



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.

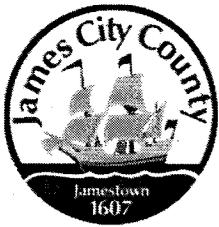
BMP NUMBER: PC110

DATE VERIFIED: July 5, 2012

QUALITY ASSURANCE TECHNICIAN: Leah Hardenbergh

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA



Stormwater Division

MEMORANDUM

DATE: March 13, 2010
TO: Michael J. Gillis, Virginia Correctional Enterprises Document Management Services
FROM: Jo Anna Ripley, Stormwater
PO: 270712
RE: Files Approved for Scanning

General File ID or BMP ID: PC110

PIN: 3330100011D

Subdivision, Tract, Business or Owner

Name (if known):

60 West Business Park

Property Description:

Lot 1; House of Worship

Site Address:

5493 Mooretown Road

(For internal use only)

Box 2

Drawer: 2

Agreements: (in file as of scan date)

Y

Book or Doc#:

990026887

Page:

990026404

Comments

As of 3/10/10, Owner or Responsible Party: Williamsburg Congregation of Jehovahs Witnesses

DECLARATION OF COVENANTS

COPY

INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

THIS DECLARATION, made this ^{16th} ~~28th~~ day of December, 19 99, between Williamsburg Congregation of Jehovah's Witnesses and all successors in interest, hereinafter referred to as the "COVENANTOR(S)," owner(s) of the following property: 5493 Mooretown Road, Deed Book _____, Page No. _____ or Instrument No. 990026404 and James City County, Virginia, hereinafter referred to as the "COUNTY."

WITNESSETH:

We, the COVENANTOR(S), with full authority to execute deeds, mortgages, other covenants, and all rights, titles and interests in the property described above, do hereby covenant with the COUNTY as follows:

1. The COVENANTOR(S) shall provide maintenance for the drainage system including any runoff control facilities, conveyance systems and associated easements, hereinafter referred to as the "SYSTEM," located on and serving the above-described property to ensure that the SYSTEM is and remains in proper working condition in accordance with approved design standards, and with the law and applicable executive regulations. The SYSTEM shall not include any elements located within any Virginia Department of Transportation rights-of-way.

2. If necessary, the COVENANTOR(S) shall levy regular or special assessments against all present or subsequent owners of property served by the SYSTEM to ensure that the SYSTEM is properly maintained.

3. The COVENANTOR(S) shall provide and maintain perpetual access from public right-of-ways to the SYSTEM for the COUNTY, its agent and its contractor.

4. The COVENANTOR(S) shall grant the COUNTY, its agent and its contractor a right of entry to the SYSTEM for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining or repairing the SYSTEM.

5. If, after reasonable notice by the COUNTY, the COVENANTOR(S) shall fail to maintain the SYSTEM in accordance with the approved design standards and with the law and applicable executive regulations, the COUNTY may perform all necessary repair or maintenance work, and the COUNTY may assess the COVENANTOR(S) and/or all property served by the SYSTEM for the cost of the work and any applicable penalties.

6. The COVENANTOR(S) shall indemnify and save the COUNTY harmless from any and all claims for damages to persons or property arising from the installation, construction, maintenance, repair, operation or use of the SYSTEM.

7. The COVENANTOR(s) shall promptly notify the COUNTY when the COVENANTOR(S) legally transfers any of the COVENANTOR(S)' responsibilities for the SYSTEM. The COVENANTOR(S)' shall supply the COUNTY with a copy of any document of transfer, executed by both parties.

8. The covenants contained herein shall run with the land and shall bind the COVENANTOR(S) and the COVENANTOR(S)' heirs, executors, administrators, successors and assignees, and shall bind all present and subsequent owners of property served by the SYSTEM.

9. This COVENANT shall be recorded in the County Land Records.

Instrument # 990026887

Recorded Dec. 29, 1999

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of this 16 day of DECEMBER, 19 99.

COVENANTOR(S)
Willhamburg CONGREGATION of
JEHOVAH'S WITNESSES
Ralph G. Brown, TRUSTEE

Print Name/Title RALPH G. BROWN, TRUSTEE

ATTEST:

COVENANTOR(S)

Print Name/Title _____

ATTEST:

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF James City

I hereby certify that on this 16th day of December, 19 99, before the subscribed, a Notary Public of the State of Virginia, and for the City/County of James City, aforesaid personally appeared Ralph G. Brown and did acknowledge the foregoing instrument to be their Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 16th day of December, 19 99.

Lori Hazelwood
Notary Public

My Commission expires: 10-31-01

Approved as to form:

L. P. Regan
Deputy County Attorney

This Declaration of Covenants prepared by:

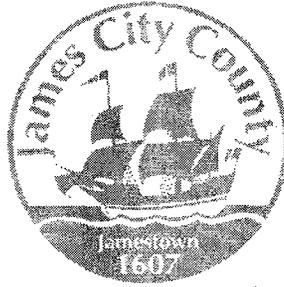
J. H. Pruden Jr. (Stilley Co.)
(Print Name)

Administrative Assistant
(Title)

737 Shields Road
(Address)

Newport News, VA. 23608
(City) (State) (Zip)

drainage.pre
Revised 2/97



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: KINGDOM HALL OF JEHOVAH'S WITNESSES
Structure/BMP Name: PC 110
Project Location: 5493 MOORETOWN RD
BMP Location: REAR OF SITE
County Plan No.: SP - 104 - 99

Project Type: Residential Business Commercial Office Institutional Industrial Public Roadway Other HOUSE OF WORSHIP
Tax Map/Parcel No.: (33-3)(01-0-0011-0)
BMP ID Code (if known): PC 110
Zoning District: M1
Land Use: HOUSE OF WORSHIP
Site Area (sf or acres): ± 2.5

Brief Description of Stormwater Management/BMP Facility: EXTENDED DURATION DRY
RETENTION W/ SHALLOW MARSH C BOTTOM

Nearest Visible Landmark to SWM/BMP Facility: KINGDOM HALL

Nearest Vertical Ground Control (if known): TOPOGRAHY BY OTHERS, PROVIDED TO LMDG BY OWNER
 JCC Geodetic Ground Control USGS Temporary Arbitrary Other
Station Number or Name: _____
Datum or Reference Elevation: _____
Control Description: _____
Control Location from Subject Facility: _____

Section 2 - Stormwater Management / BMP Facility Construction Information:

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

Approx. Construction Start Date for SWM/BMP Facility: FEBRUARY 2000

Facility Monitored by County Representative during Construction: Yes No Unknown

Name of Site Work Contractor Who Constructed Facility: STILLEY COMPANY

Name of Professional Firm Who Routinely Monitored Construction: LAND MARK DESIGN GROUP

Date of Completion for SWM/BMP Facility: APRIL 2000

Date of Record Drawing/Construction Certification Submittal: 1/22/01

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

Section 3 - Owner / Designer / Contractor Information:

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

Name: GERALD BROWN

Mailing Address: PO DRAWER 260
WILLIAMSBURG, VA 23187

Business Phone: 229-2504 Fax: _____

Contact Person: _____ Title: _____

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

Firm Name: LAND MARK DESIGN GROUP

Mailing Address: 4029 IRONBOUND RD, STE 100
WILLIAMSBURG, VA 23188

Business Phone: 253-2975

Fax: 229-0049

Responsible Plan Preparer: STEPHEN BOWEN, VA. LS # 1448-B

Title: PRINCIPAL

Plan Name: SITE PLAN FOR KINGDOM HALL OF JEHOVAH'S WITNESSES

Firm's Project No. 1870040-302.04

Plan Date: 8-30-99, REVISED 11-5-99

Sheet No.'s Applicable to SWM/BMP Facility: C-2 / C-3 / L-1 / L-2 /

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

Name: STILLEY COMPANY

Mailing Address: PO BOX 2739
NEWPORT NEWS, VA 23609

Business Phone: 806-0721

Fax: 806-9302

Contact Person: WES STILLEY

Site Foreman/Supervisor: RON HANSFORD

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: LANDMARK DESIGN GROUP
 Mailing Address: 4029 IRONBOUND RD, STE 100
WILLIAMSBURG, VA. 23188
 Business Phone: 253-2975
 Fax: 229-0079

Name: STEPHEN ROMEO, VA. LS# 1448-B
 Title: PRINCIPAL

Signature: Stephen Romeo
 Date: 10/15/01

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

Construction Certification

Firm Name: LANDMARK DESIGN GROUP
 Mailing Address: 4029 IRONBOUND RD, STE. 100
WILLIAMSBURG, VA 23188
 Business Phone: 253-2975
 Fax: 229-0049

Name: STEPHEN ROMEO, VA. LS# 1448-B
 Title: PRINCIPAL

Signature: Steph Romeo
 Date: 10/15/01

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.

1. SUBSTITUTED CMP BARREL FOR RCP



(Seal)

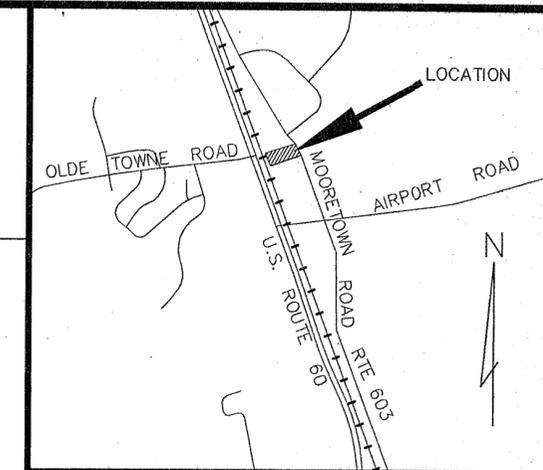
LICENSED
 Virginia Registered Professional Engineer
 or Certified Land Surveyor
LICENSED



(Seal)

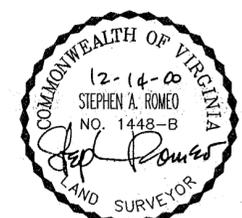
LICENSED
 Virginia Registered
 Professional Engineer
LAND SURVEYOR

CSX TRANSPORTATION
100' R/W



I HEREBY CERTIFY THAT, TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND AS I OBSERVED DURING THE EXECUTION OF THE WORK, THIS STORM WATER MANAGEMENT FACILITY WAS CONSTRUCTED IN ACCORDANCE WITH THE PLANS PREPARED FOR SAID FACILITY.

Stephen A. Romeo
STEPHEN A. ROMEO, L.S. 1448B
12-14-00
DATE



N/F
KDK ASSOCIATES, INC.

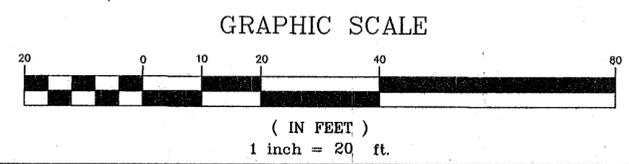
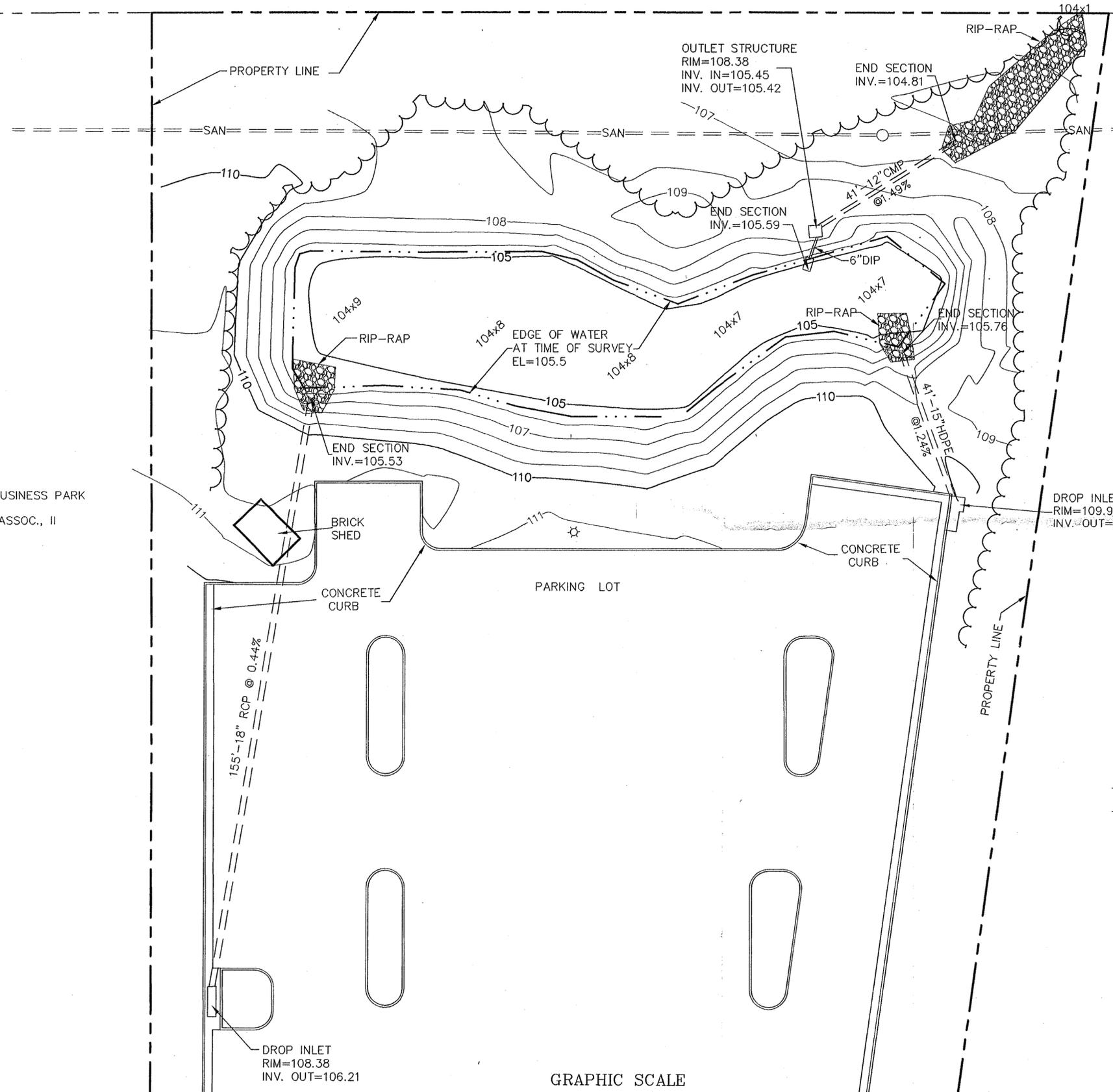
RECORD DRAWING
DETENTION BASIN / BMP
KINGDOM HALL
OF
JEHOVAH'S WITNESSES
5493 MOORETOWN ROAD
JAMES CITY COUNTY, VIRGINIA
SCALE: 1"=20' DATE: 12/11/00

**LANDMARK
DESIGN GROUP**
Engineers • Planners • Surveyors
Landscape Architects • Environmental Consultants

4029 Ironbound Road
Suite 100
Williamsburg, VA 23188
Tel. (757) 253-2975
Fax (757) 229-0049
Email: lmdg@landmarkdgb.com

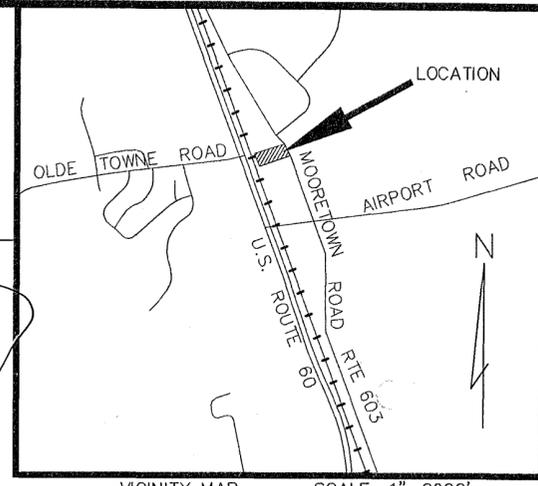
5544 Greenwich Road
Suite 200
Virginia Beach, VA 23462
Tel. (757) 473-2000
Fax (757) 497-7933
Email: lmdg@landmarkdgb.com

LOT 2, 60 WEST BUSINESS PARK
N/F
MOORETOWN ASSOC., II



NOTE: THIS RECORD DRAWING IS BASED ON AN ACTUAL FIELD SURVEY PERFORMED BY LANDMARK DESIGN GROUP, 12/8/00

DRAWN BY: PF PROJECT NO. 1870040
CHKD. BY: SAR DWG. NO. 12129W



CSX TRANSPORTATION
100' R/W
*need more
SM-T STUBS
TO VERIFY*

*SHOW
PRINCIPAL SWALLMAY
DETAIL
SHEET C-3*

*INCREASED
OFFSITE
FLOODING*
*Added
Vol int.*

I HEREBY CERTIFY THAT, TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND AS I OBSERVED DURING THE EXECUTION OF THE WORK, THIS STORM WATER MANAGEMENT FACILITY WAS CONSTRUCTED IN ACCORDANCE WITH THE PLANS PREPARED FOR SAID FACILITY.

Step Romeo
STEPHEN A. ROMEO, L.S. 1448B 12-14-00
DATE



N/F
KDK ASSOCIATES, INC.



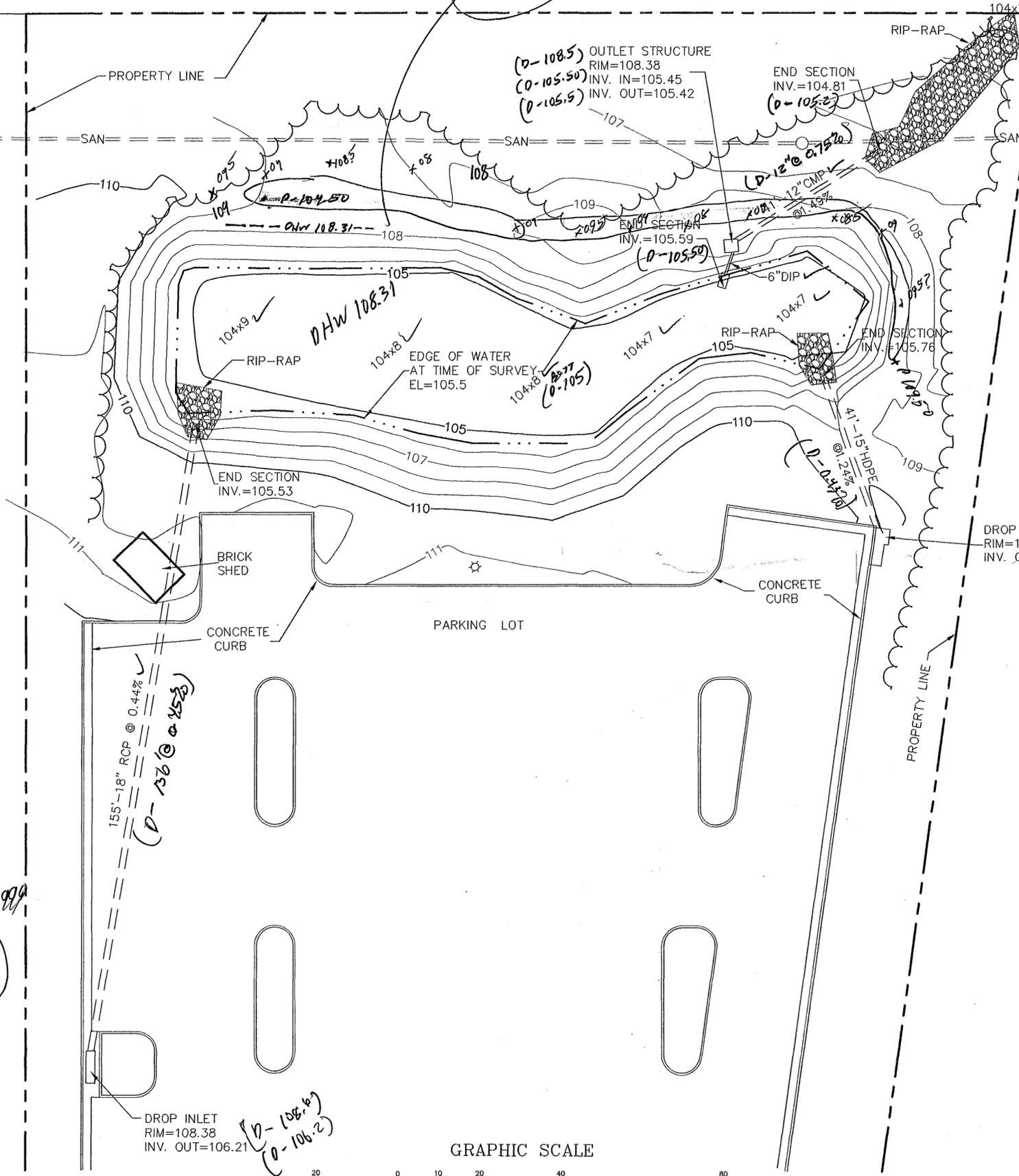
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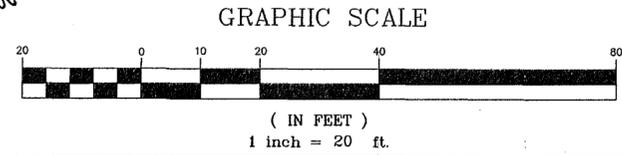
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LOT 2, 60 WEST BUSINESS PARK
N/F
MOORETOWN ASSOC., II

*SHALLOW
MARSH PLANTINGS
PER APPROVED
LANDSCAPE PLAN
SHEET (L-1) AND
AND
CBPOrd exception
request letter
dated Dec 30 2000
(C. Moore to
Stephen Romeo.)*



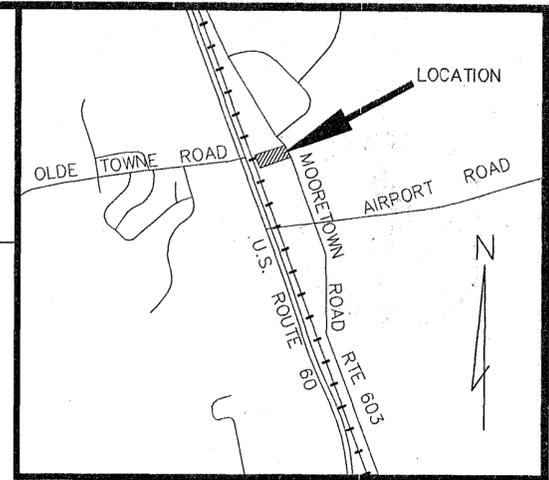
NOTE: THIS RECORD DRAWING IS BASED ON AN ACTUAL FIELD SURVEY PERFORMED BY LANDMARK DESIGN GROUP, 12/8/00



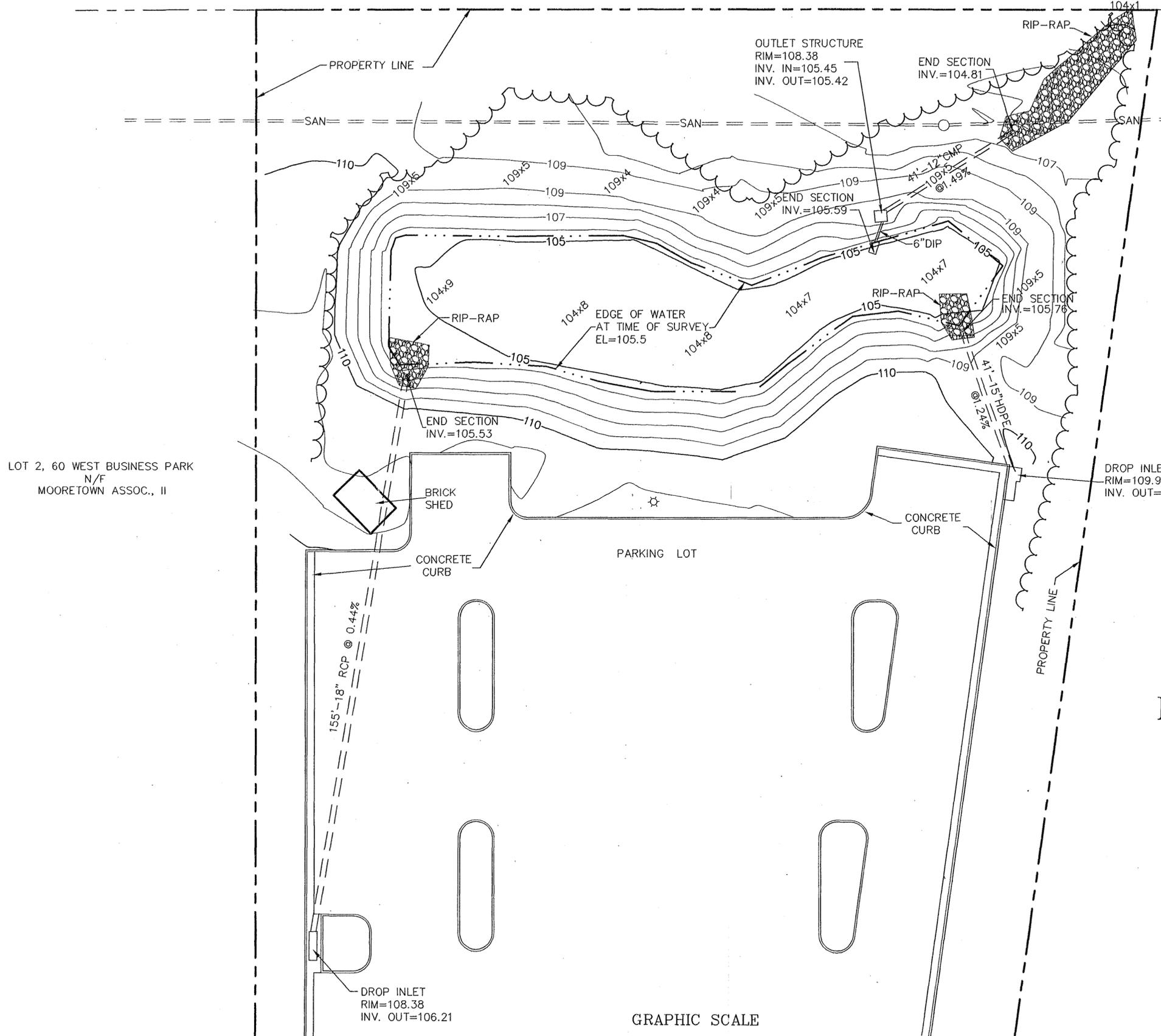
PC110
SP-104-99
GPIN 3330100011D
5493 MOORETOWN RD 23188

DRAWN BY: PF
CHKD. BY: SAR
PROJECT NO. 1870040
DWG. NO.: 12129W

CSX TRANSPORTATION
100' R/W



VICINITY MAP SCALE: 1"=2000'



I HEREBY CERTIFY THAT, TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND AS I OBSERVED DURING THE EXECUTION OF THE WORK, THIS STORM WATER MANAGEMENT FACILITY WAS CONSTRUCTED IN ACCORDANCE WITH THE PLANS PREPARED FOR SAID FACILITY.

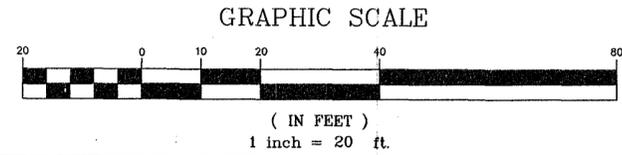
Stephen A. Romeo
STEPHEN A. ROMEO, L.S. 1448B DATE: 12/11/01



N/F
KDK ASSOCIATES, INC.

RECORD DRAWING DETENTION BASIN / BMP KINGDOM HALL OF JEHOVAH'S WITNESSES 5493 MOORETOWN ROAD JAMES CITY COUNTY, VIRGINIA SCALE: 1"=20' DATE: 12/11/00 REVISED 01/18/01

NOTE: THIS RECORD DRAWING IS BASED ON AN ACTUAL FIELD SURVEY PERFORMED BY LANDMARK DESIGN GROUP, 12/8/00



**LANDMARK
DESIGN GROUP**
Engineers • Planners • Surveyors
Landscape Architects • Environmental Consultants

4029 Ironbound Road
Suite 100
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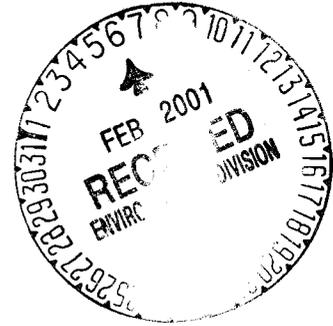
DRAWN BY : PF	PROJECT NO. 1870040
CHKD. BY : SAR	DWG. NO. : 12129W

PC 110 SP-104-99

HOLD
WAITING FOR CC &
COMPLETION OF CR ITEMS

RD
PREV Comm #2 12/22 NA.
PREV Comm #3 12/22 OK
PREV Comm #4 12/22 NA
NO MYLAR

LANDMARK DESIGN GROUP TRANSMITTAL



To: Scott Thomas
Company: JCC Environmental Division
From: Stephen Romeo
Date: 2-6-01
Subject: Jehovah's Witnesses Kingdom Hall

LMDG Job No.: 1870040-302.04

PC 110

Attached please find:

- Prints
- Plans
- Specifications
- Drawings
- Report
- Letter
-

Transmitted as checked below:

- For your use
- As requested
- For review and comment
- For approval
- Approved
-

Copies	Date	Drawing No.	Description
2	1-18-01	12129W	BMP Record Drawing

Notes: Drawing updated to reflect additional dam grading by sitework contractor pursuant to your 12-22-00 letter.
Correspondence regarding construction certification and inability of receiving channel to adequately convey runoff due to lack of maintenance forthcoming under separate cover.

- Copies
1. File: _____
 2. Jack Pruden _____
 3. Gerald Brown _____
 4. _____
 5. _____

- Enclosures
- -
 -
 -
 -

LandMark Design Group, Inc.

By: Step Romeo

Engineers ♦ Planners ♦ Surveyors ♦ Landscape Architects ♦ Environmental Consultants
4029 Ironbound Road, Suite 100, Williamsburg, VA 23188 (757) 253-2975 FAX: (757) 229-0049 lmdg@landmarkdgb.com



SP-10499

COUNTY OF JAMES CITY
FINAL SITE PLAN

APPROVALS

Fire Dept. PP/POH 9/23/99

Health Dept. 11/9/99

VECT. 11/9/99

Planning Dec/POH 11/10/99

Zoning Adm. 11/20/99

JCSA 11/20/99

County Eng. 11/20/99

REA

Other

SITE PLAN FOR KINGDOM HALL OF JEHOVAH'S WITNESSES JAMES CITY COUNTY, VIRGINIA

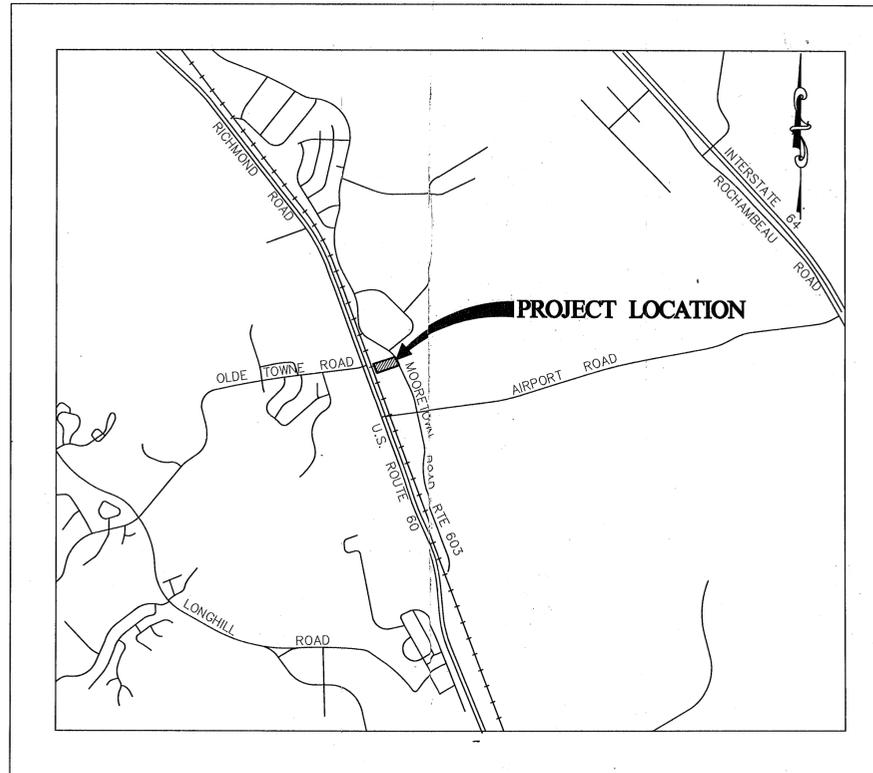
AUGUST 30, 1999

REVISED: NOVEMBER 5, 1999

LEGEND

EXISTING		PROPOSED
— SAN —	SANITARY SEWER	8" SAN
— W —	WATER	8" WATER
— S —	STORM SEWER	15" RCP
— E —	ELECTRIC LINE	— E —
— T —	TELEPHONE	— T —
— G —	GAS LINE	— G —
— TV —	CABLE TV LINE	— TV —
— FM —	FORCE MAIN	— FM —
— OH —	OVERHEAD CABLE	— OH —
○	MANHOLE	○
□	CURB DROP INLET	□
□	YARD DROP INLET	□
□	CLEANOUT	□
△	FLARED END SECTION	△
⊗	VALVE	⊗
⊕	WATER METER	⊕
⊕	FIRE HYDRANT	⊕
⊕	POWER POLE	⊕
⊕	LIGHT POLE	⊕
⊕	TELEPHONE PEDESTAL	⊕
⊕	TELEPHONE POLE	⊕
—	GROUND ELEVATION	28.10 T.C.
▭	CEMENT CONCRETE	▭
▭	BITUMINOUS CONCRETE	▭
▭	CONCRETE CURB	▭
▭	CURB & GUTTER	▭
▭	CENTERLINE/BASELINE	▭
▭	PROPERTY LINE	▭
▭	DITCH SWALE LINE	▭
▭	DIRECTION OF FLOW	▭
— X — X —	TREE LINE	— X — X —
— X — X —	FENCE	— X — X —
⊙	BENCH MARK	⊙
—	EASEMENT LINE	—
⊕	BLOW-OFF VALVE	⊕
—	DIVERSION DIKE	—
⊕	CONSTRUCTION ENTRANCE	⊕
—	SILT FENCE	—
—	INLET PROTECTION	—

NOTE: SOME SYMBOLS SHOWN IN THIS LEGEND MAY NOT NECESSARILY BE USED FOR THIS PROJECT.



VICINITY MAP

SCALE : 1"=2000'

SHEET INDEX

SHT. NO.	DESCRIPTION
C-1	COVER SHEET
C-2	SITE LAYOUT
C-3	SITE PLAN
C-4	DETAILS AND NOTES
C-5	DETAILS AND NOTES
L-1	LANDSCAPE PLAN
L-2	LANDSCAPE DETAILS AND NOTES
F-1	SITE LIGHTING PLAN

OWNER/CONTACT

JEHOVAH'S WITNESSES
C/O GERALD BROWN
P.O. DRAWER 260
WILLIAMSBURG, VA 23187
PHONE: (757) 229-2504

SITE ENGINEER

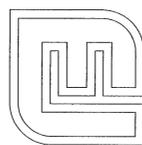
LANGLEY AND McDONALD, P.C.
4029 IRONBOUND ROAD, SUITE 100
WILLIAMSBURG VA, 23188
PHONE: (757) 253-2975
FAX: (757) 229-0049

LAND USE SUMMARY TABLE

PREVIOUSLY APPROVED PLANS	SP-20-97 (ALL SEASON'S OPERATION CENTER)
CONCEPTUAL CASE NO. C-40-99	
TAX MAP AND PARCEL (33-3) (01-0-0011-D)	
SITE ADDRESS 5493 MOORETOWN ROAD	
SITE ZONE M1	
USE CATEGORY HOUSE OF WORSHIP	
TOTAL AREA OF SITE 2.4651 AC. 107,380 SF	
TOTAL AREA OF DISTURBANCE 2.25 AC. 98,010 SF	
HEIGHT OF PROP. BLDG. 30' (ONE STORY) 35' ALLOWABLE	
PROPOSED SEATING 255 SEATS (BASED ON 450 LF OF BENCH SEATING)	
IMPERVIOUS AREA (PROPOSED) 1.11 AC. 48,352 SF 45%	
PROPOSED BUILDING AREA 5000 SF (4.7% OF TOTAL SITE AREA)	
PARKING AND DRIVE AISLE AREA 41,171 SF (38.3%)	
SIDEWALK AREA 1,820 SF (1.7%)	
OPEN AREA (PROVIDED) 1.355 AC. 59,024 SF 55.1%	
PARKING SPACES REQUIRED 47 (1 SPACE/24" OF SEATING + 2 H/C)	
PARKING SPACES PROVIDED 100 (STANDARD: 98, H/C: 2)	
LOADING SPACES REQUIRED 0	
THIS PROPERTY IS LOCATED IN BERKELEY "A" DISTRICT	
TRIP OPERATIONS 200/DAY (MAXIMUM SUNDAY)	

REFUSED TO BE DISPOSED OF BY OWNER, OFFSITE IN A LAWFUL MANNER

PROPERTY IS LOCATED WITHIN FLOOD ZONE X AS SHOWN ON FEMA MAP PANEL NUMBER 510201 0035B DATED FEB. 6, 1991.



Langley and McDonald, Inc.

Engineers · Surveyors · Planners
Landscape Architects · Environmental Consultants
VIRGINIA BEACH WILLIAMSBURG

4029 Ironbound Rd. Suite 100
Williamsburg, VA 23188
Tel. (757) 253-2975
Fax (757) 229-0049
Email: info@langleywb.com

5544 Greenwich Road - Suite 200
Virginia Beach, VA 23464
Tel. (757) 473-2000
Fax (757) 497-7933
Email: info@langleyeng.com



Project Number: 1870040-302.04
Dwg. File No.: 10738W

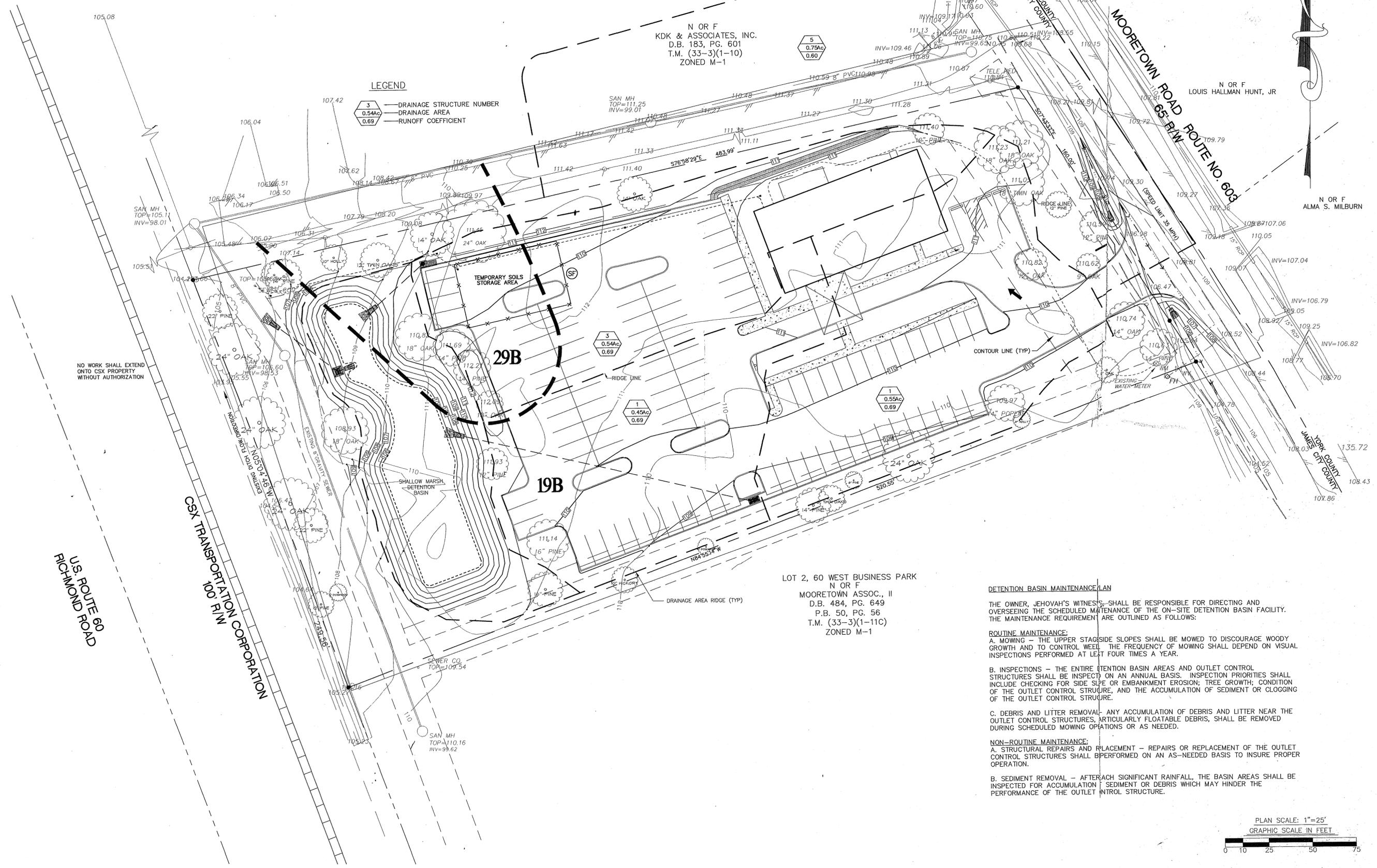
Drawing Number

C-1

SOILS INFORMATION						
TYPE	NAME	SHRINK/SWELL	HIGH PERCHED WATERTABLE (DEPTH TO WATERTABLE)	PERMEABILITY	EROSION FACTOR (K)	EROSION FACTOR (T)
19B	KEMPSVILLE-EMPORIA FINE SANDY LOAM	LOW	3 TO 4.5 FEET	2 TO 6 IN /HR	0.20 - 0.28	4
29B	SLAGLE FINE SANDY LOAM	LOW	1.5 TO 3 FEET	2 TO 6 IN /HR	0.24	3

LEGEND

	3 DRAINAGE STRUCTURE NUMBER
	0.54Ac DRAINAGE AREA
	0.69 RUNOFF COEFFICIENT



NO WORK SHALL EXTEND ONTO CSX PROPERTY WITHOUT AUTHORIZATION

U.S. ROUTE 60
RICHMOND ROAD

CSX TRANSPORTATION CORPORATION
100' R/W

N OR F
KDK & ASSOCIATES, INC.
D.B. 183, PG. 601
T.M. (33-3)(1-10)
ZONED M-1

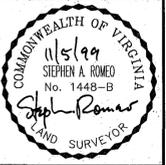
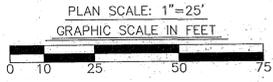
LOT 2, 60 WEST BUSINESS PARK
N OR F
MOORETOWN ASSOC., II
D.B. 484, PG. 649
P.B. 50, PG. 56
T.M. (33-3)(1-11C)
ZONED M-1

DETENTION BASIN MAINTENANCE PLAN

THE OWNER, JEHOVAH'S WITNESSES, SHALL BE RESPONSIBLE FOR DIRECTING AND OVERSEEING THE SCHEDULED MAINTENANCE OF THE ON-SITE DETENTION BASIN FACILITY. THE MAINTENANCE REQUIREMENTS ARE OUTLINED AS FOLLOWS:

- ROUTINE MAINTENANCE:**
- A. MOWING - THE UPPER STAGSIDE SLOPES SHALL BE MOWED TO DISCOURAGE WOODY GROWTH AND TO CONTROL WEED. THE FREQUENCY OF MOWING SHALL DEPEND ON VISUAL INSPECTIONS PERFORMED AT LEAST FOUR TIMES A YEAR.
 - B. INSPECTIONS - THE ENTIRE DETENTION BASIN AREAS AND OUTLET CONTROL STRUCTURES SHALL BE INSPECTED ON AN ANNUAL BASIS. INSPECTION PRIORITIES SHALL INCLUDE CHECKING FOR SIDE SLOPE OR EMBANKMENT EROSION; TREE GROWTH; CONDITION OF THE OUTLET CONTROL STRUCTURE, AND THE ACCUMULATION OF SEDIMENT OR CLOGGING OF THE OUTLET CONTROL STRUCTURE.
 - C. DEBRIS AND LITTER REMOVAL - ANY ACCUMULATION OF DEBRIS AND LITTER NEAR THE OUTLET CONTROL STRUCTURES, PARTICULARLY FLOATABLE DEBRIS, SHALL BE REMOVED DURING SCHEDULED MOWING OPERATIONS OR AS NEEDED.

- NON-ROUTINE MAINTENANCE:**
- A. STRUCTURAL REPAIRS AND REPLACEMENT - REPAIRS OR REPLACEMENT OF THE OUTLET CONTROL STRUCTURES SHALL BE PERFORMED ON AN AS-NEEDED BASIS TO INSURE PROPER OPERATION.
 - B. SEDIMENT REMOVAL - AFTER EACH SIGNIFICANT RAINFALL, THE BASIN AREAS SHALL BE INSPECTED FOR ACCUMULATION OF SEDIMENT OR DEBRIS WHICH MAY HINDER THE PERFORMANCE OF THE OUTLET CONTROL STRUCTURE.



Langley and McDonald, Inc.
Engineers · Surveyors · Planners
Landscape Architects · Environmental Consultants

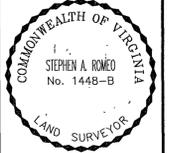
WILLIAMSBURG, VIRGINIA BEACH

4029 nonbound Rd. Suite 100
Williamsburg, VA 23098
Virginia Beach, VA 23464
Tel: (757) 487-7933
Fax: (757) 487-7933
Email: @langleng.com

REVISIONS	
No.	Date
1	11/05/99

SITE LAYOUT
KINGDOM HALL
OF
JEHOVAH'S WITNESSES
JAMES CITY COUNTY VIRGINIA

Designed: MEH	Date: 8/30/99
Checked: SAR	Scale: 1"=25'
Drawn: MCH/CMJ	CADD File name: JEHOVAH.DWG
Project Number: 1870040-302.04	Dwg. File No.: 10737 W
Drawing Number	



Langley and McDonald, Inc.
Engineers - Surveyors - Planners
Landscape Architects - Environmental Consultants
WILLIAMSBURG, VIRGINIA BEACH
4029 Forbush Road - Suite 200
Williamsburg, VA 23186
Virginia Beach, VA 23464
Tel: (757) 475-7000
Fax: (757) 223-0449
Email: @langleng.com



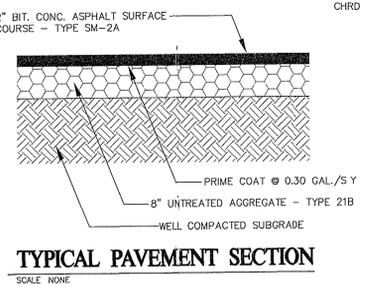
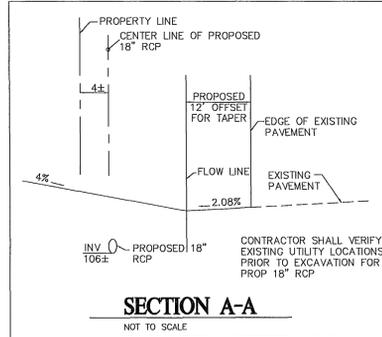
REVISIONS		
No.	Date	Comment
1	11/05/99	PER CC AND VDOT REVIEW COMMENTS
2	12/14/99	PER CC REVIEW COMMENTS

GRADING STATUS				
No.	Date	Interface Review	Client for Review	Pre-Approved Bidding
1	11/05/99	PER CC AND VDOT REVIEW COMMENTS		
2	12/14/99	PER CC REVIEW COMMENTS		

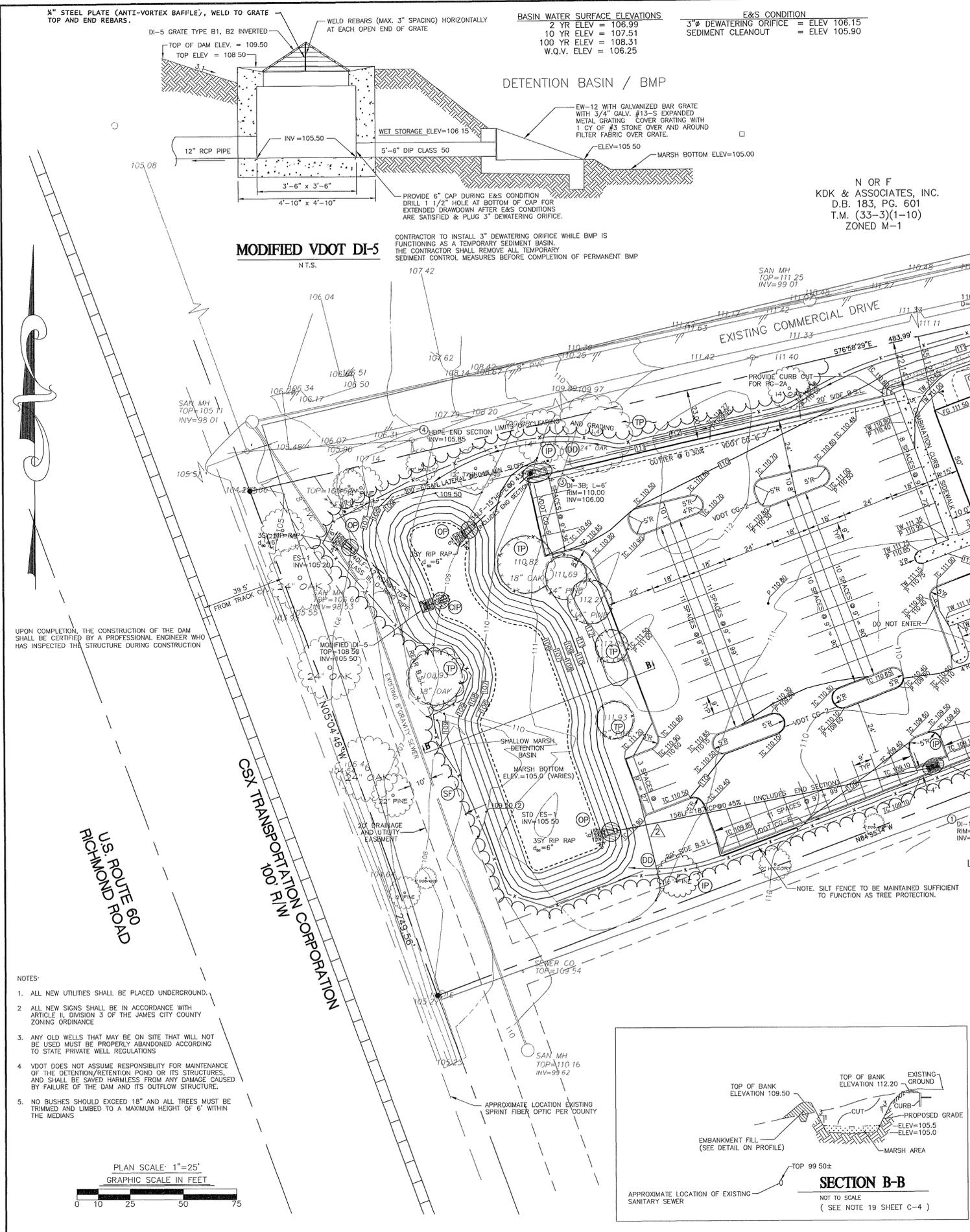
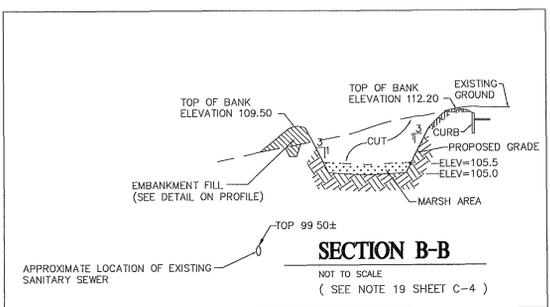
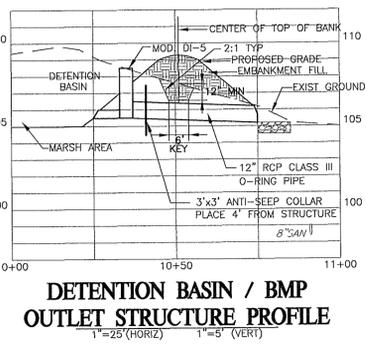
COUNTY APPROVAL	
8/6/99	11/09/99
1st Submittal	2nd Submittal
Approved	Approved

SITE PLAN
KINGDOM HALL
OF
JEHOVAH'S WITNESSES
JAMES CITY COUNTY VIRGINIA

Designed: MEH	Date: 8/30/99
Checked: SAR	Scale: 1"=25'
Drawn: MCH	CADD File Name: JEHOVAH.DWG
Project Number: 1870040-302.04	Dwg. File No.: 10736 W
Drawing Number: C-3	



- DETENTION BASIN EMBANKMENT CONSTRUCTION**
- STRIP EMBANKMENT SUBGRADE OF ALL TOPSOIL, ORGANIC MATTER, AND SOFT AND LOOSE SOILS PRIOR TO PLACEMENT OF FILL MATERIALS.
 - PROOF ROLL SUBGRADE WITH A LOADED TANDUM DUMP TRUCK OR SIMILAR EQUIPMENT UNDER THE OBSERVATION OF THE ENGINEER.
 - UNDERCUT AREAS THAT EXHIBIT EXCESSIVE PUMPING OR WEAVING.
 - PLACE FILL IN LOOSE LIFTS NOT EXCEEDING 8 INCHES IN THICKNESS AND COMPACT TO AT LEAST 95% OF MAXIMUM DRY DENSITY ACCORDING TO ASTM D-698, STANDARD PROCTOR. COMPACT FILL TO A MOISTURE CONTENT WITHIN 3% ABOVE AND 1% BELOW THE OPTIMUM MOISTURE CONTENT FOR THE MATERIAL.
 - EMBANKMENT FILL SHALL CONSIST OF UNIFIED SOIL CLASSIFICATION SYSTEM ASTM D-2487 MATERIALS, SM, SC, ML, MH, OR CL. FREE OF ALL ORGANIC MATERIALS.
 - SCARIFY TO 2 OR 3 INCHES IN DEPTH THE SURFACE OF EACH COMPLETED LIFT OF COMPACTED FILL PRIOR TO PLACING ADDITIONAL FILL TO LIMIT THE DEVELOPMENT OF HORIZONTAL SEEPAGE PLAINS.
 - COMPACT FILL IN HORIZONTAL LIFTS.
 - BENCH ALL SURFACES STEEPER THAN 4:1 SCHEDULED TO RECEIVE FILL. DO NOT EXCEED BENCH HEIGHTS OF 2 FEET.
 - PROVIDE SITE DRAINAGE TO MAINTAIN SUBGRADES FREE OF WATER AND TO AVOID SATURATION AND DISTURBANCE OF THE SUBGRADE SOILS PRIOR TO CONSTRUCTION OF FOUNDATIONS AND PLACING FILL. REMOVE ANY SOILS THAT HAVE BEEN WEAKENED DUE TO SATURATION AND DISTURBANCE AS RECOMMENDED BY THE ENGINEER. PROVIDE SITE DRAINAGE TO MAINTAIN ANY EXISTING BENCH FLOW AS NECESSARY AND TEMPORARY EROSION AND SEDIMENT CONTROL AS NECESSARY DURING CONSTRUCTION.
 - DEWATER DAM FOUNDATION AREAS (WELL POINTING OR PUMPING FROM SUMPS), AND DELIVER SURFACE WATER AWAY FROM THE WORK AREA TO ALLOW PROPER EXECUTION OF THE CONSTRUCTION.
 - MAINTAIN THE DAM FOUNDATION FREE OF PONDED WATER, EXCESSIVELY MUDDY CONDITIONS AND IN DRAINABLE CONDITION AS NEEDED FOR PROPER EXECUTION OF THE CONSTRUCTION WORK.



