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: **YR010**

DATE VERIFIED: **April 18, 2012**

QUALITY ASSURANCE TECHNICIAN: **Leah Hardenbergh**

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA

Stormwater Division

MEMORANDUM

DATE: March 10, 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: YR010

PIN: 2320100016

Subdivision, Tract, Business or Owner Name (if known): Saint Olafs Catholic Church

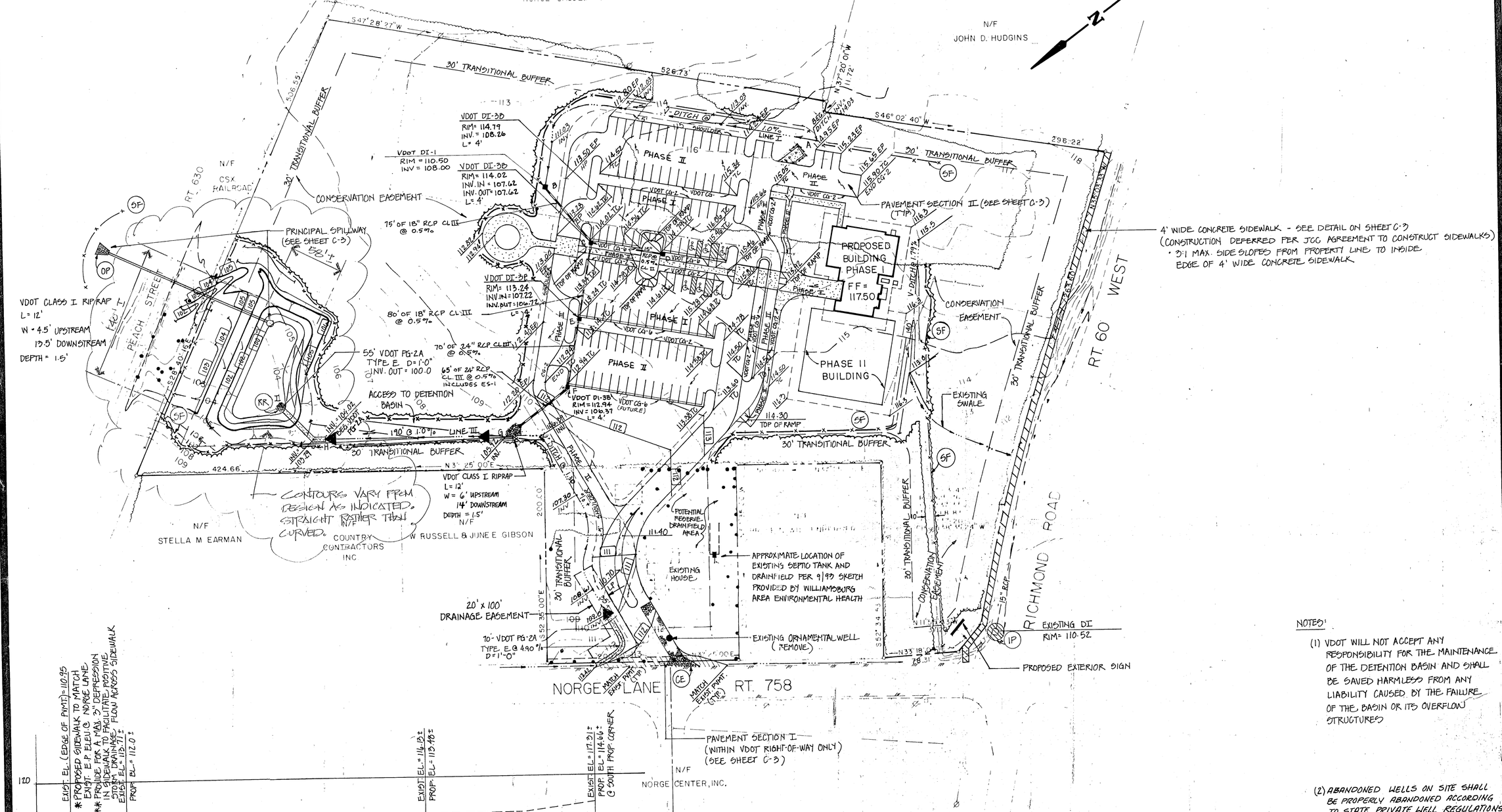
Property Description: Church site

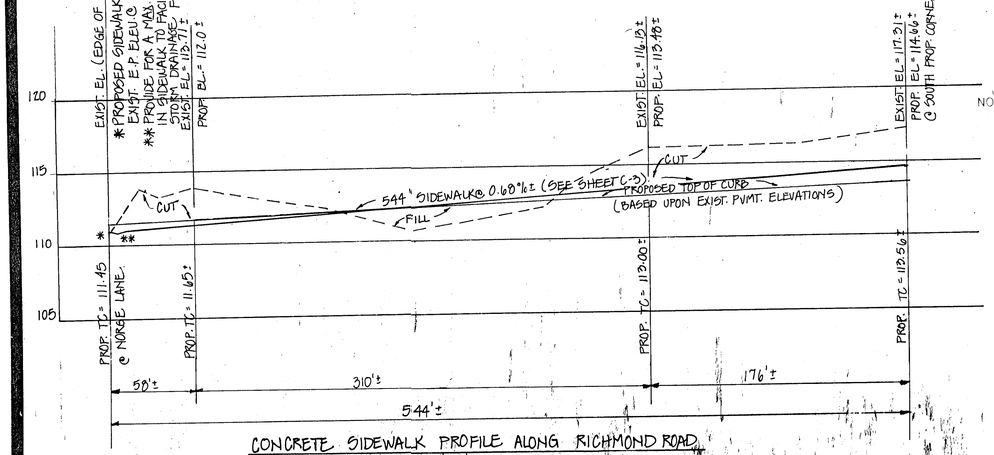
Site Address: 104 Norge Lane

(For internal use only) **Box** 9 **Drawer:** 5

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

Comments





CONCRETE SIDEWALK PROFILE ALONG RICHMOND ROAD
SCALE: H=1"=50' V=1"=5'

NOTES:

(1) VDOT WILL NOT ACCEPT ANY RESPONSIBILITY FOR THE MAINTENANCE OF THE DETENTION BASIN AND SHALL BE SAVED HARMLESS FROM ANY LIABILITY CAUSED BY THE FAILURE OF THE BASIN OR ITS OVERFLOW STRUCTURES

(2) ABANDONED WELLS ON SITE SHALL BE PROPERLY ABANDONED ACCORDING TO STATE PRIVATE WELL REGULATIONS.

BASED ON A REVIEW OF THE SITE, THE RETENTION POND APPEARS TO BE CONSTRUCTED IN GENERAL CONFORMANCE WITH PLANS, EXCEPT AS MAY BE NOTED ON SHEETS C-2 AND C-3.

JEFFREY L. BARRA

REVISIONS

No.	Date	Description
1	12/19/94	REV. PER JCC REVIEW COMMENTS
2	12/29/94	UPDATE RIPRAP DIMENSIONS PER JCC COMMENTS
3.	1/25/95	REV. PER VDOT / JCC REVIEW COMMENTS

ENGINEERS · ARCHITECTS · S
INTERIOR DESIGNERS · PL
P.O. BOX 3505 · WILLIAMSBURG, VIRGINIA 23187 · (804) 253-

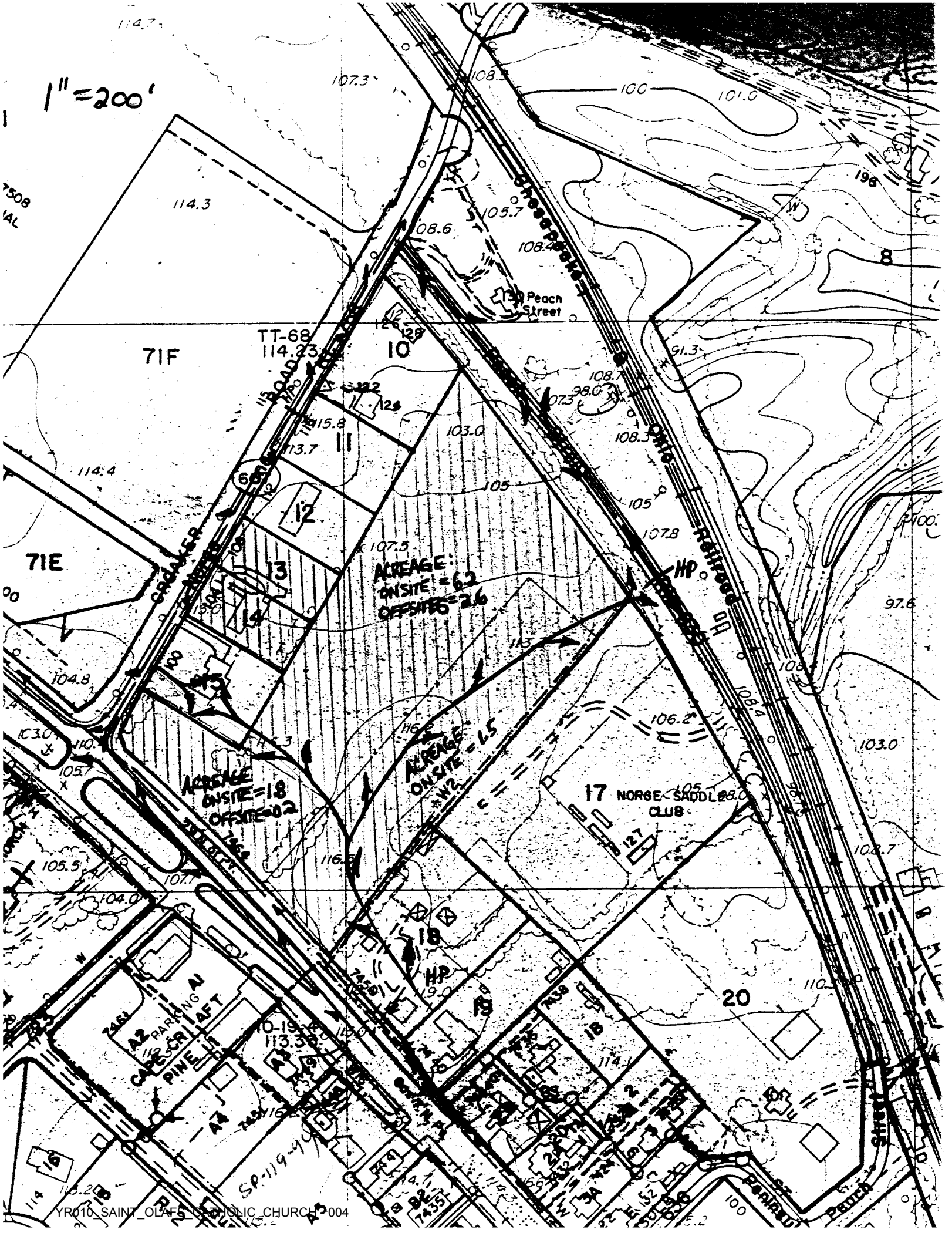
9/28/94

GRADING & STORM DRAINAGE PLAN
ST. OLAF PATRON SAINT OF NO
CATHOLIC CHURCH
JAMES CITY COUNTY, VIRGINIA

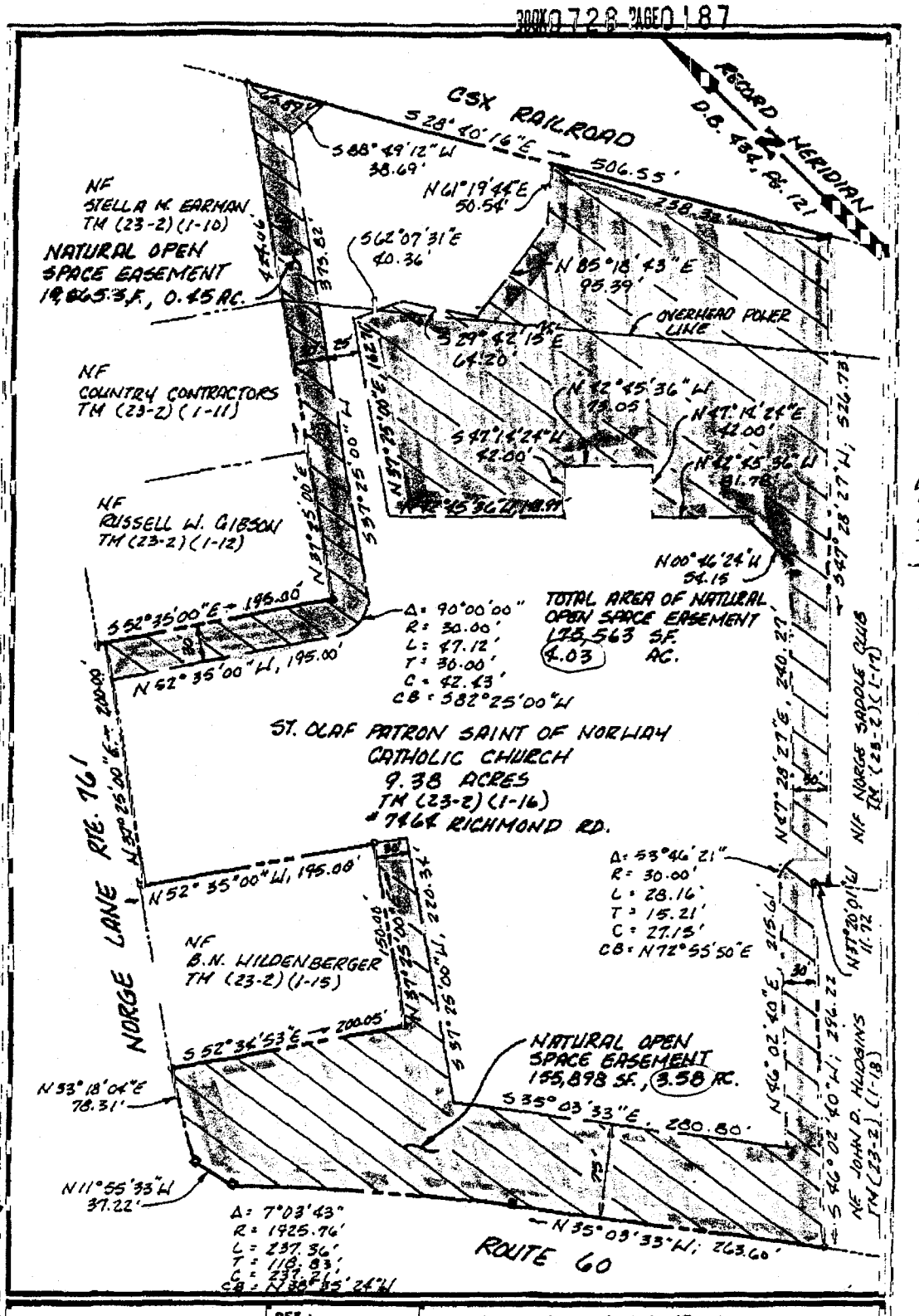
SCALE AS SHOWN
DESIGNED HLPC
DRAWN TCS/MEH
CHECKED WDJ
DATE 09-28-94
COMMISSION NO. 1930831
SHEET C-2
3

As-Built
YR 010; SP-119-94

YR010_SAINT_OLAFS_CATHOLIC_CHURCH - 003


1" = 200'
71F
71E
TT-68
114.23
10
11
12
13
14
17
18
19
20
ACREAGE:
ON SITE = 6.2
OFFSITE = 2.6
ACREAGE
ON SITE = 18
OFFSITE = 0.2
ACREAGE
ON SITE = 4.5
NORGE SADDLE CLUB
Peach Street
Chesapeake
Ohio
Railroad
CRAIGER
ROAD
PINE
CAPESTER
PARKING
AFT
A1
A2
A3
A4
B1
B2
B3
B4
B5
B6
B7
B8
B9
HP
SP-119-90

BOOK 0728 PAGE 0187



.45 AC
4.03 AC
3.58 AC
8.06 AC.

COMMONWEALTH OF VIRGINIA
1-13-95

REF.:
DB 88, PG. 246
DB 265, PG. 185
DB 299, PG. 371
DB 94, PG. 558
DB 78, PG. 239
DB 271, PG. 162
DB 434, PG. 118
DB 616, PG. 464
PB 60, PG. 80

PLAT SHOWING EASEMENT FOR NATURAL OPEN SPACE: OWNED BY THE MOST REVEREND WALTER F. SULLIVAN, BISHOP OF THE CATHOLIC DIOCESE OF RICHMOND AND HIS SUCCESSORS IN OFFICE FOR CONVEYANCE TO:

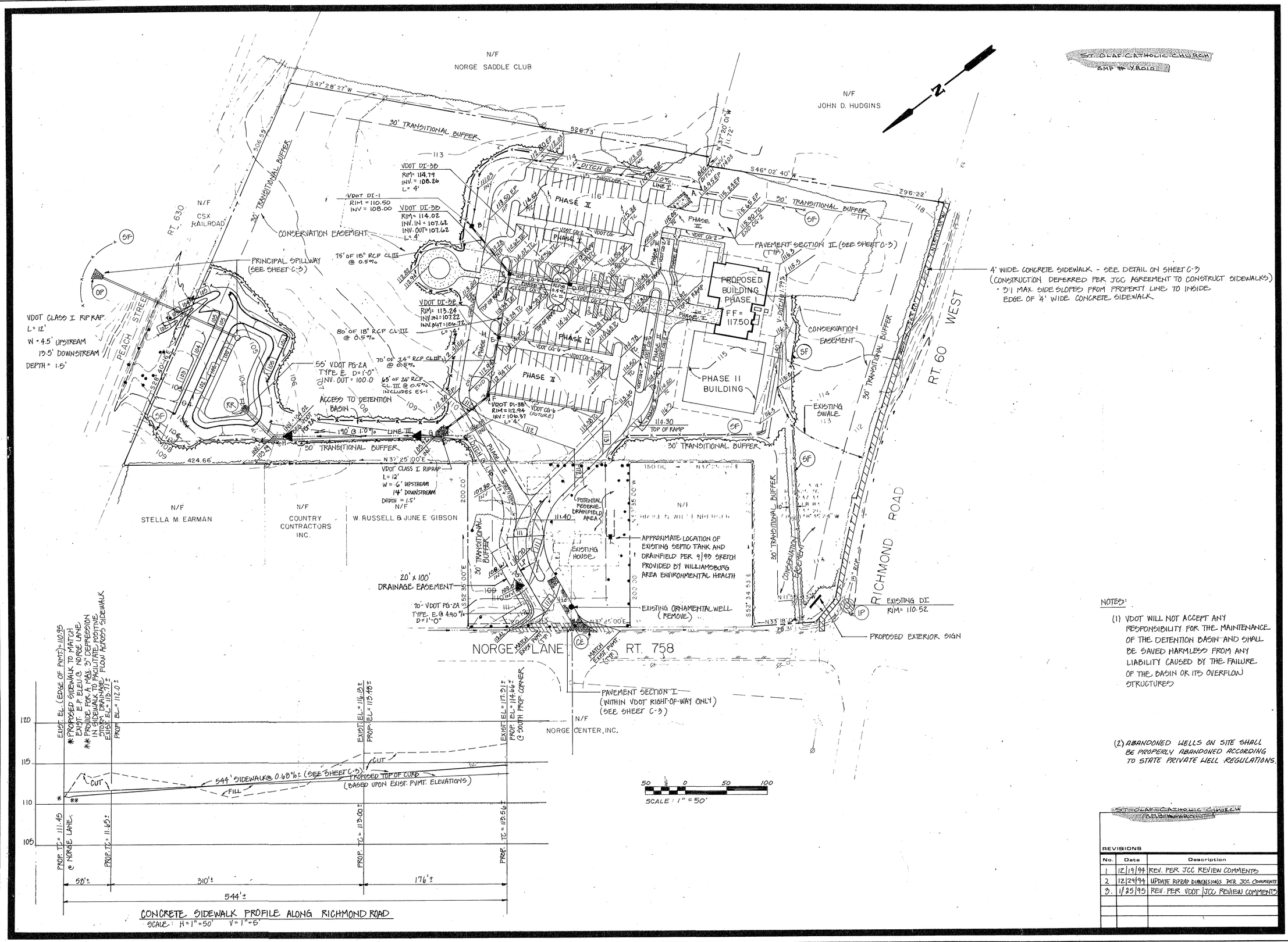
THE COUNTY OF JAMES CITY, VIRGINIA

JAMES CITY COUNTY VIRGINIA

DATE: JAN. 13, 1995 SCALE: 1" = 50'

ENGINEERS ARCHITECTS SURVEYORS
INTERIOR DESIGNERS PLANNERS
P. O. BOX 3505 WILLIAMSBURG, VIRGINIA 23187 (804) 253-0573

JOB NO. 1930831



CONCRETE SIDEWALK PROFILE ALONG RICHMOND ROAD
SCALE: H = 1" = 50' V = 1" = 5'

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ST. OLAF CATHOLIC CHURCH
BMP # V-8010

REVISIONS

No.	Date	Description
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2	12/29/94	UPDATE RIPRAP DIMENSIONS PER JCC COMMENTS
3	1/25/95	REV. PER VDOT & JCC REVIEW COMMENTS

ENGINEERS · ARCHITECTS · SURVEYORS
INTERIOR DESIGNERS · PLANNERS
P.O. BOX 3505 WILLIAMSBURG, VIRGINIA 23187 (804) 253-0673 (804) 874-5015

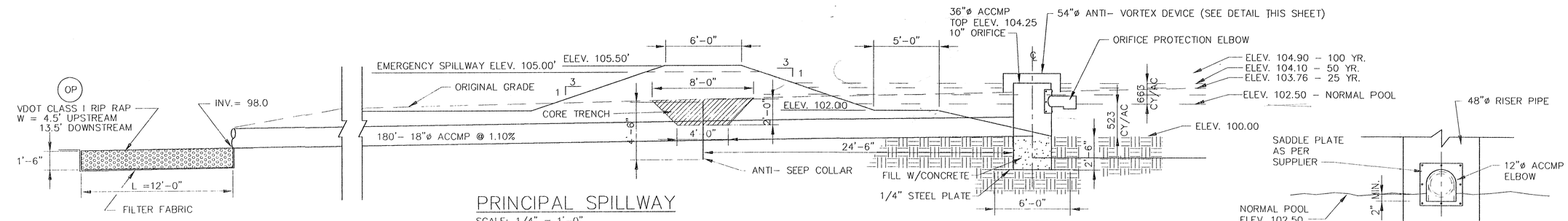
9/28/94

GRADING & STORM DRAINAGE PLAN
ST. OLAF PATRON SAINT OF NORWAY CATHOLIC CHURCH
JAMES CITY COUNTY VIRGINIA

SCALE AS SHOWN
DESIGNED HLPG
DRAWN TCS/MEH
CHECKED WDJ
DATE 09-28-94
1930831
COMMISSION NO.
SHEET C-2 3 OF 7

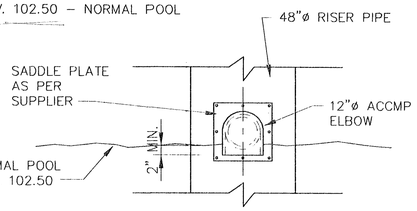
YR 010

YR010_SAINT_OLAFS_CATHOLIC_CHURCH - 006



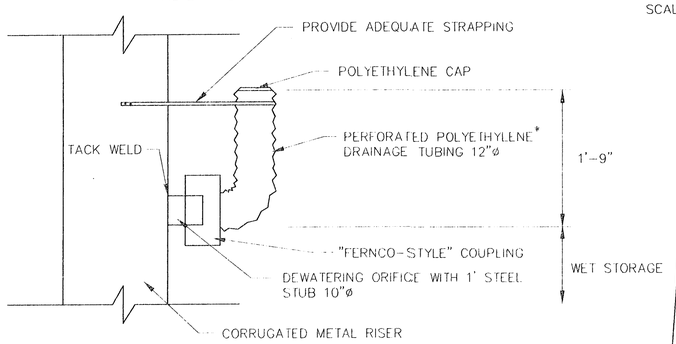
PRINCIPAL SPILLWAY

SCALE: 1/4" = 1'-0"



ORIFICE PROTECTION ELBOW

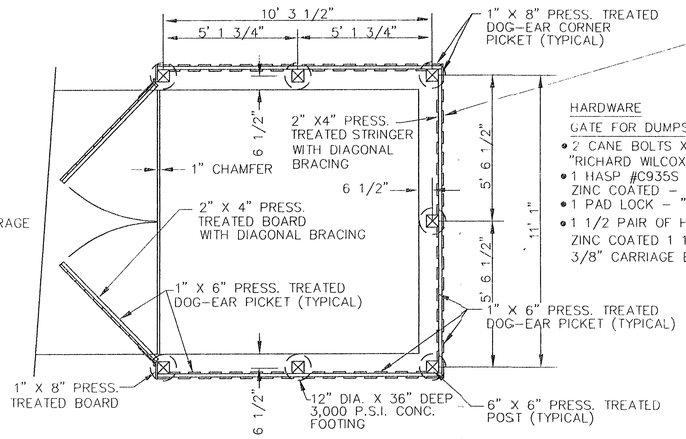
NOT TO SCALE



NOTE: WITH CONCRETE RISER USE PVC SCHEDULE 40 STUB FOR DEWATERING ORIFICE.
* DRAINAGE TUBING SHALL COMPLY WITH ASTM F667 AND AASHTO M294

DEWATERING SYSTEM DETAIL

NOT TO SCALE



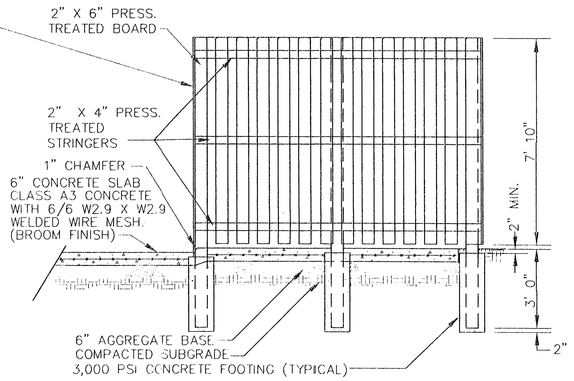
HARDWARE

GATE FOR DUMPSTER PAD AND FENCE

- 2 CANE BOLTS X 18" GALVANIZED IRON "RICHARD WILCOX" #524 X 18" ZINC PLATED.
- 1 HASP #C935S - 3" EXTRA HEAVY DUTY, ZINC COATED - "LAWRENCE"
- 1 PAD LOCK - "SCHLAGE #45 - 101
- 1 1/2 PAIR OF HINGES PER LEAF - "STANLEY #951 ZINC COATED 1 1/2 x 16" STRAP,3/4" x 6" HOOK, 3/8" CARRIAGE BOLTS AND NUTS

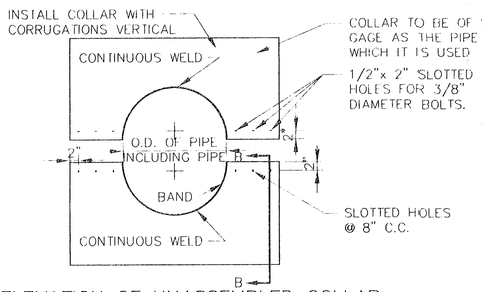
DUMPSTER PAD AND FENCE PLAN

SCALE: 3/8"= 1'-0" **PHASE II**

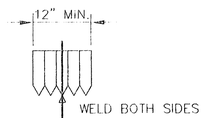


DUMPSTER PAD AND FENCE SECTION

SCALE: 3/8"= 1'-0" **PHASE II**



ELEVATION OF UNASSEMBLED COLLAR



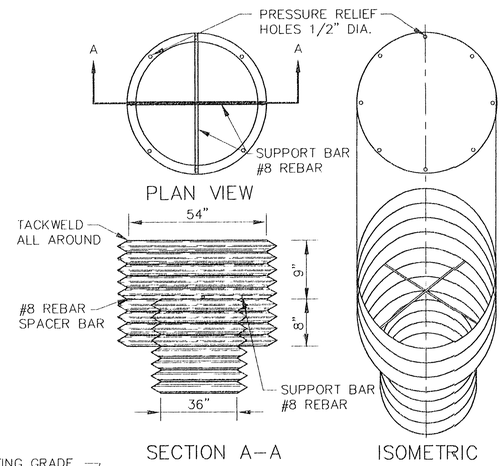
SECTION B-B

NOTES FOR COLLAR

1. ALL MATERIALS TO BE IN ACCORDANCE WITH CONSTRUCTION AND CONSTRUCTION MATERIAL SPECIFICATIONS.
2. WHEN SPECIFIED ON THE PLANS, COATING OF COLLARS SHALL BE IN ACCORDANCE WITH CONSTRUCTION AND CONSTRUCTION MATERIAL SPECIFICATIONS.
3. UNASSEMBED COLLARS SHALL BE MARKED BY PAINTING OR TAGGING TO IDENTIFY MATCHING PAIRS.
4. THE LAP BETWEEN THE PIPE AND CONNECTING BAND SHALL BE CAULKED WITH ASPHALT MASTIC AT TIME OF INSTALLATION.
5. EACH COLLAR SHALL BE FURNISHED WITH TWO 1/2" DIAMETER RODS WITH STANDARD TANK LUGS FOR CONNECTING COLLARS TO PIPE.

ANTI-SEEP COLLAR

NOT TO SCALE

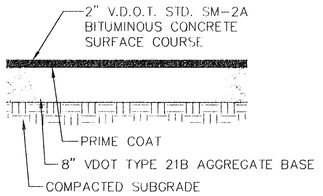


NOTES:

1. THE CYLINDER MUST BE FIRMLY FASTENED TO THE TOP OF THE RISER.
2. SUPPORT BARS ARE WELDED TO THE TOP OF THE RISER OR ATTACHED BY STRAPS BOLTED TO TOP OF RISER.

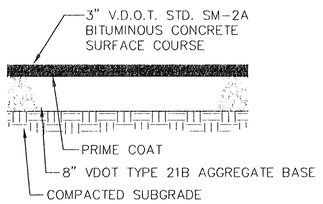
ANTI-VORTEX DEVICE

NOT TO SCALE



PAVEMENT SECTION - I

NOT TO SCALE
(ENTRANCE ROAD AND PARKING LOT)



PAVEMENT SECTION - II

NOT TO SCALE
(PAVEMENT WITHIN VDOT RIGHT OF WAY)

NOTES:

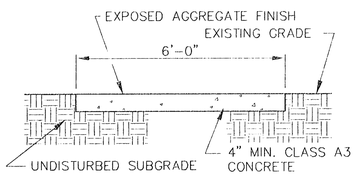
MOUNT SIGN SO THE BOTTOM EDGE OF THE SIGN IS NO LOWER THAN 4 FEET NOR HIGHER THAN 7 FEET ABOVE THE PARKING SURFACE.

BURY POST A MINIMUM OF 3 FEET.

POST SHALL BE U-TYPE ROLLED STEEL @ 2 LBS./FT. AND GALVANIZED IN ACCORDANCE WITH ASTM A123.

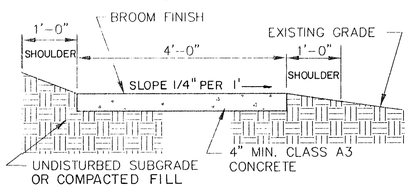
R 7-8 12"x 18" MANUAL ON UNIFORM CONTROL DEVICES

NOT TO SCALE



SIDEWALK DETAIL (ON-SITE)

NOT TO SCALE



SIDEWALK DETAIL (OFF-SITE)

NOT TO SCALE **PHASE II**

NOTES: SIDEWALK SHALL BE BUILT PARALLEL TO THE ELEVATION OF ROUTE 60. THE FIRST 8' OF THE SIDEWALK FROM THE INTERSECTION OF NORGE LANE AND RICHMOND ROAD SHALL BE EXPOSED AGGREGATE CONCRETE.

REVISIONS

NO.	DATE	DESCRIPTION
1	12/19/94	REV. PER JCC REVIEW COMMENTS
2	1/25/95	REV. PER VDOT REVIEW COMMENTS

ENGINEERS · ARCHITECTS · SURVEYORS
INTERIOR DESIGNERS · PLANNERS
P.O. BOX 3505 WILLIAMSBURG, VIRGINIA 23187 (804)253-0673 (804)874-5015

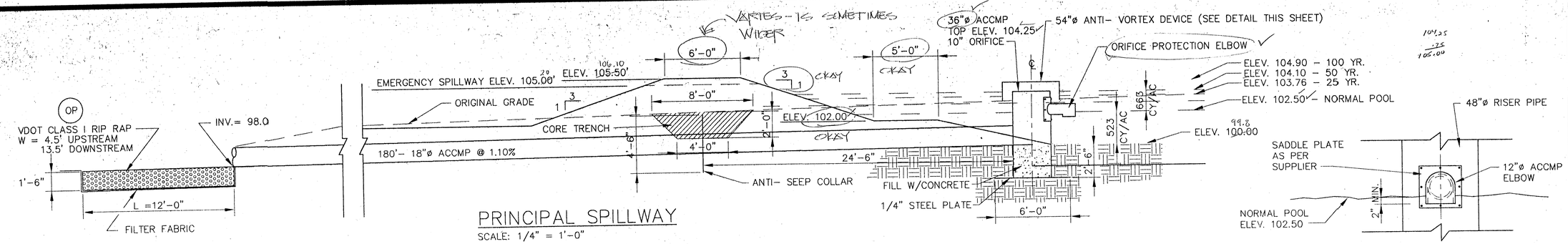
DETAILS

ST. OLAF PATRON SAINT OF NORWAY CATHOLIC CHURCH
JAMES CITY COUNTY VIRGINIA

SCALE	AS SHOWN
DESIGNED	CAD
DRAWN	LBA
CHECKED	WDJ
DATE	09-28-94
COMMISSION NO.	1930831
SHEET	C-3
	4 OF 7

FILENAME: DUCKPT.DWG
DATE: 5-26-93
PLOT SCALE: 1/4" = 1'-0"

YR010_SAINT_OLAFS_CATHOLIC_CHURCH - 007

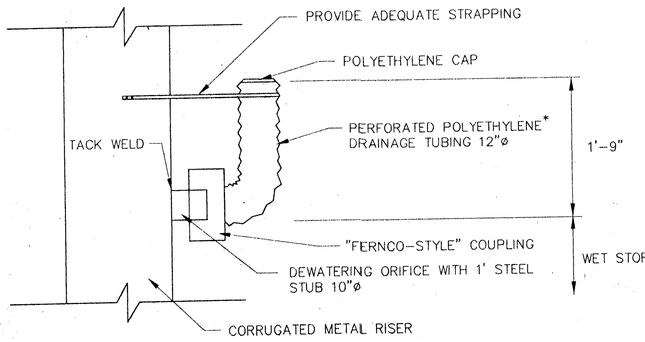


PRINCIPAL SPILLWAY

SCALE: 1/4" = 1'-0"

ORIFICE PROTECTION ELBOW

NOT TO SCALE



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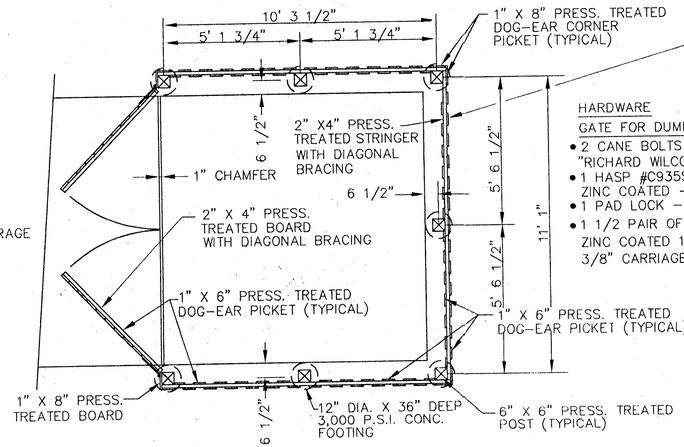
DEWATERING SYSTEM DETAIL

NOT TO SCALE



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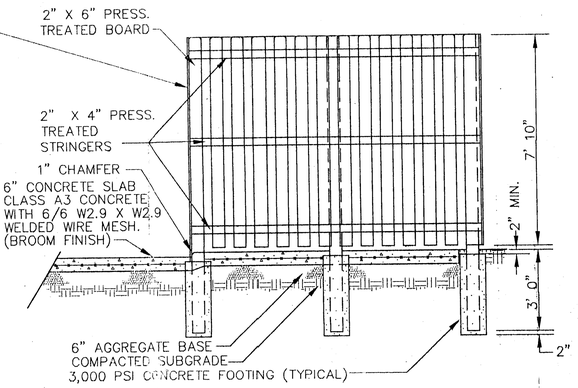
DUMPSTER PAD AND FENCE PLAN

SCALE: 3/8"= 1'-0"

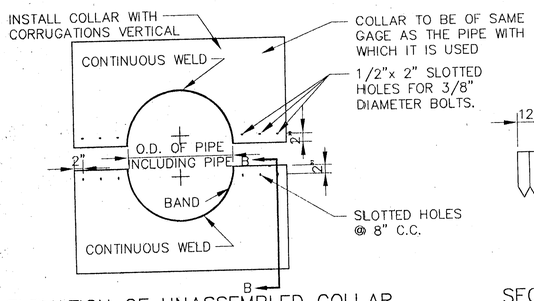
PHASE II



DUMPSTER PAD AND FENCE SECTION

SCALE: 3/8"= 1'-0"

PHASE II



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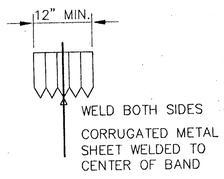

SECTION B-B

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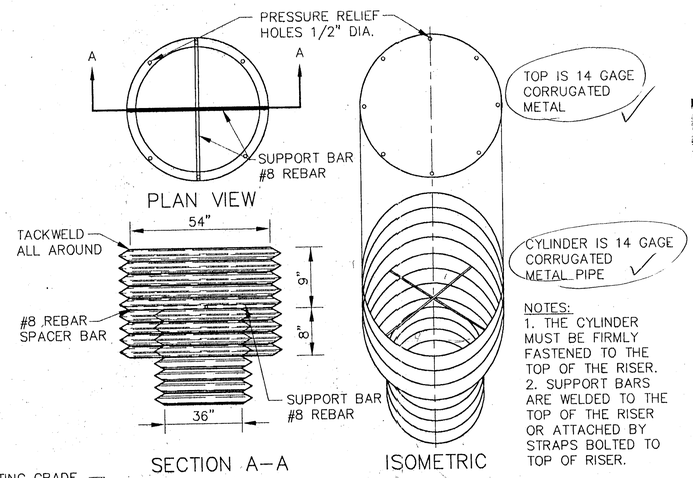

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NOT TO SCALE

PAVEMENT SECTION - I

NOT TO SCALE

(ENTRANCE ROAD AND PARKING LOT)

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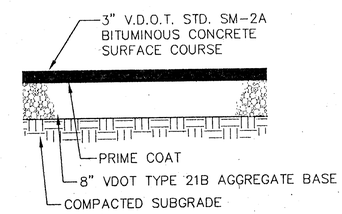
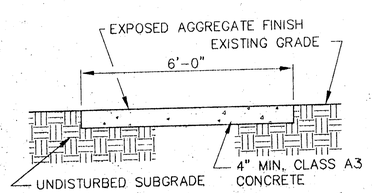
NOT TO SCALE



PAVEMENT SECTION - II

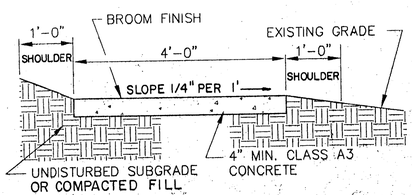
NOT TO SCALE

(PAVEMENT WITHIN VDOT RIGHT OF WAY)



SIDEWALK DETAIL (ON-SITE)

NOT TO SCALE



SIDEWALK DETAIL (OFF-SITE)

NOT TO SCALE

PHASE II

NOTES: SIDEWALK SHALL BE BUILT PARALLEL TO THE ELEVATION OF ROUTE 60. THE FIRST 8' OF THE SIDEWALK FROM THE INTERSECTION OF NORGE LANE AND RICHMOND ROAD SHALL BE EXPOSED AGGREGATE CONCRETE.

REVISIONS

NO.	DATE	DESCRIPTION
1	12/19/94	REV. PER JCC REVIEW COMMENTS
2	1/25/95	REV. PER VDOT REVIEW COMMENTS

ENGINEERS · ARCHITECTS · SURVEYORS
INTERIOR DESIGNERS · PLANNERS
P.O. BOX 3505 WILLIAMSBURG, VIRGINIA 23187 (804)253-0573 (804)874-5015

DETAILS

ST. OLAF PATRON SAINT OF NORWAY CATHOLIC CHURCH

JAMES CITY COUNTY, VIRGINIA

SCALE	AS SHOWN
DESIGNED	CAD
DRAWN	LBA
CHECKED	WDJ
DATE	09-28-94
COMMISSION NO.	1930831
SHEET	C-3 4 OF 7

STORMWATER DRAINAGE AND BMP CALCULATIONS

FOR

ST. OLAF PATRON SAINT OF NORWAY CATHOLIC CHURCH

BY

DJG, INC.
1006 RICHMOND ROAD
WILLIAMSBURG, VA 23185

SEPTEMBER 28, 1994

SP-119-94?

DJG COMMISSION NO. 1930831

YR 010

THE DEYOUNG-JOHNSON GROUP, INC.

THE DeYOUNG-JOHNSON GROUP, INC.
P.O. Box 3505
WILLIAMSBURG, VIRGINIA 23187
(804) 253-0673

JOB: ST OLAF 1930830
SHEET NO. 1 OF 5
CALCULATED BY: GOERING DATE: 9-21-94
CHECKED BY: DATE:
SCALE:

BMP POINT SYSTEM

- NATURAL OPEN SPACE CREDIT:

TOTAL SITE ACREAGE = 9.5 ac
OPEN SPACE = 1.5 ac + 2.2 ac + 0.3 ac = 4.0 ac IN NAT. OPEN SPACE?

% OPEN SPACE = (4.0/9.5) × 100 = 42.1 %

POINTS = 42.1 % × 0.1 = 4.2 POINTS

- WETPOND DESIGN #7 CREDIT:

ON-SITE ACREAGE SERVED = 5.3 ac 6.2
OFF-SITE ACREAGE SERVED = 1.8 ac 2.6
TOTAL ACREAGE SERVED = 7.1 ac 8.8

RATIO OF ACREAGE SERVED = 7.1 ac / 9.5 ac = 0.7474 8.8/9.5 = .926

POINTS = 0.7474 × 9 = 6.7 POINTS .926 × 9 = 8.34

- BMP POINT SYSTEM TOTAL:

TOTAL = NATURAL OPEN SPACE POINTS + POND POINTS

TOTAL = 4.2 POINTS + 6.7 POINTS

TOTAL = **10.9 POINTS**

Reduce NOS to min. needed

THE DeYOUNG-JOHNSON GROUP, INC.
P.O. Box 3505
WILLIAMSBURG, VIRGINIA 23187
(804) 253-0673

JOB ST OLAF 1970820
SHEET NO. 2 OF 5
CALCULATED BY GZERING DATE 9-21-04
CHECKED BY DATE
SCALE

- BMP DESIGN # 7 ($V_r \times 4.0$)

MEAN STORM = 0.50" 2.5ac imp cover - max.

IMPERVIOUS RATIO = 2.5 ac. / 9.5 ac. = 0.26

RV = 0.05 + 0.009 (26) = 0.284

VOLUME = (0.284)(0.5")(4.0) = 0.568" = 0.0473 ft/ac.

