 8.87 | 0.26 | — | — | 34.72 | 0.00 | — | — | 9.12 |
| 7.00 | 27,834 | 23.00 | 9.64 | 0.28 | — | — | 74.71 | 63.64 | — | — | 73.56 |

TIMBER STRUCTURE #3

BAY 2, POD 3

# ORIGINAL BMP DESIGN

TIMBER STRUCTURE BAY 2, POD 3

1)

## PRE-DEVELOPMENT

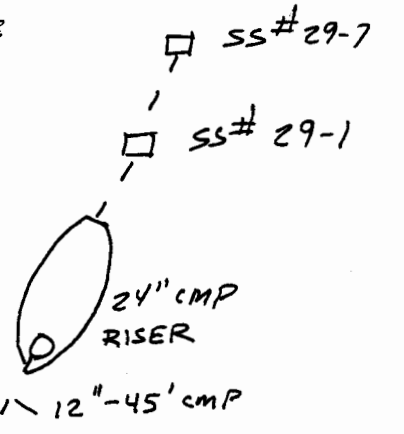
AREA: 8.94 Ac±

$C = 0.25$ $L = 700'$ OVERLAND $\Delta H = 15'$ SLOPE: 2.14%

$t_c = 30$ MIN FOR 2 YR STORM $a = 126.3$ $b = 17.3$

$I_2 = \frac{a}{b + t_c} = \frac{126.3}{30 + 17.3} = 2.67$ IN/HR

$Q_2 = (0.25)(2.67)(8.94) = 5.97$ CFS $= q_o$




## POST-DEVELOPMENT

AREA: 8.94 Ac±

$C = 0.35$ $t_c = 30$ MIN

FOR 10 YR STORM $a = 201.0$ $b = 23.9$

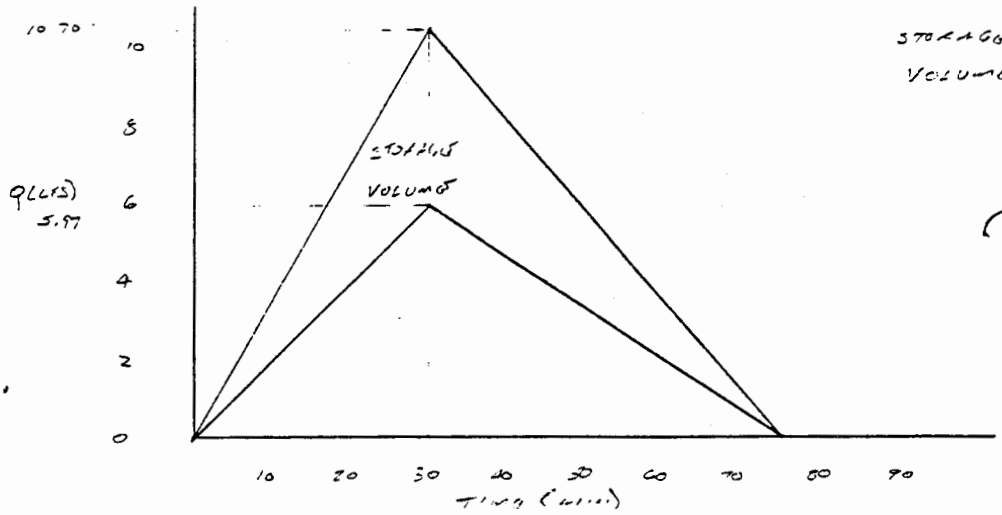
FIND CRITICAL STORM DURATION

$$T_c = \sqrt{\frac{2CAa\left(b - \frac{t_c}{4}\right)}{q_o}} - b = \sqrt{\frac{2(0.35)(8.94)(201.0)(23.9 - 30/4)}{5.97}} - 23.9$$

$T_c = 34.88$ MIN

SOLVE $q_o$ USING CRITICAL STORM DURATION

$$Q_o = (0.35)\frac{201.0}{34.88 + 23.9}(8.94) = 10.70 \text{ CFS}$$




STORAGE VOLUME: $\frac{1}{2}(75)(10.70)60 - \frac{1}{2}(75)(5.97)60$

$= 110,643$ FT$^3$ $\Rightarrow$ $= 0.45$ FT

(SEE ATTACHED SHEET FOR STAGE/STORAGE CHART)

## WATER QUALITY

DESIGN TYPE 2 $\Rightarrow$ 1/2" OVER IMP. AREA IMP. AREA = 25% (8.94) = 3.13 Ac

$= (1/2)(3.13)(43,560)(1/12) = 5681$ FT$^3$ REQUIRED TO STORE FIRST 1/2" RUNOFF.

5681 FT$^3$ IS STORED AT ELEVATION = 13.70 FT

TO DRAIN IN 6-12 HRS.

$(5681 \text{ FT}^3/12 \text{ HRS})\left(\frac{1}{60 \text{ MIN/HR}}\right)\left(\frac{1}{60 \text{ SEC/MIN}}\right) = 0.13$ CFS $= q$

TIMBER STRUCTURE #5
BAY 2, ROD 3

USE ORIFICE

$q = CA\sqrt{2gh}$ $h = 2.20'$ $g = 32.2\ ft/sec^2$
$C = 0.60$

$0.13 = 0.6A\sqrt{2(32.2)(2.20)}$ $A = 0.0182\ ft^2$

$d = \sqrt{4/\pi\,(0.0182)} = 0.1522\ FT = 1.83$ INCHES

USE 2" HOLE $A = 0.0218\ FT$
$q = (0.6)(.0218)\sqrt{2(32.2)(2.20)} = 0.16$ CFS

$0.16\ CFS \dfrac{(60\ sec/min)(60\ min/hr)}{5681\ FT^3} = \dfrac{1}{X\ HRS}$ $X = 10.14$ HRS GOOD

FROM PLATE 1.26A, A 24" RISER WILL CARRY 10.70 CFS WITH 0.68' OF HEAD
TOP OF 24" RISER WILL BE AT 20.50'.
HIGH WATER WILL BE AT 21.18' AND TOP OF STRUCTURE: 22.50'
FROM PLATE 1.26A, 45' OF 12" CMP WILL CARRY 4.50 CFS & 5.97 CFS
2 YR CAP

Option 1 STAGE / STORAGE TABLE R to reset

1. RESERVOIR No = 1. 2. RESERVOIR NAME = TIMBER #5...
3. S = Ks * Z^b
Ks = 0..... b = 0.....
START ELEV = 0..... INCREMENT = 0...

| | STAGE ft | ELEVATION ft | CO AREA sq ft | INC STORAGE cu ft | TOT STORAGE cu ft |
|---|---|---|---|---|---|
| 4 | 0.00 | 17.50. | 0..... | 0 | 0 |
| 5 | 0.50 | 18.00. | 1045.... | 261 | 261 |
| 6 | 1.50 | 19.00. | 3629.... | 2337 | 2598 |
| 7 | 2.50 | 20.00. | 6286.... | 4957 | 7555 |
| 8 | 2.95 | 20.45. | 7465.... | 3093 | 10648 |
| 9 | 3.50 | 21.00. | 8905.... | 4501 | 15149 |
| 10 | 4.50 | 22.00. | 11600... | 10252 | 25401 |
| 11 | 5.50 | 23.00. | 14500... | 13050 | 38451 |
| 12 | 0.00 | 0.00. | 0..... | 0 | 0 |
| 13 | 0.00 | 0.00. | 0..... | 0 | 0 |
| 14 | 0.00 | 0.00. | 0..... | 0 | 0 |

Change item number: 0 DY to cont

Assume Low Flow + Riser Structure Inoperable (1¼" discharge size)

WEIR WALL 85' LONG @ EL. 22.5 (Timber Crib Wall)

BAY 2 POD 5
Timber Crib
DA = 8.94 cfs
C = 0.35
$T_c$ = 30 min

| Time | Q-in (cfs) | 2S/dt - Q (cfs) | 2S/dt + Q (cfs) | Q-out (cfs) | Storage (c.f.) | Elev. (ft.) |
|---|---|---|---|---|---|---|
| 0 | 0.0 | 0 | | 0 | 0 | 17.5 |
| 8 | 5.1 | 5.0 | 5.1 | 0 | 1212 | 18.6 |
| 16 | 10.1 | 20.2 | 20.2 | 0 | 4848 | 19.57 |
| 24 | 15.1 | 45.5 | 45.5 | 0 | 10908 | 20.52 |
| 32 | 17.7 | 78.3 | 78.3 | 0 | 18784 | 21.41 |
| 40 | 12.6 | 108.6 | 108.6 | 0 | 26054 | 22.08 |
| 48 | 7.6 | 128.8 | 128.8 | 0 | 30900 | 22.47 |
| 56 | 2.5 | 134.1 | 138.8 | 2.4 | 32752.9 | 22.56 ⇐= |
| 64 | 0.0 | 133.4 | 136.6 | 1.6 | 32408.45 | 22.54 |
| 72 | 0.0 | 132.1 | 133.4 | 0.7 | 31865 | 22.52 |
| 80 | 0.0 | 131.4 | 132.1 | 0.4 | 31614 | 22.51 |

Max Q (cfs) 2.4 32,752.9 cf $\boxed{22.56}$

F/S 0.10

DHW 22.6

$Q_{100}$ PRE = 13.6 cfs

$Q_{post_{100}}$ = 18.9 cfs

BASED ON · SCS TYPE 2, P = 8.0"

$Q = C L H^{1.5}$

CHECK: WEIR EQUATION

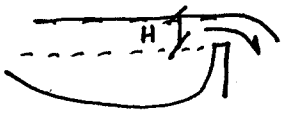
INFLOW $18.9 cfs = 3.33(85')(H)^{1.5}$

$H^{1.5} = 18.9 / 3.33(85)$

$H^{1.5} = \cancel{5349.64}\ 0.0668$

$H = 0.1646$

$22.5 + 16.46 = 22.66$




MODEL:
SWIRM-ROUTE
PENNSTATE UNIV. 1995

$\boxed{\therefore \text{ USE } 22.70}$

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Volume (cuft) | Return period (yrs) | Inflow hyd(s) | Maximum elevation (ft) | Maximum storage (cuft) | Hydrograph description |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Rational | 28.9 | 1 | 18 | 54,430 | 10 | — | — | — | 10-yr Post-Develop |
| 2 | Rational | 39.7 | 1 | 18 | 74,733 | 100 | — | — | — | 100-yr Post Develo |
| 4 | Reservoir | 20.1 | 1 | 31 | 53,719 | 10 | 1 | 22.65 | 24,954 | 10-Year |
| 5 | Reservoir | 33.8 | 1 | 25 | 73,757 | 100 | 2 | 22.76 | 25,872 | 100-Year |

| | | |
|---|---|---|
| Proj. file: lot23.GPW | IDF file: JCChydrographs.IDF | Run date: 11-22-2000 |

# Hydrograph Plot

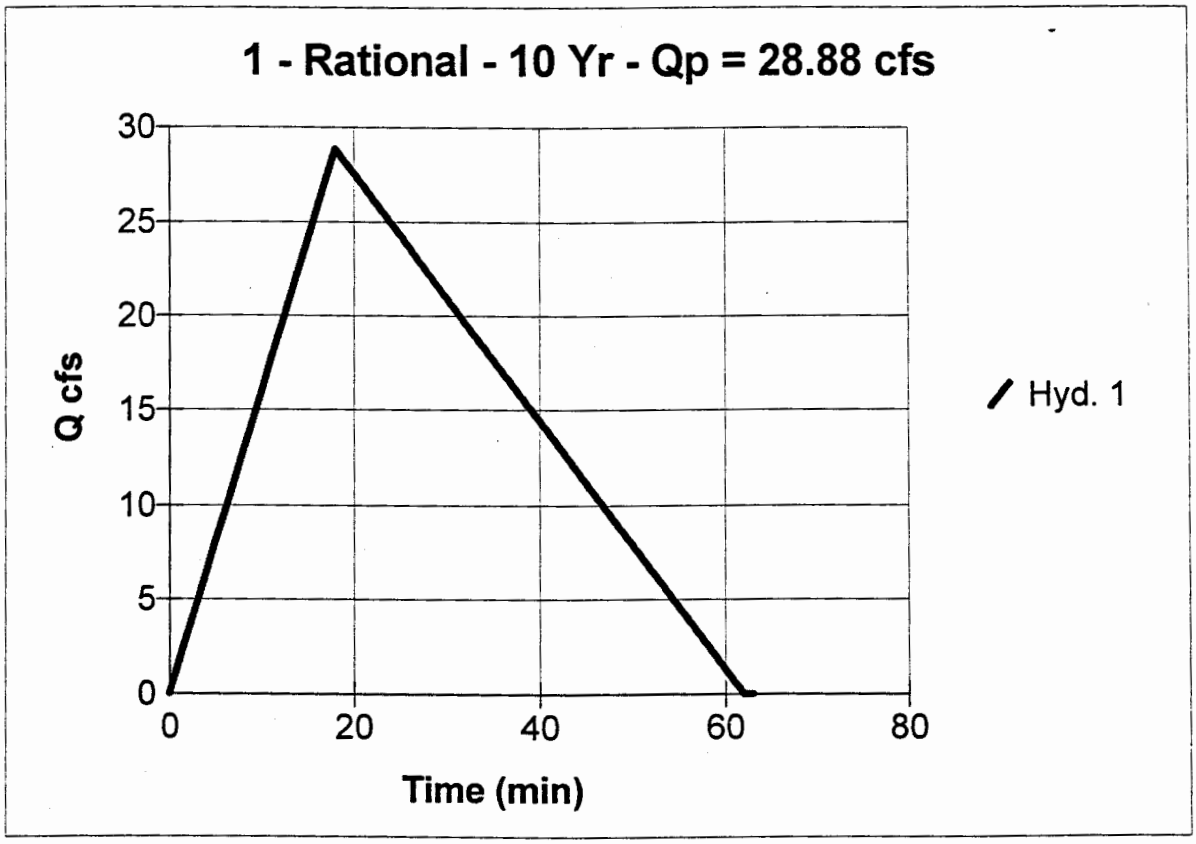
English

## Hyd. No. 1

10-yr Post-Development

| | | | |
|---|---|---|---|
| Hydrograph type | = Rational | Peak discharge | = 28.88 cfs |
| Storm frequency | = 10 yrs | Time interval | = 1 min |
| Drainage area | = 8.9 ac | Runoff coeff. | = 0.68 |
| Intensity | = 4.75 in | Time of conc. (Tc) | = 18 min |
| I-D-F Curve | = JCChydrographs.IDF | Reced. limb factor | = 2.49 |