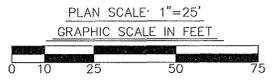
BASIN WATER SURFACE ELEVATIONS		E&S CONDITION	
2 YR	ELEV = 106.99	3"Ø DEWATERING ORIFICE	= ELEV 106.15
10 YR	ELEV = 107.51	SEDIMENT CLEANOUT	= ELEV 105.90
100 YR	ELEV = 108.31		
W.Q.V.	ELEV = 106.25		

MODIFIED VDOT DI-5
N.T.S.

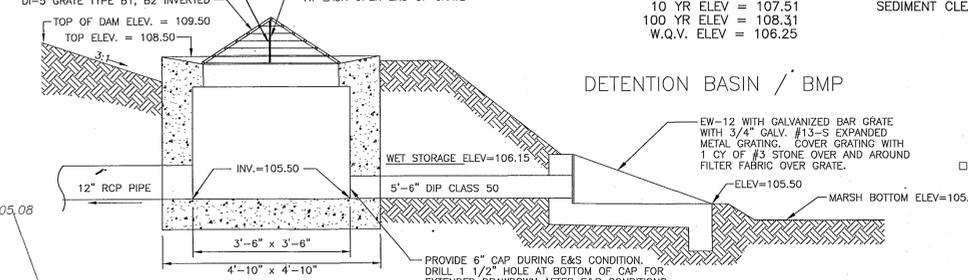
N OR F
KDK & ASSOCIATES, INC.
D.B. 183, PG. 601
T.M. (33-3)(1-10)
ZONED M-1

LOT 2, 60 WEST BUSINESS PARK
N OR F
MOORETOWN ASSOC., II
D.B. 484, PG. 649
P.B. 50, PG. 56
T.M. (33-3)(1-11C)
ZONED M-1

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 - ANY OLD WELLS THAT MAY BE ON SITE THAT WILL NOT BE USED MUST BE PROPERLY ABANDONED ACCORDING TO STATE PRIVATE WELL REGULATIONS.
 - VDOT DOES NOT ASSUME RESPONSIBILITY FOR MAINTENANCE OF THE DETENTION/RETENTION POND OR ITS STRUCTURES, AND SHALL BE SAVED HARMLESS FROM ANY DAMAGE CAUSED BY FAILURE OF THE DAM AND ITS OUTFLOW STRUCTURE.
 - NO BUSHES SHOULD EXCEED 18" AND ALL TREES MUST BE TRIMMED AND LIMBED TO A MAXIMUM HEIGHT OF 6' WITHIN THE MEDIANS.



1/2" STEEL PLATE (ANTI-VORTEX BAFFLE), WELD TO GRATE TOP AND END REBARS.

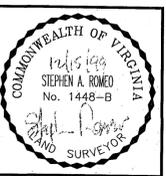
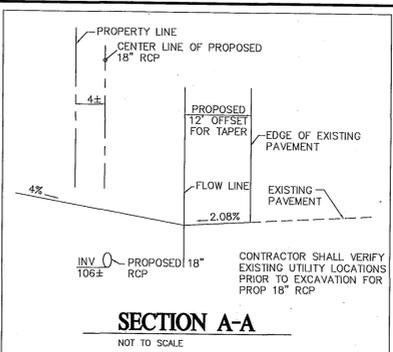


MODIFIED VDOT DI-5
N.T.S.

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Email: langley@langley.com



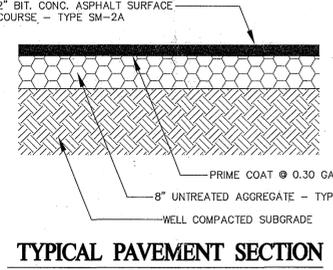
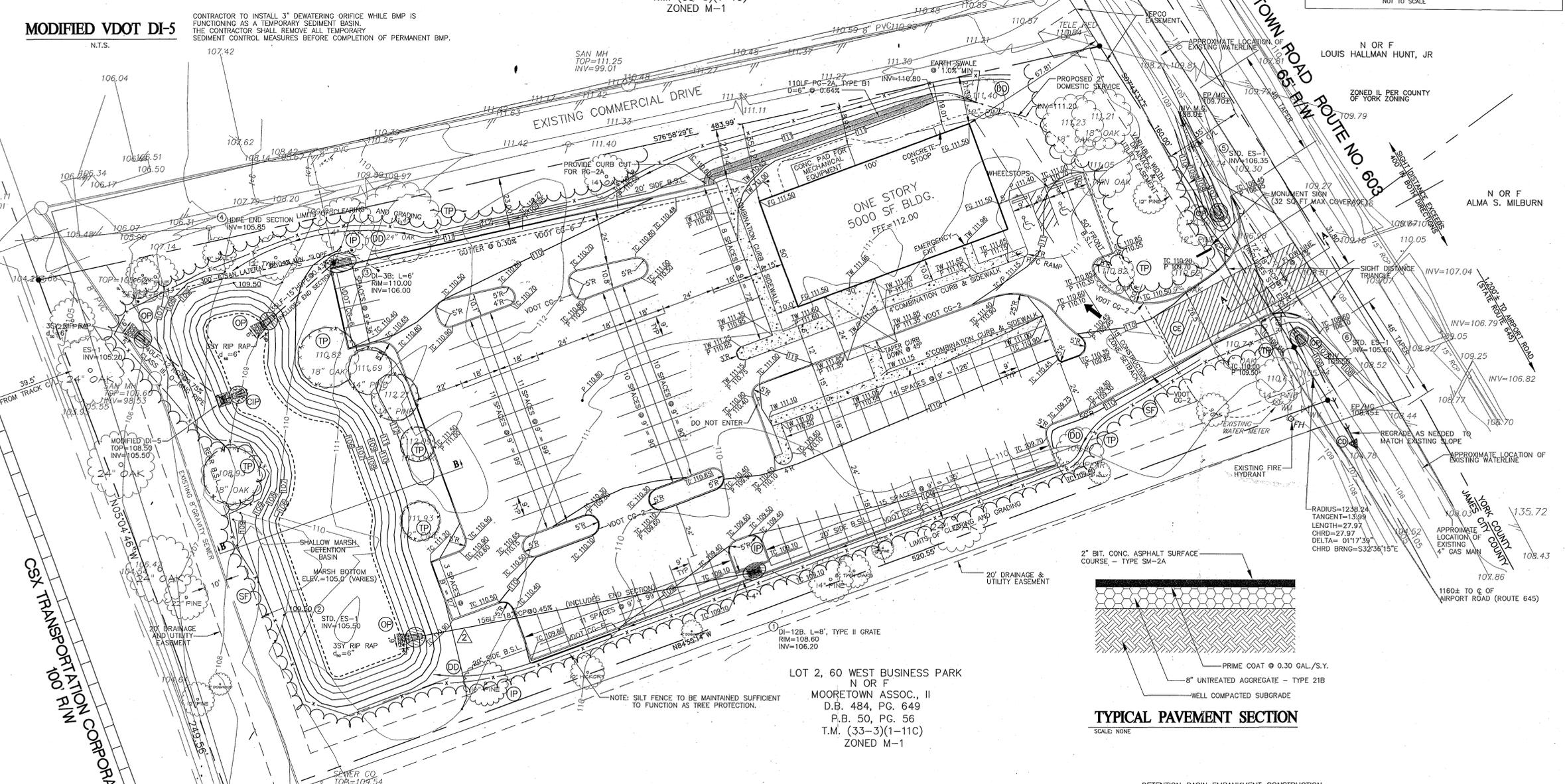
REVISIONS	By	MCH	LMP
No.	Date	Comment	
1	11/05/99	PERLCC AND VDOT REVIEW COMMENTS	
2	12/14/99	PERLCC REVIEW COMMENTS	

DRAWING STATUS	Client for Review	Per Approval	Per Approval
Interface Review			
Client for Review			
Per Approval			
Per Approval			

SITE PLAN
KINGDOM HALL OF
JEHOVAH'S WITNESSES
JAMES CITY COUNTY VIRGINIA

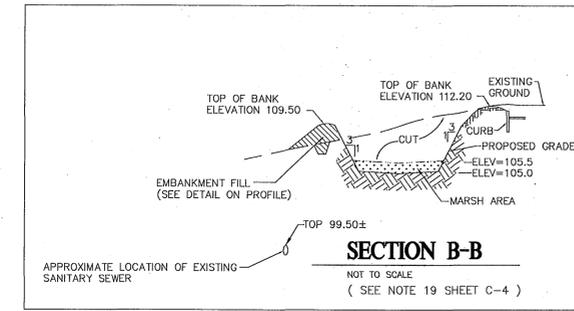
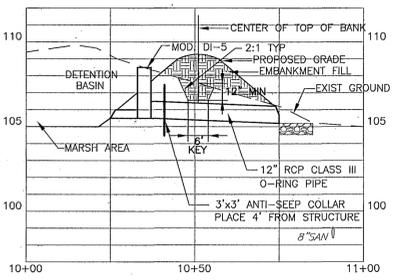
Designed: MEH	Date: 8/30/99
Checked: SAR	Scale: 1"=25'
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Project Number: 1870040-302.04	Dwg. File No.: 10736 W
Drawing Number:	

C-3
3 OF 8

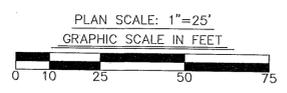


DETENTION BASIN EMBANKMENT CONSTRUCTION

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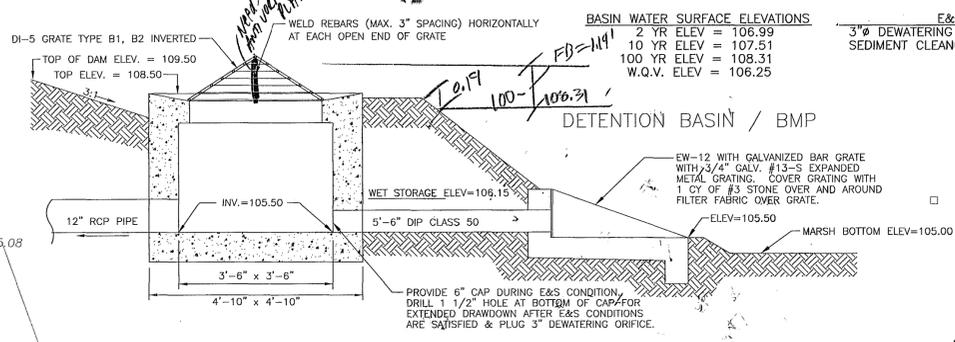
Langley and McDonald, Inc.
 Engineers · Planners
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 Landscape Architects · Environmental Consultants
 VIRGINIA BEACH
 4028 Ironshore Rd., Suite 100
 Norfolk, VA 23502
 Tel: (757) 263-2975
 Fax: (757) 263-0068
 Email: @langlmac.com



NO.	DATE	REVISIONS
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2	11/09/99	FOR ILLUSTRATION
3	11/09/99	FOR ILLUSTRATION
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99	11/09/99	FOR ILLUSTRATION
100	11/09/99	FOR ILLUSTRATION

SITE PLAN
KINGDOM HALL
 OF
JEHOVAH'S WITNESSES
 VIRGINIA
 JAMES CITY COUNTY

Designed: MEH	Date: 8/30/99
Checked: SAR	Scale: 1"=25'
Drawn: MCH	CADD File name: JEHOVAHLDWG
Project Number: 1870040-302.04	Dwg. File No.: 10736 W
Drawing Number: C-3	



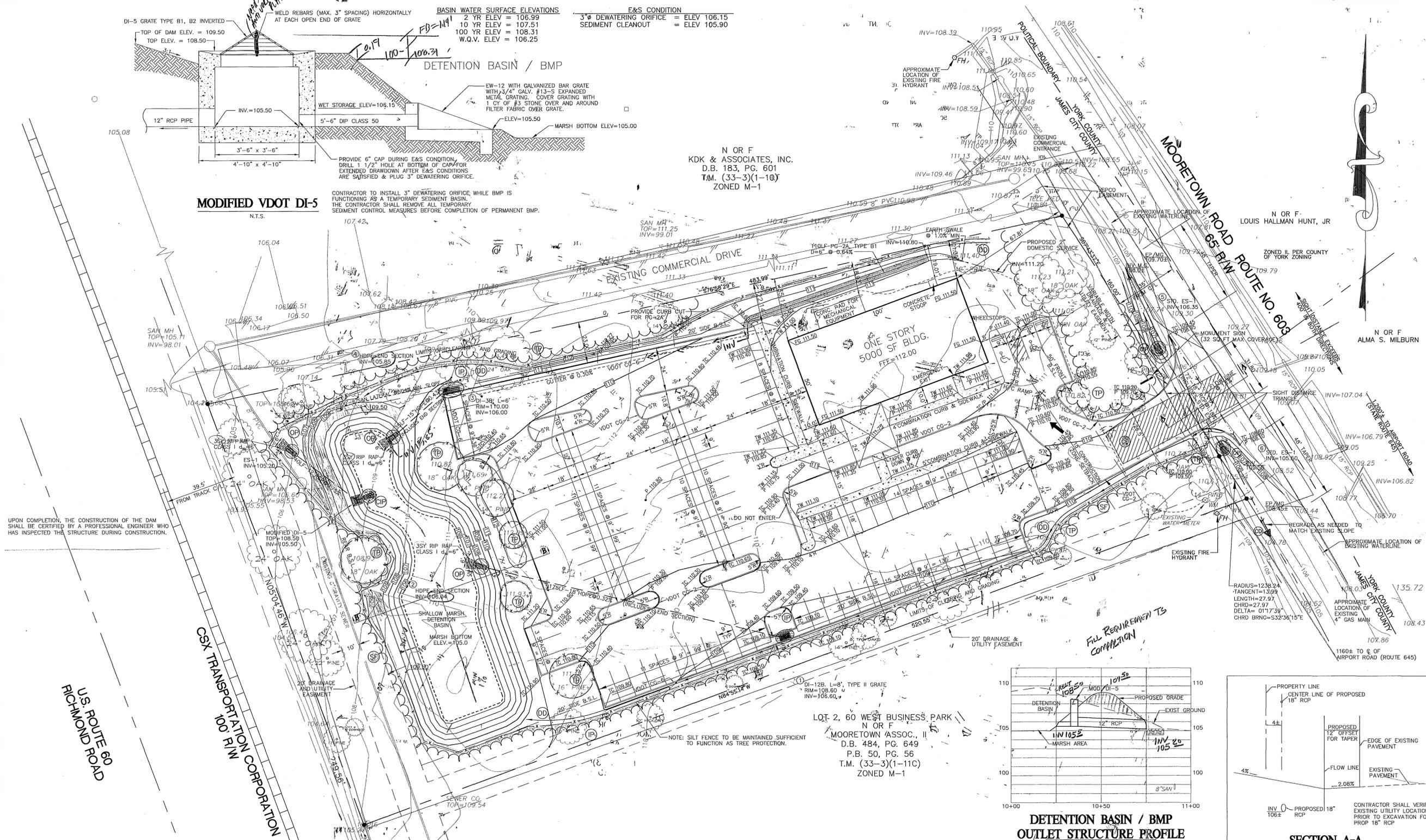
MODIFIED VDOT DI-5
 N.T.S.

CONTRACTOR TO INSTALL 3" DEWATERING ORIFICE WHILE BMP IS FUNCTIONING AS A TEMPORARY SEDIMENT BASIN. THE CONTRACTOR SHALL REMOVE ALL TEMPORARY SEDIMENT CONTROL MEASURES BEFORE COMPLETION OF PERMANENT BMP.

E&S CONDITION
 3" DEWATERING ORIFICE = ELEV 106.15
 SEDIMENT CLEANOUT = ELEV 105.90

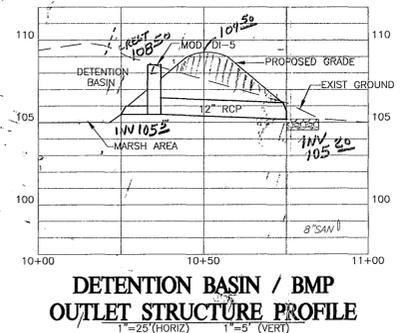
BASIN WATER SURFACE ELEVATIONS
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N OR F
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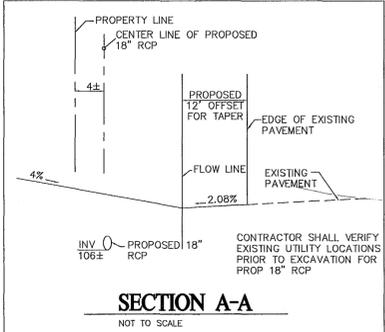


UPON COMPLETION, THE CONSTRUCTION OF THE DAM SHALL BE CERTIFIED BY A PROFESSIONAL ENGINEER WHO HAS INSPECTED THE STRUCTURE DURING CONSTRUCTION.

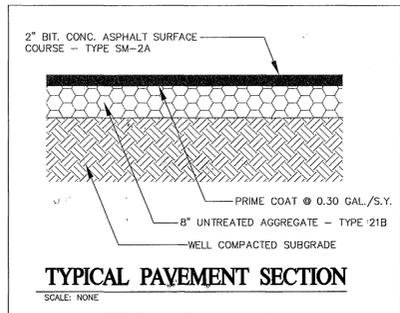
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 3. ANY OLD WELLS THAT MAY BE ON SITE THAT WILL NOT BE USED MUST BE PROPERLY ABANDONED ACCORDING TO STATE PRIVATE WELL REGULATIONS.
 4. VDOT DOES NOT ASSUME RESPONSIBILITY FOR MAINTENANCE OF THE DETENTION/RETENTION POND OR ITS STRUCTURES, AND SHALL BE SAVED HARMLESS FROM ANY DAMAGE CAUSED BY FAILURE OF THE DAM AND ITS OUTFLOW STRUCTURE.
 5. NO BUSHES SHOULD EXCEED 18" AND ALL TREES MUST BE TRIMMED AND LIMBED TO A MAXIMUM HEIGHT OF 6' WITHIN THE MEDIANS.



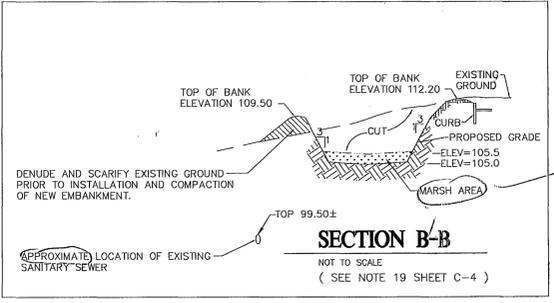
DETENTION BASIN / BMP OUTLET STRUCTURE PROFILE
 1"=25' (HORIZ) 1"=8' (VERT)



SECTION A-A
 NOT TO SCALE

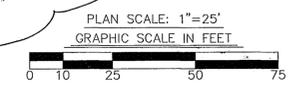


TYPICAL PAVEMENT SECTION
 SCALE: NONE



SECTION B-B
 NOT TO SCALE (SEE NOTE 19 SHEET C-4)

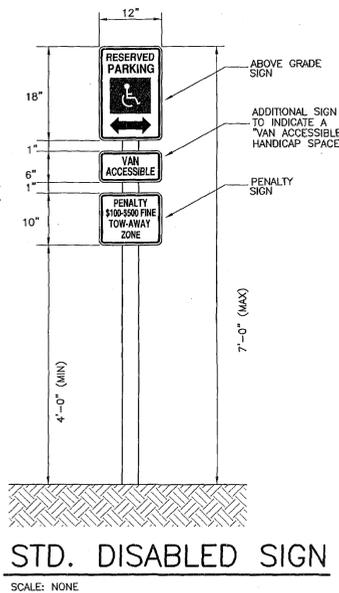
SPES FOR PLANTINGS, LANDSCAPING, ETC.



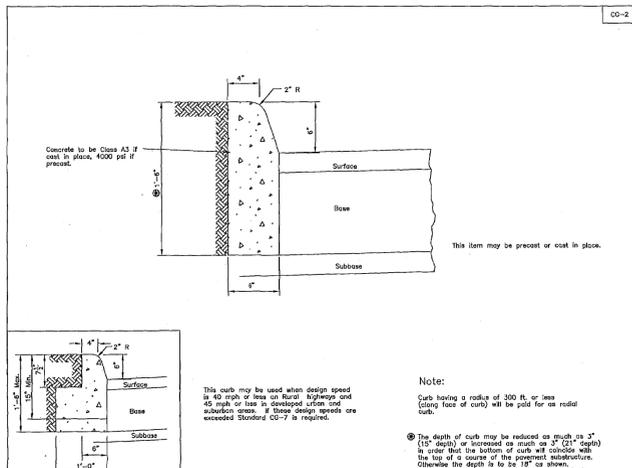
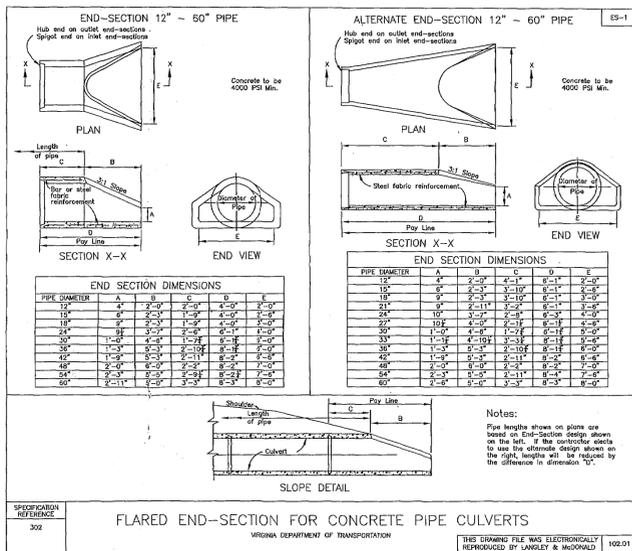
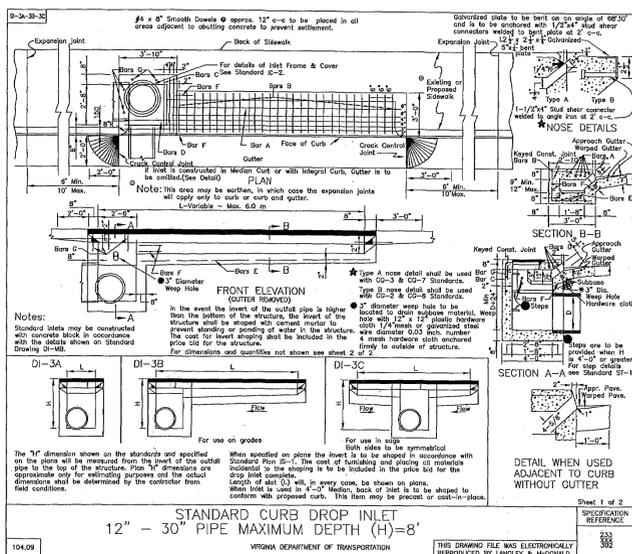
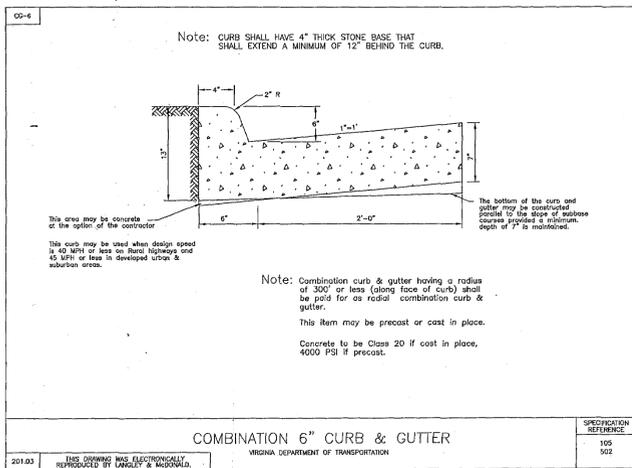
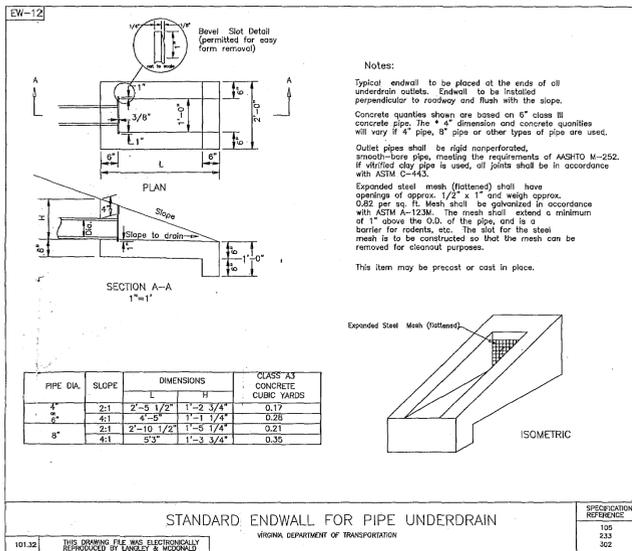
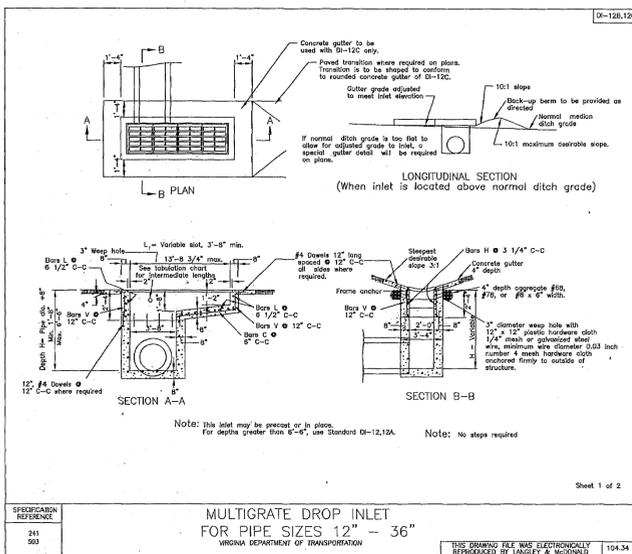
- ALL MATERIALS AND CONSTRUCTION WITHIN THE PUBLIC RIGHT OF WAY SHALL BE IN ACCORDANCE WITH CURRENT VIRGINIA DEPARTMENT OF TRANSPORTATION'S SPECIFICATIONS AND STANDARDS.
- PERMITS MUST BE OBTAINED FROM THE VIRGINIA DEPARTMENT OF TRANSPORTATION BEFORE CONSTRUCTION IS STARTED WITHIN THE EXISTING RIGHT OF WAY.
- PRIOR TO ANY CONSTRUCTION, THE CONTRACTOR SHALL CONSULT THE ENGINEER AND VERIFY THE APPROVAL OF THE PLANS BY THE VARIOUS AGENCIES.
- THE CONTRACTOR SHALL VERIFY THE ELEVATIONS OF ALL POINTS OF CONNECTION OR PROPOSED WORK TO EXISTING CURBS, SANITARY LINES, WATER LINES, ETC., PRIOR TO CONSTRUCTION.
- WHEN SOILS OCCUR THAT ARE UNSUITABLE FOR FOUNDATIONS, SUBGRADES, OR OTHER ROADWAY PURPOSES, THE CONTRACTOR SHALL BE REQUIRED TO EXCAVATE SUCH MATERIAL BELOW THE GRADE SHOWN ON THE PLANS. THE AREAS SO EXCAVATED SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED IN ACCORDANCE WITH VDOT SPECIFICATIONS. THE CONTRACTOR SHALL IMMEDIATELY INFORM THE ENGINEER UPON DISCOVERY OF THE UNSUITABLE MATERIAL. CONCURRENCE OF THE DEVELOPER SHALL BE OBTAINED BEFORE ADDITIONAL ON-SITE WORK IS UNDERTAKEN.
- ALL STORM SEWER PIPE SHALL BE REINFORCED TONGUE AND GROOVE CONCRETE PIPE IN ACCORDANCE WITH ASTM-C-76 OR ALTERNATIVE PIPE THAT HAS BEEN APPROVED ON THE PLANS. PIPE WITHIN THE RIGHT OF WAY SHALL BE A MINIMUM CL-111 OR GREATER IN ACCORDANCE WITH VDOT STANDARDS 107.05 AND SPECIFICATIONS 232 AND 302.
- TEMPORARY DRAINAGE DURING CONSTRUCTION IS TO BE PROVIDED BY THE CONTRACTOR TO RELIEVE AREAS THAT MAY CAUSE DAMAGE TO ROADWAYS OR ADJACENT PROPERTY.
- ALL CONCRETE SHALL BE CLASS A3-AE (AIR ENTRAINED 3,000 PSI).
- CURB AND GUTTER SHALL HAVE 4" OF AGGREGATE BASE 21B UNDER THE CURB AND GUTTER AND AGGREGATE SHALL EXTEND 1' BEYOND THE BACK OF THE CURB.
- ALL CURB AND GUTTER SHALL HAVE A STANDARD GUTTER ENTRANCE IN ACCORDANCE WITH VDOT STANDARDS.
- ALL ENTRANCES ARE TO BE BUILT IN ACCORDANCE WITH VDOT STANDARDS.
- THE DEVELOPER IS RESPONSIBLE FOR FURNISHING AND INSTALLING STOP SIGNS AT STREET INTERSECTIONS.
- DESIGN OR SPECIFIED MATERIALS CHANGES FROM THE APPROVED PLANS NEED TO BE RE-SUBMITTED TO VDOT. A LETTER NEEDS TO ACCOMPANY THE REVISED PLANS AND/OR DRAINAGE CALCULATIONS WHICH SHALL BE SUBMITTED TO VDOT FOR REVIEW AND APPROVAL BY THE RESIDENT ENGINEER.
- THE CONTRACTOR/SUB-CONTRACTOR SHALL HAVE A CURRENT COPY OF VDOT'S "ROAD AND BRIDGE SPECIFICATIONS" AND "ROAD AND BRIDGE STANDARDS" ON THE PROJECT.
- VDOT IS TO RECEIVE WRITTEN NOTIFICATION 48 HOURS PRIOR TO THE START OF ANY WORK.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES, WHETHER OR NOT SHOWN ON THE PLANS, AND SHALL REPAIR AT HIS OWN EXPENSE ALL UTILITIES DAMAGED BY CONSTRUCTION. MISS UTILITY MUST BE CONTACTED AT 1-800-552-7001 72 HOURS PRIOR TO THE BEGINNING OF CONSTRUCTION.
- ALL UTILITY PEDESTALS, CABINETS, FIRE HYDRANTS, AND STREET LIGHTS SHALL BE LOCATED A MINIMUM OF 9.5' FROM THE EDGE OF PAVEMENT ADJACENT TO THE RIGHT OF WAY LINE ON CURB AND GUTTER STREETS AND/OR LOCATED BEHIND THE DITCH LINE ON OPEN DITCH STREETS. PEDESTALS AND CABINETS SHOULD BE LOCATED AT THE PROPERTY LINES BETWEEN LOTS, WHERE REQUIRED, FIRE HYDRANT CROSSINGS SHALL HAVE A MINIMUM OF 15' OF ROP OR LARGER, AS WARRANTED IN OPEN ROADSIDE DITCHES AND HAVE 8' LENGTH.
- ALL STORM SEWER PIPES, DROP INLETS, AND CURB INLETS SHALL BE CLEANED OF DEBRIS AND ERODED MATERIAL DURING LAST STAGES OF CONSTRUCTION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING, WITH MATCHING MATERIALS, ANY PAVEMENT, DRIVEWAYS, WALKS, CURBS, ETC., THAT MUST BE CUT OR THAT ARE DAMAGED DURING CONSTRUCTION.
- ANY ERRORS, CONFLICTS, OR DISCREPANCIES IN THIS PLAN SHALL BE REPORTED TO THE ENGINEER FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK.
- COMPACTION REPORTS, WITH PROCTOR, ARE REQUIRED FOR SUBGRADE, SUBBASE, BASE, SURFACE COURSE, CULVERTS, DRAINAGE STRUCTURES, AND UTILITIES WITHIN THE RIGHT OF WAY BY A CERTIFIED MATERIALS TEST LAB IN ACCORDANCE WITH VDOT SPECIFICATIONS AND STANDARDS.
- INSTALLATION OF PIPE CULVERTS, STORM SEWERS, AND DRAINAGE STRUCTURES SHALL HAVE BEDDING MATERIAL IN ACCORDANCE WITH VDOT SPECIFICATIONS AND STANDARDS. BACKFILL SHALL BE SUITABLE MATERIAL FREE OF DEBRIS, TREE ROOTS, AND EXCESS MOISTURE, AND COMPACTED.
- ALL ROADSIDE DITCHES SHOWN AS PAVED ON PLANS ARE TO BE PAVED IN ACCORDANCE WITH THE STANDARD TYPICAL SECTION AS SHOWN ON THE PLANS, UNLESS OTHERWISE DIRECTED BY THE RESIDENT ENGINEER, IN WRITING. ANY ADDITIONAL PAVING OF THE DITCHES, OTHER THAN THOSE SHOWN ON THE ROAD PLANS WILL BE DETERMINED PRIOR TO ACCEPTANCE OF THE ROADS INTO THE VDOT SECONDARY ROAD SYSTEM.
- VDOT AND COUNTY APPROVAL OF SUBDIVISION ROAD PLANS DOES NOT PRECLUDE THE RIGHT TO ADD ADDITIONAL FACILITIES.
- VDOT APPROVAL OF THESE PLANS WILL EXPIRE THREE YEARS FROM THE DATE OF APPROVAL.
- CLEARING AND GRUBBING SHALL BE COMPLETE WITHIN THE RIGHT OF WAYS, AND INDICATED ON THE LAYOUT PLAN.
- THE SUBGRADE MUST BE APPROVED BY VDOT PRIOR TO PLACEMENT OF BASE.
- BASE MUST BE APPROVED BY VDOT FOR DEPTH, TEMPLATE, AND COMPACTION BEFORE SURFACE IS APPLIED.
- ALL UTILITIES ARE TO BE IN PLACE PRIOR TO LAYING BASE MATERIAL.
- AN ACTUAL COPY OF THE CBR REPORT IS TO BE SUBMITTED TO VDOT PRIOR TO APPROVAL OF THE PAVEMENT TYPICAL DESIGN. IF THE CBR VALUES ARE LESS THAN 10, THE DEVELOPER WILL BE REQUIRED TO SUBMIT FOR OUR APPROVAL HIS PROPOSED METHOD OF CONSTRUCTION.
- PAVED DITCHES MAY BE REQUIRED WHERE FIELD CONDITIONS WARRANT. GENERALLY, ALL DITCHES WITH SLOPES EXCEEDING 3% OR 1% OR LESS SHALL BE PAVED UNLESS OTHERWISE APPROVED BY THE ENGINEER, OWNER, VDOT, AND THE LOCAL GOVERNING BODY.
- ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE THE RESPONSIBILITY OF THE ROAD CONTRACTOR.
- ALL VEGETATION AND OVERBURDEN TO BE REMOVED FROM SHOULDER TO SHOULDER PRIOR TO THE CONDITION OF SUBGRADE.
- CERTIFICATION AND SOURCE OF MATERIALS ARE TO BE SUBMITTED TO VDOT OF ALL MATERIALS AND BE IN ACCORDANCE WITH THE "ROAD AND BRIDGE SPECIFICATIONS" AND "ROAD AND BRIDGE STANDARDS."
- DRY GUTTER IS NOT ALLOWED IN VDOT RIGHT OF WAY.

GENERAL NOTES

- ALL RIGHT OF WAY WORK TO BE IN ACCORDANCE WITH THE VIRGINIA DEPARTMENT OF TRANSPORTATION, "ROAD AND BRIDGE SPECIFICATIONS", DATED 1994, AND THE VIRGINIA DEPARTMENT OF TRANSPORTATION, "ROAD AND BRIDGE STANDARDS", 1993 UNLESS OTHERWISE NOTED.
- VERTICAL CONTROL IS 0.00 NATIONAL OCEAN SURVEY M.S.L.
- HORIZONTAL CONTROL BASED UPON VIRGINIA STATE PLANE COORDINATE GRID SYSTEM SOUTH ZONE.
- PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE CONTRACTOR IS DIRECTED TO NOTIFY ALL APPLICABLE OWNERS OF UTILITIES OF THE LIMITS OF IMPENDING CONSTRUCTION IN ORDER THAT THE UTILITY COMPANIES MAY SAFEGUARD THEIR FACILITIES. CONTACT "MISS UTILITY" @ 1-800-552-7001 48 HOURS PRIOR TO BEGINNING CONSTRUCTION.
- ALL VIRGINIA POWER AND BELL ATLANTIC OF VIRGINIA FACILITIES REQUIRING RELOCATION ARE TO BE DONE SO BY AFOREMENTIONED UTILITIES AT CONTRACTOR'S EXPENSE.
- THE CONTRACTOR SHALL STRIP TOPSOIL MATERIAL UNDER PARKING AND BUILDING LOCATIONS, STRIPPED TOPSOIL TO BE STOCKPILED ON SITE AT LOCATIONS DESIGNATED BY OWNER. STRIPPING SHALL NOT BE REMOVED FROM SITE WHEN SOIL IS ABNORMALLY WET. REMOVE ALL REFUSE AND OTHER EXTRANEIOUS MATERIAL FROM TOPSOIL WHEN STOCKPILING. STRAW BALE BARRIERS OR SILT FENCE SHALL BE PLACED AT THE TOE OF THE STOCKPILE AFTER STRIPPING OF TOPSOIL IS COMPLETE.
- ALL EROSION CONTROL MEASURES (SILT FENCE, CONSTRUCTION ENTRANCE, ETC.) SHALL BE INSTALLED PRIOR TO STRIPPING OF SITE. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE 1992 VIRGINIA EROSION AND SEDIMENTATION CONTROL HANDBOOK, SYMBOLS USED ON THIS PLAN CONFORM TO THE HANDBOOK SYMBOLS.
- ALL STORM WATER MANAGEMENT FACILITIES INCLUDING EROSION CONTROL STONE ARE TO BE INSTALLED AND MADE OPERATIONAL WITHIN 30 DAYS FOLLOWING THE START OF CLEARING OPERATIONS, INSTALLATION OF BMP'S AND APPROVED TEMPORARY SEDIMENT BASINS. THE INSTALLATION OF DRAINAGE FACILITIES SHALL TAKE PRECEDENCE OVER ALL OTHER UNDERGROUND UTILITIES.
- THE CONTRACTOR SHALL COMPLETE DRAINAGE FACILITIES WITHIN 30 DAYS FOLLOWING COMPLETION OF ROUGH GRADING AT ANY POINT WITHIN THE PROJECT.
- ALL AREAS DESIGNATED FOR PAVING UNDERGROUND UTILITIES AND STRUCTURAL USE SHALL BE STABILIZED AS SOON AS PRACTICAL, NOT TO EXCEED 30 DAYS FOLLOWING INSTALLATION. NO MORE THAN 100' OF SANITARY SEWER OR STORM SEWER ARE TO BE OPEN AT ANY ONE TIME. BASE COURSE MATERIAL SHALL BE PLACED IN ALL PARKING AND STREET AREAS WITHIN 30 DAYS OF FINAL GRADING.
- ALL CLEANOUT AND METER RIMS TO BE FLUSH WITH GROUND, RIM ELEVATION MAY VARY SLIGHTLY TO SUIT EXISTING UNDISTURBED GROUND.
- STORMWATER SURFACE RUNOFF SHALL NOT BE ALLOWED TO ENTER SANITARY SEWER SYSTEM AT ANY TIME.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING WITH MATCHING MATERIALS ANY PAVEMENT, DRIVEWAYS, WALKS, CURBS, ETC. THAT MUST BE CUT OR THAT ARE DAMAGED DURING CONSTRUCTION.
- ALL CONCRETE TO BE CLASS "A-3" AIR ENTRAINED (3000 PSI).
- ALL DIMENSIONS ARE TO BACK OF CURB, FACE OF BUILDING, EDGE OF PAVEMENT UNLESS OTHERWISE INDICATED.
- SEE ARCHITECTURAL PLANS FOR DETAILS OF UTILITY CONNECTIONS TO BUILDING AND DIMENSIONS OF BUILDING.
- ALL SANITARY SEWER CONSTRUCTION, MATERIALS AND STRUCTURES TO BE IN ACCORDANCE WITH SPECIFICATIONS, STANDARDS, AND DETAILS OF JAMES CITY COUNTY, SERVICE AUTHORITY.
- INSTALL WATER METER BOX AND METER, IN STRICT COMPLIANCE WITH JAMES CITY SERVICE AUTHORITY SPECIFICATIONS DETAILS AND DRAWINGS.



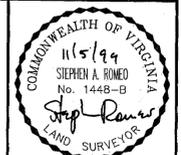
STD. DISABLED SIGN



- SUBGRADES SHALL BE PROOFROLLED IN THE PRESENCE OF A SOILS ENGINEER. SOFT AND/OR UNSUITABLE MATERIAL SHALL BE REMOVED AND REPLACED WITH APPROVED MATERIAL. SUBGRADE SHALL BE SHAPED AND COMPACTED TO 95% OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D698.
- SIDEWALK TO BE CONSTRUCTED IN 4' LENGTHS WITH 1/2" PREMOULDED JOINTS AT INTERVALS NOT TO EXCEED 40 FEET.

COMBINATION CURB AND SIDEWALK DETAIL

SCALE: NONE



Langley and McDonald, Inc.
Engineers • Surveyors • Planners
Landscape Architects • Environmental Consultants
WILLIAMSBURG, VIRGINIA BEACH

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Tel: (757) 233-2936
Fax: (757) 233-0049
Email: lang@langmc.com

5644 Greenhill Road - Suite 200
Virginia Beach, VA 23464
Tel: (757) 437-7833
Fax: (757) 487-7833
Email: lang@langmc.com

NO.	DATE	BY	REASON
1	11/05/99	PRJ/ACC AND VDOT REVIEW COMMENTS	REVISED
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DETAILS AND NOTES
OF
KINGDOM HALL
JEHOVAH'S WITNESSES
VIRGINIA
JAMES CITY COUNTY

Designed: MEH Date: 08/30/99
Checked: SAR Scale: N.T.S.
Drawn: MCH/CMJ CADD File name: DETAIL2.DWG
Project Number: 1870040-302.04 Dwg. File No.: 10734 W
Drawing Number: C-5

PLANTING NOTES:

- THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, ETC. NECESSARY TO COMPLETE ALL PLANTING AS SHOWN ON THIS DRAWING, AS SPECIFIED HEREIN OR IN SUPPLEMENTAL SPECIFICATIONS, AND/OR AS REQUIRED BY JOB CONDITIONS. THE WORK IN GENERAL INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:
- (1) SOIL TESTING
 - (2) TOPSOIL
 - (3) PLANTING AREA PREPARATION
 - (4) PLANTING PIT EXCAVATION AND SOIL AMENDMENT
 - (5) PLANTING MATERIALS AND MULCH
 - (6) FERTILIZING
 - (7) STAKING (WHEN REQUIRED)
 - (8) CHEMICAL APPLICATION (WHEN REQUIRED)
 - (9) MAINTENANCE AND GUARANTEE
 - (10) ALL OTHER ITEMS NECESSARY TO MAKE WORK COMPLETE

(1.1) SOIL TESTING
(1.1) THE CONTRACTOR IS RESPONSIBLE FOR SOILS TESTING AND ANALYSIS FOR SUITABILITY FOR PLANTING. THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, ETC. NECESSARY TO COMPLETE ALL PLANTING AS SHOWN ON THIS DRAWING, AS SPECIFIED HEREIN OR IN SUPPLEMENTAL SPECIFICATIONS, AND/OR AS REQUIRED BY JOB CONDITIONS. THE WORK IN GENERAL INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:

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 - (1.2) SOIL ANALYSIS SHALL BE BY CERTIFIED LABORATORY AND SHALL INCLUDE SOIL TEXTURE, COMPOSITION, ORGANIC MATTER CONTENT, PH, SALINITY, AND FERTILITY (AVAILABLE NUTRIENTS). THE CONTRACTOR SHALL SUBMIT A COPY OF THE REPORT TO THE OWNER.
- (2) TOPSOIL
 - (2.1) NECESSARY QUANTITIES OF TOPSOIL SHALL BE SUPPLIED BY THE CONTRACTOR AND APPROVED BY THE OWNER OR HIS REPRESENTATIVE. THE CONTRACTOR SHALL APPLY TOPSOIL ONLY AFTER SECURING SOIL TEST, AS SPECIFIED ABOVE, APPLYING RECOMMENDED TREATMENT THEREOF, AND SUBMITTING FOR APPROVAL.
 - (2.2) TOPSOIL REQUIREMENTS MAY BE MET IN ANY OF THE FOLLOWING WAYS:
 - ON-SITE TOPSOIL MEETING SPECIFICATIONS MAY BE STRIPPED AND STOCKPILED ON SITE.
 - ON-SITE TOPSOIL NOT MEETING SPECIFICATIONS MAY BE STRIPPED, STOCKPILED AND AMENDED ON SITE, TO MEET SPECIFICATIONS.
 - OFF-SITE TOPSOIL MEETING SPECIFICATIONS AND FROM AN APPROVED SOURCE MAY BE PROVIDED.
 - (2.3) TOPSOIL STOCKPILED FOR LATER USE SHALL BE STORED WITHIN THE RIGHT-OF-WAY, AND AT LOCATIONS APPROVED BY THE OWNER, UNLESS THE WORKING AREA IS SUCH THAT THE PRESENCE OF THE MATERIAL WOULD INTERFERE WITH OR OBSTRUCT PROVISION OF THE WORK. STOCKPILE AREAS OUTSIDE OF THE RIGHT-OF-WAY SHALL BE LOCATED BY THE CONTRACTOR AT HIS EXPENSE.
 - (2.4) STRIPPING SHALL BE COMPLETED WITHIN 15 DAYS FOLLOWING THE EXCAVATION IS TO BE ACTIVELY PROSECUTED WITHIN 15 DAYS FOLLOWING THE STRIPPING OPERATION. EXCAVATION AND EMBANKMENT CONSTRUCTION SHALL BE COMPLETED WITHIN 30 DAYS OF THE DATE OF THE STRIPPING OPERATION. THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, ETC. NECESSARY TO COMPLETE ALL PLANTING AS SHOWN ON THIS DRAWING, AS SPECIFIED HEREIN OR IN SUPPLEMENTAL SPECIFICATIONS, AND/OR AS REQUIRED BY JOB CONDITIONS. THE WORK IN GENERAL INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:

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 - (2.3) TOPSOIL STOCKPILED FOR LATER USE SHALL BE STORED WITHIN THE RIGHT-OF-WAY, AND AT LOCATIONS APPROVED BY THE OWNER, UNLESS THE WORKING AREA IS SUCH THAT THE PRESENCE OF THE MATERIAL WOULD INTERFERE WITH OR OBSTRUCT PROVISION OF THE WORK. STOCKPILE AREAS OUTSIDE OF THE RIGHT-OF-WAY SHALL BE LOCATED BY THE CONTRACTOR AT HIS EXPENSE.
 - (2.4) STRIPPING SHALL BE COMPLETED WITHIN 15 DAYS FOLLOWING THE EXCAVATION IS TO BE ACTIVELY PROSECUTED WITHIN 15 DAYS FOLLOWING THE STRIPPING OPERATION. EXCAVATION AND EMBANKMENT CONSTRUCTION SHALL BE COMPLETED WITHIN 30 DAYS OF THE DATE OF THE STRIPPING OPERATION. THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, ETC. NECESSARY TO COMPLETE ALL PLANTING AS SHOWN ON THIS DRAWING, AS SPECIFIED HEREIN OR IN SUPPLEMENTAL SPECIFICATIONS, AND/OR AS REQUIRED BY JOB CONDITIONS. THE WORK IN GENERAL INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:

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 - (3.1) PLANTING AREAS. BECAUSE OF SOIL COMPOSITION DURING CONSTRUCTION, ALL PLANTING AREAS SHALL BE CROSSLINED BY ROTO-TILLING AS SPECIFIED BELOW. AREAS UNDER THE DRIP LINE OF TREES OR SHRUBS TO REMAIN IN PLACE SHALL NOT BE ROTO-TILLED. A PLANTING AREA IS ANY AREA IN WHICH NEW PLANTING OCCURS.
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 - (3.3) IN CONTINUOUS SHRUB AND GROUND COVER BEDS, THE ROTO-TILLED PERIMETER SHOULD EXTEND TO A DISTANCE OF 3 TIMES THE DIAMETER OF A SINGLE ROOTBALL OF THE PERMANENT DEPTH OF THE ROOT BALL.