→ (0.0473)(7.1 ac)(43560) = 14640 ft³

- ESTABLISH MIN. POOL ELEV. TO ACCOMODATE REQ'D VOLUME:

• BASIN STORAGE TO LEVEL SHELF @ 102.0'

ELEV.	AREA (SF)	$\Sigma(A_i + A_j)/2$	VOLUME (ft³)	Σ VOLUME (ft³)
100.0	3800	1900	0	0
101.0	4750	4275	4275	4275
102.0	5900	5325	5325	9600

• STORAGE NEED ABOVE 102' = 14640 ft³ − 9600 ft³ = 5040 ft³

• BASIN STORAGE ABOVE SHELF @ 102'

ELEV.	AREA (SF)	$\Sigma(A_i + A_j)/2$	VOLUME (ft³)	Σ VOLUME (ft³)
102.0	8100	4050	0	0
103.0	9580	8840	8840	8840
104.0	11200	10390	10390	19230
105.0	12900	12050	12050	31280

• STORAGE ALGORITHM: $z_1 = 1.0$ $z_2 = 3.0$ $S_1 = 8840$ $S_2 = 31280$

$$b = \frac{\ln\left(\frac{S_2}{S_1}\right)}{\ln\left(\frac{z_2}{z_1}\right)} = 1.1503$$

$$K_s = \frac{S_2}{z_2^{\,b}} = 8840 \qquad z = \left(\frac{5040}{8840}\right)^{\frac{1}{1.1503}} = 0.61$$

∴ SET POOL ELEV. @ 102.0 + 0.61 ≈ 102.5'

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JOB: ST OLAF 1930830
SHEET NO. 3 OF 5
CALCULATED BY: GOERING DATE: 9-21-94
CHECKED BY: DATE:
SCALE:

- BASIN STORAGE ABOVE NORMAL POOL ELEV. @ 102.5'

ELEV.	AREA (SF)	$\Sigma(A_i + A_j)/2$	VOLUME (ft^3)	Σ VOLUME (ft^3)
102.5	8840	4420	0	0
103.0	9580	9210	4605	4605
104.0	11200	10390	10390	14995
105.0	12900	12050	12050	27045

- STORAGE ALGORITHM: $z_1 = 0.5$ $z_2 = 2.5$ $b = \frac{\ln\left(\frac{S_2}{S_1}\right)}{\ln\left(\frac{z_2}{z_1}\right)} = 1.09999$

$S_1 = 4605$ $S_2 = 27045$

$K_s = \frac{S_2}{z_2^b} = 9870$ $z = \left(\frac{S}{9870}\right)^{\frac{1}{1.09999}} \Rightarrow S_2 = 9870\left(z^{1.09999}\right)$

- RISER = 36" Ø CMP
- BARREL = 18" CMP $\Rightarrow Q = Q \times 0.69$ (0.69 = PIPE FLOW CORRECTION FACTOR)
- ORIFICE = 10" $\Rightarrow Q = CA\sqrt{2gH_o}$ $A = 0.545\ ft^2$ $C = 0.60$

- STAGE - STORAGE - DISCHARGE:

	ELEV	STAGE	H_p	Q_p	H_o	Q_o	ΣQ	STORAGE
	102.50	0	—	—	—	—	—	—
	103.00	0.5	—	—	0.08	0.74	0.74	4605
	103.25	0.75	—	—	0.33	1.51	1.51	7193
	103.50	1.0	—	—	0.58	2.00	2.00	9870
	103.75	1.25	—	—	0.83	2.39	2.39	12616
	104.00	1.50	—	—	1.08	2.73	2.73	15448
C.R.	104.25	1.75	—	—	1.33	3.03	3.03	18267
	104.50	2.0	5.75	3.50	1.58	3.30	6.80	21157
	104.75	2.25	6.00	9.25	1.83	3.55	12.80	24083
	105.00	2.50	6.25	9.44	2.08	3.79	13.23	27043

THE DeYOUNG-JOHNSON GROUP, INC.
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JOB ST. OLAF 193033
SHEET NO. 4 OF 5
CALCULATED BY GOERING DATE 9-21-94
CHECKED BY DATE
SCALE

ANTI-SEEP COLLAR CALCULATIONS:

$$L_s = y(z+4)\left(1+\frac{S}{0.25-S}\right)$$

L_s = LENGTH OF BARREL IN SATURATED ZONE (ft)
y = WATER DEPTH AT CREST OF RISER (ft)
z = SLOPE OF UPSTREAM FACE OF EMBANKMENT (z:1 ft)
S = SLOPE OF BARREL IN FEET PER FOOT

$$L_s = 4.25'(3'+4)\left(1+\frac{0.011}{0.25-0.011}\right)$$

$L_s = 31.1$ ft

PLATE 3.14-12 (E&S) ⟹ 1 ANTI-SEEP COLLAR, 4.5' x 4.5'

* NOTE: COLLAR SHOULD NOT BE LOCATED CLOSER THAN 2' TO PIPE JOINTS

CN CALCULATIONS:

- PRE-DEVELOPMENT (SOIL GROUP ~~B~~ A)

ACREAGE (ac)	LAND CONDITION	CN		WEIGHTED (A·CN)		
5.2	GOOD WOODS	25	30	130	156	39
1.2	PASTURE	25	39	30	46.8	⟹ CN=30
3.5	LOTS (1ac)	40	51	140	178.5	
9.9				300	381.3	

- POST-DEVELOPMENT

ACREAGE (ac)	LAND CONDITION	CN		WEIGHTED (A·CN)		
2.8	IMPERVIOUS	98		274		
2.7	GOOD GRASS	~~25~~	39	149		⟹ CN=55
4.0	GOOD WOODS	~~25~~	30	100		53
9.5				523		

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JOB: ST OLAF 19?.33C
SHEET NO. 5 OF 5
CALCULATED BY: ECERING DATE: 4-21-94
CHECKED BY: DATE:
SCALE:

- DRAWDOWN CALCULATIONS:

DESIGN: 25 YR STORM ELEV. = 103.76, VOL = 26793 ft³

6hr. drawdown $Q_{avg} = \frac{\text{VOL. DETAINED}}{6\text{hrs} \times 3600}$

$Q_{avg} = \frac{26793 \text{ ft}^3}{6 \times 3600} = 1.24 \text{ cfs}$

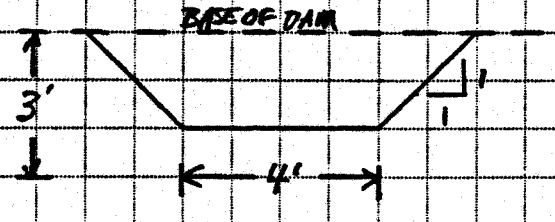
ACTUAL: 25 YR STORM ELEV. 103.76 VOL = 26793 ft³

$Q_{avg} = 1.40$ cfs (DETERMINED FROM TR-55 METHOD RESULTS INCLUDED)

$1.40 \text{ cfs} = \frac{26793 \text{ ft}^3}{T \times 3600}$

$\Rightarrow \boxed{T = 5.34 \text{ hrs.}}$

- CORE TRENCH DETAIL:



* NOTE: CORE TRENCH RUNS ALONG CENTERLINE OF DAM UP THE SIDES OF THE ABUTMENT TO AN ELEVATION OF 103.5'

- OUTLET PROTECTION FOR BARREL PIPE: PIPE DIA. = 18" Q_p (100 yr) = 33 cfs

- ASSUME MIN. TAILWATER CONDITION
- APRON LENGTH = (ESS pg III-164) = 12'
- APRON WIDTH: UPSTREAM = 3 × DIA. = 3 × 1.5' = 4.5'
  DOWNSTREAM = DIA. + APRON LENGTH = 1.5 + 12 = 13.5'
- RIPRAP: d_{50} = 6" DEPTH = 18"

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Project ST. OLAF CATHOLIC CHURCH 193830

Basin # _____ Location TOANO

Total area draining to basin: 7.1 acres.

Basin Volume Design

Wet Storage:

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

   67 cu. yds. x 7.1 acres = 475.7 cu. yds.

2. Available basin volume = 523 cu. yds. at elevation 102.5. (From storage - elevation curve)

3. Excavate approx. 1050 cu. yds. to obtain required volume*.

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

4. Available volume before cleanout required.

   33 cu. yds. x 7.1 acres = 234.3 cu. yds.

5. Elevation corresponding to cleanout level = 104.48'.

   (From Storage - Elevation Curve)

6. Distance from invert of the dewatering orifice to cleanout level = 1.98 ft. (Min. = 1.0 ft.)

Dry Storage:

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

   67 cu. yds. x 7.1 acres = 475.7 cu. yds.

8. Total available basin volume at crest of riser* = 676.6 cu. yds. at elevation 104.25. (From Storage - Elevation Curve)

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

9. Diameter of dewatering orifice = 10 in.

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

Preliminary Design Elevations

11. Crest of Riser = 104.25

Top of Dam = 105.5

Design High Water = 104.4 ?

Upstream Toe of Dam = 100.0

Basin Shape

12. Length of Flow / Effective Width — L / We = 100 / 50

If > 2, baffles are not required ✓

If < 2, baffles are required _____

Runoff

13. Q_2 = 0.178 cfs (From Chapter 5)

14. Q_{25} = 2.397 cfs (From Chapter 5)

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2 =$ 0.178 cfs. (riser and barrel)

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

16. With emergency spillway:

Assumed available head (h) = 0.75 ft. (Using Q_2)

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

Without emergency spillway:

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

h = Design High Water Elevation - Crest of Riser Elevation

17. Riser diameter (D_r) = 36 in. Actual head (h) = 1.65 ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = 180 ft.

Head (H) on barrel through embankment = 5.65 ft. (using Q_{100})

(From Plate 3.14-7).

19. Barrel diameter = 18 in.

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

20. Trash rack and anti-vortex device

Diameter = 54 inches.

Height = 17 inches.

(From Table 3.14-D).

Emergency Spillway Design

2.4 - .2 = 2.2

21. Required spillway capacity $Q_e = Q_{25} - Q_p$ = 2.219 cfs.

22. Bottom width (b) = 8 ft.; the slope of the exit channel (s) = 4 ft./foot; and the minimum length of the exit channel (x) = 30 ft.
(From Table 3.14-C).

Anti-Seep Collar Design

23. Depth of water at principal spillway crest (Y) = 4.25 ft.

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

Slope of principal spillway barrel (S_b) = 1.11 %

Length of barrel in saturated zone (L_s) = 31.1 ft.

24. Number of collars required = 1 dimensions = 4.5' x 4.5'

(from Plate 3.14-12).

Final Design Elevations

25. Top of Dam = 105.5

Design High Water = 104.4

Emergency Spillway Crest = 105.0

Principal Spillway Crest = 104.25

Dewatering Orifice Invert = 102.5

Cleanout Elevation = 104.48'

Elevation of Upstream Toe of Dam or Excavated Bottom of "Wet Storage Area" (if excavation was performed) = 100.0'

YR010_SAINT_OLAFS_CATHOLIC_CHURCH - 018

PRE-DEVELOPMENT 2-YR STORM

INPUT DESIGN DATA

DESIGN STORM FOR ANALYSIS = 2 YEAR
DRAINAGE AREA (ACRES) = 9.7
AVERAGE SLOPE OF DRAINAGE AREA (%) = 3
HYDRAULIC LENGTH (FT) = 650
IMPERVIOUS SURFACE (%) = 10
HYDRAULIC LENGTH MODIFIED (%) = 2
COMPOSITE CURVE NUMBER = 39
SLOPE ADJUSTMENT FACTOR = .93
PONDING ADJUSTMENT FACTOR = 1

RESULTS OF HYDRAULIC CALCULATIONS
(SCS TR-55 & TP-149 PROCEDURES)

WATERSHED LAG ADJUSTED (IMPER. AREAS & CHAN. IMPROV.) IS .344 HOURS
TIME OF CONCENTRATION ADJUSTED IS .574 HOURS
THE PEAK DISCHARGE FROM THIS WATERSHED IS 0 C.F.S.

THE FOLLOWING ARE TIME INCREMENTS AND ORDINATES OF THE INFLOW HYDROGRAPH

(HOURS)	(C.F.S.)
0,0	
.138	0
.275	0
.413	0
.551	0
.688	0
.826	0
.964	0
1.101	0
1.239	0
1.377	0
1.514	0
1.652	0
1.789	0
1.927	0

2-YEAR

PRE-DEVELOPMENT 50-YR STORM

INPUT DESIGN DATA

DESIGN STORM FOR ANALYSIS = 50 YEAR
DRAINAGE AREA (ACRES) = 9.7
AVERAGE SLOPE OF DRAINAGE AREA (%) = 3
HYDRAULIC LENGTH (FT) = 650
IMPERVIOUS SURFACE (%) = 10
HYDRAULIC LENGTH MODIFIED (%) = 2
COMPOSITE CURVE NUMBER = 39
SLOPE ADJUSTMENT FACTOR = .93
PONDING ADJUSTMENT FACTOR = 1

RESULTS OF HYDRAULIC CALCULATIONS
(SCS TR-55 & TP-149 PROCEDURES)

WATERSHED LAG ADJUSTED (IMPER. AREAS & CHAN. IMPROV.) IS .344 HOURS
TIME OF CONCENTRATION ADJUSTED IS .574 HOURS
THE PEAK DISCHARGE FROM THIS WATERSHED IS 3 C.F.S.

THE FOLLOWING ARE TIME INCREMENTS AND ORDINATES OF THE INFLOW HYDROGRAPH

(HOURS)	(C.F.S.)
0,0	
.138	0
.275	0
.413	0
.551	0
.688	.5080001
.826	1.52
.964	2.711
1.101	3.088
1.239	2.66
1.377	1.946
1.514	1.231
1.652	.5170001
1.789	.107
1.927	0

POST-DEVELPOMENT

INPUT DESIGN DATA

DESIGN STORM FOR ANALYSIS = 50 YEAR
DRAINAGE AREA (ACRES) = 7.1
AVERAGE SLOPE OF DRAINAGE AREA (%) = 3
HYDRAULIC LENGTH (FT) = 650
IMPERVIOUS SURFACE (%) = 26
HYDRAULIC LENGTH MODIFIED (%) = 40
COMPOSITE CURVE NUMBER = 53
SLOPE ADJUSTMENT FACTOR = .93
PONDING ADJUSTMENT FACTOR = 1

RESULTS OF HYDRAULIC CALCULATIONS
(SCS TR-55 & TP-149 PROCEDURES)

WATERSHED LAG ADJUSTED (IMPER. AREAS & CHAN. IMPROV.) IS .138 HOURS
TIME OF CONCENTRATION ADJUSTED IS .231 HOURS
THE PEAK DISCHARGE FROM THIS WATERSHED IS 15 C.F.S.

THE FOLLOWING ARE TIME INCREMENTS AND ORDINATES OF THE INFLOW HYDROGRAPH

(HOURS)	(C.F.S.)
0,0	
.055	.247
.111	.912
.166	2.41
.222	4.733
.277	7.943
.332	11.642
.388	14.816
.443	15.497
.499	13.416
.554	9.303001
.609	5.688
.665	2.805
.72	.857
.776	0

STAGE (FT)	DISCHARGE (CFS)	STORAGE (CF)
0	0	0
.5	.74	4605
.75	1.51	7193
1	2	9870
1.25	2.39	12616
1.5	2.73	15418
1.75	3.03	18267
2	6.8	21157
2.5	13.23	27043

THE FOLLOWING ARE TIME INCREMENTS AND ORDINATES OF THE OUTFLOW HYDOGRAPH

(HOURS)	(C.F.S.)
0.000	0.004
0.055	0.022
0.111	0.074
0.166	0.184
0.222	0.378
0.277	0.675
0.332	1.345
0.388	1.902
0.443	2.275
0.499	2.508
0.554	2.628
0.609	2.666
0.665	2.646
0.720	2.593
0.776	2.531
0.831	2.471
0.886	2.412
0.942	2.348
0.997	2.282
1.053	2.219
1.108	2.157
1.163	2.097
1.219	2.038
1.274	1.976
1.329	1.905
1.385	1.837
1.440	1.771
1.496	1.707
1.551	1.646
1.606	1.587
1.662	1.530
1.717	1.454
1.773	1.370
1.828	1.291
1.883	1.217
1.939	1.147
1.994	1.081
2.050	1.019
2.105	0.960

MAXIMUM OUTFLOW IS 2.666 C.F.S.
MAXIMUM STAGE IS 1.452941 FT.
MAXIMUM STORAGE IS 14890 CUBIC FEET

Calculated By: GOERING Date: 9-28-94
Checked By: Date:
N= 0.05 (GRASS) = 0.013 (CEMENT)
Storm Frequency 10-YR

DJG P.O. Box 3505
Williamsburg, Virginia 23187

STORM DRAINAGE COMPUTATION SHEET

Project No.: ST. OLAF CATHOLIC CHURCH
Project Desc.:

Sheet 1 of 1 Sheets

LOCATION				RUN-OFF											PIPE - CHANNEL DESIGN						HYDRAULIC GRADE LINE								
				AREA-ACRES					TIME OF FLOW - MIN.																				
LINE	RUN	FROM	TO	INCREMENT	TOTAL	RUN-OFF COEFF.	INCREMENTAL CA	ACCUMULATED CA	TO INLET/ UPPER REACH	WITHIN REACH CONVEYANCE	TIME OF CONCENTRATION	INTENSITY	DISCHARGE C.F.S.	PIPE SIZE	CHANNEL SECTION	SLOPE FT./FT.	CAPACITY FULL C.F.S.	VELOCITY FULL F.P.S.	DESIGN VELOCITY F.P.S.	CONVEYANCE LENGTH FT.	INVERT UPSTREAM	INVERT DOWNSTREAM	FRICTION SLOPE FT./FT.	VELOCITY F.P.S.	$V^2/2G$ FT.	H.G.L. ELEV. UPSTREAM	H.G.L. ELEV. DOWNSTREAM	COVER ELEV. TOP OF BANK
I		A	B	0.85	0.85	0.78	0.66	0.66			4.0	7.0	4.62	–	GRASS V-DITCH	0.010	15.99	2.4	1.74	340'	114.03	110.50						
		B	C	0.0	0.85	0.78	0.66	0.66			4.0	7.0	4.62	18"	–	0.005	7.43	4.2	4.43	75'	108.00	107.62						
		D	C	0.10	0.10	0.98	0.10	0.10			4.2	7.0	0.70	15"	–	0.005	4.57	3.7	2.69	75'	108.26	107.62						
		C	E	0.20	1.15	0.98	0.20	0.96			4.4	7.0	6.72	18"	–	0.005	7.43	4.2	4.76	80'	107.62	107.22						
		E	F	0.40	1.55	0.98	0.40	1.36			4.6	7.0	9.52	24"	–	0.005	16.0	5.1	5.31	70'	106.72	106.37						
		F	G	0.30	1.85	0.98	0.30	1.66			4.8	7.0	11.62	24"	–	0.005	16.0	5.1	5.55	65'	106.37	106.04						
II		A	B	0.10	0.10	0.75	0.08	0.08			2.1	7.8	0.62	–	PG-2A E	0.049	46.17	15.4	5.24	70'	112.42	109.00						
		B	G	1.72	1.82	0.50	0.86	0.91			3.0	7.5	6.83	–	GRASS V-DITCH	0.013	18.23	2.7	2.11	235'	109.00	106.70						
III		G	H	1.32	4.99	0.50	0.66	2.50			4.8	7.0	17.5	–	GRASS V-DITCH	0.010	34.43	2.87	2.42	190'	106.70	104.10						
		H	I	0.0	4.99	0.50	0.66	2.50			4.8	7.0	17.5	–	PG-2A E	0.075	57.12	19.04	14.16	55'	104.10	100.00						

LINE I A→B DESIGN

Created Revised
01-Nov-94 01-Nov-94 12:03

MANNING'S EQUATION Rec/Trap/Tria

Units (ft)	= FEET		Area (sq ft)	=	2.66
Depth (ft)	= <.94>	<---	Velocity (ft/s)	=	1.74
Discharge (cfs)	= <4.62>		Froude Number	=	0.45
Manning's n	= <.05>		Critical Depth (ft)	=	0.68
Slope(decimal)	= <.01>		Normal Depth (ft)	=	0.94
Bottom Width(ft)	= <0>		Hydraulic Radius (ft)	=	0.45
			Depth to Centroid(ft)	=	0.31
Side Slope	= <3>		Top Width (ft)	=	5.65

CAPACITY

Created Revised
01-Nov-94 01-Nov-94 12:04

MANNING'S EQUATION Rec/Trap/Tria

Units (ft)	= FEET		Area (sq ft)	=	6.75
Depth (ft)	= <1.5>		Velocity (ft/s)	=	2.37
Discharge (cfs)	= <15.99>	<---	Froude Number	=	0.48
Manning's n	= <.05>		Critical Depth (ft)	=	1.12
Slope(decimal)	= <.01>		Normal Depth (ft)	=	1.50
Bottom Width(ft)	= <0>		Hydraulic Radius (ft)	=	0.71
			Depth to Centroid(ft)	=	0.50
Side Slope	= <3>		Top Width (ft)	=	9.00

LINE I B→C DESIGN

Created Revised
01-Nov-94 01-Nov-94 12:05

MANNING'S EQUATION Circular cross-section

Units (ft)	= FEET		Area (sq ft)	=	1.04
Depth (ft)	= <.86>	<---	Velocity (ft/s)	=	4.43
Discharge (cfs)	= <4.62>		Froude Number	=	0.93
Manning's n	= <.013>		Critical Depth (ft)	=	0.83
Slope(decimal)	= <.005>		Normal Depth (ft)	=	0.86
Diameter (in)	= <18>		Hydraulic Radius (ft)	=	0.41
			Depth to Centroid(ft)	=	0.37
			Top Width (ft)	=	1.48

CAPACITY

Created Revised
01-Nov-94 01-Nov-94 12:06

MANNING'S EQUATION Circular cross-section

Units (ft)	= FEET		Area (sq ft)	=	1.77
Depth (ft)	= <1.5>		Velocity (ft/s)	=	4.20
Discharge (cfs)	= <7.43>	<---	Froude Number	=	---
Manning's n	= <.013>		Critical Depth (ft)	=	1.06
Slope(decimal)	= <.005>		Normal Depth (ft)	=	1.23
Diameter (in)	= <18>		Hydraulic Radius (ft)	=	0.38
			Depth to Centroid(ft)	=	0.75
			Top Width (ft)	=	0.00

LINE I D→C DESIGN

Created Revised
01-Nov-94 01-Nov-94 12:07

MANNING'S EQUATION Circular cross-section

Units (ft)	= FEET		Area (sq ft)	=	0.26
Depth (ft)	= <.33>	<---	Velocity (ft/s)	=	2.69
Discharge (cfs)	= <.7>		Froude Number	=	0.98
Manning's n	= <.013>		Critical Depth (ft)	=	0.33
Slope(decimal)	= <.005>		Normal Depth (ft)	=	0.33
Diameter (in)	= <15>		Hydraulic Radius (ft)	=	0.19
			Depth to Centroid(ft)	=	0.14
			Top Width (ft)	=	1.10

CAPACITY

Created Revised
01-Nov-94 01-Nov-94 12:08

MANNING'S EQUATION Circular cross-section

Units (ft)	= FEET		Area (sq ft)	=	1.23
Depth (ft)	= <1.25>		Velocity (ft/s)	=	3.72
Discharge (cfs)	= <4.57>	<---	Froude Number	=	---
Manning's n	= <.013>		Critical Depth (ft)	=	0.87
Slope(decimal)	= <.005>		Normal Depth (ft)	=	1.02
Diameter (in)	= <15>		Hydraulic Radius (ft)	=	0.31
			Depth to Centroid(ft)	=	0.63
			Top Width (ft)	=	0.00

LINE I C→E DESIGN

Created Revised
01-Nov-94 01-Nov-94 12:09

MANNING'S EQUATION Circular cross-section

Units (ft)	= FEET		Area (sq ft)	=	1.41
Depth (ft)	= <1.12>	<---	Velocity (ft/s)	=	4.76
Discharge (cfs)	= <6.72>		Froude Number	=	0.81
Manning's n	= <.013>		Critical Depth (ft)	=	1.00
Slope(decimal)	= <.005>		Normal Depth (ft)	=	1.12
Diameter (in)	= <18>		Hydraulic Radius (ft)	=	0.45
			Depth to Centroid(ft)	=	0.50
			Top Width (ft)	=	1.31

CAPACITY

Created Revised
01-Nov-94 01-Nov-94 12:10

MANNING'S EQUATION Circular cross-section

Units (ft)	= FEET		Area (sq ft)	=	1.77
Depth (ft)	= <1.5>		Velocity (ft/s)	=	4.20
Discharge (cfs)	= <7.43>	<---	Froude Number	=	----
Manning's n	= <.013>		Critical Depth (ft)	=	1.06
Slope(decimal)	= <.005>		Normal Depth (ft)	=	1.23
Diameter (in)	= <18>		Hydraulic Radius (ft)	=	0.38
			Depth to Centroid(ft)	=	0.75
			Top Width (ft)	=	0.00

LINE I E→F DESIGN

Created Revised
01-Nov-94 01-Nov-94 12:11

MANNING'S EQUATION Circular cross-section

Units (ft)	= FEET		Area (sq ft)	=	1.79
Depth (ft)	= <1.11>	<---	Velocity (ft/s)	=	5.31
Discharge (cfs)	= <9.52>		Froude Number	=	0.99
Manning's n	= <.013>		Critical Depth (ft)	=	1.10
Slope(decimal)	= <.005>		Normal Depth (ft)	=	1.11
Diameter (in)	= <24>		Hydraulic Radius (ft)	=	0.53
			Depth to Centroid(ft)	=	0.48
			Top Width (ft)	=	1.99

CAPACITY

Created Revised
01-Nov-94 01-Nov-94 12:11

MANNING'S EQUATION Circular cross-section

Units (ft)	= FEET		Area (sq ft)	=	3.14
Depth (ft)	= <2>		Velocity (ft/s)	=	5.09
Discharge (cfs)	= <16>	<---	Froude Number	=	---
Manning's n	= <.013>		Critical Depth (ft)	=	1.44
Slope(decimal)	= <.005>		Normal Depth (ft)	=	1.64
Diameter (in)	= <24>		Hydraulic Radius (ft)	=	0.50
			Depth to Centroid(ft)	=	1.00
			Top Width (ft)	=	0.00

LINE I F → G DESIGN

Created Revised
01-Nov-94 01-Nov-94 12:12

MANNING'S EQUATION Circular cross-section

Units (ft)	= FEET		Area (sq ft)	=	2.09
Depth (ft)	= <1.26>	<---	Velocity (ft/s)	=	5.55
Discharge (cfs)	= <11.62>		Froude Number	=	0.94
Manning's n	= <.013>		Critical Depth (ft)	=	1.22
Slope(decimal)	= <.005>		Normal Depth (ft)	=	1.26
Diameter (in)	= <24>		Hydraulic Radius (ft)	=	0.57
			Depth to Centroid(ft)	=	0.55
			Top Width (ft)	=	1.93

CAPACITY

Created Revised
01-Nov-94 01-Nov-94 12:13

MANNING'S EQUATION Circular cross-section

Units (ft)	= FEET		Area (sq ft)	=	3.14
Depth (ft)	= <2>		Velocity (ft/s)	=	5.09
Discharge (cfs)	= <16>	<---	Froude Number	=	---
Manning's n	= <.013>		Critical Depth (ft)	=	1.44
Slope(decimal)	= <.005>		Normal Depth (ft)	=	1.64
Diameter (in)	= <24>		Hydraulic Radius (ft)	=	0.50
			Depth to Centroid(ft)	=	1.00
			Top Width (ft)	=	0.00

LINE II A→B DESIGN

Created Revised
01-Nov-94 01-Nov-94 12:15

MANNING'S EQUATION Rec/Trap/Tria

Units (ft)	= FEET		Area (sq ft)	=	0.12
Depth (ft)	= <.2> <---		Velocity (ft/s)	=	5.24
Discharge (cfs)	= <.62>		Froude Number	=	2.93
Manning's n	= <.013>		Critical Depth (ft)	=	0.31
Slope(decimal)	= <.049>		Normal Depth (ft)	=	0.20
Bottom Width(ft)	= <0>		Hydraulic Radius (ft)	=	0.09
			Depth to Centroid(ft)	=	0.07
Side Slope	= <3>		Top Width (ft)	=	1.19

CAPACITY

Created Revised
01-Nov-94 01-Nov-94 12:16

MANNING'S EQUATION Rec/Trap/Tria

Units (ft)	= FEET		Area (sq ft)	=	3.00
Depth (ft)	= <1>		Velocity (ft/s)	=	15.39
Discharge (cfs)	= <46.17> <---		Froude Number	=	3.84
Manning's n	= <.013>		Critical Depth (ft)	=	1.71
Slope(decimal)	= <.049>		Normal Depth (ft)	=	1.00
Bottom Width(ft)	= <0>		Hydraulic Radius (ft)	=	0.47
			Depth to Centroid(ft)	=	0.33
Side Slope	= <3>		Top Width (ft)	=	6.00

LINE II B → G

DESIGN

Created Revised
01-Nov-94 01-Nov-94 12:18

MANNING'S EQUATION Rec/Trap/Tria

Units (ft)	= FEET		Area (sq ft)	=	3.23
Depth (ft)	= <1.04>	<---	Velocity (ft/s)	=	2.11
Discharge (cfs)	= <6.83>		Froude Number	=	0.52
Manning's n	= <.05>		Critical Depth (ft)	=	0.80
Slope(decimal)	= <.013>		Normal Depth (ft)	=	1.04
Bottom Width(ft)	= <0>		Hydraulic Radius (ft)	=	0.49
			Depth to Centroid(ft)	=	0.35
Side Slope	= <3>		Top Width (ft)	=	6.23

CAPACITY

Created Revised
01-Nov-94 01-Nov-94 12:19

MANNING'S EQUATION Rec/Trap/Tria

Units (ft)	= FEET		Area (sq ft)	=	6.75
Depth (ft)	= <1.5>		Velocity (ft/s)	=	2.70
Discharge (cfs)	= <18.23>	<---	Froude Number	=	0.55
Manning's n	= <.05>		Critical Depth (ft)	=	1.18
Slope(decimal)	= <.013>		Normal Depth (ft)	=	1.50
Bottom Width(ft)	= <0>		Hydraulic Radius (ft)	=	0.71
			Depth to Centroid(ft)	=	0.50
Side Slope	= <3>		Top Width (ft)	=	9.00

LINE III G→H DESIGN

Created Revised
01-Nov-94 01-Nov-94 12:20

MANNING'S EQUATION Rec/Trap/Tria

Units (ft)	= FEET		Area (sq ft)	=	7.22
Depth (ft)	= <1.55>	<---	Velocity (ft/s)	=	2.42
Discharge (cfs)	= <17.5>		Froude Number	=	0.48
Manning's n	= <.05>		Critical Depth (ft)	=	1.16
Slope(decimal)	= <.01>		Normal Depth (ft)	=	1.55
Bottom Width(ft)	= <0>		Hydraulic Radius (ft)	=	0.74
			Depth to Centroid(ft)	=	0.52
Side Slope	= <3>		Top Width (ft)	=	9.31

CAPACITY

Created Revised
01-Nov-94 01-Nov-94 12:21

MANNING'S EQUATION Rec/Trap/Tria

Units (ft)	= FEET		Area (sq ft)	=	12.00
Depth (ft)	= <2>		Velocity (ft/s)	=	2.87
Discharge (cfs)	= <34.43>	<---	Froude Number	=	0.51
Manning's n	= <.05>		Critical Depth (ft)	=	1.52
Slope(decimal)	= <.01>		Normal Depth (ft)	=	2.00
Bottom Width(ft)	= <0>		Hydraulic Radius (ft)	=	0.95
			Depth to Centroid(ft)	=	0.67
Side Slope	= <3>		Top Width (ft)	=	12.00

LINE III H → I DESIGN

Created Revised
01-Nov-94 01-Nov-94 12:22

MANNING'S EQUATION Rec/Trap/Tria

Units (ft)	= FEET		Area (sq ft)	=	1.24
Depth (ft)	= <.64> <---		Velocity (ft/s)	=	14.16
Discharge (cfs)	= <17.5>		Froude Number	=	4.41
Manning's n	= <.013>		Critical Depth (ft)	=	1.16
Slope(decimal)	= <.075>		Normal Depth (ft)	=	0.64
Bottom Width(ft)	= <0>		Hydraulic Radius (ft)	=	0.30
			Depth to Centroid(ft)	=	0.21
Side Slope	= <3>		Top Width (ft)	=	3.85

CAPACITY

Created Revised
01-Nov-94 01-Nov-94 12:23

MANNING'S EQUATION Rec/Trap/Tria

Units (ft)	= FEET		Area (sq ft)	=	3.00
Depth (ft)	= <1>		Velocity (ft/s)	=	19.04
Discharge (cfs)	= <57.12> <---		Froude Number	=	4.75
Manning's n	= <.013>		Critical Depth (ft)	=	1.86
Slope(decimal)	= <.075>		Normal Depth (ft)	=	1.00
Bottom Width(ft)	= <0>		Hydraulic Radius (ft)	=	0.47
			Depth to Centroid(ft)	=	0.33
Side Slope	= <3>		Top Width (ft)	=	6.00

WATERSHED	YR	MAINTENANCE PLAN	No	CTRL STRUC DESC	ACCMP Rise
BMP ID NO	010	SITE AREA acre	9.3	CTRL STRUC SIZE inches	36
PLAN NO	SP-119-94	LAND USE	Church	OTLT BARRL DESC	ACCMP Barr
TAX PARCEL	(23-02)(01-16)	old BMP TYP	Wet Pond	OTLT BARRL SIZE inch	18
PIN NO	2320100016	JCC BMP CODE			
CONSTRUCTION DATE	6/1/1994	POINT VALUE	9	EMERG SPILLWAY	Yes
PROJECT NAME	St. Olafs Catholic Church			DESIGN HW ELEV	104.9
FACILITY LOCATION	104 Norge Lane			PERM POOL ELEV	102.5
CITY-STATE	Norge, Va. 23168	SVC DRAIN AREA acres	9.5	2-YR OUTFLOW cfs	0.00
CURRENT OWNER	Catholic Diocese of Va. (c/o WF Sullivan)			10-YR OUTFLOW cfs	0.00
OWNER ADDRESS	811-B Cathedral Place			REC DRAWING	~~No~~ YES
OWNER ADDRESS 2		SERVICE AREA DESCRI	Building, Parking & OS areas		
CITY-STATE-ZIP CODE	Richmond, Va. 23220	IMPERV AREA acres	2.50	CONSTR CERTI	No
OWNER PHONE		RECV STREAM	UT of York River		
MAINT AGREEMENT	Yes	EXT DET-WQ-CTRL	Yes	LAST INSP DATE	11/1/2000
EMERG ACTION PLAN	No	WTR QUAL VOL acre-ft	0.33	INTERNAL RATING	3
		CHAN PROT CTRL	No	MISC/COMMENTS	
		CHAN PROT VOL acre-ft	0	NE corner of site. 2-year control.	
		SW/FLOOD CONTROL	Yes		
		GEOTECH REPORT	No		

Get Last BMP No

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ENVIRONMENTAL DIVISION REVIEW COMMENTS
ST. OLAF CATHOLIC CHURCH EXPANSION
COUNTY PLAN NO. C – 19 - 08
March 10, 2008

General Comments:

1. It appears a Land-Disturbing permit would be required for this project. At the time of plan of development for expansion activities an environmental inventory, an erosion and sediment control plan, a drainage plan and stormwater management plan would be required.

2. Label Norge Lane on the concept plan drawing.

3. Watershed. Provide a note on the concept plan to indicate that this project is situated within the York River watershed of the County. Also, label the "existing retention pond" with County BMP Code Number identifier YR 010.

4. Existing impervious cover information does not include site impervious cover associated with parking lots. Only impervious cover associated with existing buildings was shown.

5. It appears a Community Character Corridor (CCC) is situated along the west part of the site. Contact the Planning Division to obtain additional information about requirements for the CCC.

Chesapeake Bay Preservation:

6. Section 23-9(b)(3) states that land development shall minimize impervious cover to promote infiltration of stormwater into the ground, consistent with the proposed use or development permitted. The plan of development appears to show excessive impervious cover with regard to the amount of parking spaces. The narrative indicates 1 space per 2.5 seats was applied and the total (240 spaces) is based on 600 seats. However, the narrative also indicates that 300 spaces may be needed. It is unclear if the plan is showing 240 or an ultimate plan for 300 spaces. Additional information may need to be provided to support the need for impervious cover as proposed.

Stormwater Management / Drainage:

7. Stormwater Management. Any "uncontrolled" drainage from developed areas of the site (ie. not draining to stormwater management facilities) would need to demonstrate compliance with Minimum Standard # 19 of the Virginia Erosion and Sediment Control regulations. This would include the back part of proposed Phase I, II and III buildings which may drain directly to existing parcels to the east and areas that drain to existing Norge Lane or Richmond Road. The proposed expansion plan should not result in increased runoff or impact to existing surrounding parcels.

8. Existing Pond. Previously approved plans for the project show that the onsite "existing retention pond", County BMP ID Code YR 010, as a 9-point wet pond (Design # 7) serving 7.1 acres (5.3 acres onsite and 1.8 acres offsite). As such it obtains 6.7 points of the 10 points required for water quality. It is recommended that the expansion plan include upgrade of the stormwater basin

to a 10-point wet pond design meeting current County requirements for pretreatment, water quality and stream channel protection design.

9. Outfall Pipe. Confirm if the outfall pipe from the existing BMP facility (18-inch) extends onto offsite property. Drainage easements may be required to ensure onsite drainage can be adequately conveyed offsite to a receiving channel, without obstruction.

10. Treatment Train Concept. The concept plan does not show very much detail with regard to compliance with the County's 10-point system. It is unclear if the wet pond will remain a 9-point BMP, upgraded to a 10-point BMP or if conservation area will be revised or removed from the plan or what point value the bioretention basins will be. Provide a preliminary indication of how 10-points will be achieved for water quality purposes. Traditionally our Division has supported treatment train approaches to stormwater management if 1) the correct combination of stormwater facilities is used; and 2) BMP points are allocated in the correct manner. Bioretention in parking lots in combination with a downstream wet pond would be a satisfactory combination. For BMP points, 10-point credit would be given to drainage area direct to the bioretention areas and then ½ points (4 or 5 points) given for the same drainage area again through the wet pond. Drainage direct to the wet pond would be given BMP points consistent with the points assigned to the basin, currently a 9-point BMP or a 10-point BMP if upgraded.

11. LID. Use of low-impact development principles and techniques are fully encouraged for use in site design to reduce and control impacts associated with increased stormwater runoff. This includes minimizing disturbance, minimizing impervious area, disconnection of impervious areas, saving existing trees, preserving existing topography and HSG A&B soils, use of flatter site grades, reduced slope heights, increasing time of concentration flow paths, maintaining sheet flow, increasing surface roughness coefficients, use of wide and flat stormwater conveyance channels, alternative managed porous or pervious parking lot or sidewalk materials, minimizing use of storm drain pipe, underground stormwater detention or infiltration; tree box filter units; manufactured BMPs for pretreatment; rain barrels; and use of bioretention cells with appropriate landscaping. *(Note: If onsite storm drainage piping systems are to be upgraded and parking lot bioretention cells are to have under drain systems, then managed pervious pavement may be feasible in strategically placed remote or overflow parking areas.)*

12. NOS. The natural open space easement plat as provided with the concept plan submittal shows about 8 acres of dedicated conservation easement (Deed Book 728, Page 187). The concept plans as proposed has no indication of revision or residue natural open space proposed. Full abandonment of existing dedicated conservation easements on the site may require County Engineer and/or Board of Supervisor action.

13. Offsite Open Space. In order to meet water quality criteria, this project may qualify to use the County's offsite natural open space program as adopted on December 14, 2004.

14. Existing Utilities. Any new or revised dedicated conservation easements for the site should not include the existing utility easements such as the power line in the back of the site and the waterline along Route 60.

ENVIRONMENTAL DIVISION REVIEW COMMENTS
ST. OLAF CATHOLIC CHURCH EXPANSION
COUNTY PLAN NO. Z – 01 - 08 / SUP – 06 - 08
April 15, 2008

The Environmental Division does not recommend approval of this rezoning and Special Use Permit application until more clarification is provided on the following comments.

General Comments:

1. Refer to previous comments issued by the Environmental Division on March 10, 2008 for County concept plan No. C-19-08.

2. It appears a Land-Disturbing permit would be required for this project. At the time of plan of development for expansion activities an environmental inventory, an erosion and sediment control plan, a drainage plan and stormwater management plan would be required.

3. Show existing and preliminary proposed impervious cover breakdowns for parking lots.

4. Provide notes on the concept plan drawings and in applicable portions of the Community Impact Statement (CIS) to indicate that portions of this project are located within sub-watershed 103 of the Yarmouth Creek watershed. The York River watershed has not been broken down into sub-watersheds, and the note as presented for this is okay.

5. Paragraphs 5 and 6 on Page 2 of the Community Impact Statement indicate some changes proposed to previously approved Special Use Permit conditions. If any conditions are proposed for the SUP or if any proffers are proposed as part of the rezoning effort, these need to be reviewed by the Environmental Division.

Chesapeake Bay Preservation:

6. Information on the concept plan drawings and in the Community Impact Statement is unclear on the total amount of parking spaces proposed. The drawings show 190 (1 space per 5 seats) and 300 (1 space per 2 seats). The narrative shows a tabulation based on monitored use which did not exceed 183 cars, Section 23-9 (b)(3) states that land development shall minimize impervious cover to promote infiltration of stormwater into the ground, consistent with the proposed use or development permitted. The plan of development appears to show excessive impervious cover with regard to the amount of parking spaces. Provide additional information to clarify spaces associated with parking lot impervious cover and how the figure was derived.

Stormwater Management / Drainage:

7. The stormwater management plan as shown on the concept plan drawings and on Pages 5 and 6 of the Community Impact Statement was presented with two alternatives. One alternative is to convert the existing BMP (YR010). The second alternative is to keep the current BMP

configuration and add LID measures in a treatment train approach. A decision must be made on which alternative is to be pursued for the site plan of development.

8. NOS. The following comments pertain to natural open spaces, whether existing, proposed or part of the stormwater compliance package.

   8a. The natural open space easement plat as provided with the concept plan submittal shows about 8 acres of dedicated conservation easement (Deed Book 728, Page 187). This plan does not shown any existing nor proposed natural open space easements.

   8b. It is unclear of the intent for dedicated natural open spaces under each stormwater management alternative. If the first stormwater management alternative is pursued, dedicated natural open space may need to be eliminated or adjusted. If the second stormwater management alternative is pursued, dedicated natural open spaces may need to be adjusted or added. Only the BMP worksheet on the conceptual stormwater management plan (Sheet 4) provides any indication of the intent for open space (ie. 1.90 acres), but it is unclear where this is located or how it's changed from it's current configuration.

   8c. Partial or full abandonment of existing dedicated conservation easements on the site may require County Engineer and/or Board of Supervisor action.

   8d. In order to meet water quality criteria, this project may qualify to use the County's offsite natural open space program as adopted on December 14, 2004.

9. Any "uncontrolled" drainage from developed areas of the site (ie. not draining to stormwater management facilities) would need to demonstrate compliance with Minimum Standard # 19 of the Virginia Erosion and Sediment Control regulations. This would include the back part of proposed Phase I, II and III buildings which may drain directly to existing parcels to the east and areas that drain to existing Norge Lane or Richmond Road. The proposed expansion plan should not result in increased runoff or impact to existing surrounding parcels.

10. BMP. Any BMP upgrades would need to be in compliance with the County BMP manual requirements for water quality and stream channel protection. This includes, but is not limited to: wet and dry extended detention pools, aquatic and safety benches, pretreatment sediment forebays, pond buffers (if applicable), volume to meet stream channel protection criteria, riser/barrel configurations, outlet protection, emergency spillways and freeboard.

11. Outfall Pipe. Confirm if the outfall pipe from the existing BMP facility (18-inch) extends onto offsite property. Whether using the existing BMP or whether upgrades are proposed, drainage easements may be required to ensure onsite drainage can be adequately conveyed offsite to a receiving channel, without obstruction.