Total Volume = 54,430 cuft



# Hydrograph Plot

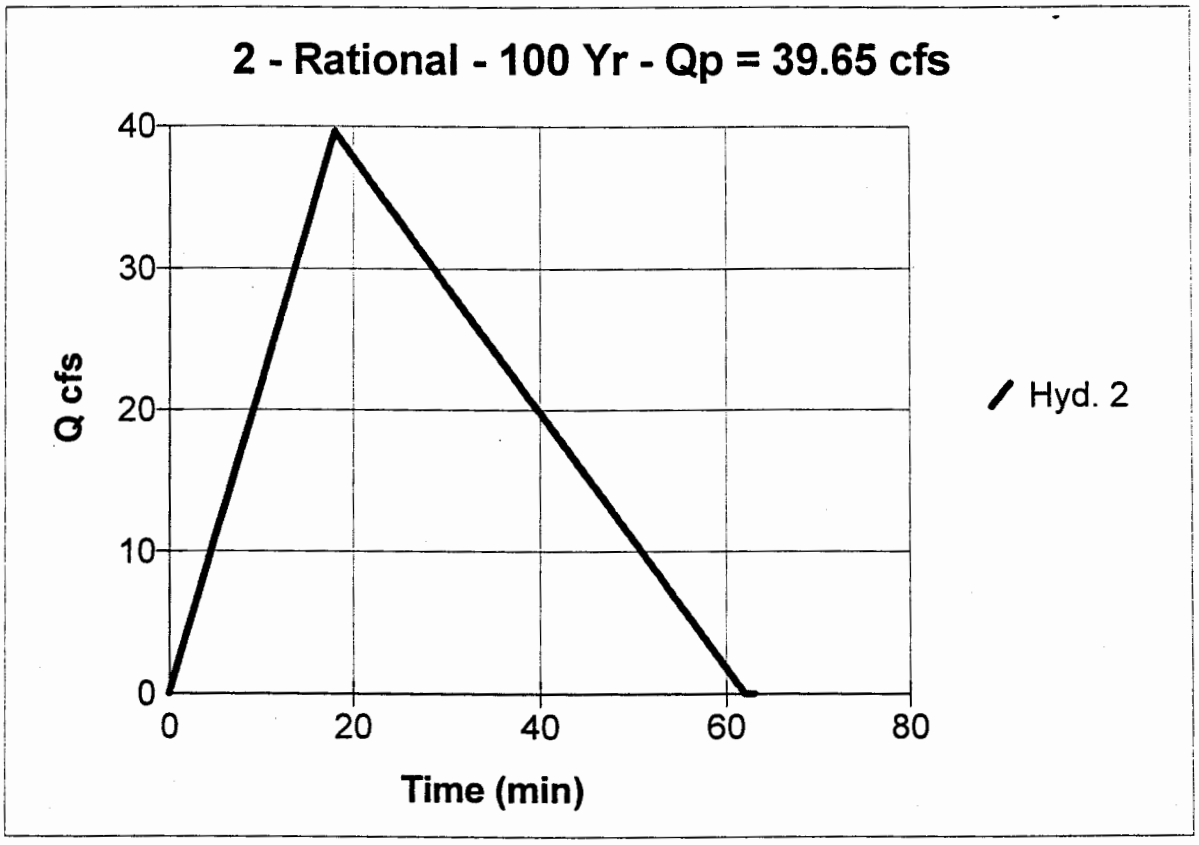
English

## Hyd. No. 2

100-yr Post Development

| | | | |
|---|---|---|---|
| Hydrograph type | = Rational | Peak discharge | = 39.65 cfs |
| Storm frequency | = 100 yrs | Time interval | = 1 min |
| Drainage area | = 8.9 ac | Runoff coeff. | = 0.68 |
| Intensity | = 6.52 in | Time of conc. (Tc) | = 18 min |
| I-D-F Curve | = JCChydrographs.IDF | Reced. limb factor | = 2.49 |

Total Volume = 74,733 cuft



# Reservoir Report



English

## Reservoir No. 1 - Timber BMP

### 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 | 16.00 | 44 | 0 | 0 |
| 1.00 | 17.00 | 397 | 221 | 221 |
| 2.00 | 18.00 | 1,654 | 1,026 | 1,247 |
| 3.00 | 19.00 | 3,250 | 2,452 | 3,699 |
| 4.00 | 20.00 | 4,731 | 3,991 | 7,690 |
| 5.00 | 21.00 | 6,013 | 5,372 | 13,062 |
| 6.00 | 22.00 | 7,262 | 6,638 | 19,700 |
| 7.00 | 23.00 | 9,005 | 8,134 | 27,834 |

### Culvert / Orifice Structures

| | | [A] | [B] | [C] | [D] |
|---|---|---|---|---|---|
| Rise in | = | 12.0 | 2.0 | 0.0 | 0.0 |
| Span in | = | 12.0 | 2.0 | 0.0 | 0.0 |
| No. Barrels | = | 1 | 1 | 0 | 0 |
| Invert El. ft | = | 16.00 | 16.00 | 0.00 | 0.00 |
| Length ft | = | 45.0 | 0.5 | 0.0 | 0.0 |
| Slope % | = | 13.00 | 1.00 | 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 | = | 6.3 | 60.0 | 0.0 | 0.0 |
| Crest El. ft | = | 20.50 | 22.50 | 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 = 12.45 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 | 16.00 | 0.00 | 0.00 | — | — | 0.00 | 0.00 | — | — | 0.00 |
| 1.00 | 221 | 17.00 | 2.67 | 0.10 | — | — | 0.00 | 0.00 | — | — | 0.10 |
| 2.00 | 1,247 | 18.00 | 4.63 | 0.15 | — | — | 0.00 | 0.00 | — | — | 0.15 |
| 3.00 | 3,699 | 19.00 | 5.98 | 0.18 | — | — | 0.00 | 0.00 | — | — | 0.18 |
| 4.00 | 7,690 | 20.00 | 7.07 | 0.21 | — | — | 0.00 | 0.00 | — | — | 0.21 |
| 5.00 | 13,062 | 21.00 | 8.02 | 0.23 | — | — | 6.68 | 0.00 | — | — | 6.92 |
| 6.00 | 19,700 | 22.00 | 8.87 | 0.26 | — | — | 34.72 | 0.00 | — | — | 9.12 |
| 7.00 | 27,834 | 23.00 | 9.64 | 0.28 | — | — | 74.71 | 63.64 | — | — | 73.56 |

TIMBER STRUCTURE #5

BAY 2, POD 3

# ORIGINAL BMP DESIGN

TIMBER STRUCTURE BAY 2, POD 3

1)

## PRE-DEVELOPMENT

AREA: 8.94 Ac±

$c = 0.25$  L = 700' OVERLAND  ΔH: 15'  SLOPE: 2.14%

$t_c = 30$ MIN  FOR 2 YR STORM  a: 126.3  b: 17.3

$I_2 = \frac{a}{b + t_c} = \frac{126.3}{30 + 17.3} = 2.67$ IN/HR

$Q_2 = (0.25)(2.67)(8.94) = 5.97$ CFS $= q_o$

## POST-DEVELOPMENT

AREA: 8.94 Ac±

$c = 0.35$  $t_c = 30$ MIN

FOR 10 YR STORM  a: 201.0  b: 23.9

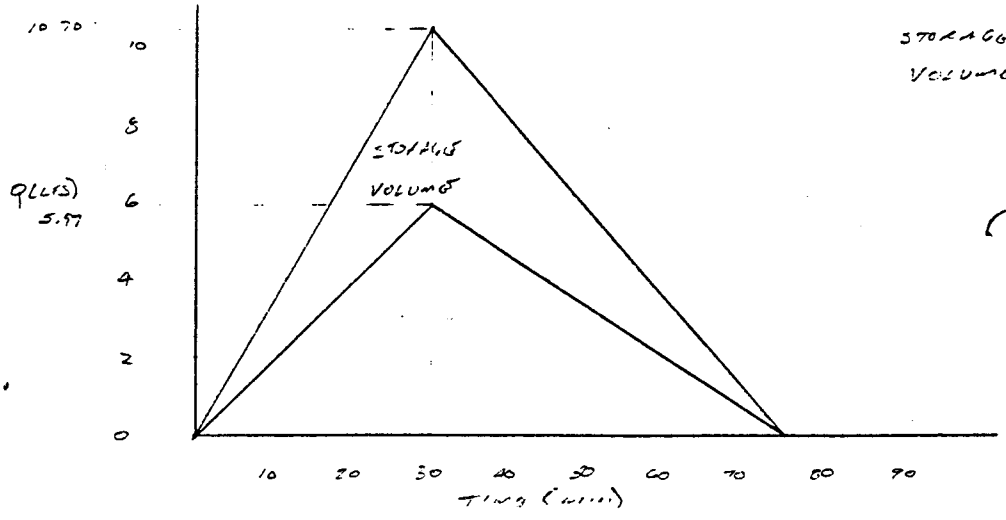
FIND CRITICAL STORM DURATION

$T_c = \sqrt{\frac{2CAa(b - t_c/4)}{q_o}} - b = \sqrt{\frac{2(0.35)(8.94)(201.0)(23.9 - 30/4)}{5.97}} - 23.9$

$T_c = 34.55$ MIN

SOLVE $Q_o$ USING CRITICAL STORM DURATION

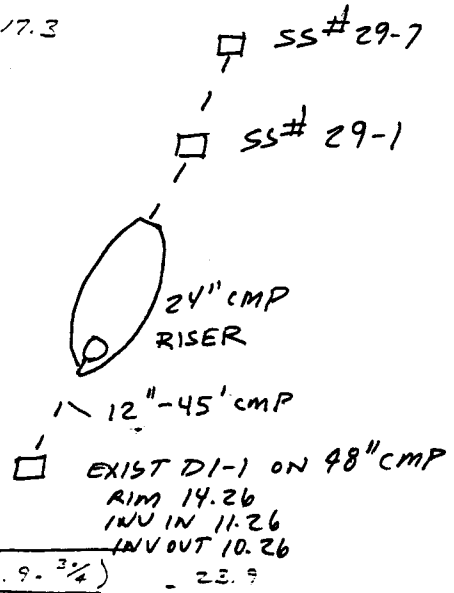
$Q_o = (0.35)\frac{201.0}{34.55 + 23.9}(8.94) = 10.70$ CFS




STORAGE VOLUME: $\frac{1}{2}(75)(10.70)60 - \frac{1}{2}(75)(5.97)60$

$= \underline{110,643 \text{ FT}^3}$  $h = \underline{9.45 \text{ FT}}$

(SEE ATTACHED SHEET FOR STAGE/STORAGE CHART)




## WATER QUALITY

DESIGN TYPE 2 → ½" OVER IMP. AREA  IMP. AREA = 25%(8.94) = 3.13 Ac.

$= (\frac{1}{2})(3.13)(43,560)(\frac{1}{12}) = \underline{5681 \text{ FT}^3}$  REQUIRED TO STORE FIRST ½" RUNOFF

5681 FT³ IS STORED AT ELEVATION = 13.70 FT

TO LAUNCH IN 6-12 HRS.