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- (3.2) ALL TAGS, STRINGS OR ANY OTHER MATERIAL ATTACHED TO THE PLANTS SHALL BE REMOVED AT THE TIME OF THE PLANTING. LABEL AT LEAST ONE TREE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL PLANTS FROM SHRUB AND GROUND COVER OF EACH VARIETY WITH A SECURELY ATTACHED WATERPROOF TAG BEARING LEGIBLE DESCRIPTION OF BOTANICAL NAME AND SIZE, AS SPECIFIED IN THE PLANT LIST OF REQUIRED PLANTS. LABELS SHALL BE SECURELY ATTACHED TO PLANTS AND SHALL BE LEGIBLE FOR 60 DAYS AFTER DELIVERY TO THE PLANTING SITE. WIRE IDENTIFICATION TAGS SHALL NOT BE USED.
- (3.3) SUBSTITUTIONS WILL BE PERMITTED ONLY UPON SUBMISSION OF PROOF THAT AN ALTERNATE IS NOT OBTAINABLE. ALL SUBSTITUTIONS MUST BE AUTHORIZED BY THE OWNER OR THE OWNER'S REPRESENTATIVE IN WRITING PROVIDED FOR USE OF THE NEAREST EQUIVALENT OBTAINABLE SIZE OR VARIETY OF PLANT HAVING THE SAME ESSENTIAL CHARACTERISTICS AS THE ORIGINAL VARIETY WITH AN EQUITABLE ADJUSTMENT OF CONTRACT PRICE.
- (3.4) BALLED AND BURLAPPED PLANTS (B&B) SHALL BE DUG WITH FIRMS, NATURAL BALLS OF EARTH OF SUFFICIENT DIAMETER AND DEPTH TO ENCOMPASS THE FIRMS AND FEEDING ROOT SYSTEMS NECESSARY FOR FULL RECOVERY OF PLANTS. BALLS SHALL BE FIRMLY WRAPPED WITH BURLAP OR SIMILAR MATERIAL AND BOUND WITH TWINE OR CORD. BURLAP SHALL NOT BE PULLED OUT FROM UNDER BALLS DURING DELIVERY OPERATIONS. B&B PLANTS WHICH CANNOT BE PLANTED IMMEDIATELY ON DELIVERY SHALL BE COVERED WITH MOIST SOIL, MULCH, OR OTHER MATERIAL TO PROVIDE PROTECTION FROM DRYING WINDS AND SUN.
- (3.5) PLANTS NOTED "CONTAINER" ON THE PLANT LIST MUST BE CONTAINER GROWN WITH WELL ESTABLISHED ROOT SYSTEMS. LOOSE CONTAINERED PLANT MATERIAL WILL NOT BE ACCEPTED. ALL PLANTS INBARED AND PLANTS WITH ROOT BALLS BROKEN DURING TRANSPORT OR PLANTING OPERATIONS WILL BE REJECTED. BARE-ROOTED PLANTS (BR) SHALL BE PLANTED OR RECEIVED IMMEDIATELY UPON DELIVERY. ALL PLANTS SHALL BE WATERED AS NECESSARY UNTIL PLANTED.
- (3.6) NEW PLANTINGS SHALL BE LOCATED WHERE SHOWN ON THE PLAN EXCEPT WHERE OBSTRUCTIONS BELOW GROUND ARE ENCOUNTERED OR WHERE CHANGES HAVE BEEN MADE IN THE PROPOSED CONSTRUCTION. NECESSARY ADJUSTMENTS SHALL BE MADE ONLY AFTER APPROVAL BY THE OWNER OR THE OWNER'S REPRESENTATIVE. PLANTS SHALL BE EXPOSED TO HARD FREEZING PITS DUG AND SOIL PREPARED PRIOR TO MOVING PLANTS TO THEIR RESPECTIVE LOCATIONS TO ENSURE THAT THEY WILL NOT BE UNNECESSARILY EXPOSED TO DRYING OR PHYSICAL DAMAGE.
- (3.7) A LIST OF PLANTS, INCLUDING SPECIES, QUANTITIES AND OTHER REQUIREMENTS, IS SHOWN ON THE DRAWINGS. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE QUANTITIES AS SHOWN ON THE DRAWINGS. IF DISCREPANCIES OCCUR IN THE QUANTITIES SHOWN, THE PLANTING PLANS SHALL GOVERN.
- (3.8) THE PLANTING CONTRACTOR WILL BE NOTIFIED BY THE GENERAL CONTRACTOR WHEN OTHER DIVISIONS OF THE WORK HAVE PROCEEDED SUFFICIENTLY TO CONDUCT WORK ON THE PLANTING OPERATION. THEREAFTER, PLANTING OPERATIONS SHALL BE CONDUCTED UNDER FAVORABLE WEATHER CONDITIONS DURING THE NEXT SEASON OR SEASONS WHICH ARE NORMAL FOR SUCH WORK. REMOVAL OF ROCK OR OTHER UNDERGROUND OBSTRUCTIONS, RELOCATIONS TO AVOID OBSTRUCTIONS, AND PROVISION OF DRAINAGE OPERATIONS SHALL BE DONE ONLY AS APPROVED BY THE OWNER OR THE OWNER'S REPRESENTATIVE.
- (3.9) ALL PLANTS SHALL BE PLANTED UPRIGHT AND FACED TO GIVE THE BEST APPEARANCE OR RELATIONSHIP TO ADJACENT STRUCTURES. ROOTS SHALL BE SPREAD IN THEIR NORMAL POSITIONS. ALL BROKEN OR FRAILED ROOTS SHALL BE CUT OFF CLEANLY. PLANTS WITH CIRCULING ROOTS SHALL NOT BE ACCEPTED. BURLAP TWINE AND OTHER FASTENING MATERIAL SHALL BE CUT AND PUSHED TO THE BOTTOM OF THE PLANT PIT PRIOR TO BACKFILL MATERIAL BEING PLACED. THE PLANT SHALL NOT BE ROOVED BACK AND FOURTH TO ENTIRELY REMOVE THE WRAPPING MATERIAL NOR SHALL ANY OTHER PRACTICE BE PERFORMED WHICH COULD CAUSE THE ROOT BALL TO BREAK. WHEN WIRE BASKETS ARE USED ON THE ROOT BALL OF PLANTS THE WIRE SHALL BE REMOVED TO AT LEAST 12" BELOW THE TOP OF THE ROOT BALL.
- (3.10) AT THE TIME OF PLANTING, AND AS MANY TIMES LATER AS SEASONAL CONDITIONS REQUIRE, EACH PLANT AND THE SOIL AROUND IT SHALL BE THOROUGHLY WATERED. CARE SHALL BE TAKEN TO PREVENT OVERWATERING AND FLOODING OF PLANTS AND BEDS, DISPLACEMENT OF MULCH MATERIAL AND EROSION OF SOIL. AVOID USE OF HIGH PRESSURE HOSES. THE CONTRACTOR SHALL MAKE, AT HIS EXPENSE, WATERING ARRANGEMENTS TO BE NECESSARY TO ENSURE AN ADEQUATE SUPPLY OF WATER TO MEET THE NEEDS OF THIS CONTRACT DURING INSTALLATION. THE CONTRACTOR SHALL ALSO FURNISH ALL NECESSARY HOSE, EQUIPMENT ATTACHMENTS AND ACCESSORIES FOR THE ADEQUATE WATERING OF PLANTED AREAS AS MAY BE REQUIRED WITH ACCEPTANCE BY THE OWNER OR THE OWNER'S REPRESENTATIVE.
- (3.11) MULCH SHALL BE CLEAN, GROUNDED OR SHREDDED BARK OR HARDWOOD MULCH. IN PLANTING AREAS WHERE SLOPES EXCEED 3:1 AND AT DRAINAGE DISPERSION POINTS OR ALONG NATURAL WATERWAYS WHERE CONCENTRATIONS OF WATER, CARBONATES, GROUND SOIL THAT NOT LESS THAN 98% PASSES A 20-MESH SIEVE, AND NOT LESS THAN 90% PASSES A 100-MESH SIEVE, COMMERCIAL GRADE IN DRY POWDER FORM.
- (3.12) SUPERPHOSPHATE: SOLUBLE MIXTURE OF TREATED MINERALS; 20% AVAILABLE PHOSPHORUS AND 10% AVAILABLE POTASH.
- (3.13) FERTILIZER: GRANULAR OR PELLET FORM, HORTICULTURAL GRADE COMPLETE FORMULAS, DRY AND FREE-FLOWING, UNIFORM IN COMPOSITION, AND SUITABLE FOR APPLICATION BY APPROVED EQUIPMENT. THE FERTILIZER SHALL CONFORM TO THE APPLICABLE STATE AND FEDERAL STANDARDS.
- (3.14) SEED: STATE-CERTIFIED SEED OF THE LATEST SEASON'S CROP COMMON TO THE SITE LOCATION. PROVIDE FRESH, CLEAN, NEW-CROP SEED COMPLYING WITH ESTABLISHED TOLERANCES FOR GERMINATION AND PURITY IN ACCORDANCE WITH THE U.S. DEPARTMENT OF AGRICULTURE'S RULES AND REGULATIONS UNDER THE LABELING OF SEEDS. SEED ACT, SEED SHALL BE MIXED BY THE DEALER AND SHALL BE DELIVERED TO THE SITE IN SEALS WHICH SHALL BE UNOPENED UNTIL THE SEED IS TO BE USED. SEEDS THAT HAVE BECOME WET, MOULDY, OR OTHERWISE DAMAGED WILL NOT BE ACCEPTABLE. SEEDING:
 - (3.14.1) ATHLETIC FIELD MIXTURE
RATE: 6 LBS/1000 SF
SOWING DATES: 4/1-5/31 OR 8/16-12/30
 - (3.14.2) MIXTURE CONTAINS:

SP. #	DESCRIPTION	% PURITY	GERMINATION RATE
1	FESTUCA ARUNDINACEA "REBEL 30"	90-98%	3-7 DAYS
2	LULIAM PERENNE "PALMER II"	90-98%	10-21 DAYS
3	POA PRATENSIS - KENTUCKY BLUEGRASS	90-98%	10-21 DAYS
 - (3.14.3) STRAW MULCH: STRAW SHALL BE STALKS FROM OATS, WHEAT, RYE, BARLEY OR RICE THAT ARE FREE FROM NOXIOUS WEEDS, CHEMICALS, MOLD OR OTHER OBJECTIONABLE MATERIALS WITH A MULCH TOLERANCE UNDER THE MULTIPLE PLANT PERMITS. SEED ACT, SEED SHALL BE MIXED BY THE DEALER AND SHALL BE DELIVERED TO THE SITE IN SEALS WHICH SHALL BE UNOPENED UNTIL THE SEED IS TO BE USED. SEEDS THAT HAVE BECOME WET, MOULDY, OR OTHERWISE DAMAGED WILL NOT BE ACCEPTABLE. SEEDING:
 - (3.14.3.1) MULCH SUPPLIED FOR USE WITH HYDRAULIC APPLICATION OF GRASS SEED. FERTILIZER SHALL CONSIST OF SILVA-FIBER MULCH BY WETBEVER GARDEN PRODUCTS, INC. (90%+ SILVA-FIBER MULCH). THE FERTILIZER SHALL NOT BE UTILIZED HOWEVER FROM 6/1 TO 9/15, DURING THIS TIME, STRAW MULCH SHALL BE UTILIZED.
 - (3.14.3.2) PROCESSING OF WOOD CELLULOSE FIBER SHALL BE IN SUCH A MANNER THAT IT WILL NOT CONTAIN GERMINATION OR GROWTH INHIBITING ELEMENTS.
 - (3.14.3.3) WOOD CELLULOSE FIBER SHALL BE DYED AN APPROPRIATE COLOR TO ALLOW VISUAL METERING OF ITS APPLICATION.
 - (3.14.3.4) WOOD CELLULOSE FIBER SHALL HAVE THE PROPERTY OF BECOMING EVENLY DISPERSED AND SUSPENDED WHEN AGITATED IN WATER. WHEN SPRAYED UNIFORMLY ON THE SURFACE OF THE SOIL, THE FIBERS SHALL FORM A BOTTLE-LIKE GROUND COVER WHICH READILY ABSORBS WATER AND ALLOWS INFILTRATION TO THE UNDERGROUND.
 - (3.14.3.5) MIGHT SPECIFICATIONS FROM SUPPLIERS FOR APPLICATIONS SHALL REFER TO AIR-DRY WEIGHT OF THE FIBER, A STANDARD EQUIVALENT TO 10 PERCENT MOISTURE.
 - (3.14.4) THE LANDSCAPE CONTRACTOR SHALL CAREFULLY CORRELATE HIS WORK WITH THAT OF OTHER SITE DEVELOPERS. THE LANDSCAPE CONTRACTOR IS REQUIRED TO INSTALL AND FINISH HIS FINISHED WORK AT HIS EXPENSE.
 - (3.14.5) SEED BED PREPARATION
 - (3.14.5.1) SEEDING SHALL NOT BE DONE WHEN THE GROUND IS FROZEN, SNOW COVERED, SATURATED, OR IN ANY OTHER CONDITION WHICH WOULD MAKE ESTABLISHMENT AND SURVIVAL OF SEEDS UNLIKELY.
 - (3.14.5.2) AT THE TIME OF BEGINNING SEED BED PREPARATION, TOPSOIL SHALL BE IN A LOOSE, FRAGILE CONDITION, FREE FROM STONES IN ANY DIMENSION, STICKS, ROOTS AND OTHER EXTRANEOUS MATERIAL. IF TOPSOIL HAS BECOME CRUSTY, HARDENED OR FROZEN, THE CONTRACTOR SHALL BREAK UP AND REMOVE THE CRUSTY PORTIONS TO THE LOOSE CONDITION DESCRIBED ABOVE.
 - (3.14.5.3) SPRINKLE FERTILIZER AT THE RATE OF 4 LBS./1000 SF 4 TIMES PER YEAR. ADD PH OF 5.5 TO 6.8 BLEND ADDED THOROUGHLY INTO UPPER 4" OF TOPSOIL. REMOVE ANY ROCKS OR OTHER DEBRIS WHICH MAY CAUSE THE FERTILIZER TO BE UNEVENLY DISTRIBUTED AND FRIABLE AND ALL SOIL AMENDMENTS ARE UNIFORMLY DISTRIBUTED.
 - (3.14.5.4) WORK ALL AREAS TO A SMOOTH EVEN SURFACE FREE FROM IRREGULARITIES, ROOTS, OR DEPRESSIONS. PREPARED AREAS SHALL MEET REQUIRED FINISH GRADE ELEVATIONS AND SHALL BE BURNED, CLEANED, REPAIRED AND WASHED AND CRODDED PORTIONS.
 - (3.14.5.5) MOIST PREPARED AREAS IF SOIL IS DRY, WATER THOROUGHLY, THEN ALLOW SURFACE MOISTURE TO EVAPORATE. DO NOT CREATE MOIST SOIL CONDITIONS.
 - (3.14.5.6) SOIL SEED USING A SPREADER OR SEEDING MACHINE AT THE RATE OF 6 LBS./1000 SF. DO NOT SEED WHEN WIND VELOCITY EXCEEDS 9 MPH PER HOUR. DISTRIBUTE SEED EVENLY OVER ENTIRE AREA BY SOWING EQUAL QUANTITY IN 2 DIRECTIONS AT RIGHT ANGLES TO EACH OTHER. OVERSEED EVERY YEAR AT A RATE OF 8 LBS./1000 SF.
 - (3.14.5.7) RAKE SEED LIGHTLY INTO TOP 1/4" OF SOIL. FIRM ENTIRE AREA WITH A ROLLER NOT EXCEEDING 90 LBS. PER FOOT OF ROLLER WIDTH, AND WATER WITH A FINE SPRAY.
 - (3.14.5.8) UNLESS INDICATED OTHERWISE ON THE DRAWINGS, PROTECT NESTED SEEDS BY SPREADING MULCH TO A UNIFORM AND CONTINUOUS DEPTH OF 1-1/2" LOOSE MEASUREMENT (70-90 LBS./1000 SF).
 - (3.14.6) MAINTENANCE DURING ESTABLISHMENT PERIOD:
 - (3.14.6.1) IT IS THE LANDSCAPE CONTRACTOR'S RESPONSIBILITY TO DETERMINE WATER APPLICATION RATES.
 - (3.14.6.2) THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL MAINTENANCE DURING THE ESTABLISHMENT AND UNTIL FINAL ACCEPTANCE. MAINTENANCE SHALL BE IMMEDIATELY AFTER SEEDING AND SHALL INCLUDE WATERING, FERTILIZING, REMOVAL OF WEEDS, AND OTHER NECESSARY OPERATIONS. REQUEST SHALL BE SUBMITTED BY CONTRACTOR AT LEAST TEN DAYS PRIOR TO THE ANTICIPATED DATE FOR INSPECTION. AFTER INSPECTION, THE CONTRACTOR SHALL BE NOTIFIED IN WRITING BY THE OWNER OR THE OWNER'S REPRESENTATIVE OF ACCEPTANCE OF THE WORK. EXCLUSIVE OF POSSIBLE REPLACEMENT OF PLANTS SUBJECT TO GUARANTEE, OR, IF THERE ARE ANY DEFICIENCIES, THE CONTRACTOR WILL BE NOTIFIED OF THE REQUIREMENTS NECESSARY FOR COMPLETION OF THE WORK. PLANTINGS SHALL NOT BE CONSIDERED ACCEPTED UNTIL ALL DEFICIENCIES HAVE BEEN CORRECTED AND APPROVED IN WRITING.

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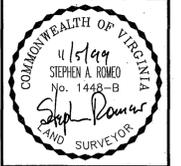
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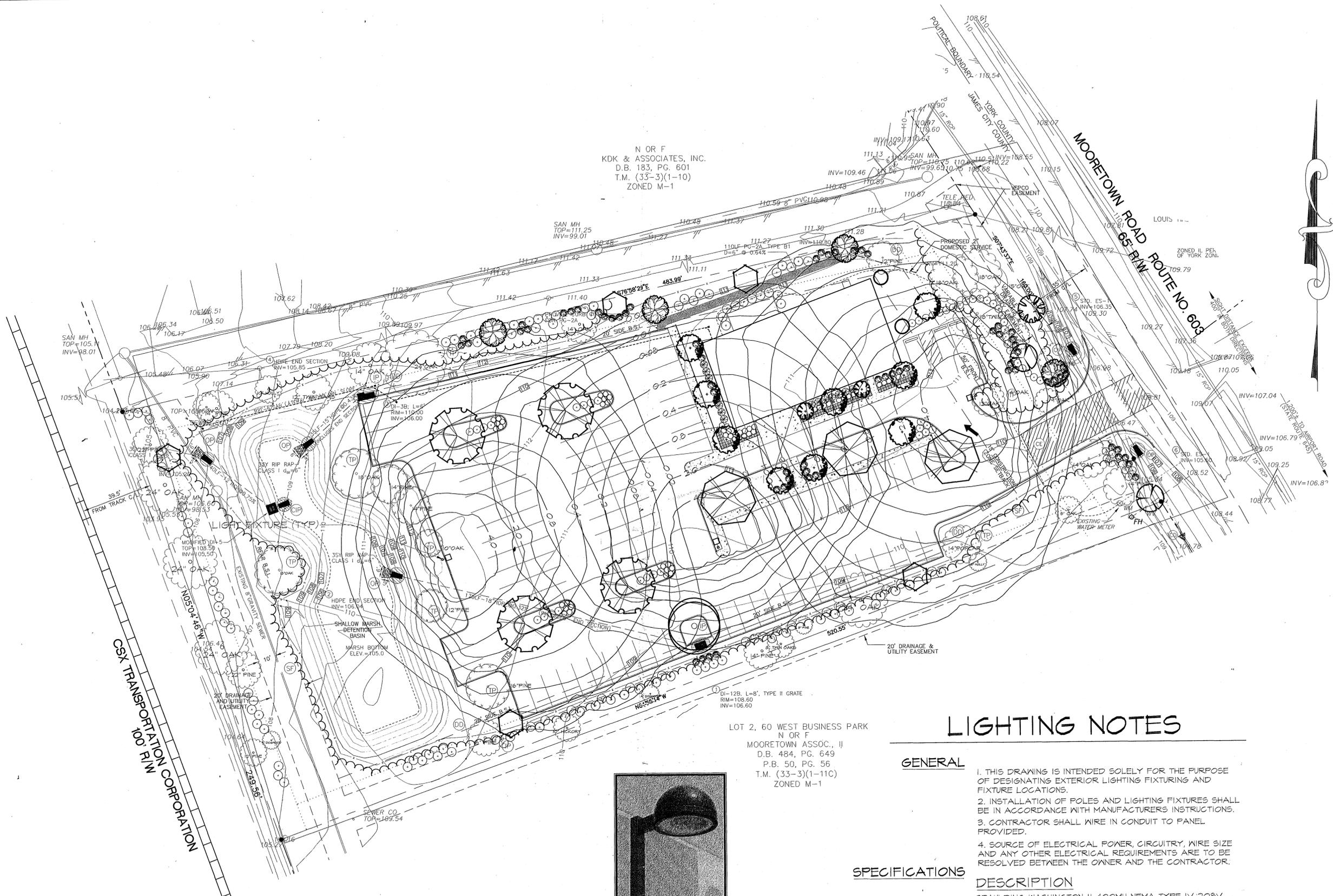
Langley and McDonald, Inc.
 Engineers • Surveyors • Planners
 Landscape Architects • Environmental Consultants
 WILLIAMSBURG
 4028 Westwood Dr., Suite 105
 Williamsburg, VA 23188
 Tel: (757) 252-2975
 Fax: (757) 228-0608
 Email: info@langley.com

By	Date	Comment
TRC	11/05/99	REVISED PER VDOT & JCC COMMENTS

LIGHTING PLAN
KINGDOM HALL
 OF
JEHOVAH'S WITNESSES
 VIRGINIA
 JAMES CITY COUNTY

Designed:	TRC	Date:	8/30/99
Checked:	SAR	Scale:	1"=25'
Drawn:	TRC	CADD File name:	JWC-L1.DWG
Project Number:	1870040-302.04	Dwg. File No.:	10731W
Drawing Number:	F-1		

N OR F
 KDK & ASSOCIATES, INC.
 D.B. 183, PG. 601
 T.M. (33-3)(1-10)
 ZONED M-1



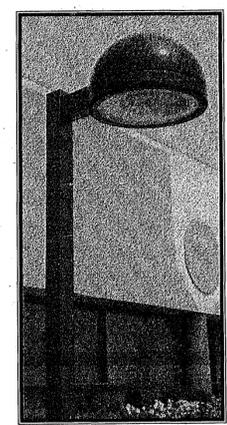
LIGHTING NOTES

GENERAL

1. THIS DRAWING IS INTENDED SOLELY FOR THE PURPOSE OF DESIGNATING EXTERIOR LIGHTING FIXTURING AND FIXTURE LOCATIONS.
2. INSTALLATION OF POLES AND LIGHTING FIXTURES SHALL BE IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
3. CONTRACTOR SHALL WIRE IN CONDUIT TO PANEL PROVIDED.
4. SOURCE OF ELECTRICAL POWER, CIRCUITRY, WIRE SIZE AND ANY OTHER ELECTRICAL REQUIREMENTS ARE TO BE RESOLVED BETWEEN THE OWNER AND THE CONTRACTOR.

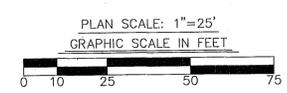
SPECIFICATIONS

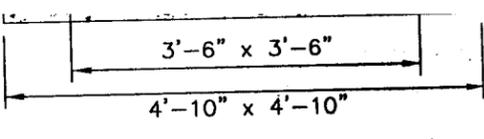
DESCRIPTION
 SPAULDING WASHINGTON II 400MH NEMA TYPE IV 208V ON 30 FT HAPCO SERIES 50 ALUMINUM POLE (BLACK)
CATALOG NUMBER
 WNII-M400-208V-FT-5F-DB-VCS



WASHINGTON II

LOT 2, 60 WEST BUSINESS PARK
 N OR F
 MOORETOWN ASSOC., II
 D.B. 484, PG. 649
 P.B. 50, PG. 56
 T.M. (33-3)(1-11C)
 ZONED M-1



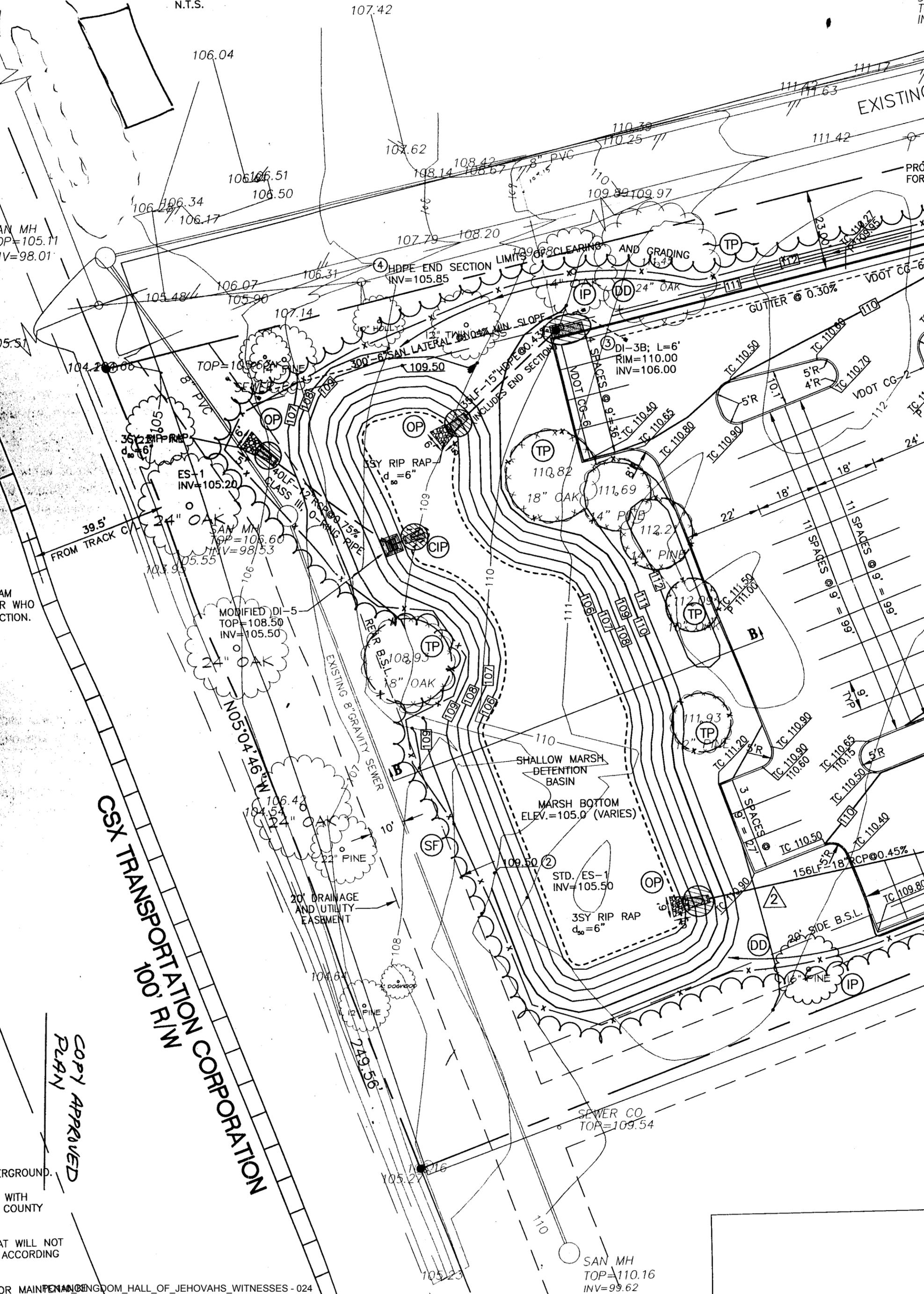


PROVIDE 6" CAP DURING E&S CONDITION.
 DRILL 1 1/2" HOLE AT BOTTOM OF CAP FOR
 EXTENDED DRAWDOWN AFTER E&S CONDITIONS
 ARE SATISFIED & PLUG 3" DEWATERING ORIFICE.

MODIFIED VDOT DI-5

CONTRACTOR TO INSTALL 3" DEWATERING ORIFICE WHILE BMP IS
 FUNCTIONING AS A TEMPORARY SEDIMENT BASIN.
 THE CONTRACTOR SHALL REMOVE ALL TEMPORARY
 SEDIMENT CONTROL MEASURES BEFORE COMPLETION OF PERMANENT BMP.

N.T.S.



SAN MH
 OP=105.11
 IV=98.01

AM
 R WHO
 ICTION.

ERGROUND.
 WITH
 COUNTY

AT WILL NOT
 ACCORDING

OR MAINTENANCE KINGDOM_HALL_OF_JEHOVAHS_WITNESSES - 024
 TS STRUCTURES.

CSX TRANSPORTATION CORPORATION
 100' R/W

COPY APPROVED
 PLAN

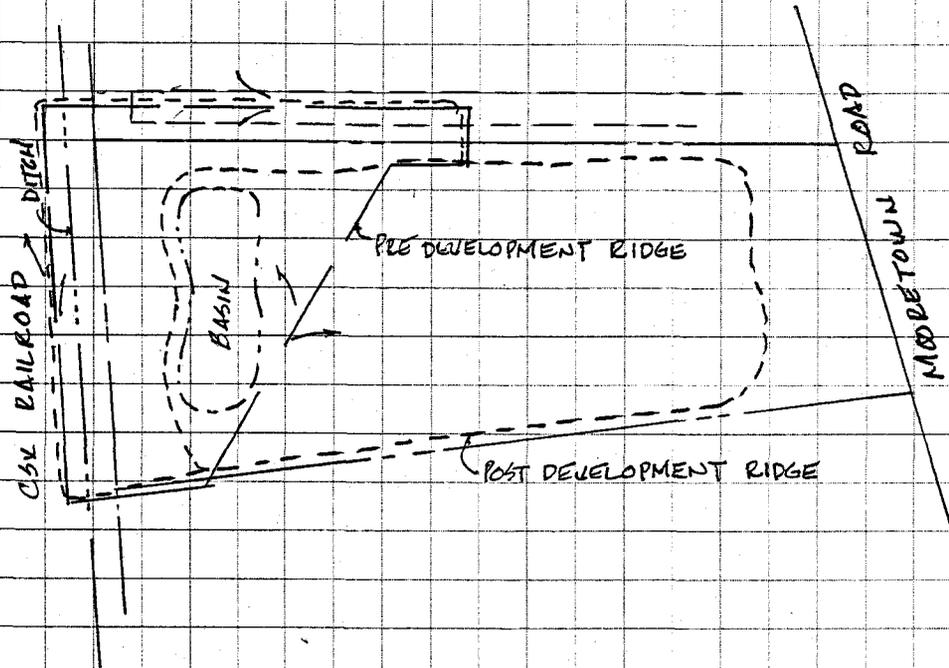
SEWER CO.
 TOP=109.54

SAN MH
 TOP=110.16
 INV=99.62

S/
 TC
 IN

Engineers • Planners • Surveyors • Landscape Architects • Environmental Consultants

DRAINAGE ANALYSIS - NW CORNER OF SITE @ CSX RR DITCH



PRE DEVELOPMENT

DA = 1.02 ACRES
 $C_{avg} = 0.33$ (0.05 ac. pav't @ $C = 0.9$, 0.97 ac. WOODED & OPEN @ $C = 0.30$)
 $T_c = 15$ MIN (100' OVERLAND @ 2% + 270 LF DITCH @ $V = 1.5 \pm$)

$Q_{10} = 1.70 cfs$
 $VOL = 2,043 cf.$

POST DEVELOPMENT TO BASIN

DA = 1.90 ACRES
 $C_{avg} = 0.69$ (PER PREV. CALC'S)
 $T_c = 10$ MIN (PER PREV. CALC'S)

$Q_{10} = 7.73 cfs$
 $VOL = 6189 cf.$

POST DEVELOPMENT OVERLAND (BYPASS)

DA = 0.53 ACRES
 $C_{avg} = 0.36$ (0.05 ac. pav't @ $C = 0.90$, 0.48 ac. WOODED & OPEN @ $C = 0.30$)
 $T_c = 15$ MIN (100' OVERLAND @ 2% + 270 LF DITCH @ $V = 1.5 \pm$)

$Q_{10} = 0.96 cfs$
 $VOL = 1158 cf$

BASIN (OUT): 0.06 cfs; EL. 106.57; VOL = 4030 CF.

COMBINED (BASIN & BYPASS): 1.01 cfs; VOL = 5,187 cf.

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	Manual	0.83	10	10	18,678	50	—	—	—	50yr critical
2	Reservoir	0.10	10	390	18,678	50	1	108.16	17,136	50yr routed
3	Manual	0.50	10	10	9,450	2	—	—	—	2yr critical
4	Manual	0.65	10	10	13,452	10	—	—	—	10yr critical
5	Manual	0.91	10	10	19,926	100	—	—	—	100yr critical
6	Reservoir	0.07 ✓	10	330	9,450	2	3	106.99 ✓	8,516	2yr routed
7	Reservoir	0.08 ✓	10	360	13,452	10	4	107.51 ✓	12,235	10yr routed
8	Reservoir	0.10 ✓	10	380	19,926	100	5	108.31 ✓	18,376	100yr routed
9	Rational	1.70	1	15	2,043	10	—	—	—	10yr pre *
10	Rational	7.73	1	10	6,189	10	—	—	—	10yr post to basin
11	Rational	0.96	1	15	1,158	10	—	—	—	10yr post overland
12	Reservoir	0.06	1	26	4,030	10	10	106.57	5,967	10yr post basin ou
13	Combine	1.01	1	15	5,187	10	11 + 12	—	—	10yr total outflow *

✓ - CHECK VS ORIG. HYDRAULICS

2

PREDEV Q=CIA
 2 - 0.33(3.96)(1.02) = 1.33 CFS
 10 - 0.33(5.16)(1.02) = 1.73 CFS
 100 - 0.33(7.16)(1.02) = 2.41 CFS

POST (w/o DET)
 2 -
 10 -
 100 -

POST ROUTED
 2 - 0.07 CFS
 10 - 1.01 CFS

Proj. file: Jehovah's.GPW

IDF file: Norfolk.IDF

Run date: 09-15-2000

Hyd. No. 9

10yr pre

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 1.0 ac
Intensity = 5.05 in
I-D-F Curve = Norfolk.IDF

Peak discharge = 1.70 cfs
Time interval = 1 min
Runoff coeff. = 0.33
Time of conc. (Tc) = 15 min
Reced. limb factor = 1.67

Total Volume = 2,043 cuft

Hydrograph Discharge Table

Time -- Outflow (hrs cfs)	Time -- Outflow (hrs cfs)
0.02 0.11	0.55 0.48
0.03 0.23	0.57 0.41
0.05 0.34	0.58 0.34
0.07 0.45	0.60 0.27
0.08 0.57	0.62 0.20
0.10 0.68	0.63 0.14
0.12 0.79	0.65 0.07
0.13 0.91	
0.15 1.02	
0.17 1.13	...End
0.18 1.25	
0.20 1.36	
0.22 1.47	
0.23 1.59	
0.25 1.70 <<	
0.27 1.63	
0.28 1.56	
0.30 1.50	
0.32 1.43	
0.33 1.36	
0.35 1.29	
0.37 1.22	
0.38 1.16	
0.40 1.09	
0.42 1.02	
0.43 0.95	
0.45 0.88	
0.47 0.82	
0.48 0.75	
0.50 0.68	
0.52 0.61	
0.53 0.54	

PREDEV

Hyd. No. 10

10yr post to basin

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 1.9 ac
Intensity = 5.89 in
I-D-F Curve = Norfolk.IDF

Peak discharge = 7.73 cfs
Time interval = 1 min
Runoff coeff. = 0.69
Time of conc. (Tc) = 10 min
Reced. limb factor = 1.67

Total Volume = 6,189 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.02	0.77
0.03	1.55
0.05	2.32
0.07	3.09
0.08	3.86
0.10	4.64
0.12	5.41
0.13	6.18
0.15	6.95
0.17	7.73 <<
0.18	7.24
0.20	6.76
0.22	6.28
0.23	5.79
0.25	5.31
0.27	4.83
0.28	4.35
0.30	3.86
0.32	3.38
0.33	2.90
0.35	2.41
0.37	1.93
0.38	1.45
0.40	0.97
0.42	0.48

...End

10-YR POST
TO BASIN

Hyd. No. 11

10yr post overland

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 0.5 ac
Intensity = 5.05 in
I-D-F Curve = Norfolk.IDF

Peak discharge = 0.96 cfs
Time interval = 1 min
Runoff coeff. = 0.36
Time of conc. (Tc) = 15 min
Reced. limb factor = 1.67

Total Volume = 1,158 cuft

Hydrograph Discharge Table

Time -- Outflow (hrs cfs)	Time -- Outflow (hrs cfs)
0.02 0.06	0.55 0.27
0.03 0.13	0.57 0.23
0.05 0.19	0.58 0.19
0.07 0.26	0.60 0.15
0.08 0.32	0.62 0.12
0.10 0.39	0.63 0.08
0.12 0.45	0.65 0.04
0.13 0.51	
0.15 0.58	
0.17 0.64	...End
0.18 0.71	
0.20 0.77	
0.22 0.84	
0.23 0.90	
0.25 0.96 <<	
0.27 0.93	
0.28 0.89	
0.30 0.85	
0.32 0.81	
0.33 0.77	
0.35 0.73	
0.37 0.69	
0.38 0.66	
0.40 0.62	
0.42 0.58	
0.43 0.54	
0.45 0.50	
0.47 0.46	
0.48 0.42	
0.50 0.39	
0.52 0.35	
0.53 0.31	

10-YEAR
BYPASS

SAME PRE & POST

Hyd. No. 12

10yr post basin out

Hydrograph type = Reservoir
 Storm frequency = 10 yrs ✓
 Inflow hyd. No. = 10
 Max. Elevation = 106.57 ft

Peak discharge = 0.06 cfs
 Time interval = 1 min
 Reservoir name = Onsite BMP Wetl
 Max. Storage = 5,967 cuft

Storage Indication method used.

Total Volume = 4,030 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
0.03	1.55	105.52	0.00	0.00	---	---	---	---	---	---	0.00
0.05	2.32	105.54	0.01	0.00	---	---	---	---	---	---	0.00
0.07	3.09	105.57	0.03	0.01	---	---	---	---	---	---	0.01
0.08	3.86	105.61	0.06	0.01	---	---	---	---	---	---	0.01
0.10	4.64	105.66	0.12	0.02	---	---	---	---	---	---	0.02
0.12	5.41	105.72	0.22	0.02	---	---	---	---	---	---	0.02
0.13	6.18	105.79	0.36	0.03	---	---	---	---	---	---	0.03
0.15	6.95	105.86	0.55	0.03	---	---	---	---	---	---	0.03
0.17	7.73 <<	105.95	0.81	0.04	---	---	---	---	---	---	0.04
0.18	7.24	106.03	1.10	0.04	---	---	---	---	---	---	0.04
0.20	6.76	106.10	1.35	0.04	---	---	---	---	---	---	0.04
0.22	6.28	106.17	1.55	0.05	---	---	---	---	---	---	0.05
0.23	5.79	106.23	1.73	0.05	---	---	---	---	---	---	0.05
0.25	5.31	106.28	1.86	0.05	---	---	---	---	---	---	0.05
0.27	4.83	106.33	1.97	0.05	---	---	---	---	---	---	0.05
0.28	4.35	106.38	2.04	0.05	---	---	---	---	---	---	0.05
0.30	3.86	106.42	2.08	0.05	---	---	---	---	---	---	0.05
0.32	3.38	106.45	2.08	0.06	---	---	---	---	---	---	0.06
0.33	2.90	106.48	2.09	0.06	---	---	---	---	---	---	0.06
0.35	2.41	106.51	2.12	0.06	---	---	---	---	---	---	0.06
0.37	1.93	106.53	2.19	0.06	---	---	---	---	---	---	0.06
0.38	1.45	106.55	2.24	0.06	---	---	---	---	---	---	0.06
0.40	0.97	106.56	2.28	0.06	---	---	---	---	---	---	0.06
0.42	0.48	106.57	2.30	0.06	---	---	---	---	---	---	0.06
0.43	0.00	106.57	2.30	0.06	---	---	---	---	---	---	0.06 <<
0.45	0.00	106.57	2.30	0.06	---	---	---	---	---	---	0.06
0.47	0.00	106.57	2.30	0.06	---	---	---	---	---	---	0.06
0.48	0.00	106.57	2.30	0.06	---	---	---	---	---	---	0.06
0.50	0.00	106.57	2.30	0.06	---	---	---	---	---	---	0.06
0.52	0.00	106.56	2.30	0.06	---	---	---	---	---	---	0.06
0.53	0.00	106.56	2.29	0.06	---	---	---	---	---	---	0.06
0.55	0.00	106.56	2.29	0.06	---	---	---	---	---	---	0.06
0.57	0.00	106.56	2.29	0.06	---	---	---	---	---	---	0.06
0.58	0.00	106.56	2.29	0.06	---	---	---	---	---	---	0.06
0.60	0.00	106.56	2.29	0.06	---	---	---	---	---	---	0.06
0.62	0.00	106.56	2.28	0.06	---	---	---	---	---	---	0.06

Continues on next page...

Hydrograph Report

Hyd. No. 13

10yr total outflow

Hydrograph type = Combine
Storm frequency = 10 yrs
1st inflow hyd. No. = 11

Peak discharge = 1.01 cfs
Time interval = 1 min
2nd inflow hyd. No. = 12

Total Volume = 5,187 cuft

Hydrograph Discharge Table

*THIS
EXCEEDS
PREDEV.*

Time (hrs)	1st Inflow cfs	+ 2nd Inflow cfs	= Outflow cfs
0.02	0.06	0.00	0.06
0.03	0.13	0.00	0.13
0.05	0.19	0.00	0.20
0.07	0.26	0.01	0.26
0.08	0.32	0.01	0.33
0.10	0.39	0.02	0.40
0.12	0.45	0.02	0.47
0.13	0.51	0.03	0.54
0.15	0.58	0.03	0.61
0.17	0.64	0.04	0.68
0.18	0.71	0.04	0.75
0.20	0.77	0.04	0.81
0.22	0.84	0.05	0.88
0.23	0.90	0.05	0.95
0.25	0.96 <<	0.05	1.01 <<
0.27	0.93	0.05	0.98
0.28	0.89	0.05	0.94
0.30	0.85	0.05	0.90
0.32	0.81	0.06	0.87
0.33	0.77	0.06	0.83
0.35	0.73	0.06	0.79
0.37	0.69	0.06	0.75
0.38	0.66	0.06	0.71
0.40	0.62	0.06	0.68
0.42	0.58	0.06	0.64
0.43	0.54	0.06 <<	0.60
0.45	0.50	0.06	0.56
0.47	0.46	0.06	0.52
0.48	0.42	0.06	0.48
0.50	0.39	0.06	0.44
0.52	0.35	0.06	0.41
0.53	0.31	0.06	0.37
0.55	0.27	0.06	0.33
0.57	0.23	0.06	0.29
0.58	0.19	0.06	0.25
0.60	0.15	0.06	0.21

Continues on next page...

Hydrograph Report

Hyd. No. 11

10yr post overland

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 0.5 ac
Intensity = 5.05 in
I-D-F Curve = Norfolk.IDF

Peak discharge = 0.96 cfs
Time interval = 1 min
Runoff coeff. = 0.36
Time of conc. (Tc) = 15 min
Reced. limb factor = 1.67

Total Volume = 1,158 cuft

Hydrograph Discharge Table

Time -- Outflow (hrs cfs)	Time -- Outflow (hrs cfs)
0.02 0.06	0.55 0.27
0.03 0.13	0.57 0.23
0.05 0.19	0.58 0.19
0.07 0.26	0.60 0.15
0.08 0.32	0.62 0.12
0.10 0.39	0.63 0.08
0.12 0.45	0.65 0.04
0.13 0.51	
0.15 0.58	
0.17 0.64	...End
0.18 0.71	
0.20 0.77	
0.22 0.84	
0.23 0.90	
0.25 0.96 <<	
0.27 0.93	
0.28 0.89	
0.30 0.85	
0.32 0.81	
0.33 0.77	
0.35 0.73	
0.37 0.69	
0.38 0.66	
0.40 0.62	
0.42 0.58	
0.43 0.54	
0.45 0.50	
0.47 0.46	
0.48 0.42	
0.50 0.39	
0.52 0.35	
0.53 0.31	

10-YEAR
BYPASS

SAME PRE & POST

Hydrograph Report

Hyd. No. 12

10yr post basin out

Hydrograph type = Reservoir
 Storm frequency = 10 yrs ✓
 Inflow hyd. No. = 10
 Max. Elevation = 106.57 ft

Peak discharge = 0.06 cfs
 Time interval = 1 min
 Reservoir name = Onsite BMP Wetl
 Max. Storage = 5,967 cuft

Storage Indication method used.

Total Volume = 4,030 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
0.03	1.55	105.52	0.00	0.00	---	---	---	---	---	---	0.00
0.05	2.32	105.54	0.01	0.00	---	---	---	---	---	---	0.00
0.07	3.09	105.57	0.03	0.01	---	---	---	---	---	---	0.01
0.08	3.86	105.61	0.06	0.01	---	---	---	---	---	---	0.01
0.10	4.64	105.66	0.12	0.02	---	---	---	---	---	---	0.02
0.12	5.41	105.72	0.22	0.02	---	---	---	---	---	---	0.02
0.13	6.18	105.79	0.36	0.03	---	---	---	---	---	---	0.03
0.15	6.95	105.86	0.55	0.03	---	---	---	---	---	---	0.03
0.17	7.73 <<	105.95	0.81	0.04	---	---	---	---	---	---	0.04
0.18	7.24	106.03	1.10	0.04	---	---	---	---	---	---	0.04
0.20	6.76	106.10	1.35	0.04	---	---	---	---	---	---	0.04
0.22	6.28	106.17	1.55	0.05	---	---	---	---	---	---	0.05
0.23	5.79	106.23	1.73	0.05	---	---	---	---	---	---	0.05
0.25	5.31	106.28	1.86	0.05	---	---	---	---	---	---	0.05
0.27	4.83	106.33	1.97	0.05	---	---	---	---	---	---	0.05
0.28	4.35	106.38	2.04	0.05	---	---	---	---	---	---	0.05
0.30	3.86	106.42	2.08	0.05	---	---	---	---	---	---	0.05
0.32	3.38	106.45	2.08	0.06	---	---	---	---	---	---	0.06
0.33	2.90	106.48	2.09	0.06	---	---	---	---	---	---	0.06
0.35	2.41	106.51	2.12	0.06	---	---	---	---	---	---	0.06
0.37	1.93	106.53	2.19	0.06	---	---	---	---	---	---	0.06
0.38	1.45	106.55	2.24	0.06	---	---	---	---	---	---	0.06
0.40	0.97	106.56	2.28	0.06	---	---	---	---	---	---	0.06
0.42	0.48	106.57	2.30	0.06	---	---	---	---	---	---	0.06
0.43	0.00	106.57	2.30	0.06	---	---	---	---	---	---	0.06 <<
0.45	0.00	106.57	2.30	0.06	---	---	---	---	---	---	0.06
0.47	0.00	106.57	2.30	0.06	---	---	---	---	---	---	0.06
0.48	0.00	106.57	2.30	0.06	---	---	---	---	---	---	0.06
0.50	0.00	106.57	2.30	0.06	---	---	---	---	---	---	0.06
0.52	0.00	106.56	2.30	0.06	---	---	---	---	---	---	0.06
0.53	0.00	106.56	2.29	0.06	---	---	---	---	---	---	0.06
0.55	0.00	106.56	2.29	0.06	---	---	---	---	---	---	0.06
0.57	0.00	106.56	2.29	0.06	---	---	---	---	---	---	0.06
0.58	0.00	106.56	2.29	0.06	---	---	---	---	---	---	0.06
0.60	0.00	106.56	2.29	0.06	---	---	---	---	---	---	0.06
0.62	0.00	106.56	2.28	0.06	---	---	---	---	---	---	0.06

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Hydrograph Report

Hyd. No. 13

10yr total outflow

Hydrograph type = Combine
Storm frequency = 10 yrs
1st inflow hyd. No. = 11

Peak discharge = 1.01 cfs
Time interval = 1 min
2nd inflow hyd. No. = 12

Total Volume = 5,187 cuft

Hydrograph Discharge Table

Time (hrs)	1st Inflow cfs	+	2nd Inflow cfs	=	Outflow cfs
0.02	0.06		0.00		0.06
0.03	0.13		0.00		0.13
0.05	0.19		0.00		0.20
0.07	0.26		0.01		0.26
0.08	0.32		0.01		0.33
0.10	0.39		0.02		0.40
0.12	0.45		0.02		0.47
0.13	0.51		0.03		0.54
0.15	0.58		0.03		0.61
0.17	0.64		0.04		0.68
0.18	0.71		0.04		0.75
0.20	0.77		0.04		0.81
0.22	0.84		0.05		0.88
0.23	0.90		0.05		0.95
0.25	0.96 <<		0.05		1.01 <<
0.27	0.93		0.05		0.98
0.28	0.89		0.05		0.94
0.30	0.85		0.05		0.90
0.32	0.81		0.06		0.87
0.33	0.77		0.06		0.83
0.35	0.73		0.06		0.79
0.37	0.69		0.06		0.75
0.38	0.66		0.06		0.71
0.40	0.62		0.06		0.68
0.42	0.58		0.06		0.64
0.43	0.54		0.06 <<		0.60
0.45	0.50		0.06		0.56
0.47	0.46		0.06		0.52
0.48	0.42		0.06		0.48
0.50	0.39		0.06		0.44
0.52	0.35		0.06		0.41
0.53	0.31		0.06		0.37
0.55	0.27		0.06		0.33
0.57	0.23		0.06		0.29
0.58	0.19		0.06		0.25
0.60	0.15		0.06		0.21

THIS EXCEEDS PREDEV.

Continues on next page...