12. Treatment Train Concept. The current conceptual stormwater management plan drawings does not show any approximate locations for Low Impact Development measures as outlined in the Community Impact Statement. Our Division may support the second stormwater management alternative under the following conditions: 1) the correct combination of LID/Traditional

stormwater facilities is used; and 2) BMP points are allocated in the correct manner. Bioretention in parking lots in combination with a downstream wet pond would be a satisfactory combination. For BMP points, 10-point credit would be given to drainage area direct to the bioretention areas and then ½ points (4 or 5 points) given for the same drainage area again through the wet pond. Drainage direct to the wet pond would be given BMP points consistent with the points assigned to the basin, currently a 9-point BMP or a 10-point BMP if upgraded.

13. LID. Use of low-impact development principles and techniques are fully encouraged for use in site design to reduce and control impacts associated with increased stormwater runoff. This includes minimizing disturbance, minimizing impervious area, disconnection of impervious areas, saving existing trees, preserving existing topography and HSG A&B soils, use of flatter site grades, reduced slope heights, increasing time of concentration flow paths, maintaining sheet flow, increasing surface roughness coefficients, use of wide and flat stormwater conveyance channels, alternative managed porous or pervious parking lot or sidewalk materials, minimizing use of storm drain pipe, underground stormwater detention or infiltration; tree box filter units; manufactured BMPs for pretreatment; rain barrels; and use of bioretention cells with appropriate landscaping. (Note: If onsite storm drainage piping systems are to be upgraded and parking lot bioretention cells are to have under drain systems, then managed pervious pavement may be feasible in strategically placed remote or overflow parking areas. Also, manufactured tree box type filters may have feasible potential within this expansion scheme.)

14. Existing Utilities. Any new or revised dedicated conservation easements for the site should not include the existing utility easements such as the power line in the back of the site and the waterline along Route 60.

YR010_SAINT_OLAFS_CATHOLIC_CHURCH - 040

James City County Engineering and Resource Protection Division
Stormwater Management/BMP Record Drawing and Construction Certification Review Tracking Form

Project Name: St. Olaf Catholic Church
County Plan No. (List any amendments): SP-017-12 / SP-122-08
Stormwater Management Facility Type: Wet Extended Retention Pond- A3
BMP Phase #: ☐ I ☐ II ☐ III

- ☑ Information Package Submittal Date: 3-17-13
- ☐ Completeness Check:
  - ☑ Record Drawing Date/By: 3/4/13 R.L. Galloway Surveying
  - ☑ Construction Certification Date/By: 3/7/13 GET Solutions Inc.
  - ☑ RD/CC Standard Forms (Ensure that all forms for the BMP type are included)
  - ☑ Insp/Maint Agreement # / Date: 3/23/10
  - ☑ BMP Maintenance Plan Location: Sheet 9
  - ☐ Special Considerations:
- ☑ Standard E&SC Notes on Approved Plan Requiring RD/CC or County comment in plan review
  Location (sheet #): Sheet 16
- ☑ **County BMP ID Code #:** YR-010
- ☑ Log into Division's "As-Built Tracking Log"
- ☑ Obtain basic site information (GPIN, Owner, Address, etc.)
- ☑ Log into Access Database (BMP ID #, Plan No., GPIN, Project Name, etc.)
- ☑ Copy from Active Project File (correspondence, H&H, design computations, etc.).
- ☑ Create As-Built File using Project File information (File label, folder, copy plan/details/design information, etc.).
- ☑ Inspector Review of RD/CC (consult with Chief Engineer prior to completion of comments).
- ☑ Record Drawing Review against Approved Plan prior to Field Inspection.
- ☑ Final Site Inspection (FI) Performed Date: 10/11/12
- ☑ Record Drawing (RD) Review Date: 3/12/13
- ☑ Construction Certification (CC) Review Date: 3/12/13
- ☐ Actions:
  - ☑ No comments.
  - ☐ Comments. Letter Forwarded. Date:
  - ☐ Record Drawing (RD)
  - ☐ Construction Certification (CC)
  - ☐ Construction-Related (CR)
  - ☐ Site Issues (SI)
  - ☐ Other :
- ☐ Resubmittal (# and date):
- ☐ Re-inspection (if necessary):
- ☑ Drainage System Information Acceptable (RD/CC/System Info). Ok for bond release.
- ☑ Complete "Surety Request Form".
- ☑ Final Inspection of active file copying any relevant information to "As-Built" file.
- ☑ On County BMP Inventory (Phase I, II or III).
- ☑ Copy Final Inspection Report into County BMP Inspection Program file. email
- ☐ Provide Digital Photographs of BMP and save into County BMP Inventory.
- ☑ Request mylar/reproducible from As-Built plan preparer.
- ☑ Complete "As-built Tracking Log".
- ☑ Last check of BMP Access Database (County BMP Inventory).
- ☐ Add BMP to JCC Hydrology & Hydraulic database (optional).
- ☐ Add BMP to Municipal BMP list (if a County-owned facility)
- ☐ Add BMP to PRIDE BMP ratings database.

Final Sign-Off

Inspector: Mike Majdeski / Dave Creech Date: 3/14/13

Chief Engineer: [signature] Date: 4/8/13

*** See separate checklist, if needed.

Project Name: ST. OLAF CATHOLIC CHURCH EXP.
Location: ST. OLAF CATHOLIC CHURCH
Project Number: SP-122-08
Date of Inspection:
Inspector(s): M. MATJESKI
Date:
Time:

BMP Number:

Infiltration and Filtering Practice Construction Inspection Checklist

Development Status (Active, Inactive, Complete): ACTIVE

Stage of Construction (Pre-Construction, Installation, etc):

Key Questions		
Item	**X**	**Comments**
1. Type of facility (check all that apply)		
a. Infiltration - C1, C2, C3 or C4		
b. Filtration - D2, D3, D4, D5, or D6		
c. Bioretention - D1	X	
d. Extended detention (storage for Cpv)		
2. Facility Location		
a. Surface		
b. Underground	X	
3. Filtration Media		
a. No filtration media (e.g. dry well)		
b. Sand		
c. Bioretention soil		
d. Peat		
e. Other		
4. Hydraulic configuration		
a. On-line facility	X	
b. Off-line facility		
5. Type of pretreatment facility		Pretreatment must be provided
a. Sediment forebay (above ground)		
b. Sedimentation chamber		
c. Grass channel		
d. Grass filter strip		
e. Plunge pool		
f. Stone diaphragm		
g. Other		Type:

A. Pre-Construction S = Satisfactory U = Unsatisfactory N/A = Not Applicable				
Item	**S**	**U**	**N/A**	**Comments**
1. Pre-construction meeting	✓			4/13/10
a. Review of facility details, testing reqts and sequence of construction	✓			↓
b. Review of required inspections, geo-tech reports, checklists & certificates	✓			

B. *Site Preparation*

S = Satisfactory U = Unsatisfactory N/A = Not Applicable

Item	S	U	N/A	Comments
1. If infiltration practice, facility is not used for sediment control during construction				
2. Stormwater runoff diverted around facility				
3. Tree save and non-compaction areas				
4. Facility location staked out and cleared	✓			5/10

C. *Excavation/Grading*

S = Satisfactory U = Unsatisfactory N/A = Not Applicable

Item	S	U	N/A	Comments
1. Excavation and grading conform to plans	✓			BENCHMARK INSPECTION 7/28/10
a. Location, size and depth of facility are correct	✓			
2. If infiltration practice, underlying soils not compacted during excavation	✓			
3. Embankment/berm constructed according to plan				
a. Suitable fill material used for construction of embankment/berm				
b. Compaction completed in accordance with approved plans and specifications				
c. Embankment/berm elevations, slopes and top widths are correct				

D. *Installation*

S = Satisfactory U = Unsatisfactory N/A = Not Applicable

Item	S	U	N/A	Comments
1. If off-line facility, flow diversion structure installed according to plans				
2. Pretreatment facility installed according to approved plans				
3. Inlet(s) and inlet protection installed				
4. Structural components (e.g. foundation, walls) installed according to plans				
5. Underground chambers or pipes installed correctly with bedding if required	✓			BENCHMARK INSPECTION 7/28/10 GET INSPECTED 7/27
6. Liner installed correctly, if applicable	✓			BENCHMARK INSPECTION 7/28/10. GET INSPECTED 7/27
7. Filter bed composition, depth and installation conforms to approved plans and	✓			BENCHMARK INSPECTION 9/2/10 GET ON-SITE AS WELL
8. Riser/outlet structure installed correctly				
a. Location, dimensions and type of riser are correct				
b. Riser equipped with removable trash rack or maintenance access				
c. Location, dimensions and type of low flow orifice are correct				
d. Low flow orifice installed correctly and adequately protected from clogging				

e. If a filtration system, underdrain system installed correctly				
8. Emergency overflow structure/spillway installed according to plans				

E. Vegetation S = Satisfactory U = Unsatisfactory N/A = Not Applicable				
Item	**S**	**U**	**N/A**	**Comments**
1. Vegetation complies with approved planting plan and specifications				

F. Final Inspection S = Satisfactory U = Unsatisfactory N/A = Not Applicable				
Item	**S**	**U**	**N/A**	**Comments**
1. Contributing drainage area stabilized				
2. If off-line facility, flow diversion installed and operational				
3. Pretreatment facility installed and operational				
4. Inlet(s) installed and operational				
5. Configuration, size and depth of bioretention facility conforms with approved plans				
7. Vegetation established				
8. Riser/Outlet Structure installed and operational				
9. Emergency overflow structure/spillway installed and operational				
10. Maintenance access routes provided				
11. Observation Ports Installed				
12. Flow diversions removed; runoff reaches facility				

G. Permit Approval and Documentation S = Satisfactory U = Unsatisfactory N/A = Not Applicable				
Item	**S**	**U**	**N/A**	**Comments**
1. Construction certification submitted				
2. As-built plans submitted and approved				
3. Performance bond status				
a. Not released				
b. Partial release				
c. Full release				
4. Certificate of completion issued				

Additional Comments:

Actions to be Taken:	X	
1. No action necessary; continue routine inspections		
2. Correct noted deficiencies		Correct by:
a. 1st notice		
b. 2nd notice		
3. Submit modifications to project plans		Submit by:

Project Name: ST. OLAF CATHOLIC CHURCH EXP.
Location: ST. OLAF CATHOLIC CHURCH
Project Number: SP-122-08
Date of Inspection: ON GOING
Inspector(s): M. MAJDESKI
Date:
Time:

BMP Number:

Wet Pond, Wetlands, and Extended Dry Detention Construction Inspection Checklist

Development Status (Active, Inactive, Complete): ACTIVE

Stage of Construction (Pre-Construction, Installation, etc): ON GOING CONSTRUCTION

Key Questions		
Item	**X**	**Comments**
1. Type of stormwater pond or wetland (check all that apply)		
a. Wet Pond - Type A1, A2 or A3	☐	
OR		
Wetlands - Type B1, B2, B3 or B4	☐	
OR		
Extended dry detention - Type F1 or F2	☐	
b. Extended detention	☐	
c. Micropool	☐	
d. Aquatic bench	☐	
e. Multiple pond system	☐	
f. Wetlands to be created		
3. Type of pretreatment facility	☐	Pretreatment must be provided
a. Sediment forebay	☐	
b. Grass filter strip	☐	
c. Other	☐	Type:

A. Pre-Construction S = Satisfactory U = Unsatisfactory N/A = Not Applicable				
Item	**S**	**U**	**N/A**	**Comments**
1. Pre-construction meeting	✓			4/13/10
a. Review of facility details, testing reqts and sequence of construction	✓			↓
b. Review of required inspections, geo-tech reports, checklists & certificates	✓			

B. Site Preparation S = Satisfactory U = Unsatisfactory N/A = Not Applicable				
Item	**S**	**U**	**N/A**	**Comments**
1. Stormwater runoff diverted around facility or otherwise protected from construction impacts	✓			5/25/10 EXISTING POND PUMP OUT
2. Tree save and non-compaction areas				
3. Facility location staked out and cleared				

a. Embankment/berm location stripped of all vegetation, topsoil and organic matter and core trench excavated	✓			BENCHMARK INSPECTION RE GRADING OF EXISTING POND
4. Pipe and appurtenances delivered and inspected prior to construction	✓			BENCHMARK INSPECTION 6/30/10
a. Materials	✓			
b. Diameters	✓			
c. Dimensions	✓			

C. *Excavation/Grading*

S = Satisfactory U = Unsatisfactory N/A = Not Applicable

· EXISTING POND TO BE RE-GRADED

Item	S	U	N/A	Comments
1. Excavation and grading conform to plans	✓			6/9/10
a. Embankment/berm core trench backfilled with suitable material			✓	EXISTING DAM EMBANKMENT EXCAVATED
b. Suitable fill material used for construction of embankment/berm			✓	↓
c. Compaction completed in accordance with approved plans and specifications			✓	↓
d. Embankment/berm elevations, slopes and top widths are correct	✓			RE-GRADING ON-GOING AS OF 6/17/10
e. Impounded area excavated/graded according to plans				
f. Aquatic and safety benches provided in accordance with approved plans				

D. *Installation*

S = Satisfactory U = Unsatisfactory N/A = Not Applicable

Item	S	U	N/A	Comments
1. Pretreatment facility installed correctly				
a. Location, size and depth of facility are correct				
2. Inlet(s) and inlet protection installed according to plans				
3. Liner installed correctly				
4. Riser/outlet structure installed correctly	✓			
a. Location, dimensions and type of riser are correct	✓			BENCHMARK INSPECTION 9/14/10
b. Riser located within embankment	✓			BENCHMARK INSPECTION 9/14/10
c. Riser base excavated or formed on stable subgrade	✓			BENCHMARK INSPECTION 9/14/10
d. Riser base set to design elevation	✓			BENCHMARK INSPECTION 9/14/10
e. Riser equipped with removable trash rack or maintenance access				BENCHMARK INSPECTION
f. Location, dimensions and type of low flow orifice are correct				BENCHMARK INSPECTION
g. Low flow orifice installed correctly and adequately protected from clogging				BENCHMARK INSPECTION
h. Pond drain system installed correctly				BENCHMARK INSPECTION

i. Pond drain equipped with adjustable control valve				**BENCHMARK INSPECTION**
5. Outfall pipe (barrel) installed correctly				
a. Invert at proper elevation and grade				
b. Waterproof pipe connectors and gaskets properly installed				**BENCHMARK INSPECTION**
c. Anti-seep collars properly spaced and have watertight connections to pipe				**BENCHMARK INSPECTION**
6. Emergency overflow structure/spillway installed according to plans				
7. Adequate buffer provided				

E. Vegetation

S = Satisfactory U = Unsatisfactory N/A = Not Applicable

Item	S	U	N/A	Comments
1. Vegetation complies with approved planting plan and specifications				
2. Embankment/berm and emergency spillway kept free of woody vegetation				

F. Final Inspection

S = Satisfactory U = Unsatisfactory N/A = Not Applicable

Item	S	U	N/A	Comments
1. Contributing drainage area stabilized				
2. Construction sediment removed from stormwater pond/wetland and pretreatment facility				
3. Pretreatment facility installed and operational				
4. Inlet(s) installed and operational				
5. Configuration, size and depth of stormwater pond/wetland is correct				
6. Vegetation established				
7. Riser/outlet structure installed and operational				
8. Emergency overflow structure/spillway installed and operational				
9. Maintenance access routes provided				
10. Flow diversions removed; runoff reaches facility				

G. Permit Approval and Documentation

S = Satisfactory U = Unsatisfactory N/A = Not Applicable

Item	S	U	N/A	Comments
1. Construction certification submitted				
2. Record drawings submitted and approved				
3. Performance bond status				
a. Not released				
b. Partial release				
c. Full release				
4. Certificate of completion issued				

Additional Comments:

Actions to be Taken:	X	
1. No action necessary; continue routine inspections		
2. Correct noted deficiencies		Correct by:
a. 1st notice		
b. 2nd notice		
3. Submit modifications to project plans		Submit by:

Project Name: ST. OLAF CATHOLIC CHURCH EXPANSION
Location: ST. OLAF CATHOLIC CHURCH
Project Number: SP-122-08
Date of Inspection:
Inspector(s): M. MAJDLESKI
Date:
Time:

Closed Storm Drain System Construction Inspection Checklist

Development Status (Active, Inactive, Complete): ACTIVE

Stage of Construction (Pre-Construction, Installation, etc):

Key Questions		
Item	**X**	**Comments**
1. Type of closed pipe system		
a. Round	X	6/30/10
b. Elliptical		
c. Other		
2. Type of pipe material		
a. Reinforced concrete pipe (RCP)		
b. HPDE		
c. Corrugated metal		
d. Other		

A. Pre-Construction S = Satisfactory U = Unsatisfactory N/A = Not Applicable				
Item	**S**	**U**	**N/A**	**Comments**
1. Pre-construction meeting	✓			4/13/10
a. Review of plan details, and sequence of construction	✓			↓
b. Review of required inspections, geo-tech reports, checklists & certificates	✓			↓

B. Site Preparation S = Satisfactory U = Unsatisfactory N/A = Not Applicable				
Item	**S**	**U**	**N/A**	**Comments**
1. Pipe and structures delivered and inspected prior to construction	✓			6/30/10
a. Inspect for material, diameter, dimensions and condition	✓			↓

C. Excavation/Grading S = Satisfactory U = Unsatisfactory N/A = Not Applicable				
Item	**S**	**U**	**N/A**	**Comments**
1. Excavation and grading conform to plans	✓			6/30/10 INSPECTION
a. Trench bottom shaped to permit barrel of pipe to be in direct contact with soil or bedding	✓			7/2/10
b. Areas excavated below established grade shall be backfilled with VDOT #25 or 26 aggregate (unless water is encountered - then #57 aggregate shall be used).	✓			↓ ↓

2. All earthwork shall be in conformance with VDOT Standard and Specification #303				

D. *Installation* S = Satisfactory U = Unsatisfactory N/A = Not Applicable				
Item	S	U	N/A	Comments
1. Bedding per VDOT 302.03(a)2(b)	✓			7/2/10 ; 6/30/10 ; 7/7/10
a. Material shall be VDOT #25 or #26 aggregate or as specificied on the approved plans (unless water is encountered - then #57 aggregate shall be used).	✓			
b. Shall be lightly compacted and shaped so pipe is in full contact with bedding	✓			
c. Shall be shaped to accommodate the bell when bell and spigot pipe is used	✓			
2. Placing Pipe per VDOT 302.03(a)2c	✓			7/2/10
a. Pipe shall be placed beginning at downstream end with bell or groove ends of rigid pipe facing upstream	✓			
b. Pipe shall be inspected before backfill is placed	✓			GET ON-SITE
3. Joining Pipe per VDOT 302.03(a)2(d)				
a. Rigid pipe sections shall have ends fully entered and inner surfaces flush and even				
b. Joints shall be sealed to form a leak-resistant joint				
c. Flexible pipe sections shall be firmly joined by approved coupling bands to form a leak-resistant joint				
d. When pipes enter structure, the inside of the pipe/structure joint shall be flush and fully mortared				
e. Lift holes in rigid pipe shall be plugged with a lift hole plug furnished by the manufacturer (302.03)				
4. Backfill shall be compacted in horizontal layers not more that six inches in thickness, loose measurement. VDOT 303.04(g)				GET TO PERFORM COMPACTION TESTS
5. Compaction of backfill shall be in accordance with VTM-1 to the following densities:				
a. 95% beneath pavement, walks and road shoulders				
b. 90% in other unpaved areas				
6. Testing and Inspection				
a. Each lift shall be tested for compaction on alternating sides of the pipe at intervals not to exceed 300 feet				
b. Pipe shall be inspected before any backfill is placed. (VDOT 302.03(a)2c)				

E. *Final Inspection*

S = Satisfactory U = Unsatisfactory N/A = Not Applicable

Item	S	U	N/A	Comments
1. Pipes and structures shall be free of sediment and debris				
2. All inlet protection measures removed				
3. All joints sealed				
4. Outlet protection installed and operational				
5. Configuration and dimensions of pipe system conforms with approved plans				

G. *Permit Approval and Documentation*

S = Satisfactory U = Unsatisfactory N/A = Not Applicable

Item	S	U	N/A	Comments
1. Construction certification submitted and				
2. As-built plans submitted and approved				
3. Performance bond status				
a. Not released				
b. Partial release				
c. Full release				
4. Certificate of completion issued				

Additional Comments:

6/30/10 - OBSERVED STORM PIPE INSTALLATION + INSPECTED DELIVERED PIPE SECTIONS GET TO BE ONSITE @ 7/1/10 FOR COMPACTION TESTS

7/7/10 - OBSERVED ON-GOING PIPE INSTALLATION

Actions to be Taken:		X	
1. No action necessary; continue routine			
2. Correct noted deficiencies			Correct by:
a.	1st notice		
b.	2nd notice		
3. Submit modifications to project plans			Submit by:

Stormwater Facilities Inspection Fee Program Preconstruction Policy and Checklist

Purpose

In accordance with Chapters 19 and 24 of the James City County Code, inspections are required for stormwater facilities constructed for all development projects. This policy establishes the guidelines for the stormwater inspection program preconstruction meeting and contains necessary documentation of the meeting.

Guidelines

1. The meeting will be held in conjunction with the Erosion and Sediment Control preconstruction meeting conducted by the Environmental Division. It is the responsibility of the owner/developer to schedule the preconstruction meeting. If a joint meeting is not possible because of unusual extenuating circumstances, then an alternate meeting can be arranged on a case-by-case basis. However, no work on any stormwater facility (BMP or storm drain pipes) can begin until the meeting is conducted.

2. Representatives of the owner/developer, general contractor, site contractor, pipe contractor, and a geotechnical engineer responsible for certifying the facilities' construction must be in attendance at the meeting. If all these representatives are not in attendance at the meeting, the meeting will be rescheduled and a Certificate to Construct stormwater Facilities will not be issued.

3. The stormwater portion of the meeting shall be conducted by the Stormwater Division (Division) representative who will inform the attendees of the minimum requirements and procedures necessary to document and certify the construction of the stormwater facilities in accordance with the approved development plans. Checklists, documentation requirements, and inspection schedules will be presented and discussed by the Division representative.

4. The approved construction plans will be reviewed at the meeting to ensure all parties are aware of the various stormwater facilities and the construction requirements including the timing of installation associated with each facility.

5. The Division representative will inform the attendees about the enforcement procedures that will be undertaken to correct any deficiencies found during the inspection process. All observations of noncompliance with the approved plans and specifications shall be documented and communicated to the contractor. If the noncompliance is not corrected immediately, the contractor and owner will be given a Notice to Comply with and appropriate time frame for correction. If the work has not been corrected, a Stop Work Order will be issued and remain in force until the problem is corrected.

6. Certification requirements will also be discussed. At the completion of the project, all stormwater facilities will require completion of a construction certification and record drawings. In addition, any temporary sediment control measure that will be converted to a permanent BMP will be required to have an interim certification completed by the geotechnical engineer.

7. The signature of each of the meeting attendees and their contact information shall be required on the checklist at the conclusion of the meeting.

STORMWATER DIVISION

Preconstruction Meeting

Project: St. Olaf Church Expansion Date: 4/13/2011

1. Is the person who will be certifying the construction of the stormwater facilities present?

   YES ☐ NO ☑ Name: GET Solutions

2. Is the contractor (s) who will be installing the stormwater facilities present?

   YES ☑ NO ☐ Name: ET Gresham (Michael Sprinkle)

3. Is a representative of the owner/developer present?

   YES ☑ NO ☐ Name: St Olaf's Catholic Church (Bob Williams)

4. Is a representative of the general contractor present?

   YES ☑ NO ☐ Name: ET Gresham

5. A copy of the approved site plan is required to be on the project site daily.

6. Are there any proposed revisions to the approved plan pending?

   YES ☐ NO ☑

7. Any proposed changes to the approved plan must be submitted to James City County for review and approval prior to implementation.

8. Are any representative present aware of any discrepancies, errors or deficiencies with the approved plan?

   YES ☐ NO ☑

9. Are all representatives aware of the inspection and documentation requirements for the project?

   YES ☑ NO ☐

County Representative: [illegible]

STORMWATER DIVISION

Preconstruction Meeting Checklist

Project: ST. OLAF CHURCH EXPANSION

Date: 4/13/2010 **Time:** 9:00 ☑ AM ☐ PM

Permittee: ST. OLAF CHURCH **Address:** 104 NOTGE LANE WILLIAMSBURG, VA 23188

Contractor: ET GRESHAM CONSTRUCTION

Phone No.: _____ **Fax No.:** _____

Address: _____

1. **Timing of Installation of Stormwater Facilities:**

   (A) **Narrative Plan**

   (B) **Contractor-Developed Sequence of Construction**

2. **Inspection Requirements for Stormwater Facilities:**

✓	**Wet Ponds**	____	**Extended Dry Detention**
____	**Wetlands**	____	**Outlet Protection**
____	**Infiltration**	____	**Stormwater Conveyance Channels**
____	**Filtering Systems**	✓	**Storm Drainage System (Pipe)**
____	**Open Channel Systems**	✓	**Other** (BIORETENTION)
____	**Sediment Basins**		

3. **Inspection and Enforcement Procedures**

   A. **Permittee/Contractor Inspections:** ✓

   B. **County Inspections:** ✓

      1. **Benchmark:** ✓

      2. **Routine:** ✓

Stormwater Division

Preconstruction Meeting Checklist

C. Enforcement Actions: ✓

1. Inspection Reports & Initial Contact: ✓
2. Notice Comply: ✓
3. Stop Work Order: ✓
4. Legal Proceedings: ✓

4. Limits of Clearing and Non-compaction Areas Protection Measures Inspection

A. Non-compaction Areas protected adequately ☐ Yes ☐ No N/A

B. Color of Flagging: N/A

C. Non-compaction Areas Protection Measures, Type: N/A

5. Issuance of Stormwater Facility Inspection, Record Drawing and Construction Certification; Standard Forms and Instructions (as applicable to project)

6. Attendees – Identify contract Person for Stormwater Facilities Construction

Signature:	[illegible]	[illegible]	RA Williams
Printed Name:	Robert Cosby	MICHAEL SPRINKEL	RA Williams
Affiliation:	AES	E.T. GRESHAM	St. OLAF Catholic Church
Address:			
Phone No.:	253-0040	681-1437	

7. Comments:

County Representative: [illegible] Date: 4/13/2010

Rev. 09/08

DRAINAGE CALCULATIONS

FOR

St. Olaf Catholic Church Expansion

SITE:

James City County

SUBMITTED TO:

Environmental Division
James City County

RECEIVED
JAN 2009
Planning Department

Prepared By:

AES Consulting Engineers
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188

COMMONWEALTH OF VIRGINIA
VICTORIA A. BAINS
Lic. No. 033929
1/14/09
PROFESSIONAL ENGINEER

November 3, 2008
Revised: January 14, 2009

AES Project No. 9882-01

9882-01.drncalcs-Rev-1.doc

AES
CONSULTING ENGINEERS

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AES
CONSULTING ENGINEERS

I INTRODUCTION

This project, known as St. Olaf Catholic Church Expansion is a commercial development, which will allow St. Olaf to expand the existing worship center and parking lot to meet future needs. The drainage associated with this site will be collected into a proposed storm drainage system utilizing the existing system on-site and draining to an existing best management practice (BMP) facility that is being modified to meet the site modifications and James City County requirements. During construction, diversion dikes and diversions will be utilized to collect runoff from the disturbed area into the sediment basin. In addition, Silt Fence and Tree Protection shall be utilized to limit potential of sediment leaving the project area and minimize potential for damage to existing woodlands, which are to remain.

II EXISTING SITE CONDITIONS

This site is currently occupied by St. Olaf Catholic Church, which consists of two existing buildings and parking lot with the rest of the site being grass that is mowed regularly and woods. Stormwater is currently collected in an existing storm system and carried to the existing pond on site that drains to the CSX railroad which is in the York River Watershed

III PROPOSED STORMDRAIN SYSTEM

This project will be collected by a proposed storm drainage system utilizing the existing system on-site and draining to an existing best management practice (BMP) facility that is being modified to meet the site modifications and James City County requirements. This facility is designed as a temporary sediment basin, which will be converted to a best management practice (BMP) facility upon completion of this site plan. Low Impact Design (LID) features are planned as part of this scope of work. The LID features are designed to treat 0.40 - inch of impervious. The stormwater master plan for this site showed LID measures, which are included to allow this site to achieve 10 points.

IV BMP POINT SYSTEM

The BMP Point System for this site is utilizing a treatment train concept for a portion of the site. Primary treatment of 2.60 acres(2.15 acres is impervious) in a series of five bio-retention facilities, which provides four (4) BMP points. This runoff is then treated by the secondary ED BMP as discussed with Environmental Division staff. This secondary treatment facility receives eight (8) BMP points for this acreage. The remaining 4.39 acres of on-site and 2.30 acres of off-site utilize the ED BMP as a 10-point facility. As shown on the included BMP worksheet this series of BMP's provides a total of 10.45 points meeting Environmental division point system and requirements.

APPENDIX A

DRAINAGE AREA MAPS

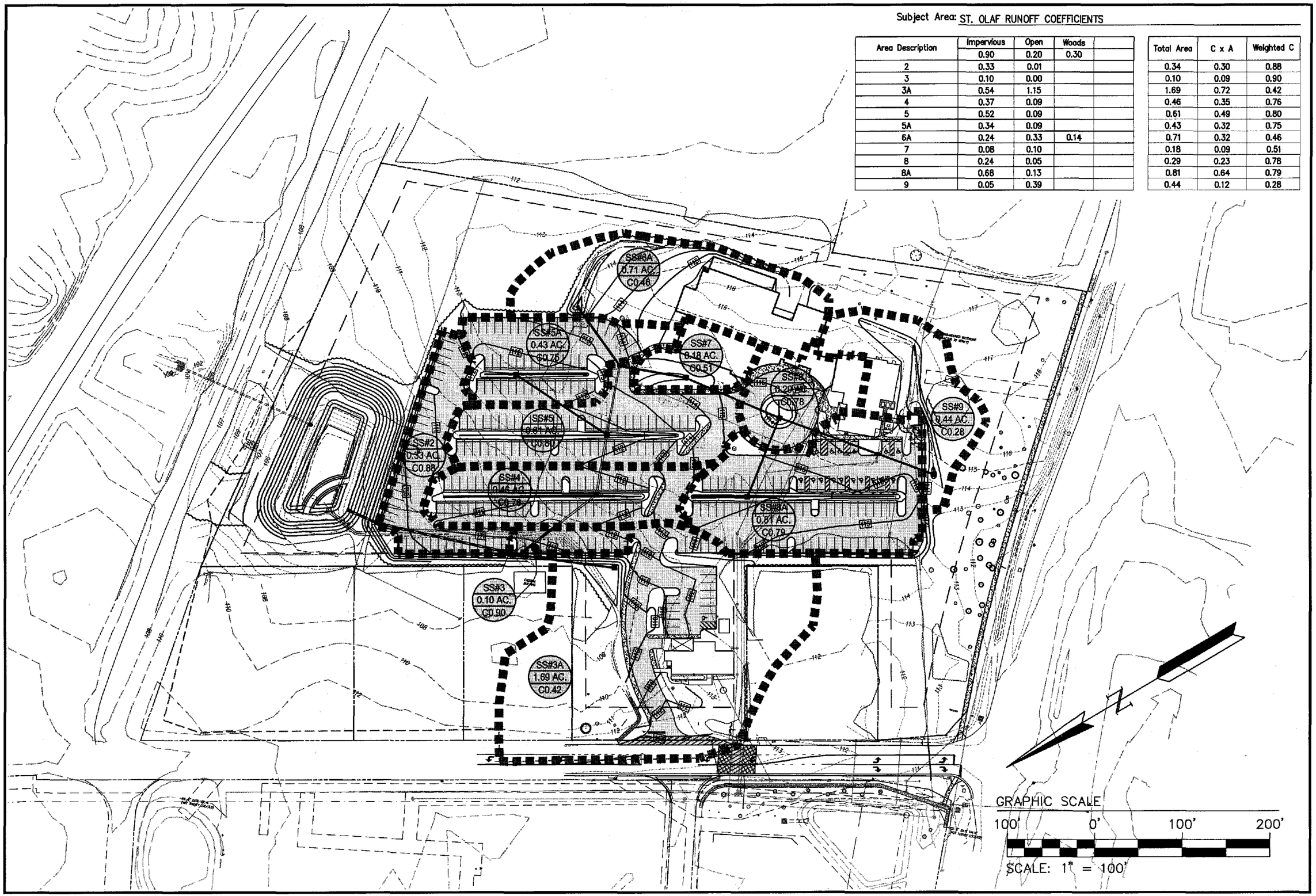
STORM DRAINAGE AREA MAP
BMP/SWM DRAINAGE AREA MAP
BIORETENTION DRAINAGE AREA MAPS
"C" FACTOR ANALYSIS

CONSULTING ENGINEERS

Subject Area: ST. OLAF RUNOFF COEFFICIENTS

Area Description	Impervious	Open	Woods	
	0.90	0.20	0.30	
2	0.33	0.01		
3	0.10	0.00		
3A	0.54	1.15		
4	0.37	0.09		
5	0.52	0.09		
5A	0.34	0.09		
6A	0.24	0.33	0.14	
7	0.08	0.10		
8	0.24	0.05		
8A	0.68	0.13		
9	0.05	0.39		

Total Area	C x A	Weighted C
0.34	0.30	0.88
0.10	0.09	0.90
1.69	0.72	0.42
0.46	0.35	0.76
0.61	0.49	0.80
0.43	0.32	0.75
0.71	0.32	0.46
0.18	0.09	0.51
0.29	0.23	0.78
0.81	0.64	0.79
0.44	0.12	0.28



No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY

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

CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

STORM SYSTEM DRAINAGE AREA MAP
ST. OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VAB	RMK
Scale	Date
1"=100'	10/31/08

Project No.
9852-01

Drawing No.
1

OVERFLOW PATH

ONSITE 6.99 AC. CN84

OFFSITE 2.30 AC. CN84

GRAPHIC SCALE

100' 0' 100' 200'

SCALE: 1" = 100'

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	PROJ MGR BY

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

CONSULTING ENGINEERS

WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

BMP DRAINAGE AREA MAP

ST. OLAF CATHOLIC CHURCH

104 NORGE LANE, WILLIAMSBURG

STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed VAB	Drawn RMK
Scale 1"=100'	Date 10/31/08
Project No. 9882-01	
Drawing No. 1	

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	PROOFED BY

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

CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

BIORETENTION DRAINAGE AREA MAP

ST. OLAF CATHOLIC CHURCH

104 NORGE LANE, WILLIAMSBURG

STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VAB	RMK
Scale	Date
1"=100'	10/31/08

Project No.
9882-01

Drawing No.
1

CONSULTING ENGINEERS

Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040
Fredericksburg (540) 710-6606

Project:	St. Olaf
Project No.:	9882-01
Subject:	Inlet Runoff Coefficients
Date:	October 8, 2008
Calculated By:	RMK

Runoff Coefficients used in the following calculations were taken from Table 4-3 of the Virginia Stormwater Management Handbook.

Subject Area: ST. OLAF RUNOFF COEFFICIENTS

Area Description	Impervious	Open	Woods		Total Area	C x A	Weighted C
	0.90	0.20	0.30				
2	0.33	0.01			0.34	0.30	0.88
3	0.10	0.00			0.10	0.09	0.90
3A	0.54	1.15			1.69	0.72	0.42
4	0.37	0.09			0.46	0.35	0.76
5	0.52	0.09			0.61	0.49	0.80
5A	0.34	0.09			0.43	0.32	0.75
6A	0.24	0.33	0.14		0.71	0.32	0.46
7	0.08	0.10			0.18	0.09	0.51
8	0.24	0.05			0.29	0.23	0.78
8A	0.68	0.13			0.81	0.64	0.79
9	0.05	0.39			0.44	0.12	0.28

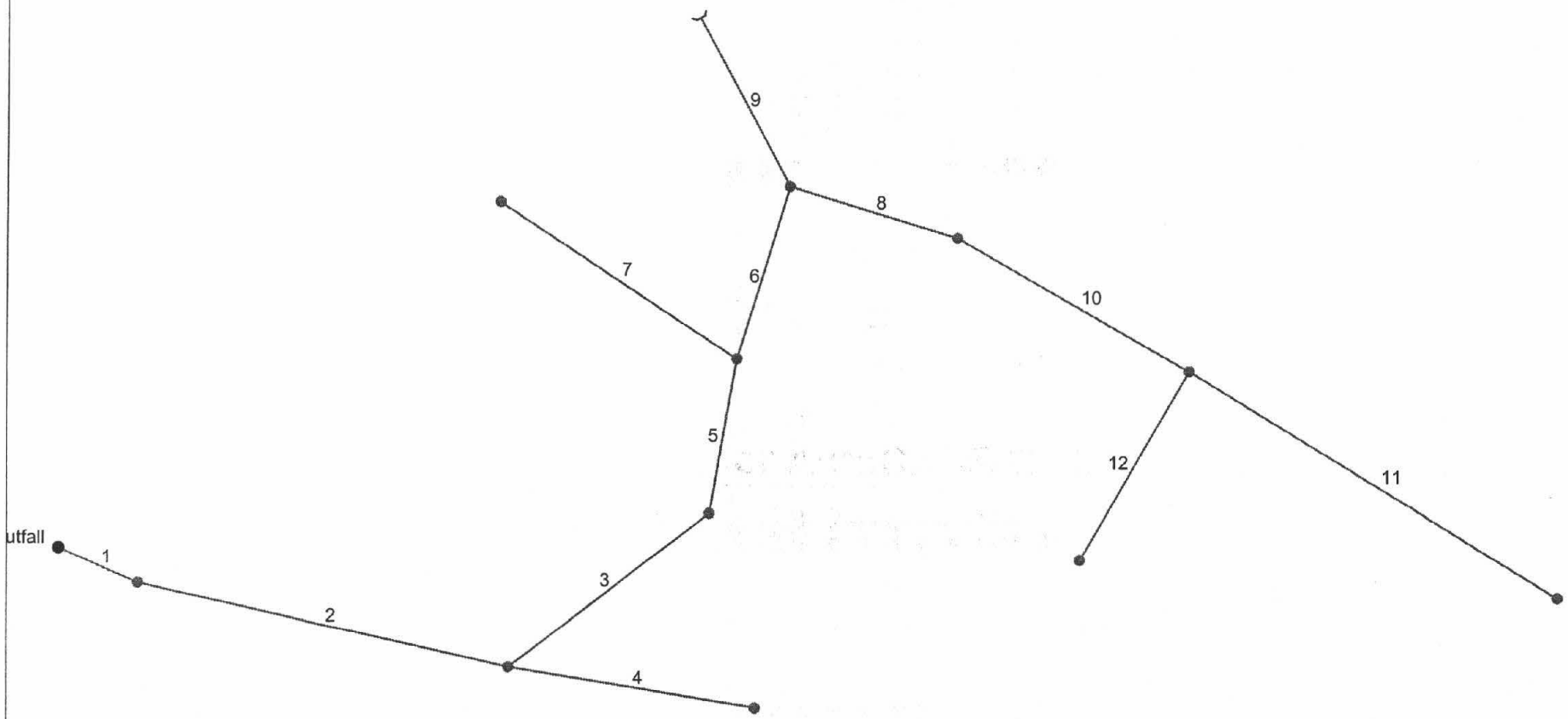
APPENDIX B

STORM SEWER SYSTEM

STORM SEWER SYSTEM CALCULATIONS
OUTLET PROTECTION

AES
CONSULTING ENGINEERS

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2009 Plan



Project File: 988201-storm.stm	Number of lines: 12	Date: 01-13-2009

Hydraflow Storm Sewers Extension v6.066

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	38.000	24.000	MH	0.00	0.33	0.88	5.0	100.00	3.24	101.23	24	Cir	0.013	0.24	109.30	#2 - #1
2	1	166.000	-11.400	MH	0.00	0.10	0.90	5.0	101.23	1.01	102.90	24	Cir	0.013	0.81	110.85	#3 - #2
3	2	112.000	-50.600	MH	0.00	0.46	0.76	10.0	105.63	0.65	106.36	24	Cir	0.013	0.72	110.75	#4 - #3
4	2	110.000	-3.500	MH	0.00	1.69	0.42	16.5	102.90	1.00	104.00	15	Cir	0.013	1.00	107.50	#3A - #3
5	3	70.000	-42.100	MH	0.00	0.61	0.80	10.0	106.36	0.76	106.89	24	Cir	0.013	0.93	111.10	#5 - #4
6	5	80.000	6.700	MH	0.00	0.00	0.00	0.0	107.05	0.74	107.64	18	Cir	0.013	1.00	113.66	#6 - #5
7	5	125.000	-66.500	MH	0.00	0.43	0.75	10.0	107.05	0.52	107.70	15	Cir	0.013	1.00	111.20	#5A - #5
8	6	77.000	90.100	MH	0.00	0.18	0.51	5.0	107.72	0.75	108.30	18	Cir	0.013	0.27	114.00	#7 - #6
9	6	84.000	-44.900	Hdwl	0.00	0.71	0.46	10.0	107.72	3.67	110.80	18	Cir	0.013	1.00	0.00	#6A -#6
10	8	118.000	13.000	MH	0.00	0.29	0.78	10.0	108.30	0.51	108.90	18	Cir	0.013	1.00	114.75	#8 - #7
11	10	188.000	2.000	MH	0.00	0.44	0.28	8.0	108.90	0.53	109.90	15	Cir	0.013	1.00	112.90	#9 - #8
12	10	97.000	90.000	MH	0.00	0.81	0.79	10.0	108.90	0.72	109.60	15	Cir	0.013	1.00	113.50	#8A - #8

Project File: 988201-storm.stm | Number of lines: 12 | Date: 01-13-2009

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	38.000	0.33	6.05	0.88	0.29	3.66	5.0	18.0	4.7	17.26	40.69	5.50	24	3.24	100.00	101.23	103.94	104.16	0.00	109.30	#2 - #1
2	1	166.000	0.10	5.72	0.90	0.09	3.37	5.0	17.1	4.8	16.29	22.69	5.19	24	1.01	101.23	102.90	104.27	105.14	109.30	110.85	#3 - #2
3	2	112.000	0.46	3.93	0.76	0.35	2.57	10.0	12.5	5.6	14.28	18.26	6.38	24	0.65	105.63	106.36	106.97	107.70	110.85	110.75	#4 - #3
4	2	110.000	1.69	1.69	0.42	0.71	0.71	16.5	16.5	4.9	3.49	6.46	2.85	15	1.00	102.90	104.00	105.47	105.80	110.85	107.50	#3A - #3
5	3	70.000	0.61	3.47	0.80	0.49	2.22	10.0	12.1	5.6	12.50	19.68	4.98	24	0.76	106.36	106.89	108.16	108.19	110.75	111.10	#5 - #4
6	5	80.000	0.00	2.43	0.00	0.00	1.41	0.0	11.6	5.7	8.05	9.02	4.56	18	0.74	107.05	107.64	108.67	109.14	111.10	113.66	#6 - #5
7	5	125.000	0.43	0.43	0.75	0.32	0.32	10.0	10.0	6.1	1.95	4.66	1.67	15	0.52	107.05	107.70	108.67	108.78	111.10	111.20	#5A - #5
8	6	77.000	0.18	1.72	0.51	0.09	1.08	5.0	11.2	5.8	6.28	9.11	3.60	18	0.75	107.72	108.30	109.46	109.71	113.66	114.00	#7 - #6
9	6	84.000	0.71	0.71	0.46	0.33	0.33	10.0	10.0	6.1	1.98	20.11	2.30	18	3.67	107.72	110.80	109.46	111.34	113.66	0.00	#6A -#6
10	8	118.000	0.29	1.54	0.78	0.23	0.99	10.0	10.5	5.9	5.88	7.49	3.68	18	0.51	108.30	108.90	109.76	110.06	114.00	114.75	#8 - #7
11	10	188.000	0.44	0.44	0.28	0.12	0.12	8.0	8.0	6.6	0.81	4.71	1.19	15	0.53	108.90	109.90	110.31	110.41	114.75	112.90	#9 - #8
12	10	97.000	0.81	0.81	0.79	0.64	0.64	10.0	10.0	6.1	3.88	5.49	3.40	15	0.72	108.90	109.60	110.31	110.61	114.75	113.50	#8A - #8

Project File: 988201-storm.stm | Number of lines: 12 | Run Date: 01-13-2009

NOTES: Intensity = 55.61 / (Inlet time + 10.00) ^ 0.74; Return period = 10 Yrs. ; c = cir e = ellip b = box

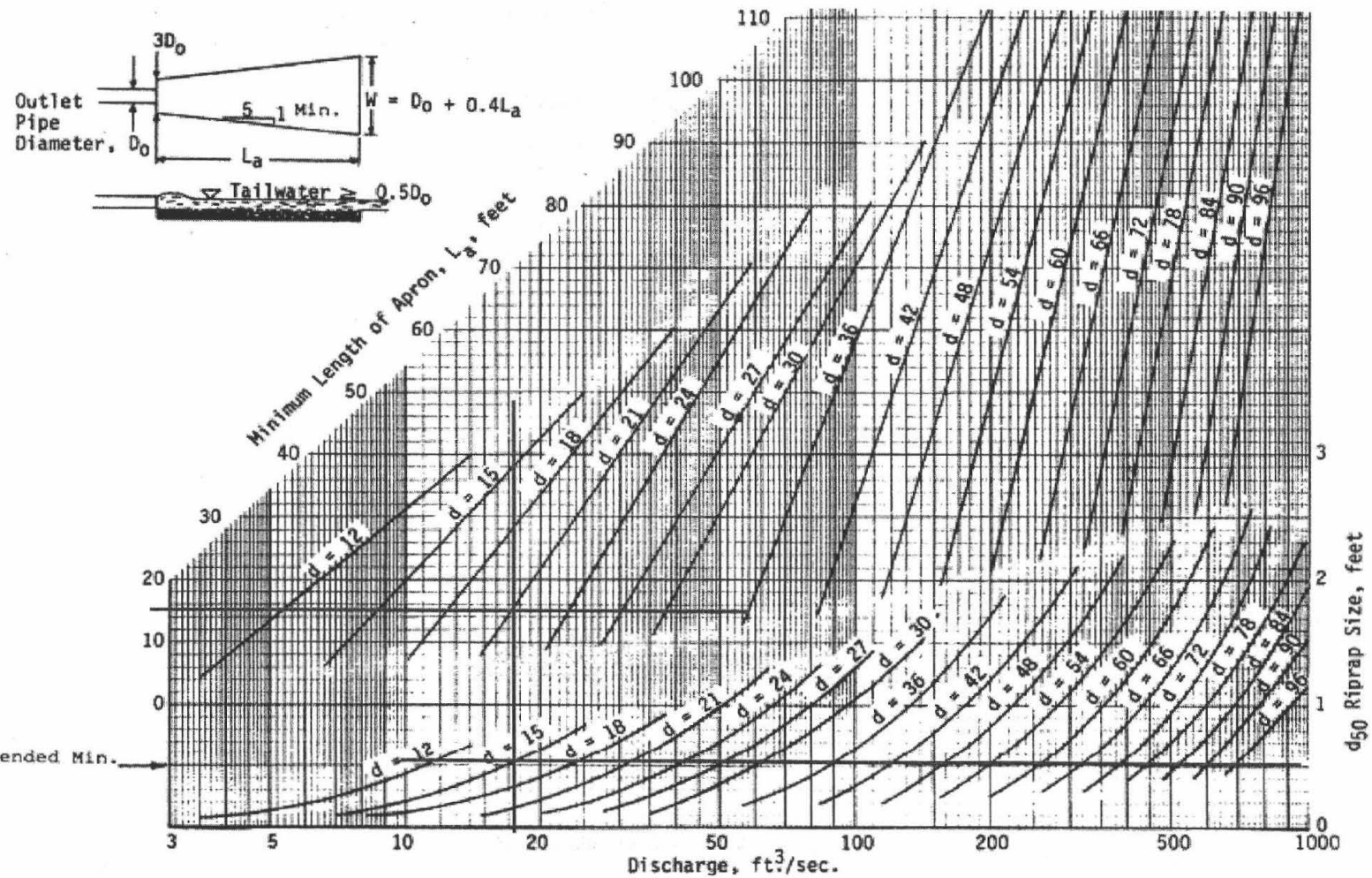
CONSULTING ENGINEERS

Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040

Project:	St. Olaf
Project No.:	9882-01
Subject:	Outlet Protection
Date:	January 9, 2009
Calculated By:	VAB

Outlet Location: End of Line 1 (24" RCP)

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
MAXIMUM TAILWATER CONDITION ($T_W \geq 0.5$ DIAMETER)



Q =	17.26	cfs	$3D_0$ =	72	in	W =	8	ft	Depth = 1.5 ft
D_0 =	24	in	L_a =	16	ft	d_{50} =	0.5	ft	

Source: USDA-SCS

Plate 3.18-4

APPENDIX C

TEMPORARY SEDIMENT BASIN

E&S MANUAL WORKSHEET
STORAGE ELEVATIONS CURVE "WET" & "DRY" STORAGE
STORMWATER ROUTING 2 & 25 YEAR STORM

Storm Event	Incoming Flow (cfs)	Outgoing Flow (cfs)	Water Surface Elevation
2 yr	17.34	2.21	102.52
25 yr	41.36	14.34	104.22

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Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040
Fredericksburg (540) 710-6606

Project:	9882-01
Project No.:	St. Olaf
Subject:	Sediment Basin Design
Date:	October 31, 2008
Calculated By:	RMK

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without an emergency spillway)

Total area draining to basin: **9.6** acres.