$(5681 \text{ FT}^3 / 12 \text{ HRS})(\frac{\text{DAY}}{24 \text{ HRS}})(\frac{1}{60 \text{ SEC/MIN}}) = 0.13 \text{ CFS} = q$

TIMBER STRUCTURE #5
BAY 2, ROD 3

USE ORIFICE

$Q = CA\sqrt{2gh}$ $h = 2.20'$ $g = 32.2\ ft/sec^2$
$C = 0.60$

$0.13 = 0.6\,A\sqrt{2(32.2)(2.20)}$ $A = 0.0182\ ft^2$

$d = \sqrt{4/\pi\,(0.0182)} = 0.1522\ FT = 1.83$ INCHES

USE 2" HOLE $A = 0.0218\ FT$
$Q = (0.6)(.0218)\sqrt{2(32.2)(2.20)} = 0.16$ CFS

$0.16\ CFS\ \frac{(60\ sec/min)(60\ min/hr)}{5681\ FT^3} = \frac{1}{X\ HRS}$ $X = 10.12$ HRS GOOD

FROM PLATE 1.26h, A 24" RISER WILL CARRY 10.70 CFS WITH 0.68' OF HEAD
TOP OF 24" RISER WILL BE AT 20.50'.
HIGH WATER WILL BE AT 21.18' AND TOP OF STRUCTURE: 22.50'
FROM PLATE 1.26a, 45' OF 12" CMP WILL CARRY 4.50 CFS & 5.97 CFS
2 YR 100

Option 1 STAGE / STORAGE TABLE R to reset

1. RESERVOIR No = 1. 2. RESERVOIR NAME = TIMBER #5...
3. S = Ks * Z^b
Ks = 0..... b = 0.....
START ELEV = 0..... INCREMENT = 0...

| | STAGE ft | ELEVATION ft | CO AREA sq ft | INC STORAGE cu ft | TOT STORAGE cu ft |
|---|---|---|---|---|---|
| 4 | 0.00 | 17.50. | 0..... | 0 | 0 |
| 5 | 0.50 | 18.00. | 1045.... | 261 | 261 |
| 6 | 1.50 | 19.00. | 3629.... | 2337 | 2598 |
| 7 | 2.50 | 20.00. | 6286.... | 4957 | 7555 |
| 8 | 2.95 | 20.45. | 7465.... | 3093 | 10648 |
| 9 | 3.50 | 21.00. | 8905.... | 4501 | 15149 |
| 10 | 4.50 | 22.00. | 11600... | 10252 | 25401 |
| 11 | 5.50 | 23.00. | 14500... | 13050 | 38451 |
| 12 | 0.00 | 0.00. | 0..... | 0 | 0 |
| 13 | 0.00 | 0.00. | 0..... | 0 | 0 |
| 14 | 0.00 | 0.00. | 0..... | 0 | 0 |

Change item number: 0 DY to cont

Dooke

JN 7173
1/23/92

WORKSHEET FOR BMP POINT SYSTEM

GOVERNOR'S LAND AT TWO RIVERS - OVERALL PROJECT

A. STRUCTURAL BMP POINT ALLOCATION

| BMP | BMP Points | | Fraction of Site Served by BMP | | Weighted BMP Points |
|---|---|---|---|---|---|
| PREVIOUS BMP POINT VALUE AS PRESENTED TO JAMES CITY COUNTY | | x | — | = | 9.5 |
| | | x | | = | |
| BAY 2, POP 3 TIMBER DRY POND | 4 | x | 8.95/1444 | = | 0.01 |
| | | x | | = | |

TOTAL WEIGHTED STRUCTURAL BMP POINTS: 9.51

B. NATURAL OPEN SPACE CREDIT

| Fraction of Site | | Natural Open Space Credit (0.1 per 1%) | | Points for Natural Open Space |
|---|---|---|---|---|
| | x | | = | — |

C. TOTAL WEIGHTED POINTS

| 9.51 | + | — | = | 9.51 |
|---|---|---|---|---|
| Structural BMP Points | | Natural Open Space Points | | TOTAL |

# TIMBER STRUCTURE #5
## BAY 2, POD 3

### PRE-DEVELOPMENT

AREA: 8.94 Ac±

$c = 0.25$ $L = 700'$ OVERLAND $\Delta H = 15'$ SLOPE: 2.14%

$t_c = 30$ MIN FOR 2 YR STORM $a = 126.3$ $b = 17.3$

$$I_2 = \frac{a}{b + t_c} = \frac{126.3}{30 + 17.3} = 2.67 \text{ IN/HR}$$

$$Q_2 = (0.25)(2.67)(8.94) = 5.97 \text{ CFS} = q_o$$

### POST-DEVELOPMENT

AREA: 8.94 Ac±

$c = 0.35$ $t_c = 30$ MIN.

FOR 10 YR STORM $a = 201.0$ $b = 23.9$

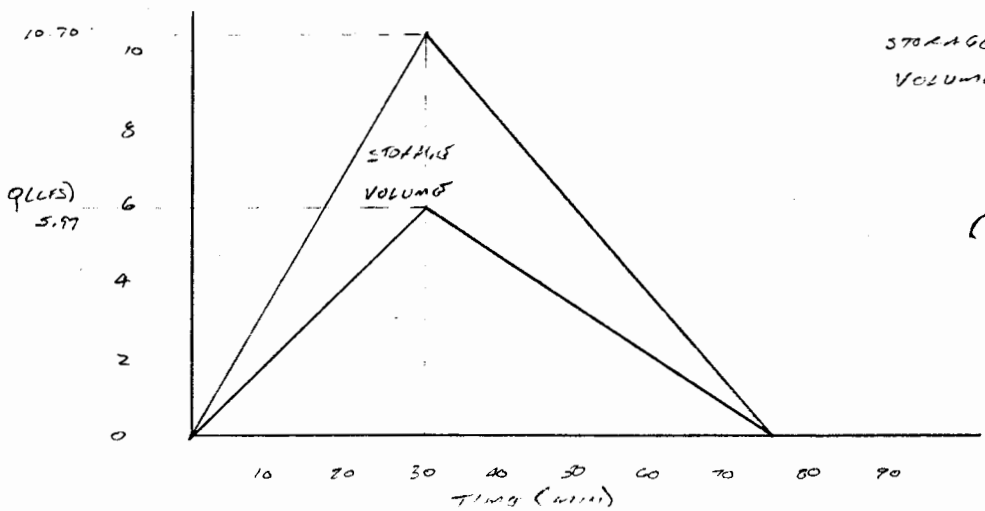
FIND CRITICAL STORM DURATION

$$T_c = \sqrt{\frac{2CAa\,(b - t_c/4)}{q_o}} - b = \sqrt{\frac{2(0.35)(8.94)(201.0)(23.9 - 30/4)}{5.97}} - 23.9$$

$T_c = 34.88$ MIN

SOLVE $Q_o$ USING CRITICAL STORM DURATION

$$Q_o = (0.35)\frac{201.0}{34.88 + 23.9}(8.94) = 10.70 \text{ CFS}$$




STORAGE VOLUME: $\frac{1}{2}(75)(10.70)60 - \frac{1}{2}(75)(5.97)60$

$= \underline{10{,}643 \text{ FT}^3} \approx \underline{20.45 \text{ FT}}$

(SEE ATTACHED SHEET FOR STAGE/STORAGE CHART)

### WATER QUALITY

DESIGN TYPE 2 ⇒ 1/2" OVER IMP AREA IMP. AREA = 35% (8.94) = 3.13 Ac.

$= (1/2)(3.13)(43{,}560)(1/12) = \underline{5681 \text{ FT}^3}$ REQUIRED TO STORE FIRST 1/2" RUNOFF

5681 FT³ IS STORED AT ELEVATION = 19.70 FT

TO COLLECT IN 6-12 HRS.

$(5681 \text{ FT}^3/12 \text{ HRS})\left(\frac{1}{60 \text{ MIN/HR}}\right)\left(\frac{1}{60 \text{ SEC/MIN}}\right) = 0.13 \text{ CFS} = q$

TIMBER STRUCTURE #5
BAY 2, AD 3

SIZE ORIFICE

$q = c a \sqrt{2 g h}$  $h = 2.20'$  $g = 32.2$ FT/SEC$^2$
$c = 0.60$

$0.13 = 0.6\, a \sqrt{2(32.2)(2.20)}$  $a = 0.0182$ FT$^2$

$d = \sqrt{4/\pi\,(0.0182)} = 0.1522$ FT $= 1.83$ INCHES

USE 2" HOLE  $a = 0.0218$ FT
$q = (0.6)(.0218)\sqrt{2(32.2)(2.20)} = 0.16$ CFS

$0.16 \text{ CFS} \dfrac{(60 \text{ SEC/MIN})(60 \text{ MIN/HR})}{5681 \text{ FT}^3} = \dfrac{1}{X \text{ HRS}}$  $X = 10.14$ HRS  GOOD

FROM PLATE 1.26h, A 24" RISER WILL CARRY 10.70 CFS WITH 0.68' OF HEAD
TOP OF 24" RISER WILL BE AT 20.50'.
HIGH WATER WILL BE AT 21.18' AND TOP OF STRUCTURE: 22.50'
FROM PLATE 1.26a, 45' OF 12" CMP WILL CARRY 4.50 CFS & 5.97 CFS
2 YR PAIR

Option 1  STAGE / STORAGE TABLE  R to reset

1. RESERVOIR No = 1.  2. RESERVOIR NAME = TIMBER #5...
3. S = Ks * Z^b
Ks = 0.....  b = 0.....
START ELEV = 0.....  INCREMENT = 0...

| | STAGE ft | ELEVATION ft | CO AREA sq ft | INC STORAGE cu ft | TOT STORAGE cu ft |
|---|---|---|---|---|---|
| 4 | 0.00 | 17.50. | 0..... | 0 | 0 |
| 5 | 0.50 | 18.00. | 1045.... | 261 | 261 |
| 6 | 1.50 | 19.00. | 3629.... | 2337 | 2598 |
| 7 | 2.50 | 20.00. | 6286.... | 4957 | 7555 |
| 8 | 2.95 | 20.45. | 7465.... | 3093 | 10648 |
| 9 | 3.50 | 21.00. | 8905.... | 4501 | 15149 |
| 10 | 4.50 | 22.00. | 11600... | 10252 | 25401 |
| 11 | 5.50 | 23.00. | 14500... | 13050 | 38451 |
| 12 | 0.00 | 0.00. | 0..... | 0 | 0 |
| 13 | 0.00 | 0.00. | 0..... | 0 | 0 |
| 14 | 0.00 | 0.00. | 0..... | 0 | 0 |