Subject JELLOUAK'S WITNESSES

SITE - MOORETOWN RD

Computed LMP Checked _____



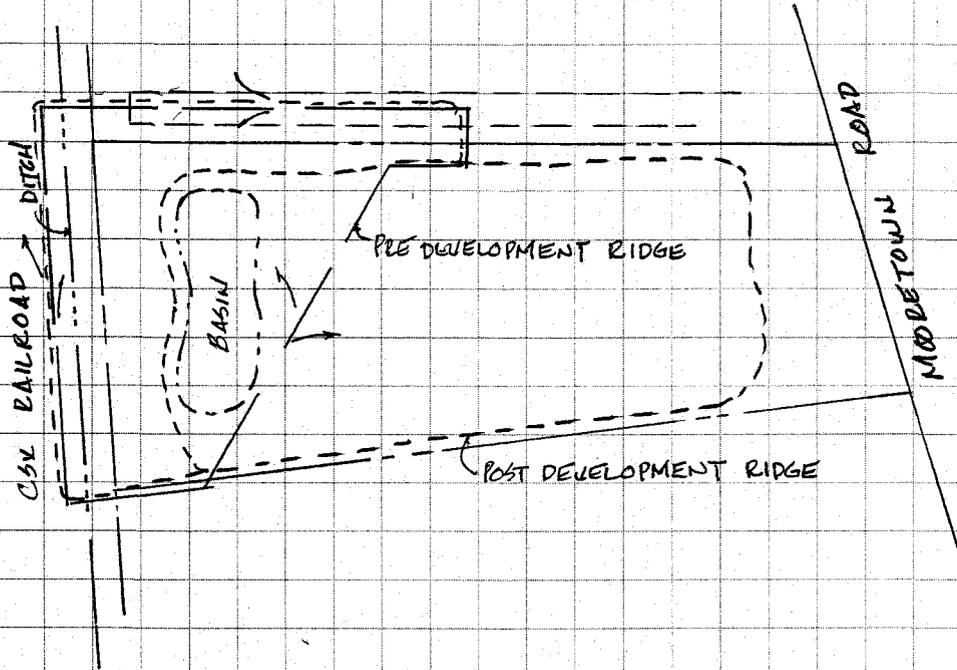
Project # _____

Client _____

Date 9-15-00 Sheet # _____

Engineers • Planners • Surveyors • Landscape Architects • Environmental Consultants

DRAINAGE ANALYSIS - NW CORNER OF SITE @ CSX RR DITCH



PRE DEVELOPMENT

DA = 1.02 ACRES

Cavg = 0.33 (0.05 ac. pav't @ C=0.9, 0.97 ac. WOODED & OPEN @ C=0.30)

Tc = 15 MIN (100' OVERLAND @ 2% + 270 LF DITCH @ U=1.5±)

Q₁₀ = 1.70 cfs
VOL = 2,043 cf.

POST DEVELOPMENT TO BASIN

DA = 1.90 ACRES

Cavg = 0.69 (PER PREV. CALC'S)

Tc = 10 MIN (PER PREV. CALC'S)

Q₁₀ = 7.73 cfs
VOL = 6189 cf.

POST DEVELOPMENT OVERLAND (BYPASS)

DA = 0.53 ACRES

Cavg = 0.36 (0.05 ac. pav't @ C=0.90, 0.48 ac. WOODED & OPEN @ C=0.30)

Tc = 15 MIN (100' OVERLAND @ 2% + 270 LF DITCH @ U=1.5±)

Q₁₀ = 0.96 cfs
VOL = 1158 cf.

BASIN (OUT): 0.06 cfs; EL. 106.57; VOL = 4030 CF.

COMBINED (BASIN & BYPASS): 1.01 cfs; VOL = 5,187 cf.

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	Manual	0.83	10	10	18,678	50	---	---	---	50yr critical
2	Reservoir	0.10	10	390	18,678	50	1	108.16	17,136	50yr routed
3	Manual	0.50	10	10	9,450	2	---	---	---	2yr critical
4	Manual	0.65	10	10	13,452	10	---	---	---	10yr critical
5	Manual	0.91	10	10	19,926	100	---	---	---	100yr critical
6	Reservoir	0.07	10	330	9,450	2	3	106.99	8,516	2yr routed
7	Reservoir	0.08	10	360	13,452	10	4	107.51	12,235	10yr routed
8	Reservoir	0.10	10	380	19,926	100	5	108.31	18,376	100yr routed
9	Rational	1.70	1	15	2,043	10	---	---	---	10yr pre *
10	Rational	7.73	1	10	6,189	10	---	---	---	10yr post to basin
11	Rational	0.96	1	15	1,158	10	---	---	---	10yr post overland
12	Reservoir	0.06	1	26	4,030	10	10	106.57	5,967	10yr post basin ou
13	Combine	1.01	1	15	5,187	10	11 + 12	---	---	10yr total outflow *

2

PREDEV Q=CIA
 2 - 0.33(3.96)(1.02) = 1.33 cfs
 10 - 0.33(5.16)(1.02) = 1.73 cfs
 100 - 0.33(7.16)(1.02) = 2.41 cfs

POST (w/o DET)
 2 -
 10 -
 100 -

POST Routed
 2 - 0.07 cfs
 10 - 1.01 cfs

Proj. file: Jehovah's.GPW

IDF file: Norfolk.IDF

Run date: 09-15-2000

Hydrograph Report

Hyd. No. 9

10yr pre

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 1.0 ac
Intensity = 5.05 in
I-D-F Curve = Norfolk.IDF

Peak discharge = 1.70 cfs
Time interval = 1 min
Runoff coeff. = 0.33
Time of conc. (Tc) = 15 min
Reced. limb factor = 1.67

Total Volume = 2,043 cuft

Hydrograph Discharge Table

Time -- Outflow (hrs cfs)	Time -- Outflow (hrs cfs)
0.02 0.11	0.55 0.48
0.03 0.23	0.57 0.41
0.05 0.34	0.58 0.34
0.07 0.45	0.60 0.27
0.08 0.57	0.62 0.20
0.10 0.68	0.63 0.14
0.12 0.79	0.65 0.07
0.13 0.91	
0.15 1.02	
0.17 1.13	...End
0.18 1.25	
0.20 1.36	
0.22 1.47	
0.23 1.59	
0.25 1.70 <<	
0.27 1.63	
0.28 1.56	
0.30 1.50	
0.32 1.43	
0.33 1.36	
0.35 1.29	
0.37 1.22	
0.38 1.16	
0.40 1.09	
0.42 1.02	
0.43 0.95	
0.45 0.88	
0.47 0.82	
0.48 0.75	
0.50 0.68	
0.52 0.61	
0.53 0.54	

PREDEV

Hydrograph Report

Hyd. No. 10

10yr post to basin

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 1.9 ac
Intensity = 5.89 in
I-D-F Curve = Norfolk.IDF

Peak discharge = 7.73 cfs
Time interval = 1 min
Runoff coeff. = 0.69
Time of conc. (Tc) = 10 min
Reced. limb factor = 1.67

Total Volume = 6,189 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.02	0.77
0.03	1.55
0.05	2.32
0.07	3.09
0.08	3.86
0.10	4.64
0.12	5.41
0.13	6.18
0.15	6.95
0.17	7.73 <<
0.18	7.24
0.20	6.76
0.22	6.28
0.23	5.79
0.25	5.31
0.27	4.83
0.28	4.35
0.30	3.86
0.32	3.38
0.33	2.90
0.35	2.41
0.37	1.93
0.38	1.45
0.40	0.97
0.42	0.48

...End

10-YR POST
TO BASIN



Langley and McDonald, P.C.

ENGINEERS • SURVEYORS • PLANNERS
LANDSCAPE ARCHITECTS • ENVIRONMENTAL CONSULTANTS

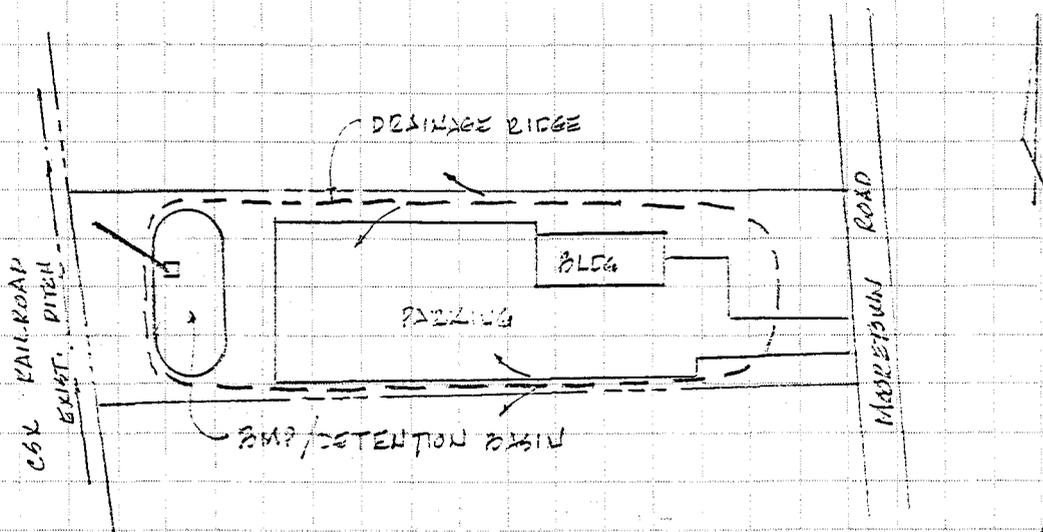
VIRGINIA BEACH • WILLIAMSBURG, VIRGINIA

Subject JEHOVAH'S WITNESSES
SITE PLAN - WILLIAMSBURG, VA.
Computed By LMP Checked by _____

Project No. 1570000-001.00
Client _____
Date 10-99 Sheet No. 1

ANALYSIS BMP DESIGN CRITERIA

- USE EXTENDED DETENTION (DESIGN 1) WITH 24HR WASH DELAYED
- USE MODIFIED RATIONAL CRITICAL STORM METHOD
- MAX. 0.10 CFS RELEASE FROM BMP FOR 30 YR STORM PER "CSX" REQUIREMENT
- USE STRESS INDICATION METHOD FOR ROUTINGS



BEST DEVELOPMENT CONDITIONS

- DA = 1.90 ACRES TO BMP ✓
- BLSG = 0.11 AC. CO = 0.90 ✓
- PAVED & WALKS = 0.93 AC. CO = 0.90
- OPEN/GRASSED = 0.50 AC. CO = 0.25
- $C_{avg} = 0.69$ ✓
- $T_0 = 10$ MIN. ✓
- IMPERVIOUS RATIO = 87% ✓

POND HYDRAULICS & HYDROLOGY APPEAR OK, NO ES. PROVIDED *ST*

NONE NEEDED 100-YEAR DESIGN WSEL CANNOT REACH RISER CREST OR ALLOWABLE 0.1 CFS IS EXCEEDED. FB = 1.11 FT NO SIGNIFICANT STRUCTURES DOWNSTREAM.

SUMMARY - PEAK CRITICAL STORM INFLOW TO BASIN

STORM	INFLOW (CFS)
2 YR	0.50
10 YR	0.65
30 YR	0.88
100 YR	0.91

MAX. OUTFLOW = 0.10 CFS PER "CSX"

PROJECT: SITE PLAN JEHOVAH'S WITNESSES

DETENTION BASIN DESIGN
MODIFIED RATIONAL
CRITICAL STORM METHOD

DESIGN DATA:

2 Year Design Storm

Drainage Area (Acres)	=	1.9 Acres
Runoff Coeff. (Pre)	=	0.25
Runoff Coeff. (Post)	=	0.62
Post Development TC (Min)	=	10 Min.

RESULTS:

Critical Storm Duration (Min)	=	315 Min.
Peak Critical Storm Basin Inflow (CFS)	=	0.50 C.F.S.
Allowable Post Development Basin Discharge (CFS)	=	0.05 C.F.S.
Required Storage Volume for Detention Basin (CF)	=	8978 C.F. ✓

HYDROGRAPH VALUES
POST DEVELOPMENT

<u>Q</u>	<u>I</u>
0.00	0.0
0.50	10
0.50	315
0.00	330

PROJECT: SITE PLAN JEHOVAH'S WITNESSES

DETENTION BASIN DESIGN
MODIFIED RATIONAL
CRITICAL STORM METHOD

DESIGN DATA:

10 Year Design Storm

Drainage Area (Acres)	=	1.9 Acres
Runoff Coeff. (Pre)	=	0.25
Runoff Coeff. (Post)	=	0.62
Post Development TC (Min)	=	10 Min.

RESULTS:

Critical Storm Duration (Min)	=	340 Min.
Peak Critical Storm Basin Inflow (CFS)	=	0.65 C.F.S.
Allowable Post Development Basin Discharge (CFS)	=	0.08 C.F.S.
Required Storage Volume for Detention Basin (CF)	=	12624 C.F. ✓

HYDROGRAPH VALUES
POST DEVELOPMENT

<u>Q</u>	<u>I</u>
0.00	0.0
0.65	10
0.65	340
0.00	355

PROJECT: SITE PLAN JEHOVAH'S WITNESSES

DETENTION BASIN DESIGN
MODIFIED RATIONAL
CRITICAL STORM METHOD

DESIGN DATA:

50 Year Design Storm

Drainage Area (Acres)	=	1.90 Acres
Runoff Coeff. (Pre)	=	0.25
Runoff Coeff. (Post)	=	0.62
Post Development TC (Min)	=	10 Min.

RESULTS:

Critical Storm Duration (Min)	=	371 Min.
Peak Critical Storm Basin Inflow (CFS)	=	0.83 C.F.S.
Allowable Post Development Basin Discharge (CFS)	=	0.10 C.F.S.
Required Storage Volume for Detention Basin (CF)	=	17480 C.F.

HYDROGRAPH VALUES
POST DEVELOPMENT

<u>Q</u>	<u>I</u>
0.00	0.0
0.83	10
0.83	371
0.00	386

PROJECT: SITE PLAN JEHOVAH'S WITNESSES

DETENTION BASIN DESIGN
MODIFIED RATIONAL
CRITICAL STORM METHOD

DESIGN DATA:

100 Year Design Storm

Drainage Area (Acres)	=	1.9 Acres
Runoff Coeff. (Pre)	=	0.25
Runoff Coeff. (Post)	=	0.62
Post Development TC (Min)	=	10 Min.

RESULTS:

Critical Storm Duration (Min)	=	364 Min.
Peak Critical Storm Basin Inflow (CFS)	=	0.91 C.F.S.
Allowable Post Development Basin Discharge (CFS)	=	0.11 C.F.S.
Required Storage Volume for Detention Basin (CF)	=	18668 C.F.

HYDROGRAPH VALUES
POST DEVELOPMENT

<u>Q</u>	<u>I</u>
0.00	0.0
0.91	10
0.91	364
0.00	379



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VIRGINIA BEACH • WILLIAMSBURG, VIRGINIA

Subject Kingdom Hall of Jehovah's Witnesses

Project No. 15-00000-000

Client _____

Computed By LM? Checked by _____

Date _____ Sheet No. _____

WQ. WATER QUALITY VOLUME REQ DESIGN

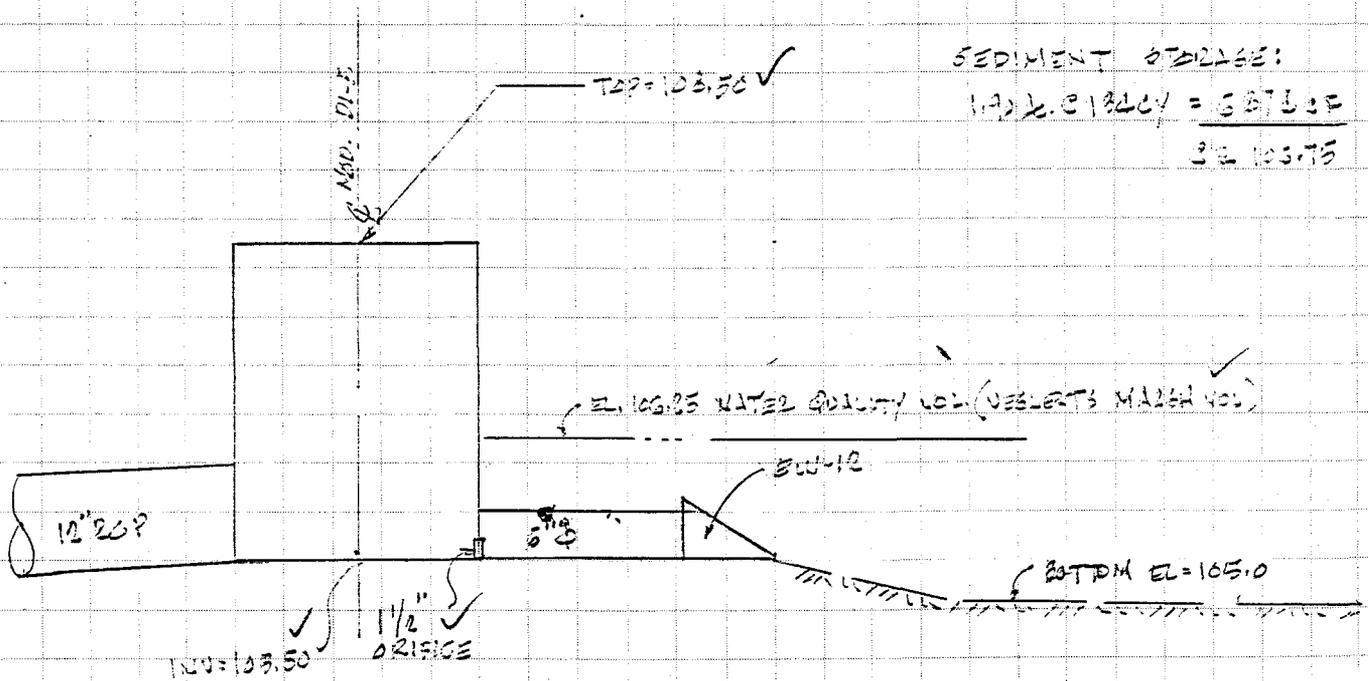
1" STD. EL. FOR 31 HOURS

$$\begin{aligned} R_v &= 0.05 + 0.004 (I) \\ &= 0.05 + 0.004 (57) \\ &= 0.56 \end{aligned}$$

$I = 57\%$

$I = 57\%$
SITE = 1.11 AC IMPERV.
SITE AREA = 2.4651 (1.57)
= 1.40 AC.

$$\begin{aligned} \text{VOLUME} &= (0.033') (0.56) (1.90) (43560) \\ &= 8317 \text{ C.F. (Req. 10325)} \checkmark \end{aligned}$$



WETLAND VOL. REQ'D (0.45') ← ?

$$\begin{aligned} \text{VOL} &= (0.0375') (0.56) (1.90) (43560) \\ &= 1733 \text{ C.F.} \end{aligned}$$

ELEV	AREA (sq)	H + L / 2	VOL. (C.F.)
105.0	1111	0	
105.5	1734	1.462	2232 (102) > 1738

Reservoir Report

Reservoir No. 2 - Onsite BMP Wetland

English

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	105.50	4,784	0	0
0.50	106.00	5,480	2,566	2,566
1.50	107.00	6,500 ✓	5,990	8,556
2.50	108.00	7,856	7,178	15,734
3.50	109.00	9,312	8,584	24,318
4.00	109.50	10,444	4,939	29,257

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 12.0 ✓	1.5	0.0	0.0
Span in	= 12.0 ✓	1.5	0.0	0.0
No. Barrels	= 1	1	0	0
Invert El. ft	= 105.50 ✓	105.50	0.00	0.00
Length ft	= 40.0 ✓	0.0	0.0	0.0
Slope %	= 0.75 ✓	0.00	0.00	0.00
N-Value	= .013 ✓	.010	.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	= 12.7	0.0	0.0	0.0
Crest El. ft	= 108.50 ✓	0.00	0.00	0.00
Weir Coeff.	= 3.08 ✓	0.00	0.00	0.00
Eqn. Exp.	= 1.50	0.00	0.00	0.00
Multi-Stage	= Yes	No	No	No

3.5(4) = 14 SF
10% CLOGGED
GRATE AREA
NOT USED
ONLY BOX
OPENING.

Tailwater Elevation = 0.00 ft *NO TW ELEV*

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	105.50	0.00	0.00	---	---	0.00	---	---	---	0.00
0.05	257	105.55	0.01	0.00	---	---	0.00	---	---	---	0.00
0.10	513	105.60	0.05	0.01	---	---	0.00	---	---	---	0.01
0.15	770	105.65	0.11	0.02	---	---	0.00	---	---	---	0.02
0.20	1,026	105.70	0.18	0.02	---	---	0.00	---	---	---	0.02
0.25	1,283	105.75	0.27	0.03	---	---	0.00	---	---	---	0.03
0.30	1,540	105.80	0.38	0.03	---	---	0.00	---	---	---	0.03
0.35	1,796	105.85	0.52	0.03	---	---	0.00	---	---	---	0.03
0.40	2,053	105.90	0.64	0.03	---	---	0.00	---	---	---	0.03
0.45	2,309	105.95	0.81	0.04	---	---	0.00	---	---	---	0.04
0.50	2,566	106.00	0.99	0.04	---	---	0.00	---	---	---	0.04

Continues on next page...

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
0.60	3,165	106.10	1.34	0.04	---	---	0.00	---	---	---	0.04
0.70	3,764	106.20	1.66	0.05	---	---	0.00	---	---	---	0.05
0.80	4,363	106.30	1.91	0.05	---	---	0.00	---	---	---	0.05
0.90	4,962	106.40	2.08	0.05	---	---	0.00	---	---	---	0.05
1.00	5,561	106.50	2.09	0.06	---	---	0.00	---	---	---	0.06
1.10	6,160	106.60	2.41	0.06	---	---	0.00	---	---	---	0.06
1.20	6,759	106.70	2.69	0.06	---	---	0.00	---	---	---	0.06
1.30	7,358	106.80	2.95	0.07	---	---	0.00	---	---	---	0.07
1.40	7,957	106.90	3.19	0.07	---	---	0.00	---	---	---	0.07
1.50	8,556	107.00	3.41	0.07	---	---	0.00	---	---	---	0.07
1.60	9,274	107.10	3.61	0.07	---	---	0.00	---	---	---	0.07
1.70	9,992	107.20	3.81	0.08	---	---	0.00	---	---	---	0.08
1.80	10,709	107.30	3.99	0.08	---	---	0.00	---	---	---	0.08
1.90	11,427	107.40	4.17	0.08	---	---	0.00	---	---	---	0.08
2.00	12,145	107.50	4.34	0.08	---	---	0.00	---	---	---	0.08
2.10	12,863	107.60	4.51	0.08	---	---	0.00	---	---	---	0.08
2.20	13,581	107.70	4.66	0.09	---	---	0.00	---	---	---	0.09
2.30	14,298	107.80	4.82	0.09	---	---	0.00	---	---	---	0.09
2.40	15,016	107.90	4.97	0.09	---	---	0.00	---	---	---	0.09
2.50	15,734	108.00	5.11	0.09	---	---	0.00	---	---	---	0.09
2.60	16,592	108.10	5.25	0.09	---	---	0.00	---	---	---	0.09
2.70	17,451	108.20	5.39	0.10	---	---	0.00	---	---	---	0.10
2.80	18,309	108.30	5.52	0.10	---	---	0.00	---	---	---	0.10
2.90	19,168	108.40	5.65	0.10	---	---	0.00	---	---	---	0.10
3.00	20,026	108.50	5.78	0.10	---	---	0.00	---	---	---	0.10
3.10	20,884	108.60	5.90	0.10	---	---	1.23	---	---	---	1.34
3.20	21,743	108.70	6.02	0.10	---	---	3.49	---	---	---	3.59
3.30	22,601	108.80	6.14	0.11	---	---	6.41	---	---	---	6.25
3.40	23,460	108.90	6.26	0.11	---	---	9.86	---	---	---	6.37
3.50	24,318	109.00	6.37	0.11	---	---	13.79	---	---	---	6.48
3.55	24,812	109.05	6.43	0.11	---	---	15.90	---	---	---	6.54
3.60	25,306	109.10	6.49	0.11	---	---	18.12	---	---	---	6.60
3.65	25,800	109.15	6.54	0.11	---	---	20.43	---	---	---	6.65
3.70	26,294	109.20	6.60	0.11	---	---	22.84	---	---	---	6.71
3.75	26,788	109.25	6.65	0.11	---	---	25.33	---	---	---	6.76
3.80	27,281	109.30	6.71	0.11	---	---	27.90	---	---	---	6.82
3.85	27,775	109.35	6.76	0.11	---	---	30.56	---	---	---	6.87
3.90	28,269	109.40	6.81	0.12	---	---	33.29	---	---	---	6.93
3.95	28,763	109.45	6.87	0.12	---	---	36.11	---	---	---	6.98
4.00	29,257	109.50	6.92	0.12	---	---	38.99	---	---	---	7.04

...End

0.10 CFS
EXCEEDED
IF WSEL
GETS TO
RISE
CREST.

BMP

BMP - JEHOVAH'S WITNESSES PROJECT - MOORETOWN ROAD
BASIN DRAWDOWN SUMMARY FOR 1" Rv STORM
1-1/2" ORIFICE AT ELEV. 105.50

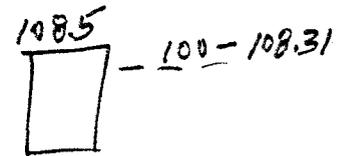
ELEV	RISE	VOL(CF)	D	Q(OUT)	TIME(HR)	SUM(HR)
106.25	0.750	3847.00	0.687	0.0499	0.4620	0.4620
106.20	0.700	3764.00	0.637	0.0481	3.4624	3.9244
106.10	0.600	3165.00	0.537	0.0441	3.7710	7.6954
106.00	0.500	2566.00	0.437	0.0398	3.5801	11.2755
105.90	0.400	2053.00	0.337	0.0350	4.0768	15.3523
105.80	0.300	1540.00	0.237	0.0293	4.8709	20.2232
105.70	0.200	1026.00	0.137	0.0223	6.3941	26.6173
105.60	0.100	513.00	0.037	0.0116	12.3037	38.9210
105.50	0.000	0.00	0.000	0.0000	0.0000	38.9210

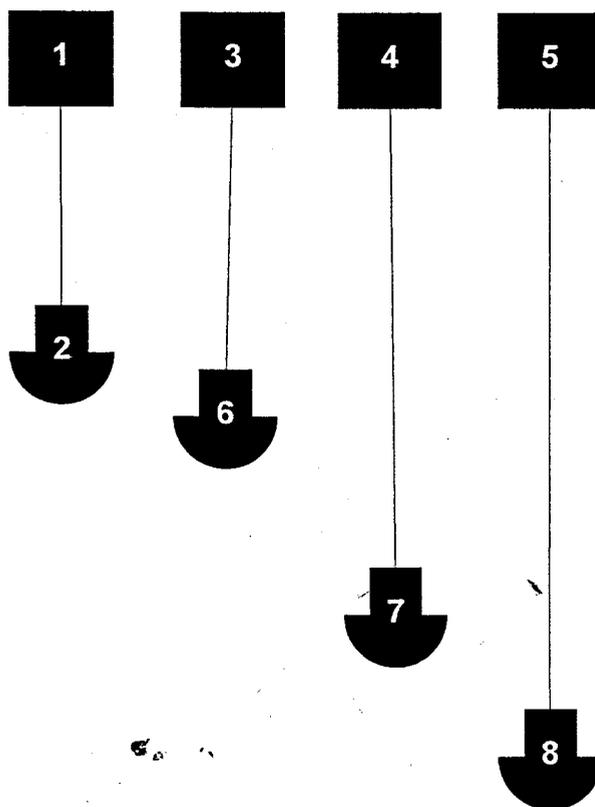
> 24-30 HRS OK

SUMMARY OF RUNOFF ANALYSIS AND DETENTION BASIN PERFORMANCE

- 2 YR - POST DEVELOPMENT ROUTING DISCHARGE = 0.07 CFS @ Elevation 106.99
- 10 YR - POST DEVELOPMENT ROUTING DISCHARGE = 0.08 CFS @ Elevation 107.51
- 50 YR - POST DEVELOPMENT ROUTING DISCHARGE = 0.10 CFS @ Elevation 108.16
- 100 YR - POST DEVELOPMENT ROUTING DISCHARGE = 0.10 CFS @ Elevation 108.31

ALL
 < 0.1 CFS
 W/SEL
 CANNOT GET
 TO RISE CRIST
 OR ALLOW PRE
 IS EXCEEDED





Legend

- Runoff
- Combined
- Channel Reach
- Diversion
- ⌋ Pond Route

Project: Jehovah's.GPW

IDF: Norfolk.IDF

8 hyd's

10-25-1999

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	Manual	0.83	10	10	18,678	50	—	—	—	50yr critical	
2	Reservoir	0.10	10	390	18,678	50	1	108.16	17,136	50yr <u>routed</u>	
3	Manual	0.50	10	10	9,450	2	—	—	—	2yr critical	
4	Manual	0.65	10	10	13,452	10	—	—	—	10yr critical	
5	Manual	0.91	10	10	19,926	100	—	—	—	100yr critical	
6	Reservoir	0.07	10	330	9,450	2	3	106.99	8,516	2yr <u>routed</u>	
7	Reservoir	0.08	10	360	13,452	10	4	107.51	12,235	10yr <u>routed</u>	
8	Reservoir	0.10	10	380	19,926	100	5	108.31	18,376	100yr <u>routed</u>	
Proj. file: Jehovah's.GPW				IDF file: Norfolk.IDF				Run date: 10-25-1999			

Hydrograph Report

Hyd. No. 3

2yr critical

Hydrograph type = Manual

Storm frequency = 2 yrs

Peak discharge = 0.50 cfs

Time interval = 10 min

Total Volume = 9,450 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.17	0.50 <<
1.83	0.50 <<
3.50	0.50 <<
5.17	0.50 <<

...End

Hydrograph Report

Hyd. No. 4

10yr critical

Hydrograph type = Manual
Storm frequency = 10 yrs

Peak discharge = 0.65 cfs
Time interval = 10 min

Total Volume = 13,452 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.17	0.65 <<
1.83	0.65 <<
3.50	0.65 <<
5.17	0.65 <<

...End

Hydrograph Report

Hyd. No. 1

50yr critical

Hydrograph type = Manual
Storm frequency = 50 yrs

Peak discharge = 0.83 cfs
Time interval = 10 min

Total Volume = 18,678 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.17	0.83 <<
1.83	0.83 <<
3.50	0.83 <<
5.17	0.83 <<

...End

Hydrograph Report

Hyd. No. 5

100yr critical

Hydrograph type = Manual
Storm frequency = 100 yrs

Peak discharge = 0.91 cfs
Time interval = 10 min

Total Volume = 19,926 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.17	0.91 <<
1.83	0.91 <<
3.50	0.91 <<
5.17	0.91 <<

...End

Hydrograph Report

Hyd. No. 6

2yr routed

Hydrograph type = Reservoir
 Storm frequency = 2 yrs
 Inflow hyd. No. = 3
 Max. Elevation = 106.99 ft ✓

Peak discharge = 0.07 cfs
 Time interval = 10 min
 Reservoir name = Onsite BMP Wetl
 Max. Storage = 8,516 cuft

Storage Indication method used.

Total Volume = 9,450 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
1.67	0.50 <<	106.02	1.08	0.04	---	---	---	---	---	---	0.04
3.33	0.50 <<	106.48	2.09	0.06	---	---	---	---	---	---	0.06
5.00	0.50 <<	106.91	3.22	0.07	---	---	---	---	---	---	0.07
6.67	0.00	106.94	3.28	0.07	---	---	---	---	---	---	0.07
8.33	0.00	106.88	3.13	0.07	---	---	---	---	---	---	0.07
10.00	0.00	106.81	2.97	0.07	---	---	---	---	---	---	0.07
11.67	0.00	106.74	2.80	0.06	---	---	---	---	---	---	0.06
13.33	0.00	106.68	2.64	0.06	---	---	---	---	---	---	0.06
15.00	0.00	106.62	2.46	0.06	---	---	---	---	---	---	0.06
16.67	0.00	106.56	2.27	0.06	---	---	---	---	---	---	0.06
18.33	0.00	106.50	2.09	0.06	---	---	---	---	---	---	0.06
20.00	0.00	106.44	2.08	0.06	---	---	---	---	---	---	0.06
21.67	0.00	106.39	2.07	0.05	---	---	---	---	---	---	0.05
23.33	0.00	106.34	1.97	0.05	---	---	---	---	---	---	0.05
25.00	0.00	106.29	1.87	0.05	---	---	---	---	---	---	0.05
26.67	0.00	106.24	1.75	0.05	---	---	---	---	---	---	0.05
28.33	0.00	106.19	1.62	0.05	---	---	---	---	---	---	0.05
30.00	0.00	106.14	1.48	0.04	---	---	---	---	---	---	0.04
31.67	0.00	106.10	1.33	0.04	---	---	---	---	---	---	0.04
33.33	0.00	106.06	1.19	0.04	---	---	---	---	---	---	0.04
35.00	0.00	106.01	1.04	0.04	---	---	---	---	---	---	0.04
36.67	0.00	105.97	0.89	0.04	---	---	---	---	---	---	0.04
38.33	0.00	105.93	0.74	0.04	---	---	---	---	---	---	0.04
40.00	0.00	105.89	0.61	0.03	---	---	---	---	---	---	0.03
41.67	0.00	105.85	0.52	0.03	---	---	---	---	---	---	0.03
43.33	0.00	105.81	0.42	0.03	---	---	---	---	---	---	0.03
45.00	0.00	105.78	0.34	0.03	---	---	---	---	---	---	0.03
46.67	0.00	105.75	0.27	0.03	---	---	---	---	---	---	0.03
48.33	0.00	105.72	0.22	0.02	---	---	---	---	---	---	0.02
50.00	0.00	105.69	0.17	0.02	---	---	---	---	---	---	0.02
51.67	0.00	105.67	0.14	0.02	---	---	---	---	---	---	0.02
53.33	0.00	105.65	0.11	0.02	---	---	---	---	---	---	0.02
55.00	0.00	105.63	0.08	0.02	---	---	---	---	---	---	0.02
56.67	0.00	105.61	0.07	0.01	---	---	---	---	---	---	0.01
58.33	0.00	105.60	0.05	0.01	---	---	---	---	---	---	0.01
60.00	0.00	105.59	0.04	0.01	---	---	---	---	---	---	0.01

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
61.67	0.00	105.58	0.03	0.01	----	----	----	----	----	----	0.01
63.33	0.00	105.57	0.03	0.01	----	----	----	----	----	----	0.01
65.00	0.00	105.56	0.02	0.01	----	----	----	----	----	----	0.01
66.67	0.00	105.56	0.02	0.00	----	----	----	----	----	----	0.00
68.33	0.00	105.55	0.01	0.00	----	----	----	----	----	----	0.00
70.00	0.00	105.55	0.01	0.00	----	----	----	----	----	----	0.00
71.67	0.00	105.54	0.01	0.00	----	----	----	----	----	----	0.00
73.33	0.00	105.54	0.01	0.00	----	----	----	----	----	----	0.00
75.00	0.00	105.54	0.01	0.00	----	----	----	----	----	----	0.00
76.67	0.00	105.53	0.01	0.00	----	----	----	----	----	----	0.00
78.33	0.00	105.53	0.01	0.00	----	----	----	----	----	----	0.00
80.00	0.00	105.53	0.01	0.00	----	----	----	----	----	----	0.00
81.67	0.00	105.53	0.01	0.00	----	----	----	----	----	----	0.00
83.33	0.00	105.52	0.01	0.00	----	----	----	----	----	----	0.00
85.00	0.00	105.52	0.01	0.00	----	----	----	----	----	----	0.00
86.67	0.00	105.52	0.01	0.00	----	----	----	----	----	----	0.00
88.33	0.00	105.52	0.00	0.00	----	----	----	----	----	----	0.00
90.00	0.00	105.52	0.00	0.00	----	----	----	----	----	----	0.00
91.67	0.00	105.52	0.00	0.00	----	----	----	----	----	----	0.00
93.33	0.00	105.51	0.00	0.00	----	----	----	----	----	----	0.00
95.00	0.00	105.51	0.00	0.00	----	----	----	----	----	----	0.00
96.67	0.00	105.51	0.00	0.00	----	----	----	----	----	----	0.00
98.33	0.00	105.51	0.00	0.00	----	----	----	----	----	----	0.00
100.00	0.00	105.51	0.00	0.00	----	----	----	----	----	----	0.00

...End

Hydrograph Report

Hyd. No. 7

10yr routed

Hydrograph type = Reservoir
 Storm frequency = 10 yrs
 Inflow hyd. No. = 4
 Max. Elevation = 107.51 ft ✓

Peak discharge = 0.08 cfs
 Time interval = 10 min
 Reservoir name = Onsite BMP Wetl
 Max. Storage = 12,235 cuft

Storage Indication method used.

Total Volume = 13,452 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
1.67	0.65 <<	106.16	1.54	0.05	---	---	---	---	---	---	0.05
3.33	0.65 <<	106.76	2.84	0.06	---	---	---	---	---	---	0.06
5.00	0.65 <<	107.28 ←	3.96	0.08	---	---	---	---	---	---	0.08
6.67	0.00	107.49 ←	4.32	0.08	---	---	---	---	---	---	0.08
8.33	0.00	107.42	4.20	0.08	---	---	---	---	---	---	0.08
10.00	0.00	107.35	4.08	0.08	---	---	---	---	---	---	0.08
11.67	0.00	107.29	3.97	0.08	---	---	---	---	---	---	0.08
13.33	0.00	107.22	3.85	0.08	---	---	---	---	---	---	0.08
15.00	0.00	107.16	3.73	0.07	---	---	---	---	---	---	0.07
16.67	0.00	107.10	3.60	0.07	---	---	---	---	---	---	0.07
18.33	0.00	107.04	3.48	0.07	---	---	---	---	---	---	0.07
20.00	0.00	106.97	3.34	0.07	---	---	---	---	---	---	0.07
21.67	0.00	106.90	3.19	0.07	---	---	---	---	---	---	0.07
23.33	0.00	106.83	3.03	0.07	---	---	---	---	---	---	0.07
25.00	0.00	106.77	2.87	0.06	---	---	---	---	---	---	0.06
26.67	0.00	106.70	2.70	0.06	---	---	---	---	---	---	0.06
28.33	0.00	106.64	2.53	0.06	---	---	---	---	---	---	0.06
30.00	0.00	106.58	2.35	0.06	---	---	---	---	---	---	0.06
31.67	0.00	106.52	2.16	0.06	---	---	---	---	---	---	0.06
33.33	0.00	106.47	2.09	0.06	---	---	---	---	---	---	0.06
35.00	0.00	106.41	2.08	0.05	---	---	---	---	---	---	0.05
36.67	0.00	106.36	2.01	0.05	---	---	---	---	---	---	0.05
38.33	0.00	106.30	1.92	0.05	---	---	---	---	---	---	0.05
40.00	0.00	106.25	1.80	0.05	---	---	---	---	---	---	0.05
41.67	0.00	106.21	1.68	0.05	---	---	---	---	---	---	0.05
43.33	0.00	106.16	1.53	0.05	---	---	---	---	---	---	0.05
45.00	0.00	106.12	1.39	0.04	---	---	---	---	---	---	0.04
46.67	0.00	106.07	1.24	0.04	---	---	---	---	---	---	0.04
48.33	0.00	106.03	1.10	0.04	---	---	---	---	---	---	0.04
50.00	0.00	105.99	0.95	0.04	---	---	---	---	---	---	0.04
51.67	0.00	105.95	0.79	0.04	---	---	---	---	---	---	0.04
53.33	0.00	105.90	0.65	0.03	---	---	---	---	---	---	0.03
55.00	0.00	105.86	0.56	0.03	---	---	---	---	---	---	0.03
56.67	0.00	105.83	0.46	0.03	---	---	---	---	---	---	0.03
58.33	0.00	105.79	0.37	0.03	---	---	---	---	---	---	0.03
60.00	0.00	105.76	0.30	0.03	---	---	---	---	---	---	0.03

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
61.67	0.00	105.73	0.24	0.02	---	---	---	---	---	---	0.02
63.33	0.00	105.70	0.19	0.02	---	---	---	---	---	---	0.02
65.00	0.00	105.68	0.15	0.02	---	---	---	---	---	---	0.02
66.67	0.00	105.66	0.12	0.02	---	---	---	---	---	---	0.02
68.33	0.00	105.64	0.09	0.02	---	---	---	---	---	---	0.02
70.00	0.00	105.62	0.07	0.01	---	---	---	---	---	---	0.01
71.67	0.00	105.61	0.05	0.01	---	---	---	---	---	---	0.01
73.33	0.00	105.59	0.04	0.01	---	---	---	---	---	---	0.01
75.00	0.00	105.58	0.04	0.01	---	---	---	---	---	---	0.01
76.67	0.00	105.57	0.03	0.01	---	---	---	---	---	---	0.01
78.33	0.00	105.56	0.02	0.01	---	---	---	---	---	---	0.01
80.00	0.00	105.56	0.02	0.00	---	---	---	---	---	---	0.00
81.67	0.00	105.55	0.02	0.00	---	---	---	---	---	---	0.00
83.33	0.00	105.55	0.01	0.00	---	---	---	---	---	---	0.00
85.00	0.00	105.55	0.01	0.00	---	---	---	---	---	---	0.00
86.67	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
88.33	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
90.00	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
91.67	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
93.33	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
95.00	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
96.67	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
98.33	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
100.00	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
101.67	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
103.33	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
105.00	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
106.67	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
108.33	0.00	105.51	0.00	0.00	---	---	---	---	---	---	0.00
110.00	0.00	105.51	0.00	0.00	---	---	---	---	---	---	0.00
111.67	0.00	105.51	0.00	0.00	---	---	---	---	---	---	0.00

...End

Hydrograph Report

Hyd. No. 2

50yr routed

Hydrograph type = Reservoir
 Storm frequency = 50 yrs
 Inflow hyd. No. = 1
 Max. Elevation = 108.16 ft

Peak discharge = 0.10 cfs
 Time interval = 10 min
 Reservoir name = Onsite BMP Wetl
 Max. Storage = 17,136 cuft

Storage Indication method used.

Total Volume = 18,678 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
1.67	0.83 <<	106.33	1.96	0.05	---	---	---	---	---	---	0.05
3.33	0.83 <<	107.08	3.58	0.07	---	---	---	---	---	---	0.07
5.00	0.83 <<	107.71	4.68	0.09	---	---	---	---	---	---	0.09
6.67	0.00	108.16	5.33	0.10	---	---	---	---	---	---	0.10
8.33	0.00	108.09	5.24	0.09	---	---	---	---	---	---	0.09
10.00	0.00	108.03	5.14	0.09	---	---	---	---	---	---	0.09
11.67	0.00	107.95	5.04	0.09	---	---	---	---	---	---	0.09
13.33	0.00	107.88	4.93	0.09	---	---	---	---	---	---	0.09
15.00	0.00	107.80	4.82	0.09	---	---	---	---	---	---	0.09
16.67	0.00	107.73	4.71	0.09	---	---	---	---	---	---	0.09
18.33	0.00	107.66	4.60	0.09	---	---	---	---	---	---	0.09
20.00	0.00	107.59	4.48	0.08	---	---	---	---	---	---	0.08
21.67	0.00	107.52	4.37	0.08	---	---	---	---	---	---	0.08
23.33	0.00	107.45	4.25	0.08	---	---	---	---	---	---	0.08
25.00	0.00	107.38	4.14	0.08	---	---	---	---	---	---	0.08
26.67	0.00	107.32	4.02	0.08	---	---	---	---	---	---	0.08
28.33	0.00	107.25	3.90	0.08	---	---	---	---	---	---	0.08
30.00	0.00	107.19	3.78	0.08	---	---	---	---	---	---	0.08
31.67	0.00	107.12	3.66	0.07	---	---	---	---	---	---	0.07
33.33	0.00	107.06	3.54	0.07	---	---	---	---	---	---	0.07
35.00	0.00	107.00	3.41	0.07	---	---	---	---	---	---	0.07
36.67	0.00	106.93	3.26	0.07	---	---	---	---	---	---	0.07
38.33	0.00	106.87	3.11	0.07	---	---	---	---	---	---	0.07
40.00	0.00	106.80	2.95	0.07	---	---	---	---	---	---	0.07
41.67	0.00	106.73	2.78	0.06	---	---	---	---	---	---	0.06
43.33	0.00	106.67	2.61	0.06	---	---	---	---	---	---	0.06
45.00	0.00	106.61	2.44	0.06	---	---	---	---	---	---	0.06
46.67	0.00	106.55	2.25	0.06	---	---	---	---	---	---	0.06
48.33	0.00	106.49	2.09	0.06	---	---	---	---	---	---	0.06
50.00	0.00	106.44	2.08	0.06	---	---	---	---	---	---	0.06
51.67	0.00	106.38	2.05	0.05	---	---	---	---	---	---	0.05
53.33	0.00	106.33	1.96	0.05	---	---	---	---	---	---	0.05
55.00	0.00	106.28	1.86	0.05	---	---	---	---	---	---	0.05
56.67	0.00	106.23	1.73	0.05	---	---	---	---	---	---	0.05
58.33	0.00	106.18	1.60	0.05	---	---	---	---	---	---	0.05
60.00	0.00	106.14	1.46	0.04	---	---	---	---	---	---	0.04

Continues on next page...

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
61.67	0.00	106.09	1.31	0.04	----	----	----	----	----	----	0.04
63.33	0.00	106.05	1.17	0.04	----	----	----	----	----	----	0.04
65.00	0.00	106.01	1.03	0.04	----	----	----	----	----	----	0.04
66.67	0.00	105.97	0.87	0.04	----	----	----	----	----	----	0.04
68.33	0.00	105.92	0.72	0.04	----	----	----	----	----	----	0.04
70.00	0.00	105.88	0.60	0.03	----	----	----	----	----	----	0.03
71.67	0.00	105.85	0.51	0.03	----	----	----	----	----	----	0.03
73.33	0.00	105.81	0.41	0.03	----	----	----	----	----	----	0.03
75.00	0.00	105.78	0.33	0.03	----	----	----	----	----	----	0.03
76.67	0.00	105.75	0.26	0.03	----	----	----	----	----	----	0.03
78.33	0.00	105.72	0.21	0.02	----	----	----	----	----	----	0.02
80.00	0.00	105.69	0.17	0.02	----	----	----	----	----	----	0.02
81.67	0.00	105.67	0.13	0.02	----	----	----	----	----	----	0.02
83.33	0.00	105.65	0.10	0.02	----	----	----	----	----	----	0.02
85.00	0.00	105.63	0.08	0.01	----	----	----	----	----	----	0.01
86.67	0.00	105.61	0.06	0.01	----	----	----	----	----	----	0.01
88.33	0.00	105.60	0.05	0.01	----	----	----	----	----	----	0.01
90.00	0.00	105.59	0.04	0.01	----	----	----	----	----	----	0.01
91.67	0.00	105.58	0.03	0.01	----	----	----	----	----	----	0.01
93.33	0.00	105.57	0.03	0.01	----	----	----	----	----	----	0.01
95.00	0.00	105.56	0.02	0.01	----	----	----	----	----	----	0.01
96.67	0.00	105.56	0.02	0.00	----	----	----	----	----	----	0.00
98.33	0.00	105.55	0.01	0.00	----	----	----	----	----	----	0.00
100.00	0.00	105.55	0.01	0.00	----	----	----	----	----	----	0.00
101.67	0.00	105.54	0.01	0.00	----	----	----	----	----	----	0.00
103.33	0.00	105.54	0.01	0.00	----	----	----	----	----	----	0.00
105.00	0.00	105.54	0.01	0.00	----	----	----	----	----	----	0.00
106.67	0.00	105.53	0.01	0.00	----	----	----	----	----	----	0.00
108.33	0.00	105.53	0.01	0.00	----	----	----	----	----	----	0.00
110.00	0.00	105.53	0.01	0.00	----	----	----	----	----	----	0.00
111.67	0.00	105.53	0.01	0.00	----	----	----	----	----	----	0.00
113.33	0.00	105.52	0.01	0.00	----	----	----	----	----	----	0.00
115.00	0.00	105.52	0.01	0.00	----	----	----	----	----	----	0.00
116.67	0.00	105.52	0.01	0.00	----	----	----	----	----	----	0.00
118.33	0.00	105.52	0.00	0.00	----	----	----	----	----	----	0.00
120.00	0.00	105.52	0.00	0.00	----	----	----	----	----	----	0.00
121.67	0.00	105.52	0.00	0.00	----	----	----	----	----	----	0.00
123.33	0.00	105.51	0.00	0.00	----	----	----	----	----	----	0.00
125.00	0.00	105.51	0.00	0.00	----	----	----	----	----	----	0.00

...End

Hydrograph Report

Hyd. No. 8

100yr routed

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Inflow hyd. No. = 5
 Max. Elevation = 108.31 ft ✓

Peak discharge = 0.10 cfs
 Time interval = 10 min
 Reservoir name = Onsite BMP Wet
 Max. Storage = 18,376 cuft

Storage indication method used.