Basin Volume Design

Wet Storage:

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

   67 cu. yds. x **9.6** acres = **643.2** cu. yds.

2. Available basin volume = **767** cu. yds. at elevation **100**. (From storage - elevation curve)

3. Excavate **767** cu. yds. to obtain required volume*.

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

4. Available volume before cleanout required.

   33 cu. yds. x **9.6** acres = **316.8** cu. yds.

5. Elevation corresponding to cleanout level = **98.5**.

   (From Storage - Elevation Curve)

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

Dry Storage:

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

   67 cu. yds. x **9.6** acres = **643.2** cu. yds.

8. Total available basin volume at crest of riser* = **1940** cu. yds. at elevation **102.4** . (From Storage - Elevation Curve)

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

9. Diameter of dewatering orifice = **3** in.

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

Preliminary Design Elevations

11. Crest of Riser = **102.4**

Top of Dam = **108**

Design High Water = **104.17**

Upstream Toe of Dam = **97**

Basin Shape

12. $\frac{\text{Length of Flow}}{\text{Effective Width}}$ $\frac{L}{We}$ = **N/A**

If > 2, baffles are not required ✓

If < 2, baffles are required _____

Runoff

13. Q_2 = **2.87** cfs (From Chapter 5)

14. Q_{25} = **14.53** cfs (From Chapter 5)

Principal Spillway Design

15. With emergency spillway, required spillway capacity $Q_p = Q_2$ = **2.87** cfs. (riser and barrel)

Without emergency spillway, required spillway capacity $Q_p = Q_{25}$ = **14.53** cfs. (riser and barrel)

16. With emergency spillway:

Assumed available head (h) = **N/A** ft. (Using Q_2)

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

Without emergency spillway:

Assumed available head (h) = **1.95** ft. (Using Q_{25})

h = Design High Water Elevation - Crest of Riser Elevation

17. Riser diameter (D_r) = **48** in. Actual head (h) = **1.95** ft.

(From Plate 3.14-8.)

Note: Avoid orifice flow conditions.

18. Barrel length (l) = **180** ft.

Head (H) on barrel through embankment = **6.49** ft.

(From Plate 3.14-7).

19. Barrel diameter = **18** in.

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

20. Trash rack and anti-vortex device

Diameter = **48** inches.

Height = **21.25** inches.

(From Table 3.14-D).

Emergency Spillway Design **N/A**

21. Required spillway capacity $Q_e = Q_{25} - Q_p$ = **11.66** cfs.

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

Anti-Seep Collar Design **N/A**

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

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

Slope of principal spillway barrel (S_b) = _____ %

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

24. Number of collars required = _____ dimensions = _____

(From Plate 3.14-12).

Final Design Elevations

25. Top of Dam = **106.8**

Design High Water = **104.35**

Emergency Spillway Crest = **N/A**

Principal Spillway Crest = **102.40**

Dewatering Orifice Invert = **100**

Cleanout Elevation = **98.50**

Elevation of Upstream Toe of Dam or Excavated Bottom of "Wet Storage Area" (if excavation was performed) = **97.0**

AES Consulting Engineers
Project #9882-01

St. Olaf
Catholic Church Expansion
James City County

Temporary Sediment Basin Volumes **"Wet" and "Dry" Volume**

Elev.	Countour Area (in s.f.)	Storage (Between contours)			Cumulative Storage Volume
105	Area = 20764 s.f.				Cumulative Storage = 3677.0 c.y.
		Storage =	19694 c.f.=	729.4 c.y.	
104	Area = 18623 s.f.				Cumulative Storage = 2947.6 c.y.
		Storage =	17603 c.f.=	652.0 c.y.	
103	Area = 16583 s.f.				Cumulative Storage = 2295.7 c.y.
		Storage =	15614 c.f.=	578.3 c.y.	
102.4	Area = 15408 s.f.				Cumulative Storage = 1940.0 c.y.
		Storage =	6010 c.f.=	222.6 c.y.	
102	Area = 14644 s.f.				Cumulative Storage = 1717.4 c.y.
		Storage =	13725 c.f.=	508.3 c.y.	
101	Area = 12805 s.f.				Cumulative Storage = 1209.1 c.y.
		Storage =	11936 c.f.=	442.1 c.y.	
100	Area = 11067 s.f.				Cumulative Storage = 767.0 c.y.
		Storage =	9115 c.f.=	337.6 c.y.	
99	Area = 7162 s.f.				Cumulative Storage = 429.4 c.y.
		Storage =	3405 c.f.=	126.1 c.y.	
98.5	Area = 6456 s.f.				Cumulative Storage = 303.3 c.y.
		Storage =	3058 c.f.=	113.3 c.y.	
98	Area = 5775 s.f.				Cumulative Storage = 190.1 c.y.
		Storage =	5132 c.f.=	190.1 c.y.	
97	Area = 4489 s.f.				Cumulative Storage = 0.0 c.y.

AES Consulting Engineers
Project #9882-01

St. Olaf
Catholic Church Expansion
James City County

Storage =	0 c.f.=	0.0 c.y.

67 CY per acre "Wet"
67 CY per acre "Dry"
33 CY per acre "Cleanout"

Total Drainage Area =	9.6 acre	
Volume Required =	643.2 c.y.	
Volume Required =	17366.4 c.f.	
"Wet" Volume Provided =	767.0 c.y.	At Elevation 100.0
"Wet" Volume Provided =	20709 c.f.	

Adequate "Wet" Volume is provided in Sediment Basin

"Dry" Volume Provided =	1173.0 c.y.	At Elevation 102.4
"Dry" Volume Provided =	31671 c.f.	

Adequate "Dry" Volume is provided in Sediment Basin

Clenaout Volume Required =	316.8 c.y.	
Clenaout Volume Required =	8553.6 c.f.	
"Cleanout" Volume Provided =	463.7 c.y.	At Elevation 98.5
"Cleanout" Volume Provided =	12519 c.f.	

Adequate "Cleanout" Volume is provided in Sediment Basin

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Pond No. 1 - St. Olaf Wet Pond

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 97.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.00	4,823	0	0
1.00	98.00	6,185	5,489	5,489
2.00	99.00	7,648	6,903	12,392
3.00	100.00	11,744	9,622	22,014
4.00	101.00	13,558	12,639	34,653
4.50	101.50	14,503	7,013	41,666
5.00	102.00	15,473	7,492	49,158
5.50	102.50	16,469	7,983	57,142
6.00	103.00	17,489	8,487	65,629
7.00	104.00	19,605	18,535	84,164
8.00	105.00	21,821	20,701	104,865
9.00	106.00	24,138	22,968	127,833
10.00	107.00	25,346	24,737	152,570
11.00	108.00	27,788	26,555	179,125

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	3.00	0.00	0.00
Span (in)	= 18.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 99.80	100.00	0.00	0.00
Length (ft)	= 180.00	0.00	0.00	0.00
Slope (%)	= 1.10	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

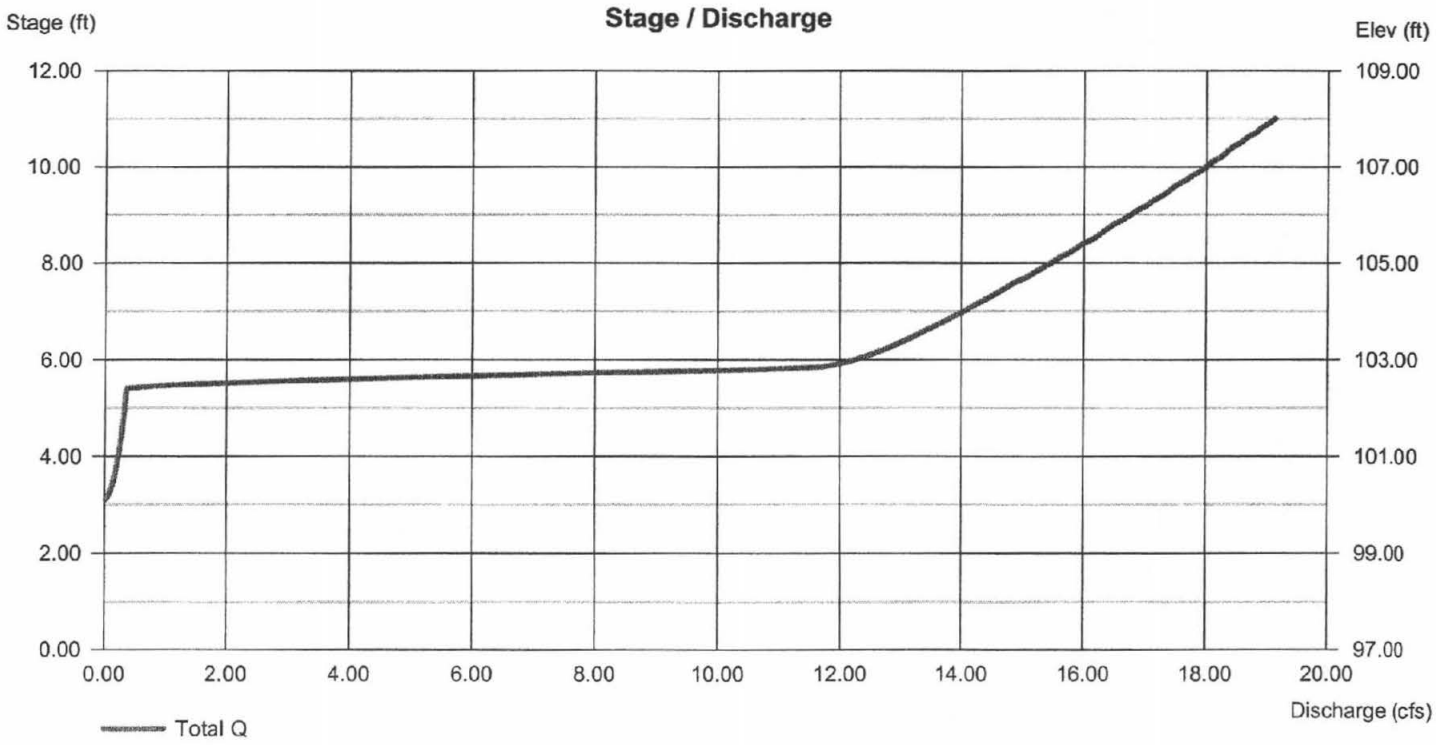
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.57	0.00	0.00	0.00
Crest El. (ft)	= 102.40	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	6.233	5	740	34,251	------	------	------	Pre-Development Approx.
3	SCS Runoff	17.34	2	728	63,755	------	------	------	During Construction for Sediment B
5	SCS Runoff	19.11	5	725	67,482	------	------	------	St. Olaf Post Development
7	Reservoir	3.166	5	760	67,419	5	102.57	58,253	St.Olaf Wet-Pond BMP
9	Reservoir	2.209	2	774	63,417	3	102.52	57,561	Sedimenrt Basin

Hydrograph Report

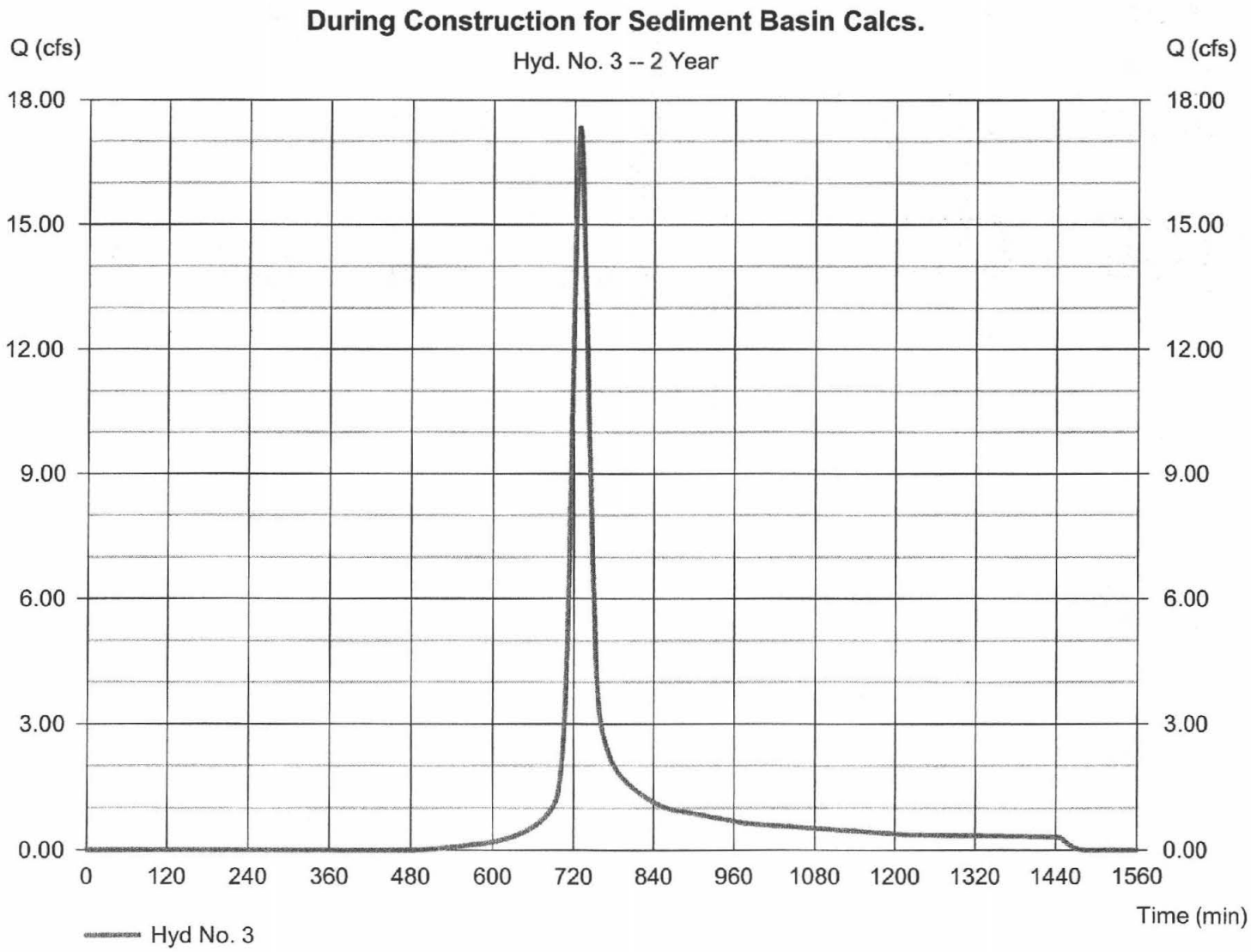
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Hyd. No. 3

During Construction for Sediment Basin Calcs.

Hydrograph type	= SCS Runoff	Peak discharge	= 17.34 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 63,755 cuft
Drainage area	= 9.600 ac	Curve number	= 83*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 25.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(5.300 x 91) + (4.300 x 74)] / 9.600



Hydrograph Report

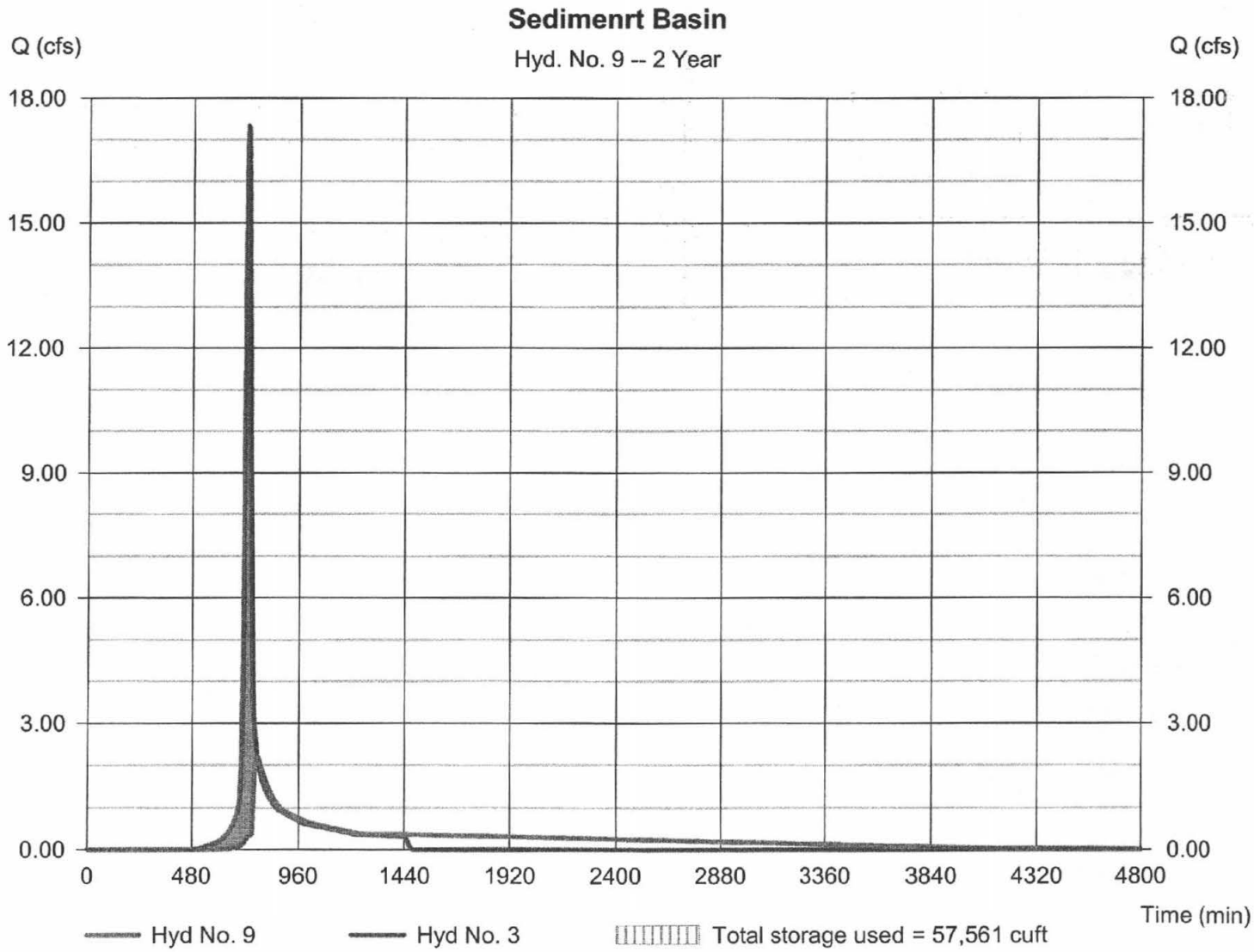
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 — Monday, Jan 12, 2009

Hyd. No. 9

Sedimenrt Basin

Hydrograph type	= Reservoir	Peak discharge	= 2.209 cfs
Storm frequency	= 2 yrs	Time to peak	= 774 min
Time interval	= 2 min	Hyd. volume	= 63,417 cuft
Inflow hyd. No.	= 3 - During Construction for Sediment Basin	Max. Elevation	= 102.52 ft
Reservoir name	= St. Olaf Wet Pond	Max. Storage	= 57,561 cuft

Storage Indication method used. Wet pond routing start elevation = 100.00 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	21.53	5	735	106,208	------	------	------	Pre-Development Approx.
3	SCS Runoff	41.36	2	728	153,132	------	------	------	During Construction for Sediment B
5	SCS Runoff	44.66	5	725	159,331	------	------	------	St. Olaf Post Development
7	Reservoir	14.57	5	745	159,268	5	104.39	92,001	St.Olaf Wet-Pond BMP
9	Reservoir	14.34	2	748	152,783	3	104.22	88,630	Sedimenrt Basin

Hydrograph Report

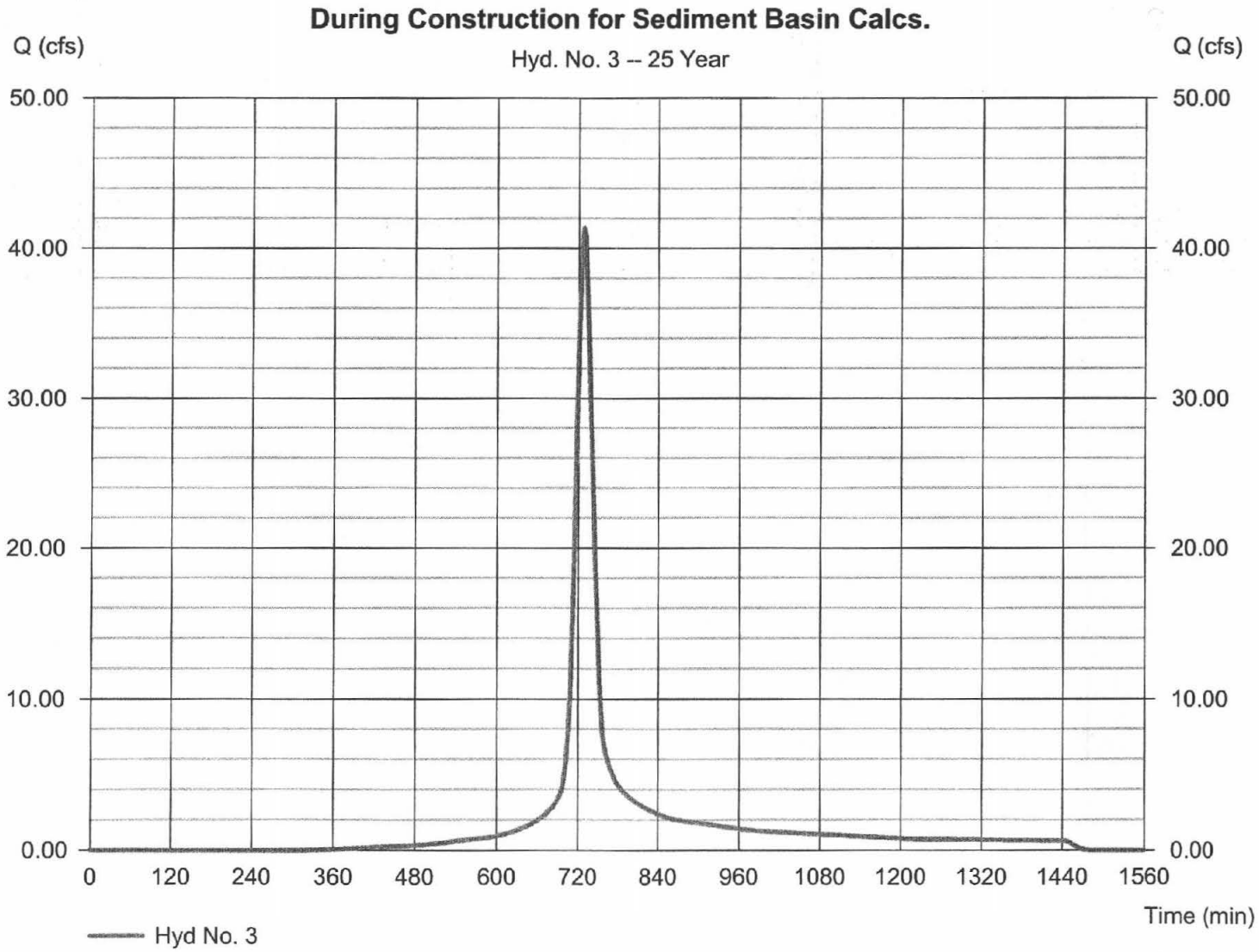
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Hyd. No. 3

During Construction for Sediment Basin Calcs.

Hydrograph type	= SCS Runoff	Peak discharge	= 41.36 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 153,132 cuft
Drainage area	= 9.600 ac	Curve number	= 83*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 25.00 min
Total precip.	= 6.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(5.300 x 91) + (4.300 x 74)] / 9.600



Hydrograph Report

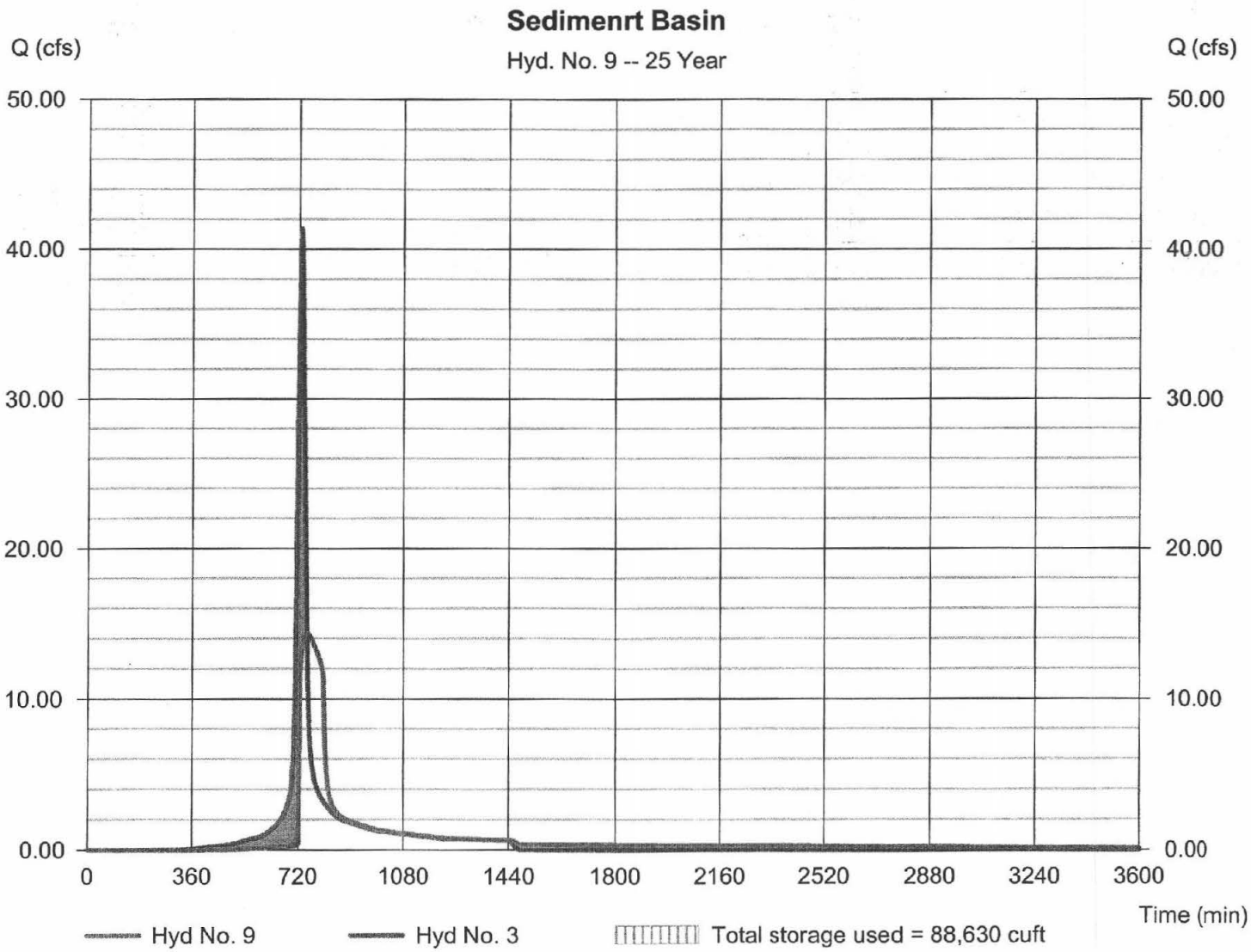
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Hyd. No. 9

Sedimenrt Basin

Hydrograph type	= Reservoir	Peak discharge	= 14.34 cfs
Storm frequency	= 25 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 152,783 cuft
Inflow hyd. No.	= 3 - During Construction for Sediment Basin	Max. Elevation	= 104.22 ft
Reservoir name	= St. Olaf Wet Pond	Max. Storage	= 88,630 cuft

Storage Indication method used. Wet pond routing start elevation = 100.00 ft.



APPENDIX D

BEST MANAGEMENT PRACTICE (BMP) FACILITY

CHANNEL PROTECTION VOLUME (KERPLUNK)
SEDIMENT FOREBAY VOLUME
WATER QUALITY VOLUME
RISER BUOYANCY CALCULATIONS
BMP STAGE/STORAGE/DISCHARGE TABLE
STORMWATER ROUTING 1, 2, 10, & 100 YEAR STORM
OUTLET PROTECTION

Storm Event	Incoming Flow (cfs)	Outgoing Flow (cfs)	Water Surface Elevation	PRE-DEVELOPMENT (cfs)
1	13.24	0.36	102.38	3.38
2	19.11	3.17	102.57	6.23
10	39.31	13.95	103.76	18.09
100	58.91	16.24	105.60	31.06

Storm Event	PRE-DEVELOPMENT (cfs)	POST-DEVELOPMENT (cfs)
1	3.38	0.36
2	6.23	3.17
10	18.09	13.95
100	31.06	16.24

AES
CONSULTING ENGINEERS

AES CONSULTING ENGINEERS
Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040

Project	St. Olaf		
Project No.	9882-01		
Subject	Pond #	1	
Sheet No.	1	of	1
Calculated By	VAB	Date	10/31/07

Channel Protection Volume:

Drainage Area	=	9.6 Acres
Runoff Curve No.	=	84
1-Yr, 24-Hr Storm Volume	=	2.8 inches

Direct Runoff (From TR55 Equations 2-3 & 2-4)
Q = 1.35 inches

Channel Protection Volume = DA * Q * 60% (Virginia Stormwater Managment Handbook section 5-6.2 - Method 2)

Vcp = 12.99 Ac-in = **28,298** cubic feet

Determine Volume of Pond by Contour (starting at normal pool):

Elevation	Incremental Depth	Area (sq. ft.)	Volume (cu. ft.)	Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)	Incremental Avg Head[1] (feet)	Incremental Avg Flow[1] (feet)	Incremental Drawdown Time[1] (hrs)
100.0	0.0	11,067	-	-	-	-			
101.0	1.0	12,805	11,936	442	11,936	442	0.50	0.14	22.91
101.5	0.5	13,712	6,629	246	18,565	688	1.25	0.25	7.35
102.0	0.5	14,644	7,089	263	25,654	950	1.75	0.30	6.54
103.0	1.0	16,583	15,614	578	41,268	1,528	2.08	0.33	2.22
104.0	1.0	18,623	17,603	652	58,871	2,180	0.00	0.00	0.00
		Total	58,871	2,180					39.01

[1] Incremental values computed from Channel Protection Volume Elevation

Elevation of Normal Pool	=	100.00	feet
Elevation of 1-yr, 24-hr Storage Volume	=	102.17	feet
Size of Orifice	=	3.00	inches
Total Average Drawdown Time	=	**39.01**	**hrs**

>24 HRS, OK

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Project #9882-01

St. Olaf
Catholic Church Expansion
James City County

BMP Sediment Forebay Volumes

Elev.	Countour Area (in s.f.)	Storage (Between contours)	Cumulative Storage Volume
99.5	Area = s.f.		Cumulative Storage = 61.0 c.y.
		Storage = 0 c.f.= 0.0 c.y.	
99.5	Area = 1280 s.f.		Cumulative Storage = 61.0 c.y.
		Storage = 520 c.f.= 19.3 c.y.	
99	Area = 801 s.f.		Cumulative Storage = 41.8 c.y.
		Storage = 0 c.f.= 0.0 c.y.	
99	Area = 1097 s.f.		Cumulative Storage = 41.8 c.y.
		Storage = 784 c.f.= 29.0 c.y.	
98	Area = 470 s.f.		Cumulative Storage = 12.7 c.y.
		Storage = 344 c.f.= 12.7 c.y.	
97	Area = 218 s.f.		Cumulative Storage = 0.0 c.y.
		Storage = 0 c.f.= 0.0 c.y.	

Volume Required
10% of Water Quality Volume Required
WQV = 13976 CF

Volume Required = 1397.6 c.f.

WQV Volume Provided = 61.0 c.y. At Elevation 99.50
WQV Volume Provided = 1648 c.f.

Adequate Volume is provided in Forebay

AES Consulting Engineers
Project #9882-01

St. Olaf
Catholic Church Expansion
James City County

BMP Water Quality Volumes

Elev.	Countour Area (in s.f.)	Storage (Between contours)	Cumulative Storage Volume
105	Area = 20764 s.f.		Cumulative Storage = 3677.2 c.y.
		Storage = 19694 c.f.= 729.4 c.y.	
104	Area = 18623 s.f.		Cumulative Storage = 2947.9 c.y.
		Storage = 17603 c.f.= 652.0 c.y.	
103	Area = 16583 s.f.		Cumulative Storage = 2295.9 c.y.
		Storage = 15614 c.f.= 578.3 c.y.	
102.4	Area = 15408 s.f.		Cumulative Storage = 1940.2 c.y.
		Storage = 6010 c.f.= 222.6 c.y.	
102	Area = 14644 s.f.		Cumulative Storage = 1717.6 c.y.
		Storage = 13725 c.f.= 508.3 c.y.	
101	Area = 12805 s.f.		Cumulative Storage = 1209.3 c.y.
		Storage = 11936 c.f.= 442.1 c.y.	
100	Area = 11067 s.f.		Cumulative Storage = 767.2 c.y.
		Storage = 9115 c.f.= 337.6 c.y.	
99	Area = 7162 s.f.		Cumulative Storage = 429.6 c.y.
		Storage = 6469 c.f.= 239.6 c.y.	
98	Area = 5775 s.f.		Cumulative Storage = 190.1 c.y.
		Storage = 5132 c.f.= 190.1 c.y.	
97	Area = 4489 s.f.		Cumulative Storage = 0.0 c.y.
		Storage = 0 c.f.= 0.0 c.y.	

AES Consulting Engineers
Project #9882-01

St. Olaf
Catholic Church Expansion
James City County

Volume Required
2 * WQV
WQV = 1/2" per impervious acre

Impervious Area =	3.85 acre	
Wet WQV =	6988 c.f.	
Wet Volume Required =	13976 c.f.	
Wet WQV Volume Provided =	767.2 c.y.	At Elevation 100.00
Wet WQV Volume Provided =	20715 c.f.	

Adequate Water Quality Volume is provided in BMP

Dry WQV =	6988 c.f.	
Dry Volume Required =	13976 c.f.	
Dry WQV Volume Provided =	1173.0 c.y.	At Elevation 102.40
Dry WQV Volume Provided =	31671 c.f.	

Adequate Water Quality Volume is provided in BMP

St. Olaf Catholic Church
BMP #1 BUOYANCY CALCULATIONS
January 13, 2009

Note: THESE CALCULATION ARE PROVIDED TO ENSURE THE PRINCIPAL SPILLWAY / RISER DOES NOT HAVE THE TENDENCY TO FLOAT.

ELEVATION OF RISER CREST =	102.4
ELEVATION OF INVERT OF RISER = (AFTER GROUTING)	99.8
INSIDE DIAMETER OF RISER =	4 feet
OUTSIDE DIAMETER OF RISER =	5 feet
DIAMETER OF EXTENDED BASE=	5.67 feet
DEPTH OF BASE=	1 feet

WEIGHT OF WATER DISPLACED BY AIR

Weight of water displaced by air: Weight of water/cu. Ft. * 3.14 * (Outside Diameter of riser / 2)^2 * (El. Of Riser Crest - El. Of riser invert) + Weight of water/cu. Ft. * 3.14 * (Diameter of base / 2)^2 * (Depth of Base))

Weight of water displaced by air	4,759	lbs.

WEIGHT OF PRINCIPAL SPILLWAY / RISER

Weight of concrete of riser = (Weight of concrete/cu. Ft. * 3.14 * (Outside diameter of riser / 2)^2 * (El. Of Riser Crest - El. Of riser invert)) - (Weight of concrete per cu. Ft. * 3.14 * (Inside diameter of riser / 2)^2 * (El. Of Riser Crest - El. Of riser invert))

Weight of Concrete Riser =	2,755	lbs.
Weight of Anti-vortex =	-	lbs.
Weight of Extend Base Only =	3,786	lbs.
Total Weight of Riser =	6,541	lbs.