Change item number: 0  DY to cont

Form LD 204
Rev 6-85

~~RTE~~ RD 'D', 'A' PROJ GOV. LAND (BAY 2, POD 3) DATE 1/7/92

| | INLET NUMBER | INLET TYPE | INLET LENGTH (FT) | STATION | DRAINAGE AREA (AC) | C | CA | Σ CA | I IN/HR | Q INCR (CFS) | Q CARRY-OVER (CFS) | $Q_T$ GUTTER FLOW | S GUTTER SLOPE (FT/FT) | Sx CROSS SLOPE (FT/FT) | T(SPREAD) | W(FT) | W/T | Sw(FT/FT) | Sw/Sx | Eo(#10) | a | Sw=a/(12W) | Se(FT/FT)= Sx + SwEo | LT(FT)15 / P EFFEC LENGTH FT | L/LT | d(FT) | E(#16) | h(FT) | Q; INTERC-EPTED CFS | d/h | Qb CARRY-OVER CFS | T SPREAD @ SAG FT | REMARK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 | 3B | 6 | 25+50 RT | 0.51 | 0.50 | 0.26 | | 3.5 | 0.89 | | 0.89 | .0304 | .0208 | 3.5 | 1.5 | 0.43 | .0833 | 4 | 0.90 | 2.625 | .1458 | .1520 | 7.71 | | 0.78 | 93.36% | | 0.83 | | 0.06 | | SS #29-5 |
| SUMP | 2 | 3A | 2.5 | 26+73 RT | 0.06 | 0.50 | 0.03 | | 3.5 | 0.11 | 0.06 | 0.17 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.14 | 0.18 | | 0.78 | | T=3.6<6.5 | | SS #29-2 |
| | 6 | 3B | 6 | 15+50 LT | 0.51 | 0.35 | 0.18 | | 3.5 | 0.62 | | 0.62 | .0371 | .0208 | 2.2 | 1.5 | 0.68 | .0833 | 4 | 0.99 | 2.625 | .1458 | .1651 | 6.69 | | 0.90 | 98.33% | | 0.61 | | 0.01 | | SS #29-6 |
| SUMP | 2 | 3A | 2.5 | 26+74 RT | 0.35 | 0.35 | 0.12 | | 3.5 | 0.43 | 0.01 | 0.44 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.15 | 0.22 | | 0.63 | | T=6.5<6.5 | | SS #29-2 |
| | 4 | 3B | 6 | 18+00 RT | 0.73 | 0.35 | 0.26 | | 3.5 | 0.89 | | 0.89 | .0321 | .0208 | 3.4 | 1.5 | 0.44 | .0833 | 4 | 0.90 | 2.625 | .1458 | .1520 | 7.84 | | 0.77 | 92.68% | | 0.82 | | 0.07 | | SS #29-4 |
| SUMP | 3 | 3A | 2.5 | 17+00 LT | 0.06 | 0.50 | 0.03 | | 3.5 | 0.11 | 0.07 | 0.18 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.14 | 0.19 | | 0.74 | | T=3.8<6.5 | | SS #29-3 |
| SUMP | 3 | 3A | 2.5 | 16+99 RT | 0.20 | 0.50 | 0.10 | | 3.5 | 0.35 | | 0.35 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.15 | 0.22 | | 0.68 | | T=5.9<6.5 | | SS #29-3 |
| | | | | RD 'A' | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 8 | 3B | 4 | 19+85 LT | 0.31 | 0.50 | 0.16 | | 3.5 | 0.54 | | 0.54 | .0067 | .0208 | 4.4 | 1.5 | 0.34 | .0833 | 4 | 0.83 | 2.625 | .1458 | .1416 | 4.14 | | 0.97 | 99.78% | | 0.54 | | 0.00 | | SS #30-8 |
| | 2 | 3B | 6 | 25+52 LT | 0.51 | 0.50 | 0.26 | | 3.5 | 0.89 | | 0.89 | .0300 | .0208 | 3.6 | 1.5 | 0.42 | .0833 | 4 | 0.90 | 2.625 | .1458 | .1520 | 7.68 | | 0.78 | 93.53% | | 0.83 | | 0.06 | | SS #30-2 |
| SUMP | | 3A | 2.5 | 26+87 LT | 0.08 | 0.50 | 0.04 | | 3.5 | 0.14 | 0.06 | 0.20 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.14 | 0.18 | | 0.78 | | T=4.0<9.5 | | |
| SUMP | | 3A | 2.5 | 27+15 LT | 0.07 | 0.50 | 0.04 | | 3.5 | 0.12 | | 0.12 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.13 | 0.15 | | 0.87 | | T=2.5<9.5 | | |
| | 7 | 3B | 4 | 17+80 RT | 0.20 | 0.35 | 0.07 | | 3.5 | 0.25 | | 0.25 | .0056 | .0208 | 2.2 | 1.5 | 0.68 | .0833 | 4 | 0.99 | 2.625 | .1458 | .1651 | 2.59 | | 1.54 | 100% | | 0.25 | | 0.00 | | SS #30-7 |
| SUMP | 6 | 3A | 2.5 | 18+80 RT | 0.78 | 0.35 | 0.26 | | 3.5 | 0.89 | | 0.89 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.19 | 0.29 | | 0.66 | | T=9.4<9.5 | | SS #30-6 |
| SUMP | 6 | 3A | 2.5 | 18+81 RT | 0.44 | 0.35 | 0.15 | | 3.5 | 0.54 | | 0.54 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.16 | 0.25 | | 0.64 | | T=7.4<9.5 | | SS #30-6 |
| | 5 | 3B | 4 | 19+85 RT | 0.64 | 0.35 | 0.22 | | 3.5 | 0.78 | | 0.78 | .0056 | .0208 | 5.8 | 1.5 | 0.26 | .0833 | 4 | 0.70 | 2.625 | .1458 | .1229 | 4.99 | | 0.80 | 94.57% | | 0.74 | | 0.04 | | SS #30-5 |
| | 4 | 3B | 4 | 21+95 RT | 0.17 | 0.50 | 0.09 | | 3.5 | 0.30 | 0.04 | 0.34 | .0040 | .0208 | 3.6 | 1.5 | 0.42 | .0833 | 4 | 0.90 | 2.625 | .1458 | .1520 | 2.80 | | 1.43 | 100% | | 0.34 | | 0.00 | | SS #30-4 |
| | 3 | 3B | 4 | 25+52 RT | 0.21 | 0.50 | 0.11 | | 3.5 | 0.37 | 0.00 | 0.37 | .0300 | .0208 | 1.6 | 1.5 | 0.94 | .0833 | 4 | 1.00 | 2.625 | .1458 | .1666 | 5.03 | | 0.80 | 94.27% | | 0.35 | | 0.02 | | SS #30-3 |
| SUMP | | 3A | 2.5 | 27+15 RT | 0.08 | 0.50 | 0.04 | | 3.5 | 0.14 | 0.02 | 0.16 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.14 | 0.17 | | 0.82 | | T=3.5<9.5 | | |

SHEET 2 OF 2

# STORM WATER INLET COMPUTATIONS

Form LD 204
Rev 6-85

~~RTE~~ KDS 'A' - 'C' PROJ GOV. LAND (BAY 2, ADD 3) DATE 12/30/91

n = 0.015

| | INLET NUMBER | TYPE | LENGTH (FT) | STATION | DRAINAGE AREA (AC) | C | CA | Σ CA | I IN/HR | Q INCR (CFS) | Q CARRY-OVER (CFS) | $Q_T$ GUTTER FLOW | S GUTTER SLOPE (FT/FT) | SX CROSS SLOPE (FT/FT) | T(SPREAD) | W(FT) | W/T | Sw(FT/FT) | Sw/Sx | Eo(#10) | a | Sw=a/(12W) | Se(FT/FT)=Sx + SwEo | $L_T$(FT)15 | P EFFEC LENGTH FT L/$L_T$ | d(FT) | E(#16) | h(FT) | Q; INTERCEPTED CFS d/h | Qb CARRY-OVER CFS | T SPREAD @ SAG FT | REMARK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | RD 'A' NORTH | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SUMP | 2 | 3A | 2.5 | 13+42 LT | 0.44 | 0.50 | 0.22 | | 3.5 | 0.77 | | 0.77 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.18 | 0.27 | 0.67 | T=8.3<9.5 | | SS #28-2 |
| | 6 | 3B | 6 | 12+20 LT | 0.54 | 0.50 | 0.27 | | 3.5 | 0.95 | | 0.95 | .0177 | .0208 | 4.6 | 1.5 | 0.33 | .0833 | 4 | 0.81 | 2.625 | .1458 | .1389 | 7.11 | | 0.84 | 96.47% | 0.92 | | 0.03 | | SS #28-6 |
| SUMP | 2 | 3A | 2.5 | 13+41 LT | 0.13 | 0.50 | 0.07 | | 3.5 | 0.23 | 0.03 | 0.26 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.14 | 0.20 | 0.70 | T=4.9<9.5 | | SS #28-2 |
| | | | | RD 'A' SOUTH | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 4 | 3B | 4 | 13+75 RT | 0.33 | 0.35 | 0.12 | | 3.5 | 0.40 | | 0.40 | .0140 | .0208 | 2.4 | 1.5 | 0.63 | .0833 | 4 | 0.96 | 2.625 | .1458 | .1608 | 4.22 | | 0.95 | 99.51% | 0.40 | | 0.00 | | SS #28-4 |
| | | | | RD 'C' | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 10 | 3B | 6 | 12+72 RT | 1.03 | 0.35 | 0.36 | | 3.5 | 1.26 | | 1.26 | .0047 | .0208 | 7.7 | 1.5 | 0.19 | .0833 | 4 | 0.55 | 2.625 | .1458 | .1010 | 6.51 | | 0.92 | 98.97% | 1.25 | | 0.01 | | SS #28-10 |
| SUMP | 3 | 3A | 2.5 | RD 7 SOUTH 13+05 RT | 0.68 | 0.35 | 0.24 | | 3.5 | 0.83 | 0.01 | 0.84 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.18 | 0.28 | 0.64 | T=9.1<9.5 | | SS #28-3 |
| SUMP | 3 | 3A | 2.5 | 13+04 RT | 1.91 | 0.35 | 0.48 | | 3.5 | 1.67 | | 1.67 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.27 | 0.41 | 0.66 | T=15<9.5 | | SS #28-3 |
| | | | | SPACING | | X = [200 dK]^½ = [200(0.27)(32.67)]^½ = 41.96' @ T=9.5, DI 3A will carry 0.90 CFS | | | | | | | | | | | | | | | | | | | | | | | ✱ | NEED FLANKING INLET | | |
| | 9 | 3B | 6 | 12+62 RT | | (1.67-0.90 = 0.77 cfs) | | | | | | 0.77 | .0167 | .0208 | 4.1 | 1.5 | 0.37 | .0833 | 4 | 0.86 | 2.625 | .1458 | .1462 | 6.20 | | 1.29 | 100% | 0.77 | — | | SS #28-9 |
| | | | | RD 'C' | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SUMP | 5 | 3A | 2.5 | 18+22 RT | 0.70 | 0.35 | 0.25 | | 3.5 | 0.86 | | 0.86 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.18 | 0.28 | 0.64 | T=9.2<9.5 | | SS #28-5 |
| SUMP | 5 | 3A | 2.5 | 18+23 RT | 0.18 | 0.35 | .06 | | 3.5 | 0.22 | | 0.22 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.14 | 0.17 | 0.82 | T=4.2<9.5 | | SS #28-5 |
| | | | | RD 'B' | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SUMP | 7 | 3A | 2.5 | 10+97 LT | 0.05 | 0.50 | 0.03 | | 3.5 | 0.09 | | 0.09 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.12 | 0.12 | 1.00 | T=1.8<6.5 | | SS #28-7 |
| | 8 | 3B | 4 | 12+50 LT | 0.73 | 0.30 | 0.22 | | 3.5 | 0.77 | | 0.77 | .0035 | .0208 | 6.8 | 1.5 | 0.22 | .0833 | 4 | 0.62 | 2.625 | .1458 | .1112 | 4.58 | | 0.87 | 97.61% | 0.75 | | 0.02 | | SS #28-8 |
| SUMP | 7 | 3A | 2.5 | 10+98 LT | 0.40 | 0.30 | 0.12 | | 3.5 | 0.42 | 0.02 | 0.44 | .001 | .0208 | | 1.5 | | .0833 | 4 | | | | | 5.2 | | 0.15 | 0.24 | 0.63 | T=6.5<6.5 | | SS #28-7 |

SHEET 1 OF 2

POST-DEVELOPMENT 10 YEAR STORM ROUTING TO ROAD "A" CULVERT

page 16

S.C.S. HYDROGRAPH

PDEVDP#1.GPI

1. HYDROGRAPH No. = 1..... Need to be Revised

2. HYDROGRAPH DESCRIPTION

A. BAY 2, POD 1 AREA.....
B. TO.HORNE LAKE.....
C. POST - DEV.....

3. AREA (ac) = 45.9.....

4. BASIN SLOPE (%) = .67.....

5. HYDRAULIC LENGTH (ft) = 2340..

6. CURVE NUMBER = 78.....

7. TIME INTERVAL (min) = 2.....

8. 24 HR PRECIPITATION = 5.6.

9. RETURN PERIOD = 10.

10. DISTRIBUTION = 3....

1. I 2. IA 3. II

4. III 5. SYNTH 6. MAN

7. IIA 8. SOMERSET

11. STORM DUR (hrs) = 0..

Change item number: 0

Hyd No. 1 UNIT HYDROGRAPH

| | | | |
|---|---|---|---|
| Curve number | = | 78 | |
| Time Interval (Min) | = | 2 | |
| Basin lag (min) | = | 48.89 | |
| Time to peak (min) | = | 50.00 | |
| Time base (min) | = | 134.00 | |
| Rainfall excess (in) | = | 1 | |
| Peak discharge (cfs) | = | 41.65 | |
| Time of Conc. (Min) | = | 0 | (Equals Tc-Lag when 0) |
| Tc-Lag Method (Min) | = | 81.65 | |
| Shape Factor | = | 484 | |

[T] to edit Tc [D] to edit Dur [S] to edit Shp Fctr [E] to SCS [↵] to cont

S.C.S. HYDROGRAPH

1. HYDROGRAPH No. = 2.....
2. HYDROGRAPH DESCRIPTION
   A. BAY 2, POD 2.....
   B. TO HORNE LAKE.....
   C. POST - DEV.....
3. AREA (ac) = 50.6.....
4. BASIN SLOPE (%) = .8.....
5. HYDRAULIC LENGTH (ft) = 2100..
6. CURVE NUMBER = 77.....
7. TIME INTERVAL (min) = 2.....
8. 24 HR PRECIPITATION = 5.6.
9. RETURN PERIOD = 10.
10. DISTRIBUTION = 3....
    1. I  2. IA  3. II
    4. III  5. SYNTH  6. MAN
    7. IIA  8. SOMERSET
11. STORM DUR (hrs) = 0..

Change item number: 0

Hyd No. 2 UNIT HYDROGRAPH

| | | | |
|---|---|---|---|
| Curve number | = | 77 | |
| Time Interval (Min) | = | 2 | |
| Basin lag (min) | = | 42.27 | |
| Time to peak (min) | = | 42.00 | |
| Time base (min) | = | 112.00 | |
| Rainfall excess (in) | = | 1 | |
| Peak discharge (cfs) | = | 54.67 | |
| Time of Conc. (Min) | = | 0 | (Equals Tc-Lag when 0) |
| Tc-Lag Method (Min) | = | 70.60 | |
| Shape Factor | = | 484 | |

[T] to edit Tc [D] to edit Dur [S] to edit Shp Fctr [E] to SCS [_J] to cont

S.C.S. HYDROGRAPH

1. HYDROGRAPH No. = 3.....
2. HYDROGRAPH DESCRIPTION
   A. BAY 2, POD 3.....
   B. TO HORNE LAKE.....
   C. POST - DEV.....
3. AREA (ac) = 10.4.....
4. BASIN SLOPE (%) = 1.17.....
5. HYDRAULIC LENGTH (ft) = 1100..
6. CURVE NUMBER = 78.....
7. TIME INTERVAL (min) = 2.....
8. 24 HR PRECIPITATION = 5.6.
9. RETURN PERIOD = 10.
10. DISTRIBUTION = 3....
    1. I  2. IA  3. II
    4. III  5. SYNTH  6. MAN
    7. IIA  8. SOMERSET
11. STORM DUR (hrs) = 0..