Total Volume = 19,926 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
1.67	0.91 <<	106.40	2.08	0.05	---	---	---	---	---	---	0.05
3.33	0.91 <<	107.21	3.82	0.08	---	---	---	---	---	---	0.08
5.00	0.91 <<	107.90	4.96	0.09	---	---	---	---	---	---	0.09
6.67	0.00	108.29	5.51	0.10	---	---	---	---	---	---	0.10
8.33	0.00	108.23	5.42	0.10	---	---	---	---	---	---	0.10
10.00	0.00	108.16	5.33	0.10	---	---	---	---	---	---	0.10
11.67	0.00	108.09	5.24	0.09	---	---	---	---	---	---	0.09
13.33	0.00	108.03	5.15	0.09	---	---	---	---	---	---	0.09
15.00	0.00	107.96	5.05	0.09	---	---	---	---	---	---	0.09
16.67	0.00	107.88	4.94	0.09	---	---	---	---	---	---	0.09
18.33	0.00	107.81	4.83	0.09	---	---	---	---	---	---	0.09
20.00	0.00	107.73	4.71	0.09	---	---	---	---	---	---	0.09
21.67	0.00	107.66	4.60	0.09	---	---	---	---	---	---	0.09
23.33	0.00	107.59	4.49	0.08	---	---	---	---	---	---	0.08
25.00	0.00	107.52	4.37	0.08	---	---	---	---	---	---	0.08
26.67	0.00	107.45	4.26	0.08	---	---	---	---	---	---	0.08
28.33	0.00	107.38	4.14	0.08	---	---	---	---	---	---	0.08
30.00	0.00	107.32	4.03	0.08	---	---	---	---	---	---	0.08
31.67	0.00	107.25	3.91	0.08	---	---	---	---	---	---	0.08
33.33	0.00	107.19	3.79	0.08	---	---	---	---	---	---	0.08
35.00	0.00	107.13	3.67	0.07	---	---	---	---	---	---	0.07
36.67	0.00	107.07	3.54	0.07	---	---	---	---	---	---	0.07
38.33	0.00	107.01	3.42	0.07	---	---	---	---	---	---	0.07
40.00	0.00	106.94	3.27	0.07	---	---	---	---	---	---	0.07
41.67	0.00	106.87	3.11	0.07	---	---	---	---	---	---	0.07
43.33	0.00	106.80	2.95	0.07	---	---	---	---	---	---	0.07
45.00	0.00	106.74	2.79	0.06	---	---	---	---	---	---	0.06
46.67	0.00	106.67	2.62	0.06	---	---	---	---	---	---	0.06
48.33	0.00	106.61	2.44	0.06	---	---	---	---	---	---	0.06
50.00	0.00	106.55	2.26	0.06	---	---	---	---	---	---	0.06
51.67	0.00	106.49	2.09	0.06	---	---	---	---	---	---	0.06
53.33	0.00	106.44	2.08	0.06	---	---	---	---	---	---	0.06
55.00	0.00	106.38	2.06	0.05	---	---	---	---	---	---	0.05
56.67	0.00	106.33	1.96	0.05	---	---	---	---	---	---	0.05
58.33	0.00	106.28	1.86	0.05	---	---	---	---	---	---	0.05
60.00	0.00	106.23	1.74	0.05	---	---	---	---	---	---	0.05

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
61.67	0.00	106.18	1.61	0.05	---	---	---	---	---	---	0.05
63.33	0.00	106.14	1.46	0.04	---	---	---	---	---	---	0.04
65.00	0.00	106.09	1.32	0.04	---	---	---	---	---	---	0.04
66.67	0.00	106.05	1.17	0.04	---	---	---	---	---	---	0.04
68.33	0.00	106.01	1.03	0.04	---	---	---	---	---	---	0.04
70.00	0.00	105.97	0.87	0.04	---	---	---	---	---	---	0.04
71.67	0.00	105.92	0.72	0.04	---	---	---	---	---	---	0.04
73.33	0.00	105.88	0.60	0.03	---	---	---	---	---	---	0.03
75.00	0.00	105.85	0.51	0.03	---	---	---	---	---	---	0.03
76.67	0.00	105.81	0.41	0.03	---	---	---	---	---	---	0.03
78.33	0.00	105.78	0.33	0.03	---	---	---	---	---	---	0.03
80.00	0.00	105.75	0.26	0.03	---	---	---	---	---	---	0.03
81.67	0.00	105.72	0.21	0.02	---	---	---	---	---	---	0.02
83.33	0.00	105.69	0.17	0.02	---	---	---	---	---	---	0.02
85.00	0.00	105.67	0.13	0.02	---	---	---	---	---	---	0.02
86.67	0.00	105.65	0.10	0.02	---	---	---	---	---	---	0.02
88.33	0.00	105.63	0.08	0.01	---	---	---	---	---	---	0.01
90.00	0.00	105.61	0.06	0.01	---	---	---	---	---	---	0.01
91.67	0.00	105.60	0.05	0.01	---	---	---	---	---	---	0.01
93.33	0.00	105.59	0.04	0.01	---	---	---	---	---	---	0.01
95.00	0.00	105.58	0.03	0.01	---	---	---	---	---	---	0.01
96.67	0.00	105.57	0.03	0.01	---	---	---	---	---	---	0.01
98.33	0.00	105.56	0.02	0.01	---	---	---	---	---	---	0.01
100.00	0.00	105.56	0.02	0.00	---	---	---	---	---	---	0.00
101.67	0.00	105.55	0.01	0.00	---	---	---	---	---	---	0.00
103.33	0.00	105.55	0.01	0.00	---	---	---	---	---	---	0.00
105.00	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
106.67	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
108.33	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
110.00	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
111.67	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
113.33	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
115.00	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
116.67	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
118.33	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
120.00	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
121.67	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
123.33	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
125.00	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
126.67	0.00	105.51	0.00	0.00	---	---	---	---	---	---	0.00

...End

Jehovah's Witness BMP Compliance

12/13/99

Side Area - 2.47 ac

onsite BMP - 9 Pts w/ 1.9 ac drainage area

offsite BMP 6 Pts w/ 0.22 ac " "

Structural Pts

$$9 \times \frac{1.9}{2.47} + 6 \times \frac{0.22}{2.47} = 7.5 \text{ Pts}$$

$$\text{Pond Area} = \frac{240 \times 80}{43,560} = 0.44$$

$$\text{if counted as NOS} = \frac{0.44}{2.47} = 0.18 \times 10 = \underline{1.8}$$

9.3 Pts

Rear of Lot 40' x 245' = 0.22 ac

reduce size of lot by 0.22 ac for undisturbed area

$$\frac{9 \times 1.9}{2.23} + \frac{6 \times 0.22}{2.23} = 8.26$$

$$\text{Plus NOS} = \underline{1.8}$$

10.06 pts



Langley and McDonald, P.C.

ENGINEERS • SURVEYORS • PLANNERS
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VIRGINIA BEACH • WILLIAMSBURG, VIRGINIA

Subject JEHOVAH'S WITNESSES
SITE PLAN - MORETOWN, VA.

Computed By LUP Checked by _____

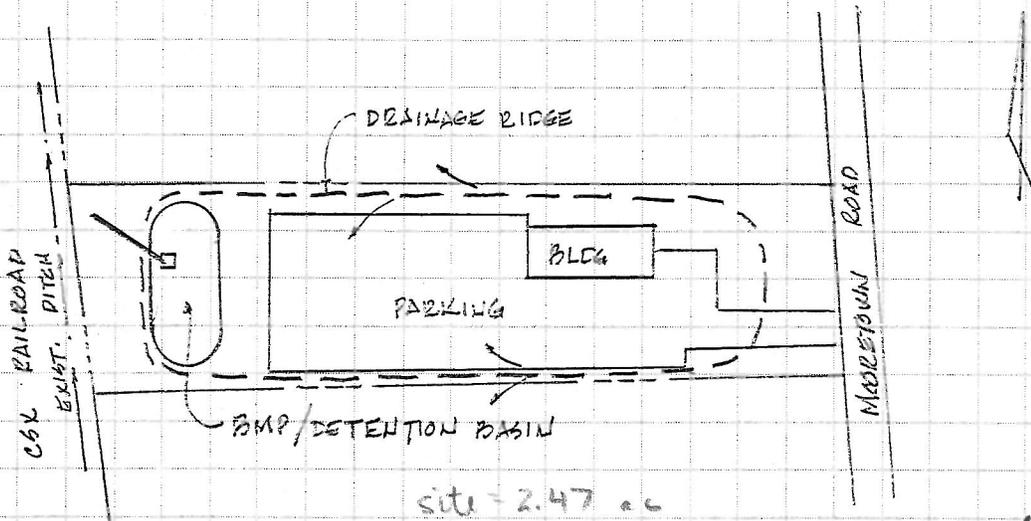
Project No. 131020-001.02

Client _____

Date 10-99 Sheet No. 1

ON-SITE BMP DESIGN CRITERIA

- USE EXTENDED DETENTION (DESIGN I) WITH 24HR WASH DRAINDOWN
- USE MODIFIED RATIONAL CRITICAL STORM METHOD
- MAX. 0.10 CFS RELEASE FROM BMP FOR 50 YR STORM PER "CSX" REQUIREMENT
- USE STORAGE INDICATION METHOD FOR ROUTINGS



site = 2.47 ac

DA BMP = 1.9

77% x 9 = 6.9 pts

POST DEVELOPMENT CONDITIONS

DA = 1.90 ACRES TO BMP ✓

BLDG = 0.11 Ac. C C=0.90 ✓

PAVED & WALKS = 0.93 Ac. C C=0.90

OPEN/GRASSED = 0.50 Ac. C C=0.25

Cavg = 0.69 ✓

T_d = 10 MIN. ✓

IMPERVIOUS RATIO = 57% ✓

Need 3.1 pts

or .77 ac of site in NOS

POUND HYDRAULICS & HYDROLOGY APPEAR OK, ES. PROVIDED

NONE NEEDED
100-YEAR DESIGN WSEL CANNOT REACH RISER CREST OR ALLOWABLE 0.1 CFS IS EXCEEDED.
FB = 1.19 FT

NO SIGNIFICANT STRUCTURES DOWNSTREAM.

SUMMARY - PEAK CRITICAL STORM INFLOW TO BASIN

STORM	INFLOW (CFS)
2 YR	0.50
10 YR	0.65
50 YR	0.88
100 YR	0.91

MAX. OUTFLOW = 0.10 CFS PER "CSX"

FINAL HYDRAULICS

PROJECT: SITE PLAN JEHOVAH'S WITNESSES

DETENTION BASIN DESIGN
MODIFIED RATIONAL
CRITICAL STORM METHOD

DESIGN DATA:

2 Year Design Storm

Drainage Area (Acres) = 1.9 Acres
Runoff Coeff. (Pre) = 0.25
Runoff Coeff. (Post) = 0.62
Post Development TC (Min) = 10 Min.

RESULTS:

Critical Storm Duration (Min) = 315 Min.
Peak Critical Storm Basin Inflow (CFS) = 0.50 C.F.S.
Allowable Post Development Basin Discharge (CFS) = 0.05 C.F.S.
Required Storage Volume for Detention Basin (CF) = 8978 C.F. ✓

HYDROGRAPH VALUES
POST DEVELOPMENT

<u>Q</u>	<u>T</u>
0.00	0.0
0.50	10
0.50	315
0.00	330

PROJECT: SITE PLAN JEHOVAH'S WITNESSES

DETENTION BASIN DESIGN
MODIFIED RATIONAL
CRITICAL STORM METHOD

DESIGN DATA:

10 Year Design Storm

Drainage Area (Acres)	=	1.9 Acres
Runoff Coeff. (Pre)	=	0.25
Runoff Coeff. (Post)	=	0.62
Post Development TC (Min)	=	10 Min.

RESULTS:

Critical Storm Duration (Min)	=	340 Min.
Peak Critical Storm Basin Inflow (CFS)	=	0.65 C.F.S.
Allowable Post Development Basin Discharge (CFS)	=	0.08 C.F.S.
Required Storage Volume for Detention Basin (CF)	=	12624 C.F. ✓

HYDROGRAPH VALUES
POST DEVELOPMENT

<u>Q</u>	<u>I</u>
0.00	0.0
0.65	10
0.65	340
0.00	355

PROJECT: SITE PLAN JEHOVAH'S WITNESSES

DETENTION BASIN DESIGN
MODIFIED RATIONAL
CRITICAL STORM METHOD

DESIGN DATA:

50 Year Design Storm

Drainage Area (Acres)	=	1.90 Acres
Runoff Coeff. (Pre)	=	0.25
Runoff Coeff. (Post)	=	0.62
Post Development TC (Min)	=	10 Min.

RESULTS:

Critical Storm Duration (Min)	=	371 Min.
Peak Critical Storm Basin Inflow (CFS)	=	0.83 C.F.S.
Allowable Post Development Basin Discharge (CFS)	=	0.10 C.F.S.
Required Storage Volume for Detention Basin (CF)	=	17480 C.F.

HYDROGRAPH VALUES
POST DEVELOPMENT

<u>Q</u>	<u>T</u>
0.00	0.0
0.83	10
0.83	371
0.00	386

PROJECT: SITE PLAN JEHOVAH'S WITNESSES

DETENTION BASIN DESIGN
MODIFIED RATIONAL
CRITICAL STORM METHOD

DESIGN DATA:

100 Year Design Storm		
Drainage Area (Acres)	=	1.9 Acres
Runoff Coeff. (Pre)	=	0.25
Runoff Coeff. (Post)	=	0.62
Post Development TC (Min)	=	10 Min.

RESULTS:

Critical Storm Duration (Min)	=	364 Min.
Peak Critical Storm Basin Inflow (CFS)	=	0.91 C.F.S.
Allowable Post Development Basin Discharge (CFS)	=	0.11 C.F.S.
Required Storage Volume for Detention Basin (CF)	=	18668 C.F.

HYDROGRAPH VALUES
POST DEVELOPMENT

<u>Q</u>	<u>T</u>
0.00	0.0
0.91	10
0.91	364
0.00	379



Langley and McDonald, P.C.

ENGINEERS • SURVEYORS • PLANNERS
LANDSCAPE ARCHITECTS • ENVIRONMENTAL CONSULTANTS

VIRGINIA BEACH • WILLIAMSBURG, VIRGINIA

Subject JEHOVAHS WITNESSES

Project No. 18T0040-300.04

Client _____

Computed By LMP Checked by _____

Date _____ Sheet No. _____

MIN. WATER QUALITY VOLUME PER DESIGN 1

1" STORM RU FOR 24 HOURS

$$R_u = 0.05 + 0.009(I)$$

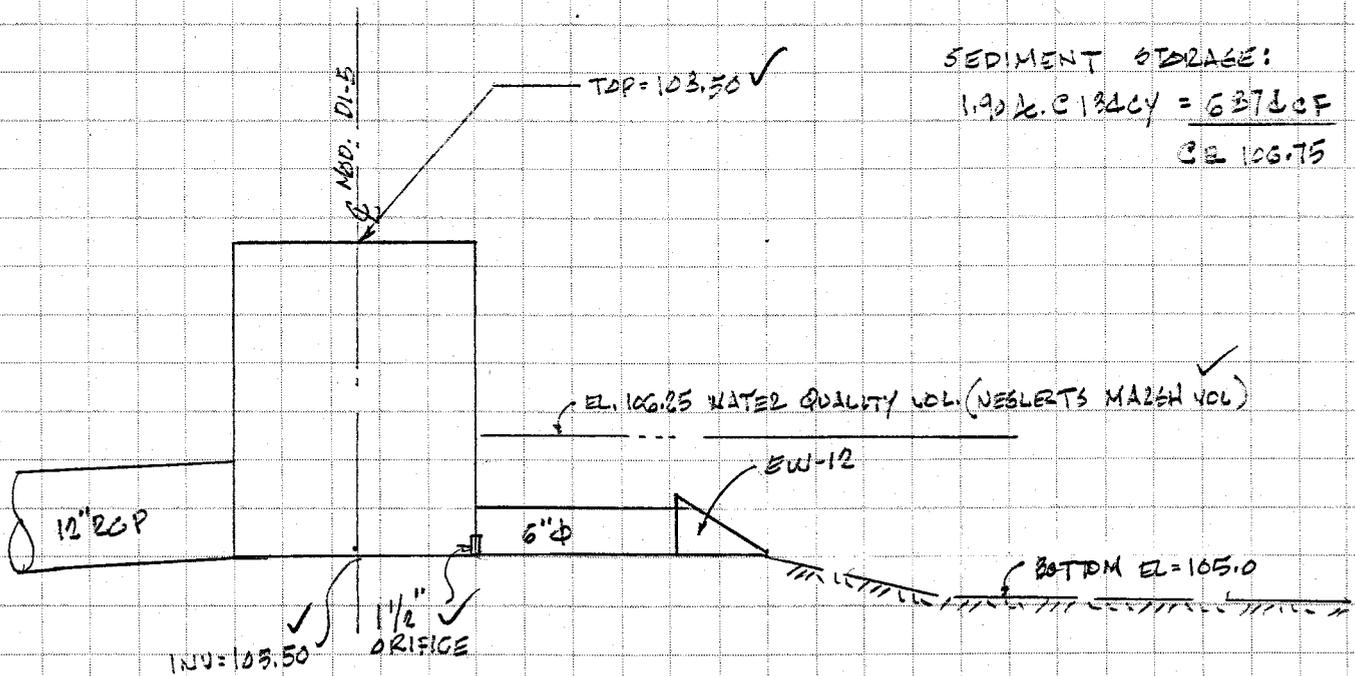
$$= 0.05 + 0.009(57)$$

$$= 0.56$$

I = 57%

$$VOLUME = (0.033')(0.56)(1.90)(43560)$$

$$= \underline{3317 \text{ C.F.}} \quad (\text{EL. 106.25}) \checkmark$$



SEDIMENT STORAGE:

$$1.90 \text{ L.C.} = \underline{6373 \text{ CF}}$$

CE 106.75

WETLAND VOL. REQ'D (0.45") ← ?

$$VOL = (0.0375')(0.56)(1.90)(43560)$$

$$= \underline{1733 \text{ C.F.}}$$

ELEV	AREA (SF)	A ₁ +A ₂ /2	VOL. (CF)
105.0	4144	0	
105.5	4724	4462	2232 \checkmark 02 > 1738

Reservoir Report

Reservoir No. 2 - Onsite BMP Wetland

English

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	105.50	4,784	0	0
0.50	106.00	5,480	2,566	2,566
1.50	107.00	6,500 ✓	5,990	8,556
2.50	108.00	7,856	7,178	15,734
3.50	109.00	9,312	8,584	24,318
4.00	109.50	10,444	4,939	29,257

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 12.0 ✓	1.5	0.0	0.0
Span in	= 12.0 ✓	1.5	0.0	0.0
No. Barrels	= 1	1	0	0
Invert El. ft	= 105.50 ✓	105.50 ✓	0.00	0.00
Length ft	= 40.0 ✓	0.0	0.0	0.0
Slope %	= 0.75 ✓	0.00	0.00	0.00
N-Value	= .013 ✓	.010	.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	= 12.7	0.0	0.0	0.0
Crest El. ft	= 108.50 ✓	0.00	0.00	0.00
Weir Coeff.	= 3.08 ✓	0.00	0.00	0.00
Eqn. Exp.	= 1.50	0.00	0.00	0.00
Multi-Stage	= Yes	No	No	No

3.5(A) = 14 SF
10% CLOGGED
GRATE AREA
NOT USED
ONLY BOX
OPENING.

Tailwater Elevation = 0.00 ft *No TW ELEV*

Stage / Storage / Discharge Table

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

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	105.50	0.00	0.00	---	---	0.00	---	---	---	0.00
0.05	257	105.55	0.01	0.00	---	---	0.00	---	---	---	0.00
0.10	513	105.60	0.05	0.01	---	---	0.00	---	---	---	0.01
0.15	770	105.65	0.11	0.02	---	---	0.00	---	---	---	0.02
0.20	1,026	105.70	0.18	0.02	---	---	0.00	---	---	---	0.02
0.25	1,283	105.75	0.27	0.03	---	---	0.00	---	---	---	0.03
0.30	1,540	105.80	0.38	0.03	---	---	0.00	---	---	---	0.03
0.35	1,796	105.85	0.52	0.03	---	---	0.00	---	---	---	0.03
0.40	2,053	105.90	0.64	0.03	---	---	0.00	---	---	---	0.03
0.45	2,309	105.95	0.81	0.04	---	---	0.00	---	---	---	0.04
0.50	2,566	106.00	0.99	0.04	---	---	0.00	---	---	---	0.04

Continues on next page...

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
0.60	3,165	106.10	1.34	0.04	---	---	0.00	---	---	---	0.04
0.70	3,764	106.20	1.66	0.05	---	---	0.00	---	---	---	0.05
0.80	4,363	106.30	1.91	0.05	---	---	0.00	---	---	---	0.05
0.90	4,962	106.40	2.08	0.05	---	---	0.00	---	---	---	0.05
1.00	5,561	106.50	2.09	0.06	---	---	0.00	---	---	---	0.06
1.10	6,160	106.60	2.41	0.06	---	---	0.00	---	---	---	0.06
1.20	6,759	106.70	2.69	0.06	---	---	0.00	---	---	---	0.06
1.30	7,358	106.80	2.95	0.07	---	---	0.00	---	---	---	0.07
1.40	7,957	106.90	3.19	0.07	---	---	0.00	---	---	---	0.07
1.50	8,556	107.00	3.41	0.07	---	---	0.00	---	---	---	0.07
1.60	9,274	107.10	3.61	0.07	---	---	0.00	---	---	---	0.07
1.70	9,992	107.20	3.81	0.08	---	---	0.00	---	---	---	0.08
1.80	10,709	107.30	3.99	0.08	---	---	0.00	---	---	---	0.08
1.90	11,427	107.40	4.17	0.08	---	---	0.00	---	---	---	0.08
2.00	12,145	107.50	4.34	0.08	---	---	0.00	---	---	---	0.08
2.10	12,863	107.60	4.51	0.08	---	---	0.00	---	---	---	0.08
2.20	13,581	107.70	4.66	0.09	---	---	0.00	---	---	---	0.09
2.30	14,298	107.80	4.82	0.09	---	---	0.00	---	---	---	0.09
2.40	15,016	107.90	4.97	0.09	---	---	0.00	---	---	---	0.09
2.50	15,734	108.00	5.11	0.09	---	---	0.00	---	---	---	0.09
2.60	16,592	108.10	5.25	0.09	---	---	0.00	---	---	---	0.09
2.70	17,451	108.20	5.39	0.10	---	---	0.00	---	---	---	0.10
2.80	18,309	108.30	5.52	0.10	---	---	0.00	---	---	---	0.10
2.90	19,168	108.40	5.65	0.10	---	---	0.00	---	---	---	0.10
3.00	20,026	108.50	5.78	0.10	---	---	0.00	---	---	---	0.10
3.10	20,884	108.60	5.90	0.10	---	---	1.23	---	---	---	1.34
3.20	21,743	108.70	6.02	0.10	---	---	3.49	---	---	---	3.59
3.30	22,601	108.80	6.14	0.11	---	---	6.41	---	---	---	6.25
3.40	23,460	108.90	6.26	0.11	---	---	9.86	---	---	---	6.37
3.50	24,318	109.00	6.37	0.11	---	---	13.79	---	---	---	6.48
3.55	24,812	109.05	6.43	0.11	---	---	15.90	---	---	---	6.54
3.60	25,306	109.10	6.49	0.11	---	---	18.12	---	---	---	6.60
3.65	25,800	109.15	6.54	0.11	---	---	20.43	---	---	---	6.65
3.70	26,294	109.20	6.60	0.11	---	---	22.84	---	---	---	6.71
3.75	26,788	109.25	6.65	0.11	---	---	25.33	---	---	---	6.76
3.80	27,281	109.30	6.71	0.11	---	---	27.90	---	---	---	6.82
3.85	27,775	109.35	6.76	0.11	---	---	30.56	---	---	---	6.87
3.90	28,269	109.40	6.81	0.12	---	---	33.29	---	---	---	6.93
3.95	28,763	109.45	6.87	0.12	---	---	36.11	---	---	---	6.98
4.00	29,257	109.50	6.92	0.12	---	---	38.99	---	---	---	7.04

0.10 CFS
EXCEEDED
IF WSEL
GETS TO
RISE
CREST.

...End

BMP

BMP - JEHOVAH'S WITNESSES PROJECT - MOORETOWN ROAD
BASIN DRAWDOWN SUMMARY FOR 1" Rv STORM
1-1/2" ORIFICE AT ELEV. 105.50

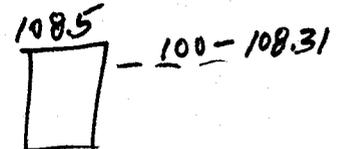
ELEV	RISE	VOL(CF)	D	Q(OUT)	TIME(HR)	SUM(HR)
106.25	0.750	3847.00	0.687	0.0499	0.4620	0.4620
106.20	0.700	3764.00	0.637	0.0481	3.4624	3.9244
106.10	0.600	3165.00	0.537	0.0441	3.7710	7.6954
106.00	0.500	2566.00	0.437	0.0398	3.5801	11.2755
105.90	0.400	2053.00	0.337	0.0350	4.0768	15.3523
105.80	0.300	1540.00	0.237	0.0293	4.8709	20.2232
105.70	0.200	1026.00	0.137	0.0223	6.3941	26.6173
105.60	0.100	513.00	0.037	0.0116	12.3037	38.9210
105.50	0.000	0.00	0.000	0.0000	0.0000	38.9210

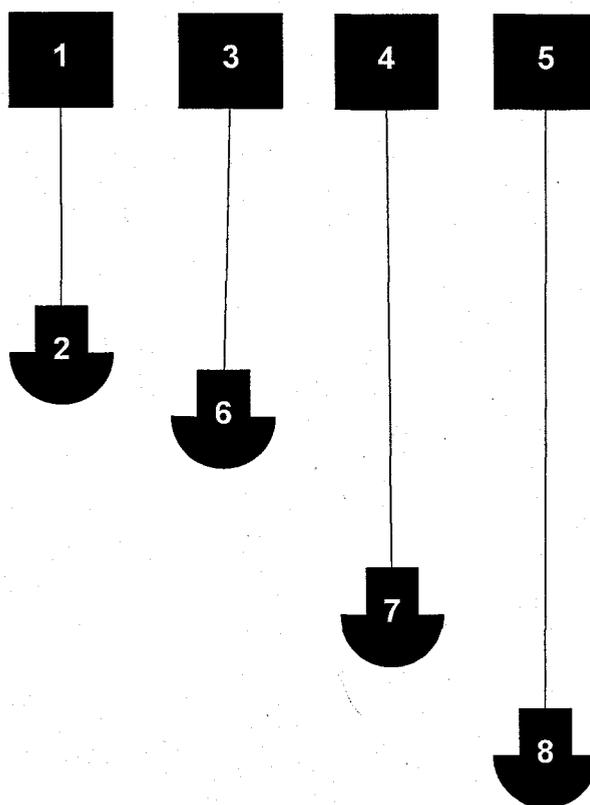
> 24-30 HRS OK

SUMMARY OF RUNOFF ANALYSIS AND DETENTION BASIN PERFORMANCE

- 2 YR - POST DEVELOPMENT ROUTING DISCHARGE = 0.07 CFS @ Elevation 106.99
- 10 YR - POST DEVELOPMENT ROUTING DISCHARGE = 0.08 CFS @ Elevation 107.51
- 50 YR - POST DEVELOPMENT ROUTING DISCHARGE = 0.10 CFS @ Elevation 108.16
- 100 YR - POST DEVELOPMENT ROUTING DISCHARGE = 0.10 CFS @ Elevation 108.31

ALL
 < 0.1 CFS
 WSEL
 CANNOT GET
 TO RISER CRBST
 OR ALLOW PRE
 IS EXCEEDED





Legend

- Runoff
- Combined
- Channel Reach
- Diversion
- ⌋ Pond Route

Project: Jehovah's.GPW	IDF: Norfolk.IDF	8 hyd's	10-25-1999
------------------------	------------------	---------	------------

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	Manual	0.83	10	10	18,678	50	—	—	—	50yr critical
2	Reservoir	0.10	10	390	18,678	50	1	108.16	17,136	50yr routed
3	Manual	0.50	10	10	9,450	2	—	—	—	2yr critical
4	Manual	0.65	10	10	13,452	10	—	—	—	10yr critical
5	Manual	0.91	10	10	19,926	100	—	—	—	100yr critical
6	Reservoir	0.07	10	330	9,450	2	3	106.99	8,516	2yr routed
7	Reservoir	0.08	10	360	13,452	10	4	107.51	12,235	10yr routed
8	Reservoir	0.10	10	380	19,926	100	5	108.31	18,376	100yr routed

Proj. file: Jehovah's.GPW	IDF file: Norfolk.IDF	Run date: 10-25-1999
---------------------------	-----------------------	----------------------

Hydrograph Report

Hyd. No. 1

50yr critical

Hydrograph type = Manual
Storm frequency = 50 yrs

Peak discharge = 0.83 cfs
Time interval = 10 min

Total Volume = 18,678 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.17	0.83 <<
1.83	0.83 <<
3.50	0.83 <<
5.17	0.83 <<

...End

Hydrograph Report

Hyd. No. 2

50yr routed

Hydrograph type = Reservoir
 Storm frequency = 50 yrs
 Inflow hyd. No. = 1
 Max. Elevation = 108.16 ft

Peak discharge = 0.10 cfs
 Time interval = 10 min
 Reservoir name = Onsite BMP Wetl
 Max. Storage = 17,136 cuft

Storage Indication method used.

Total Volume = 18,678 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
1.67	0.83 <<	106.33	1.96	0.05	---	---	---	---	---	---	0.05
3.33	0.83 <<	107.08	3.58	0.07	---	---	---	---	---	---	0.07
5.00	0.83 <<	107.71	4.68	0.09	---	---	---	---	---	---	0.09
6.67	0.00	108.16	5.33	0.10	---	---	---	---	---	---	0.10
8.33	0.00	108.09	5.24	0.09	---	---	---	---	---	---	0.09
10.00	0.00	108.03	5.14	0.09	---	---	---	---	---	---	0.09
11.67	0.00	107.95	5.04	0.09	---	---	---	---	---	---	0.09
13.33	0.00	107.88	4.93	0.09	---	---	---	---	---	---	0.09
15.00	0.00	107.80	4.82	0.09	---	---	---	---	---	---	0.09
16.67	0.00	107.73	4.71	0.09	---	---	---	---	---	---	0.09
18.33	0.00	107.66	4.60	0.09	---	---	---	---	---	---	0.09
20.00	0.00	107.59	4.48	0.08	---	---	---	---	---	---	0.08
21.67	0.00	107.52	4.37	0.08	---	---	---	---	---	---	0.08
23.33	0.00	107.45	4.25	0.08	---	---	---	---	---	---	0.08
25.00	0.00	107.38	4.14	0.08	---	---	---	---	---	---	0.08
26.67	0.00	107.32	4.02	0.08	---	---	---	---	---	---	0.08
28.33	0.00	107.25	3.90	0.08	---	---	---	---	---	---	0.08
30.00	0.00	107.19	3.78	0.08	---	---	---	---	---	---	0.08
31.67	0.00	107.12	3.66	0.07	---	---	---	---	---	---	0.07
33.33	0.00	107.06	3.54	0.07	---	---	---	---	---	---	0.07
35.00	0.00	107.00	3.41	0.07	---	---	---	---	---	---	0.07
36.67	0.00	106.93	3.26	0.07	---	---	---	---	---	---	0.07
38.33	0.00	106.87	3.11	0.07	---	---	---	---	---	---	0.07
40.00	0.00	106.80	2.95	0.07	---	---	---	---	---	---	0.07
41.67	0.00	106.73	2.78	0.06	---	---	---	---	---	---	0.06
43.33	0.00	106.67	2.61	0.06	---	---	---	---	---	---	0.06
45.00	0.00	106.61	2.44	0.06	---	---	---	---	---	---	0.06
46.67	0.00	106.55	2.25	0.06	---	---	---	---	---	---	0.06
48.33	0.00	106.49	2.09	0.06	---	---	---	---	---	---	0.06
50.00	0.00	106.44	2.08	0.06	---	---	---	---	---	---	0.06
51.67	0.00	106.38	2.05	0.05	---	---	---	---	---	---	0.05
53.33	0.00	106.33	1.96	0.05	---	---	---	---	---	---	0.05
55.00	0.00	106.28	1.86	0.05	---	---	---	---	---	---	0.05
56.67	0.00	106.23	1.73	0.05	---	---	---	---	---	---	0.05
58.33	0.00	106.18	1.60	0.05	---	---	---	---	---	---	0.05
60.00	0.00	106.14	1.46	0.04	---	---	---	---	---	---	0.04

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
61.67	0.00	106.09	1.31	0.04	----	----	----	----	----	----	0.04
63.33	0.00	106.05	1.17	0.04	----	----	----	----	----	----	0.04
65.00	0.00	106.01	1.03	0.04	----	----	----	----	----	----	0.04
66.67	0.00	105.97	0.87	0.04	----	----	----	----	----	----	0.04
68.33	0.00	105.92	0.72	0.04	----	----	----	----	----	----	0.04
70.00	0.00	105.88	0.60	0.03	----	----	----	----	----	----	0.03
71.67	0.00	105.85	0.51	0.03	----	----	----	----	----	----	0.03
73.33	0.00	105.81	0.41	0.03	----	----	----	----	----	----	0.03
75.00	0.00	105.78	0.33	0.03	----	----	----	----	----	----	0.03
76.67	0.00	105.75	0.26	0.03	----	----	----	----	----	----	0.03
78.33	0.00	105.72	0.21	0.02	----	----	----	----	----	----	0.02
80.00	0.00	105.69	0.17	0.02	----	----	----	----	----	----	0.02
81.67	0.00	105.67	0.13	0.02	----	----	----	----	----	----	0.02
83.33	0.00	105.65	0.10	0.02	----	----	----	----	----	----	0.02
85.00	0.00	105.63	0.08	0.01	----	----	----	----	----	----	0.01
86.67	0.00	105.61	0.06	0.01	----	----	----	----	----	----	0.01
88.33	0.00	105.60	0.05	0.01	----	----	----	----	----	----	0.01
90.00	0.00	105.59	0.04	0.01	----	----	----	----	----	----	0.01
91.67	0.00	105.58	0.03	0.01	----	----	----	----	----	----	0.01
93.33	0.00	105.57	0.03	0.01	----	----	----	----	----	----	0.01
95.00	0.00	105.56	0.02	0.01	----	----	----	----	----	----	0.01
96.67	0.00	105.56	0.02	0.00	----	----	----	----	----	----	0.00
98.33	0.00	105.55	0.01	0.00	----	----	----	----	----	----	0.00
100.00	0.00	105.55	0.01	0.00	----	----	----	----	----	----	0.00
101.67	0.00	105.54	0.01	0.00	----	----	----	----	----	----	0.00
103.33	0.00	105.54	0.01	0.00	----	----	----	----	----	----	0.00
105.00	0.00	105.54	0.01	0.00	----	----	----	----	----	----	0.00
106.67	0.00	105.53	0.01	0.00	----	----	----	----	----	----	0.00
108.33	0.00	105.53	0.01	0.00	----	----	----	----	----	----	0.00
110.00	0.00	105.53	0.01	0.00	----	----	----	----	----	----	0.00
111.67	0.00	105.53	0.01	0.00	----	----	----	----	----	----	0.00
113.33	0.00	105.52	0.01	0.00	----	----	----	----	----	----	0.00
115.00	0.00	105.52	0.01	0.00	----	----	----	----	----	----	0.00
116.67	0.00	105.52	0.01	0.00	----	----	----	----	----	----	0.00
118.33	0.00	105.52	0.00	0.00	----	----	----	----	----	----	0.00
120.00	0.00	105.52	0.00	0.00	----	----	----	----	----	----	0.00
121.67	0.00	105.52	0.00	0.00	----	----	----	----	----	----	0.00
123.33	0.00	105.51	0.00	0.00	----	----	----	----	----	----	0.00
125.00	0.00	105.51	0.00	0.00	----	----	----	----	----	----	0.00

...End

Hydrograph Report

Hyd. No. 3

2yr critical

Hydrograph type = Manual
Storm frequency = 2 yrs

Peak discharge = 0.50 cfs
Time interval = 10 min

Total Volume = 9,450 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.17	0.50 <<
1.83	0.50 <<
3.50	0.50 <<
5.17	0.50 <<

...End

Hydrograph Report

Page 1

English

Hyd. No. 4

10yr critical

Hydrograph type = Manual

Storm frequency = 10 yrs

Peak discharge = 0.65 cfs

Time interval = 10 min

Total Volume = 13,452 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.17	0.65 <<
1.83	0.65 <<
3.50	0.65 <<
5.17	0.65 <<

...End

Hydrograph Report

Page 1

English

Hyd. No. 5

100yr critical

Hydrograph type = Manual

Storm frequency = 100 yrs

Peak discharge = 0.91 cfs

Time interval = 10 min

Total Volume = 19,926 cuft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

0.17	0.91 <<
1.83	0.91 <<
3.50	0.91 <<
5.17	0.91 <<

...End

Hydrograph Report

Hyd. No. 6

2yr routed

Hydrograph type = Reservoir
 Storm frequency = 2 yrs
 Inflow hyd. No. = 3
 Max. Elevation = 106.99 ft ✓

Peak discharge = 0.07 cfs
 Time interval = 10 min
 Reservoir name = Onsite BMP Wetl
 Max. Storage = 8,516 cuft

Storage Indication method used.

Total Volume = 9,450 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
1.67	0.50 <<	106.02	1.08	0.04	---	---	---	---	---	---	0.04
3.33	0.50 <<	106.48	2.09	0.06	---	---	---	---	---	---	0.06
5.00	0.50 <<	106.91	3.22	0.07	---	---	---	---	---	---	0.07
6.67	0.00	106.94	3.28	0.07	---	---	---	---	---	---	0.07
8.33	0.00	106.88	3.13	0.07	---	---	---	---	---	---	0.07
10.00	0.00	106.81	2.97	0.07	---	---	---	---	---	---	0.07
11.67	0.00	106.74	2.80	0.06	---	---	---	---	---	---	0.06
13.33	0.00	106.68	2.64	0.06	---	---	---	---	---	---	0.06
15.00	0.00	106.62	2.46	0.06	---	---	---	---	---	---	0.06
16.67	0.00	106.56	2.27	0.06	---	---	---	---	---	---	0.06
18.33	0.00	106.50	2.09	0.06	---	---	---	---	---	---	0.06
20.00	0.00	106.44	2.08	0.06	---	---	---	---	---	---	0.06
21.67	0.00	106.39	2.07	0.05	---	---	---	---	---	---	0.05
23.33	0.00	106.34	1.97	0.05	---	---	---	---	---	---	0.05
25.00	0.00	106.29	1.87	0.05	---	---	---	---	---	---	0.05
26.67	0.00	106.24	1.75	0.05	---	---	---	---	---	---	0.05
28.33	0.00	106.19	1.62	0.05	---	---	---	---	---	---	0.05
30.00	0.00	106.14	1.48	0.04	---	---	---	---	---	---	0.04
31.67	0.00	106.10	1.33	0.04	---	---	---	---	---	---	0.04
33.33	0.00	106.06	1.19	0.04	---	---	---	---	---	---	0.04
35.00	0.00	106.01	1.04	0.04	---	---	---	---	---	---	0.04
36.67	0.00	105.97	0.89	0.04	---	---	---	---	---	---	0.04
38.33	0.00	105.93	0.74	0.04	---	---	---	---	---	---	0.04
40.00	0.00	105.89	0.61	0.03	---	---	---	---	---	---	0.03
41.67	0.00	105.85	0.52	0.03	---	---	---	---	---	---	0.03
43.33	0.00	105.81	0.42	0.03	---	---	---	---	---	---	0.03
45.00	0.00	105.78	0.34	0.03	---	---	---	---	---	---	0.03
46.67	0.00	105.75	0.27	0.03	---	---	---	---	---	---	0.03
48.33	0.00	105.72	0.22	0.02	---	---	---	---	---	---	0.02
50.00	0.00	105.69	0.17	0.02	---	---	---	---	---	---	0.02
51.67	0.00	105.67	0.14	0.02	---	---	---	---	---	---	0.02
53.33	0.00	105.65	0.11	0.02	---	---	---	---	---	---	0.02
55.00	0.00	105.63	0.08	0.02	---	---	---	---	---	---	0.02
56.67	0.00	105.61	0.07	0.01	---	---	---	---	---	---	0.01
58.33	0.00	105.60	0.05	0.01	---	---	---	---	---	---	0.01
60.00	0.00	105.59	0.04	0.01	---	---	---	---	---	---	0.01

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
61.67	0.00	105.58	0.03	0.01	---	---	---	---	---	---	0.01
63.33	0.00	105.57	0.03	0.01	---	---	---	---	---	---	0.01
65.00	0.00	105.56	0.02	0.01	---	---	---	---	---	---	0.01
66.67	0.00	105.56	0.02	0.00	---	---	---	---	---	---	0.00
68.33	0.00	105.55	0.01	0.00	---	---	---	---	---	---	0.00
70.00	0.00	105.55	0.01	0.00	---	---	---	---	---	---	0.00
71.67	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
73.33	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
75.00	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
76.67	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
78.33	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
80.00	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
81.67	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
83.33	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
85.00	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
86.67	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
88.33	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
90.00	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
91.67	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
93.33	0.00	105.51	0.00	0.00	---	---	---	---	---	---	0.00
95.00	0.00	105.51	0.00	0.00	---	---	---	---	---	---	0.00
96.67	0.00	105.51	0.00	0.00	---	---	---	---	---	---	0.00
98.33	0.00	105.51	0.00	0.00	---	---	---	---	---	---	0.00
100.00	0.00	105.51	0.00	0.00	---	---	---	---	---	---	0.00

...End

Hydrograph Report

Hyd. No. 7

10yr routed

Hydrograph type = Reservoir
 Storm frequency = 10 yrs
 Inflow hyd. No. = 4
 Max. Elevation = 107.51 ft ✓

Peak discharge = 0.08 cfs
 Time interval = 10 min
 Reservoir name = Onsite BMP Wetl
 Max. Storage = 12,235 cuft

Storage Indication method used.

Total Volume = 13,452 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
1.67	0.65 <<	106.16	1.54	0.05	---	---	---	---	---	---	0.05
3.33	0.65 <<	106.76	2.84	0.06	---	---	---	---	---	---	0.06
5.00	0.65 <<	107.28 ←	3.96	0.08	---	---	---	---	---	---	0.08
6.67	0.00	107.49 ←	4.32	0.08	---	---	---	---	---	---	0.08
8.33	0.00	107.42	4.20	0.08	---	---	---	---	---	---	0.08
10.00	0.00	107.35	4.08	0.08	---	---	---	---	---	---	0.08
11.67	0.00	107.29	3.97	0.08	---	---	---	---	---	---	0.08
13.33	0.00	107.22	3.85	0.08	---	---	---	---	---	---	0.08
15.00	0.00	107.16	3.73	0.07	---	---	---	---	---	---	0.07
16.67	0.00	107.10	3.60	0.07	---	---	---	---	---	---	0.07
18.33	0.00	107.04	3.48	0.07	---	---	---	---	---	---	0.07
20.00	0.00	106.97	3.34	0.07	---	---	---	---	---	---	0.07
21.67	0.00	106.90	3.19	0.07	---	---	---	---	---	---	0.07
23.33	0.00	106.83	3.03	0.07	---	---	---	---	---	---	0.07
25.00	0.00	106.77	2.87	0.06	---	---	---	---	---	---	0.06
26.67	0.00	106.70	2.70	0.06	---	---	---	---	---	---	0.06
28.33	0.00	106.64	2.53	0.06	---	---	---	---	---	---	0.06
30.00	0.00	106.58	2.35	0.06	---	---	---	---	---	---	0.06
31.67	0.00	106.52	2.16	0.06	---	---	---	---	---	---	0.06
33.33	0.00	106.47	2.09	0.06	---	---	---	---	---	---	0.06
35.00	0.00	106.41	2.08	0.05	---	---	---	---	---	---	0.05
36.67	0.00	106.36	2.01	0.05	---	---	---	---	---	---	0.05
38.33	0.00	106.30	1.92	0.05	---	---	---	---	---	---	0.05
40.00	0.00	106.25	1.80	0.05	---	---	---	---	---	---	0.05
41.67	0.00	106.21	1.68	0.05	---	---	---	---	---	---	0.05
43.33	0.00	106.16	1.53	0.05	---	---	---	---	---	---	0.05
45.00	0.00	106.12	1.39	0.04	---	---	---	---	---	---	0.04
46.67	0.00	106.07	1.24	0.04	---	---	---	---	---	---	0.04
48.33	0.00	106.03	1.10	0.04	---	---	---	---	---	---	0.04
50.00	0.00	105.99	0.95	0.04	---	---	---	---	---	---	0.04
51.67	0.00	105.95	0.79	0.04	---	---	---	---	---	---	0.04
53.33	0.00	105.90	0.65	0.03	---	---	---	---	---	---	0.03
55.00	0.00	105.86	0.56	0.03	---	---	---	---	---	---	0.03
56.67	0.00	105.83	0.46	0.03	---	---	---	---	---	---	0.03
58.33	0.00	105.79	0.37	0.03	---	---	---	---	---	---	0.03
60.00	0.00	105.76	0.30	0.03	---	---	---	---	---	---	0.03

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
61.67	0.00	105.73	0.24	0.02	---	---	---	---	---	---	0.02
63.33	0.00	105.70	0.19	0.02	---	---	---	---	---	---	0.02
65.00	0.00	105.68	0.15	0.02	---	---	---	---	---	---	0.02
66.67	0.00	105.66	0.12	0.02	---	---	---	---	---	---	0.02
68.33	0.00	105.64	0.09	0.02	---	---	---	---	---	---	0.02
70.00	0.00	105.62	0.07	0.01	---	---	---	---	---	---	0.01
71.67	0.00	105.61	0.05	0.01	---	---	---	---	---	---	0.01
73.33	0.00	105.59	0.04	0.01	---	---	---	---	---	---	0.01
75.00	0.00	105.58	0.04	0.01	---	---	---	---	---	---	0.01
76.67	0.00	105.57	0.03	0.01	---	---	---	---	---	---	0.01
78.33	0.00	105.56	0.02	0.01	---	---	---	---	---	---	0.01
80.00	0.00	105.56	0.02	0.00	---	---	---	---	---	---	0.00
81.67	0.00	105.55	0.02	0.00	---	---	---	---	---	---	0.00
83.33	0.00	105.55	0.01	0.00	---	---	---	---	---	---	0.00
85.00	0.00	105.55	0.01	0.00	---	---	---	---	---	---	0.00
86.67	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
88.33	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
90.00	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
91.67	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
93.33	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
95.00	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
96.67	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
98.33	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
100.00	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
101.67	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
103.33	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
105.00	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
106.67	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
108.33	0.00	105.51	0.00	0.00	---	---	---	---	---	---	0.00
110.00	0.00	105.51	0.00	0.00	---	---	---	---	---	---	0.00
111.67	0.00	105.51	0.00	0.00	---	---	---	---	---	---	0.00

...End

Hydrograph Report

Hyd. No. 8

100yr routed

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Inflow hyd. No. = 5
 Max. Elevation = 108.31 ft ✓

Peak discharge = 0.10 cfs
 Time interval = 10 min
 Reservoir name = Onsite BMP Wetl
 Max. Storage = 18,376 cuft

Storage Indication method used.

Total Volume = 19,926 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
1.67	0.91 <<	106.40	2.08	0.05	---	---	---	---	---	---	0.05
3.33	0.91 <<	107.21	3.82	0.08	---	---	---	---	---	---	0.08
5.00	0.91 <<	107.90 ←	4.96	0.09	---	---	---	---	---	---	0.09
6.67	0.00	108.29	5.51	0.10	---	---	---	---	---	---	0.10
8.33	0.00	108.23	5.42	0.10	---	---	---	---	---	---	0.10
10.00	0.00	108.16	5.33	0.10	---	---	---	---	---	---	0.10
11.67	0.00	108.09	5.24	0.09	---	---	---	---	---	---	0.09
13.33	0.00	108.03	5.15	0.09	---	---	---	---	---	---	0.09
15.00	0.00	107.96	5.05	0.09	---	---	---	---	---	---	0.09
16.67	0.00	107.88	4.94	0.09	---	---	---	---	---	---	0.09
18.33	0.00	107.81	4.83	0.09	---	---	---	---	---	---	0.09
20.00	0.00	107.73	4.71	0.09	---	---	---	---	---	---	0.09
21.67	0.00	107.66	4.60	0.09	---	---	---	---	---	---	0.09
23.33	0.00	107.59	4.49	0.08	---	---	---	---	---	---	0.08
25.00	0.00	107.52	4.37	0.08	---	---	---	---	---	---	0.08
26.67	0.00	107.45	4.26	0.08	---	---	---	---	---	---	0.08
28.33	0.00	107.38	4.14	0.08	---	---	---	---	---	---	0.08
30.00	0.00	107.32	4.03	0.08	---	---	---	---	---	---	0.08
31.67	0.00	107.25	3.91	0.08	---	---	---	---	---	---	0.08
33.33	0.00	107.19	3.79	0.08	---	---	---	---	---	---	0.08
35.00	0.00	107.13	3.67	0.07	---	---	---	---	---	---	0.07
36.67	0.00	107.07	3.54	0.07	---	---	---	---	---	---	0.07
38.33	0.00	107.01	3.42	0.07	---	---	---	---	---	---	0.07
40.00	0.00	106.94	3.27	0.07	---	---	---	---	---	---	0.07
41.67	0.00	106.87	3.11	0.07	---	---	---	---	---	---	0.07
43.33	0.00	106.80	2.95	0.07	---	---	---	---	---	---	0.07
45.00	0.00	106.74	2.79	0.06	---	---	---	---	---	---	0.06
46.67	0.00	106.67	2.62	0.06	---	---	---	---	---	---	0.06
48.33	0.00	106.61	2.44	0.06	---	---	---	---	---	---	0.06
50.00	0.00	106.55	2.26	0.06	---	---	---	---	---	---	0.06
51.67	0.00	106.49	2.09	0.06	---	---	---	---	---	---	0.06
53.33	0.00	106.44	2.08	0.06	---	---	---	---	---	---	0.06
55.00	0.00	106.38	2.06	0.05	---	---	---	---	---	---	0.05
56.67	0.00	106.33	1.96	0.05	---	---	---	---	---	---	0.05
58.33	0.00	106.28	1.86	0.05	---	---	---	---	---	---	0.05
60.00	0.00	106.23	1.74	0.05	---	---	---	---	---	---	0.05

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
61.67	0.00	106.18	1.61	0.05	---	---	---	---	---	---	0.05
63.33	0.00	106.14	1.46	0.04	---	---	---	---	---	---	0.04
65.00	0.00	106.09	1.32	0.04	---	---	---	---	---	---	0.04
66.67	0.00	106.05	1.17	0.04	---	---	---	---	---	---	0.04
68.33	0.00	106.01	1.03	0.04	---	---	---	---	---	---	0.04
70.00	0.00	105.97	0.87	0.04	---	---	---	---	---	---	0.04
71.67	0.00	105.92	0.72	0.04	---	---	---	---	---	---	0.04
73.33	0.00	105.88	0.60	0.03	---	---	---	---	---	---	0.03
75.00	0.00	105.85	0.51	0.03	---	---	---	---	---	---	0.03
76.67	0.00	105.81	0.41	0.03	---	---	---	---	---	---	0.03
78.33	0.00	105.78	0.33	0.03	---	---	---	---	---	---	0.03
80.00	0.00	105.75	0.26	0.03	---	---	---	---	---	---	0.03
81.67	0.00	105.72	0.21	0.02	---	---	---	---	---	---	0.02
83.33	0.00	105.69	0.17	0.02	---	---	---	---	---	---	0.02
85.00	0.00	105.67	0.13	0.02	---	---	---	---	---	---	0.02
86.67	0.00	105.65	0.10	0.02	---	---	---	---	---	---	0.02
88.33	0.00	105.63	0.08	0.01	---	---	---	---	---	---	0.01
90.00	0.00	105.61	0.06	0.01	---	---	---	---	---	---	0.01
91.67	0.00	105.60	0.05	0.01	---	---	---	---	---	---	0.01
93.33	0.00	105.59	0.04	0.01	---	---	---	---	---	---	0.01
95.00	0.00	105.58	0.03	0.01	---	---	---	---	---	---	0.01
96.67	0.00	105.57	0.03	0.01	---	---	---	---	---	---	0.01
98.33	0.00	105.56	0.02	0.01	---	---	---	---	---	---	0.01
100.00	0.00	105.56	0.02	0.00	---	---	---	---	---	---	0.00
101.67	0.00	105.55	0.01	0.00	---	---	---	---	---	---	0.00
103.33	0.00	105.55	0.01	0.00	---	---	---	---	---	---	0.00
105.00	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
106.67	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
108.33	0.00	105.54	0.01	0.00	---	---	---	---	---	---	0.00
110.00	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
111.67	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
113.33	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
115.00	0.00	105.53	0.01	0.00	---	---	---	---	---	---	0.00
116.67	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
118.33	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
120.00	0.00	105.52	0.01	0.00	---	---	---	---	---	---	0.00
121.67	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
123.33	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
125.00	0.00	105.52	0.00	0.00	---	---	---	---	---	---	0.00
126.67	0.00	105.51	0.00	0.00	---	---	---	---	---	---	0.00

...End

Hydraulic Grade Line Summary
Jehovah's Witnesses Site - Mooretown Road

PLANS SHOW 18" CAPACITY WOULD BE 4.75 HGL WOULD GO ↓. OK.

Structure No.	Structure No.	Length (ft)	Total Flow (cfs)	Capac. Full (cfs)	Veloc (ft/s)	Pipe Size (in)	Pipe Slope (%)	Inv Elev Up (ft)	Inv Elev Dn (ft)	HGL Elev Up (ft)	HGL Elev Dn (ft)	Gr/Rim El Up (ft)	Gr/Rim El Dn (ft)
1	2	175.00 ✓	4.42 ✓	4.75 ✓	3.60 ✓	15.00 ✓	0.32 ✓	106.60 ✓	106.04 ✓	108.00 ✓	107.51 ✓	108.60 ✓	107.30 ✓
3	4	35.00 ✓	2.37 ✓	5.50 ✓	1.93 ✓	15.00 ✓	0.43 ✓	106.00 ✓	105.85 ✓	107.54 ✓	107.51 ✓	110.00 ✓	107.10 ✓

Return period = 10 Yrs.