Total Weight of Riser > Weight of Water Displaced, I.e. Will not flo 1.37 Safety Factor

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Pond No. 1 - St. Olaf Wet Pond

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 97.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.00	4,823	0	0
1.00	98.00	6,185	5,489	5,489
2.00	99.00	7,648	6,903	12,392
3.00	100.00	11,744	9,622	22,014
4.00	101.00	13,558	12,639	34,653
4.50	101.50	14,503	7,013	41,666
5.00	102.00	15,473	7,492	49,158
5.50	102.50	16,469	7,983	57,142
6.00	103.00	17,489	8,487	65,629
7.00	104.00	19,605	18,535	84,164
8.00	105.00	21,821	20,701	104,865
9.00	106.00	24,138	22,968	127,833
10.00	107.00	25,346	24,737	152,570
11.00	108.00	27,788	26,555	179,125

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	3.00	0.00	0.00
Span (in)	= 18.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 99.80	100.00	0.00	0.00
Length (ft)	= 180.00	0.00	0.00	0.00
Slope (%)	= 1.10	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

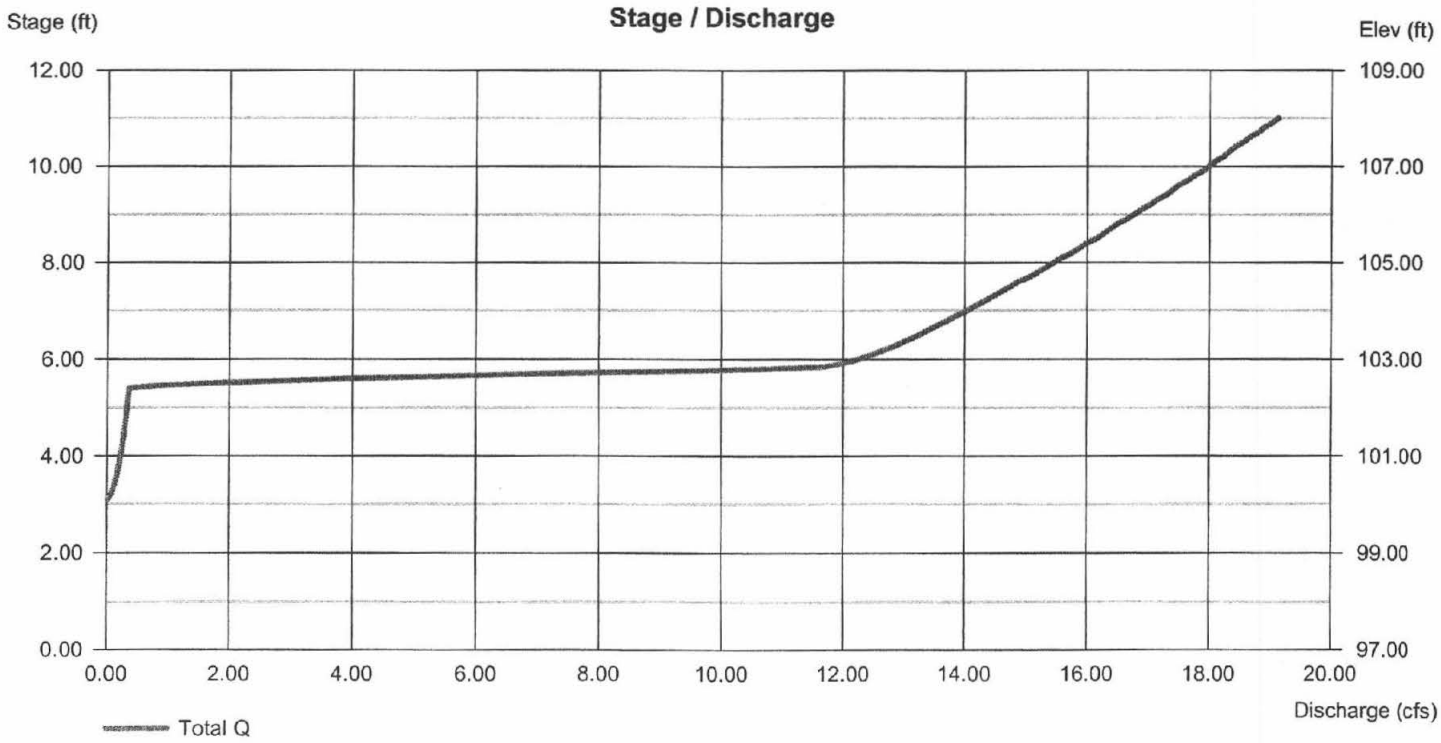
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.57	0.00	0.00	0.00
Crest El. (ft)	= 102.40	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	3.384	5	740	20,589	------	------	------	Pre-Development Approx.
3	SCS Runoff	11.88	2	728	44,159	------	------	------	During Construction for Sediment B
5	SCS Runoff	13.24	5	725	47,163	------	------	------	St. Olaf Post Development
7	Reservoir	0.355	5	1130	47,100	5	102.38	55,243	St.Olaf Wet-Pond BMP
9	Reservoir	0.343	2	1128	43,878	3	102.23	52,797	Sedimenrt Basin

Hydrograph Report

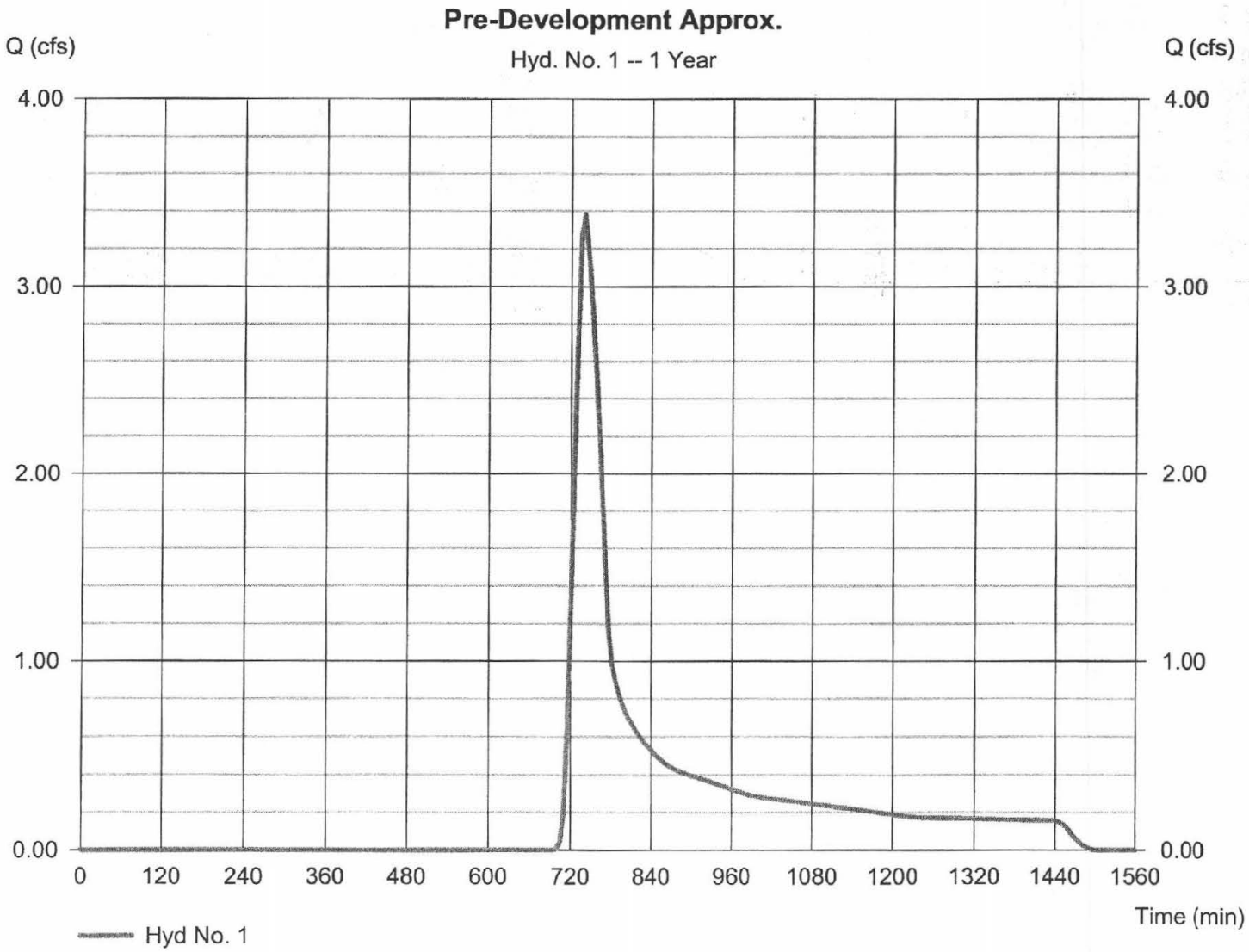
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Hyd. No. 1

Pre-Development Approx.

Hydrograph type	= SCS Runoff	Peak discharge	= 3.384 cfs
Storm frequency	= 1 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 20,589 cuft
Drainage area	= 9.600 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 40.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(9.600 x 70)] / 9.600



Hydrograph Report

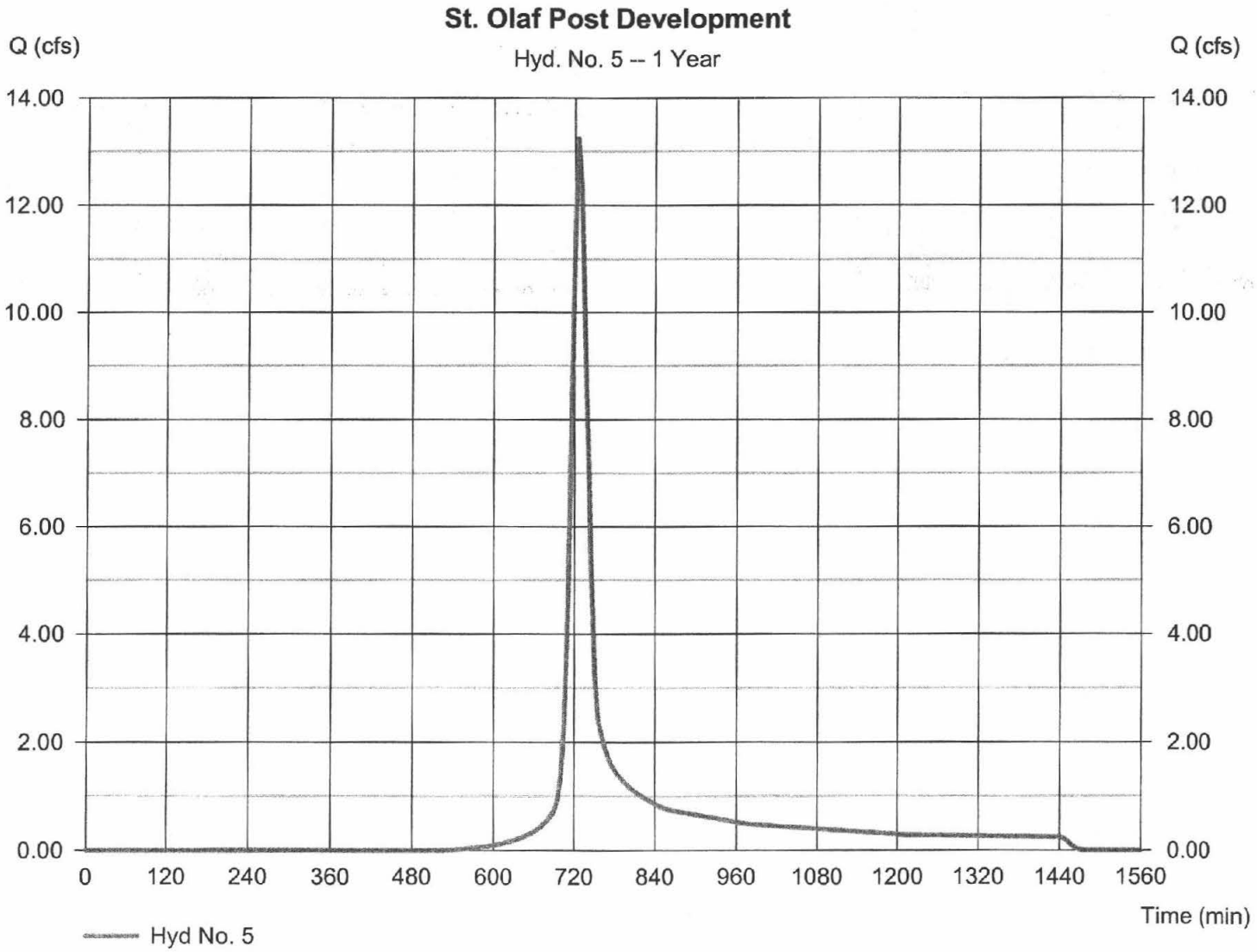
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Hyd. No. 5

St. Olaf Post Development

Hydrograph type	= SCS Runoff	Peak discharge	= 13.24 cfs
Storm frequency	= 1 yrs	Time to peak	= 725 min
Time interval	= 5 min	Hyd. volume	= 47,163 cuft
Drainage area	= 9.600 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 17.70 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.850 x 98) + (5.750 x 74)] / 9.600



Hydrograph Report

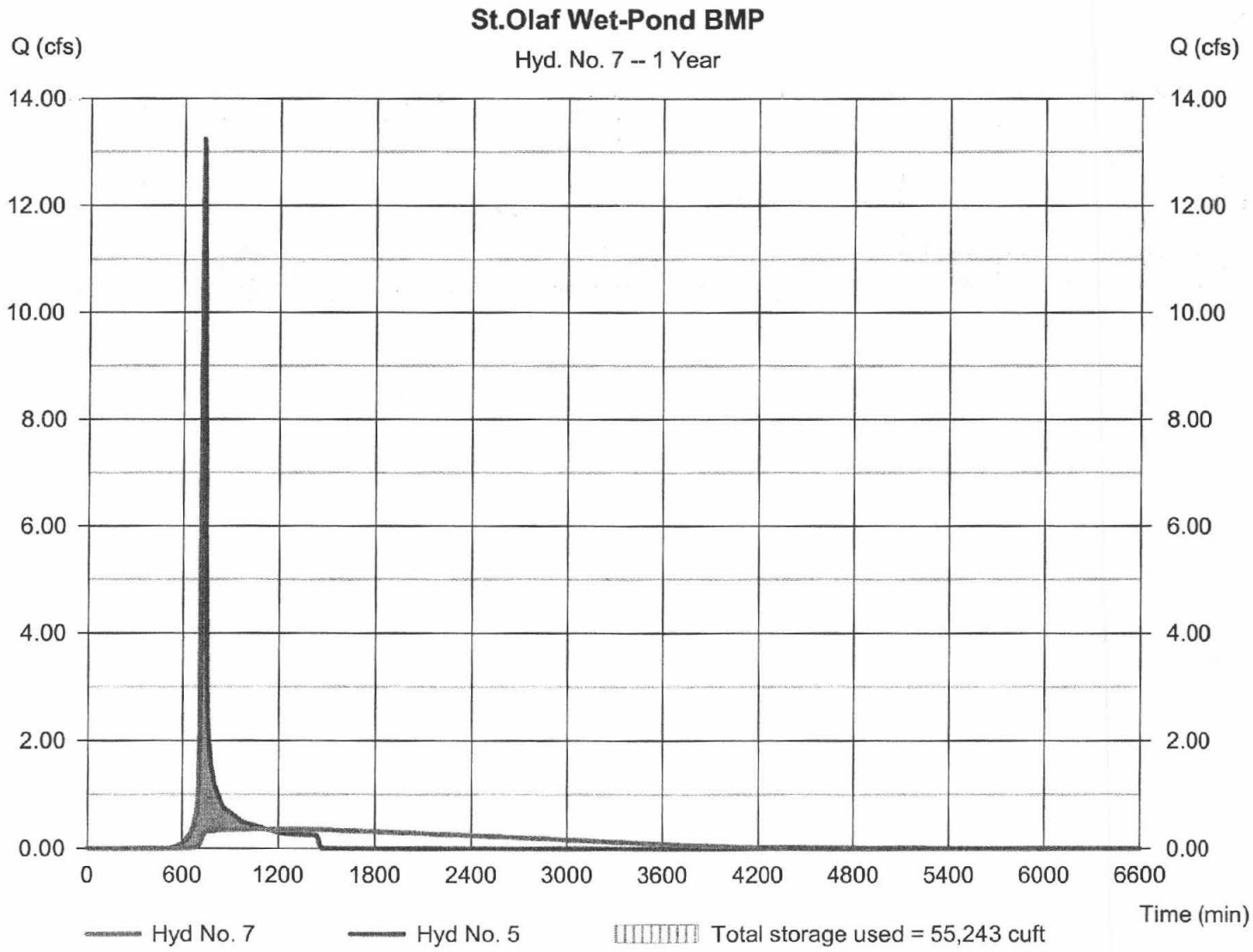
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Hyd. No. 7

St.Olaf Wet-Pond BMP

Hydrograph type	= Reservoir	Peak discharge	= 0.355 cfs
Storm frequency	= 1 yrs	Time to peak	= 1130 min
Time interval	= 5 min	Hyd. volume	= 47,100 cuft
Inflow hyd. No.	= 5 - St. Olaf Post Development	Max. Elevation	= 102.38 ft
Reservoir name	= St. Olaf Wet Pond	Max. Storage	= 55,243 cuft

Storage Indication method used. Wet pond routing start elevation = 100.00 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	6.233	5	740	34,251	------	------	------	Pre-Development Approx.
3	SCS Runoff	17.34	2	728	63,755	------	------	------	During Construction for Sediment B
5	SCS Runoff	19.11	5	725	67,482	------	------	------	St. Olaf Post Development
7	Reservoir	3.166	5	760	67,419	5	102.57	58,253	St.Olaf Wet-Pond BMP
9	Reservoir	2.209	2	774	63,417	3	102.52	57,561	Sedimenrt Basin

Hydrograph Report

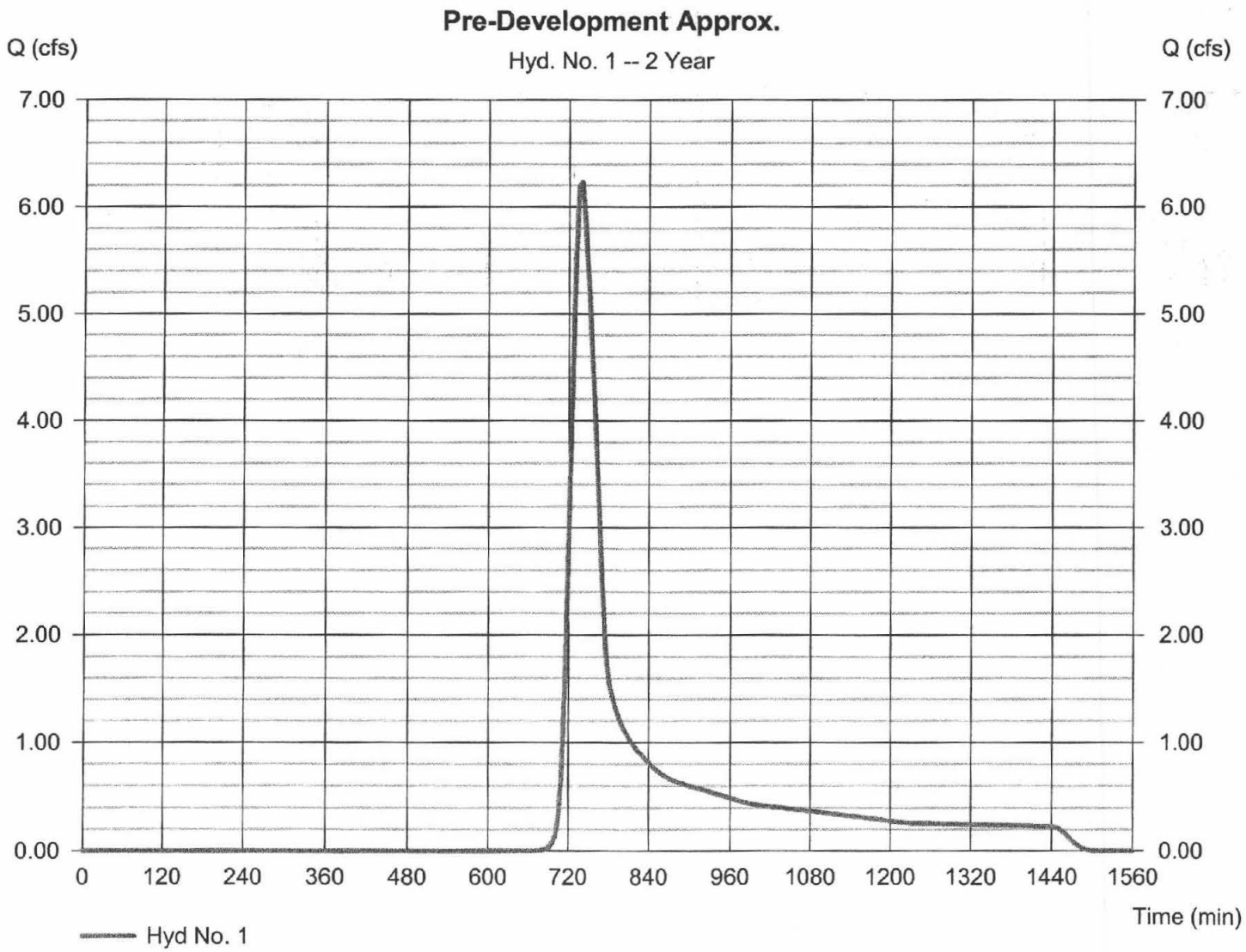
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Hyd. No. 1

Pre-Development Approx.

Hydrograph type	= SCS Runoff	Peak discharge	= 6.233 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 34,251 cuft
Drainage area	= 9.600 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 40.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(9.600 x 70)] / 9.600



Hydrograph Report

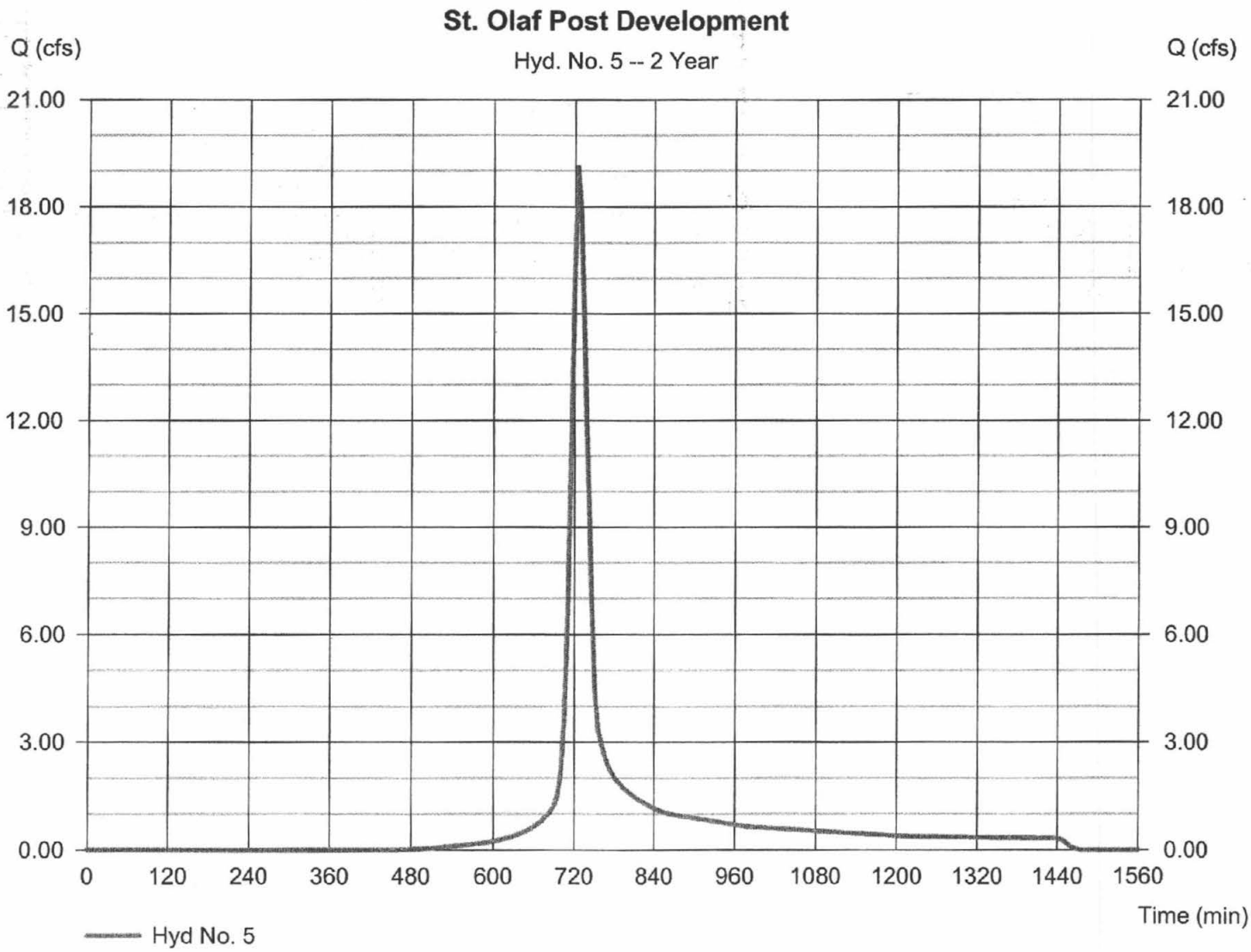
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Hyd. No. 5

St. Olaf Post Development

Hydrograph type	= SCS Runoff	Peak discharge	= 19.11 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 5 min	Hyd. volume	= 67,482 cuft
Drainage area	= 9.600 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 17.70 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.850 x 98) + (5.750 x 74)] / 9.600



Hydrograph Report

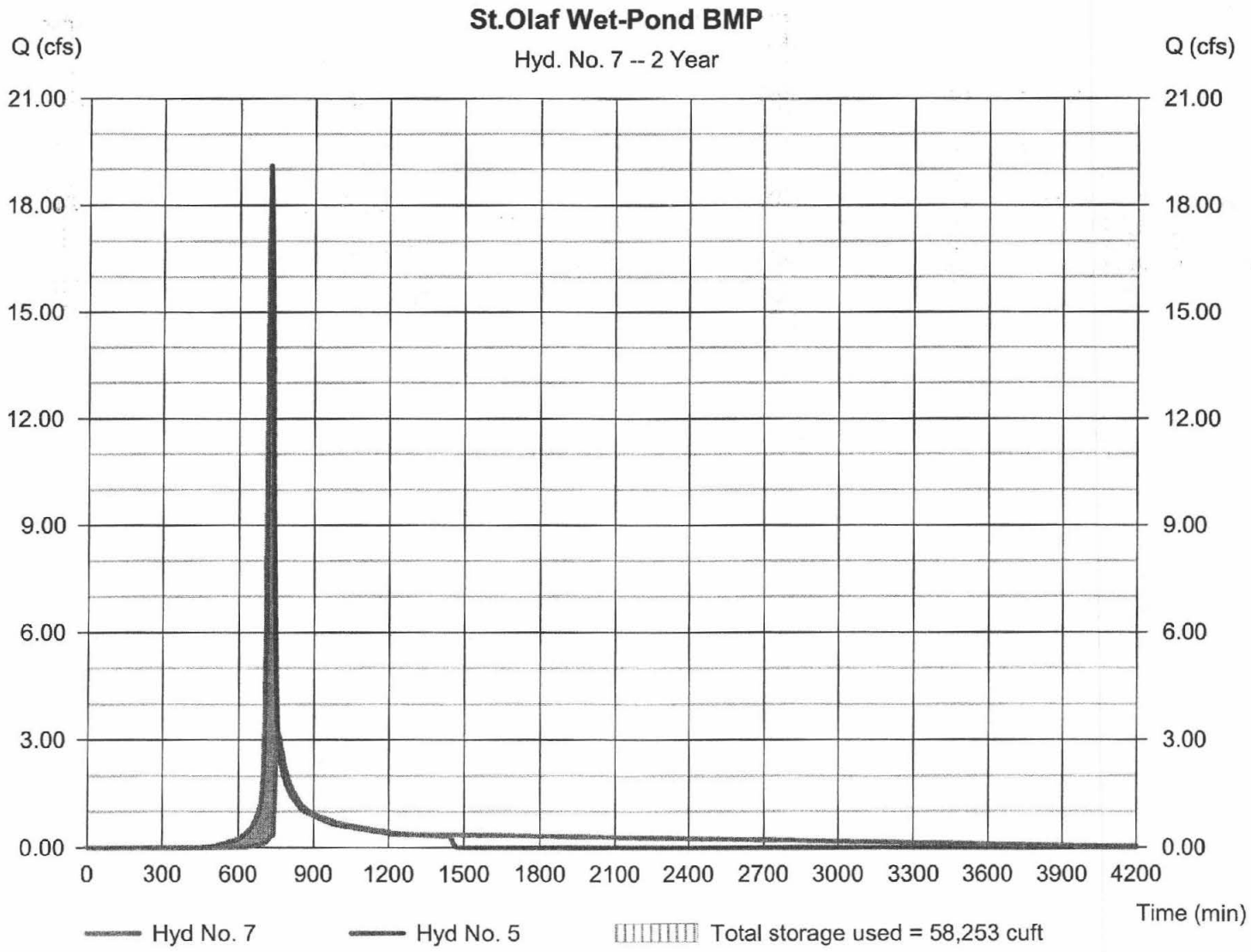
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Hyd. No. 7

St.Olaf Wet-Pond BMP

Hydrograph type	= Reservoir	Peak discharge	= 3.166 cfs
Storm frequency	= 2 yrs	Time to peak	= 760 min
Time interval	= 5 min	Hyd. volume	= 67,419 cuft
Inflow hyd. No.	= 5 - St. Olaf Post Development	Max. Elevation	= 102.57 ft
Reservoir name	= St. Olaf Wet Pond	Max. Storage	= 58,253 cuft

Storage Indication method used. Wet pond routing start elevation = 100.00 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	18.09	5	735	89,950	------	------	------	Pre-Development Approx.
3	SCS Runoff	36.31	2	728	133,994	------	------	------	During Construction for Sediment B
5	SCS Runoff	39.31	5	725	139,729	------	------	------	St. Olaf Post Development
7	Reservoir	13.95	5	745	139,666	5	103.94	83,101	St.Olaf Wet-Pond BMP
9	Reservoir	13.67	2	748	133,647	3	103.76	79,735	Sedimenrt Basin

Hydrograph Report

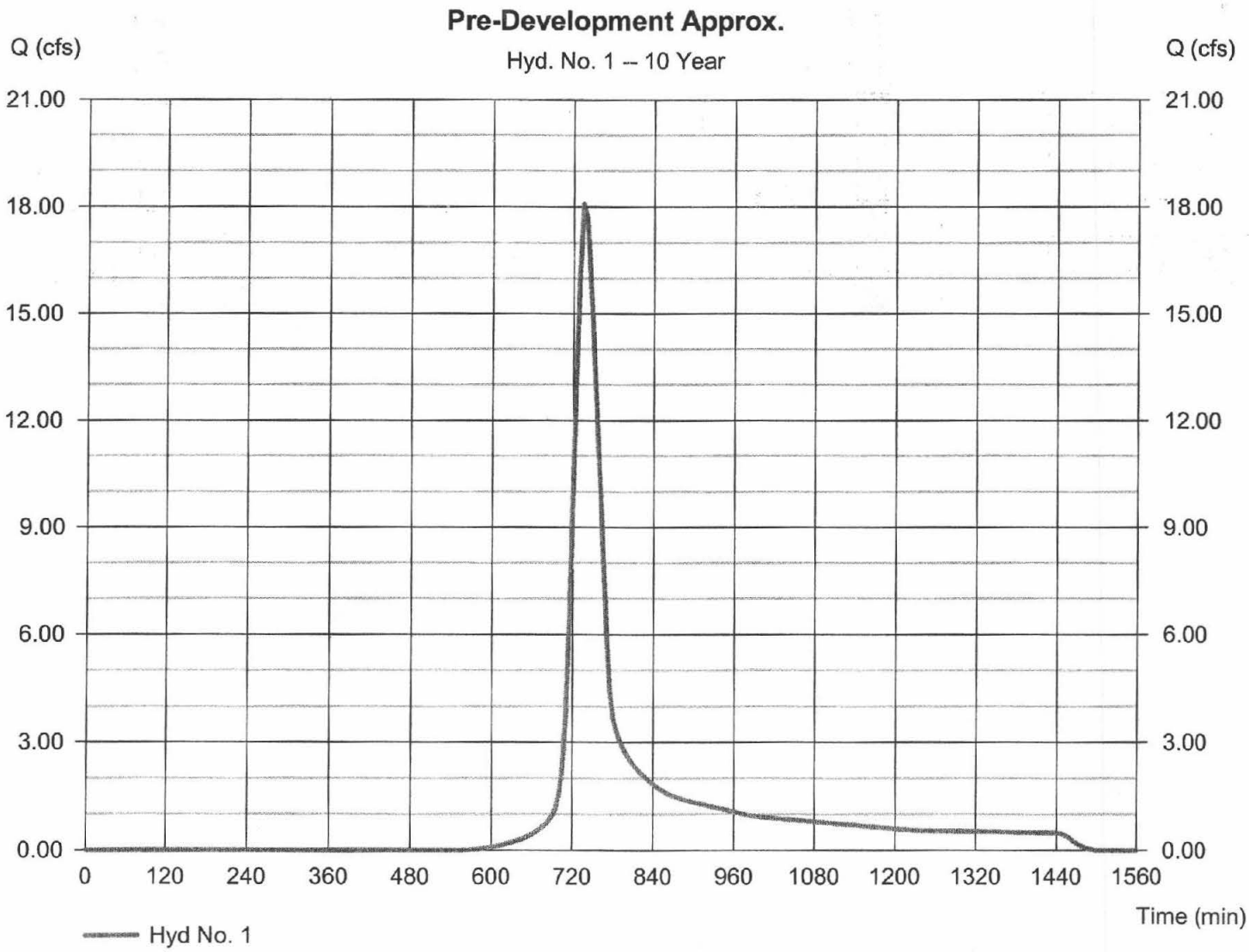
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 — Monday, Jan 12, 2009

Hyd. No. 1

Pre-Development Approx.

Hydrograph type	= SCS Runoff	Peak discharge	= 18.09 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 89,950 cuft
Drainage area	= 9.600 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 40.00 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(9.600 x 70)] / 9.600



Hydrograph Report

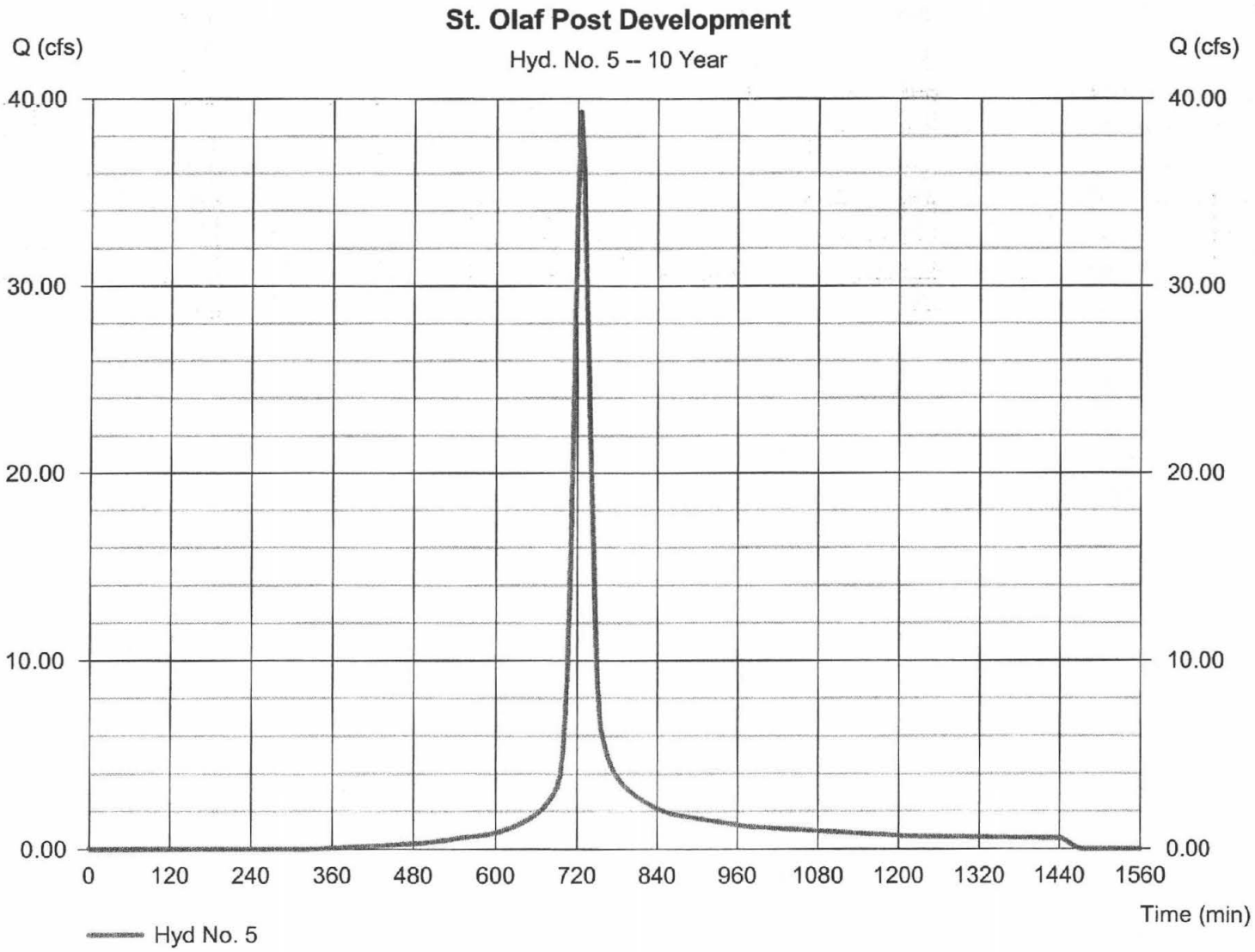
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Hyd. No. 5

St. Olaf Post Development

Hydrograph type	= SCS Runoff	Peak discharge	= 39.31 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 5 min	Hyd. volume	= 139,729 cuft
Drainage area	= 9.600 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 17.70 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.850 x 98) + (5.750 x 74)] / 9.600



Hydrograph Report

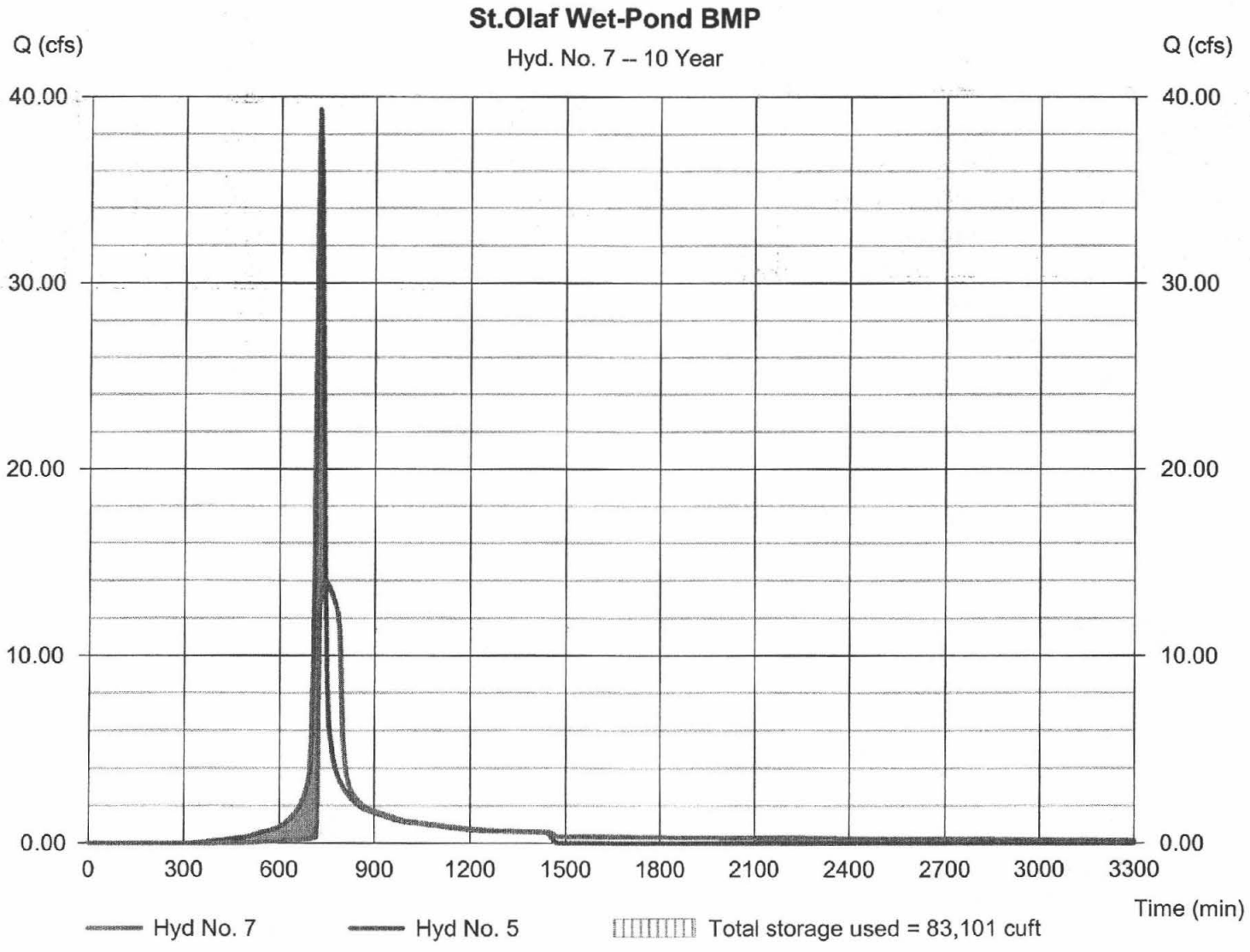
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Hyd. No. 7

St.Olaf Wet-Pond BMP

Hydrograph type	= Reservoir	Peak discharge	= 13.95 cfs
Storm frequency	= 10 yrs	Time to peak	= 745 min
Time interval	= 5 min	Hyd. volume	= 139,666 cuft
Inflow hyd. No.	= 5 - St. Olaf Post Development	Max. Elevation	= 103.94 ft
Reservoir name	= St. Olaf Wet Pond	Max. Storage	= 83,101 cuft

Storage Indication method used. Wet pond routing start elevation = 100.00 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	31.06	5	735	151,682	------	------	------	Pre-Development Approx.
3	SCS Runoff	54.82	2	728	205,046	------	------	------	During Construction for Sediment B
5	SCS Runoff	58.91	5	725	212,407	------	------	------	St. Olaf Post Development
7	Reservoir	16.24	5	750	212,344	5	105.60	118,147	St.Olaf Wet-Pond BMP
9	Reservoir	15.99	2	750	204,695	3	105.41	114,154	Sedimenrt Basin

Hydrograph Report

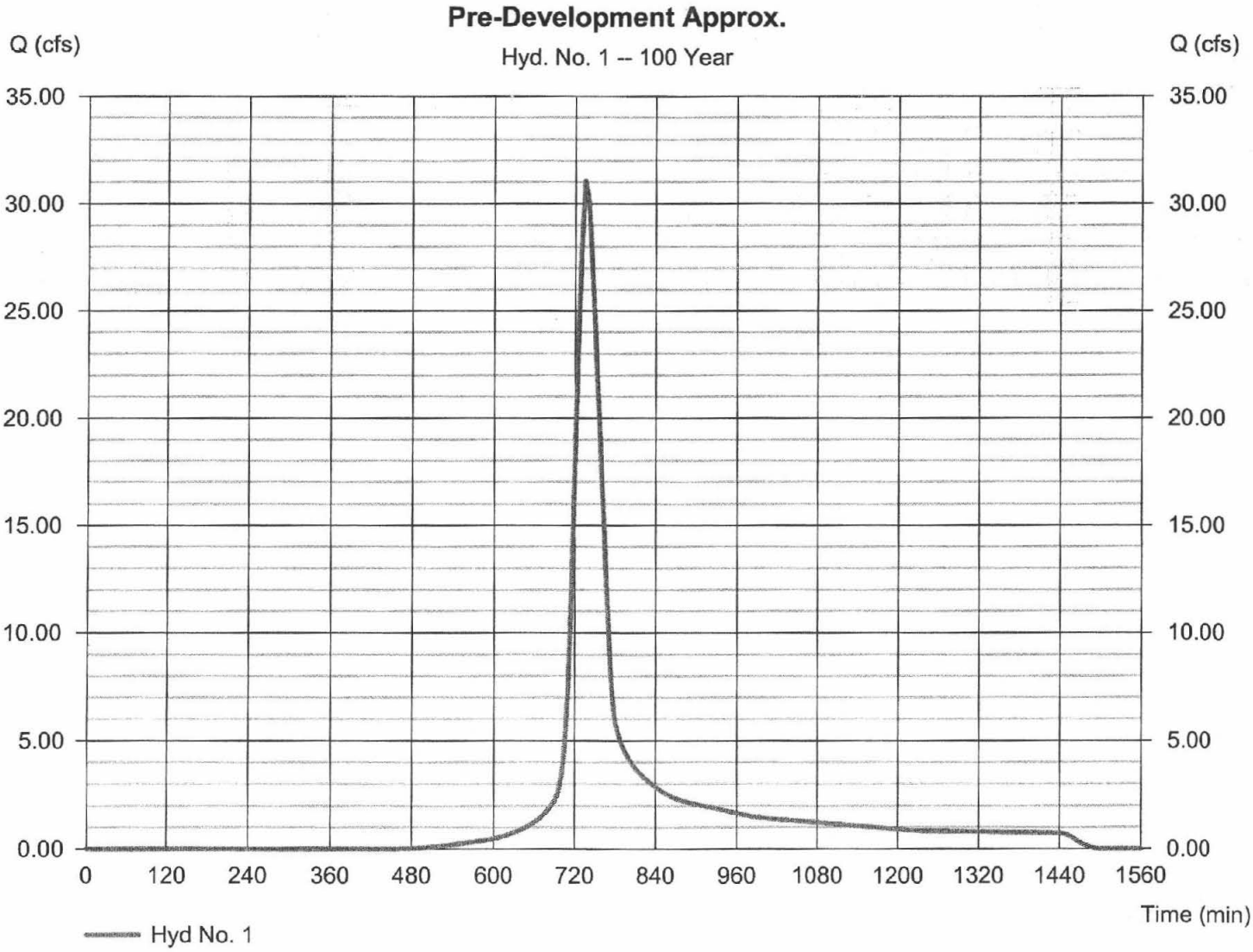
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Hyd. No. 1

Pre-Development Approx.