Change item number: 0

Hyd No. 3 UNIT HYDROGRAPH

| | | | |
|---|---|---|---|
| Curve number | = | 78 | |
| Time Interval (Min) | = | 2 | |
| Basin lag (min) | = | 20.23 | |
| Time to peak (min) | = | 22.00 | |
| Time base (min) | = | 58.00 | |
| Rainfall excess (in) | = | 1 | |
| Peak discharge (cfs) | = | 21.45 | |
| Time of Conc. (Min) | = | 0 | (Equals Tc-Lag when 0) |
| Tc-Lag Method (Min) | = | 33.78 | |
| Shape Factor | = | 484 | |

[T] to edit Tc [D] to edit Dur [S] to edit Shp Fctr [E] to SCS [↵] to cont

Option 1 STAGE / STORAGE TABLE R to reset

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

| | STAGE ft | ELEVATION ft | CO AREA sq ft | INC STORAGE cu ft | TOT STORAGE cu ft |
|---|---|---|---|---|---|
| 4 | 0.00 | 24.00. | 247595.. | 0 | 0 |
| 5 | 0.50 | 24.50. | 252005.. | 124900 | 124900 |
| 6 | 1.00 | 25.00. | 256415.. | 127105 | 252005 |
| 7 | 1.50 | 25.50. | 260825.. | 129310 | 381315 |
| 8 | 2.00 | 26.00. | 265236.. | 131515 | 512830 |
| 9 | 2.50 | 26.50. | 282318.. | 136888 | 649718 |
| 10 | 3.00 | 27.00. | 299400.. | 145429 | 795147 |
| 11 | 3.50 | 27.50. | 330301.. | 157425 | 952572 |
| 12 | 4.00 | 28.00. | 361202.. | 172875 | 1125447 |
| 13 | 6.00 | 30.00. | 400000.. | 761202 | 1886649 |
| 14 | 0.00 | 0.00. | 0..... | 0 | 0 |

Change item number: 0 ⏎ to cont

Reservoir No. 1 OUTLET STRUCTURES

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

1. WIDTH (in) = 21.
2. HEIGHT (in) = 21.
3. No. BARRELS = 1..
4. INVERT ELEV. = 18.....
5. Co = 0.60
6. CULVERT LENGTH (ft) = 90..
7. CULVERT SLOPE (%) = .56.
8. MANNING'S N-VALUE = .013

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

9. WIDTH (in) = 6..
10. HEIGHT (in) = 6..
11. No. BARRELS = 1..
12. INVERT ELEV. = 24.5.....
13. Co = 0.60
14. CULVERT LENGTH (ft) = 100.
15. CULVERT SLOPE (%) = 0...
16. MANNING'S N-VALUE = .013
17. MULTI-STAGE OPTION ? (Y/N) Y

WEIR STRUCTURE A. Q=CwLH^EXP

18. CREST LENGTH (ft) = 12.56..
19. CREST ELEVATION = 25.3...
20. Cw = 3.00
21. EXP = 1.50
22. MULTI-STAGE OPTION ? (Y/N) Y

WEIR STRUCTURE B. Q=CwLH^EXP

23. CREST LENGTH (ft) = 0.....
24. CREST ELEVATION = 0.....
25. Cw = 3.00
26. EXP = 1.50
27. MULTI-STAGE OPTION ? (Y/N) N

Change item number: 0 ⏎ to cont

Option 1 STAGE / STORAGE / DISCHARGE SUMMARY

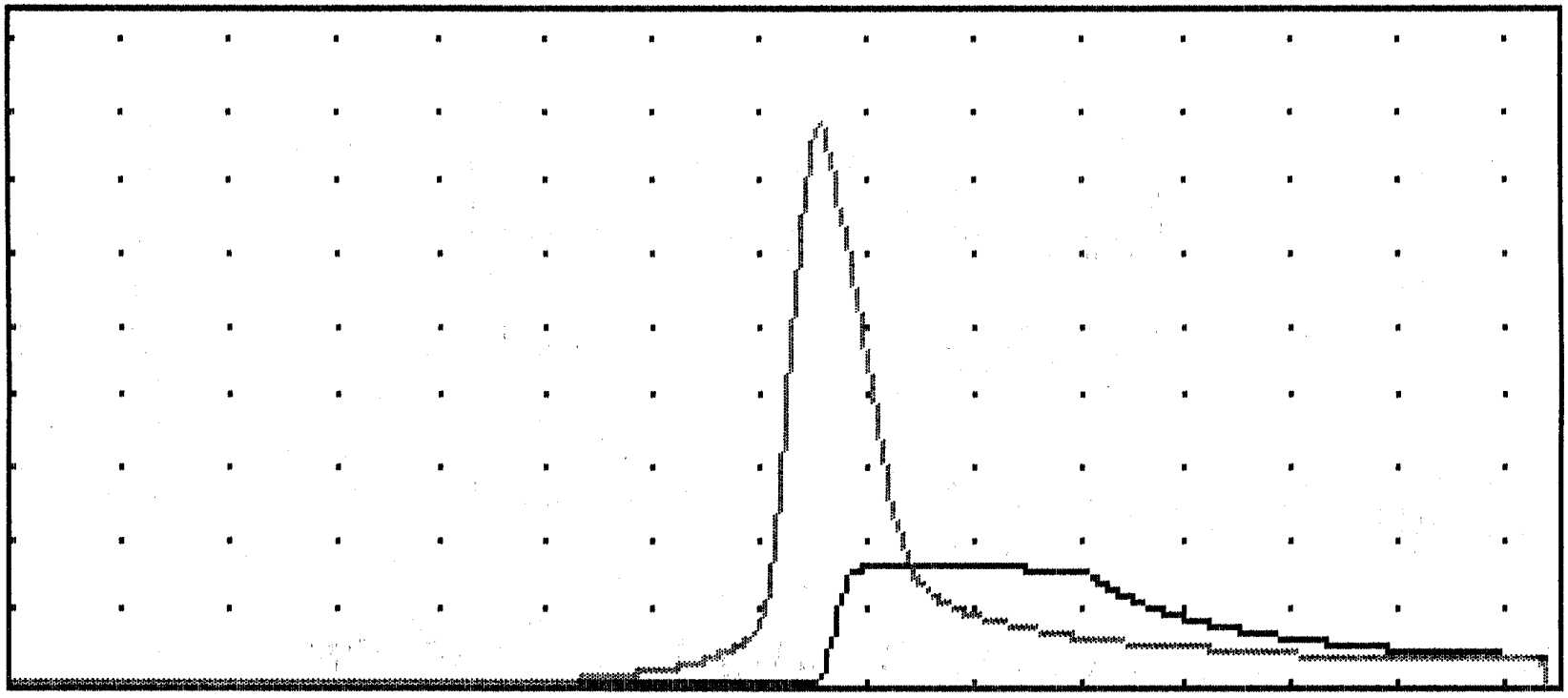
RESERVOIR No = 1 RESERVOIR NAME = HORNE LAKE..
S = Ks * Z^b
Ks = 0 b = 0
START ELEV = 0 INCREMENT = 0

| STAGE ft | ELEVATION ft | STORAGE cu ft | DISCHARGE cfs | |
|---|---|---|---|---|
| 0.00 | 24.00 | 0 | 0.00 | 1. |
| 0.50 | 24.50 | 124900 | 0.00 | 2. |
| 1.00 | 25.00 | 252005 | 0.00 | 3. |
| 1.50 | 25.50 | 381315 | 3.37 | 4. |
| 2.00 | 26.00 | 512830 | 22.07 | 5. |
| 2.50 | 26.50 | 649718 | 31.98 | 6. |
| 3.00 | 27.00 | 795147 | 33.01 | 7. |
| 3.50 | 27.50 | 952572 | 34.01 | 8. |
| 4.00 | 28.00 | 1125447 | 34.98 | 9. |
| 6.00 | 30.00 | 1886649 | 38.62 | 10. |
| 0.00 | 0.00 | 0 | 0.00 | 11. |

[⏎] cont [E] edit [R] reset [G] graph [S] screen [P] print

HYDROGRAPH #8

Qp = 32.3 RESERVOIR ROUTE 10 Yr



HGU = 100 min 8 VGU = 20.0 cfs

MAX STORAGE = 692599

MAX ELEVATION = 26.65 10 YR EL OF HORNE LAKE

page 26

S.C.S. HYDROGRAPH

1. HYDROGRAPH No. = 10.....
2. HYDROGRAPH DESCRIPTION
   A. AREA SOUTH OF HORNE ..
   B. LAKE TO ROAD A .
   C. POST-DEV.....
3. AREA (ac) = 17.7.....
4. BASIN SLOPE (%) = 2.....
5. HYDRAULIC LENGTH (ft) = 1030..
6. CURVE NUMBER = 76.....
7. TIME INTERVAL (min) = 2.....
8. 24 HR PRECIPITATION = 5.6.
9. RETURN PERIOD = 10.
10. DISTRIBUTION = 3....
    1. I 2. IA 3. II
    4. III 5. SYNTH 6. MAN
    7. IIA 8. SOMERSET
11. STORM DUR (hrs) = 0..

Change item number: 0

Hyd No. 10 UNIT HYDROGRAPH

| | | | |
|---|---|---|---|
| Curve number | = | 76 | |
| Time Interval (Min) | = | 2 | |
| Basin lag (min) | = | 19.20 | |
| Time to peak (min) | = | 20.00 | |
| Time base (min) | = | 54.00 | |
| Rainfall excess (in) | = | 1 | |
| Peak discharge (cfs) | = | 40.16 | |
| Time of Conc. (Min) | = | 32 | (Equals Tc-Lag when 0) |
| Tc-Lag Method (Min) | = | 26.01 | |
| Shape Factor | = | 484 | |

[T] to edit Tc [D] to edit Dur [S] to edit Shp Fctr [E] to SCS [↵] to cont

Option 1 STAGE / STORAGE TABLE R to reset

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

| | STAGE ft | ELEVATION ft | CO AREA sq ft | INC STORAGE cu ft | TOT STORAGE cu ft |
|---|---|---|---|---|---|
| 4 | 0.00 | 11.00. | 0..... | 0 | 0 |
| 5 | 1.00 | 12.00. | 177..... | 88 | 88 |
| 6 | 2.00 | 13.00. | 4750.... | 2463 | 2551 |
| 7 | 3.00 | 14.00. | 17566... | 11158 | 13709 |
| 8 | 4.00 | 15.00. | 27614... | 22590 | 36299 |
| 9 | 5.00 | 16.00. | 43256... | 35435 | 71734 |
| 10 | 6.00 | 17.00. | 60582... | 51919 | 123653 |
| 11 | 0.00 | 0.00. | 0..... | 0 | 0 |
| 12 | 0.00 | 0.00. | 0..... | 0 | 0 |
| 13 | 0.00 | 0.00. | 0..... | 0 | 0 |
| 14 | 0.00 | 0.00. | 0..... | 0 | 0 |

Change item number: 0 ↵ to cont

Reservoir No. 2 OUTLET STRUCTURES

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

1. WIDTH (in) = 30.
2. HEIGHT (in) = 30.
3. No. BARRELS = 1..
4. INVERT ELEV. = 11.....
5. Co = 0.69
6. CULVERT LENGTH (ft) = 104.
7. CULVERT SLOPE (%) = 1.09
8. MANNING'S N-VALUE = .013

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

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

WEIR STRUCTURE A. Q=CwLH^EXP

18. CREST LENGTH (ft) = 0.....
19. CREST ELEVATION = 0.....
20. Cw = 3.00
21. EXP = 1.50
22. MULTI-STAGE OPTION ? (Y/N) N

WEIR STRUCTURE B. Q=CwLH^EXP

23. CREST LENGTH (ft) = 19.....
24. CREST ELEVATION = 16.9...
25. Cw = 3.00
26. EXP = 1.50
27. MULTI-STAGE OPTION ? (Y/N) N