HGL Comps OK
ST

Jehovah's Witnesses Site Plan - Mooretown Road

PROJECT 1870040-302.04
HEC12 Version: V2.91

Run Date: 10-25-1999

INLET NUMBER 3 LENGTH 6.0 *DI-3B*

DRAINAGE AREA = 0.540 ACRES C VALUE = .690 CA = 0.373
SUM CA= 0.373 INT= 4.00 CFS= 1.490 CO= 0.000 GUTTER FLOW= 1.490

GUTTER SLOPE = 0.0030 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
8.88	2.0	0.23	0.0833	4.0	0.63	3.5	0.146	0.113

XXXXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXXXX
REQUIRED LENGTH (ft) = 5.7 ✓ EFFICIENCY= 1.00
CFS INTERCEPTED= 1.49 CFS CARRYOVER= 0.00

OK
ST

Culvert Calculator Report Entrance Culvert

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	107.45 ft	Headwater Depth/ Height	0.65
Computed Headwater Elevation	107.33 ft	Discharge	2.70 cfs
Inlet Control HW Elev	107.22 ft	Tailwater Elevation	106.11 ft
Outlet Control HW Elev	107.33 ft ✓	Control Type	Outlet Control

Grades			
Upstream Invert	106.35 ft ✓	Downstream Invert	105.50 ft ✓
Length	72.00 ft ✓	Constructed Slope	0.011806 ft/ft ✓

Hydraulic Profile			
Profile	S2	Depth, Downstream	0.50 ft ✓
Slope Type	Steep	Normal Depth	0.50 ft
Flow Regime	Supercritical	Critical Depth	0.62 ft
Velocity Downstream	5.29 ft/s	Critical Slope	0.005069 ft/ft

Section			
Section Shape	Circular ✓	Mannings Coefficient	0.013 ✓
Section Material	Concrete ✓	Span	1.50 ft ✓
Section Size	18 inch ✓	Rise	1.50 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev	107.33 ft	Upstream Velocity Head	0.24 ft
Ke	0.50	Entrance Loss	0.12 ft

Inlet Control Properties			
Inlet Control HW Elev	107.22 ft	Flow Control	Unsubmerged
Inlet Type	Square edge w/headwall	Area Full	1.8 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

$$\frac{HW}{D} = \frac{0.98}{18/12} = 0.65$$

$$107.45 - 107.33 = 0.12'$$

$$107.33 - 106.35 = 0.98$$

NOT 1 ← 1.5 BUT OK.
 10 YR BELOW PAVEMENT

$$\frac{107.33}{0} \sqrt{2.121}$$

OK
SFT

Worksheet
Worksheet for Triangular Channel

Project Description	
Worksheet	Exist. Road Ditch
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.030
Slope	0.013000 ft/ft
Left Side Slope	3.00 H : V
Right Side Slope	3.00 H : V
Discharge	2.70 cfs

Results	
Depth	0.61 ft ✓
Flow Area	1.1 ft ²
Wetted Perimeter	3.83 ft
Top Width	3.63 ft
Critical Depth	0.55 ft
Critical Slope	0.021634 ft/ft
Velocity	2.46 ft/s ✓
Velocity Head	0.09 ft
Specific Energy	0.70 ft
Froude Number	0.79
Flow Type	Subcritical

Kingdom Hall of Jehovah's Witnesses
(C-40-99)

Zoned M1 (House of Worship)
Berkeley "A" Voting District
August 30, 1999

SUPPORTING ENGINEERING DOCUMENTS

Narrative

Storm Drainage Calculations

Drainage Area Map
Southern Ditch
Entrance Culvert

BMP Calculations

Weighted C
CBPA
Temporary Sediment Trap

Detention Facility Computations

10 year storm
100 year storm
Storage capacity

Water and Sewer Data Sheets

Soils Report

Final Pavement Design

Checklists

James City County
VDOT

L&M Project #1870040-302.04

*VOID
RESUBMITTED
NOV 2 '99*



Langley and McDonald, P.C.

Engineers
Surveyors
Planners
Landscape Architects
Environmental Consultants

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(757) 253-2975 Fax (757) 229-0049

August 30, 1999

**Narrative for Kingdom Hall
of Jehovah's Witnesses
Conceptual Case No. C-40-99
James City County , Virginia**

General project description:

The building for this project will be constructed to serve as a house of worship. The proposed building is a 5000 SQ FT building. The area within the building is majority a worship hall with small areas set aside for studies and restrooms. Additionally, a parking lot will be constructed to support 100 vehicles. The developer will have to construct a dry detention facility at the western end (rear) of the property.

Existing site conditions:

The property is 95 percent wooded. The only area cleared is on the front of the property where a roadside ditch cuts across the southeastern part of the property.

Land disturbance considerations:

No offsite or adjacent properties will be affected by this site's being cleared. The total area of disturbance for this site is 2.25 acres.

Soils information can be found on Sheet C-2.

Erosion and Sediment control measures are specified on the plan sheets as well as the erosion and sediment control Sheet C-4.

Stormwater Runoff and Water Quality Considerations:

Contractor should pay close attention to the Construction Sequencing and construct the temporary sediment trap and southern ditch as quickly as possible. The detention facility is sized to hold back to a 100year storm and release runoff into the ditch that runs parallel to the CSX right of way. CSX will allow 0.1 cfs of runoff into the existing ditch. Because of this constraint water quality measures are surpassed rather easily.

Critical Areas for high erosion:

The only areas of concern are the southern property line, the roadside ditch and the common property line with CSX (rear property). Installation of silt fence and straw bales as shown on the plans will eliminate downstream sediment buildup. There will be minimal work along the CSX property line and contractor will need to clear a small area only to install a 4" outfall pipe.

Meh/l&m/projects/1870040-302.04/correspondence/narrative

Southern Ditch
Worksheet for Triangular Channel

Project Description	
Project File	untitled.fm2
Worksheet	Jehovah's Witnesses
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.022
Channel Slope	0.005000 ft/ft ✓
Left Side Slope	2.000000 H : V
Right Side Slope	2.000000 H : V
Discharge	3.15 cfs

$$Q = (0.50) (7.2) (1.23 AC.)$$

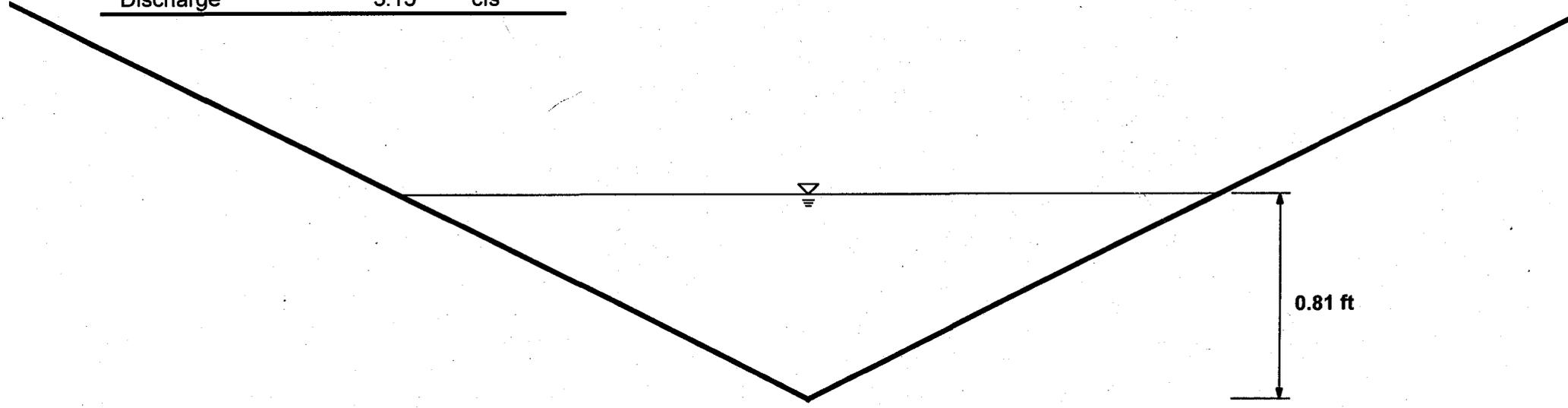
4.6 cfs

Results		
Depth	0.81	ft
Flow Area	1.30	ft ²
Wetted Perimeter	3.61	ft
Top Width	3.23	ft
Critical Depth	0.69	ft
Critical Slope	0.011680	ft/ft
Velocity	2.42	ft/s
Velocity Head	0.09	ft
Specific Energy	0.90	ft
Froude Number	0.67	
Flow is subcritical.		

Cross Section
 Cross Section for Triangular Channel
 @ DROP INLET

Project Description	
Project File	untitled.fm2
Worksheet	Jehovah's Witnesses
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.022
Channel Slope	0.005000 ft/ft
Depth	0.81 ft
Left Side Slope	2.000000 H : V
Right Side Slope	2.000000 H : V
Discharge	3.15 cfs



Culvert Calculator Report
18" culvert
@ ENTRANCE

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	109.00 ft	Headwater Depth/ Height	0.87
Computed Headwater Elevation	108.31 ft	Discharge	2.70 cfs
Inlet Control HW Elev	108.20 ft	Tailwater Elevation	108.20 ft
Outlet Control HW Elev	108.31 ft	Control Type	Outlet Control

Grades			
Upstream Invert	107.00 ft	Downstream Invert	105.50 ft
Length	72.00 ft	Constructed Slope	0.020833 ft/ft

Hydraulic Profile			
Profile	CompositePressureS1	Depth, Downstream	2.70 ft
Slope Type	N/A	Normal Depth	0.43 ft
Flow Regime	Subcritical	Critical Depth	0.62 ft
Velocity Downstream	1.53 ft/s	Critical Slope	0.005069 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.50 ft
Section Size	18 inch	Rise	1.50 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev	108.31 ft	Upstream Velocity Head	0.05 ft
Ke	0.50	Entrance Loss	0.02 ft

Inlet Control Properties			
Inlet Control HW Elev	108.20 ft	Flow Control	Unsubmerged
Inlet Type	End-Section Conforming to fill slope	Area Full	1.8 ft ²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

$T_c = 10 \text{ min. (SEE NYMNOGRAPH ATTACHED HEREWITH)}$

$$L = \frac{210}{T_c + 25} = \frac{210}{35} = 6$$

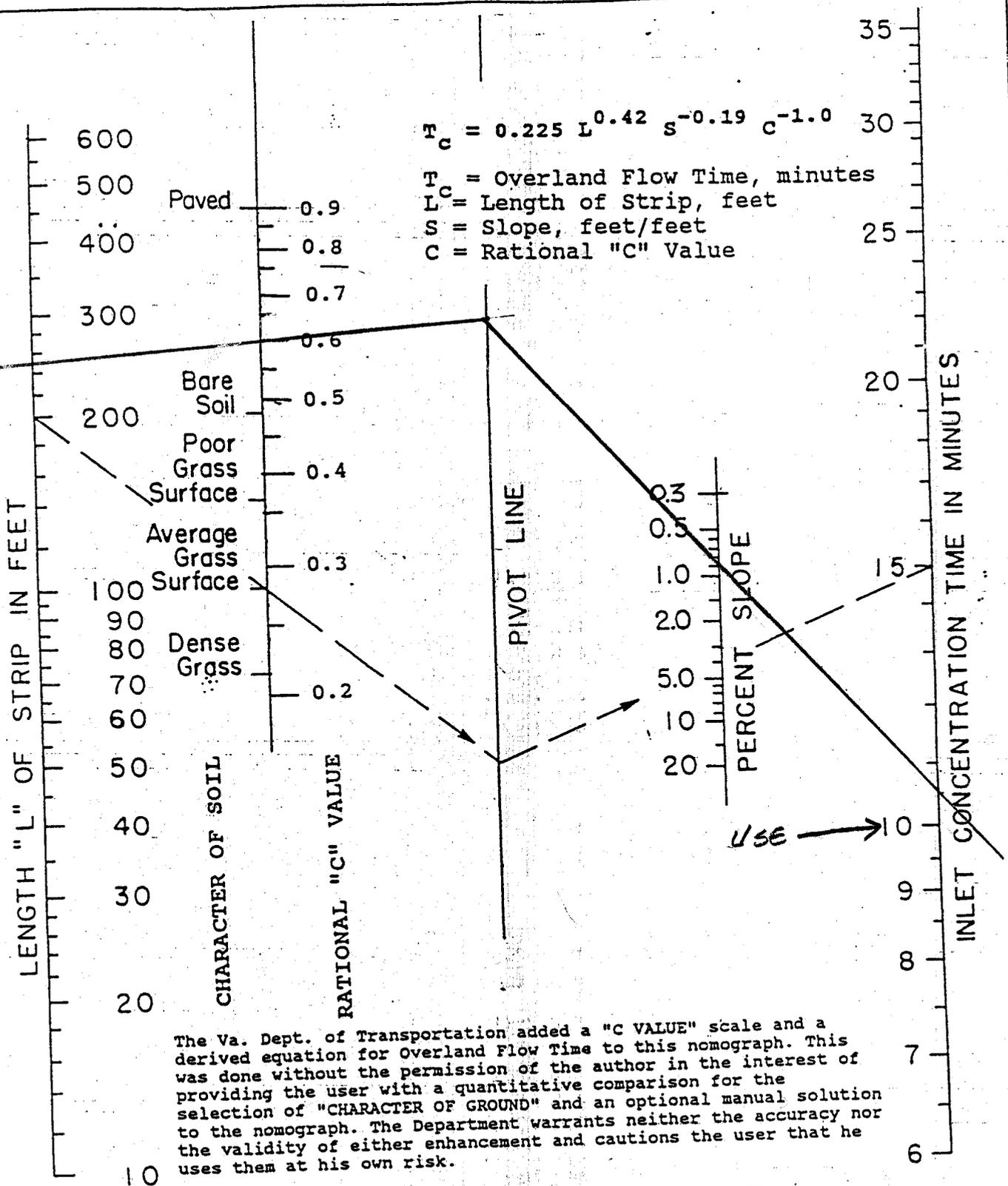
$$Q = C I A \quad C = .60 \text{ (composite)}$$

$$a = .75$$

$$L = 6$$

$$Q = 2.7 \text{ cfs.}$$

FIG. 1.5.1.1



The Va. Dept. of Transportation added a "C VALUE" scale and a derived equation for Overland Flow Time to this nomograph. This was done without the permission of the author in the interest of providing the user with a quantitative comparison for the selection of "CHARACTER OF GROUND" and an optional manual solution to the nomograph. The Department warrants neither the accuracy nor the validity of either enhancement and cautions the user that he uses them at his own risk.

OVERLAND FLOW TIME

(Rev. 8/95)

REPRINTED WITH PERMISSION FROM "DATA BOOK FOR CIVIL ENGINEERS" VOL. I - DESIGN
 2ND EDITION (1951) BY E. E. SEELYE

*JEHOVAH'S
 WITNESSES
 1970020-307 nd*

WEIGHTED C COMPUTATION

Total site area	2.4651 ACRES ✓	
Developed AREA	2.4651 ACRES ✓	107380 SF
IMPERVIOUS AREA	1.1017 ACRES ✓	47991 SF
GREEN AREA	1.3634 ACRES ✓	59389 SF

C COEFFICIENT

IMPERVIOUS 0.90

GRASS **0.20**

*0.21 OK ✓
HSG B 0.21 = 0.21
open space lands, ok.*

CALCULATED COMPOSITE C

0.52

.5128 OK

Building Area	5000.00	SF
Sidewalk Area	1820.00	SF
Paved Area	41171.00	SF
	47991.00	

*HSG B/C
SAY B
SLOPES 0-270*

PROJECT NAME: Kingdom Hall of Jehovah's Witnesses

Project Engineer: Mel Hopkins

Date: 30-Aug-99

GUIDANCE CALCULATION PROCEDURE

NEW DEVELOPMENT WORKSHEET

TOTAL SITE AREA(A)	=	2.4651 Acres	107380 sf
Developed SITE AREA(A)	=	2.4651 Acres	107380 sf
IMPERVIOUS AREA:			
STRUCTURES	=	0.11 Acres	5000 sf
PARKING LOT	=	0.95 Acres	41171 sf
ROADWAY	=	0.00	
Sidewalks	=	0.04	1820 sf
OTHER	=		

TOTAL IMPERVIOUS(Ia) = 1.10 Acres

I(site)= Total Ia/A(100) = 45 % *If I(site) greater than 16% then continue*
I(watershed-default) = 16 %

PRE-DEVELOPMENT LOAD: $L=45 \times 0.9 \times [0.05 + (0.009 \times 16)] \times 0.26 \times A \times 2.72 / 12$
L(pre) = 1.14 pounds

POST DEVELOPMENT LOAD: $L=45 \times 0.9 \times [0.05 + (0.009 \times I_{site})] \times 0.26 \times A \times 2.72 / 12$
L(post) = 2.68 pounds

POLLUTANT REMOVAL R'QD:
RR = 1.54 pounds $RR=L_{post}-L_{pre}$

EFFICIENCY REQUIRED:
%RR = 57 % $\%RR=RR/L_{post} \times 100$

GUIDANCE CALCULATION PROCEDURE

COMPLIANCE WORKSHEET

<u>Selected BMP Option</u>	<u>Removal Efficiency</u>	<u>% Site Area Served</u>	<u>Lpost lbs/yr</u>	<u>=</u>	<u>Load Removed</u>
				=	
Design 10	70	86	2.68	=	1.61
Design 15	10	50	2.68	=	0.13
				=	
				=	
Total Load Removed				=	1.75 lbs/yr

OVERALL COMPLIANCE:

Total Removed = 1.75

Total Required = 1.54

If total removed > removal required, criteria satisfied

BMP Options

Efficiency

A. Extended Detention

- (1) Design 2 (6-12) 20%
- (2) Design 3 (24 hours) 30%
- (3) Design 4 (shallow marsh) 50%

B. Wet Pond

- (1) Design 5 (0.5 in/imp. ac.) 35%
- (2) Design 6 (2.5 V) 40-45%
- (3) Design 7 (4.0 V) 50%

C. Infiltration

- (1) Design 8 (0.5 in/imp.ac.) 50%
- (2) Design 9 (1.0 in/imp. ac.) 65%
- (3) **Design 10 (2-year storm) 70%**

Use because of CSX runoff outfall constraint of 0.1cfs

D. Grassed Swale

- (1) Design 15 (check dams) 10-20% use 10% no check dams

Project Engineer: Mel Hopkins

Date: August 30, 1999

Computations for temporary sediment trap. Storage capacity for temporary pond.

Req'd. storage is 134 cu yards for each impervious acre.

FOR ALL OF DRAINAGE AREA

Req'd. dry storage is 67 cu yards for each impervious acre.

NO.

Req'd. wet storage is 67 cu yards for each impervious acre.

Proposed impervious area = 1.11 acres

	Elev (ft.)	Area(sq.ft.)	Volume (cb.ft.)	Volume (cb.yd.)		
	103	1920	0	0		
	103.1	1983	195	7		
	103.2	2046	397	15	Storage volume required	149 cu yds
	103.3	2110	605	22		
	103.4	2175	819	30	Wet storage required	74 cu yds
	103.5	2241	1040	39		
	103.6	2307	1268	47	Dry storage required	74 cu yds
	103.7	2374	1503	56		
	103.8	2442	1745	65		
Wet	103.9	2511	1994	74		
	104	2580	2250	83	Bottom Length =	80 ft
	104.1	2650	2513	93	Bottom Width =	24 ft
	104.2	2721	2784	103	Side Slope =	3
	104.3	2792	3063	113	Starting Elev =	103.00
	104.4	2864	3349	123	Increment =	0.1 ft
	104.5	2937	3643	134		
	104.6	3011	3944	145		
Dry	104.7	3085	4254	156		
	104.8	3160	4572	168		
	104.9	3236	4898	180		
	105	3312	5232	192		
	105.1	3389	5575	204		
	105.2	3467	5926	217		
	105.3	3546	6285	230		

MUD PATIONAL
METHOD DIRECT SOL.

Course "C" Method for small detention facilities

Project; 5493 Mooretown Road
Contact: Gerald Brown
Date August 30, 1999

SITE = 2.465 AC.

JOB No. 1870040-302.04 Project Engineer Mel Hopkins

AREA 2.47 TIME CONC 5.00 0.20
Exist'g C 0.20 ALLOW DISCH 0.10 per CSX
Exist'g Tc 1000.00 RUNOFF COEF 0.52 ✓

Existing Tc is based on maximum allowable discharge into the CSX ditch at the western side of the property.

a= 201.52 qo= 0.10 ALLOWABLE
b= 23.38 Tcr= 314.75 MIN
Icr= 0.60 INFLOW
Qo= 0.76
V= 13518.02

10 YR.

APP 5A
NORFOLK

PER USMH P. 5-20
2-126.3
10-201

Parameters for a and b

	a	b
Norfolk	124.88	17.02
2 year	142.00	20.32
5 year	173.80	22.70
10 year	201.52 190.64	23.38 22.14
100 year	300.62 288.13	26.54 25.60

Req'd Storage

11699 CU FT.

TD (MIN)	RAIN RATE (IN/HR)	VOLUME IN (CU. FT.)	VOLUME OUT (CU. FT.)	STORAGE (CU. FT.)
10	6.04	5223.65	52.50	5171.15
11	5.86	5522.54	55.50	5467.04
12	5.70	5804.52	58.50	5746.02
13	5.54	6071.00	61.50	6009.50
14	5.39	6323.23	64.50	6258.73
15	5.25	6562.31	67.50	6494.81
16	5.12	6789.25	70.50	6718.75
17	4.99	7004.95	73.50	6931.45
18	4.87	7210.22	76.50	7133.72
19	4.76	7405.81	79.50	7326.31
20	4.65	7592.38	82.50	7509.88
21	4.54	7770.54	85.50	7685.04
22	4.44	7940.85	88.50	7852.35
23	4.34	8103.81	91.50	8012.31
24	4.25	8259.90	94.50	8165.40
25	4.17	8409.53	97.50	8312.03
26	4.08	8553.10	100.50	8452.60
27	4.00	8690.98	103.50	8587.48
28	3.92	8823.48	106.50	8716.98

11699 CF

MODIFIED RATIONAL
METHOD DIRECT SOLUTION

$$T_{d10} = \frac{10 \text{ YR}}{P_{0.2}} \sqrt{C A a (b - t_c / 14)} - b$$

$$= \sqrt{2(0.52)(2.465)(20.52)(23.38 - 5)} - 23.38$$

321.49 \approx 314.75 OK CRIT. SYSTEM DUR. - 23.38

$$T_{10} = \frac{9}{b + T_{d10}} = \frac{20.52}{23.38 + 321.49} = 0.5843 \approx 0.60 \text{ OK}$$

$$Q_{10} = (0.52)(0.60)(2.465) = 0.76$$

VOLUME REQUIRED

$$V_{10} = \left[0.76(314.75) + \frac{(0.76)(5)}{4} - \frac{(0.1)(314.75)}{2} - \frac{3(0.1)(5)}{4} \right] 60$$

$$= (239.2 + 0.95 - 15.73 - 0.375) 60$$

$$= 13,442.7 \text{ CF } (0.30 \text{ AC-FT})$$

VOLUME RAD. ZNR

Course "C" Method for small detention facilities

Project; 5493 Mooretown Road
 Owner: Gerald Brown
 Date: August 30, 1999

JOB No. 1990084-000.01 Project Engineer Mel Hopkins

AREA 2.47 TIME CONC 5.00 0.29
 Exist'g C 0.20 ALLOW DISCH 0.10
 Exist'g Tc 1000.00 RUNOFF COEF 0.52 ✓

Existing Tc is based on maximum allowable discharge into the CSX ditch at the western side of the property.

a= 300.62 qo= 0.10 *ALLOWABLE*
 b= 26.54 Tcr= 414.95
 Icr= 0.68
 Qo= 0.87 *70.10*
 V= 20529.27

100 yr.

Parameters for a and b

	a	b
Norfolk		
2 year	142.00	20.32
5 year	173.80	22.70
10 year	201.52	23.38
100 year	300.62	26.54

Req'd Storage

17005 CU FT.

TD (MIN)	RAIN RATE (IN/HR)	VOLUME IN (CU. FT.)	VOLUME OUT (CU. FT.)	STORAGE (CU. FT.)
10	8.23	7118.56	52.50	7066.06
11	8.01	7544.84	55.50	7489.34
12	7.80	7948.99	58.50	7890.49
13	7.60	8332.71	61.50	8271.21
14	7.42	8697.49	64.50	8632.99
15	7.24	9044.71	67.50	8977.21
16	7.07	9375.61	70.50	9305.11
17	6.90	9691.31	73.50	9617.81
18	6.75	9992.83	76.50	9916.33
19	6.60	10281.11	79.50	10201.61
20	6.46	10557.00	82.50	10474.50
21	6.32	10821.28	85.50	10735.78
22	6.19	11074.68	88.50	10986.18
23	6.07	11317.84	91.50	11226.34
24	5.95	11551.39	94.50	11456.89
25	5.83	11775.87	97.50	11678.37
26	5.72	11991.80	100.50	11891.30
27	5.61	12199.67	103.50	12096.17
28	5.51	12399.92	106.50	12293.42

17005 CF

Project Engineer: Mel Hopkins

Date: August 30, 1999

Computations for proposed BMP facility. Storage capacity for 10 and 100 year storm.

Elev (ft.)	Area(sq.ft.)	Volume (cb.ft.)	Volume (cb.yd.)		
104.5	4320	0	0	Bottom Length =	135
104.55	4370	217	8	Bottom Width =	32 (Average)
104.6	4421	437	16	Side Slope =	3
104.65	4471	659	24	Starting Elev =	104.50
104.7	4522	884	33	Increment =	0.05
104.75	4573	1112	41		
104.8	4624	1342	50		
104.85	4675	1574	58		
104.9	4727	1809	67		
104.95	4778	2047	76		
105	4830	2287	85		
105.05	4882	2531	94		
105.1	4934	2776	103		
105.15	4987	3025	112		
105.2	5039	3276	121		
105.25	5092	3529	131		
105.3	5145	3786	140		
105.35	5198	4045	150		
105.4	5251	4307	159		
105.45	5304	4572	169		
105.5	5358	4839	179		
105.55	5412	5109	189		
105.6	5466	5382	199		
105.65	5520	5658	209		
105.7	5574	5937	219		
105.75	5629	6218	230		
105.8	5683	6502	240		
105.85	5738	6789	251		
105.9	5793	7079	262		
105.95	5849	7372	272		

100	5004	7668	283
106.05	5960	7967	294
106.1	6015	8268	305
106.15	6071	8573	317
106.2	6127	8880	328
106.25	6184	9191	339
106.3	6240	9504	351
106.35	6297	9821	362
106.4	6354	10140	374
106.45	6411	10463	386
106.5	6468	10788	398
106.55	6525	11117	410
106.6	6583	11448	422
106.65	6641	11783	434
106.7	6699	12121	447
106.75	6757	12461	459
106.8	6815	12805	472
106.85	6874	13152	484
106.9	6932	13503	497
106.95	6991	13856	510
107	7050	14212	523
107.05	7109	14572	536
107.1	7169	14935	549
107.15	7228	15301	563
107.2	7288	15671	576
107.25	7348	16043	590
107.3	7408	16419	603
107.35	7468	16798	617
107.4	7529	17180	631
107.45	7589	17566	645
107.5	7650	17955	659
107.55	7711	18347	673
107.6	7772	18743	688
107.65	7834	19142	702
107.7	7895	19544	717
107.75	7957	19950	731
107.8	8019	20359	746
107.85	8081	20771	761
107.9	8143	21187	776

11699

10 year elevation

17005

100 year elevation

109.50
 -107.35

 2.15' FB

109.50

WATER DATA SHEET

Date: August 30, 1999

1. Project Name: Kingdom Hall of Jehovah's Witnesses
2. Project location: 5493 Mooretown Road, Williamsburg, VA
3. Engineer: Langley and McDonald, Inc.
4. Source of Water: JCSA - 8" waterline 4' off edge of existing pavement, in Mooretown Road.

5. Design Population (Number and Type of Dwelling): (4000 SF Worship / (1000 SF Office/Restrooms)

5a: Industrial: N/A

5b: Domestic: 1.4 gpm

5c: Fire Flow: 750 gpm

5d: Pressure Maximum: 50 psi

Minimum: 20 psi

6. Water Distribution System Piping:

Pipe Diameter (Inches)	Length (Feet)	Material (DI, PVC, etc.)
2"	200	PVC

7. Water Meter Assemblies: 2" (Size), 1 (Number)
- _____ (Size), _____ (Number)
- _____ (Size), _____ (Number)
- _____ (Size), _____ (Number)

Average Day Demand: Worship Hall: $(21,600\text{SF}) (.02) = 432 \text{ gpd} > 672 \text{ gpd}$
 Office: $(2400 \text{ SF}) (.10) = 240 \text{ gpd}$

Maximum Day Demand: $(1.7)(672) = 1142.4 \text{ gpd}$

Peak Hour Demand: $(4)(672) = 2688 \text{ gpd}$

SEWER DATA SHEET
APPENDIX "B"

DATE August 30, 1999

I. PROJECT NAME Kingdom Hall of Jehovah's Witnesses

II. PROJECT LOCATION 5493 Mooretown Road, Williamsburg, VA

III. ENGINEER Langley and McDonald, Inc.

IV. POINT OF CONNECTION TO AUTHORITY SYSTEM Clean out @ northwestern corner of property.

V. DESIGN POPULATION (NUMBER AND TYPE OF DWELLINGS) House of Worship

VI. AVERAGE DESIGN FLOW 672 gpd

VII. PEAK DESIGN FLOW 1680 gpd

VIII. PIPE MATERIAL PVC

IX. PIPE DIAMETER	<u>(INCHES)</u>	<u>LENGTH (FEET)</u>
	4" (laterals)	<u>300</u>
	6"	_____
	8"	_____
	10"	_____
	12"	_____
	15"	_____
	18"	_____
	21"	_____
	24"	_____

TOTAL FEET 300

X.	MANHOLES	(A) STANDARD	<u>N/A</u>	(NUMBER)	AVERAGE DEPTH	<u>N/A</u>
		(B) DROP	<u>N/A</u>	(NUMBER)	AVERAGE DEPTH	<u>N/A</u>

XI. (A) PUMP STATIONS SIZE N/A (GPM)

(B) FORCE MAIN (SIZE LENGTH) N/A (FEET)



Langley and McDonald, P.C.

ENGINEERS • SURVEYORS • PLANNERS
LANDSCAPE ARCHITECTS • ENVIRONMENTAL CONSULTANTS

VIRGINIA BEACH • WILLIAMSBURG, VIRGINIA

Subject CHES BAY

Computed By SAR Checked by _____

Project No. 1870010-302.04

Client PRIME

Date 10/21/99 Sheet No. 1

EXISTING SHOPPING CENTER = 34.6 ACRES
EXPANSION ADOCS = 2.9 ACRES
37.5 ACRES
AREA EXEMPT FROM CHES BAY = 19 ACRES
AREA SUBJECT TO CHES BAY REGS = 18.5 ACRES

CBLAM APPENDIX C CALCS ATTACHED FOR :

- ① JEHOVAH'S WITNESSES SITE ON MOONSTOWN RD
- ② PRIME EXPANSION
- ③ COMPLIANCE USING EXISTING PRIME BMP

GUIDANCE CALCULATION PROCEDURE

WORKSHEET A : NEW DEVELOPMENT OPTION TWO: VA. CHESAPEAKE BAY DEFAULT

1 Compile site-specific data and determine site imperviousness (I_{site}).

		POST-DEVELOPMENT	
A^*		=	<u>2.47</u> acres
I_{site}^{**}	structures	=	<u>1.11</u> acres
	parking lot	=	_____ acres
	roadway	=	_____ acres
	other	=	_____ acres
		=	_____ acres
		=	_____ acres
	total I_a	=	<u>1.11</u> acres
$I_{site} = (total I_a / A) \times 100$		=	<u>45</u> (percent expressed in whole numbers)

Jehovah's Witness

* Although the area subject to regulations may be only the area actually in a CBPA, some localities may require all of the site to comply with criteria.
 ** I_a represents the actual amount of impervious area.

2 Determine the average land cover conditions ($I_{watershed}$).

Use $I_{watershed} = I_{VA} = 16$ because $F_{average} = 0.45$ lbs/ac/yr for Virginia's Chesapeake Bay Watershed. Use $C_{pre} = 0.26$ mg/l.

3 Determine need to continue.

$$\frac{I_{site}}{I_{watershed}} = \frac{45}{16} \% \text{ (from Step 1)}$$

If $I_{site} \leq I_{watershed}$ STOP and submit analysis to this point.
 If $I_{site} > I_{watershed}$ CONTINUE.

4 Set constants.

- | | | | |
|-------|--|-----|--|
| P_j | = unitless rainfall correction factor | P | = annual rainfall depth in inches |
| | = 0.9 for all of Tidewater Virginia | | = 40 inches for Northern Virginia area |
| | | | = 43 inches for Richmond Metropolitan area |
| C | = flow weighted mean concentration of total phosphorus | | = 45 inches for Hampton Roads area |
| | = 0.26 mg/l for all I_{site} | | |

12 and 2.72 are used in the equation as unit conversion factors.

GUIDANCE CALCULATION PROCEDURE

WORKSHEET A : NEW DEVELOPMENT

OPTION TWO: VA. CHESAPEAKE BAY DEFAULT

5 Calculate the pre-development load (L_{pre}).

$$\begin{aligned} L_{pre} &= P \times P_i \times [0.05 + (0.009 \times I_{\text{watershed}})] \times C_{pre} \times A \times 2.72 / 12 \\ &= 44 \times 0.9 \times [0.05 + (0.009 \times 16)] \times 0.26 \times 2.47 \times 2.72 / 12 \\ &= 1.12 \text{ pounds per year} \end{aligned}$$

6 Calculate the post-development load (L_{post}).

$$\begin{aligned} L_{post} &= P \times P_i \times [0.05 + (0.009 \times I_{\text{site}})] \times C \times A \times 2.72 / 12 \\ &= 44 \times 0.9 \times [0.05 + (0.009 \times 15)] \times 0.26 \times 2.47 \times 2.72 / 12 \\ &= 2.62 \text{ pounds per year} \end{aligned}$$

7 Calculate the pollutant removal requirement (RR).

$$\begin{aligned} RR &= L_{post} - L_{pre} \\ &= 2.62 - 1.12 \\ &= 1.50 \text{ pounds per year} \end{aligned}$$

To determine the overall BMP efficiency required (%RR) when selecting BMP options:

$$\begin{aligned} \%RR &= RR / L_{post} \times 100 \\ &= (1.50 / 2.62) \times 100 \\ &= 57 \% \end{aligned}$$

GUIDANCE CALCULATION PROCEDURE

WORKSHEET A : NEW DEVELOPMENT

OPTION TWO: VA. CHESAPEAKE BAY DEFAULT

1 Compile site-specific data and determine site imperviousness (I_{site}).

		POST-DEVELOPMENT	
A^*		=	<u>18.5</u> acres
I_{site}^{**}	structures	=	_____ acres
	parking lot	=	_____ acres
	roadway	=	_____ acres
	other	=	_____ acres
		=	_____ acres
		=	_____ acres
	total I_a	=	<u>10.3</u> acres
$I_{site} = (\text{total } I_a / A) \times 100$		=	<u>56</u> (percent expressed in whole numbers)

* Although the area subject to regulations may be only the area actually in a CBPA, some localities may require all of the site to comply with criteria.
 ** I_a represents the actual amount of impervious area.

2 Determine the average land cover conditions ($I_{watershed}$).

Use $I_{watershed} = I_{VA} = 16$ because $F_{average} = 0.45$ lbs/ac/yr for Virginia's Chesapeake Bay Watershed. Use $C_{pre} = 0.26$ mg/l.

3 Determine need to continue.

$$\frac{I_{site}}{I_{watershed}} = \frac{56}{16} \% \text{ (from Step 1)}$$

$$= 3.5 \% \text{ (from Step 2)}$$

If $I_{site} \leq I_{watershed}$, STOP and submit analysis to this point.
 If $I_{site} > I_{watershed}$, CONTINUE.

4 Set constants.

- | | |
|--|---|
| <p>P_j = unitless rainfall correction factor
 = 0.9 for all of Tidewater Virginia</p> <p>C = flow weighted mean concentration of total phosphorus
 = 0.26 mg/l for all I_{site}</p> | <p>P = annual rainfall depth in inches
 = 40 inches for Northern Virginia area
 = 43 inches for Richmond Metropolitan area
 = 45 inches for Hampton Roads area</p> |
|--|---|

12 and 2.72 are used in the equation as unit conversion factors.

GUIDANCE CALCULATION PROCEDURE

WORKSHEET A : NEW DEVELOPMENT

OPTION TWO: VA. CHESAPEAKE BAY DEFAULT

5 Calculate the pre-development load (L_{pre}).

$$\begin{aligned}
 L_{pre} &= P \times P_i \times [0.05 + (0.009 \times I_{\text{watershed}})] \times C_{pre} \times A \times 2.72 / 12 \\
 &= 44 \times 0.9 \times [0.05 + (0.009 \times 16)] \times 0.26 \times 18.5 \times 2.72 / 12 \\
 &= 8.38 \text{ pounds per year}
 \end{aligned}$$

6 Calculate the post-development load (L_{post}).

$$\begin{aligned}
 L_{post} &= P \times P_i \times [0.05 + (0.009 \times I_{\text{site}})] \times C \times A \times 2.72 / 12 \\
 &= 44 \times 0.9 \times [0.05 + (0.009 \times 56)] \times 0.26 \times 18.5 \times 2.72 / 12 \\
 &= 23.92 \text{ pounds per year}
 \end{aligned}$$

7 Calculate the pollutant removal requirement (RR).

$$\begin{aligned}
 RR &= L_{post} - L_{pre} \\
 &= 23.92 - 8.38 \\
 &= 15.54 \text{ pounds per year}
 \end{aligned}$$

To determine the overall BMP efficiency required (%RR) when selecting BMP options:

$$\begin{aligned}
 \%RR &= RR / L_{post} \times 100 \\
 &= (\quad / \quad) \times 100 \\
 &= \quad \%
 \end{aligned}$$

GUIDANCE CALCULATION PROCEDURE

WORKSHEET C: COMPLIANCE

Select BMP options using screening tools and list them below. Then calculate the load removed for each option. **DO NOT LIST BMPs IN SERIES HERE.**

1

Selected Option	Removal Efficiency (%/100)	×	Fraction of CBPA Drainage Area Served (expressed in decimal form)	×	L _{post} (lbs/yr)	=	Load Removed (lbs/yr)
DESIGN 3 "PRIME"	0.30		$\frac{59.8}{18.5} = 3.23$		23.92		23.18
DESIGN 4 "JEHOVAH'S"	0.50		$\frac{1.90}{2.67} = 0.71$		2.62		1.01
TOTAL = 24.19							

2a

Estimate parameters for non-CBPA drainage areas on the project site (if the locality does not require complete compliance for the whole site). If the locality requires compliance for the whole site, omit this step.

- A (on site, non-CBPA) = _____ acres
- I₁: structures = _____ acres
- parking lot = _____ acres
- roadway = _____ acres
- other = _____ acres
- = _____ acres
- = _____ acres
- total I₁ = _____ acres
- I = (total I₁ / A) × 100 = _____ %
- R_v = 0.05 + (0.009 × I) = _____
- C: I ≥ 20 = 1.08 mg/l = _____ mg/l
- I < 20 = 0.26 mg/l

When using VIRGINIA CHESAPEAKE BAY DEFAULT (F_v = 0.45 lbs/ac/yr), C=0.26 mg/l for all I_{site}.

2b

Calculate post-development load for on-site non-CBPAs.

$$L_{\text{post(outside)}} = P \times P_i \times R_v \times C \times A \times 2.72 / 12$$

$$= \underline{\quad} \times 0.9 \times \underline{\quad} \times \underline{\quad} \times \underline{\quad} \times 2.72 / 12$$

$$= \underline{\quad} \text{ pounds per year}$$

Revised 7/90

GUIDANCE CALCULATION PROCEDURE

3 Determine loadings for off-site areas if the locality allows this option.

$$I_{\text{watershed}} = \text{from locality OR } I_{\text{watershed}} = I_{VA} = 16$$

If $I_{\text{watershed}} < 20$, use $C_{\text{offsite}} = 0.26 \text{ mg/l}$.

If $I_{\text{watershed}} \geq 20$, use $C_{\text{offsite}} = 1.08 \text{ mg/l}$.

If $I_{\text{watershed}} = I_{VA}$ use $C_{\text{offsite}} = 0.26 \text{ mg/l}$.

$$L_{\text{offsite}} = P \times P_j \times [0.05 + (0.009 \times I_{\text{watershed}})] \times C_{\text{offsite}} \times A_{\text{offsite}} \times 2.72 / 12$$

$$= \underline{\hspace{2cm}} \times 0.9 \times [0.05 + (0.009 \times \underline{\hspace{2cm}})] \times \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} \times 2.72 / 12$$

$$= \underline{\hspace{2cm}} \text{ pounds per year}$$

4 Total non-CBPA pollutant loading.

$$\text{Step 3} + \text{Step 4} = \text{total non-CBPA loading}$$

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ pounds per year}$$

5 Calculate credits if the locality allows this option.

Selected Option	Removal Efficiency (%/100)	×	L_{post} (lbs/yr)	=	Load Removed (lbs/yr)
_____	_____		_____		_____
_____	_____		_____		_____
_____	_____		_____		_____

6 Calculate overall compliance.

$$\text{Step 1} + \text{Step 5} = \text{total load removed}$$

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ pounds per year}$$

If total load removed > removal requirement, criteria are satisfied.

$$\underline{24.19} > \underline{17.04}$$

15.54 prime + 1.5 jehovah's

PROJECT NAME
L&M JOB NO.

Jehovah's Witnesses Site Plan
1870040-302.04

TABLE 3

WORKSHEET FOR BMP POINT SYSTEM

SITE AREA = 2.47 ACRES

A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP POINTS		FRACTION OF SITE SERVED BY BMP	=	WEIGHTED BMP POINTS
Onsite BMP (Design 4)	9	x	1.90 / 2.47	=	6.92
Prime Outlet Point Transfer		x		=	3.08
		x		=	
		x		=	
TOTAL WEIGHTED STRUCTURAL BMP POINTS:					10.00

B. NATURAL OPEN SPACE CREDIT

FRACTION OF SITE	NATURAL OPEN SPACE CREDIT		POINTS FOR NATURAL OPEN SPACE
		x	=

C. TOTAL WEIGHTED POINTS

10.0	+		=	10.00
STRUCTURAL BMP POINTS		NATURAL OPEN SPACE POINTS		TOTAL



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

March 31, 1997

AES Consulting Engineers
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Attn: Mr. Mike Nice, P. E.

RECEIVED
APR 03 1997
AES CONSULTING
ENGINEERS

ECS Project No. R3456

Reference: All Seasons Office Park
Mooretown Road
James City County, Virginia

Dear Mr. Nice:

On 1 and 4 March 1997, a representative of this company visited the above referenced project site. The purpose of these visits was to explore the subsurface soils and comment on the potential for these soils to possess shrink-swell characteristics which might affect the proposed building construction. ECS, Ltd. also performed a pavement subgrade analysis to explore the pavement bearing quality of the subgrade soils by performing California Bearing Ratio (CBR) tests. A review of structural loading and foundation design and pavement design recommendations were not included in this study.

The site of the proposed construction consists of a 2.55 acre parcel, which is located about 150 feet east of the intersection of Route 60 with Olde Towne Road in James City County, Virginia. The parcel extends east of the CSX Railroad about 500 feet the west to Mooretown Road, where access is provided to the site. At the time of our visit, the site was vegetated with first generation pines and second generation hardwoods. Surface grades generally sloped down slightly towards the northwest. The proposed construction was not staked at the time of our visit.

It is anticipated that the proposed building construction will consist of three, one-story office and warehouse buildings across the site. The structures are anticipated to be of wood frame and masonry bearing wall construction with a slab-on-grade floor. Maximum wall and column loads for the buildings are anticipated to be less than about 3 kips/ft and 15 kips, respectively. Pavements are to be constructed to provide access and parking to the proposed structures.

2119-D North Hamilton Street, Richmond, Virginia 23230 • (804) 353-6333 • Fax (804) 353-9478

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This exploration was accomplished by performing six shallow handauger borings with dynamic cone penetrometer tests in proposed building corners and two shallow handauger borings in proposed pavement areas, performing laboratory tests on representative soil samples including CBR testing for pavement subgrade analysis, and by reviewing available Soil Survey data from the Soil Conservation Service publication.

Handauger boring locations are shown on the Boring Location Diagram. The handauger borings indicated the presence of about 8 inches of topsoil overlying natural soils throughout the subsurface of the site. The natural soils appeared to be seasonally saturated, loose, and probably unsuitable for footing support to depths of between 24 and 36 inches throughout the site. Construction in late spring or summer will likely encounter less moisture and firmer ground at shallower depths. Handauger borings were extended to a maximum depth of 60 inches below the ground surface in proposed pavement areas and up to 96 inches below existing grades in the proposed buildings. Handauger boring logs describing the soils encountered at this site with dynamic cone penetrometer (DCP) test results are included herein.

Representative samples obtained from the borings were returned to our Richmond laboratory for percent passing the No. 200 sieve, moisture content, Atterberg Limits (plasticity), Proctor, and CBR testing. The test results are summarized in Table 1.

Based on our review of the Soil Survey of James City County by the U.S. Soil Conservation Service, it appears that the natural bearing soils at the site are of the Kempsville and Craven Series. Considering this, and based on the laboratory test results, it is our opinion that the shallow natural bearing soils possess a low shrink-swell potential.

The ground water level encountered as shallow as 8 inches below the existing site grades is probably the result of the high amounts of precipitation during the winter months of the year. Saturated, loose sands (SM, SC) and clays (CL) encountered at the site are soft and may not be suitable for support of foundations. Depending on seasonal conditions, some undercutting of soft soils could be required. In this regard, we recommend a contingency for undercutting quantities be included in the construction contract.

The site should be cleared and stripped of topsoil to 5 feet outside of the building lines and 2 feet outward from the back of curb lines in pavement areas. The exposed natural subgrade soils should be proofrolled and carefully observed at the time of construction in order to aid in identifying any localized soft or unsuitable materials. Such soils should be scarified and compacted or undercut to firm ground at the direction of the Geotechnical Engineer. Engineered Fill should be compacted and tested with loose lifts not exceeding 8 inches in depth. Compaction should be to at least 95 percent of maximum dry density determined in accordance with ASTM D-698, Standard Proctor Method. Engineered Fill should extend at least 5 feet and 2 feet horizontally outside of the building lines and back of curb lines, respectively, before being sloped to meet existing site grades.

Based on the results of our exploration and provided the aforementioned earthwork procedures are implemented, the proposed buildings can be supported by shallow spread footings bearing in the firm natural soils encountered at this site or in properly compacted Engineered Fill placed to bring the building pads up to design subgrade. Footings can be designed for a net allowable soil pressure of 2,000 lbs/sq. ft. provided the footings are constructed with a minimum width of 18 inches. All footings should bear a minimum depth of 24 inches below final exterior grades.

Footing excavations should be extended through all topsoil or otherwise unsuitable material so as to expose firm, natural subgrade. Where soft or unsuitable bearing materials are encountered, they should be removed and footings lowered or bottom of footing elevations reestablished by backfilling with No. 57 Stone or flowable fill. A qualified inspector should be called on to observe all footing excavations prior to placement of No. 57 stone, flowable fill, or concrete to ascertain that firm bearing soils have been exposed.

CBR-1 and CBR-2 locations are shown on the Boring Location Diagram. These locations were selected as containing surficial soils generally consistent with the dominant soil types at this site. CBR testing performed on these materials indicated soaked CBR values of 24 and 28 for CBR-1 and CBR-2, respectively. The handauger borings performed within the proposed pavement areas indicate the natural and fill soils at pavement grades will consist primarily of Sandy CLAYS (CL) and Clayey SANDS (SC). On the basis of our exploration and experience with soils within the study area, it is our opinion that these values may be higher than actual pavement bearing quality encountered during construction. Therefore, we recommend the design CBR be limited to 10.0.

An important consideration with the design and construction of pavements is subsurface drainage. Where water seepage occurs into the subbase and base course layer, softening of the base materials and other problems related to the deterioration of the pavement can be expected. Good surface drainage should minimize the potential of the subgrade materials becoming saturated over a long period of time. A thorough inspection of subgrades prior to stone placement is considered essential towards minimizing long term pavement deterioration.

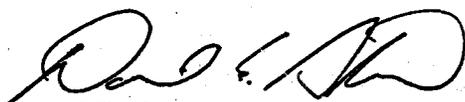
Prior to stone placement, all subgrades should be proofrolled and carefully observed by a qualified inspector in order to aid in identifying any localized soft or unsuitable materials. Areas which are excessively soft or otherwise unsuitable should be recompacted or undercut at the direction of the inspector. Areas to be recompacted should be moisture conditioned to within +/-3% of the optimum moisture content and recompacted to a depth of 8 inches to at least 95% of maximum dry density as mentioned above.

The recommendations contained herein were based on the data obtained from the handauger borings which indicate subsurface conditions at these specific locations at the time of the exploration. Soil conditions may vary between borings. Furthermore, it is sometimes difficult to characterize soil content and consistency using handauger borings alone. Therefore, as a critical part of a complete soil evaluation, all fill subgrades and footing excavations should be observed by a qualified inspector to ascertain that soil conditions encountered by our exploration are consistent with conditions encountered during construction. If during the course of construction variations appear evident, the Soils Engineer should be informed so that the conditions can be addressed.

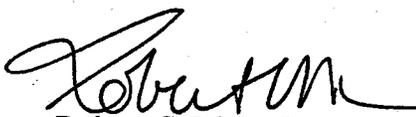
We have appreciated the opportunity to be of service to you in this regard. If we can be of further assistance or should you have questions concerning this investigation, please contact our office.

Respectfully,

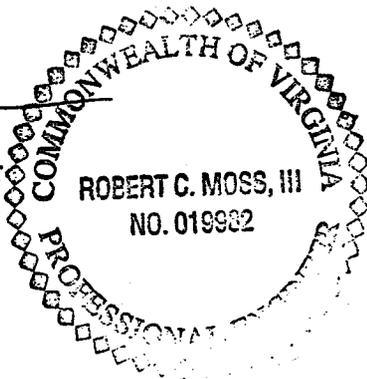
ENGINEERING CONSULTING SERVICES, LTD.