Hydrograph type	= SCS Runoff	Peak discharge	= 31.06 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 151,682 cuft
Drainage area	= 9.600 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 40.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(9.600 x 70)] / 9.600



Hydrograph Report

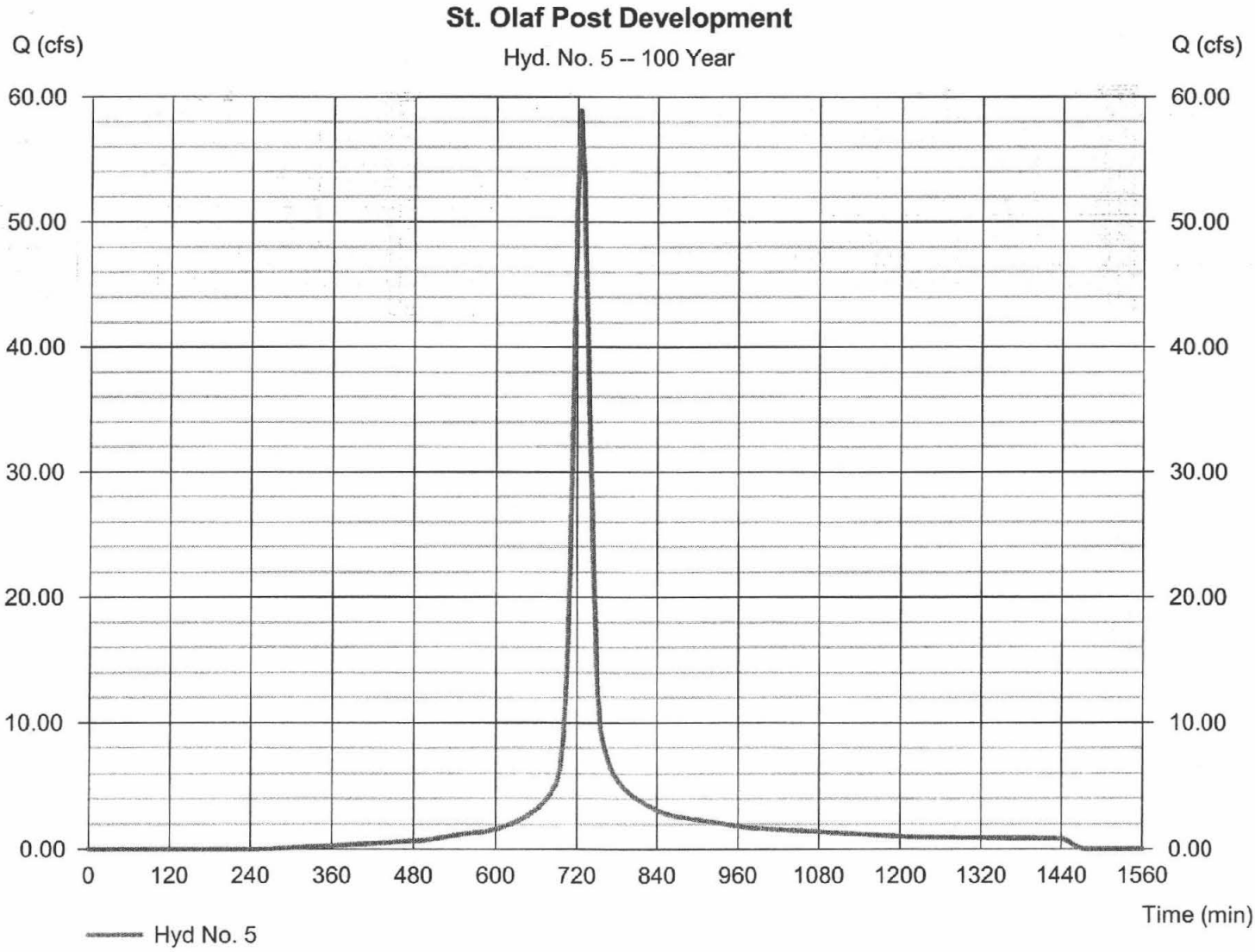
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Hyd. No. 5

St. Olaf Post Development

Hydrograph type	= SCS Runoff	Peak discharge	= 58.91 cfs
Storm frequency	= 100 yrs	Time to peak	= 725 min
Time interval	= 5 min	Hyd. volume	= 212,407 cuft
Drainage area	= 9.600 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 17.70 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.850 x 98) + (5.750 x 74)] / 9.600



Hydrograph Report

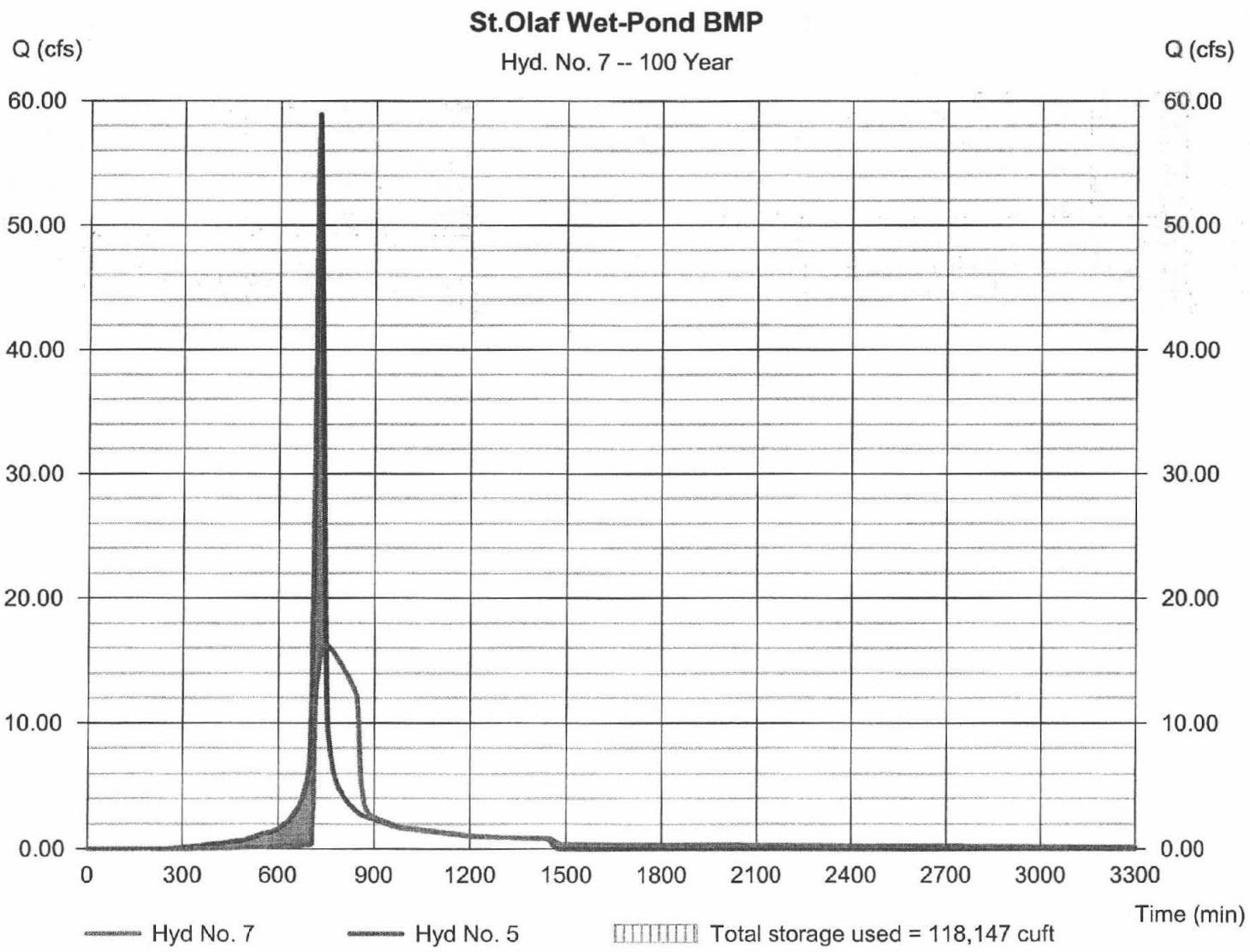
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Monday, Jan 12, 2009

Hyd. No. 7

St.Olaf Wet-Pond BMP

Hydrograph type	= Reservoir	Peak discharge	= 16.24 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 5 min	Hyd. volume	= 212,344 cuft
Inflow hyd. No.	= 5 - St. Olaf Post Development	Max. Elevation	= 105.60 ft
Reservoir name	= St. Olaf Wet Pond	Max. Storage	= 118,147 cuft

Storage Indication method used. Wet pond routing start elevation = 100.00 ft.

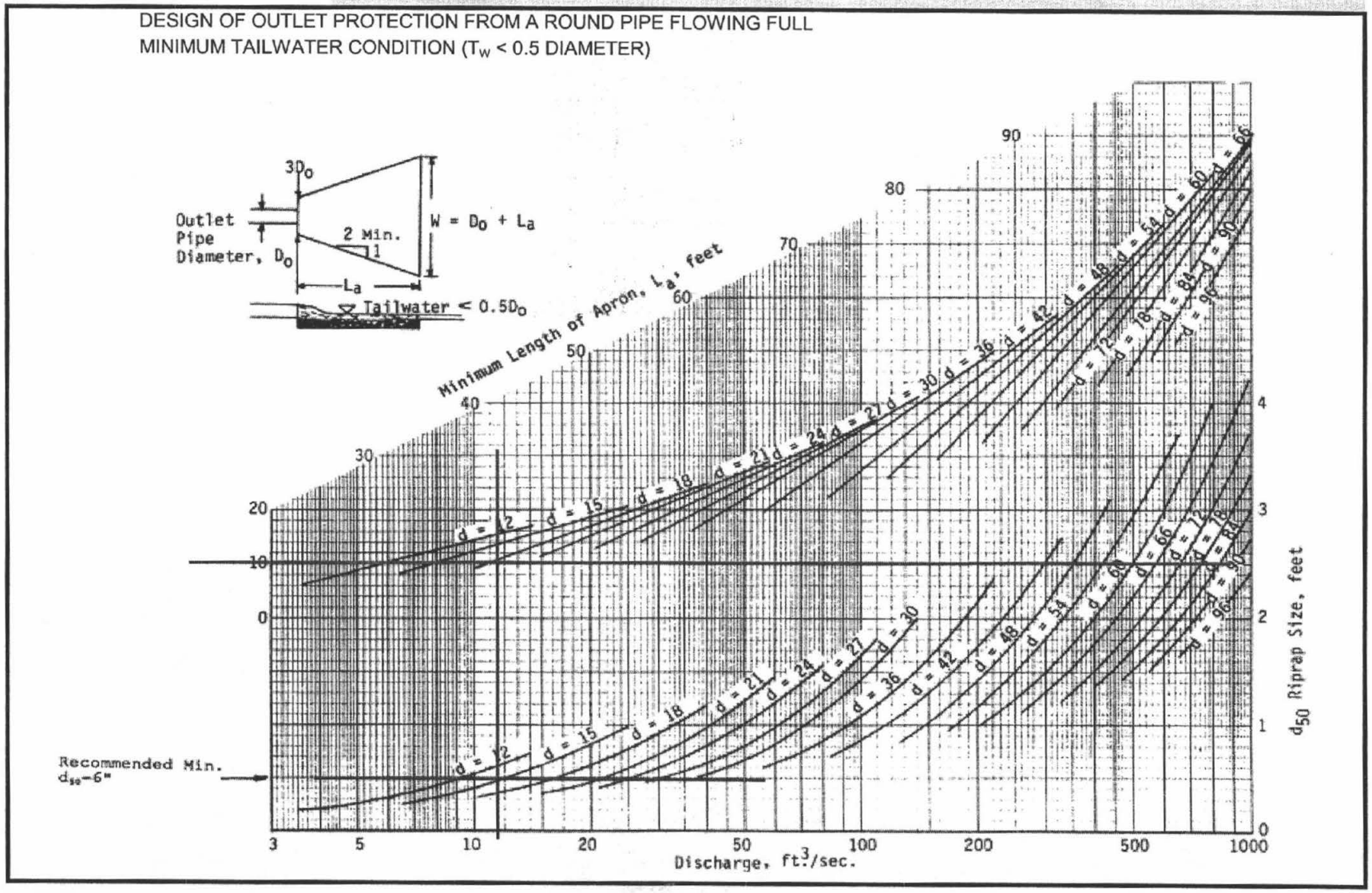


CONSULTING ENGINEERS

Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040

Project:	St. Olaf
Project No.:	9882-01
Subject:	Outlet Protection
Date:	January 9, 2009
Calculated By:	VAB

Outlet Location: Pond Outfall



Q =	11.54	cfs	$3D_0$ =	4.5	ft	W =	12	ft	Depth = 1.5 ft
D_0 =	18	in	L_a =	10	ft	d_{50} =	0.5	ft	

Source: USDA-SCS

Plate 3.18-3

APPENDIX E

LID FEATURES

WATER QUALITY VOLUMES

CONSULTING ENGINEERS

CONSULTING ENGINEERS

Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040
Fredericksburg (540) 710-6606

Project:	St. Olaf
Project No.:	9882-01
Subject:	Water Quality Volume
	Total of Bioretention Basins
Date:	October 24, 2008
Calculated By:	RMK

BMP Type = **Total of Bioretention Basins**

Water Quality Volume = 0.5 in. x **2.15** acres of impervious coverage

= (0.5 / 12) x (43,560 x **2.15**)

= **3902** CF

Total Storage Volume Required = **2** x Water Quality Volume

= **2** x **3902**

= **7804** CF

Sum of Bioretention Basins

Bioretention Basin Number	Volume (cu. ft.)	Inches of impervious per acre treated
#4	632	0.47
#5	722	0.38
#5A	299	0.24
#8	601	0.69
#8A	443	0.18

Total Storage Volume Provided = 2697.2 c.f.

CONSULTING ENGINEERS

Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040
Fredericksburg (540) 710-6606

Project:	St. Olaf
Project No.:	9882-01
Subject:	Water Quality Volume Bioretention Basin #4
Date:	October 24, 2008
Calculated By:	RMK

BMP Type = **Bioretention Basin #4**

Water Quality Volume = 0.5 in. x **0.37** acres of impervious coverage

= (0.5 / 12) x (43,560 x **0.37**)

= **672** CF

Total Storage Volume Required = **2** x Water Quality Volume

= **2** x **672**

= **1344** CF

Total Storage Volume Provided

Elevation	Depth	Area (sq. ft.)	Volume (cu. ft.)	Sum Volume (cu. ft.)
110	0	191	0	0
110.75	0.75	1493	631.5	632

Storage Volume Provided = **632** CF Elevation = **110.75** **(Top of Structure)**

Total Storage Volume Provided **632** CF > Total Storage Volume Required **1344**

Storage Volume Provided = **632** CF

= **632** / (43,560 x **0.37**) / 12)

= **0.47** in. per impervious acre treated

AES CONSULTING ENGINEERS

Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040
Fredericksburg (540) 710-6606

Project:	St. Olaf
Project No.:	9882-01
Subject:	Water Quality Volume Bioretention Basin #5
Date:	October 24, 2008
Calculated By:	RMK

BMP Type = **Bioretention Basin #5**

Water Quality Volume = 0.5 in. x **0.52** acres of impervious coverage

= (0.5 / 12) x (43,560 x **0.52**)

= **944** CF

Total Storage Volume Required = **2** x Water Quality Volume

= **2** x **944**

= **1888** CF

Total Storage Volume Provided

Elevation	Depth	Area (sq. ft.)	Volume (cu. ft.)	Volume (cu. ft.)
110.4	0	185	0	0
111.1	0.7	1769	683.9	684

Storage Volume Provided = **684** CF Elevation = **111.10** **(Top of Structure)**

Elevation	Depth	Area (sq. ft.)	Volume (cu. ft.)	Sum Volume (cu. ft.)
110.9	0	1	0	0
111.6	0.7	109	38.5	38

Storage Volume Provided = **38** CF Elevation = **111.60** **(Top of Timber Wall)**

Total Storage Volume Provided **722** CF > Total Storage Volume Required

Storage Volume Provided = **722** CF

= **722** / (43,560 x **0.52**) / 12)

= **0.38** in. per impervious acre treated

CONSULTING ENGINEERS

Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040
Fredericksburg (540) 710-6606

Project:	St. Olaf
Project No.:	9882-01
Subject:	Water Quality Volume Bioretention Basin #5A
Date:	October 24, 2008
Calculated By:	RMK

BMP Type = **Bioretention Basin #5A**

Water Quality Volume = 0.5 in. x **0.34** acres of impervious coverage

= (0.5 / 12) x (43,560 x **0.34**)

= **617** CF

Total Storage Volume Required = **2** x Water Quality Volume

= **2** x **617**

= **1234** CF

Total Storage Volume Provided

Elevation	Depth	Area (sq. ft.)	Volume (cu. ft.)	Sum Volume (cu. ft.)
110.5	**0**	**117**	**0**	**0**
111.2	**0.7**	**738**	**299.25**	**299**

Storage Volume Provided = **299** CF Elevation = **111.20** **(Top of Structure)**

Total Storage Volume Provided **299** CF > Total Storage Volume Required **1234**

Storage Volume Provided = **299** CF

= **299** / (43,560 x **0.34**) / 12)

= **0.24** in. per impervious acre treated

CONSULTING ENGINEERS

Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040
Fredericksburg (540) 710-6606

Project:	St. Olaf
Project No.:	9882-01
Subject:	Water Quality Volume Bioretention Basin #8
Date:	October 24, 2008
Calculated By:	RMK

BMP Type = **Bioretention Basin #8**

Water Quality Volume = 0.5 in. x **0.24** acres of impervious coverage

= (0.5 / 12) x (43,560 x **0.24**)

= **436** CF

Total Storage Volume Required = **2** x Water Quality Volume

= **2** x **436**

= **872** CF

Total Storage Volume Provided

Elevation	Depth	Area (sq. ft.)	Volume (cu. ft.)	Sum Volume (cu. ft.)
114	**0**	**642**	**0**	**0**
114.75	**0.75**	**960**	**601**	**601**

Storage Volume Provided = **601** CF Elevation = **114.75** **(Top of Structure)**

Total Storage Volume Provided **601** CF > Total Storage Volume Required **872**

Storage Volume Provided = **601** CF

= **601** / (43,560 x **0.24**) / 12)

= **0.69** in. per impervious acre treated

AES CONSULTING ENGINEERS

Williamsburg (757) 253-0040
Gloucester (804) 693-4450
Richmond (804) 330-8040
Fredericksburg (540) 710-6606

Project:	St. Olaf
Project No.:	9882-01
Subject:	Water Quality Volume Bioretention Basin #8A
Date:	October 24, 2008
Calculated By:	RMK

BMP Type = **Bioretention Basin #8A**

Water Quality Volume = 0.5 in. x **0.68** acres of impervious coverage

= (0.5 / 12) x (43,560 x **0.68**)

= **1234** CF

Total Storage Volume Required = **2** x Water Quality Volume

= **2** x **1234**

= **2468** CF

Total Storage Volume Provided

Elevation	Depth	Area (sq. ft.)	Volume (cu. ft.)	Sum Volume (cu. ft.)
112.8	0	85	0	0
113.5	0.7	866	333	333

Storage Volume Provided = **333** CF Elevation = **113.50** **(Top of Structure)**

Total Storage Volume Provided

Elevation	Depth	Area (sq. ft.)	Volume (cu. ft.)	Sum Volume (cu. ft.)
113.5	0	71	0	0
114	0.5	371	110.5	111

Storage Volume Provided = **111** CF Elevation = **114.00** **(Top of Timber Wall)**

Total Storage Volume Provided **443** CF > Total Storage Volume Required **290**

Storage Volume Provided = **443** CF

= **443** / (43,560 x **0.68**) / 12)

= **0.18** in. per impervious acre treated

APPENDIX F

WORKSHEET FOR BMP POINT SYSTEM

AES
CONSULTING ENGINEERS

TABLE 3

WORKSHEET FOR BMP POINT SYSTEM
St. Olaf Existing BMP W/ LID, AES PROJECT No. 9882-01
TOTAL AREA = 9.39 ACRE(s)

A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP Drainage Area	BMP Points		Fraction of Site Served by BMP (BMP Drainage Area/Total Area)		Weighted BMP Points
ED-Wet Pond-On-Site Area	4.39	10	X	0.468	=	4.68
Bio-Retention	2.60	4	X	0.277	=	1.11
Bio-Retention thru BMP	2.60	8	X	0.277	=	2.22
ED-Wet Pond-Off-Site Area	2.30	10	X	0.245	=	2.45
		TOTAL WEIGHTED STRUCTURAL BMP POINTS:				10.45

B. NATURAL OPEN SPACE CREDIT

Open Space Area	Fraction of Site (Open Space Area/Total Area)	Natural Open Space Credit		Points for Natural Open Space (Fraction of Site * Natural Open Space Credit %)
		(0.1 per 1%)	=	
		(0.15 per 1%)	=	
		TOTAL OPEN SPACE POINTS:		0.00

C. TOTAL WEIGHTED POINTS

10.45	+	0.00	=	10.45
Structural BMP Points		Natural Open Space Points		TOTAL

APPENDIX G

GEOTECHNICAL ENGINEERING REPORT

CONSULTING ENGINEERS

GET Solutions, Inc.

Geotechnical • Environmental • Testing

REPORT OF SUBSURFACE INVESTIGATION AND GEOTECHNICAL ENGINEERING SERVICES

ADDITIONS TO ST. OLAF CATHOLIC CHURCH
JAMES CITY COUNTY, VIRGINIA

G E T PROJECT NO: WM08-236G

NOVEMBER 19, 2008

Prepared for

ST. OLAF CATHOLIC CHURCH
104 NORGE LANE
WILLIAMSBURG, VIRGINIA 23188
ATTN: MR. JIM SIMCOX

Prepared by

GET SOLUTIONS, INC.

1592-E Penniman Road, Williamsburg, VA ♦ Phone 757-564-6452 ♦ Fax 757-564-6453
www.getsolutionsinc.com

GET Solutions, Inc.

Geotechnical · Environmental · Testing

November 19, 2008

TO: **St. Olaf Catholic Church**
104 Norge Lane
Williamsburg, VA 23188

Attn: Mr. Jim Simcox

RE: Report of Subsurface Investigation & Geotechnical Engineering Services
Additions to St. Olaf Catholic Church
James City County, Virginia
G E T Project No.: WM08-236G

Dear Mr. Simcox:

In compliance with your instructions, we have completed our Geotechnical Engineering Services for the referenced project. The results of this study and our recommendations for geotechnical aspects of the project are presented in this report.

To help assure soil conditions encountered during construction are properly identified and interpreted, **G E T Solutions, Inc.** would be pleased to continue its role as Geotechnical Engineer during the project implementation.

We trust that the information contained herein meets your immediate needs and trust you will contact this office should you have questions or require further assistance.

Respectfully Submitted,
G E T Solutions, Inc.

Sara B. Phillips

Sara B. Phillips
Project Geologist

COMMONWEALTH OF VIRGINIA
ROBERT C. MOSS, III
Lic. No. 019982
PROFESSIONAL ENGINEER

Robert C, Moss, III, P.E.
Principal Engineer
VA Reg. # 019982

Copies: (2) Client via mail/e-mail: jsimcox@stolafchurch.hrcoxmail.com
(1) Mr. Ken Sebra, RA via e-mail: ksebra@brawerhauptman.com
(1) Ms. Victoria Bains, PE via email: tory.bains@aesva.com

1592 Penniman Road, Suite E • Williamsburg, VA 23185 • Phone (757) 564-6452 • Fax (757) 564-6453
info@getsolutionsinc.com

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James City County, Virginia
G E T Project No.: WM08-236G

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EXECUTIVE SUMMARY

This report presents the results of our subsurface exploration and geotechnical engineering services for the proposed Additions to St. Olaf Catholic Church project located at 104 Norge Lane in James City County, Virginia. The construction at this site is planned to consist of a one-story church addition complex including a sanctuary, meeting rooms, a commons, administrative spaces, and a kitchen. The maximum building and column wall loads are expected to be associated with the new sanctuary and will be less than 120 kips and 3 kips/ft., respectively. Floors will be supported as slabs-on-grade within about 2 feet of existing grades. New asphalt parking lots with drive lanes and parking spaces will be provided for about 300 vehicles. Existing pavements are to be demolished. We understand that the construction may be phased over several years.

The existing BMP wet pond facility will be expanded and the excavated materials will be used as Structural Fill, if appropriate. LID measures will be installed in the parking lot islands. These will have an infiltration component, if practical.

Based on the anticipated maximum foundation loads, the proposed building additions can be supported by shallow spread footings designed for a net allowable soil pressure of 2,000 psf based on a minimum embedment depth of 24 inches. A net allowable soil pressure of 3,000 psf can be used for more heavily loaded column footings based on a minimum embedment of 4 feet. FILL materials were not encountered within the borings; however, FILL materials may be present on site, particularly above existing utilities and adjacent to the existing church building. Where encountered in foundation excavations, this FILL should be removed and replaced with No. 57 Stone.

The building floors can be supported as a slab-on-grade. However, if existing FILL is encountered, the FILL should be evaluated at the time of construction to determine its suitability for slab support. Some undercutting of FILL materials from below the slab may be required.

Natural soils on this site are suitable for supporting asphalt pavement sections employing typical design and construction methods.

Most soils available from cuts within the top several feet will consist of Silty and Clayey Sands. These materials are suitable for reuse as Structural Fill but may require moisture conditioning before they can be reused. Some materials excavated on site will be unsuitable for reuse as Structural Fill due to organic content.

It appears that soils on this site can support an infiltration type stormwater management system. Design elevations for this system will not be affected by the presence of the static groundwater table, which was encountered below depths of 20 feet. Restrictive Clay layers are erratic on site and may require undercutting below infiltration levels.

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QUALITY

ORIGINAL(S)
FOLLOW

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VCE DOCUMENT CONVERSION

The groundwater table was encountered below depths of 20 feet and will not impact utility excavations. Perched water could be encountered in shallow excavations. Shallow perched water may also occur near the surface during wet periods.

Further information regarding the subsurface exploration procedures used; soil and groundwater conditions observed; recommended earthwork specifications; and design and construction recommendations for foundations, slabs-on-grade, pavements, and stormwater facilities is included in the text of this report.

This summary briefly discusses some of the major topics mentioned in the attached report. Accordingly, this report should be read in its entirety to thoroughly evaluate the contents.

1.0 PROJECT INFORMATION

1.1 Project Authorization

G E T Solutions, Inc. has completed our Geotechnical Engineering study for the Additions to St. Olaf Catholic Church project. The project site is located at 104 Norge Lane at the existing St. Olaf Catholic Church in James City County, Virginia. The Geotechnical Engineering Services were conducted in general accordance with the scope presented in **G E T** proposal No. PWM08-202G dated July 17, 2008. Authorization to proceed with the geotechnical services was received in the form of a signed proposal from Pastor Peter M. Creep of St. Olaf Catholic Church.

1.2 Project Description:

The construction at this site is planned to consist of a one-story church addition complex including a sanctuary, meeting rooms, a commons, administrative spaces, and a kitchen. The maximum building and column wall loads are expected to be associated with the new sanctuary and will be less than 120 kips and 3 kips/ft., respectively. Floors will be supported as slabs-on-grade within about 2 feet of existing grades. We understand that the construction may be phased over several years.

New asphalt drive lanes and parking lots will be constructed providing parking for about 300 vehicles. The existing pavements are to be demolished. LID measures will be constructed in the parking lot islands. These facilities are anticipated to have an infiltration component, if practical.

The existing BMP wet pond is to be expanded with the excavated material reused as Structural Fill, if appropriate.

If any of the noted information is incorrect or has changed, please inform **G E T Solutions, Inc.** so that we may amend the recommendations presented in this report, if appropriate.

1.3 Purpose and Scope of Services:

The purpose of this study was to obtain information on the general subsurface conditions at the project site so as to provide recommendations to guide design and construction of the building addition foundations and floor slabs, pavements, and the project's BMP/LID facilities and to aid in the development of earthwork specifications for the project. The subsurface conditions encountered were evaluated with respect to the available project characteristics. In this regard, engineering assessments for the following items were formulated:

1. General assessment of the soils revealed by the borings performed at the proposed development.

2. Shrink/Swell characteristics of the foundation bearing soils.

3. Evaluation of a shallow foundation system for support of the proposed structures. Design parameters required for the foundation systems, including foundation sizes and allowable bearing pressures and expected settlements.

4. Pavement design parameters based on the field exploration and our experience with similar soil conditions.

5. General assessment of the subsurface soil and groundwater conditions revealed by the borings at the BMP/LID facilities.

6. General requirements for development of earthwork specifications, including stripping, subgrade preparation, dewatering, and compaction. Engineering criteria for placement and compaction of approved Structural Fill material.

The scope of services did not include an environmental assessment for determining the presence or absence of wetlands or hazardous or toxic material in the soil, bedrock, surface water, groundwater or air, on or below or around this site.

2.0 FIELD AND LABORATORY PROCEDURES

2.1 Field Exploration:

In order to explore the general subsurface soil types at this site and to aid in developing associated foundation design parameters, four (4) 35-foot deep Standard Penetration Test (SPT) borings (designated as BB-1 through BB-4), two (2) 20-foot SPT borings (designated as BB-5 and BB-6), and three (3) 15-foot SPT borings (designated as BB-7 through BB-9) were drilled by **G E T Solutions, Inc.** within the proposed building addition footprints.

In order to explore BMP design parameters and borrow fill suitability, two (2) 15-foot SPT borings (designated as BMP-1 and BMP-2) were performed within the BMP expansion area.

And in order to explore pavement support conditions as well as ascertain infiltration characteristics of the soils in the parking lot and drive lanes; three (3) 10-foot SPT borings (designated as PB-1 through PB-3) and seven (7) 6-foot hand auger borings (designated as PHA-1 through PHA-7) were performed within the lateral limits of the pavement and LID measure areas. Four (4) infiltration tests were performed at boring locations PHA-1 through PHA-4. Two (2) bulk soil samples (designated as CBR-1 and CBR-2) were collected from two of the locations of PHA-5 and PHA-7.

The SPT borings were performed utilizing mud-rotary drilling techniques. Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

The tests were performed continuously from the existing ground surface to a depth of 12 feet, and at 5-foot intervals thereafter. The soil samples were obtained with a standard 1.4" I.D., 2" O.D., 30" long split-spoon sampler. The sampler was driven with blows of a 140 lb. hammer falling 30 inches. The number of blows required to drive the sampler each 6-inch increment of penetration was recorded and is shown on the boring logs. The sum of the second and third penetration increments is termed the SPT N-value. A representative portion of each disturbed split-spoon sample was collected with each SPT, placed in a glass jar, sealed, labeled, and returned to our laboratory for review.

Boring locations are presented in Appendix I of this report. Boring Logs are presented in Appendix II. The Geotechnical Engineer grouped the various soil types into the major zones noted on the boring logs. The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs are approximate; in-situ, the transitions may be gradual. A generalized subsurface profile is included as Appendix III, and a reference to the boring logs is included as Appendix IV. A summary of field infiltration test data is included in Appendix VII.

The borings were staked in the field by a representative of **G E T Solutions, Inc.** at locations selected by us and indicated on the Boring Location Plan of Appendix I, which was developed from a site drawing provided to us by the client and prepared by **AES Consulting Engineers, Inc.**

2.2 Laboratory Testing:

Representative portions of all soil samples collected during drilling were sealed in glass jars, labeled, and transferred to our laboratory for classification and analysis. The soil classification was performed by an Engineering Geologist in accordance with ASTM D 2488.

Twelve (12) representative soil samples were selected and subjected to natural moisture content, percent passing the No. 200 sieve, and Atterberg Limits testing and analysis in order to corroborate the visual classifications and ascertain engineering properties of the soils. Two bulk soil samples obtained from the pavement areas were returned to the laboratory and subjected to Proctor and CBR testing in accordance with VTM standards, as well as classification testing. Laboratory test results are presented in Appendices V and VI and are shown on the Boring Logs of Appendix II, included with this report.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Location and Description:

The project site is located at 104 Norge Lane at St. Olaf Catholic Church in James City County, Virginia. The building addition sites are located on the south and east sides of the existing church and are mostly flat and grass covered with a concrete sidewalk and volleyball court. A portion of the new sanctuary site contains asphalt pavements. The site of the proposed BMP facility expansion is located along the site's eastern property line in a partially wooded area just south of the existing BMP facility. The new parking lot area will be located to the east of the existing church and is currently comprised of an existing asphalt parking lot (including drive lanes and parking spaces) surrounded by a grassy area and woods. The project site is relatively flat with grade changes of less than 2 or 3 feet for every 50 linear feet.

3.2 Subsurface Soil Conditions:

The results of our field exploration program indicated the presence of about 4 to 13 inches and possibly more of topsoil materials at the boring locations in landscaped areas. Borings BB-1 and PHA-3 were performed within existing pavement areas and encountered 3 inches of asphalt underlain by 6 to 9 inches of aggregate base material. Underlying the topsoil, asphalt, and aggregate base material, the natural subsurface soils encountered within the borings were primarily granular in nature.

The soils encountered within the top 2 to 6 feet were comprised mostly of Silty and Clayey SAND (SM and SC). These granular soils were generally of very loose to medium dense relative density. From between 2 and 6 feet below the surface in most boring locations, a 2 to 8-foot thick layer of medium stiff, Sandy Lean CLAY (CL) was encountered.

Below the intervening Clay layer, which typically extended to 8 to 12 feet, the soils encountered consisted of Silty, fine SAND (SM) and poorly graded SAND (SP-SM) with trace Silt to the boring termination depths. These granular soils were generally of a loose to medium dense relative density.

The subsurface description is of a generalized nature provided to highlight the major soil strata encountered. The records of the subsurface exploration included in Appendix II (Boring Logs) and Appendix III (Generalized Soil Profile) should be reviewed for specific information. The stratifications shown on the record of the subsurface exploration represent the conditions only at the actual boring locations. Variations may occur and should be expected at other locations. The stratifications represent the approximate boundary between subsurface materials. In-situ, the transitions may be gradual.

3.3 Shrink-Swell Characteristics

The soils within the project area are mapped by the Soil Survey of James City County as **Kempsville-Emporia, Kenansville, and Slagle** Series soils. The natural soils encountered in the borings appear to be consistent with these soil series. These soils are described by the Soil Survey as being of low to moderate shrink swell potential.

Based on the visual and laboratory classification, the near-surface soils encountered at the boring locations are generally considered to have a low shrink/swell potential. Accordingly, shallow foundation improvements beyond those described herein are not required to accommodate for shrink/swell concerns.

3.4 Groundwater Information:

The groundwater table was encountered at the boring locations at a depth of about 20 feet below existing surface grades. It is anticipated that shallow perched water may occur across the site during wet periods. This would generally consist of water which becomes perched above Clay soils within the top 10 feet.

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, such as grading and paving, etc. In the project area, seasonal groundwater fluctuations of ± 2 feet are common; however, greater fluctuations have been documented. We recommend that the contractor determine the actual groundwater levels at the time of the construction to determine groundwater impact on the construction procedures, if necessary.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 Foundation Design

1. **Bearing Pressure:** Based on the results of our exploration, and considering the maximum anticipated foundation loads of 120 kips for columns and 3 kips/ft for walls, the proposed building additions can be supported by spread footings with a slab-on-grade floor. Spread footings can be dimensioned for a net allowable soil bearing pressure of 2,000 psf. In order to develop this allowable soil pressure, all footings should have a minimum embedment of 24 inches and width of 24 inches. For more heavily loaded column footings, a net allowable soil pressure of 3,000 psf can be used with a minimum embedment of 48 inches and minimum width of 48 inches.

2. **Net Pressure:** The net allowable soil bearing pressure refers to that pressure which may be transmitted to the foundation bearing soils in excess of the final minimum surrounding overburden pressure. In this regard, the weight of the footing, including the weight of the backfill over the footing, need not be considered when evaluating net pressures. For

retaining walls with unbalanced fill, the unbalanced weight of backfill over the footing should be considered when determining net pressures.

3. **Footing Embedment:** Footings designed for a net allowable soil pressure of 2,000 psf should have a minimum embedment of 24 inches below finished exterior grades. Footings designed for a net allowable soil pressure of 3,000 psf should have a minimum embedment of 48 inches below finished exterior grades.

4. **Foundation Settlement:** Provided the foundation design and construction recommendations discussed herein are employed, and considering the previously mentioned maximum foundation loading (120 kips for columns and 3 kips/ft for walls), the total foundation settlement for the proposed building additions is estimated to be about one inch or less with differential settlements of approximately one-half to three-quarters this amount between column and wall footings and the floor slab. If substantially higher actual foundation loads exist, settlements in excess of one inch could occur. Careful field control will contribute substantially towards minimizing the settlements. The Geotechnical Engineer should be informed if foundation loads in excess of those stated will actually occur.

5. **Foundation Subgrade Preparation and Verification:** The bearing capacity at the final footing elevation should be verified in the field by an experienced Geotechnical Engineer or his representative prior to concrete placement or backfilling with gravel to assure that the in-situ bearing capacity at the bottom of each footing excavation is adequate for the design loads. FILL was not encountered within any of the soil borings but could be present around the existing building and in existing pavement areas. FILL is considered unsuitable for foundation support and should be removed from below all footings. Furthermore, some soils within the top several feet are very loose and may require localized undercutting. In areas where loose, soft, and/or unsuitable material or FILL is undercut below the bottom of the footings, the footing may be lowered or the undercut area may be backfilled to the original design subgrade elevation with VDOT Size No. 57 Stone. This stone can be readily placed with minimal compactive effort and will be less susceptible to deterioration from moisture intrusion.

6. **Seismic Site Class:** The Seismic Site Class, based on International Building Code guidelines, was estimated for the site. The Seismic Site Class for the proposed building was determined from soil boring N-Value data and our experience with the soils in the project and surrounding areas. Based on Section 1615 of the International Building Code and our local experience, the project site is estimated to have a **Seismic Site Class of D**.

4.2 Floor Slab Design

1. **Slab Subgrade Preparation and Verification:** For the design and construction of all slabs-on-grade for the proposed building additions, it is recommended that all unstable

subgrade be removed from the 5-foot building addition limits. Suitable but excessively loose or soft soils should be moisture conditioned and thoroughly compacted. The Geotechnical Engineer should be called on to observe exposed subgrades to assure that adequate subgrade preparation has been achieved. A proofrolling using a drum roller or loaded dump truck should be performed in his presence at that time. Once subgrades have been approved, new Structural Fill can be placed. Structural Fill required to establish slab subgrade elevation should be placed and compacted to the criteria discussed in this report.

2. **Porous Fill:** The building addition slabs-on-grade should be directly supported by a Porous Fill layer consisting of a minimum of 4 inches of VDOT No. 57 Stone or clean Sand classified as SP or SW with a maximum 5% fines or by a minimum 6 inches of Aggregate Base Material (VDOT Type I, Size 21A Stone). This densely graded aggregate (Size 21-A) will help shed water and protect sensitive, underlying soils during wetter, winter weather. The Porous Fill layer will facilitate the fine grading of the subgrade, provide more uniform bearing conditions, and help minimize the rise of water to the bottom of the slab (capillary action). Before placement of floor slab concrete, a polyethylene vapor barrier should be placed on top of the granular material in heated areas to provide additional moisture protection.

3. **Subgrade Modulus:** Provided the placement of Structural Fill and Porous Fill is per the recommendations discussed herein, the slabs may be designed assuming a Modulus of Subgrade Reaction, K_S, of 200 psi per inch.

4. **Floating Slabs:** Floor slabs should be designed as "floating"; that is, generally ground supported and not rigidly connected to walls and foundations. This is to allow for settlement of the foundations to occur without cracking or stressing the slab. Where this is not possible, the slabs should be thickened and reinforced.

5. **Thickened Sections and Turned-Down Edges:** Thickened slab sections which support relatively lightly loaded walls need not contain the underslab Porous Fill layer provided soils exposed in the excavation bottoms are suitable and stable. However, their excavations should be prepared and, if necessary, undercut in the same manner as the footings. For turned-down edges or thickened sections which are considered load bearing, a net allowable soil pressure of 1,500 psf can be used in the design provided a minimum turned-down or thickened section width of 16 inches is provided. Turned-down edges or thickened sections exposed to frost and which are not supported by a footing should have a bottom embedment of at least 18 inches below finished exterior grades.

4.3 Pavement Design

1. **Section Design Parameters:** It is anticipated that pavement areas are to be surfaced with asphalt. Our design also assumes that ditches and swales will be provided along the edges of all pavements to prevent water penetration of the subgrade soils. Based on the results of our soil borings, it appears that the soils that will be exposed as pavement subgrades will consist mainly of Silty, fine SAND (SM). Based on the CBR test results, we have selected a design CBR value of 10, or about two-thirds the average of the two CBR tests. The following minimum pavement sections are recommended. The Civil Engineer should review actual traffic patterns and loading to determine whether or not these sections are appropriate for given traffic patterns.

Primary Circulation Lanes/Entrance Drives/Dumpster Truck Access

Asphalt Surface	- 2.0 inches Asphalt Concrete Surface Mix.
Aggregate Base	- 8.0 inches untreated Aggregate, Type I, Size 21A.
Subgrade	- Stable and compacted in accordance with the recommendations of Section 4.1.

Parking Stalls

Asphalt Surface	- 2.0 inches Asphalt Concrete Surface Mix.
Aggregate Base	- 6.0 inches untreated Aggregate, Type I, Size 21A.
Subgrade	- Stable and compacted in accordance with the recommendations of Section 4.1.

It should be noted that these designs do not consider instability of the subgrade due to localized soft, wet subgrade materials. Unstable materials will require undercutting and backfilling with Imported Structural Fill or Aggregate Base Material and possibly employment of geotextile fabric. The Geotechnical Engineer should be called on to observe all unstable areas and provide specific recommendations for their remediation.

2. **Dumpster Pad:** Heavy dumpster trucks exert concentrated dynamic wheel loads on pavements during trash pick up. This type of loading typically results in rutting of the base and subgrade materials and ultimately pavement failures. Therefore, we recommend that the pavement in the dumpster pickup and loading area (if applicable), to include the position of the truck's front wheels, consist of a minimum 6-inch-thick, mesh-reinforced concrete slab supported on at least a 6-inch layer of Aggregate Base Material, VDOT Type I, Size 21A, compacted to at least 95% of the Standard Proctor (ASTM D698).

3. **Pavement Subgrade Preparation and Verification:** For the construction of new pavements, we recommend that any soft, unstable and/or unsuitable materials be removed from the pavement areas and be replaced with Structural Fill or Aggregate Base Material. Subgrades should be thoroughly compacted. The stripped surface should be

proofrolled and carefully observed at the time of construction in order to aid in identifying any localized soft, unstable, or unsuitable materials. This material, where encountered, should be closely evaluated during construction and should be removed from below the pavement as recommended by the Geotechnical Engineer.

4.4 Drainage Considerations

Positive drainage away from the proposed building additions and pavements is an essential element in minimizing the adverse effects that water might have on the bearing soil's stability. Positive drainage should be provided around the perimeter of the building additions and pavement structures to minimize moisture infiltration into the foundation and/or subgrade soils. We recommend landscape areas adjacent to the building additions are provided with a fall of least six inches for the first ten feet outward from the building. We recommend that gutters be employed on these building additions and that gutter effluent be discharged away from the building additions or into the storm sewer system. Swales and ditches should be used around the perimeter of the pavements to prevent base and subgrade materials fro becoming excessively wet. Based on the anticipated finished grade elevations, underdrains for slabs and foundation drains for footings, except retaining walls, are not considered necessary for this project. Foundation and wall drains are recommended for retaining walls.