Change item number: 0 ↵ to cont

Option 1 STAGE / STORAGE / DISCHARGE SUMMARY

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

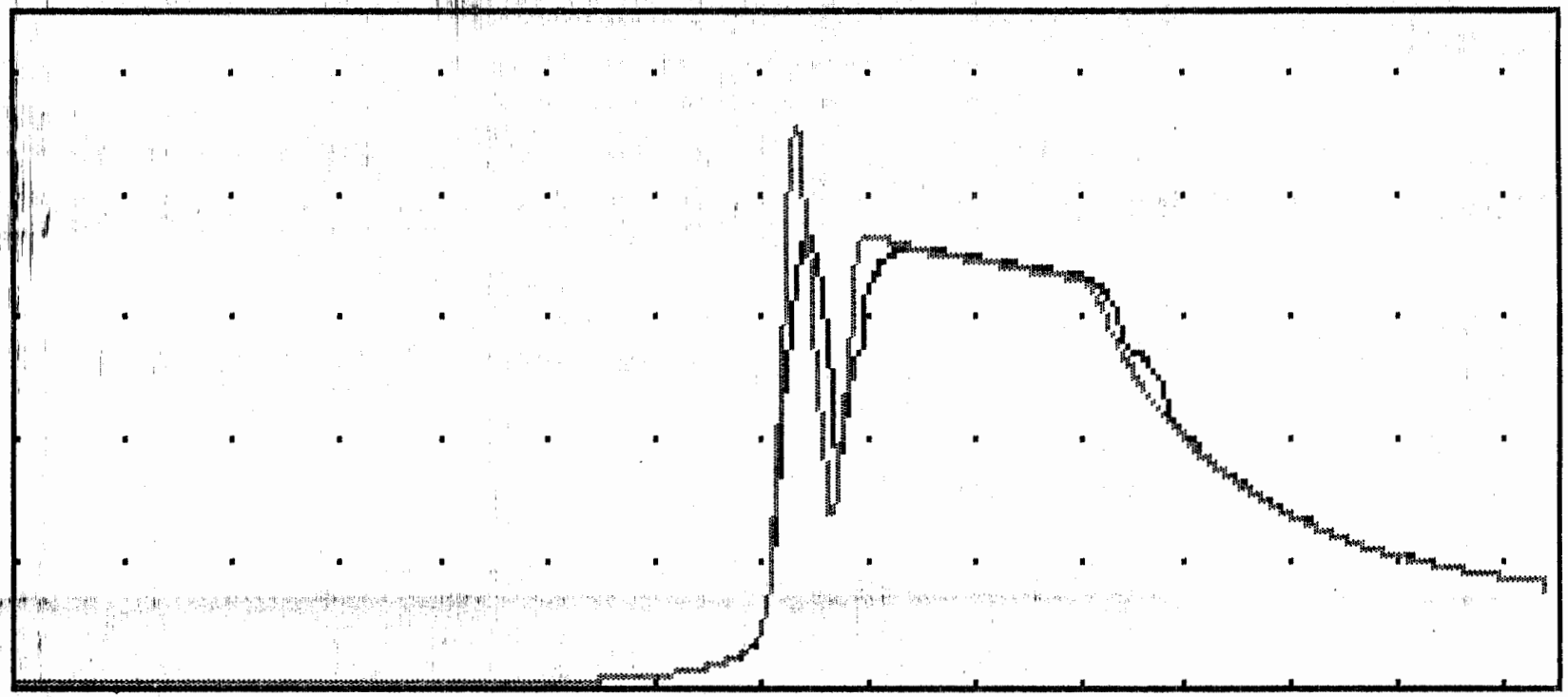
| STAGE ft | ELEVATION ft | STORAGE cu ft | DISCHARGE cfs | |
|---|---|---|---|---|
| 0.00 | 11.00 | 0 | 0.00 | 1. |
| 1.00 | 12.00 | 88 | 7.70 | 2. |
| 2.00 | 13.00 | 2551 | 24.70 | 3. |
| 3.00 | 14.00 | 13709 | 35.95 | 4. |
| 4.00 | 15.00 | 36299 | 45.07 | 5. |
| 5.00 | 16.00 | 71734 | 52.63 | 6. |
| 6.00 | 17.00 | 123653 | 61.03 | 7. |
| 0.00 | 0.00 | 0 | 0.00 | 8. |
| 0.00 | 0.00 | 0 | 0.00 | 9. |
| 0.00 | 0.00 | 0 | 0.00 | 10. |
| 0.00 | 0.00 | 0 | 0.00 | 11. |

[↵] cont [E] edit [R] reset [G] graph [S] screen [P] print

"Final" Hydrograph #11

Qp = 36.6 RESERVOIR ROUTE 10 Yr

Post Development



HGU = 100 min 12 VGU = 10.0 cfs

MAX STORAGE = 15075

MAX ELEVATION = 14.06

GOVERNOR'S LAND
BAY 2, POD 3
JN 7173
1/16/92

# OUTLET PROTECTION DESIGN FOR SYSTEM 31

GIVEN: 30" PIPE DISCHARGES INTO EXISTING NATURAL CHANNEL WITH SQUARE CROSS-SECTION, 2' DEEP, VERTICAL, 3' WIDE SIDE SLOPES. CHANNEL HAS APPROXIMATE SLOPE 0.50%

FIND: "n" FACTOR AND DETERMINE REQUIRED LENGTH, WIDTH AND MEDIAN STONE SIZE ($D_{50}$) FOR RIP-RAP LINING.

SOLUTION:

FIND "n" FACTOR

| | | |
|---|---|---|
| BASIC "n" VALUE | 0.02 | (EARTH CHANNEL) |
| SURFACE IRREGULARITY | 0.02 | (SEVERE) |
| SIZE & SHAPE OF X SECTION | 0.012 | (LARGE & SMALL SECTIONS) |
| OBSTRUCTIONS | 0.013 | (MINOR) |
| VEGETATION | 0 | (LOW GROWTH) |
| DEGREE OF MEANDER | 0.01 | (APPRECIABLE) |
| n = | 0.075 | |

FIND TAILWATER DEPTH USING MANNING'S EQUATION

Q = 36.6 CFS (FROM ROUTING CALCULATION OF WATERSHED FOR 10 YEAR STORM

$$36.6 = \frac{1.49}{0.075}\left(\frac{3d}{3+2d}\right)^{2/3}(0.005)^{1/2}(3d)$$

$d \approx 1.15$ ft

DIAMETER OF PIPE = 15" = 1.25' > 1.15
SO MINIMUM TAILWATER CONDITION EXIST.
FROM PLATE 1.36 C
MEAN STONE SIZE ($d_{50}$) = 0.5 ft
APRON LENGTH = 16' USE 20'

*Mr. and Mrs. John McElroy*
*3988 Driftwood Way*
*Williamsburg, Va. 23188*

November 30, 2000

Scott J. Thomas, P.E.
James City County, Environmental Division
101 Mounts Bay Road
Williamsburg, Va. 23187
Fax: 259-4032

NOV 2000
RECEIVED
ENVIRONMENTAL DIVISION

RE: Lot 23 Nathaniel's Green

Dear Mr. Thomas:

We are writing to request a waiver from the 25' minimum pond buffer per the James City County BMP manual. On the right hand side of our property there is a storm water management facility that is designed for the temporary storage of storm water. AES Consulting Engineers has determined that this facility, as it currently sits, has a potential 100-Year Storm WSEL of 22.76 feet. The revised positioning of our house places our closest house corner 8'-0" horizontally away from this 100-year flood line. More importantly our revised basement finished floor elevation of 24.6 feet places us 1.74' vertically above this 100-year flood elevation.

I have included a copy of the report from AES for your review. Please note we have moved the original house position 4' to the left and raised the house 6" vertically in order to minimize the effects that have been created by the installation of the retaining wall and fill material in the BMP on lot 24.

Your assistance in this mater would be greatly appreciated.

Sincerely,

John & Pat McElroy

**Variance to JCC BMP manual pond buffer and setback requirements and supporting documentation dated November 22, 2000 as submitted by AES Consulting Engineers reviewed and found to be acceptable.**

**Scott J. Thomas**
**Civil Engineer**
**James City County Environmental Division**

12-01-00
**Date**

CONSULTING ENGINEERS

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

November 22, 2000

Mr. Jeffrey N. Clark, President
Michael C. Brown Custom Builder, LLC
P.O. Box 188
Toano, Virginia 23168

FILE COPY

**RE: Lot 23, Nathaniel's Green – Governor's Land**
**AES Project No. 21647**

Dear Mr. Clark:

AES Consulting Engineers has recently become aware of a situation involving the timber structure BMP/SWM facility located between lots 23 and 24 in the Governor's Land subdivision. During the construction of the home at lot 24, a retaining wall and fill material was placed within the area originally planned for stormwater management. This event has caused the need for a re-evaluation of the BMP/SWM facility to determine the flooding potential for the neighboring parcel to address the concerns of James City County.

To provide a baseline, AES researched the design files and identified the water surface elevations of the facility as originally designed. The water surface elevation (WSEL) for the 10-year storm associated with the original stormwater facility plan was 21.15 feet. No 100-Year storm elevation was completed for the original design.

After an evaluation of the current site conditions, the following criteria were utilized to create hydrographs and run stormwater modeling (see attached) to determine the water surface elevations associated with these design storms. The drainage area contributing to this facility totals 8.94 acres. Conservative values for runoff coefficients and time of concentration were utilized, a C factor of 0.68 and a $T_c$ (Time of Concentration) of 18 minutes, were estimated. Using these criteria led to the following elevations:

10-Year Storm WSEL – 22.65 feet
100-Year Storm WSEL – 22.76 feet

Based on this revised information, the horizontal clearance from the 10-year flood line will be 6-feet from the nearest corner of the proposed structure and the 100-year flood line will be 4-feet from the closest corner of the proposed structure. The vertical separation from the 10-year flood elevation will be 1.35 feet and vertical separation from the 100-year flood elevation will be 1.24 feet.

Should you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,

AES Consulting Engineers

V. Marc Bennett, P.E.
Project Manager

Attachments

21647\00\WORDPROC\DOCUMENT\2164700101.ksh.doc

*Mr. and Mrs. John McElroy*
*3988 Driftwood Way*
*Williamsburg, Va. 23188*

November 30, 2000

Scott J. Thomas, P.E.
James City County, Environmental Division
101 Mounts Bay Road
Williamsburg, Va. 23187
Fax: 259-4032

NOV 2000
RECEIVED
ENVIRONMENTAL DIVISION

RE: Lot 23 Nathaniel's Green

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Sincerely,

John & Pat McElroy

**Variance to JCC BMP manual pond buffer and setback requirements and supporting documentation dated November 22, 2000 as submitted by AES Consulting Engineers reviewed and found to be acceptable.**

**Scott J. Thomas**
**Civil Engineer**
**James City County Environmental Division**

12-01-00
**Date**

CONSULTING ENGINEERS

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

November 22, 2000

Mr. Jeffrey N. Clark, President
Michael C. Brown Custom Builder, LLC
P.O. Box 188
Toano, Virginia 23168

FILE COPY

**RE: Lot 23, Nathaniel's Green – Governor's Land**
**AES Project No. 21647**

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**100-Year Storm WSEL – 22.76 feet**

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Should you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,

AES Consulting Engineers

V. Marc Bennett, P.E.
Project Manager

Attachments

21647\00\WORDPROC\DOCUMENT\2164700I01.ksh.doc

# DEVELOPMENT MANAGEMENT

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

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

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

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

COUNTY ENGINEER
(757) 253-6678

INTEGRATED PEST MANAGEMENT
(757) 253-2620


May 19, 2003

Mr. James H. Bennett
Governors Land Associates
9701 Mill Pond Run
Toano, Va. 23168

Re: Governor's Land - Nathaniel's Green
County Plan No. S-6-92
Stormwater Management Facility
County BMP ID Code: JR 029

Dear Mr. Bennett:

The Environmental Divisions has reviewed a record drawing (asbuilt) as submitted for the stormwater management facility for the above referenced project. The record drawing provides as-built information for a timber crib wall situated between Lots 23 and 24 along Miln House Road.

Based on our review of the project and a concurrent field inspection as performed on March 12th 2003, the following items must be addressed prior to release of the developer's surety instrument for the stormwater management/BMP facility at the site and to proceed with closing out the project:

***Construction Certification:***

1. Based on a review of the plans and active file for the project, there appears to be no construction certification requirement imposed for this BMP.

***Record Drawing:***

2. The record drawing set dated October 2000, with a certification date of March 30th 2002, is **satisfactory** with corrections as noted below. Please forward one reproducible and one blue/black line set of the record drawings to our office.

3. An email request was forwarded to our office on May 13th 2003 requesting modifications to the approved riser/barrel configuration for this particular BMP. Based on our recent discussions, meetings and correspondence, the Environmental Division has no objection to removal of the riser structure for the BMP with primary control relying on the 12-inch barrel through the wall. The overall BMP inspection/inventory program has revealed that certain timber crib walls in remote locations within Governor's Land are experiencing failure due to clogging of the rock pack around the riser structure. This was clearly evident based on our review and inspection of timber crib walls within West Island Road and Whittaker Island. The intent of the rock pack is to extend detention time at the BMP both during construction (the land-disturbing phase) and

following construction; however, once active construction is finished the rock is being excessively clogged by organic material (leaves, debris, etc.) and flow through the BMP is finding it's way around the base of the riser. Rather than filtering through the rock into the riser structure as intended, it is short-circuiting and causing erosion along the upstream base of the wall. In addition, concentrated drainage to the toe of the wall is finding any point of weakness along the timber structures and undermining the walls and/or supports. For this specific review case, removal of the riser structure is approved due to outlet barrel control governing BMP function and due to a recent BMP analyses that was provided relative to the single family pond buffer variance request at Lot 23 (AES Project 21647). Ensure the final configuration will not result in an increase to the design high water elevation at the BMP, the final configuration is adequately reflected on the record drawing set and a maintenance plan is shown on the record drawing set for the modified primary flow control structure. The revised configuration will also result in the need for a new asbuilt certification. *(Note: For active and record file purposes, advance sketches of the intended configuration are encouraged, but will not be required due to the simple nature of the modification.)*

***Construction - Related Items:***

4. Clean accumulated sediment, debris and vegetation within 15 ft. of the principal spillway device, whether the riser is constructed per the approved plans and specifications or whether the riser is removed as outlined above.