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



Robert C. Moss, III, P.E.
Richmond Branch Manager



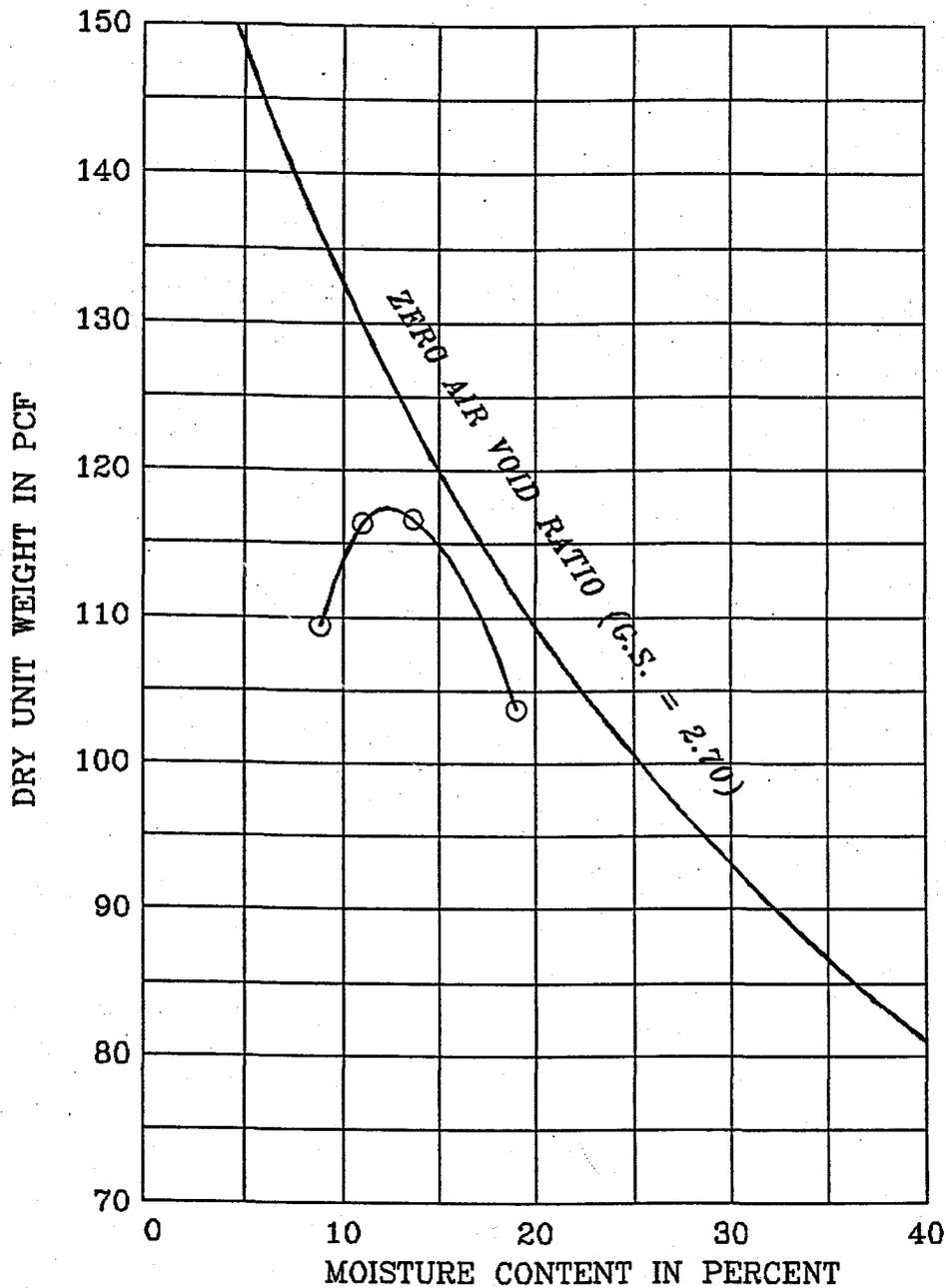
Copies: (3) Client

TABLE 1
SUMMARY OF LABORATORY TEST DATA

Project: All Seasons Office Park
ECS Project No: R3456
Location: James City County, Virginia
Date: 3-31-97

Boring No.	Depth (in.)	Moisture Content, %	% Silt & Clay	Plasticity LL/PI	USCS Symbol	Maximum Dry Density, pcf	Optimum Moisture Content, %	Soaked CBR Value
HA-2	24-36"	16.6	43.4	-	SC	-	-	-
HA-4	48-60	22.5	46.9	-	SC	-	-	-
HA-5	36-48	12.9	29.9	-	SM	-	-	-
HA-7	24-36	20.1	50.2	-	SC-CL	-	-	-
HA-8	42-48	24.0	51.1	-	CL	-	-	-
CBR-1/HA-3	12-60	-	46.6	NP	SC	117.4	12.3	24
CBR-2/HA-6	12-60	-	52.4	NP	CL	112.3	14.2	28

NP = NON-PLASTIC



SYMBOL	SAMPLE LOCATION	DEPTH (ft)	DESCRIPTION	TEST METHOD	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)
O	CBR 1/HA-3	1.0-5.0	Brown, Clayey, SAND (SC)	ASTM D698	12.3	117.4

Remark : R3456P1

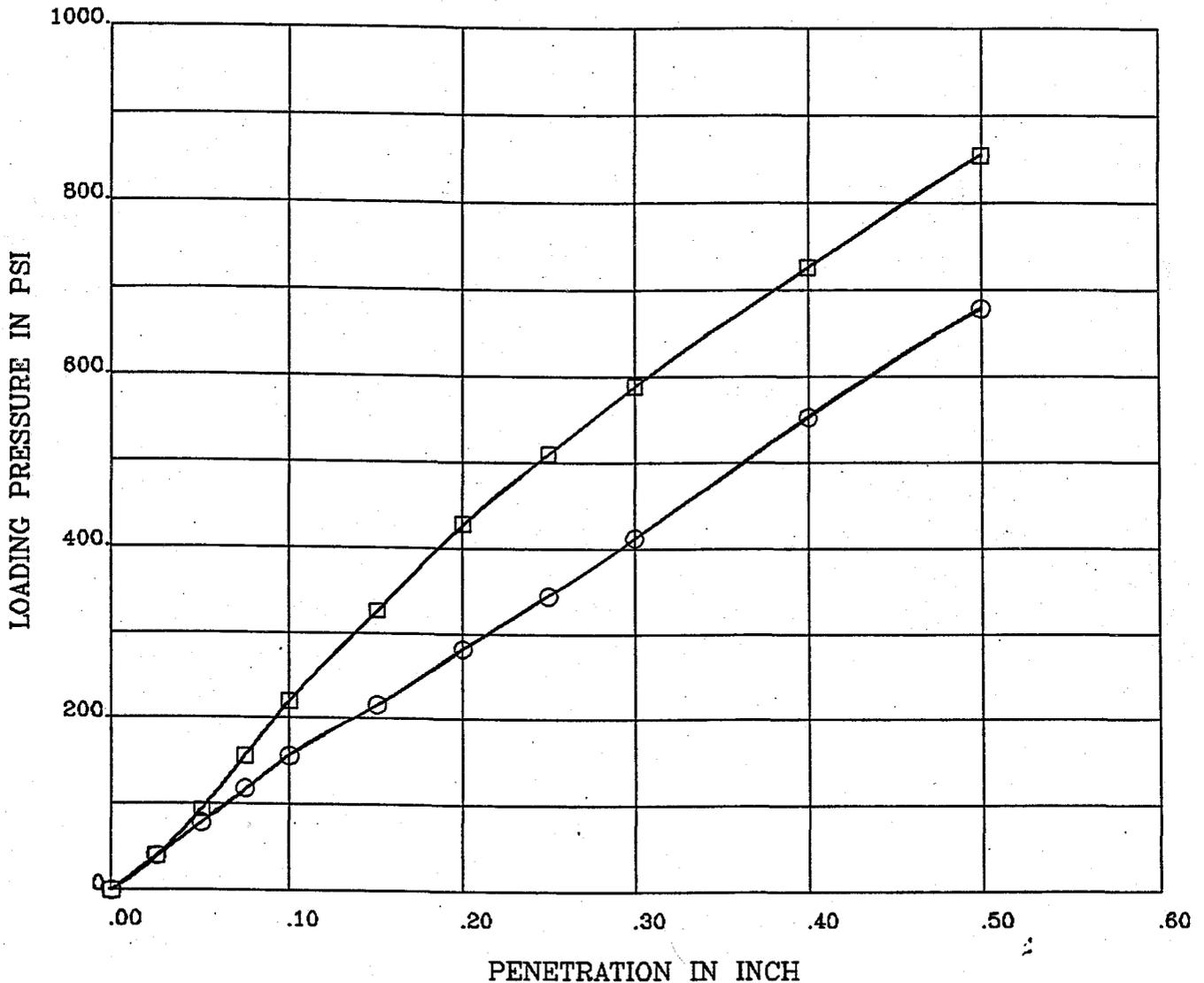
Project No.R3456

ALL SEASONS OFFICE PARK

ECS, Ltd.

COMPACTION TEST

Figure No.1



SAMPLE : CBR 1/HA-3 DEPTH (ft) : 1.0-5.0
 WATER CONTENT (%) : 13.3 DRY DENSITY (PCF) : 117.4
 O. M. C. (%) : 12.3 MAX. DRY DENSITY (PCF) : 117.4
 RELATIVE COMPACTION: 100 PERCENT SWELLING (%) : .1
 DESCRIPTION : Brown, Clayey, SAND (SC)

SYMBOL	SAMPLE	C.B.R.(0.1 in)	C.B.R.(0.2 in)	SOAKED MOISTURE CONTENT (%)	UPPER	MIDDLE
○	UNSOAKED	16	19	14.0		
□	SOAKED	24	29			

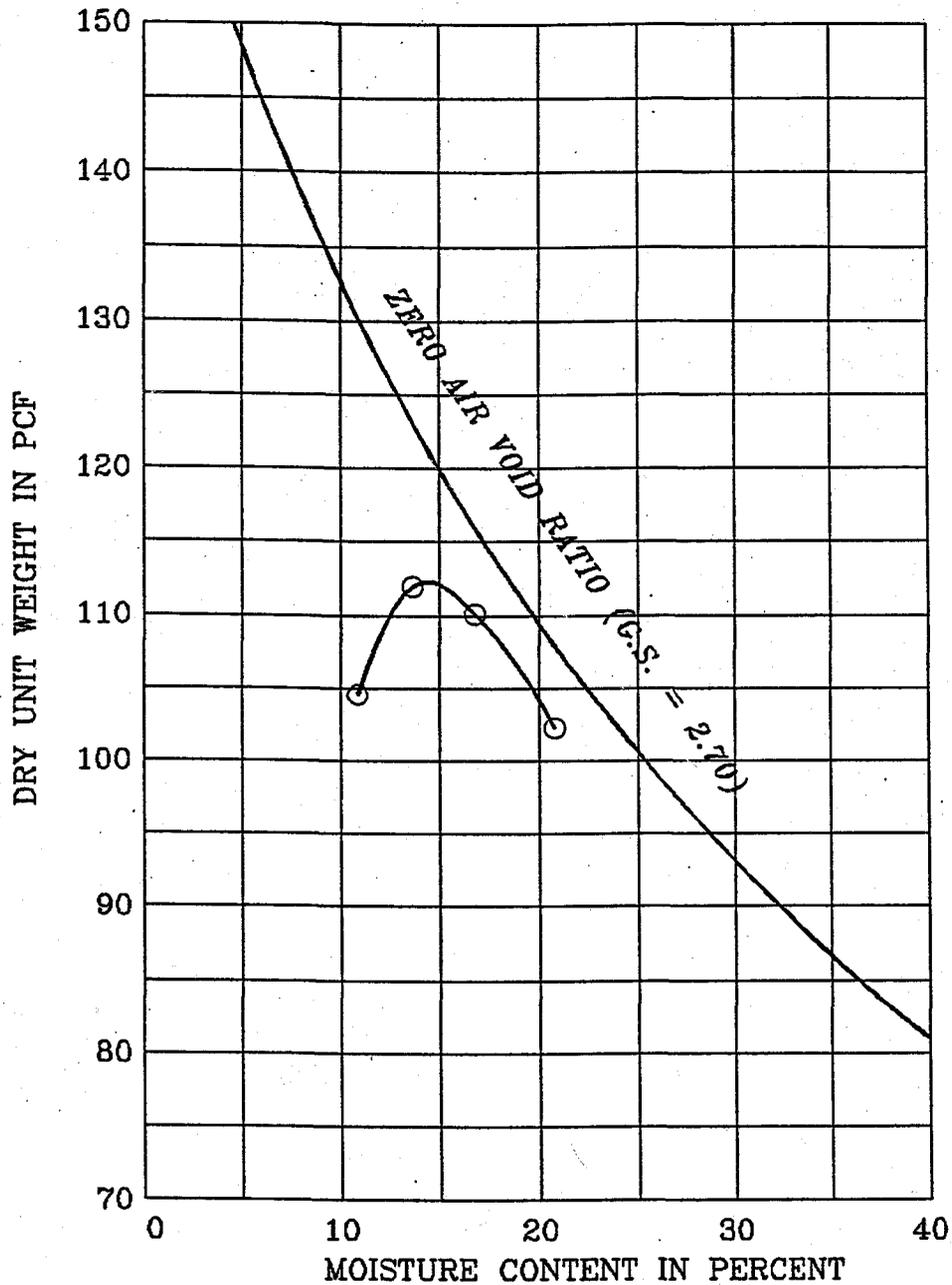
Remark:R3456C1

Project No.R3456

Project :ALL SEASONS OFFICE PARK

ECS, Ltd.

CALIFORNIA BEARING RATIO Figure No.2



SYMBOL	SAMPLE LOCATION	DEPTH (ft)	DESCRIPTION	TEST METHOD	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)
○	CBR 2/HA-6	1.0-5.0	Brown, Sandy CLAY (CL)	ASTM D698	14.2	112.3

Remark : R3456P2

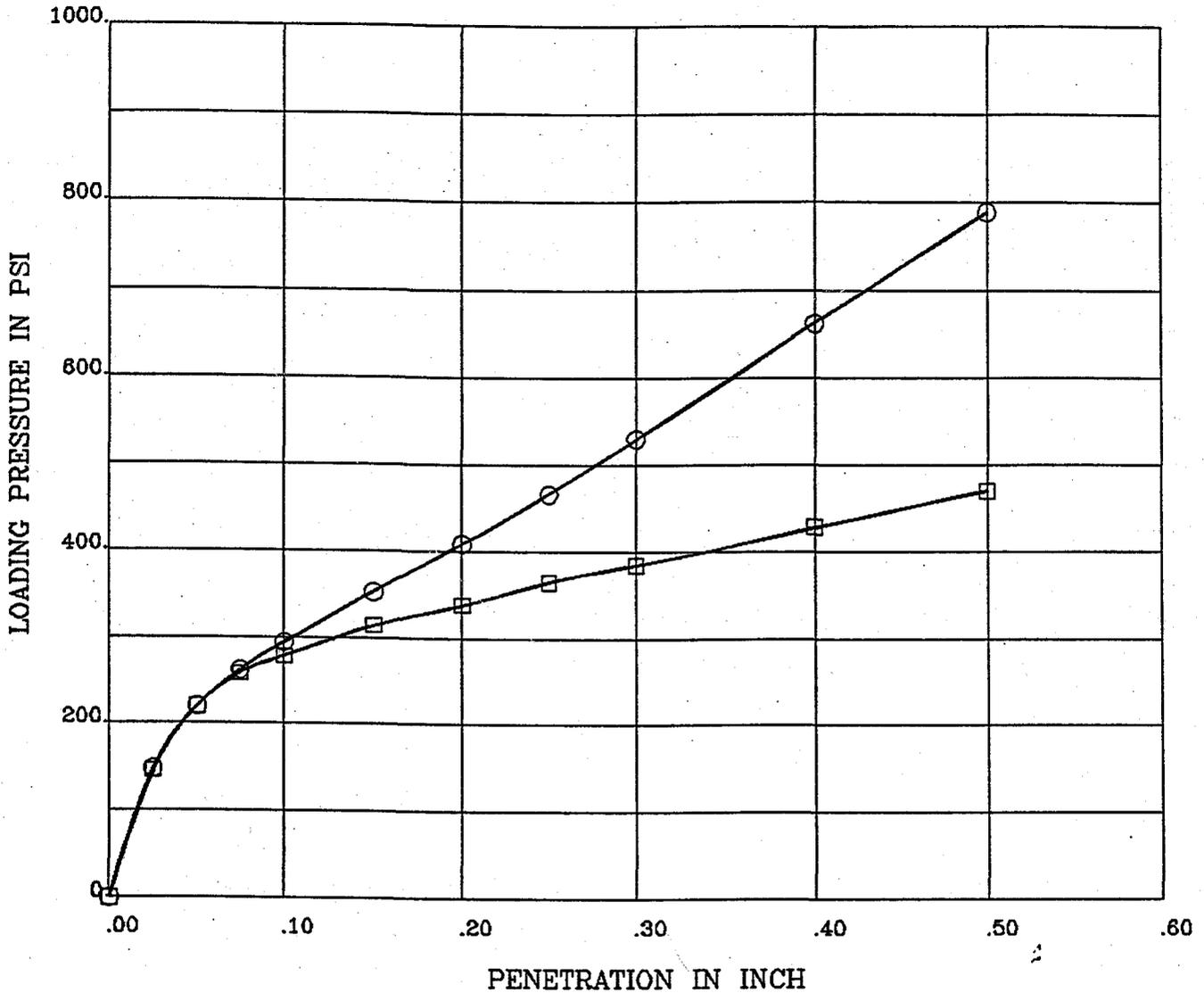
Project No. R3456

ALL SEASONS OFFICE PARK

ECS, Ltd.

COMPACTION TEST

Figure No.3



SAMPLE : CBR 2/HA-6 DEPTH (ft) : 1.0-5.0
 WATER CONTENT (%) : 14.2 DRY DENSITY (PCF) : 111.1
 O. M. C. (%) : 14.2 MAX. DRY DENSITY (PCF) : 112.3
 RELATIVE COMPACTION: 99 PERCENT SWELLING (%) : 1.9
 DESCRIPTION : Brown, Sandy CLAY (CL)

SYMBOL	SAMPLE	C.B.R.(0.1 in)	C.B.R.(0.2 in)	SOAKED MOISTURE CONTENT (%)	UPPER	MIDDLE
○	UNSOAKED	29	27	15.0		
□	SOAKED	28	22			

Remark:R3456C2

Project No.R3456

Project :ALL SEASONS OFFICE PARK

ECS, Ltd.

CALIFORNIA BEARING RATIO

Figure No.4

HANDAUGER BORING LOGS

Project: All Seasons Office Park
ECS Project No: R3456
Location: James City County, Virginia
Date: 3-31-97

HA-1

0-8" Topsoil
8-30" Tan, moist to wet, Silty, fine SAND (SM), contains root fragments
30-42" Orange and Tannish Brown, moist, Clayey, fine SAND (SC-CL)
42-64" Orange, moist, Clayey, fine SAND (SC)
64-84" Orangish and Yellowish Brown, moist, Silty, fine SAND (SC)
Groundwater not encountered.

END OF BORING AT 84 INCHES

HA-2

	DCP Blow Counts (Blows per increment)
0-8" Topsoil	
8-24" Tan, wet to moist, Silty, fine SAND (SM)	(2-2-3) @ 24"
24-36" Orangish Brown and Tan, moist to wet, Clayey, fine SAND (SC)	(3-5-5) @ 36"
36-48" Orangish and Yellowish Brown, moist, Silty, fine SAND (SM)	
48-60" Reddish Orange, moist, Clayey, fine SAND (SC)	(4-6-6) @ 60"
60-84 Reddish Orange, moist, Silty, fine SAND (SM), contains root fragments	

Groundwater not encountered

END OF BORING AT 84 INCHES

CBR-1/HA-3

0-8" Topsoil
8-18" Tan, moist to wet, Silty, fine SAND (SM), contains root fragments
18-30" Tan and Brown, wet to moist, Clayey, fine SAND (SC)
30-36" Tan and Brown, moist, Silty, fine SAND (SM)
36-48" Tan and Brown, moist, Clayey, fine SAND (SM)
48-60" Orangish Brown, moist, Clayey, fine SAND (SC)
Groundwater not encountered.

END OF BORING AT 60 INCHES

HA-4

0-8" Topsoil
8-20" Tan, moist to wet, Silty, fine SAND (SM)
20-48" Orange, moist, Clayey, fine SAND (SC-CL)
48-64" Reddish Orange, moist, Clayey, fine SAND (SC)
64-84" Yellowish Brown, moist, Silty, fine SAND (SM)
Groundwater not encountered.

END OF BORING AT 84 INCHES

HA-5

0-8" Topsoil
8-24" Tan, moist to wet, Silty, fine SAND (SM)
24-30" Orange, moist, Clayey, fine SAND (SC-CL)
30-56" Orange and Tan, moist, Silty, fine SAND (SM), contains root fragments
56-84" Orange and Red, moist, Silty, fine SAND (SM)
84-96" Red and Orangish Brown, moist, Silty, Clayey, fine to coarse SAND (SM-SC), trace gravel
Groundwater not encountered.
END OF BORING AT 96 INCHES

**DCP Blow Counts
(Blows per increment)**

(2-2-2) @ 24"
(3-4-4) @ 36"
(4-6-6) @ 42"
(4-5-7) @ 48"
(5-15-15) @ 60"
(5-10-10) @ 72"
(6-14-20) @ 84"

CBR-2/HA-6

0-8" Topsoil
8-15" Tan, moist to wet, Silty, fine SAND (SM), contains root fragments
15-54" Orangish Brown and Tan, wet to moist, fine Sandy CLAY (CL)
54-60" Orange Gray and Red, moist, fine Sandy CLAY (CL)
Groundwater encountered at 56 inches.

END OF BORING AT 60 INCHES

HA-7

0-8" Topsoil
8-20" Tan, moist to wet, Silty, fine SAND (SM)
20-56" Orange and Yellowish Brown, moist, Clayey, fine SAND (SC-CL), contains root fragments
56-70" Orange and Gray, moist, Clayey, fine SAND (SC)
70-80" Orange Gray and Red, moist, fine Sandy CLAY (CL)
Groundwater not encountered.

DCP Blow Counts
(Blows per increment)

(2-3-3) @ 24"
(2-7-8) @ 36"
(5-8-9) @ 48"
(7-15-18) @ 60"
(9-24-24) @ 72"

END OF BORING AT 80 INCHES

HA-8

0-8" Topsoil
8-20" Tan, moist to wet, Silty, fine SAND (SM)
20-36" Orange and Yellowish Brown, moist, Clayey, fine SAND (SC-CL)
36-48" Orange and Yellowish Brown, moist, fine Sandy CLAY (CL)
48-72" Orange Red and Gray, moist, fine Sandy CLAY (CL)
Groundwater encountered at 8 inches.

DCP Blow Counts
(Blows per increment)

(3-4-6) @ 24"
(6-14-24) @ 36"
(5-14-18) @ 48"
(5-18-26) @ 60"

END OF BORING AT 72 INCHES

Note: Soils were classified in general accordance with ASTM D2488 (Descriptions and Identification of Soils - Visual/Manual Procedures)



November 2, 1999

Mr. Paul D. Holt, III
Department of Development Management
James City County
P.O. Box 8784
Williamsburg, VA 23187-8784



Re: Kingdom Hall of Jehovah's Witnesses (L&M #1870040-302.04)
JCC Case No. SP-104-99

Dear Mr. Holt:

Accompanying this letter are ten (10) sets of plans for the referenced project, revised pursuant to your letter dated October 5, 1999. The following revisions have been made:

PLANNING

1. The Kingdom Hall does not have a steeple or spire.
2. The zoning of the property across Mooretown Road (Zone IL) is shown on Sheet C-3.
3. There is adequate room for an extended shoulder bike lane on Mooretown Road. The site entrance improvements should not interfere with this future bike lane improvement.
4. The drainage swale has been removed from the landscape area along the southern property line.
5. A note has been added to Sheet C-3 concerning underground utility placement.
6. A note was added to Sheet C-3 regarding the new signs.
7. A note was added to Sheet C-3 regarding the old wells.
8. The limits of clearing have been added and labeled on Sheet C-3.
9. After further conversation with Paul Holt and consulting the zoning ordinance, we have not moved the concrete stoop or mechanical pad, but have shown their distance from the property line, such that they are within 3 feet from the building setback line.
10. Additional evergreen landscaping has been added to better screen the proposed mechanical equipment.
11. The handicap spaces have been resized and dimensioned properly.
12. The landscape islands have increased in size to meet the 9' minimum width requirement.
13. The lighting plan has been revised to maintain a maximum of 0.1 foot-candle glare onto adjacent property or public streets.
14. Tree protection notations has been provided and labeled.
15. The "construction zone" setback has been shown on the plans.
16. The landscape plan has been revised to identify existing trees for which credit is requested.
17. The proposed monument sign has been added to the landscape plan.
18. These calculations are shown on Sheet L-2 in the Landscape Materials Summary Table on the bottom line.
19. The landscape plan has been revised to identify existing trees for which credit is requested.
20. Adjoining property owner letters have been sent to the Owner's across Mooretown Road.
21. Enclosed is a check in the amount of \$50.00 for JCSA review fee.

Engineers • Planners • Surveyors • Landscape Architects • Environmental Consultants

4029 Ironbound Road • Williamsburg, VA 23188 • (757) 253-2975 • FAX: (757) 229-0049 • L&M@langleywb.com

FMP

Mr. Paul D. Holt, III
James City County

November 2, 1999
Page 2

ENVIRONMENTAL

- ✓ 1. A Land Disturbing Permit requirement is acknowledged.
- ✓ 2. An Inspection/Maintenance Agreement requirement is acknowledged.
- ✓ 3. A note has been added to Sheet C-3 concerning the requirement for professional engineer is certification of construction of the dam.
- ✓ 4. The limits of clearing and grading have been shown on the plans.
- ✓ 5. Approximate location existing Sprint fiber optic line is shown on Sheet C-3 per review comment.
- ✓ 6. The road shown on the north border of the property is an existing commercial entrance and has been labeled as such.
- ✓ 7. The existing contours have been shown on the plans and the proposed contours have been revised as requested.
- ✓ 8. Tree protection fencing has been provided around existing trees to be saved.
- ✓ 9. The new landscape plantings referenced in the southwest and northeast corners of the site were minimums necessary to meet ordinance requirements for the entire side yard. Plant materials were forced into these corners due to the unplantable drainage swale along the south property line. Since the swale has been eliminated, these plantings are now dispersed along the south property line and integrated with existing trees. Areas outside the limits of clearing will not be disturbed. Existing vegetation is to be retained and supplemented with ordinance required minimums.
- ✓ 10. The detention basin has been revised and required sediment trap volume recalculated and provided.
- ✓ 11. The revised detention basin will not require over excavation.
- ✓ 12. The revised detention basin will not require a forebay.
- ✓ 13. Storm drain inlet protection has been added to the inlets and an inlet protection detail has been added to Sheet C-4.
- ✓ 14. Silt fence has been added to coincide with the clearing limits.
- ✓ 15. Diversion dikes have been added along the north and south limits of disturbance and directed to the detention basin/sediment trap.
- ✓ 16. A rock check dam has been added instead of a straw bale barrier in the Mooretown Road road ditch.
- ✓ 17. Outlet protection has been added and labeled as requested. Dimensions and stone size have also been added. The required outlet protection detail has been added to Sheet C-4.
- ✓ 18. The "southern channel" has been removed.
- ✓ 19. The "southern channel" has been removed.
- ✓ 20. The "southern channel" has been removed.
- ✓ 21. A construction entrance has been added at the entrance to the site.
- ⇒ 22. The detention basin/ BMP has been redesigned as an extended detention with shallow marsh facility providing approximately 6.9 points. We propose to make up the balance required to meet the 10 point minimum via excess credits from the Prime Retail BMP facility. This request was forwarded to Darryl Cook October 25, 1999. This is similar to offsite treatment utilized at Williamsburg Comprehensive Cancer Treatment Facility.
- ✓ 23. No Natural Open Space Credit is claimed in the BMP worksheet.
- ✓ 24. The detention basin has been redesigned as 6.9 point extended dry basin with a shallow marsh.
- OK 25. Complete calculations (design basis, inflow hydrographs, stage-storage, stage-discharge, routings, and basin drawdown) for the redesigned BMP detention basin are attached.
- ✓ 26. Water quality volume and drawdown time summary calculations are attached.
- ✓ 27. The water quality outlet control has been revised. See plan Sheet C-4 for structure details.

Langley and McDonald

Mr. Paul D. Holt, III
James City County

November 2, 1999
Page 3

- 28. A profile along the basin outfall has been added to Sheet C-3.
- 29. The basin outlet pipe and structure has been revised.
- 30. A detention basin/BMP maintenance plan has been added to Sheet C-2.
- 31. Water surface elevations for water quality volume, 2yr, 10yr and 100 yr routed elevations added to Sheet C-3.
- 32. The 4" PVC drain and grate have been eliminated.
- 33. The curb cut flumes have been eliminated.
- 34. All proposed storm drainage pipe and structures have been properly labeled.
- 35. All proposed storm drainage pipe and structures have been properly labeled.
- 36. The drainage ridge for the culvert has been added to Sheet C-2 ~~Sheet C-3~~.
- 37. The culvert has been redesigned with a tailwater elevation equal to the depth of flow in the receiving road ditch. The computed headwater elevation is 1.62' below the edge of pavement.

JCSA

1. The water service line has been relocated to tie in to the existing water meter box at the southeast property corner.
2. The existing water meter box at the southeast property corner will be used for service connection.

VDOT

1. Requested note added to Sheet C-3. Sight distance triangles added to Sheet C-3.
2. The note concerning maintenance of the detention/retention pond was added to Sheet C-3.
3. The note regarding aggregate under the curb is shown on Sheet C-5, Note #9.
4. The riprap has been eliminated.
5. The roadway shown to the north of the property is an existing private commercial entrance and noted as such on the plans.

Accompanying these plans is one set of attachments marked "FOR JCC ENVIRONMENTAL DIVISION", VDOT's red pencil markup plan, and a check in the amount of \$50.00 for JCSA review fee. If you need further clarification or need to discuss any of our responses, please contact us at 253-2975.

Best regards,

LANGLEY AND McDONALD, INC.



Stephen A. Romeo, L.S.
Principal

SAR/tmp
Enclosure
Copy: File

Scott Thomas

From: Lou Penci [lpenci@landmarkdgb.com]
Sent: Thursday, September 21, 2000 1:01 PM
To: scottt@james-city.va.us
Subject: Jehovah's site drainage analysis

Scott;
I'm sending over to you my calculations and drainage area map. My calc's show the pre development peak flow rate to be 1.70 cfs and the post development flow rate to be 1.01 cfs. I did not try to pick up any portion of the road into the basin as the drainage area is very small. I think the calc's prove what you anticipated.

PEAK FLOW RATE

PRE, 1.70 CFS

POST, 1.01 CFS

40% REDUCTION

VOLUME

VOL_{10PRE} = 2,043 cf.

VOL_{10POST} = 5,187 cf

153% INCREASE



December 15, 1999



Mr. Paul D. Holt, III
Department of Development Management
James City County
P.O. Box 8784
Williamsburg, VA 23187-8784

Re: Kingdom Hall of Jehovah's Witnesses (L&M #1870040-302.04)
JCC Case No. SP-104-99

Dear Mr. Holt:

Accompanying this letter are four (4) sets of plans for the referenced project, revised pursuant to your transmittal of review comments dated December 14, 1999. The following revisions have been made:

ENVIRONMENTAL

1. A letter requesting an exception to the 10-point criteria is attached.
2. The Landscape Plan is revised to include the seeding schedule for the shallow marsh.
3. Additional details and notes have been added to Sheet C-3 for construction requirements of the embankment and outlet control structure.
4. The storm drain along the south portion of the site has been relocated to outfall at the south end of the BMP.
5. The non-requirement for an emergency spillway is acknowledged.
6. The DI-5 structure will operate in weir flow to approximate elevation 110.10 at which point orifice flow will govern. Since the top of embankment is at elevation 109.50, it is our opinion the structure will not achieve orifice flow and therefore not require an anti-vortex device
7. The 12" outlet pipe has been specified on the plans as O-ring pipe.

If you need further clarification or need to discuss any of our responses, please contact us at 253-2975.

Best regards,

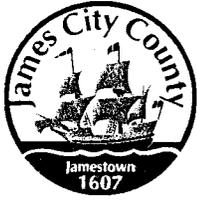
LANGLEY AND McDONALD, INC.

Stephen A. Romeo, L.S.
Principal

SAR/tmp
Enclosure

Engineers • Planners • Surveyors • Landscape Architects • Environmental Consultants

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DEVELOPMENT MANAGEMENT

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planning@james-city.va.us

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

January 9, 2002

Stilley Company
P.O. Box 2739
Newport News, Va. 23609

Attn: Mr. Jack Pruden

Re: Kingdom Hall of Jehovah's Witnesses
County Plan No. SP-104-99
County BMP ID Code: PC 110

Dear Mr. Pruden:

The Environmental Division has reviewed your letter dated November 29th 2001, as well as other information as previously forwarded to our office by LandMark Design Group on October 15th 2001. The information as provided by the consultant was forwarded to respond to correspondence issued by our office on December 22, 2000.

Based on our review of information as submitted and upon reinspection of the site by our office, the following items must be addressed prior to release of the developer's surety instrument for the stormwater management/BMP facility:

Construction Certification:

1. Pursuant to previous comment # 1 as outlined in our correspondence dated December 22nd 2000 and in accordance with Note # 19 on Sheet C-4 of the approved plan:

"As-built drawings must be provided for all detention/BMP facilities. Also upon completion, the construction of all detention/BMP facilities shall be certified by a professional engineer who inspected the structure during construction. The certification shall state that to the best of his/her judgement, knowledge and belief, the structure was constructed in accordance with the approval plans and specifications".

Construction certification was required for this specific BMP facility due to the embankment fill and key trench along the north and west perimeter of the pond, the hydraulic control structure and anti-seep collar installations. As the note as outlined above was present on the approved plans and specifications, it was responsibility of the owner/contractor to ensure a professional engineer was present during the construction process to observe construction and to provide construction certification once the structure was completed. Although recently we have strengthened and provided better definition to the record drawing (as-built) and construction certification process for stormwater management facilities in James City County, the requirement for construction certification by a registered professional engineer has not changed.

A cover letter or statement (using standard forms as provided in page 3 of the current record drawing/construction certification guidelines) without proper seal and signature of a licensed professional engineer cannot be accepted by our division, as it contradicts our past and current policy for construction certification of BMP facilities.

Record Drawing:

2. The revised record drawing dated 1/22/01 appears **satisfactory**. One reproducible set of the record drawing is hereby requested and should be forwarded to our office.

Construction - Related Items:

3. Upon reinspection, all construction-related (field) items appear properly addressed and are now **satisfactory**.

In addition, I highly recommend that you and other individuals within your organization who routinely construct stormwater management and drainage facilities in James City County review and familiarize yourselves with our current requirements for record drawings and construction certification. This includes Note # 20 of the James City County Environmental Division, Erosion and Sediment Control notes dated July 6th 2001 and our current record drawing/construction certification packet entitled *James City County Environmental Division, Stormwater Management /BMP Facilities, Record Drawing and Construction Certification, Standard Forms & Instructions* (attached).

Please contact me at 757-253-6639 if you have any further comments or questions relative to certification requirements for this project.

Sincerely,

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

Enclosures
SJT/sjt

cc: Stephen A. Romeo, LandMark Design Group
Gerald Brown, Kingdom Hall of Jehovah's Witnesses

G:\SWMProg\AsBuilts\ClarLetters\PC110.1

Mr. Scott Thomas, P.E.
James City County Department of Development Management
Environmental Division
Post Office Box 8784
Williamsburg, VA 23187-8784

Re: Jehovah's Witness Kingdom Hall – Mooretown Road

November 29, 2001

Dear Scott,



As you will recall, we had a meeting at this site last December 14 in an attempt to have our \$20,000.00 erosion and sedimentation control bond released. On December 22, 2000, you responded with a letter, which contained a punch list for both the contractor and the engineer. The re-grading work, marsh planting and pond re-seeding work was done as soon as the weather permitted. It is also my understanding that the construction certification and the record drawing you requested form the engineer has been provided as well.

Mr. Steve Romeo of the Landmark Design Group wrote you a follow up letter on October 15, 2001 with additional documentation and a request for the release of the posted surety. Since there has been no response from your office, we assume all issues have been resolved and our bond can be released. Please provide necessary release paper work for our bonding company.

Thanking you in advance for your assistance in this matter.

Sincerely,

Jack Pruden

Cc. Mr. Gerald Brown – Kingdom Hall
Mr. Stephen Romeo – Landmark Design Group
Mr. James Windsor, P.C. – Kaufmann & Canoles
Mrs. Marni Cannata – Taylor Johnson Group

Larry S. Barry, PE., President
Norman H. Mason, L.S., VP
Vaughn B. Rinner, C.L.A.
Elizabeth J. Anderson, PE.
Kenneth A. Dierks
Robert P. Kerr, R.E.P., P.W.S.



Clayton E. Massey, PE.
Charles R. Orsborne, L.S.
Stephen A. Romeo, L.S.
Mark W. Strickland, PE.
William R. Turner, Jr., A.I.C.P.
A. Gary Webb, PE.

October 15, 2001

Mr. Scott J. Thomas, PE
Civil Engineer
James City County Department of Development Management
Environmental Division
PO Box 8784
Williamsburg, Virginia 23187-8784

Dear Mr. Thomas:

Pursuant to our on going communications regarding the Stormwater Management/BMP Facility (PC110) located at the Jehovah's Witnesses Kingdom Hall on Mooretown Road (SP-104-99), this letter is to once again convey to you our position that the referenced facility is functioning correctly. Furthermore, the flooding on the adjacent property results from a condition that existed prior to the construction of the Kingdom Hall project. The County has allowed the condition of the drainage facilities (ditches/culverts, etc.) along and within the CSX Railroad right of way to deteriorate to the point of being non-functional. Also, the subdivision creating the lot that this Kingdom Hall was constructed upon included a provision, assumed to be requisite of the County's approval of the subdivision, for handling stormwater runoff via an offsite facility. However, the offsite facility was never constructed and we understand that this is due to the County's failure to enforce compliance prior to the expiration of the survey posted to guarantee construction of the facility.

We have demonstrated through documentation submitted in support of the project's approval that the facility complies with the applicable regulations promulgated for such. It is our position that the Virginia Erosion and Sediment Control Regulations (4VAC 50-30-40), Minimum Standard 19 is satisfied through provision C.(3).

In as much as we sympathize with the owner of the adjacent property relative to the flooding that occurs with each moderate rainfall event, we maintain that this condition is made no worse by the Kingdom Hall project. In fact, we believe that the Kingdom Hall project may have helped relieve some of the flooding in that the excess runoff from the adjacent property floods the Kingdom Hall Pond's Outfall, thereby creating a tailwater condition that was not anticipated during the design of the facility.

Lastly I have provided documentation to your department, from the Commonwealth of Virginia Board for Architects, Professional Engineers, Land Surveyors, Certified Interior Designers and Landscape Architects supporting my qualifications to provide the construction certification for this facility, (ie: if I'm qualified to certify the design of the facility, then I'm qualified to certify it's construction.)

Engineers • Planners • Surveyors • Landscape Architects • Environmental Consultants
4029 Ironbound Road, Suite 100, Williamsburg, VA 23188 (757) 253-2975 FAX: (757) 229-0049 imgd@landmarkdgb.com

Mr. Scott J. Thomas
James City County Department of Development Management

October 15, 2001
Page 2

I'm enclosing with this letter, pages 1, 2, and 3 of the County's Stormwater Management/BMP Facilities Record Drawing and Construction Certification Forms, along with a copy of the record drawing for this facility and request that you release the surety posted for this.

Please contact me if you have any questions about this.

Sincerely,

LandMark Design Group, Inc.

Stephen A. Romeo, L.S.
Principal

CC: Mr. Gerald Brown
Mr. Jack Pruden
Vernon M. Geddy, III Esq.





DEVELOPMENT MANAGEMENT

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INTEGRATED PEST MANAGEMENT
(757) 259-4116

December 22, 2000

Landmark Design Group
4029 Ironbound Road, Suite 100
Williamsburg, Va. 23188
Attn: Mr. Stephen A. Romeo, L.S.

Re: Kingdom Hall of Jehovah's Witnesses
County Plan No. SP-104-99
Stormwater Management/BMP Facility (PC 110)

Dear Mr. Romeo:

The Environmental Division has reviewed a record drawing as submitted to us at a site meeting held on December 14th for the above referenced project. The record drawing dated December 11th 2000 provides as-built information for a single shallow marsh dry detention facility and the portions of the onsite storm drainage system.

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

Construction Certification:

1. In accordance with Note # 19 on Sheet C-4 of the approved plan, upon completion the construction of all detention/BMP facilities shall be certified by a professional engineer who inspected the structure during construction. The certification shall state that to the best of his/her judgement, knowledge, and belief, the structure was constructed in accordance with the approval plans and specifications. A construction certification was not provided. (*Note: Construction certification is required for the embankment fill and key trench along the north and west perimeter of the pond, the hydraulic control structure and anti-seep collar installations per the approved design plan*).

Record Drawing:

2. Add details entitled "Modified DI-5" and "Outlet Structure Profile" as shown on Sheet C-3 of the approved plan, annotated as necessary with as-built (constructed) information, to the record drawing. These details show important information relative to construction of the facility.

NOT
ADD'D

3. ✓ Provide additional top of dam finished grade spot elevations along the north and west sides of the facility. Based on elevations as presented on the record drawing, it does not appear design plan top of dam Elevation 109.5 was not achieved on fill portions of the embankment on the north and west sides.
4. ✓ If possible add the following County identifiers to the lower right hand corner of the record drawing: County Plan Number SP-104-99 and BMP ID No. PC 110.

Construction - Related Items:

- ? 5. The approved design plan required top of dam (fill embankment) along the north and west sides to be at Elevation 109.50. Based on the record drawing, it appears the facility does not meet proposed top of dam design grade and freeboard requirements for the facility will not be met. The highest elevation along the fill embankment is around El. 108 to 109. This work is required to be performed; or if the work was performed, additional record drawing information (spot elevations) is required to show conformance with the approved plan.
- ? 6. Dry detention basin shallow marsh plantings do not appear to be installed per approved Landscape Plan Sheet L-1 and in accordance with the Chesapeake Bay Preservation Ordinance exception request letter from Darryl Cook dated December 30th 1999 .
- ? 7. Various bare soil areas were observed in graded areas surrounding the BMP facility, especially along the north side. Adequate stabilization by seeding and mulching methods needs performed at these locations.

Other:

8. Based on a drainage complaint received by our office, it has become apparent following development of this site and construction of the stormwater management facility, that outlet discharge from the stormwater management facility has increased the volume of runoff onto the adjacent north property. Although it is confirmed that the peak design flow rate from the site's BMP has met a very stringent 0.1 cfs peak discharge limit as set by CSX for the 100-year design storm event, the resulting outflow hydrograph from the facility has been extended in duration such that an increase in runoff volume (not peak flow rate) is being experienced on the adjacent property, in excess of that experienced prior to development of the site.

Based on preliminary evaluation, the increase in runoff volume to the adjacent north property for the 10-year design storm event is approximately 153 percent. This in turn has resulted in an increased flooding risk to offsite property and an existing building (structure) occupied and utilized by the adjacent owner for business purposes.

Minimum Standard 19 of the Virginia Erosion and Sediment Control Regulations (4VAC50-30-40.19) states that "properties and waterways downstream from development sites shall be protected from sediment deposition, erosion and damage due to increase in volume, velocity and peak rate of stormwater runoff." Therefore, an acceptable alternative to resolve this situation needs presented and installed before the surety for this facility can be released.

One reproducible and one blue/black line set of the record drawings are requested once the above items are adequately addressed. Please contact me at 757-253-6639 if you have any further comments or questions relative to record drawing or construction certification requirements or construction-related punch-list items for this project.

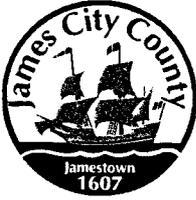
Sincerely,



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

cc: Gerald Brown, Kingdom Hall of Jehovah's Witness
Jack Prudent, Stilley Company

G:\SWMProg\AsBuilts\SP-104-99.cert



DEVELOPMENT MANAGEMENT

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

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planning@james-city.va.us

COUNTY ENGINEER
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INTEGRATED PEST MANAGEMENT
(757) 259-4116

December 22, 2000

Landmark Design Group
4029 Ironbound Road, Suite 100
Williamsburg, Va. 23188
Attn: Mr. Stephen A. Romeo, L.S.

Re: Kingdom Hall of Jehovah's Witnesses
County Plan No. SP-104-99
Stormwater Management/BMP Facility (PC 110)

Dear Mr. Romeo:

The Environmental Division has reviewed a record drawing as submitted to us at a site meeting held on December 14th for the above referenced project. The record drawing dated December 11th 2000 provides as-built information for a single shallow marsh dry detention facility and the portions of the onsite storm drainage system.

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

Construction Certification:

1. In accordance with Note # 19 on Sheet C-4 of the approved plan, upon completion the construction of all detention/BMP facilities shall be certified by a professional engineer who inspected the structure during construction. The certification shall state that to the best of his/her judgement, knowledge, and belief, the structure was constructed in accordance with the approval plans and specifications. A construction certification was not provided. (*Note: Construction certification is required for the embankment fill and key trench along the north and west perimeter of the pond, the hydraulic control structure and anti-seep collar installations per the approved design plan*).

Record Drawing:

2. Add details entitled "Modified DI-5" and "Outlet Structure Profile" as shown on Sheet C-3 of the approved plan, annotated as necessary with as-built (constructed) information, to the record drawing. These details show important information relative to construction of the facility.

3. Provide additional top of dam finished grade spot elevations along the north and west sides of the facility. Based on elevations as presented on the record drawing, it does not appear design plan top of dam Elevation 109.5 was not achieved on fill portions of the embankment on the north and west sides.
4. If possible add the following County identifiers to the lower right hand corner of the record drawing: County Plan Number SP-104-99 and BMP ID No. PC 110.

Construction - Related Items:

5. The approved design plan required top of dam (fill embankment) along the north and west sides to be at Elevation 109.50. Based on the record drawing, it appears the facility does not meet proposed top of dam design grade and freeboard requirements for the facility will not be met. The highest elevation along the fill embankment is around El. 108 to 109. This work is required to be performed; or if the work was performed, additional record drawing information (spot elevations) is required to show conformance with the approved plan.
6. Dry detention basin shallow marsh plantings do not appear to be installed per approved Landscape Plan Sheet L-1 and in accordance with the Chesapeake Bay Preservation Ordinance exception request letter from Darryl Cook dated December 30th 1999 .
7. Various bare soil areas were observed in graded areas surrounding the BMP facility, especially along the north side. Adequate stabilization by seeding and mulching methods needs performed at these locations.

Other:

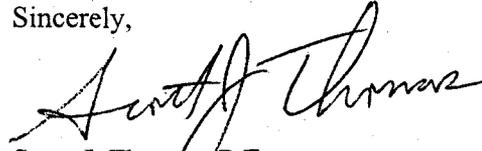
8. Based on a drainage complaint received by our office, it has become apparent following development of this site and construction of the stormwater management facility, that outlet discharge from the stormwater management facility has increased the volume of runoff onto the adjacent north property. Although it is confirmed that the peak design flow rate from the site's BMP has met a very stringent 0.1 cfs peak discharge limit as set by CSX for the 100-year design storm event, the resulting outflow hydrograph from the facility has been extended in duration such that an increase in runoff volume (not peak flow rate) is being experienced on the adjacent property, in excess of that experienced prior to development of the site.

Based on preliminary evaluation, the increase in runoff volume to the adjacent north property for the 10-year design storm event is approximately 153 percent. This in turn has resulted in an increased flooding risk to offsite property and an existing building (structure) occupied and utilized by the adjacent owner for business purposes.

Minimum Standard 19 of the Virginia Erosion and Sediment Control Regulations (4VAC50-30-40.19) states that "properties and waterways downstream from development sites shall be protected from sediment deposition, erosion and damage due to increase in volume, velocity and peak rate of stormwater runoff." Therefore, an acceptable alternative to resolve this situation needs presented and installed before the surety for this facility can be released.

One reproducible and one blue/black line set of the record drawings are requested once the above items are adequately addressed. Please contact me at 757-253-6639 if you have any further comments or questions relative to record drawing or construction certification requirements or construction-related punch-list items for this project.

Sincerely,



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

cc: Gerald Brown, Kingdom Hall of Jehovah's Witness
Jack Prudent, Stilley Company

G:\SWMProg\AsBuilts\SP-104-99.cert

FILE-



R. L. Cope
Project Engineer
Engineering Department

*Darryl
COPY*

Richmond District
Design & Construction
1610 Forest Avenue, Suite 120
Richmond, VA 23229
FAX (804) 226-7759

Phone (804) 226-7728

March 19, 1998

RECEIVED
MAR 23 1998
AES CONSULTING
ENGINEERS

Mr. C. Andrew Herr
AES Consulting Engineers
5248 Olde Towne Road, Suite 1
Williamsburg, VA 23188

Re: All Seasons Operations Center — *SP-20-97*

Dear Mr. Herr:

CSXT will not object to your proposal to develop the property adjacent to their right-of-way in the vicinity of MP CA-40.40, at Williamsburg, Virginia. It is understood that the detention pond will allow no more than 0.10 C.F.S. of storm water to come to the Railroad right-of-way, based on a one-hundred year storm. This will be less than the predevelopment runoff of 1.4 C.F.S.

No part of the facility will be placed on CSXT right-of-way, and rip-rap baffles should be placed at the end of your twelve inch (12") outlet pipe to give the storm water a wide disbursement.

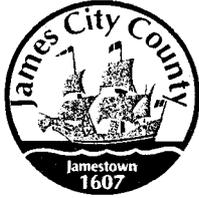
Very truly yours,

R. L. Cope
Project Engineer

Scott, AES submitted a plan for this same parcel last year. The railroad provided this letter stipulating what type of runoff they would allow on their right-of-way.

I assume the same rules still apply.

Mark



DEVELOPMENT MANAGEMENT

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INTEGRATED PEST MANAGEMENT
(757) 253-2620

December 30, 1999

Mr. Stephen Romeo
Langley and McDonald
4029 Ironbound Road
Williamsburg, VA 23188

RE: Exception Request for Kingdom Hall of Jehovah's Witness
SP-104-99

Dear Mr. Romeo:

Pursuant to your letter request of December 14, 1999, an exception from the Chesapeake Bay Preservation Ordinance's 10-point BMP evaluation procedure is granted for this site with a condition. All the site's impervious cover drains to either the onsite 9-point BMP facility or the offsite 6-point BMP facility built to control runoff from other parcels in the Sixty West subdivision. The ability to obtain additional points through the establishment of conservation easements onsite does not exist due to the presence of utility and other easements on the site.

The condition on which the exception is granted is that the shallow marsh vegetation in the BMP needs to be established by planting rather than seeding. Establishment by planting gives more control over the marsh design and will result in the marsh being established more quickly. A landscape plan that shows the types, amounts and locations of wetland plantings must be included on the site plan.

Please contact me at 253-6673 if you have any questions.

Sincerely,

Darryl E. Cook, P.E.
Environmental Director



December 14, 1999

Mr. Darryl Cook
Code Compliance
James City County
P.O. Box 8784
Williamsburg, VA 23187-8784

Re: Jehovah's Witnesses – Mooretown Road Site
(James City County Case No. SP-104-99)

Dear Darryl:

Pursuant to our telephone conversation on December 13, 1999, this letter is to request an exception to the County's Chesapeake Bay Preservation Ordinance. As discussed, I believe we are doing all that we can on this site to comply with the ordinance. For example, we are under the impervious coverage threshold by 5%; we are taking all measures possible to retain existing vegetation; we have relocated one of the storm drain outlets in order to lengthen the path from the storm drain outlet to the BMP water quality inlet and we are specifying a wetland seed mix for the shallow marsh area of the BMP in order to further enhance the ability of the facility to filter pollutants. We trust that you'll find this to be satisfactory and ask that you contact us if you have any questions or need additional information about this.

Best regards,

LANGLEY AND McDONALD, INC.

Stephen A. Romeo, L.S.
Principal

SAR/dhm

Copy: Mr. Alan R. Kofoed
File: 1870040-302.04

Scott Thomas

From: Lou Penci [lpenci@landmarkdgb.com]
Sent: Thursday, September 21, 2000 1:01 PM
To: scottt@james-city.va.us
Subject: Jehovah's site drainage analysis

Scott;
I'm sending over to you my calculations and drainage area map. My calc's show the pre development peak flow rate to be 1.70 cfs and the post development flow rate to be 1.01 cfs. I did not try to pick up any portion of the road into the basin as the drainage area is very small. I think the calc's prove what you anticipated.

PEAK FLOW RATE

PRE, 1.70 CFS

POST, 1.01 CFS

40% REDUCTION

VOLUME

VOL_{10PRE} = 2,043 cf.

VOL_{10POST} = 5,187 cf.

153% INCREASE

ENVIRONMENTAL DIVISION REVIEW COMMENTS
KINGDOM HALL OF JEHOVAH'S WITNESSES
SITE PLAN NO. SP - 104 - 99
December 30, 1999 SJT

These comments pertain to the revised site plan as submitted with a professional signature and seal date of November 5, 1999.