4.5 BMP Evaluation

Based on the results of our field and laboratory investigation and engineering analyses, the following commentary is presented relative to BMP design:

1. Two (2) 15-foot deep SPT borings (designated as BMP-1 and BMP-2) were drilled within the area proposed for the BMP expansion to ascertain the soil types and groundwater conditions. The BMP borings encountered deposits of moderate-permeability, Silty and Clayey, fine SANDS (SM and SC) to depths of 15 feet below existing grades. Groundwater was not encountered within 15 feet of the surface. Therefore, it is anticipated that the pond will tend to be dry if less than about 20 feet deep. If a wet pond is required, a 1.5-foot thick soil (Clay) liner or a synthetic liner could be employed. The BMP pond could employ an infiltration component. However, infiltration suitability and rates should be explored at the actual pond bottom elevations if this is to be a part of the BMP design.

2. The groundwater table was not encountered within the borings to the boring termination depth of 15 feet below existing grades.

3. The soils encountered within the top 15 feet in the expanded BMP facility were comprised of Silty and Clayey, fine SANDS (SM and SC) with layers of Sandy Lean CLAY (CL). Most of these materials are considered suitable for reuse as Structural Fill below the building additions and pavements, subject to the limitations of material suitability discussed in this report.

4.6 LID Evaluation

LID measures will be constructed in the parking lot islands. These facilities will have an infiltration component, if practical. The following commentary is presented relative to LID design:

1. **Infiltration Testing:** Four infiltration tests (designated as INF-1 through INF-4) were performed adjacent to boring locations PHA-1 through PHA-4 within the LID areas (refer to the attached boring location plan for the specific infiltration test locations). The infiltration test boreholes were prepared utilizing a planer auger to remove soil clippings from its base. The infiltration tests were performed at depths of 3 to 4 feet below existing site elevations. Infiltration testing was conducted within the vadose zone utilizing a Precision Permeameter. The hydraulic conductivity test results are summarized in Table 1 below. Complete data for the tests is included in Appendix VII.

Table 1 – Infiltration Test Results

Infiltration Test	SPT Boring	Test Depth (feet)	Silt and Clay (%)	Soil Classification	Hydraulic Conductivity (in/hr)
INF-1	PHA-1	3-4	50.5	CL	1.36
INF-2	PHA-2	3-4	22.0	SM	3.12
INF-3	PHA-3	3-4	35.5	SM	1.38
INF-4	PHA-4	3-4	39.7	SC	1.93

2. **Infiltration Suitability:** It appears that the Sands across the site possess a moderate permeability. The hydraulic conductivity of these Sands is anticipated to be on the order of 1 to 3 inches/hour. It appears that an infiltration component is feasible in these soils. However, the site does contain Clay layers at shallow depths. The suitability of the soils at the LID locations should be explored at the time of construction. Where restrictive Clay layers are present within a few feet of the infiltration swale bottom, it may be necessary to undercut the Clay and replace it with more porous material. As the groundwater table appears to be about 20 feet below the surface, it is not expected to present a restriction to infiltration.

3. **Borrow Fill:** The shallow soils encountered within the top 4 feet in the borings performed in the areas of the LID measures were predominately comprised of Silty, fine SAND (SM) with trace Clay; Clayey, fine SAND (SC); and borderline Clayey, fine SAND (SC)/ fine Sandy CLAY (CL). Most of these Sandy materials are considered suitable for reuse as Structural Fill below buildings and pavements, subject to the limitations of material suitability discussed in this report.

4.7 Subgrade Preparation and Earthwork Operations

1. **Stripping:** The subgrade preparation should consist of removing all topsoil, asphalt, unsuitable FILL materials, and any other soft or unsuitable material from the proposed 5-foot expanded building addition and 2-foot expanded pavement limits. Topsoil was observed to be up to 13 inches thick. Asphalt was observed to be 3 inches thick with an observed 6 to 9 inches of aggregate base material. Topsoil, root mat, asphalt, etc. may extend deeper in localized areas, and will likely require deeper stripping. Asphalt in areas planned for new paving can be left in place only if it is intact and will receive a minimum 1.5-inch asphalt overlay.

2. **Subgrade Preparation and Verification:** After stripping of topsoil, asphalt, and other deleterious materials and cutting to the desired grade, and prior to footing construction or Structural Fill placement, the cut surface should be observed by an experienced Geotechnical Engineer or his authorized representative. Proofrolling using a 5-ton drum roller or a loaded tandem axle dump truck having an axle weight of at least 10 tons should be performed at this time to aid in identifying localized soft or unsuitable material. Any soft or unsuitable materials encountered during subgrade inspection should be removed and replaced with an approved backfill (Structural Fill or Aggregate Base Material) compacted to the criteria outlined in the following paragraphs. Suitable materials which are excessively wet should be aerated, dried, and re-compacted to the specifications below. Existing subgrades should be moisture conditioned and compacted at this time. The contractor should be prepared to moisture condition soils within the surface layer during typically wet seasonal conditions.

3. **Subgrade and Structural Fill Compaction:** Existing subgrades as well as subsequent layers of Structural Fill should be properly compacted. We recommend that the existing subgrades to a depth of at least 8 inches and all Structural Fill be moisture conditioned to within +/- 3% of optimum moisture content then be compacted to a dry density at least 95% of that soil's Standard Proctor maximum dry density (ASTM D698). Structural Fill lifts should be a maximum of 8 inches in loose thickness. Field density testing of subgrades and each lift of fill should be performed at a rate of no less than one test per 2,500 square feet in the building addition areas and one test per 5,000 square feet in the pavement areas, but not less than 2 tests per lift. Compaction of natural subgrade surfaces may be waived by the Geotechnical Engineer if they are observed to be stable during proofrolling inspection.

4. **Trench and Excavation Backfill:** All utility trench backfill should be adequately compacted. Utility trench backfill, as well as backfill above footings, below slabs, and in structural areas behind retaining walls, should be placed in 4 to 8-inch loose lifts, moisture conditioned to within +/- 3% of optimum moisture content, then be compacted to a dry density at least 95% of that soil's Standard Proctor maximum dry density (ASTM D698). Field density testing of trench backfill should be performed at a rate of no less than one test per 50 linear feet of trench, but not less than 1 test per lift. Based on the

soil boring data, the groundwater table is not expected to impact utility excavations; however, perched water may be encountered depending upon seasonal conditions at the time of construction. Trench backfill in building area excavations with difficult access can consist of No. 57 Stone separated from overlying soil backfill with a non-woven, geotextile filter fabric.

5. The following Structural Fill types are recommended for use on this project:

   On-Site Borrow Structural Fill: Soil Material classified as SAND (SM, SC, SP, or better) or CLAY (CL) with a maximum 60% passing the No. 200 Sieve and which is free of organics and debris. Most soils excavated on site from within the top 10 feet will consist of Silty and Clayey SANDS (SM and SC) or Sandy Lean CLAY (CL) considered suitable for reuse as Structural Fill below the building additions and pavements. Clay soils may be difficult to work during adverse seasonal conditions.

   Imported Structural Fill: Soil Material classified as SM, SP, or better containing a maximum of 15% by weight Silt and free of organics and debris. Maximum aggregate size should be limited to 4 inches.

   Porous Fill: VDOT Size No. 57 Stone or clean SAND (SP or SW) with a maximum 5% fines (Silt and Clay) employed in a minimum 4-inch layer or Aggregate Base Material, VDOT Type I, Size 21A employed in a minimum 6-inch layer.

   Footing Backfill or backfill in areas which compaction equipment cannot access: VDOT Size No. 57 Stone placed at the direction of the Geotechnical Engineer.

   It is recommended that all materials to be used for Structural Fill be analyzed and approved by the Geotechnical Engineer prior to their use on the site.

4.8 Earthwork Considerations

1. The surface of the site may be seasonally wet. A contingency for scarifying, aerating, and drying the soils of this layer where they are observed to be excessively wet should be included in the contractor's budget. Where drying of these soils cannot be achieved due to prevailing weather conditions, undercutting will be required

2. If clearing is attempted during wet seasonal conditions, substantial disturbance to the subgrade will likely occur. The contractor should exercise care during clearing and stripping to minimize subgrade disturbance as rutting of the subgrade will result in contamination of otherwise suitable soils with topsoil and organic debris. The use of tracked equipment should help minimize subgrade deterioration during wet conditions.

3. Exposure to the environment and construction activity may weaken the subgrade soils if stripped subgrade surfaces or excavations are exposed to inclement weather or trenches

remain open for too long a time. Therefore, Structural Fill, Aggregate Base Material, and foundation/slab concrete should be placed as early in the construction stages as practical to minimize subgrade exposure. With regard to foundation construction, concrete should be placed the same day that excavations are made (or as soon as practicable). If bearing soils are softened by surface water intrusion or exposure, the softened soils must be dried out and recompacted or removed and replaced as deemed necessary by the Geotechnical Engineer.

4. Proper clearing and stripping, subgrade preparation, and compaction control of new Structural Fill are essential aspects of this project. Structural Fill materials should be placed, compacted, and tested in accordance with the recommendations contained in this report. We recommend that all cut and fill operations be observed by a representative of the Geotechnical Engineer to determine if minimum earthwork and compaction requirements are being met.

5. It would be most desirable to perform initial earthwork operations on this site during the drier seasonal conditions that typically extend from May through October. In this manner, material that otherwise will require removal or drying and reworking could possibly be left in place below new fills.

6. In a dry and undisturbed state, the subgrade soils at the site will provide moderate subgrade support for fill placement and construction operations. When wet, this soil will degrade quickly either with or without disturbance from contractor operations. Therefore, good site drainage should be maintained during earthwork operations so as to help maintain the stability of the soil. We recommend that the design depths of stone be placed in the pavement areas early in the construction to help protect the subgrades.

7. In Federal Register, Volume 54, No. 209 (October, 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better insure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that all excavations, whether they be utility trenches, basement excavation or footing excavations, be constructed in accordance with the new (OSHA) guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties. The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. We are providing this information solely as a service to our client. **G E T Solutions, Inc.** is not assuming responsibility for construction site safety or

the contractor's activities; such responsibility is not being implied and should not be inferred.

5.0 LIMITATIONS

This report has been prepared for the client for use in developing geotechnical related design and construction specifications for the project. The recommendations submitted are based on the soil information obtained by **G E T Solutions, Inc.** and the information supplied by the client and its consultants for the proposed project. Should project or site characteristics differ from those anticipated herein or should unforeseen conditions be encountered during construction, this company should be informed so that the conditions can be reviewed. The findings of such a review should be received as an addendum to this report.

After the plans and specifications are more complete, the Geotechnical Engineer should be provided the opportunity to review the final design plans and specifications to assure our engineering recommendations have been properly incorporated into the design documents and that the earthwork and foundation recommendations have been properly interpreted and implemented. At that time, it may be necessary to submit supplementary recommendations.

We recommend that the construction activities be monitored by a qualified Geotechnical Engineering firm to provide the necessary overview and to check the suitability of the subgrade soils for supporting the footings and slabs. If **G E T Solutions, Inc.** is not retained to perform these functions, **G E T Solutions, Inc.** cannot be responsible for the impact of those conditions on the geotechnical recommendations for the project.

The Geotechnical Engineer warrants that the findings, recommendations, specifications or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

This report has been prepared for the exclusive use of **St. Olaf Catholic Church** and its consultants for the specific application to the proposed Additions to St. Olaf Catholic Church project located in James City County, Virginia.

APPENDICES

I. BORING LOCATION PLAN

II. BORING LOGS

III. GENERALIZED SOIL PROFILE

IV. CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

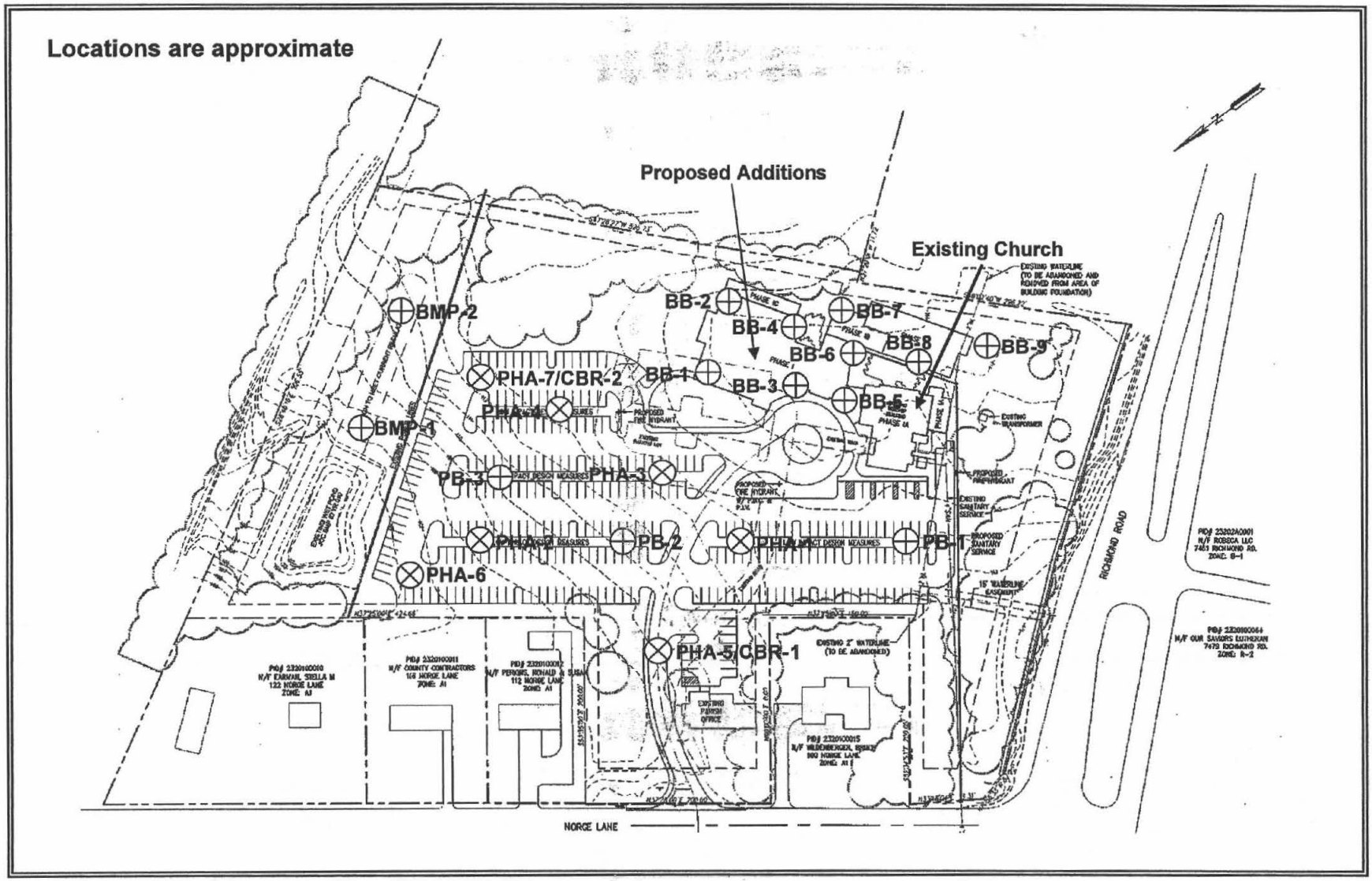
V. SUMMARY OF SOIL BORING LABORATORY TEST DATA

VI. SUMMARY OF CBR TEST DATA

VII. INFILTRATION TEST DATA SHEETS

APPENDIX I
BORING LOCATION PLAN

ADDITIONS TO ST. OLAF CATHOLIC CHURCH
GET PROJECT NO. WM08-236G



APPENDIX II

BORING LOGS

GET Solutions, Inc.
Geotechnical · Environmental · Testing

BORING LOG
BB-1

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 10/15/2008
DEPTH TO WATER - INITIAL*: ▽ 20.0' **AFTER 24 HOURS:** ▽ NT **CAVING>** ∠

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	3 inches of Asphalt (0.25)							
			9 inches of Stone (1')		1	24	SS	11 8 6 6	19	
			Orangish brown, moist, Silty, fine SAND (SM) with trace Clay, Medium Dense to Loose		2	24	SS	3 3 4 6	7	
		5	Mottled, orangish brown-reddish brown, moist, fine Sandy CLAY (CL), Stiff to Very Stiff (4)		3	24	SS	4 6 6 7	12	54
	2				4	24	SS	5 7 9 8	16	
			Orangish brown and reddish brown, moist, Clayey, fine SAND (SC), Medium Dense (8)		5	24	SS	6 6 7 6	13	
		10	Tannish brown, moist, Silty, fine SAND (SM), Loose (10)		6	24	SS	3 5 4 6	9	
	4		Gray and reddish brown, moist, Silty, fine SAND (SM) with Clay seams, Medium Dense (12)		7	24	SS	4 7 6 5	13	
		15								
	6	20 ▽	wet below 20 feet		8	24	SS	3 6 8 4	14	
			Reddish brown, wet, Silty, fine SAND (SM) with trace Clay from 32 to 35 feet, Medium Dense to Loose (22)		9	24	SS	5 5 7 6	12	
		25								
	8				10	24	SS	4 6 5 7	11	
		30								
	10				11	24	SS	3 5 5 5	10	
		35	Boring terminated at 35 ft.							

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.

Geotechnical • Environmental • Testing

BORING LOG
BB-2

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 10/15/2008
DEPTH TO WATER - INITIAL*: ▽ 20.0' **AFTER 24 HOURS:** ▽ NT **CAVING>** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	8 inches of Topsoil (0.67')							
			Tannish brown, moist, Silty, fine SAND (SM), Very Loose (2')		1	24	SS	1 2 2 3	4	
			Orangish brown, moist, Silty, fine SAND (SM) with trace Clay, Very Loose to Loose		2	24	SS	1 1 1 1	2	17
		5			3	24	SS	2 2 3 3	5	
	2		Gray and reddish brown, moist, Silty, fine SAND (SM) with Clay seams from 6 to 8 feet, Loose to Medium Dense (6')		4	24	SS	4 5 5 6	10	
		10			5	24	SS	5 7 8 8	15	
			Orangish brown and tannish brown to tannish brown, moist, Silty, fine SAND (SM), Loose (10')		6	24	SS	4 4 5 6	9	
	4	15			7	24	SS	4 4 4 4	8	
			Mottled, orangish brown-gray, moist, fine Sandy Lean CLAY (CL), Medium Stiff (17')		8	24	SS	3 3 5 5	8	
	6	20 ▽	wet below 20 feet							
			Reddish brown, wet, poorly graded SAND (SP-SC) with trace Clay, Medium Dense (22')		9	24	SS	4 6 6 5	12	
		25								
	8		Gray and reddish brown to reddish brown, wet, Silty, fine SAND (SM) with Clay seams from 27 to 32 feet, Loose to Medium Dense (27')		10	24	SS	5 5 5 5	10	
		30								
	10				11	24	SS	3 8 6 6	14	
		35	Boring terminated at 35 ft.							

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.

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BORING LOG BB-3

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 10/15/2008
DEPTH TO WATER - INITIAL*: ▽ 20.0' **AFTER 24 HOURS:** ▽ NT **CAVING>** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	13 inches of Topsoil							
			1.08 Orangish brown, moist, Silty, fine SAND (SM) with trace Clay, Loose		1	24	SS	1 2 4 4	6	
					2	24	SS	3 2 3 2	5	
			4 Orangish brown, moist, fine Sandy Lean CLAY (CL), Stiff to Very Stiff		3	24	SS	3 4 5 5	9	
	2	5			4	24	SS	6 8 9 8	17	
					5	24	SS	5 9 7 8	16	
		10	10 Tan to orangish brown, moist, Silty, fine SAND (SM) with trace Clay, Loose		6	24	SS	4 5 4 4	9	
	4				7	24	SS	3 3 6 8	9	
		15								
			17 Gray and reddish brown, moist, poorly graded SAND (SP-SM) with trace Silt and Clay, Medium Dense		8	24	SS	5 5 6 6	11	12
	6	20 ▽	wet below 20 feet							
					9	24	SS	4 4 6 5	10	
		25								
	8				10	24	SS	3 6 5 5	11	
		30								
	10				11	24	SS	4 4 7 6	11	
		35	Boring terminated at 35 ft.							

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.

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BORING LOG BB-4

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 10/15/2008
DEPTH TO WATER - INITIAL*: ▽ 20.0' **AFTER 24 HOURS:** ▽ NT **CAVING>** ⊏

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	10 inches of Topsoil (0.83)							
			Tannish brown, moist, Silty, fine SAND (SM) with trace organics from 2 to 4 feet, Very Loose		1	24	SS	1 1 1 1	2	
					2	24	SS	1 2 1 1	3	
		5	Orangish brown, moist, Silty, fine SAND (SM) with trace Clay, Very Loose (4)		3	24	SS	1 2 1 2	3	
	2		Grayish brown to orangish brown, moist, fine Sandy Lean CLAY (CL), Medium Stiff to Stiff (6)		4	24	SS	2 3 4 4	7	
		10			5	24	SS	4 6 8 8	14	
					6	24	SS	3 6 5 5	11	
	4		Tan, moist, Silty, fine SAND (SM), Medium Dense (12)		7	24	SS	4 7 8 7	15	
		15								
	6		Gray and reddish brown to reddish brown, moist, Silty, fine SAND (SM) with Clay seams from 17 to 22 feet, Medium Dense (17)		8	24	SS	3 5 10 11	15	
		20 ▽	wet below 20 feet							
		25			9	24	SS	3 5 5 4	10	
	8				10	24	SS	5 5 6 6	11	
		30								
	10				11	24	SS	3 4 7 6	11	
		35	Boring terminated at 35 ft.							

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG
BB-5

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia
PROJECT NO.: WM08-236G
BORING LOCATION: See Attached Boring Location Plan
SURFACE ELEVATION:
DRILLER: GET Solutions, Inc.
LOGGED BY: SP
DRILLING METHOD: Rotary Wash "Mud" Drilling
DATE: 10/15/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	9 inches of Topsoil (0.75)		1	24	SS	1 4 3 4	7	
			Orangish brown, moist, Silty, fine SAND (SM) with trace Clay and organics, Loose (2)							
			Orangish brown to mottled, orangish brown-reddish brown, moist, fine Sandy Lean CLAY (CL), Stiff		2	24	SS	4 5 7 6	12	54
		5			3	24	SS	6 8 8 9	16	
	2				4	24	SS	3 6 8 7	14	
		10			5	24	SS	4 6 6 5	12	
			Orangish brown, moist, Silty, fine SAND (SM), Medium Dense (10)		6	24	SS	5 8 9 8	17	
	4		Gray and reddish brown to reddish brown, moist, Silty, fine SAND (SM) with Clay seams from 12 to 17 feet, Loose to Medium Dense (12)		7	24	SS	3 5 4 6	9	
		15								
	6	20			8	24	SS	5 5 8 7	13	
			Boring terminated at 20 ft.							
		25								
	8									
		30								
	10									
		35								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG
BB-6

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 10/15/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	12 inches of Topsoil							
			Tannish brown, moist, Silty, fine SAND (SM), Medium Dense		1	24	SS	3 8 8 6	16	
			Orangish brown, moist, Silty, fine SAND (SM) with trace Clay, Very Loose		2	24	SS	1 2 1 2	3	
		5	Orangish brown to mottled, orangish brown-tan, moist, fine Sandy Lean CLAY (CL), Soft to Stiff		3	24	SS	1 2 2 4	4	
	2				4	24	SS	4 7 7 8	14	
			Mottled, reddish brown-orangish brown, moist, fine Sandy Lean CLAY (CL), Stiff		5	24	SS	6 7 8 8	15	
		10	Gray and reddish brown, moist, Silty, fine SAND (SM), Medium Dense		6	24	SS	6 8 7 9	15	
	4		Reddish brown, moist, Clayey, fine SAND (SC), Loose to Medium Dense		7	24	SS	3 5 5 5	10	47
		15								
	6	20			8	24	SS	4 7 8 9	15	
			Boring terminated at 20 ft.							
	8	25								
		30								
	10	35								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG
BB-7

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 10/15/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>**

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	10 inches of Topsoil (0.83)							
			Brown, moist, Clayey, fine SAND (SC) with trace organics, Loose (2)		1	24	SS	1 2 3 2	5	42
			Orangish brown, moist, Silty, fine SAND (SM) with trace Clay, Very Loose to Loose		2	24	SS	1 2 1 1	3	
		5			3	24	SS	1 3 3 4	6	
	2		Orangish brown to mottled, orangish brown-gray, moist, fine Sandy Lean CLAY (CL), Stiff to Very Stiff (6)		4	24	SS	3 5 5 8	10	
		10			5	24	SS	4 8 8 10	16	
			Gray and reddish brown, moist, Silty, fine SAND (SM) with Clay seams, Medium Dense (10)		6	24	SS	5 7 9 6	16	
	4		Tan, moist, Silty, fine SAND (SM), Medium Dense (12)		7	24	SS	3 5 7 7	12	
		15	Boring terminated at 15 ft.							
	6	20								
		25								
	8									
		30								
	10									
		35								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG
BB-8

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 10/15/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>**

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0								
			6 inches of Topsoil (0.5)							
			Brown to orangish brown, moist, Silty, fine SAND (SM) with trace Clay and organics, Medium Dense to Loose		1	24	SS	6 12 9 6	21	
					2	24	SS	3 3 2 2	5	
			Mottled, orangish brown-tannish brown, moist, fine Sandy Lean CLAY (CL), Stiff to Very Stiff (4)		3	24	SS	3 5 8 10	13	
	2	5			4	24	SS	8 9 16 12	25	
			Orangish brown, moist, Silty, fine SAND (SM), Medium Dense (8)		5	24	SS	8 9 7 6	16	
		10	Gray and reddish brown, moist, Silty, fine SAND (SM) with Clay seams, Medium Dense to Loose (10)		6	24	SS	5 6 6 7	12	
	4				7	24	SS	3 3 5 4	8	
		15	Boring terminated at 15 ft.							
	6	20								
		25								
	8									
		30								
	10									
		35								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG
BB-9

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 10/15/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	10 inches of Topsoil (0.83')							
			Orangish brown, moist, Silty, fine SAND (SM) with trace Clay and organics, Loose (2')		1	24	SS	1 2 3 2	5	
			Orangish brown to mottled, orangish brown-tannish brown, moist, fine Sandy Lean CLAY (CL), Stiff to Very Stiff		2	24	SS	3 5 5 6	10	63
		5			3	24	SS	6 7 13 14	20	
	2				4	24	SS	7 10 14 13	24	
					5	24	SS	6 9 12 10	21	
		10	Orangish brown and tannish brown to reddish brown, moist, Silty, fine SAND (SM) with trace Clay, Medium Dense to Loose (10')		6	24	SS	4 8 5 6	13	
	4									
		15			7	24	SS	4 3 5 4	8	
			Boring terminated at 15 ft.							
	6	20								
		25								
	8									
		30								
	10									
		35								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

This information pertains only to this boring and should not be interpreted as being indictive of the site.

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG
BMP-1

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 10/16/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0								
			8 inches of Topsoil (0.67)		1	24	SS	1 1 1 1	2	
			Tannish brown, moist, Silty, fine SAND (SM), Very Loose (2)							
			Orangish brown, moist, Silty, fine SAND (SM) with trace Clay, Very Loose (4)		2	24	SS	1 1 2 2	3	
		5	Tan, moist, Silty, fine SAND (SM), Loose		3	24	SS	2 2 4 4	6	
	2				4	24	SS	2 4 2 3	6	
					5	24	SS	3 4 4 5	8	
		10			6	24	SS	4 5 5 5	10	
			Reddish brown, moist, Silty, fine SAND (SM) with Clay seams, Loose (12)							
	4				7	24	SS	4 4 3 4	7	
		15	Boring terminated at 15 ft.							
	6	20								
		25								
	8									
		30								
	10									
		35								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG
BMP-2

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 10/16/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	6 inches of Topsoil (0.5)							
			Brown, moist, Silty, fine SAND (SM) with trace Clay and organics, Very Loose (2)		1	24	SS	1 1 1 1	2	
			Orangish brown, moist, Clayey, fine SAND (SC), Loose (4)		2	24	SS	1 3 5 6	8	41
	2	5	Tannish brown, moist, Silty, fine SAND (SM), Loose		3	24	SS	4 3 3 3	6	
					4	24	SS	3 5 3 4	8	
		10	Mottled, reddish brown-orangish brown, moist, fine Sandy Lean CLAY (CL), Very Stiff (8)		5	24	SS	6 8 9 9	17	
	4		Tannish brown, moist, Silty, fine SAND (SM), Medium Dense (10)		6	24	SS	3 6 5 6	11	
			Reddish brown, moist, Silty, fine SAND (SM) with Clay seams, Loose (12)							
		15			7	24	SS	3 5 3 4	8	
			Boring terminated at 15 ft.							
	6	20								
		25								
	8									
		30								
	10									
		35								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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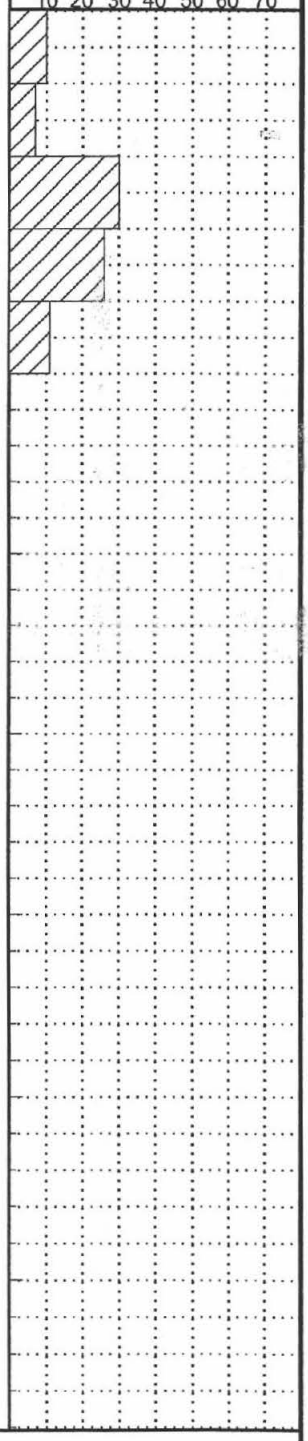
BORING LOG
PB-1

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling **DATE:** 10/16/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	11 inches of Topsoil (0.92)							
			Brown, moist, Silty, fine SAND (SM) with trace Clay and organics, Loose (2)		1	24	SS	3 4 6 4	10	
			Mottled, orangish brown-reddish brown, moist, fine Sandy Lean CLAY (CL), Medium Stiff to Very Stiff		2	24	SS	2 3 4 6	7	
	2	5			3	24	SS	10 15 15 12	30	
					4	24	SS	11 16 10 8	26	
			Orangish brown, moist, Silty, fine SAND (SM) with trace Clay, Medium Dense (8)		5	24	SS	5 6 5 5	11	
		10	Boring terminated at 10 ft.							
	4	15								
	6	20								
		25								
	8									
		30								
	10									
		35								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70



Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG PB-2

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 10/16/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>**

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	6 inches of Topsoil (0.5)		1	24	SS	2 3 5 4	8	
			Brown, moist, Silty, fine SAND (SM) with trace Clay and organics, Loose (2)		2	24	SS	3 3 3 4	6	
			Orangish brown to tannish brown, moist, Silty, fine SAND (SM) with trace Clay, Loose to Medium Dense		3	24	SS	4 7 5 6	12	
	2	5			4	24	SS	5 7 10 10	17	
					5	24	SS	7 11 9 6	20	
		10	Boring terminated at 10 ft.							
	4	15								
	6	20								
		25								
	8									
		30								
	10									
		35								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.

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BORING LOG PB-3

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling — **DATE:** 10/16/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	4 inches of Topsoil (0.33)							
			Brown, moist, Silty, fine SAND (SM) with trace Clay and organics, Loose (2)		1	24	SS	3 4 6 4	10	
	1		Orangish brown to orangish brown and reddish brown, moist, Silty, fine SAND (SM) with trace Clay from 6 to 8 feet, Loose to Medium Dense		2	24	SS	2 2 3 3	5	
		5			3	24	SS	2 3 6 7	9	
	2				4	24	SS	6 6 12 9	18	
		10			5	24	SS	5 9 11 10	20	
			Boring terminated at 10 ft.							
	4	15								
	6	20								
		25								
	8									
		30								
	10									
		35								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG
PHA-1

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Hand Auger — **DATE:** 10/16/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>**

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200	TEST RESULTS (Plastic Limit ⊢ Liquid Limit; Moisture Content - ●; N-Value - ▨; 10 20 30 40 50 60 70)
	0	0	7 inches of Topsoil (0.58)								
			Brown, moist, Silty, fine SAND (SM) with trace Clay and organics (2)								
			Orangish brown, moist, Silty, fine SAND (SM) (4)								
		5	Orangish brown, moist, fine Sandy Lean CLAY (CL)							51	
	2		Boring terminated at 6 ft.								
		10									
	4										
		15									
	6	20									
		25									
	8										
		30									
	10										
		35									

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG PHA-2

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia
PROJECT NO.: WM08-236G
BORING LOCATION: See Attached Boring Location Plan
SURFACE ELEVATION:
DRILLER: GET Solutions, Inc.
LOGGED BY: SP
DRILLING METHOD: Hand Auger
DATE: 10/16/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>**

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	5 inches of Topsoil (0.42)							
			Brownish tan, moist, Silty, fine SAND (SM) with trace Clay and organics (2)							
			Orangish brown, moist, Silty, fine SAND (SM) with trace Clay from 5 to 6 feet							22
		5								
	2		Boring terminated at 6 ft.							
		10								
	4									
		15								
	6	20								
		25								
	8									
		30								
	10									
		35								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.

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BORING LOG
PHA-3

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia
PROJECT NO.: WM08-236G
BORING LOCATION: See Attached Boring Location Plan
SURFACE ELEVATION:
DRILLER: GET Solutions, Inc.
LOGGED BY: SP
DRILLING METHOD: Rotary Wash "Mud" Drilling
DATE: 10/16/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0								
			3 inches of Asphalt (0.25)							
			6 inches of Stone (0.75)		1	24	SS	7 5 3	12	
			Orangish brown, moist, Silty, fine SAND (SM) with trace Clay, Medium Dense to Loose (4)		2	24	SS	3 3 4 4	7	
		5	Orangish brown and reddish brown, moist, Clayey, fine SAND (SC), Loose		3	24	SS	2 4 6 6	10	36
	2		Boring terminated at 6 ft.							
		10								
	4									
		15								
	6	20								
		25								
	8									
		30								
	10									
		35								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.

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BORING LOG
PHA-4

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Hand Auger — **DATE:** 10/16/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>**

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200	TEST RESULTS (Plastic Limit ⊢ Liquid Limit; Moisture Content - ●; N-Value - ▨; 10 20 30 40 50 60 70)
	0	0	6 inches of Topsoil								
			Brown, moist, Silty, fine SAND (SM) with trace Clay and organics (0.5)								
			Orangish brown, moist, Silty, fine SAND (SM) with trace Clay (1)								
		5	Tan, moist, Clayey, fine SAND (SC) (4)							40	● ⊢
	2		Boring terminated at 6 ft.								
		10									
	4	15									
	6	20									
		25									
	8	30									
	10	35									

Notes:

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

*The initial groundwater reading may not be indicative of the static groundwater level.

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.

Geotechnical • Environmental • Testing

BORING LOG
PHA-5

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia
PROJECT NO.: WM08-236G
BORING LOCATION: See Attached Boring Location Plan
SURFACE ELEVATION:
DRILLER: GET Solutions, Inc.
LOGGED BY: SP
DRILLING METHOD: Hand Auger
DATE: 10/16/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>**

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200	TEST RESULTS (Plastic Limit ⊢ Liquid Limit; Moisture Content - ●; N-Value - ▨; 10 20 30 40 50 60 70)
	0	0	10 inches of Topsoil								
			0.83 Brown, moist, Silty, fine SAND (SM) with trace Clay and organics								
			2 Orangish brown, moist, Silty, fine SAND (SM) with trace to little Clay								
		5									
	2		Boring terminated at 6 ft.								
		10									
	4										
		15									
	6	20									
		25									
	8										
		30									
	10										
		35									

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.

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BORING LOG
PHA-6

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia
PROJECT NO.: WM08-236G
BORING LOCATION: See Attached Boring Location Plan
SURFACE ELEVATION:
DRILLER: GET Solutions, Inc.
LOGGED BY: SP
DRILLING METHOD: Hand Auger
DATE: 10/16/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>**

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200	TEST RESULTS (Plastic Limit ⊢ Liquid Limit; Moisture Content - ●; N-Value - ▨; 10 20 30 40 50 60 70)
	0	0	6 inches of Topsoil								
			Brownish tan, moist, Silty, fine SAND (SM) with trace Clay and organics (0.5)								
			Orangish brown, moist, Silty, fine SAND (SM) with trace Clay								
		5									
	2		Boring terminated at 6 ft.								
		10									
	4										
		15									
	6	20									
		25									
	8										
		30									
	10										
		35									

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes:

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.

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BORING LOG
PHA-7

PROJECT: Additions to St. Olaf Catholic Church
CLIENT: St. Olaf Catholic Church
PROJECT LOCATION: James City County, Virginia — **PROJECT NO.:** WM08-236G
BORING LOCATION: See Attached Boring Location Plan — **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc. — **LOGGED BY:** SP
DRILLING METHOD: Hand Auger — **DATE:** 10/16/2008
DEPTH TO WATER - INITIAL*: NE **AFTER 24 HOURS:** NT **CAVING>**

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200	TEST RESULTS (Plastic Limit ⊢ Liquid Limit; Moisture Content - ●; N-Value - ▨; 10 20 30 40 50 60 70)
	0	0	8 inches of Topsoil								
			0.67 Tan, moist, Silty, fine SAND (SM) with trace Clay and organics								
			2 Orangish brown, moist, Silty, fine SAND (SM) with trace to little Clay								
		5									
	2		Boring terminated at 6 ft.								
		10									
	4										
		15									
	6	20									
		25									
	8										
		30									
	10										
		35									

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes:

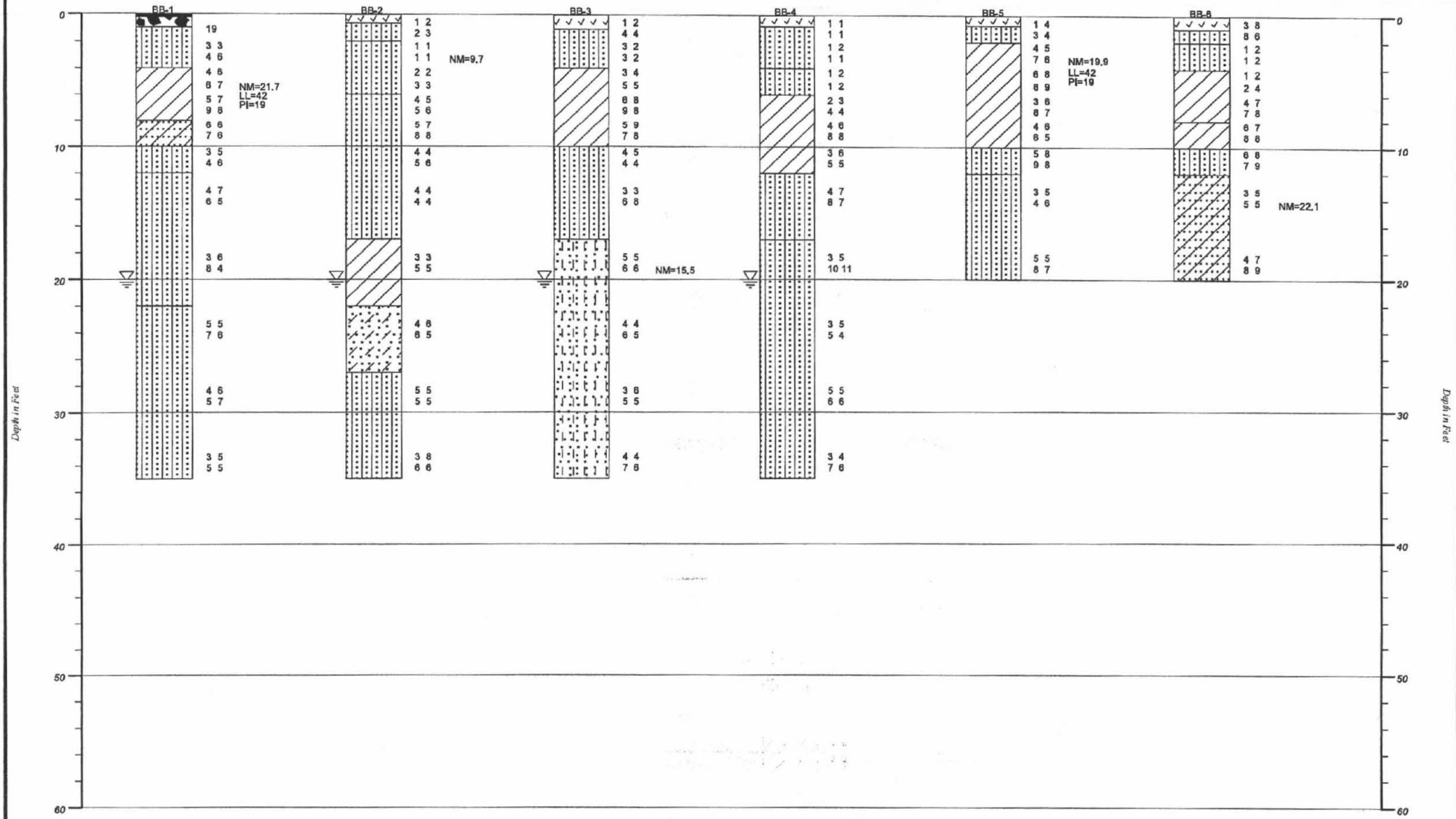
*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

APPENDIX III

GENERALIZED SOIL PROFILE



Strata symbols

- Paving
- Gravel
- Silty Sand
- Lean Clay
- Clayey Sand
- Topsoil
- Poorly graded Sand with Clay
- Poorly graded Sand with Silt

GET Solutions, Inc.