5. Repair toe erosion and undercutting that is present along the upstream toe of the timber wall. Replace toe stone in accordance with the approved plan and specifications.

6. Clear and remove any small trees or saplings present along the downstream toe of wall (within about 10 feet).

7. Restore outlet protection at the end of the outfall barrel in accordance with the approved plans and specifications.

Once this work is satisfactorily completed, contact our office appropriately for reinspection. We can then proceed with final release of the surety and/or closing out the project.

Please contact me at 757-253-6639 or the assigned Environmental Division inspector, Joe Buchite at 757-253-6643 if you have any further comments or questions.

Sincerely,

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

cc: Marc Bennett, AES - via fax

G:\AsBuilts\Reviews\GovLand\S692.jr029

# Memorandum

**DATE:** **June 23, 2003**

**TO:** **Scott Thomas**

**FROM:** **Victoria Bains**

**SUBJECT:** **Nathaniel's Green, County BMP ID Code: JR029**

---

In response to your letter dated May 19, 2003 AES Consulting Engineers has taken several actions.

**Construction Certification:**
No further action required.

**Record Drawings:**
Added information to as-built drawings to show that the riser has been removed.

**Construction – Related Items:**
Sediment, debris and organic matter have been cleared and removed from facility. The standpipe and anti vortex have been removed from the primary structure. All erosion and undercutting along the timber wall has been repaired and stone has been replaced. All small saplings that were within 10 ft. of outflow pipe have been removed. Outlet protection at the end of the outfall barrel is in accordance with approved plans. The outflow pipe from riser has been sealed with concrete where the reducer was split.

AES CONSULTING ENGINEERS

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

## Scott Thomas

**From:** Scott Thomas
**Sent:** Thursday, June 26, 2003 4:17 PM
**To:** 'Victoria Bains'
**Subject:** RE: Governor's Land BMP's

No need for field reinspection. I am satisfied with the rework on JR 029.

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

Visit: http://www.james-city.va.us/resources/devmgmt/div_devmgmt_environ.html
and
www.protectedwithpride.org

-----Original Message-----
From: Victoria Bains [mailto:vbains@aesva.com]
Sent: Thursday, June 26, 2003 3:21 PM
To: Scott Thomas
Subject: Governor's Land BMP's

Scott,

Here are the pictures that I took of Nathaniel's Green Timber Wall. Please feel free to contact me if you have any questions. Thank you for all you have done.

Tory

Victoria A. (Tory) Bains
Project Engineer
AES Consulting Engineers
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
Fax: (757) 220-8994

Control Structure Rework 6-26-03

# DEVELOPMENT MANAGEMENT

101-E MOUNTS BAY ROAD, P.O. BOX 8784, WILLIAMSBURG, VIRGINIA 23187-8784
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planning@james-city.va.us

COUNTY ENGINEER
(757) 253-6678

INTEGRATED PEST MANAGEMENT
(757) 253-2620


May 19, 2003

Mr. James H. Bennett
Governors Land Associates
9701 Mill Pond Run
Toano, Va. 23168

Reinspect 8-2-03

Re: Governor's Land - Nathaniel's Green
County Plan No. S-6-92
Stormwater Management Facility
County BMP ID Code: JR 029

Dear Mr. Bennett:

The Environmental Divisions has reviewed a record drawing (asbuilt) as submitted for the stormwater management facility for the above referenced project. The record drawing provides as-built information for a timber crib wall situated between Lots 23 and 24 along Miln House Road.

Based on our review of the project and a concurrent field inspection as performed on March 12th 2003, the following items must be addressed prior to release of the developer's surety instrument for the stormwater management/BMP facility at the site and to proceed with closing out the project:

***Construction Certification:***

OK 1. Based on a review of the plans and active file for the project, there appears to be no construction certification requirement imposed for this BMP.

***Record Drawing:***

OK 6-26-03 2. The record drawing set dated October 2000, with a certification date of March 30th 2002, is **satisfactory** with corrections as noted below. Please forward one reproducible and one blue/black line set of the record drawings to our office.

OK 6-26-03 AES photos 3. An email request was forwarded to our office on May 13th 2003 requesting modifications to the approved riser/barrel configuration for this particular BMP. Based on our recent discussions, meetings and correspondence, the Environmental Division has no objection to removal of the riser structure for the BMP with primary control relying on the 12-inch barrel through the wall. The overall BMP inspection/inventory program has revealed that certain timber crib walls in remote locations within Governor's Land are experiencing failure due to clogging of the rock pack around the riser structure. This was clearly evident based on our review and inspection of timber crib walls within West Island Road and Whittaker Island. The intent of the rock pack is to extend detention time at the BMP both during construction (the land-disturbing phase) and

following construction; however, once active construction is finished the rock is being excessively clogged by organic material (leaves, debris, etc.) and flow through the BMP is finding it's way around the base of the riser. Rather than filtering through the rock into the riser structure as intended, it is short-circuiting and causing erosion along the upstream base of the wall. In addition, concentrated drainage to the toe of the wall is finding any point of weakness along the timber structures and undermining the walls and/or supports. For this specific review case, removal of the riser structure is approved due to outlet barrel control governing BMP function and due to a recent BMP analyses that was provided relative to the single family pond buffer variance request at Lot 23 (AES Project 21647). Ensure the final configuration will not result in an increase to the design high water elevation at the BMP, the final configuration is adequately reflected on the record drawing set and a maintenance plan is shown on the record drawing set for the modified primary flow control structure. The revised configuration will also result in the need for a new asbuilt certification. *(Note: For active and record file purposes, advance sketches of the intended configuration are encouraged, but will not be required due to the simple nature of the modification.)*

***Construction - Related Items:*** Approved Riser Removal; not happy with Final Config.

OK 6-26-03 AES's photos sufficient

4. Clean accumulated sediment, debris and vegetation within 15 ft. of the principal spillway device, whether the riser is constructed per the approved plans and specifications or whether the riser is removed as outlined above. Grout Around Space.

OK 5. Repair toe erosion and undercutting that is present along the upstream toe of the timber wall. Replace toe stone in accordance with the approved plan and specifications.

OK 6. Clear and remove any small trees or saplings present along the downstream toe of wall (within about 10 feet).

OK 7. Restore outlet protection at the end of the outfall barrel in accordance with the approved plans and specifications. clean inlet at golf course path.

Once this work is satisfactorily completed, contact our office appropriately for reinspection. We can then proceed with final release of the surety and/or closing out the project.

Please contact me at 757-253-6639 or the assigned Environmental Division inspector, Joe Buchite at 757-253-6643 if you have any further comments or questions.

Sincerely,

Scott J. Thomas

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

cc: Marc Bennett, AES - via fax

G:\AsBuilts\Reviews\GovLand\S692.jr029

## Scott Thomas

**From:** Victoria Bains [vbains@aesva.com]
**Sent:** Tuesday, May 13, 2003 3:51 PM
**To:** Scott Thomas
**Cc:** Glenn Oder (E-mail)
**Subject:** Governor's Land

Scott,

We have not received a comment letter from JCC on Nathaniel's Green timber wall. This is the facility that is missing the anti-vortex top to the riser. However this facility is built like the two at Whittaker's Island that the outflow from the riser is a 10" diameter pipe. Due to this the outflow pipe is the flow control and not the riser. So we are requesting the same type of action for this facility as you approved for Whittaker's Island that is removing the vertical perforated pipe and leave the base that the inflow and outflow are connected to. If you could get back to us as soon as possible because the contractor will be at this site tomorrow, it will be greatly appreciated. Thank you for immediate attention to this matter.

Tory

Victoria A. (Tory) Bains
Project Engineer
AES Consulting Engineers
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
Fax: (757) 220-8994

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

County BMP ID Code (if known): JR029

Name of Facility: Governor's Land BMP No.: ____ of ____ Date: 3/12/03

Location: Milu House Rd. BMP ~ behind 6th lot on left

Name of Owner: ____

Name of Inspector: Rick Hall

Type of Facility: Timber Crib Wall

Weather Conditions: Sunny, Mild Type: ☒ Final Inspection ☐ County BMP Inspection Program ☐ Owner Inspection

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

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

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

| Facility Item | O.K. | Routine | Urgent | Comments |
|---|---|---|---|---|
| **Embankments and Side Slopes:** | | | | |
| Grass Height | ✓ | | | North side slopes |
| Vegetation Condition | ✓ | | | terraced w/ flag stone |
| Tree Growth | ✓ | | | in 4 foot and 2 foot |
| Erosion | ✓ | | | heights |
| Trash & Debris | ✓ | | | |
| Seepage | ✓ | | | |
| Fencing or Benches | | | | |
| **Interior Landscaping/Planted Areas:** ☐ None ☐ Constructed Wetland/Shallow Marsh ☑ Naturally Established Vegetation | | | | |
| Vegetated Conditions | ✓ | | | |
| Trash & Debris | ✓ | | | |
| Floating Material | ✓ | | | |
| Erosion | ✓ | | | |
| Sediment | ✓ | | | |
| Dead Plant | ✓ | | | |
| Aesthetics | ✓ | | | |
| Other | | | | |
| Notes: | | | | |

| Facility Item | O.K. | Routine | Urgent | Comments |
|---|---|---|---|---|
| **Water Pools:** ☐ Permanent Pool (Retention Basin) ☒ Shallow Marsh (Detention Basin) ☐ None, Dry (Detention Basin) | | | | |
| Shoreline Erosion | ✓ | | | |
| Algae | | ✓ | | main channel heavy |
| Trash & Debris | ✓ | | | with "long hair" Algae |
| Sediment | ✓ | | | most of its length |
| Aesthetics | ✓ | | | through basin |
| Other | | | | |
| **Inflows (Describe Types/Locations):** RCP from under street | | | | |
| Condition of Structure | ✓ | | | |
| Erosion | ✓ | | | |
| Trash and Debris | ✓ | | | |
| Sediment | ✓ | | | |
| Outlet Protection | | ✓ | | |
| Other | | | | |
| **Principal Flow Control Structure - Riser, Intake, etc. (Describe Type):** Perforated Galv. Riser 4' Dia | | | | |
| Condition of Structure | | ✓ | | Build up of sediment |
| Corrosion | ✓ | | | and debris around Riser |
| Trash and Debris | | ✓ | | No cap - Fall hazard |
| Sediment | | ✓ | | |
| Vegetation | ✓ | | | |
| Other | | | | |
| **Principal Outlet Structure - Barrel, Conduit, etc. :** GMP | | | | |
| Condition of Structure | | | ✓ | Barrel and it's outlet |
| Settlement | ✓ | | | are buried - |
| Trash & Debris | | | ✓ | outlet not visible |
| Erosion/Sediment | | | ✓ | |
| Outlet Protection | | | ✓ | |
| Other | | | | |
| **Emergency Spillway (Overflow):** None | | | | |
| 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:** | | | | |
| Land Uses | ✓ | | | |
| Vegetation | ✓ | | | |
| Trash & Debris | ✓ | | | |
| Aesthetics | ✓ | | | |
| Access /Maintenance Roads or Paths | ✓ | | | |
| Other | | | | |

**Remarks:**

Bottom timbers of wall are exposed in several places – water channels under wall.

Saplings are growing near wall on down stream side

**Overall Environmental Division Internal Rating:** 2

**Signature:** [illegible] **Date:** 3/12/03

**Title:** Envir. Spec

SWMProg\BMP\CoInspProg\DetRet.wpd

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

County BMP ID Code (if known): JR029

Name of Facility: NATHANIEL'S GREEN TIMBER STRUCTURE BMP No.: 13 of 25 Date: 2/6/03

Location: GOVERNOR'S LAND (NATHANIEL'S GREEN)

Name of Owner: DOMINION LAND MANAGEMENT CO.