Stormwater Management / Drainage Plan:

1. Shallow Marsh. Provide a landscaping/planting plan to show the intended shallow marsh creation at the lower stage of the detention facility along with seeding recommendations in areas around or outside the proposed wetland plant locations. (Note: A good design reference is Chapter 9 of the Metropolitan Washington Council of Governments, *Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMP's*, 1987).
2. Anti-Vortex Device. Please provide a anti-vortex baffle or plate within the inverted DI-5 Type B1, B2 trash rack structure as shown on sheet C-3. Provide additional notes or details as necessary.

(For information only. Please note that effective January 1st 2000, the James City County Environmental Division, upon recent Board of Supervisor approval of amendments to the Chapter 8 Erosion and Sediment Control ordinance, will begin the use and implementation of the James City County Guidelines for the Design and Construction of Stormwater Management BMP's manual dated October 1999. The manual provides general technical guidance pertaining to: stormwater control volume requirements for water quality and channel protection; revisions to the BMP Point System; the expanded list of BMP options; revisions to open space credits; and BMP selection assistance for development sites. Hard copies and CD-ROM versions of the manual are available upon request.)

ENVIRONMENTAL DIVISION REVIEW COMMENTS
KINGDOM HALL OF JEHOVAH'S WITNESSES
SITE PLAN NO. SP - 104 - 99

December 10, 1999

MCE/STT

These comments pertain to the revised site plan as submitted with a professional signature and seal date of November 5, 1999.

Stormwater Management / Drainage Plan:

1. BMP/Water Quality Points. Based on the calculations, the detention basin/BMP was redesigned as a 9-point extended detention basin, shallow marsh BMP providing approximately 6.9 points based on the site coverage. The front portion of the site adjacent to Mooretown Road drains to an existing offsite 6-point BMP facility, which provides an additional 0.6 BMP points. Given the presence of easements on the front and rear of the site, there is really no opportunity for natural open space conservation easements. However, the BMP facilities control all the impervious cover created on this site. Therefore, *for this particular review case*, it appears the only feasible option is to grant an exception to the 10-point BMP criteria as there is no opportunity to meet the criteria onsite. As presented in the following comments, there are enhancements that can be made to the detention basin design to improve its removal efficiency which will need to be made. A letter needs to be submitted requesting the exception.
- 2.) Shallow Marsh. Provide a landscaping/planting plan to show the intended shallow marsh creation at the lower stage of the detention facility along with seeding recommendations in areas around or outside the proposed wetland plant locations. (Note: A good design reference is Chapter 9 of the Metropolitan Washington Council of Governments, *Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMP's*, 1987).
3. Pond Construction. Provide notes or details showing specific construction requirements for the pond (fill) embankment and 12 inch RCP outlet barrel. Include requirements for subgrade, fill material and placement, soil compaction, concrete anti-seep collars or toe drain, pipe bedding and backfill, and core trench, as applicable, for a shallow marsh dry detention basin design.
4. The 175 foot section of storm drain that drains the south portion of the project needs to be relocated so that it outfalls closer to the south end of the BMP. Increasing the travel length between the inflow and outflow points of a BMP improves its pollutant removal capability.
5. Emergency Spillway. No emergency spillway was provided. Freeboard from the 100-year design WSEL to top of dam is 1.19 feet which is less than 2 feet minimum required for pond embankments without an emergency spillway. However, in consideration that none of the design WSEL's (2-, 10- and 100-year) are anticipated to ever reach the riser crest at El. 108.5 and that any discharge into the riser crest would result in exceeding the set allowable release of 0.1 cfs as established by CSX Transportation, this will be considered appropriate *for this particular review case*.
- 6.) Anti-Vortex Device. Please provide a anti-vortex baffle or plate within the inverted DI-5 Type

B1, B2 trash rack structure as shown on sheet C-3. Provide additional notes or details as necessary.

7. Outlet Barrel. Specify the type of reinforced concrete pipe proposed for the 12 pond outlet pipe. ASTM C-361 or C-76 with bell and spigot joints and O-ring rubber gaskets are recommended.

(For information only. Please note that effective January 1st 2000, the James City County Environmental Division, upon recent Board of Supervisor approval of amendments to the Chapter 8 Erosion and Sediment Control ordinance, will begin the use and implementation of the James City County Guidelines for the Design and Construction of Stormwater Management BMP's manual dated October 1999. The manual provides general technical guidance pertaining to: stormwater control volume requirements for water quality and channel protection; revisions to the BMP Point System; the expanded list of BMP options; revisions to open space credits; and BMP selection assistance for development sites. Hard copies and CD-ROM versions of the manual are available upon request.)

LANDMARK DESIGN GROUP

TRANSMITTAL



To: Scott J. Thomas
 Company: James City County
 From: Lou Penci
 Date: September 21, 2000
 Subject: Jehovah's site drainage analysis
 LMDG Job No.: 1870040-302.04

*THIS ANALYSES
 REQUESTED FOLLOWING
 POND CONSTRUCTION*

Attached please find:

- Prints
- Plans
- Specifications
- Drawings
- X Report
- Letter
-

Transmitted as checked below:

- For your use
- X As requested
- For review and comment
- For approval
- Approved
-

Copies	Date	Drawing No.	Description
1			Calculations, routings and drainage area map

Notes:

Copies

1. File: _____
2. _____
3. _____
4. _____
5. _____

Enclosures

-
-
-
-
-

LandMark Design Group, Inc.

By: Lou Penci

Engineers ♦ Planners ♦ Surveyors ♦ Landscape Architects ♦ Environmental Consultants
 4029 Ironbound Road, Suite 100, Williamsburg, VA 23188 (757) 253-2975 FAX: (757) 229-0049 lmdg@landmarkdgb.com

LANDMARK DESIGN GROUP TRANSMITTAL



*SJT.
Review
HISTORY*

PC 110 SP-104-99

To: Scott J. Thomas
 Company: James City County
 From: Lou Penci
 Date: September 21, 2000
 Subject: ~~_____ site drainage analysis~~
 LMDG Job No.: 1870040-302.04

Attached please find:

- Prints
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5. _____

Enclosures

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LandMark Design Group, Inc.

By: Lou Penci

Engineers ♦ Planners ♦ Surveyors ♦ Landscape Architects ♦ Environmental Consultants
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ENVIRONMENTAL DIVISION REVIEW COMMENTS
KINGDOM HALL OF JEHOVAH'S WITNESSES
PLAN NO. SP - 104 - 99 MCE/SJT
October 4, 1999

Erosion & Sediment Control Plan

1. A Land Disturbing Permit and Siltation Agreement, with surety, are required for this project.
2. An Inspection/Maintenance Agreement shall be executed with the County for the BMP facility for this project.
3. As-built drawings must be provided for the detention basin on completion. Also, a note shall be provided on the plan stating that upon completion, the construction of the dam will be certified by a professional engineer who has inspected the structure during construction.
4. Provide and label limits of clearing and grading on the plan.
5. An existing Sprint fiber optic cable is located along the east side of the CSX railroad. Show approximate location on the plans.
6. Label existing road (private or public), as applicable, along the north border of the site.
7. Existing contour 110 in the central portion of the site dead ends and several proposed contours do not tie to existing contours or spot elevations.
8. Provide tree protection fencing around the trees that are to be saved, particularly in the vicinity of the BMP.
9. There is a considerable amount of landscaping proposed in areas already heavily covered with existing trees and vegetation and the amount of existing trees on the site appears to be considerably more than that shown on the plans. In particular, there is no grading or improvements proposed in the southwest and northeast corners of the site, yet the landscaping plan shows a large amount of new plantings combined with existing saved trees. Please define whether the areas outside the limits of clearing and grading will be disturbed and replanted with buffers (as indicated on the landscape plan) or if existing vegetation is to be maintained to the greatest extent possible and selectively supplemented with landscaping.
10. The sediment trap storage volume computations in the engineering report are based on 134 cubic yards for each impervious acre. This is not consistent with sizing methods outlined in Minimum Standard 3.13 of the VESCH which requires 134 cubic yards per acre of drainage area. Therefore total storage volume required and depth required for the sediment trap may be greater than anticipated.

11. Sheet C-2 indicates that the pond facility will be overexcavated from El. 105 to El. 103 to provide a temporary sediment trap during construction. Since it is basically an excavated pit, the sediment trap detail shown on Sheet C-4 is not applicable since the sediment trap will effectively have no way to outlet below the 4 inch drain elevation at 104.6. A stone outlet structure per the standard detail is not feasible since the pond will have already been excavated. Please define if the overexcavated area is to be restored to El. 105 once construction is completed or if the extra storage volume is to remain for the BMP. If restoration is required, please provide E&SC provisions (sequencing, measures and details) for dewatering and sediment removal.
12. Construction Sequence #4 mentions construction of the sediment trap (forebay). Usually forebay areas are isolated from the rest of the facility and not located directly in the bottom of a BMP basin. Please define if the forebay is in the basin or if it is intended to be located at the lower end of the southern channel where the VDOT DI-1 inlet is proposed. Show computations to indicate the sediment forebay is sized to contain 0.1 inches of runoff per impervious area. Typically sediment forebays are 4 to 6 ft. deep.
13. Add storm drain inlet protection as per VESCH Minimum Standard 3.07 to the VDOT DI-1 inlet along the southern boundary. Provide a standard detail on Sheet C-4.
14. Locations of perimeter silt fence should coincide with established limits of clearing and grading. In some areas, placement of perimeter silt fence as shown will disturb existing vegetated and tree areas not planned for removal, disturbance or grading. Consider the topography on and off the site and consider existing vegetation which will remain to reduce the amount of silt fence required for this site. Silt fence is not required to control upslope drainage that is not disturbed. In addition, adequate use of perimeter onsite temporary diversion dikes will also reduce the need for silt fence in some areas.
15. Provide diversion dikes from both the north and south property lines to the sediment trap. Extend the diversion dikes parallel to the north and south property lines as required to collect and divert as much disturbed area runoff into the trap as possible between the time the site is cleared and the storm drain system if functional. Add a temporary diversion dike detail as per VESCH Minimum Standard 3.09 to Sheet C-4.
16. Use a rock check dam per VESCH Minimum Standard 3.20 instead of straw bale barrier as proposed in the channel on the west side of Mooretown Road.
17. Label all storm drain and culvert outlet protections on the plans. Specify dimensions and stone size in accordance with VESCH Minimum Standards 3.18 and 3.19. Provide an outlet protection detail on Sheet C-4.
18. Label the "southern channel" as a stormwater conveyance channel (SCC) as per VESCH Minimum Standard 3.17.

19. The east end of the "southern channel" swings north toward the site entrance and may impact the 22" oak and other existing trees and vegetation that are to remain undisturbed. There appears to be no reason why the channel requires extension beyond the east curb cut flume. Most of the site drainage to the channel upslope of the flume will consist of overland flow through existing vegetated or proposed landscaped area. If the channel requires extension beyond the flume, then maintain an alignment parallel to the southern property line to lessen impacts to larger trees shown on the plans.
20. Section A-A for the "southern channel" on Sheet C-3 shows 2H:1V sideslopes. Sideslopes of 3H:1V or steeper requires use of erosion control blanket. Show the erosion control blanket on the typical section.
21. Provide a temporary stone construction entrance as per VESCH Minimum Standard 3.02.

Stormwater Management/BMP Plan

22. Submit a BMP calculation worksheet that demonstrates that this project meets the County's 10 point criteria. The BMP Point System is the preferred method to select BMP facilities for a site rather than performance based water quality calculations as provided in the engineering report.
23. Provide conservation easements for all Natural Open Space areas claimed in the BMP worksheet.

24. The narrative in the engineering report indicates the pond is a dry detention facility. The Chesapeake Bay water quality/pollutant load calculations in the report show the pond requires a 57% removal efficiency. An infiltration basin with 70% removal efficiency was subsequently used for the BMP to determine load removed. The design plans do not reflect use of an infiltration basin but rather a dry type extended detention facility. A dry extended detention facility would typically have 30-35% pollutant removal efficiency rather than 70% as presented in the calculations. For consideration as an infiltration facility, additional information is required such as geotechnical investigations to confirm soils have an infiltration rate 0.50 inches per hour or greater and groundwater and bedrock separations are sufficiently below the facility. Use of pretreatment devices would also be necessary. If the BMP is to remain an extended dry detention facility, then a shallow marsh, wetlands or additional open spaces may be required to achieve the efficiency used in the calculations and to meet the requirements of the 10 point BMP system. (Refer to the JCC BMP Guidelines manual for additional design and soil testing requirements for Group C Infiltration facilities).

OK
SCAPE
COMMENTS

25. Pond hydrology/hydraulics. It appears that the Modified Rational method was used to estimate total storage volumes required for the 10- and 100-year events. In general, the methodology appeared acceptable for determining the critical storm duration, critical storm intensity, peak inflow and to estimate required storage volumes. Although the 10- and 100-year proposed water surface elevations were shown in the engineering report, no final hydraulic calculations (pond routings, elevation-discharge curves or orifice calculations) were provided to show the 0.1 cfs allowable release rate was maintained for the water quality, 2-, 10- and 100-year storm events through the 4 inch pond outlet.

OK

26. No computations were provided to show the required water quality volume or resultant water quality pool elevation.
27. No computations were provided to show required drawdown times for the BMP were achieved or to substantiate use of the 4 inch diameter pond drain (orifice) for the dry detention basin.
28. Pond outlet profile. Provide a profile and invert out elevation for the pond's 4 inch drain to show that there are no conflicts with the existing 8 inch sanitary sewer line and the outlet and rock dissipator can daylight onsite and positively drain to the channel along the railroad.
29. The riprap pad shown at the outlet end of the 4 inch drain from the pond is shown slightly offsite on Sheets C-2 and C-3. Please correct.
30. No stormwater management/BMP maintenance plan was provided.
31. Show pond WSEL's on the plans. Include the water quality and the 2-, 10-, and 100-year pools.
32. No bedding, installation or pipe specifications for the 4 inch PVC drain were provided. Address how clogging of the 12 inch grate will be avoided either by structural or maintenance measures.
33. The spot elevation at the western curb cut flume has two top of curb elevations. Show the proposed pavement spot elevation at this location.
34. No size, length, slope, type or class of pipe was specified for the storm drain located between the south channel and the BMP.
35. No type or class of pipe was specified for the storm drain which outlets to the north side of the pond.
36. *0.75* The drainage area for the 18 inch entrance culvert was shown in the engineering report as 0.75 acres with a C value of 0.6. The drainage area /divides were not shown on the 1"=25' scale drainage map or plan views.
37. The HW/D value for the 18 inch entrance culvert is less than typically accepted values of 1.0 to 1.5. In addition, the computed headwater elevation of 108.31 exceeds an elevation 18 inches below the proposed edge of road pavement at El. 108.95.



TRANSMITTAL

Langley and McDonald, P.C.

Engineers
Surveyors
Planners
Landscape Architects
Environmental Consultants

Main Office: 5544 Greenwich Road, Virginia Beach, VA 23462
(757) 473-2000 FAX#: (757) 497-7933
Williamsburg Office: 4029 Ironbound Road, Suite 100, Williamsburg, VA 23188
(757) 253-2975 FAX#: (757) 229-0049
e-mail: langley@langleyeng.com

Project: PRIME RETAIL EXPANSION - RELOCATION OF JEHOVAH'S WITNESSES

To: DARRYL COOK

From: STEPHEN RAMBO
Date: 10/22/99
Reply requested: Yes No
Reply to: _____

We are sending you:

- Attached
- Under separate cover via: _____
- Prints
- Copy of letter
- Plans
- Specifications
- Shop drawings
- CALCULATIONS

Transmitted as checked below:

- For your use
- As requested
- For review and comment
- For approval
- Return for correction
- Approved as noted
- Approved
- _____

Copies	Date	Drawing No.	Description

Remarks: RATHER THAN NEEDLESSLY ENCUMBERING JEHOVAH'S WITNESSES SITE ON MOORETOWN RD WITH OPEN SPACE EASEMENTS, WE PROPOSE TO MAKE UP POINTS SHY OF 10 NEEDED VIA EXCESS IN PRIME'S EXISTING BMP, SIMILAR TO PHILOSOPHY USED @ CHAMBREL/WINSBORG, CANCER TRTMT. PLEASE CALL ME TO DISCUSS.

- Copies
1. File: 1870040 - 302.04
 2. _____
 3. _____
 4. _____
 5. _____

- Enclosures
- -
 -
 -
 -

Langley and McDonald

By: Stephen Rambo

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



TRANSMITTAL

Langley and McDonald, P.C.

Engineers
Surveyors
Planners
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(757) 473-2000 FAX#: (757) 497-7933
Williamsburg Office: 4029 Ironbound Road, Suite 100, Williamsburg, VA 23188
(757) 253-2975 FAX#: (757) 229-0049
e-mail: langley@langleyeng.com

Project: KINGDOM HALL OF JEHOVAH'S WITNESS SP-104-99
To: SCOTT THOMAS From: LOU PENG
ENVIRONMENTAL DIVISION
JAMES CITY COUNTY
Date: 1-6-2000
Reply requested: Yes No
Reply to: _____

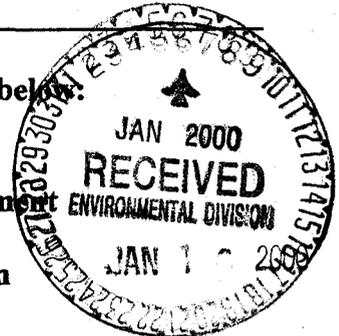
We are sending you:

- Attached
- Under separate cover via: _____

- Prints
- Copy of letter
- Plans
- Specifications
- Shop drawings

Transmitted as checked below:

- For your use
- As requested
- For review and comment
- For approval
- Return for correction
- Approved as noted
- Approved



Copies	Date	Drawing No.	Description
1			REVISED SITE PLAN & LANDSCAPE PLANS

Remarks: SCOTT - PLEASE REVIEW PLANS & LET PAUL HOLT KNOW OF APPROVAL
& ADVISE US NUMBER OF COMPLETE SET WE NEED TO SUBMIT FOR
APPROVAL SIGNATURES -
Thanks -

Copies

- 1. File: 1870040-302.04
- 2. _____
- 3. _____
- 4. _____
- 5. _____

Enclosures

-
-
-
-
-

Langley and McDonald

By: Lou Peng

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

PRELIMINARY PAVEMENT DESIGN
 Reference VHRC 73-R21

Project Engineer: Mel Hopkins
 Date: August 30, 1999

PROJECT: Kingdom Hall of Jehovah's Witnesses
 LOCATION: James City County
 STREET: Parking and Drive aisles on site
 FROM STA. TO STA.
 DATE: 01-Sep-99

TRAFFIC ANALYSIS

1. Vehicles Per Day = 200
 2. % Heavy Traffic = 5 %
 3. Equiv. Present ADT = 200
 4. Design Period 20 Yrs.
 5. % Growth = 0 %
 6. Growth Factor = 1.00
 7. V.P.D. Projection = 200 ADT

SUBGRADE ANALYSIS

1. CBR Values = 10.00 10.00 0.00
 Recommended design CBR value from soils report by ECS
 0.00 0.00 0.00
 2. Enter No. of Tests = 2
 3. Average CBR = 10.00
 4. Design CBR = 6.67
 5. Soil Resiliency Factor = 2.00
 6. Soil Support Value = 13.33 (Assumed)

PAVEMENT DESIGN

Thickness Index Required = 7.3 inches (Min.)

ALT. 'A'

Material	Factor	Thickness	Index
SM-2A	1.67	2.0	3.3
BM-2	1.67	0.0	0.0
Aggregate	0.60	8.0	4.8
Sel. Material	0.60	0.0	0.0
TOTAL		10.0	8.1 Design Acceptable

CHECKLIST OF SITE PLAN CONTENTS

I. GENERAL INFORMATION REQUIRED ON PLAN

- (✓) A. Title of Project
(20-38(A)1.)
- (✓) B. Names of engineer, architect, landscape architect and/or surveyor
(20-38(A)2.)
- (✓) C. Location map with scale no less than 1" = 2,000'
(20-38(A)3.)
- (✓) D. North arrow
(20-38(A)4.)
- (✓) E. Graphic and written scale
(20-38(A)4.)
- (✓) F. Boundary survey of site
(20-38(A)5.)

II. EXISTING FEATURES TO BE SHOWN ON PLAN

- (✓) A. Streets: Name and route number, width of right-of-way and width of road surface
(20-38(A)6.)
- (✓) B. Streams, bodies of water, watercourses, on this and adjacent property
(20-38(A)4.)
- (✓) C. Easements: Type, ownership, and dimensions
(20-38(A)6.)
- N/A (✓) D. Septic tank, distribution tank size and type
(20-38(A)6.)
- N/A (✓) E. Water Supply: well and/or tank capacity
(20-38(A)6.)
- (✓) F. Water mains on and nearby site with sizes indicated
(20-38(A)6&13)
- (✓) G. Location of all underground utilities, i.e., compressed gas lines, petroleum lines, electricity, etc.
(20-38(A)6.)
- (✓) H. Culverts and underground structures on or adjacent to the property (fuel tanks, etc.)
(20-38(A)6.)
- (✓) I. Location, type and size of all entrances to the site
(20-38(A)7.)
- (✓) J. Topography intervals (minimum five feet) existing contours
(20-38(A)8.)

- (✓) K. Woodline before site preparation with predominant species and average diameter of trees indicated. Also, approximate location, type and diameter of single trees in open areas. Average size and predominant species of trees to be removed having a diameter of 12-inches or greater.
(20-38(A)9.)
- (✓) L. Provisions for off-street parking, loading spaces and pedestrian walkways, including sidewalks.
(20-38(A)10.)
- (✓) M. Sanitary and storm sewers on and adjacent to site (size and type)
(20-38(A)13.)
- (✓) N. Fire hydrants, sizes, and types
(20-38(A)13.)
- (✓) O. Location of Fire Department connections and underground fire service lines (valve pit details, where appropriate)
(20-39(m))
- (✓) P. Indication of 100 year flood plain and flood elevation noted
(20-549(A))

III. PROPOSED PROJECT: FEATURES TO BE SHOWN ON PLAN

- (✓) A. Underground utilities proposed
(20-38(A)6.)
- (✓) B. Proposed street names and street width; proposed easements and width
(20-38(A)6.)
- (✓) C. Entrances designed to standards as set forth in VDH&T Minimum Standards of Entrances to State Highways manual, with indication as to which standard is applicable, and details of entrance
(20-38(A)7.)
- (✓) D. Proposed finished contours where regrading is necessary indicated at intervals of no more than 2 feet
(20-38(A)8.)
- (✓) E. Areas to be landscaped with approximate arrangements, plant types, and sizes
(20-38(A)9.)
- N/A (✓) F. Areas to be screened, fenced, walled with heights indicated, and location of gates and openings
(20-38(A)9.)
- (✓) G. Seeding specifications
(20-39(A)14.)
- (✓) H. Provisions for pedestrian and vehicular circulation and parking
(20-38(A)10.)
 1. Location of pedestrian walkways, sidewalks and bike paths
 2. Dimensions of parking spaces, traffic aisles, medians and sidewalks

PENDING NOTIFICATION
FROM PAUL HOLT

3. Location of curbs and bumpers
4. Type of parking surface with detail of cross-section
5. Loading spaces

(✓) I. Solid waste disposal facilities (dry and wet)
(20-38(A)13.)

1. If dumpsters are to be used, location of dumpster pad.
2. If dumpsters are used for wet garbage
 - . drain with a drainfield, as per Health Department specifications
 - . dumpsters may not be connected to the sanitary sewer
 - . type of material of the dumpster pad

(✓) J. Storm drainage system shown with calculations and drainage area map of contributing drainage areas
(20-38(A)14.)

(✓) K. Drainage ways in excess of 3% grade and type of erosion control necessary.
(20-38(A)14.)

(✓) L. Location, type, and details of sedimentation and erosion control devices to be used during and after construction, e.g., perimeter dike with outfall structure or straw bale installation
(20-38(A)14.)

(✓) M. Water Supply
(20-38(A)13.)

1. Well: Location, type, size, as per Health Department specifications
2. Water lines
 - . on-site line and size (include standpipe size if applicable)
 - . public water main location and size at location of connection
 - . meter location and size

Required if lines are to be dedicated to the County:

- . profiles, plan view
- . materials list/specifications

(✓) N. Sanitary waste disposal facilities:
(20-38(A)13.)

1. Septic tank and drainfield; or
2. Sewer line
 - . location of grease trap
 - . on-site line and size, laterals, cleanouts
 - . public line location and size
 - . elevation of connection at building and at public line

Required if lines are to be dedicated to the County:

- . profiles, Y's (slope, pipe size, type and manhole rim and invert elevations)
- . connection at building and at public line
- . details of any new manholes and pump stations
- . materials list/specifications

IV. LAND USE SUMMARY TABLE

- ✓A. Zoning of Site (20-39(A)4.)
- ✓B. Calculation for Parking Requirements
 - Use category (as defined by Section 20-12.B.(d)(iii)) (20-38(A)10.)
 - Number of spaces required
 - Number of handicapped spaces required (marked by sign)
 - Number of spaces provided
- ✓C. Open Space Data (20-38(A)15)
 - Total Site Area
 - Total Amount of Site Covered by Buildings
 - Percent of Site Covered by Buildings
 - Amount of Site Covered by Open Space
 - Percent of Site Covered by Open Space
- ✓D. Building Data (Existing and Proposed) (20-38(A)11.)
 - Total Floor Area of Each Building
 - Height of Each Building
 - Number of Floors in Each Building
 - Type (classification use group and construction type as per the Virginia Uniform Statewide Building Code)

N/A  V. ADDITIONAL REQUIREMENTS FOR MULTI-FAMILY DEVELOPMENTS

- () A. Dwelling units (20-38(A)12)
 - 1. Number, size and type of dwelling units
 - 2. Units per developable acre (20-38(A)15)
 - 3. Numbers on buildings
- () B. Recreation facilities (20-38(A)12)
 - 1. Type of equipment
 - 2. List of equipment, if playground (20-39(1))
 - 3. Recreation area as percent of total site acreage

N/A

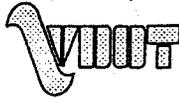


- () C. Open space (as defined by Section 20-2 of the Zoning Ordinance) (20-38(A)15)
 - 1. Number of acres
 - 2. Percent of site
- () D. By-laws of Homeowners Association (where applicable)

VI. OTHER INFORMATION TO BE SUBMITTED WITH SITE PLANS

- N/A (✓) A. Land Disturbing Permit Application, Surety and Siltation Agreement
- N/A (✓) B. Water and Sewer Data Sheets (3 COPIES EACH)
- N/A (✓) C. Certificate to Construct public water and/or sewer facilities
- N/A (✓) D. Public Improvements (water, sewer and roads) to be constructed or bonded prior to issuance of temporary Certificate of Occupancy for buildings
- N/A (✓) E. Kitchen plans must be submitted to and approved by the Health Department if structure will contain food preparation/serving areas
- N/A (✓) F. Traffic Impact Analysis as required by the Director of Planning
- (✓) G. VDOT Check List

Updated 2-93 MAF
0369A.wpf



FINAL SUBDIVISION AND SITE PLAN CHECK LIST

NAME OF WORK SITE KINGDOM HALL OF JEHOVAH'S WITNESSES ROUTE 603
 DEVELOPER CONTACT GERALD BROWN PH. (757) 229-2504
 ADDRESS P.O. DRAWER 2600 WILLIAMSBURG ZIP 23187
 ENGINEER LANGLEY & McDONALD, Inc. PHONE (757) 252-2975
 COUNTY JAMES CITY VDOT RESIDENCY WILLIAMSBURG

GENERAL INFORMATION

	Plan Sheet to Include	Yes	No	Reason for No
1	Site plan name.	✓		
2	Date of plan.	✓		
	Standard cover sheet with surveying and mapping control information. Vicinity map (1"=2000') and title block information section completed.	✓		
	North arrow, designation of north orientation, match lines & sheet nos.	✓		
	Contour intervals every 5'.	✓		
	Boundary survey of record.	✓		
7	Seal and signature on each sheet by a Virginia registered professional engineer or land surveyor.	✓		
8	Show total acreage, current zoning, and proposed zoning by acres.	✓		
9	Parcel identification, tax map, ref. numbers, owners names, present zoning, and use of all abutting parcels.	✓		
10	Any waivers or zoning variances granted for the project shown on the plans.		✓	NOT APPLICABLE
11	Master plan (all phases or proposed sections).	N/A		
12	Show site layout including lot nos. & acres, tabulate total no. of lots or units to acct. for site acreage.	N/A		

FINAL SUBDIVISION AND SITE PLAN CHECK LIST

NAME OF WORK SITE KINGDOM HALL OF JEHOVAH'S WITNESSES ROUTE 603

Plan Sheet to Include		Yes	No	Reason for No
10	Indicate right of way, centerline distance including curve data, delta, radius, arc, chord, tangent, & profile.	✓		
11	Show sight distance at all street intersections & landscaping, sign placement & all obstructions that may affect or obstruct sight distance.	✓		
	Provide sufficient information on each proposed development street including estimated future traffic so that the Resident Engineer can approve functional classification before final design stage.	✓		
13	Soils map information & actual tested CBR values under proposed roadway.	✓		
DRAINAGE				
	Show direction of drainage flow for streets, storm sewer, valley gutters, subdrains, & the like, & all existing streams.	✓		
	Show location of all streams or drainageway related to construction.	✓		
	Existing storm drainage system & proposed major drainage structures.	✓		
	Show 100-yr. flood boundaries, source of information, & square footage used.	✓		
UTILITIES				
1	Show all existing utilities & if within limits of proposed right of way.	✓		
2	Provide any notes or information necessary to explain intent & purpose of utilities or adjustment of existing utilities.	✓		
3	Existing & proposed easements, width, & use. Note certifying applicant has right to use existing ingress easement to make any proposed improvements.	✓		

FINAL SUBDIVISION AND SITE PLAN CHECK LIST

NAME OF WORK SITE KINGDOM HALL OF JEHOVAH'S WITNESSES ROUTE 602

Plan Sheet to Include	Yes	No	Reason for No
4 Trip generation.	✓		
5 Trip distribution/direction split.	N/A		
6 Traffic assignment/turning movements.			
7 Analysis of future conditions with development. A. Future daily & peak hour(s) traffic volumes. B. Capacity analysis at critical points. C. Levels of service at critical points.			
8 Recommended improvements. A. Proposed recommended improvements. B. Capacity analysis at critical points. C. Levels of service at critical points.			
9 Conclusion.	✓		
OTHER			
1 Name of any previously approved plan must be referenced on plans.	✓		
2 Certification by submitter that plans conform to all VDOT design standards, as well as county ordinances, comprehensive plans & regulations.	✓		

Certification

I certify that the above stated information is included in the attached plans.

Mel E. Appleby

Engineer's Signature

August 30, 1999

Date

Copy

ENVIRONMENTAL DIVISION REVIEW COMMENTS
KINGDOM HALL OF JEHOVAH'S WITNESSES
PLAN NO. SP - 104 - 99 MCE/SJT
October 4, 1999

Erosion & Sediment Control Plan

- m ✓ 1. A Land Disturbing Permit and Siltation Agreement, with surety, are required for this project.
- m ✓ 2. An Inspection/Maintenance Agreement shall be executed with the County for the BMP facility for this project.
- m ✓ 3. As-built drawings must be provided for the detention basin on completion. Also, a note shall be provided on the plan stating that upon completion, the construction of the dam will be certified by a professional engineer who has inspected the structure during construction.
- m ✓ 4. Provide and label limits of clearing and grading on the plan.
- m ✓ 5. An existing Sprint fiber optic cable is located along the east side of the CSX railroad. Show approximate location on the plans.
- m ✓ 6. Label existing road (private or public), as applicable, along the north border of the site.
- m ✓ 7. Existing contour 110 in the central portion of the site dead ends and several proposed contours do not tie to existing contours or spot elevations.
- m ✓ 8. Provide tree protection fencing around the trees that are to be saved, particularly in the vicinity of the BMP.
- m ✓ 9. There is a considerable amount of landscaping proposed in areas already heavily covered with existing trees and vegetation and the amount of existing trees on the site appears to be considerably more than that shown on the plans. In particular, there is no grading or improvements proposed in the southwest and northeast corners of the site, yet the landscaping plan shows a large amount of new plantings combined with existing saved trees. Please define whether the areas outside the limits of clearing and grading will be disturbed and replanted with buffers (as indicated on the landscape plan) or if existing vegetation is to be maintained to the greatest extent possible and selectively supplemented with landscaping.
- m ✓ 10. The sediment trap storage volume computations in the engineering report are based on 134 cubic yards for each impervious acre. This is not consistent with sizing methods outlined in Minimum Standard 3.13 of the VESCH which requires 134 cubic yards per acre of drainage area. Therefore total storage volume required and depth required for the sediment trap may be greater than anticipated.

- m ✓ 11. Sheet C-2 indicates that the pond facility will be overexcavated from El. 105 to El. 103 to provide a temporary sediment trap during construction. Since it is basically an excavated pit, the sediment trap detail shown on Sheet C-4 is not applicable since the sediment trap will effectively have no way to outlet below the 4 inch drain elevation at 104.6. A stone outlet structure per the standard detail is not feasible since the pond will have already been excavated. Please define if the overexcavated area is to be restored to El. 105 once construction is completed or if the extra storage volume is to remain for the BMP. If restoration is required, please provide E&SC provisions (sequencing, measures and details) for dewatering and sediment removal.
- m ✓ 12. Construction Sequence #4 mentions construction of the sediment trap (forebay). Usually forebay areas are isolated from the rest of the facility and not located directly in the bottom of a BMP basin. Please define if the forebay is in the basin or if it is intended to be located at the lower end of the southern channel where the VDOT DI-1 inlet is proposed. Show computations to indicate the sediment forebay is sized to contain 0.1 inches of runoff per impervious area. Typically sediment forebays are 4 to 6 ft. deep.
- m ✓ 13. Add storm drain inlet protection as per VESCH Minimum Standard 3.07 to the VDOT DI-1 inlet along the southern boundary. Provide a standard detail on Sheet C-4.
- m ✓ 14. Locations of perimeter silt fence should coincide with established limits of clearing and grading. In some areas, placement of perimeter silt fence as shown will disturb existing vegetated and tree areas not planned for removal, disturbance or grading. Consider the topography on and off the site and consider existing vegetation which will remain to reduce the amount of silt fence required for this site. Silt fence is not required to control upslope drainage that is not disturbed. In addition, adequate use of perimeter onsite temporary diversion dikes will also reduce the need for silt fence in some areas.
- m ✓ 15. Provide diversion dikes from both the north and south property lines to the sediment trap. Extend the diversion dikes parallel to the north and south property lines as required to collect and divert as much disturbed area runoff into the trap as possible between the time the site is cleared and the storm drain system is functional. Add a temporary diversion dike detail as per VESCH Minimum Standard 3.09 to Sheet C-4.
- m ✓ 16. Use a rock check dam per VESCH Minimum Standard 3.20 instead of straw bale barrier as proposed in the channel on the west side of Mooretown Road.
- m ✓ 17. Label all storm drain and culvert outlet protections on the plans. Specify dimensions and stone size in accordance with VESCH Minimum Standards 3.18 and 3.19. Provide an outlet protection detail on Sheet C-4.
- m ✓ 18. Label the "southern channel" as a stormwater conveyance channel (SCC) as per VESCH Minimum Standard 3.17.

- m ✓ 19. The east end of the "southern channel" swings north toward the site entrance and may impact the 22" oak and other existing trees and vegetation that are to remain undisturbed. There appears to be no reason why the channel requires extension beyond the east curb cut flume. Most of the site drainage to the channel upslope of the flume will consist of overland flow through existing vegetated or proposed landscaped area. If the channel requires extension beyond the flume, then maintain an alignment parallel to the southern property line to lessen impacts to larger trees shown on the plans.
- m ✓ 20. Section A-A for the "southern channel" on Sheet C-3 shows 2H:1V sideslopes. Sideslopes of 3H:1V or steeper requires use of erosion control blanket. Show the erosion control blanket on the typical section.
- m ✓ 21. Provide a temporary stone construction entrance as per VESCH Minimum Standard 3.02.

Stormwater Management/BMP Plan

NONE
 PROVIDED
 ⇒

- ✓ 22. Submit a BMP calculation worksheet that demonstrates that this project meets the County's 10 point criteria. The BMP Point System is the preferred method to select BMP facilities for a site rather than performance based water quality calculations as provided in the engineering report.
- ✓ 23. Provide conservation easements for all Natural Open Space areas claimed in the BMP worksheet.
- ✓ 24. The narrative in the engineering report indicates the pond is a dry detention facility. The Chesapeake Bay water quality/pollutant load calculations in the report show the pond requires a 57% removal efficiency. An infiltration basin with 70% removal efficiency was subsequently used for the BMP to determine load removed. The design plans do not reflect use of an infiltration basin but rather a dry type extended detention facility. A dry extended detention facility would typically have 30-35% pollutant removal efficiency rather than 70% as presented in the calculations. For consideration as an infiltration facility, additional information is required such as geotechnical investigations to confirm soils have an infiltration rate 0.50 inches per hour or greater and groundwater and bedrock separations are sufficiently below the facility. Use of pretreatment devices would also be necessary. If the BMP is to remain an extended dry detention facility, then a shallow marsh, wetlands or additional open spaces may be required to achieve the efficiency used in the calculations and to meet the requirements of the 10 point BMP system. (Refer to the JCC BMP Guidelines manual for additional design and soil testing requirements for Group C Infiltration facilities).

OK
 same
 comments

THIS IS WHAT THEY SELECTED TO DO.

- ✓ 25. Pond hydrology/hydraulics. It appears that the Modified Rational method was used to estimate total storage volumes required for the 10- and 100-year events. In general, the methodology appeared acceptable for determining the critical storm duration, critical storm intensity, peak inflow and to estimate required storage volumes. Although the 10- and 100-year proposed water surface elevations were shown in the engineering report, no final hydraulic calculations (pond routings, elevation-discharge curves or orifice calculations) were provided to show the 0.1 cfs allowable release rate was maintained for the water quality, 2-, 10- and 100-year storm events through the 4 inch pond outlet.

OK

- ✓ 26. No computations were provided to show the required water quality volume or resultant water quality pool elevation.
- ✓ 27. No computations were provided to show required drawdown times for the BMP were achieved or to substantiate use of the 4 inch diameter pond drain (orifice) for the dry detention basin.
- ✓ 28. Pond outlet profile. Provide a profile and invert out elevation for the pond's 4 inch drain to show that there are no conflicts with the existing 8 inch sanitary sewer line and the outlet and rock dissipator can daylight onsite and positively drain to the channel along the railroad.
- ✓ 29. The riprap pad shown at the outlet end of the 4 inch drain from the pond is shown slightly offsite on Sheets C-2 and C-3. Please correct.
- ✓ 30. No stormwater management/BMP maintenance plan was provided.
- ✓ 31. Show pond WSEL's on the plans. Include the water quality and the 2-, 10-, and 100-year pools.
- ✓ 32. No bedding, installation or pipe specifications for the 4 inch PVC drain were provided. Address how clogging of the 12 inch grate will be avoided either by structural or maintenance measures.
- ✓ 33. The spot elevation at the western curb cut flume has two top of curb elevations. Show the proposed pavement spot elevation at this location.
- ✓ 34. No size, length, slope, type or class of pipe was specified for the storm drain located between the south channel and the BMP.
- ✓ 35. No type or class of pipe was specified for the storm drain which outlets to the north side of the pond.
- ✓ 36. *NONE FOUND C-2*
The drainage area for the 18 inch entrance culvert was shown in the engineering report as 0.75 acres with a C value of 0.6. The drainage area /divides were not shown on the 1"=25' scale drainage map or plan views.
- ✓ 37. The HW/D value for the 18 inch entrance culvert is less than typically accepted values of 1.0 to 1.5. In addition, the computed headwater elevation of 108.31 exceeds an elevation 18 inches below the proposed edge of road pavement at El. 108.95.

ENVIRONMENTAL DIVISION REVIEW COMMENTS
KINGDOM HALL OF JEHOVAH'S WITNESSES
PLAN NO. SP - 104 - 99 MCE/SJT
October 4, 1999

Erosion & Sediment Control Plan

1. A Land Disturbing Permit and Siltation Agreement, with surety, are required for this project.
2. An Inspection/Maintenance Agreement shall be executed with the County for the BMP facility for this project.
3. As-built drawings must be provided for the detention basin on completion. Also, a note shall be provided on the plan stating that upon completion, the construction of the dam will be certified by a professional engineer who has inspected the structure during construction.
4. Provide and label limits of clearing and grading on the plan.
5. An existing Sprint fiber optic cable is located along the east side of the CSX railroad. Show approximate location on the plans.
6. Label existing road (private or public), as applicable, along the north border of the site.
7. Existing contour 110 in the central portion of the site dead ends and several proposed contours do not tie to existing contours or spot elevations.
8. Provide tree protection fencing around the trees that are to be saved, particularly in the vicinity of the BMP.
9. There is a considerable amount of landscaping proposed in areas already heavily covered with existing trees and vegetation and the amount of existing trees on the site appears to be considerably more than that shown on the plans. In particular, there is no grading or improvements proposed in the southwest and northeast corners of the site, yet the landscaping plan shows a large amount of new plantings combined with existing saved trees. Please define whether the areas outside the limits of clearing and grading will be disturbed and replanted with buffers (as indicated on the landscape plan) or if existing vegetation is to be maintained to the greatest extent possible and selectively supplemented with landscaping.
10. The sediment trap storage volume computations in the engineering report are based on 134 cubic yards for each impervious acre. This is not consistent with sizing methods outlined in Minimum Standard 3.13 of the VESCH which requires 134 cubic yards per acre of drainage area. Therefore total storage volume required and depth required for the sediment trap may be greater than anticipated.

11. Sheet C-2 indicates that the pond facility will be overexcavated from El. 105 to El. 103 to provide a temporary sediment trap during construction. Since it is basically an excavated pit, the sediment trap detail shown on Sheet C-4 is not applicable since the sediment trap will effectively have no way to outlet below the 4 inch drain elevation at 104.6. A stone outlet structure per the standard detail is not feasible since the pond will have already been excavated. Please define if the overexcavated area is to be restored to El. 105 once construction is completed or if the extra storage volume is to remain for the BMP. If restoration is required, please provide E&SC provisions (sequencing, measures and details) for dewatering and sediment removal.
12. Construction Sequence #4 mentions construction of the sediment trap (forebay). Usually forebay areas are isolated from the rest of the facility and not located directly in the bottom of a BMP basin. Please define if the forebay is in the basin or if it is intended to be located at the lower end of the southern channel where the VDOT DI-1 inlet is proposed. Show computations to indicate the sediment forebay is sized to contain 0.1 inches of runoff per impervious area. Typically sediment forebays are 4 to 6 ft. deep.
13. Add storm drain inlet protection as per VESCH Minimum Standard 3.07 to the VDOT DI-1 inlet along the southern boundary. Provide a standard detail on Sheet C-4.
14. Locations of perimeter silt fence should coincide with established limits of clearing and grading. In some areas, placement of perimeter silt fence as shown will disturb existing vegetated and tree areas not planned for removal, disturbance or grading. Consider the topography on and off the site and consider existing vegetation which will remain to reduce the amount of silt fence required for this site. Silt fence is not required to control upslope drainage that is not disturbed. In addition, adequate use of perimeter onsite temporary diversion dikes will also reduce the need for silt fence in some areas.
15. Provide diversion dikes from both the north and south property lines to the sediment trap. Extend the diversion dikes parallel to the north and south property lines as required to collect and divert as much disturbed area runoff into the trap as possible between the time the site is cleared and the storm drain system is functional. Add a temporary diversion dike detail as per VESCH Minimum Standard 3.09 to Sheet C-4.
16. Use a rock check dam per VESCH Minimum Standard 3.20 instead of straw bale barrier as proposed in the channel on the west side of Mooretown Road.
17. Label all storm drain and culvert outlet protections on the plans. Specify dimensions and stone size in accordance with VESCH Minimum Standards 3.18 and 3.19. Provide an outlet protection detail on Sheet C-4.
18. Label the "southern channel" as a stormwater conveyance channel (SCC) as per VESCH Minimum Standard 3.17.

19. The east end of the "southern channel" swings north toward the site entrance and may impact the 22" oak and other existing trees and vegetation that are to remain undisturbed. There appears to be no reason why the channel requires extension beyond the east curb cut flume. Most of the site drainage to the channel upslope of the flume will consist of overland flow through existing vegetated or proposed landscaped area. If the channel requires extension beyond the flume, then maintain an alignment parallel to the southern property line to lessen impacts to larger trees shown on the plans.
20. Section A-A for the "southern channel" on Sheet C-3 shows 2H:1V sideslopes. Sideslopes of 3H:1V or steeper requires use of erosion control blanket. Show the erosion control blanket on the typical section.
21. Provide a temporary stone construction entrance as per VESCH Minimum Standard 3.02.

Stormwater Management/BMP Plan

22. Submit a BMP calculation worksheet that demonstrates that this project meets the County's 10 point criteria. The BMP Point System is the preferred method to select BMP facilities for a site rather than performance based water quality calculations as provided in the engineering report.
23. Provide conservation easements for all Natural Open Space areas claimed in the BMP worksheet.
24. The narrative in the engineering report indicates the pond is a dry detention facility. The Chesapeake Bay water quality/pollutant load calculations in the report show the pond requires a 57% removal efficiency. An infiltration basin with 70% removal efficiency was subsequently used for the BMP to determine load removed. The design plans do not reflect use of an infiltration basin but rather a dry type extended detention facility. A dry extended detention facility would typically have 30-35% pollutant removal efficiency rather than 70% as presented in the calculations. For consideration as an infiltration facility, additional information is required such as geotechnical investigations to confirm soils have an infiltration rate 0.50 inches per hour or greater and groundwater and bedrock separations are sufficiently below the facility. Use of pretreatment devices would also be necessary. If the BMP is to remain an extended dry detention facility, then a shallow marsh, wetlands or additional open spaces may be required to achieve the efficiency used in the calculations and to meet the requirements of the 10 point BMP system. (Refer to the JCC BMP Guidelines manual for additional design and soil testing requirements for Group C Infiltration facilities).
25. Pond hydrology/hydraulics. It appears that the Modified Rational method was used to estimate total storage volumes required for the 10- and 100-year events. In general, the methodology appeared acceptable for determining the critical storm duration, critical storm intensity, peak inflow and to estimate required storage volumes. Although the 10- and 100-year proposed water surface elevations were shown in the engineering report, no final hydraulic calculations (pond routings, elevation-discharge curves or orifice calculations) were provided to show the 0.1 cfs allowable release rate was maintained for the water quality, 2-, 10- and 100-year storm events through the 4 inch pond outlet.

26. No computations were provided to show the required water quality volume or resultant water quality pool elevation.
27. No computations were provided to show required drawdown times for the BMP were achieved or to substantiate use of the 4 inch diameter pond drain (orifice) for the dry detention basin.
28. Pond outlet profile. Provide a profile and invert out elevation for the pond's 4 inch drain to show that there are no conflicts with the existing 8 inch sanitary sewer line and the outlet and rock dissipator can daylight onsite and positively drain to the channel along the railroad.
29. The riprap pad shown at the outlet end of the 4 inch drain from the pond is shown slightly offsite on Sheets C-2 and C-3. Please correct.
30. No stormwater management/BMP maintenance plan was provided.
31. Show pond WSEL's on the plans. Include the water quality and the 2-, 10-, and 100-year pools.
32. No bedding, installation or pipe specifications for the 4 inch PVC drain were provided. Address how clogging of the 12 inch grate will be avoided either by structural or maintenance measures.
33. The spot elevation at the western curb cut flume has two top of curb elevations. Show the proposed pavement spot elevation at this location.
34. No size, length, slope, type or class of pipe was specified for the storm drain located between the south channel and the BMP.
35. No type or class of pipe was specified for the storm drain which outlets to the north side of the pond.
36. The drainage area for the 18 inch entrance culvert was shown in the engineering report as 0.75 acres with a C value of 0.6. The drainage area /divides were not shown on the 1"=25' scale drainage map or plan views.
37. The HW/D value for the 18 inch entrance culvert is less than typically accepted values of 1.0 to 1.5. In addition, the computed headwater elevation of 108.31 exceeds an elevation 18 inches below the proposed edge of road pavement at El. 108.95.

ENVIRONMENTAL DIVISION REVIEW COMMENTS
KINGDOM HALL OF JEHOVAH'S WITNESSES
SITE PLAN NO. SP - 104 - 99
December 10, 1999 *mce/SJT*

These comments pertain to the revised site plan as submitted with a professional signature and seal date of November 5, 1999.

Stormwater Management / Drainage Plan:

1. BMP/Water Quality Points. Based on the calculations, the detention basin/BMP was redesigned as a 9-point extended detention basin, shallow marsh BMP providing approximately 6.9 points based on the site coverage. The front portion of the site adjacent to Mooretown Road drains to an existing offsite 6-point BMP facility, which provides an additional 0.6 BMP points. Given the presence of easements on the front and rear of the site, there is really no opportunity for natural open space conservation easements. However, the BMP facilities control all the impervious cover created on this site. Therefore, *for this particular review case*, it appears the only feasible option is to grant an exception to the 10-point BMP criteria as there is no opportunity to meet the criteria onsite. As presented in the following comments, there are enhancements that can be made to the detention basin design to improve its removal efficiency which will need to be made. A letter needs to be submitted requesting the exception.

OK SAT 1-10-00
2. Shallow Marsh. Provide a landscaping/planting plan to show the intended shallow marsh creation at the lower stage of the detention facility along with seeding recommendations in areas around or outside the proposed wetland plant locations. (Note: A good design reference is Chapter 9 of the Metropolitan Washington Council of Governments, *Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMP's*, 1987).

3. Pond Construction. Provide notes or details showing specific construction requirements for the pond (fill) embankment and 12 inch RCP outlet barrel. Include requirements for subgrade, fill material and placement, soil compaction, concrete anti-seep collars or toe drain, pipe bedding and backfill, and core trench, as applicable, for a shallow marsh dry detention basin design.

4. The 175 foot section of storm drain that drains the south portion of the project needs to be relocated so that it outfalls closer to the south end of the BMP. Increasing the travel length between the inflow and outflow points of a BMP improves its pollutant removal capability.

5. Emergency Spillway. No emergency spillway was provided. Freeboard from the 100-year design WSEL to top of dam is 1.19 feet which is less than 2 feet minimum required for pond embankments without an emergency spillway. However, in consideration that none of the design WSEL's (2-, 10- and 100-year) are anticipated to ever reach the riser crest at El. 108.5 and that any discharge into the riser crest would result in exceeding the set allowable release of 0.1 cfs as established by CSX Transportation, this will be considered appropriate *for this particular review case*.

OK SAT 01-10-00
6. Anti-Vortex Device. Please provide a anti-vortex baffle or plate within the inverted DI-5 Type

B1, B2 trash rack structure as shown on sheet C-3. Provide additional notes or details as necessary.

7. Outlet Barrel. Specify the type of reinforced concrete pipe proposed for the 12 pond outlet pipe. ASTM C-361 or C-76 with bell and spigot joints and O-ring rubber gaskets are recommended.

(For information only. Please note that effective January 1st 2000, the James City County Environmental Division, upon recent Board of Supervisor approval of amendments to the Chapter 8 Erosion and Sediment Control ordinance, will begin the use and implementation of the James City County Guidelines for the Design and Construction of Stormwater Management BMP's manual dated October 1999. The manual provides general technical guidance pertaining to: stormwater control volume requirements for water quality and channel protection; revisions to the BMP Point System; the expanded list of BMP options; revisions to open space credits; and BMP selection assistance for development sites. Hard copies and CD-ROM versions of the manual are available upon request.)