Name of Inspector: VICTORIA BAINS

Type of Facility: TIMBER STRUCTURE

Weather Conditions: CLEAR Type: ☐ Final Inspection ☐ County BMP Inspection Program ☒ Owner Inspection

FEB 2003 RECEIVED ENVIRONMENTAL DIVISION

**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:** | | | | |
| Grass Height | N/A | | | |
| Vegetation Condition | ✓ | | | |
| Tree Growth | ✓ | | | |
| Erosion | ✓ | | | |
| Trash & Debris | ✓ | | | |
| Seepage | ✓ | | | |
| Fencing or Benches | N/A | | | |
| **Interior Landscaping/Planted Areas:** ☐ None ☐ Constructed Wetland/Shallow Marsh ☒ Naturally Established Vegetation | | | | |
| Vegetated Conditions | N/A | | | |
| Trash & Debris | ✓ | | | |
| Floating Material | N/A | | | |
| Erosion | | ✓ | | SOME EROSION ON DOWNSTREAM SIDE OF STRUC |
| Sediment | ✓ | | | |
| Dead Plant | ✓ | | | |
| Aesthetics | ✓ | | | |
| Other | | | | |
| Notes: | | | | |

| Facility Item | O.K. | Routine | Urgent | Comments |
|---|---|---|---|---|
| **Water Pools:** ☐ Permanent Pool (Retention Basin) ☐ Shallow Marsh (Detention Basin) ☒ None, Dry (Detention Basin) | | | | |
| Shoreline Erosion | N/A | | | |
| Algae | N/A | | | |
| Trash & Debris | ✓ | | | |
| Sediment | ✓ | | | |
| Aesthetics | ✓ | | | |
| Other | | | | |
| **Inflows (Describe Types/Locations):** | | | | |
| Condition of Structure | ✓ | | | |
| Erosion | ✓ | | | |
| Trash and Debris | ✓ | | | |
| Sediment | ✓ | | | |
| Outlet Protection | ✓ | | | |
| Other | | | | |
| **Principal Flow Control Structure - Riser, Intake, etc. (Describe Type):** | | | | |
| Condition of Structure | | ✓ | | NEEDS STONE AROUND RISER TO BE CLEANED |
| Corrosion | ✓ | | | |
| Trash and Debris | ✓ | | | |
| Sediment | | ✓ | | JUST STONE AROUND RISER |
| Vegetation | ✓ | | | |
| Other | | | | |
| **Principal Outlet Structure - Barrel, Conduit, etc. :** | | | | |
| Condition of Structure | | ✓ | | OUTFLOW END OF PIPE NOT EXPOSED |
| Settlement | | | | |
| Trash & Debris | | | | |
| Erosion/Sediment | | | | |
| Outlet Protection | | ✓ | | NEED TO BE PLACED AROUND PIPE |
| Other | | | | |
| **Emergency Spillway (Overflow):** | | | | |
| Vegetation | N/A | | | |
| Lining | N/A | | | |
| Erosion | | ✓ | | SOME EROSION AROUND WALL |
| Trash & Debris | ✓ | | | |
| Other | | | | |
| Notes: | | | | |

| Facility Item | O.K. | Routine | Urgent | Comments |
|---|---|---|---|---|
| **Nuisance Type Conditions:** | | | | |
| Mosquito Breeding | ~~N/A~~ ✓ | | | |
| Animal Burrows | ✓ | | | |
| Graffiti | ✓ | | | |
| Other | | | | |
| **Surrounding Perimeter Conditions:** | | | | |
| Land Uses | ✓ | | | |
| Vegetation | ✓ | | | |
| Trash & Debris | ✓ | | | |
| Aesthetics | ✓ | | | |
| Access /Maintenance Roads or Paths | ✓ | | | |
| Other | | | | |

**Remarks:**

FOUND EVIDENCE OF SOME FLOW HAS GONE AROUND RISER. STONE NEEDS TO CLEANED OR REPLACED AROUND RISER. DOWNSTREAM SIDE OF WALL NEEDS STONE REMOVED & REPLACED ONCE FILTER FABRIC HAS BEEN PLACED UP TO 5' OFF WALL. OUTFALL PIPE NEEDS OUTFLOW EXPOSED AND ~~OUTF~~ OUTLET PROTECTION INSTALLED.

**Overall Environmental Division Internal Rating:** 2

**Signature:** Victoria Bains **Date:** 2/6/03

**Title:** PROJECT ENGINEER

SWMProg\BMP\CoInspProg\DetRet.wpd

**AES CONSULTING ENGINEERS**
Engineering, Surveying and Planning
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Phone: (757) 253-0040
Fax: (757) 220-8994

# LETTER OF TRANSMITTAL

| | |
|---|---|
| DATE: 23-Jun-03 | JOB NO. 7173-09 |
| ATTENTION: Scott Thomas | |
| RE: Governor's Land | |

TO : James City County
Environmental Division
101 Mounts Bay Road
Williamsburg, VA 23187

JUN 2003
RECEIVED
ENVIRONMENTAL DIVISION

WE ARE SENDING YOU: [X] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop drawings [X] Prints [X] Plans [ ] Samples [ ] Specifications

[X] Copy of letter [ ] Change order [X] Other Construction Certification

| COPIES | DATE | NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 6-23-03 | | As-Built drawing (Mylar) – Nathaniel's Green |
| 1 | 6-23-03 | | As-Built drawing (Black line) – Nathaniel's Green |
| 1 | 6-23-03 | | Memo responding to letter from County – Nathaniel's Green |
| 1 | 6-23-03 | | Memo responding to letter from County – Whittaker Island Block A |
| 1 | 6-23-03 | | Memo responding to letter from County – Sanctuary Drive Lot 14 |

THESE ARE TRANSMITTED as checked below:

[X] 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 Signature

[ ] FOR BIDS DUE _____ [ ] PRINTS RETURNED AFTER [illegible]

REMARKS:
If you have any questions please contact me. Thank you.

COPIES TO: file SIGNED: [illegible]

Date Record Created:

Created By:

WS_BMPNO: JR029

Print Record

**PRINTED ON**
**Thursday, March 11, 2010**
**2:16:57 PM**

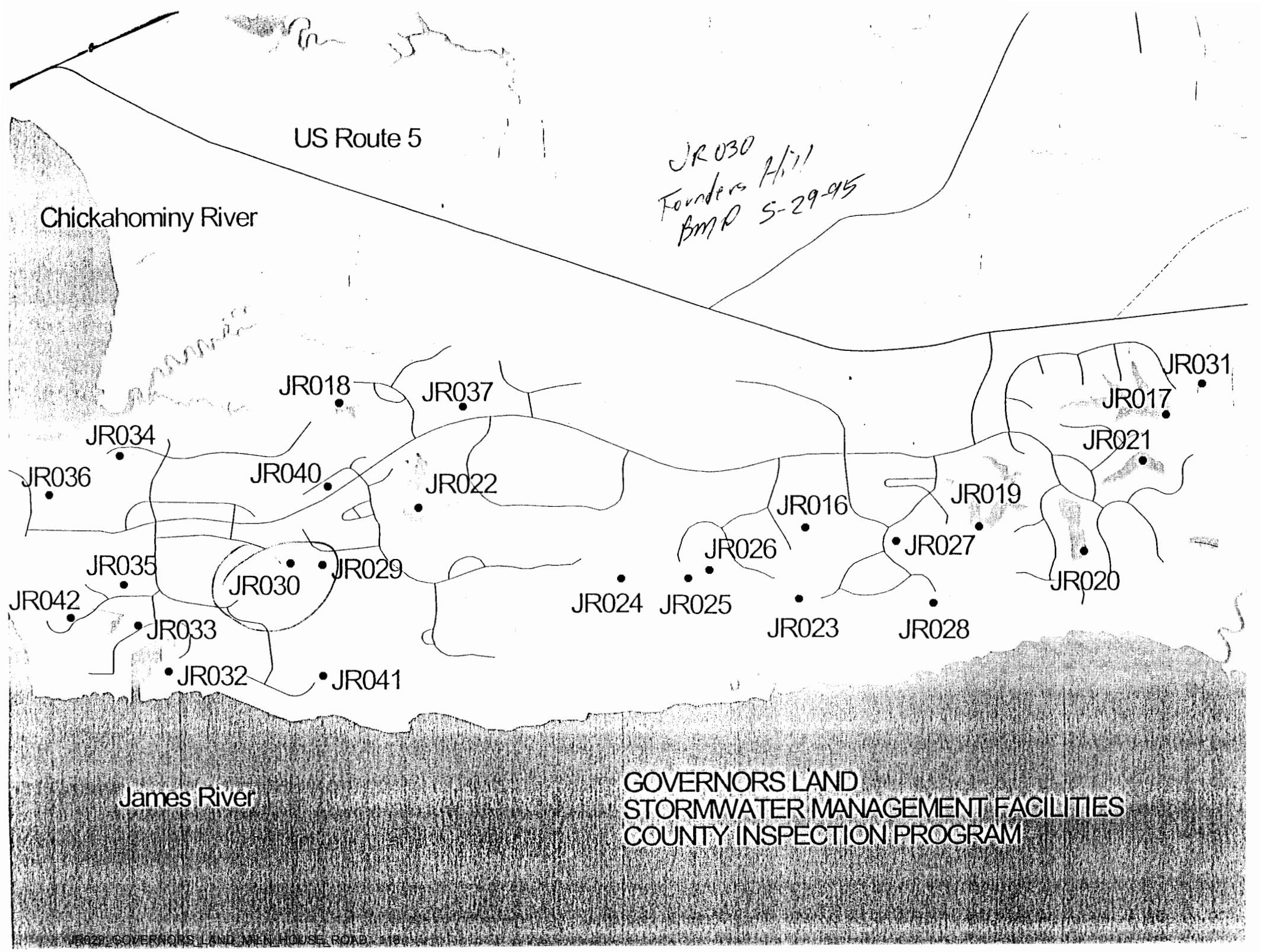
| | |
|---|---|
| WATERSHED | JR |
| BMP ID NO | 029 |
| PLAN NO | |
| TAX PARCEL | (43-2)(3-23) |
| PIN NO | 43203000023 |
| CONSTRUCTION DATE | 6/1/1992 |
| PROJECT NAME | Govenors Land - Nathaniels Green |
| FACILITY LOCATION | 1917 Miln House Road |
| CITY-STATE | Williamsburg, Va. 23185 |
| CURRENT OWNER | Governors Land Management Company |
| OWNER ADDRESS | 2700 Two Rivers Road |
| OWNER ADDRESS 2 | |
| CITY-STATE-ZIP CODE | Williamsburg, Va. 23185 |
| OWNER PHONE | |
| MAINT AGREEMENT | Yes |
| EMERG ACTION PLAN | No |

Get Last BMP No | Return to Menu

| | |
|---|---|
| MAINTENANCE PLAN | No |
| SITE AREA acre | 1444 |
| LAND USE | SF Residential |
| old BMP TYP | Timber Crib Wall |
| JCC BMP CODE | F1 Timber Walls |
| POINT VALUE | 2 |
| SVC DRAIN AREA acres | 9.2 |
| SERVICE AREA DESCRI | SF Lots & Roadways |
| IMPERV AREA acres | |
| RECV STREAM | UT of James River |
| EXT DET-WQ-CTRL | No |
| WTR QUAL VOL acre-ft | 0 |
| CHAN PROT CTRL | No |
| CHAN PROT VOL acre-ft | 0 |
| SW/FLOOD CONTROL | No |
| GEOTECH REPORT | No |

| | |
|---|---|
| CTRL STRUC DESC | |
| CTRL STRUC SIZE inches | |
| OTLT BARRL DESC | CMP Barrel |
| OTLT BARRL SIZE inch | 12 |
| EMERG SPILLWAY | No |
| DESIGN HW ELEV | 22.76 |
| PERM POOL ELEV | na |
| 2-YR OUTFLOW cfs | |
| 10-YR OUTFLOW cfs | 20.10 |
| REC DRAWING | Yes |
| CONSTR CERTIF | No |
| LAST INSP DATE | 4/12/2001 |
| Inspected by: | |
| INTERNAL RATING | 2 |
| MISC/COMMENTS | Riser removed 6/03. |

Additional Comments:


US Route 5
JR030
Founders Hill
BMP 5-29-95
Chickahominy River
JR018
JR037
JR031
JR017
JR034
JR021
JR036
JR040
JR022
JR019
JR016
JR027
JR026
JR035
JR029
JR030
JR020
JR042
JR024
JR025
JR023
JR028
JR033
JR032
JR041
James River
GOVERNORS LAND
STORMWATER MANAGEMENT FACILITIES
COUNTY INSPECTION PROGRAM

Repair Approved by PTM
6-4-12

FILE: JR-029

# *LANE* QUOTATION SHEET

**To:** Edwin Gilley
**Company:** Gilley Construction
**Phone:** (757) 812 0768
**Fax:**

**From:** W. Shane Deibel
**Company:** Lane Enterprises, Inc.
**Phone:** 540-439-3201
**Fax:** 540-439-0834

**Date:** 5/22/2012
**Pages including this cover page:** 1

POND RISER FOR HOMEOWNER ASSOC. JAMES CITY, CO, VA

| | | | | |
|---|---|---|---|---|
| TRASH RACK | 72"DIA | 16GA | CMP-T2 Aluminized | 16/8 |
| RISER | 48"DIA | 16GA | CMP-T2 Aluminized Perf. | 6 V.F. |
| STUB | 12"DIA | 16GA | CMP-T2 Aluminized | 1 EA. |
| BARREL | 12"DIA | 16GA | CMP-T2 Aluminized | 8 L.F. |
| REROLL BANDS W/ GASKETS | 12"DIA | 18GA | CMP-T2 Aluminized | 1 EACH |
| UNIVERSAL BAND W/ GASKETS | 12"DIA | 18GA | CMP-T2 Aluminized | 1 EACH |

$250.00 MINIMUM DROP CHARGE TO ALL ORDERS LESS THAN $5,000.00
ALL SEAMS STANDARD
FOB JOBSITE-LANE TRUCKS-SINGLE SHIPMENT--PLUS TAX.
ALL QUANTITIES ARE ESTIMATES BASED ON BEST INTERPRETATION OF PLANS. CONTRACTOR IS RESPONSIBLE FOR ACTUAL QUANTITIES.
*CONNECTING BANDS ARE EXTRA & PRICED AS 1-1/2 X THE PER FOOT PRICE OF PIPE UNLESS OTHERWISE STATED.*
PRICES STATED IN THIS QUOTATION ARE FIRM FOR ORDERS SHIPPED WITHIN **30 DAYS** OF THE BID/QUOTE DATE.

LANE is now supplying BaySaver Filter and Separator products!