GENERALIZED SOIL PROFILE

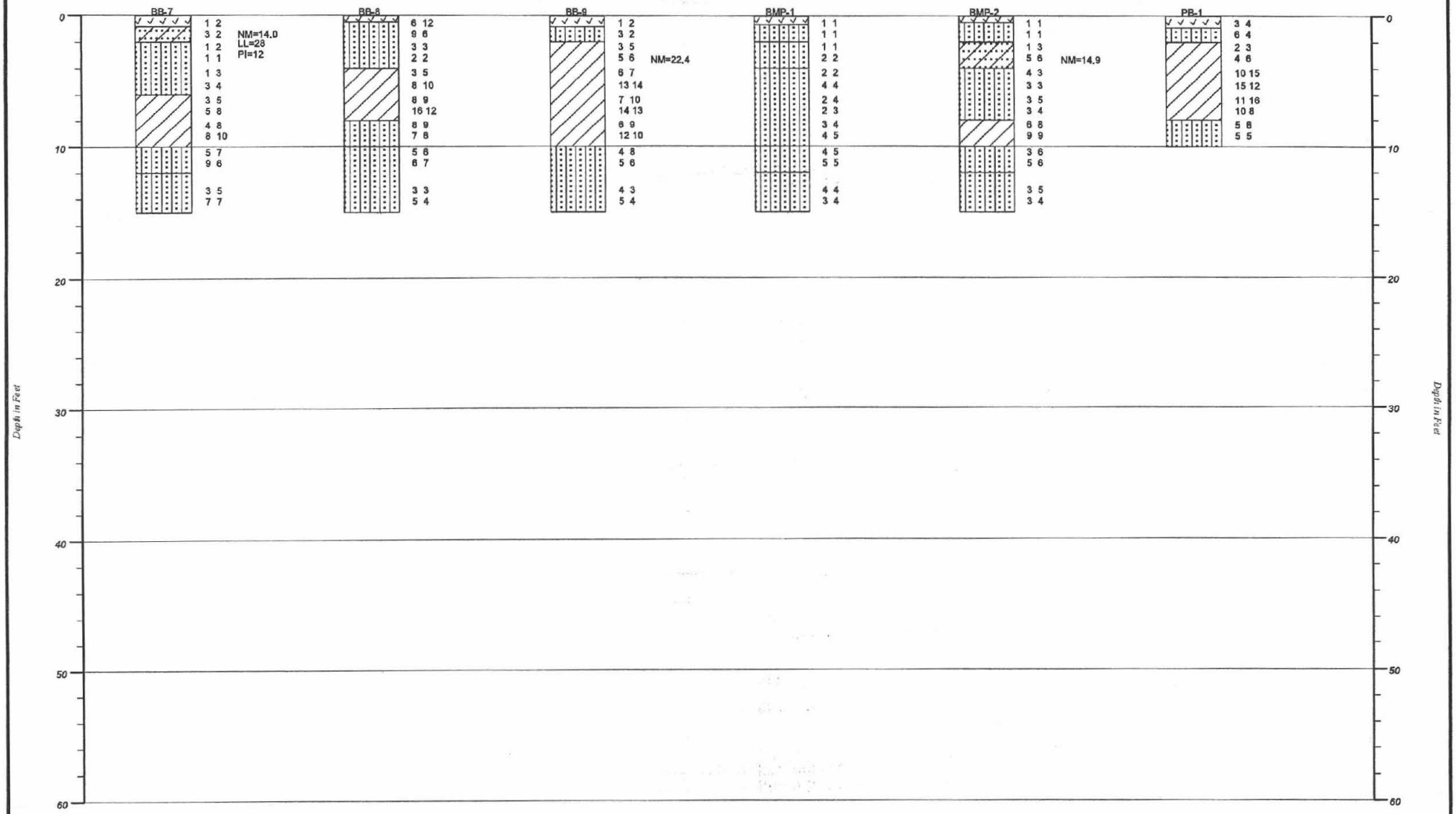
HORIZONTAL SCALE: VERTICAL SCALE: 1"=10'	DRAWN BY/APPROVED BY	DATE DRAWN
	SP	11/26/2008

Additions to St. Olaf Catholic Church

James City County, Virginia

PROJECT NO. WM08-236G

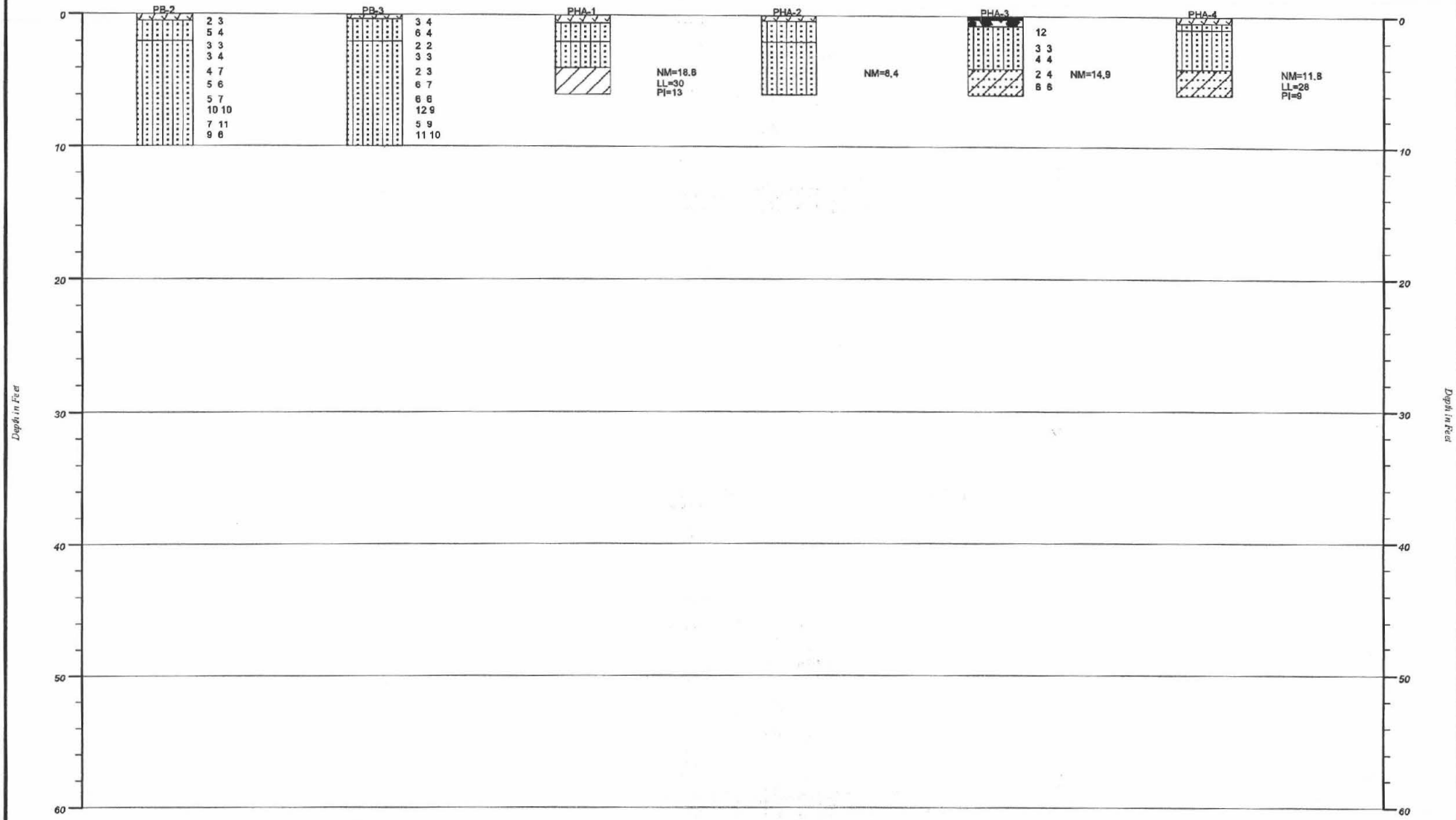
FIGURE NUMBER 1



Strata symbols

- Paving
- Gravel
- Silty Sand
- Lean Clay
- Clayey Sand
- Topsoil
- Poorly graded Sand with Clay
- Poorly graded Sand with Silt

GET Solutions, Inc. GENERALIZED SOIL PROFILE		
HORIZONTAL SCALE: VERTICAL SCALE: 1"=10'	DRAWN BY/APPROVED BY SP	DATE DRAWN 11/26/2008
Additions to St. Olaf Catholic Church James City County, Virginia		
PROJECT NO. WM08-236G		FIGURE NUMBER 2



Strata symbols

- Paving
- Gravel
- Silty Sand
- Lean Clay
- Clayey Sand
- Topsoil
- Poorly graded Sand with Clay
- Poorly graded Sand with Silt

GET Solutions, Inc.

GENERALIZED SOIL PROFILE

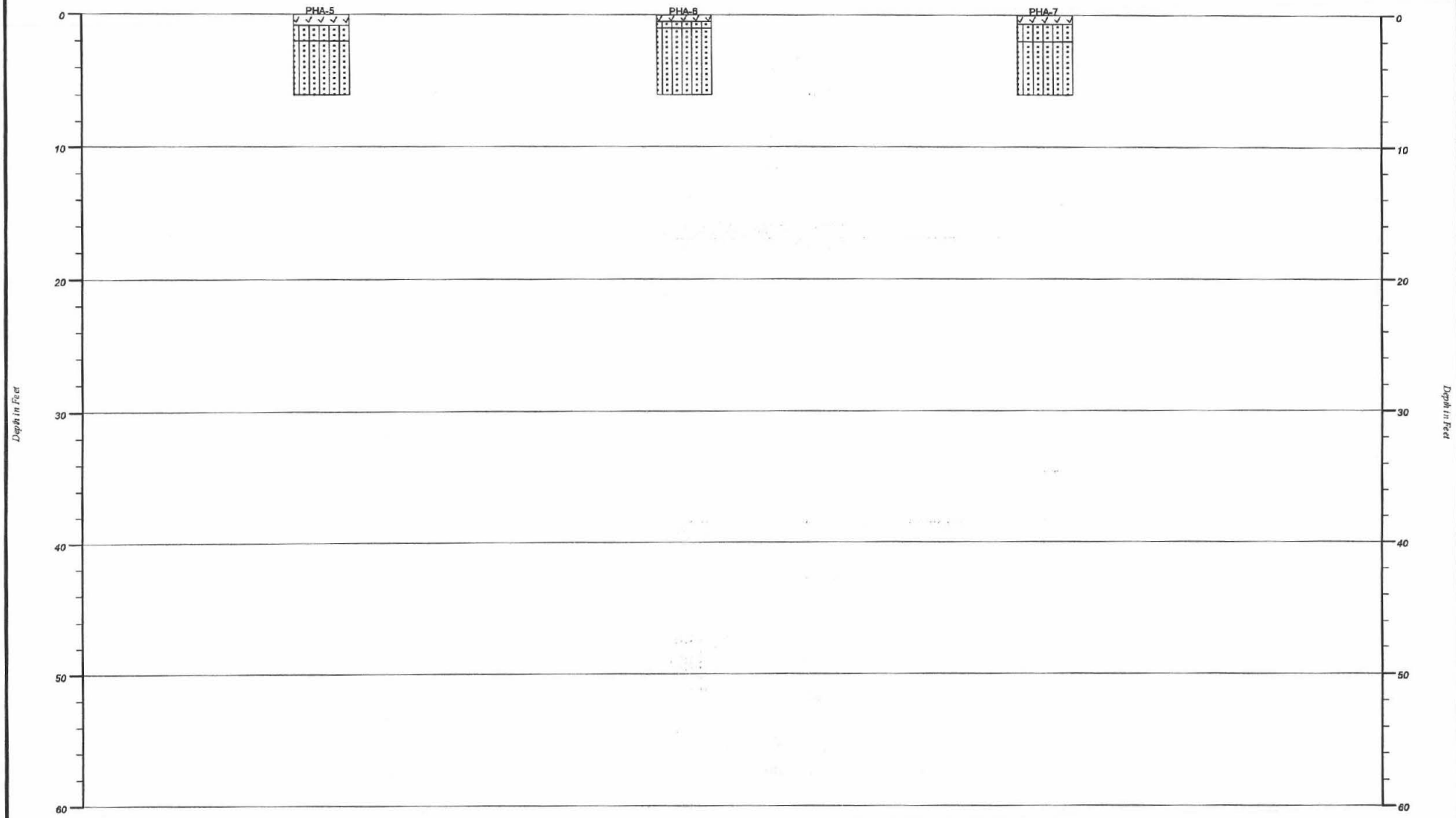
HORIZONTAL SCALE:	DRAWN BY/APPROVED BY	DATE DRAWN
VERTICAL SCALE: 1"=10'	SP	11/26/2008

Additions to St. Olaf Catholic Church

James City County, Virginia

PROJECT NO. WM08-236G

FIGURE NUMBER 3



Strata symbols

- Paving
- Gravel
- Silty Sand
- Lean Clay
- Clayey Sand
- Topsoil
- Poorly graded Sand with Clay
- Poorly graded Sand with Silt

GET Solutions, Inc.

GENERALIZED SOIL PROFILE

HORIZONTAL SCALE:	DRAWN BY/APPROVED BY	DATE DRAWN
VERTICAL SCALE: 1"=10'	SP	11/26/2008

Additions to St. Olaf Catholic Church

James City County, Virginia

PROJECT NO. WM08-236G

FIGURE NUMBER 4

APPENDIX IV

CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

GET Solutions, Inc.
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Virginia Beach Office
204 Grayson Road
Virginia Beach, VA 23462
(757) 518-1703

Williamsburg Office
1592 Penniman Rd. Suite E
Williamsburg, Virginia 23185
(757) 564-6452

Elizabeth City Office
504 East Elizabeth St. Suite 2
Elizabeth City, NC 27909
(252) 335-9765

CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

Standard Penetration Test (SPT), N-value

Standard Penetration Tests (SPT) were performed in the field in general accordance with ASTM D 1586. The soil samples were obtained with a standard 1.4" I.D., 2" O.D., 30" long split-spoon sampler. The sampler was driven with blows of a 140 lb. hammer falling 30 inches. The number of blows required to drive the sampler each 6-inch increment (4 increments for each soil sample) of penetration was recorded and is shown on the boring logs. The sum of the second and third penetration increments is termed the SPT N-value.

NON COHESIVE SOILS

(SILT, SAND, GRAVEL and Combinations)

Relative Density

Very Loose	4 blows/ft. or less
Loose	5 to 10 blows/ft.
Medium Dense	11 to 30 blows/ft.
Dense	31 to 50 blows/ft.
Very Dense	51 blows/ft. or more

Particle Size Identification

Boulders	8 inch diameter or more	
Cobbles	3 to 8 inch diameter	
Gravel	Coarse	1 to 3 inch diameter
	Medium	$^1/_2$ to 1 inch diameter
	Fine	$^1/_4$ to $^1/_2$ inch diameter
Sand	Coarse	2.00 mm to $^1/_4$ inch (diameter of pencil lead)
	Medium	0.42 to 2.00 mm (diameter of broom straw)
	Fine	0.074 to 0.42 mm (diameter of human hair)
Silt		0.002 to 0.074 mm (cannot see particles)

COHESIVE SOILS

(CLAY, SILT and Combinations)

Consistency

Very Soft	2 blows/ft. or less
Soft	3 to 4 blows/ft.
Medium Stiff	5 to 8 blows/ft.
Stiff	9 to 15 blows/ft.
Very Stiff	16 to 30 blows/ft.
Hard	31 blows/ft. or more

Relative Proportions

Descriptive Term	Percent
Trace	0-5
Few	5-10
Little	15-25
Some	30-45
Mostly	50-100

Strata Changes

In the column "Description" on the boring log, the horizontal lines represent approximate strata changes.

Groundwater Readings

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as tidal influences and man-made influences, such as existing swales, drainage ponds, underdrains and areas of covered soil (paved parking lots, side walks, etc.).

CLASSIFICATION SYMBOLS (ASTM D 2487 and D 2488)

Coarse Grained Soils

More than 50% retained on No. 200 sieve

GW - Well-graded Gravel
GP - Poorly graded Gravel
GW-GM - Well-graded Gravel w/Silt
GW-GC - Well-graded Gravel w/Clay
GP-GM - Poorly graded Gravel w/Silt
GP-GC - Poorly graded Gravel w/Clay
GM - Silty Gravel
GC - Clayey Gravel
GC-GM - Silty, Clayey Gravel
SW - Well-graded Sand
SP - Poorly graded Sand
SW-SM - Well-graded Sand w/Silt
SW-SC - Well-graded Sand w/Clay
SP-SM - Poorly graded Sand w/Silt
SP-SC - Poorly graded Sand w/Clay
SM - Silty Sand
SC - Clayey Sand
SC-SM - Silty, Clayey Sand

Fine-Grained Soils

50% or more passes the No. 200 sieve

CL - Lean Clay
CL-ML - Silty Clay
ML - Silt
OL - Organic Clay/Silt
Liquid Limit 50% or greater
CH - Fat Clay
MH - Elastic Silt
OH - Organic Clay/Silt

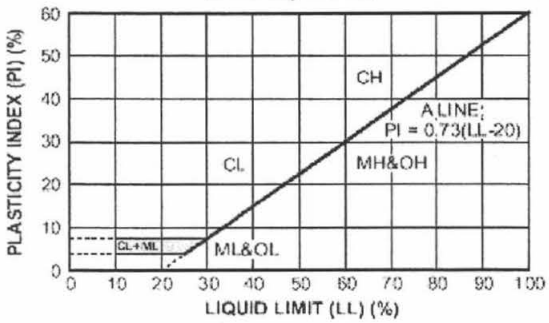
Highly Organic Soils

PT - Peat

Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent	GW, GP, SW,SP
More than 12 percent	GM, GC, SM, SC
5 to 12 percent	Borderline cases requiring dual symbols

Plasticity Chart



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APPENDIX V

SUMMARY OF SOIL BORING LABORATORY TEST DATA

ADDITIONS TO ST. OLAF CATHOLIC CHURCH
GET PROJECT NO. WM08-236G

Boring No.	Sample Depth (ft)	Natural Moisture Content (%)	Silt and/or Clay Fraction (%)	Atterberg Limits (LL/PL/PI)	Unified Soil Classification
BB-1	4-6	21.7	53.7	42/23/19	CL
BB-2	2-4	9.7	17.2	-	SM
BB-3	18-20	15.5	12.4	-	SP-SM
BB-5	2-4	19.9	53.9	42/23/19	CL
BB-6	13-15	22.1	46.5	-	SC
BB-7	0-2	14.0	41.6	28/16/12	SC
BB-9	2-4	22.4	63.0	-	CL
BMP-2	2-4	14.9	41.0	-	SC
PHA-1	3-4	18.6	50.5	30/17/13	CL
PHA-2	3-4	8.4	22.0	-	SM
PHA-3	3-4	14.9	35.5	-	SM
PHA-4	3-4	11.8	39.7	28/19/9	SC

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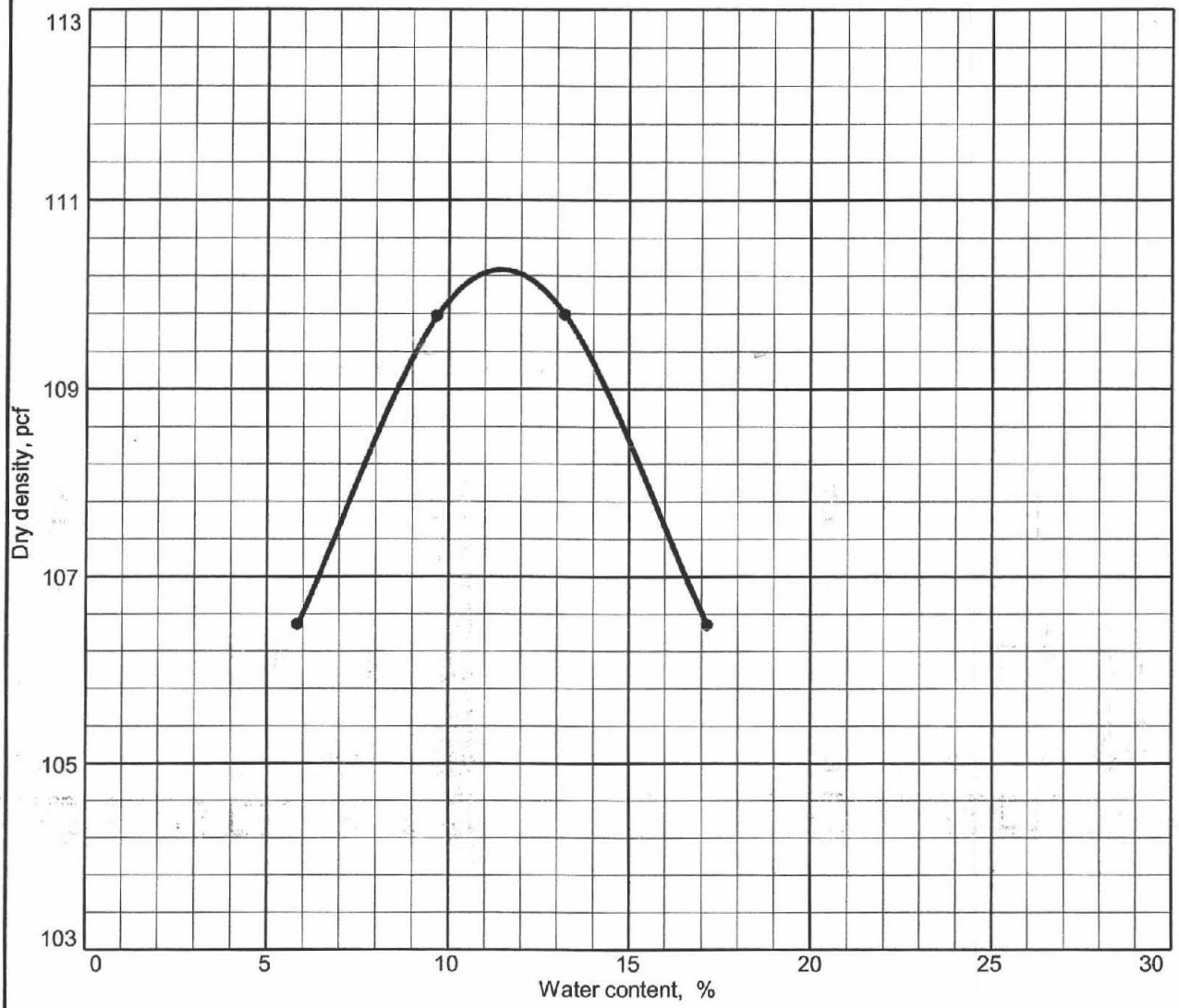
APPENDIX VI

SUMMARY OF CBR TEST DATA

ADDITIONS TO ST. OLAF CATHOLIC CHURCH
GET PROJECT NO. WM08-236G

Sample Number	CBR-1	CBR-2
Sample Depth (ft.)	1-2	1-2
Unified Soil Classification Symbol	SM	SM
Natural Moisture Content (%)	7.0	-
Atterberg Limits (LL/PL/PI)	NP	NP
% Passing #200 Sieve	20.4	30.6
Maximum Dry Density (pcf)	110.3	111.3
Optimum Moisture (%)	11.4	11.6
Unsoaked CBR Value	23.0	22.4
Soaked CBR Value	17.1	16.9
Swell (%)	0.0	0.0

MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1-2 Ft Below	SM	A-2-4(0)	7.0	Estimated	NP	NP	0.0	20.4

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 110.3 pcf Optimum moisture = 11.4 %	Brown, Silty, fine SAND (SM)

Project No. WM08-236G **Client:** St. Olaf Catholic Church
Project: Additions to St. Olaf Catholic Church

● **Location:** CBR #1 - See Attached Boring Location Plan

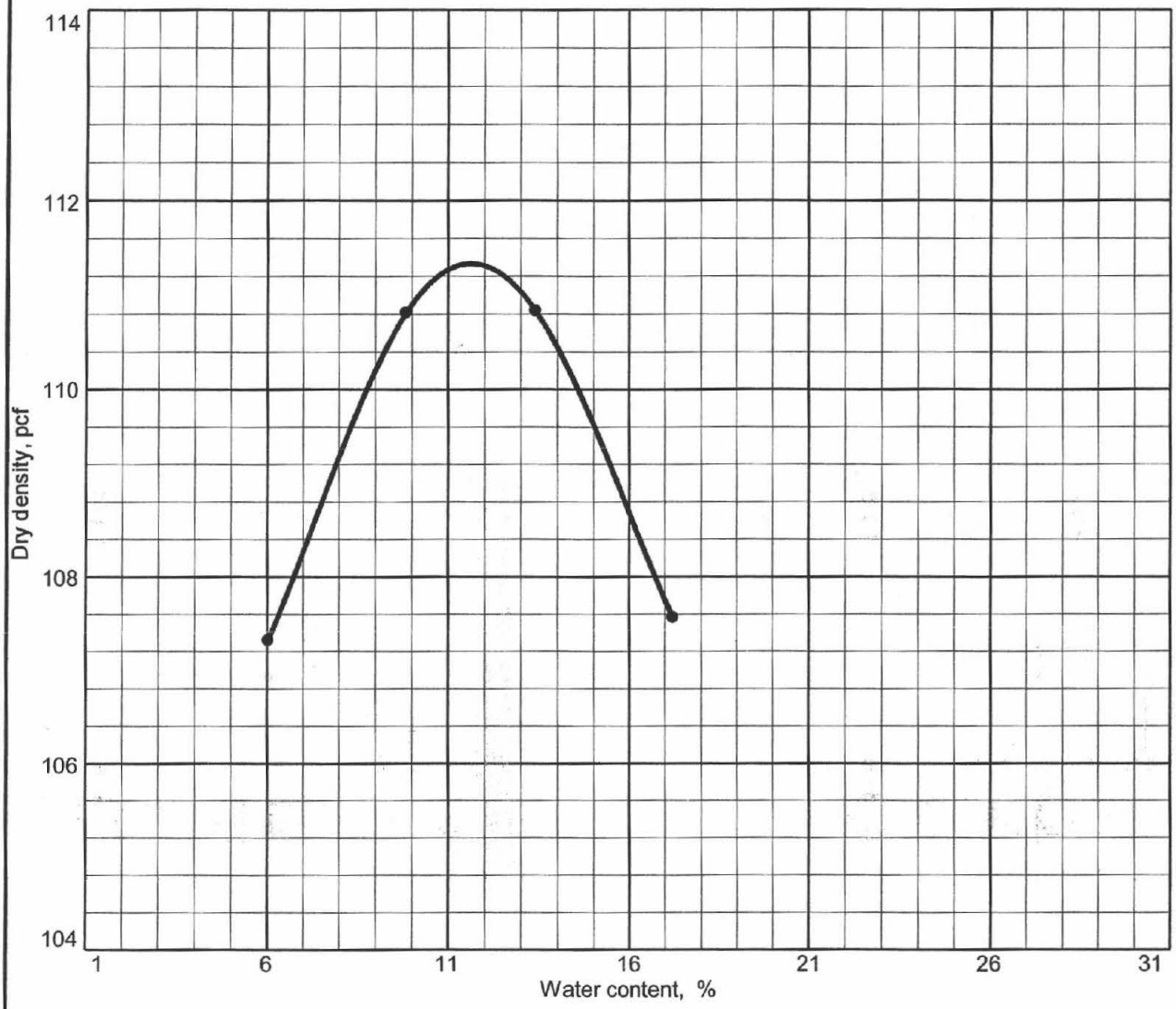
MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)

GET SOLUTIONS, INC.

Remarks:
CBR #1
Sample Obtained: 10/16/08
Sample Tested: 11/16/08
Unsoaked Value = 23.0
Soaked Value = 17.1
Swell% = 0.0

Figure 1

MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1-2 Ft Below	SM	A-2-4(0)	N/A	Estimated	NP	NP	0.0	30.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 111.3 pcf Optimum moisture = 11.6 %	Brown, Silty, fine SAND (SM)

Project No. WM08-236G **Client:** St. Olaf Catholic Church
Project: Additions to St. Olaf Catholic Church

● **Location:** CBR #2 - See Attached Boring Location Plan

MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)

GET SOLUTIONS, INC.

Remarks:
CBR #2
Sample Obtained: 10/16/08
Sample Tested: 11/16/08
Unsoaked Value = 22.4
Soaked Value = 16.9
Swell% = 0.0

Figure 2

APPENDIX VII

INFILTRATION TEST DATA SHEETS

G E T Solutions, Inc.	SATURATED HYDRAULIC CONDUCTIVITY WORKSHEET	Sheet No.: 1

Project Name.:	Additions to St. Olaf Catholic Church	**Parcel.....:**	104 Norge Lane, Williamsburg, Virginia	**Terminology and Solution**	
Boring No.....:	PHA/INF-1	**Date.....:**	11/17/2008	Ksat :	Saturated hydraulic conductivity
Investigators.:	S. Phillips/D. Mitchell	**File Name.....:**	WM08-236G	Q:	Steady-state rate of water flow into the soil
Boring Depth.:	48 inches	**WCU Base. Ht. h:**	15.0 **cm**	H:	Constant height of water in borehole
Boring Dia.....:	8.3 **cm**	**WCU Susp. Ht. S:**	15.2 **cm**	r:	Radius of cylindrical borehole
Boring Rad. (r):	4.15 **cm**	**Const. Wtr. Ht. H:**	30.2 **cm**	Ksat = Q[sinh-1(H/r) - (r2/H2+1).5 + r/H] / (2pH2)	[Glover So

VOLUME (ml)	Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed Time (hr:min:sec)	Elapsed Time (min) [b]	Flow Rate Q (ml/min) [a/b]	Ksat Equivalent Values (cm/min)	(cm/sec)	(cm/day)	(in/hr)	(ft/day)
2000		10:40:00 AM								
1900	100	10:40:31 AM	0:00:31	0.52	193.55	0.061	1.02E-03	88.1	1.445	2.89
1800	100	10:41:01 AM	0:00:30	0.50	200.00	0.063	1.05E-03	91.0	1.493	2.99
1700	100	10:42:32 AM	0:01:31	1.52	65.93	0.021	3.47E-04	30.0	0.492	0.98
1600	100	10:43:04 AM	0:00:32	0.53	187.50	0.059	9.87E-04	85.3	1.399	2.80
1500	100	10:43:35 AM	0:00:31	0.52	193.55	0.061	1.02E-03	88.1	1.445	2.89
1400	100	10:44:06 AM	0:00:31	0.52	193.55	0.061	1.02E-03	88.1	1.445	2.89
1300	100	10:44:37 AM	0:00:31	0.52	193.55	0.061	1.02E-03	88.1	1.445	2.89
1200	100	10:45:07 AM	0:00:30	0.50	200.00	0.063	1.05E-03	91.0	1.493	2.99
1100	100	10:45:39 AM	0:00:32	0.53	187.50	0.059	9.87E-04	85.3	1.399	2.80
1000	100	10:46:12 AM	0:00:33	0.55	181.82	0.057	9.57E-04	82.7	1.357	2.71
900	100	10:46:44 AM	0:00:32	0.53	187.50	0.059	9.87E-04	85.3	1.399	2.80
800	100	10:47:14 AM	0:00:30	0.50	200.00	0.063	1.05E-03	91.0	1.493	2.99
700	100	10:47:46 AM	0:00:32	0.53	187.50	0.059	9.87E-04	85.3	1.399	2.80
Natural Moisture:	Moist	**Init. Satur.Time:**	10:05:00 AM	**ESTIMATED FIELD KSAT:**		0.058	9.61E-04	**83.0**	1.362	2.72

Texture/Classif:	SAND (SC) or CLAY (CL)	**Consistency:**	N/A	**Depth to an Impermeable Layer:**	N/A	**Notes:**
Structure/Fabric:	N/A	**Slope/Landsc:**	Flat	**Depth to Bedrock.....:**	N/A	

G E T Solutions, Inc.	SATURATED HYDRAULIC CONDUCTIVITY WORKSHEET	Sheet No.: 2

Project Name.:	Additions to St. Olaf Catholic Church	Parcel.....:	104 Norge Lane, Williamsburg, Virginia	**Terminology and Solution**	
Boring No.....:	PHA/INF-2	Date.....:	11/17/2008	Ksat :	Saturated hydraulic conductivity
Investigators.:	S. Phillips/D. Mitchell	File Name.....:	WM08-236G	Q:	Steady-state rate of water flow into the soil
Boring Depth.:	48 inches	WCU Base. Ht. h:	15.0 cm	H:	Constant height of water in borehole
Boring Dia.....:	8.3 cm	WCU Susp. Ht. S:	15.2 cm	r:	Radius of cylindrical borehole
Boring Rad. (r):	4.15 cm	Const. Wtr. Ht. H:	30.2 cm	Ksat = Q[sinh-1(H/r) - (r2/H2+1).5 + r/H] / (2pH2)	[Glover So

VOLUME (ml)	Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed Time (hr:min:sec)	Elapsed Time (min) [b]	Flow Rate Q (ml/min) [a/b]	Ksat Equivalent Values (cm/min)	(cm/sec)	(cm/day)	(in/hr)	(ft/day)
2000		11:30:00 AM								
1900	100	11:30:14 AM	0:00:14	0.23	428.57	0.135	2.26E-03	195.0	3.199	6.40
1800	100	11:30:27 AM	0:00:13	0.22	461.54	0.146	2.43E-03	210.0	3.445	6.89
1700	100	11:30:42 AM	0:00:15	0.25	400.00	0.126	2.11E-03	182.0	2.985	5.97
1600	100	11:30:55 AM	0:00:13	0.22	461.54	0.146	2.43E-03	210.0	3.445	6.89
1500	100	11:31:10 AM	0:00:15	0.25	400.00	0.126	2.11E-03	182.0	2.985	5.97
1400	100	11:31:24 AM	0:00:14	0.23	428.57	0.135	2.26E-03	195.0	3.199	6.40
1300	100	11:31:38 AM	0:00:14	0.23	428.57	0.135	2.26E-03	195.0	3.199	6.40
1200	100	11:31:53 AM	0:00:15	0.25	400.00	0.126	2.11E-03	182.0	2.985	5.97
1100	100	11:32:08 AM	0:00:15	0.25	400.00	0.126	2.11E-03	182.0	2.985	5.97
1000	100	11:32:23 AM	0:00:15	0.25	400.00	0.126	2.11E-03	182.0	2.985	5.97
900	100	11:32:38 AM	0:00:15	0.25	400.00	0.126	2.11E-03	182.0	2.985	5.97
800	100	11:32:52 AM	0:00:14	0.23	428.57	0.135	2.26E-03	195.0	3.199	6.40
700	100	11:33:07 AM	0:00:15	0.25	400.00	0.126	2.11E-03	182.0	2.985	5.97
Natural Moisture:	Moist	Init. Satur.Time:	11:00:00 AM	ESTIMATED FIELD KSAT:		0.132	2.20E-03	**190.3**	3.122	6.24

Texture/Classif:	SAND (SM)	Consistency:	N/A	Depth to an Impermeable Layer:	N/A	Notes:
Structure/Fabric:	N/A	Slope/Landsc:	Flat	Depth to Bedrock.....:	N/A	

G E T Solutions, Inc.	SATURATED HYDRAULIC CONDUCTIVITY WORKSHEET	Sheet No.: 3

Project Name.:	Additions to St. Olaf Catholic Church	Parcel.....:	104 Norge Lane, Williamsburg, Virginia	**Terminology and Solution**
Boring No.....:	PHA/INF-3	Date.....:	11/17/2008	Ksat : Saturated hydraulic conductivity
Investigators.:	S. Phillips/D. Mitchell	File Name.....:	WM08-236G	Q: Steady-state rate of water flow into the soil
Boring Depth.:	48 inches	WCU Base. Ht. h:	15.0 cm	H: Constant height of water in borehole
Boring Dia.....:	8.3 cm	WCU Susp. Ht. S:	15.2 cm	r: Radius of cylindrical borehole
Boring Rad. (r):	4.15 cm	Const. Wtr. Ht. H:	30.2 cm	Ksat = Q[sinh-1(H/r) - (r2/H2+1).5 + r/H] / (2pH2) [Glover So

VOLUME (ml)	Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed Time (hr:min:sec)	Elapsed Time (min) [b]	Flow Rate Q (ml/min) [a/b]	Ksat Equivalent Values (cm/min)	(cm/sec)	(cm/day)	(in/hr)	(ft/day)
2000		12:20:00 PM								
1900	100	12:20:30 PM	0:00:30	0.50	200.00	0.063	1.05E-03	91.0	1.493	2.99
1800	100	12:21:02 PM	0:00:32	0.53	187.50	0.059	9.87E-04	85.3	1.399	2.80
1700	100	12:21:34 PM	0:00:32	0.53	187.50	0.059	9.87E-04	85.3	1.399	2.80
1600	100	12:22:06 PM	0:00:32	0.53	187.50	0.059	9.87E-04	85.3	1.399	2.80
1500	100	12:22:39 PM	0:00:33	0.55	181.82	0.057	9.57E-04	82.7	1.357	2.71
1400	100	12:23:11 PM	0:00:32	0.53	187.50	0.059	9.87E-04	85.3	1.399	2.80
1300	100	12:23:44 PM	0:00:33	0.55	181.82	0.057	9.57E-04	82.7	1.357	2.71
1200	100	12:24:17 PM	0:00:33	0.55	181.82	0.057	9.57E-04	82.7	1.357	2.71
1100	100	12:24:51 PM	0:00:34	0.57	176.47	0.056	9.29E-04	80.3	1.317	2.63
1000	100	12:25:23 PM	0:00:32	0.53	187.50	0.059	9.87E-04	85.3	1.399	2.80
900	100	12:25:56 PM	0:00:33	0.55	181.82	0.057	9.57E-04	82.7	1.357	2.71
800	100	12:26:29 PM	0:00:33	0.55	181.82	0.057	9.57E-04	82.7	1.357	2.71
700	100	12:27:03 PM	0:00:34	0.57	176.47	0.056	9.29E-04	80.3	1.317	2.63
Natural Moisture:	Moist	Init. Satur.Time:	11:45:00 AM	ESTIMATED FIELD KSAT:		0.058	9.72E-04	**84.0**	1.378	2.76

Texture/Classif:	SAND (SM)	Consistency:	N/A	Depth to an Impermeable Layer:	N/A	Notes:
Structure/Fabric:	N/A	Slope/Landsc:	Flat	Depth to Bedrock.....:	N/A	

G E T Solutions, Inc.	SATURATED HYDRAULIC CONDUCTIVITY WORKSHEET	Sheet No.: 4

Project Name.:	Additions to St. Olaf Catholic Church	**Parcel.....:**	104 Norge Lane, Williamsburg, Virginia	**Terminology and Solution**	
Boring No.....:	PHA/INF-4	**Date.....:**	11/17/2008	Ksat :	Saturated hydraulic conductivity
Investigators.:	S. Phillips/D. Mitchell	**File Name.....:**	WM08-236G	Q:	Steady-state rate of water flow into the soil
Boring Depth.:	48 inches	**WCU Base. Ht. h:**	15.0 **cm**	H:	Constant height of water in borehole
Boring Dia.....:	8.3 **cm**	**WCU Susp. Ht. S:**	15.2 **cm**	r:	Radius of cylindrical borehole
Boring Rad. (r):	4.15 **cm**	**Const. Wtr. Ht. H:**	30.2 **cm**	Ksat = Q[sinh-1(H/r) - (r2/H2+1).5 + r/H] / (2pH2)	[Glover So

VOLUME (ml)	Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed Time (hr:min:sec)	Elapsed Time (min) [b]	Flow Rate Q (ml/min) [a/b]	Ksat Equivalent Values (cm/min)	(cm/sec)	(cm/day)	(in/hr)	(ft/day)
2000		12:50:00 PM								
1900	100	12:50:22 PM	0:00:22	0.37	272.73	0.086	1.44E-03	124.1	2.035	4.07
1800	100	12:50:45 PM	0:00:23	0.38	260.87	0.082	1.37E-03	118.7	1.947	3.89
1700	100	12:51:08 PM	0:00:23	0.38	260.87	0.082	1.37E-03	118.7	1.947	3.89
1600	100	12:51:30 PM	0:00:22	0.37	272.73	0.086	1.44E-03	124.1	2.035	4.07
1500	100	12:51:53 PM	0:00:23	0.38	260.87	0.082	1.37E-03	118.7	1.947	3.89
1400	100	12:52:16 PM	0:00:23	0.38	260.87	0.082	1.37E-03	118.7	1.947	3.89
1300	100	12:52:39 PM	0:00:23	0.38	260.87	0.082	1.37E-03	118.7	1.947	3.89
1200	100	12:53:03 PM	0:00:24	0.40	250.00	0.079	1.32E-03	113.7	1.866	3.73
1100	100	12:53:27 PM	0:00:24	0.40	250.00	0.079	1.32E-03	113.7	1.866	3.73
1000	100	12:53:51 PM	0:00:24	0.40	250.00	0.079	1.32E-03	113.7	1.866	3.73
900	100	12:54:15 PM	0:00:24	0.40	250.00	0.079	1.32E-03	113.7	1.866	3.73
800	100	12:54:38 PM	0:00:23	0.38	260.87	0.082	1.37E-03	118.7	1.947	3.89
700	100	12:55:02 PM	0:00:24	0.40	250.00	0.079	1.32E-03	113.7	1.866	3.73
Natural Moisture:	Moist	**Init. Satur.Time:**	12:30:00 PM	**ESTIMATED FIELD KSAT:**		0.082	1.36E-03	**117.6**	1.929	3.86
Texture/Classif:	SAND (SC)	**Consistency:**	N/A	**Depth to an Impermeable Layer:**		N/A	**Notes:**			
Structure/Fabric:	N/A	**Slope/Landsc:**	Flat	**Depth to Bedrock.....:**		N/A				

St. Olaf Roman Catholic Church

Frank Kowaleski
Sexton

frankk@stolafchurch.hrcoxmail.com
104 Norge Lane • Williamsburg, VA 23188
Phone: 757-564-3819 • Cell: 757-903-8570 • Fax: 757-565-1099

5041600001

5040100001

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: ST OLAF Catholic Church
Structure/BMP Name: Stormwater FACILITIY
Project Location: 104 NOTGE LANE
BMP Location: Adjacent to Parking Lot
County Plan No.: SP-0122-2008

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

Tax Map/Parcel No.: 23201000016
BMP ID Code (if known): YR-010
Zoning District: R8
Land Use: Church
Site Area (sf or acres): 9.38 ACRES

Brief Description of Stormwater Management/BMP Facility: WET EXTENDED DETENTION RETENTION POND JCC BMP TYPE A-3

Nearest Visible Landmark to SWM/BMP Facility: Parking Lot

Nearest Vertical Ground Control (if known):

☒ JCC Geodetic Ground Control ☐ USGS ☐ Temporary ☐ Arbitrary ☐ Other

Station Number or Name: 306
Datum or Reference Elevation: JCC NETWORK NGVD 1929 - ELV. 100.40
Control Description:
Control Location from Subject Facility:

Section 2 - Stormwater Management/BMP Facility Construction Information:

Pre-Construction Meeting Held for Construction of SWM/BMP Facility: ☒ Yes ☐ No ☐ Unknown
Approx. Construction Start Date for SWM/BMP Facility: _____
Facility Monitored by County Representative during Construction: ☒ Yes ☐ No ☐ Unknown
Name of Site Work Contractor Who Constructed Facility: William Wills Contractor, Inc.
Name of Professional Firm Who Routinely Monitored Construction: GET
Date of Completion for SWM/BMP Facility: _____
Date of Record Drawing/Construction Certification Submittal: 3/7/13

(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 Engineering and Resource Protection 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: St. Olaf Catholic Church
Mailing Address: 104 Norge Ln
Williamsburg, VA 23188-7229
Business Phone: 564-3819 Fax: 565-1099
Contact Person: Frank Kawlecki Title: Sexton

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

Firm Name: AES Consulting Engineers
Mailing Address: 5248 Olde Towne Rd Ste 1
WMBG VA 23188
Business Phone: 757 253 0400
Fax: 757 220 8994
Responsible Plan Preparer: Robert E Cosbey III PE
Title: Project Mgr
Plan Name: St Olaf Catholic Church
Firm's Project No. 9882-01
Plan Date: 3/12/10
Sheet No.'s Applicable to SWM/BMP Facility: 6 / 7 / 8 / 9 / 16

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

Firm Name: William Wills Contractor, INC
Mailing Address: Po Box 469
Sluda VA 23149
Business Phone: 804-758-5244

Fax: _____
Contact Person: _____
Site Foreman/Supervisor: _____
Specialty Subcontractors and 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: R.L. Galloway Surveying
Mailing Address: 17226 Commerce la
Smithfield VA.
Business Phone: 757 356 9096
Fax: 757 356 9098
Name: Richard Galloway Sr.
Title: President
Signature: R L Galloway
Date: 3-4-13

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 to the provisions of the approved design plan, specifications design, and stormwater management plan, except as specifically noted.

COMMONWEALTH OF VIRGINIA
R.L. GALLOWAY
(License) No.
1256
LAND SURVEYOR

_____ (Seal)
Virginia Registered Professional Engineer or Certified Land Surveyor

Construction Certification

Firm Name: GET Solutions Inc.
Mailing Address: 1592 Penniman Rd., Suite E
Williamsburg, VA 23185
Business Phone: 757-564-6452
Fax: 757-564-6453
Name: Joseph Robinson
Title: Project Engineer
Signature: _____
Date: 3-7-13

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 plan, specifications, and stormwater management plan, except as specifically noted.

COMMONWEALTH OF VIRGINIA
JOSEPH R. ROBINSON
Lic. No. 050157
3-7-13
PROFESSIONAL ENGINEER

_____ (Seal)
Virginia Registered Professional Engineer

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

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

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

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

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

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

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

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

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

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

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

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

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

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

N/A A10. Low flow orifice has a non-clogging mechanism.

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

V. **Group C – Infiltration Practices** *(Includes C-1 Infiltration Trench; C-2 Infiltration Trench; C-3 Infiltration Basin; and C-4 Infiltration Basin)*

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

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

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

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

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

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

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

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

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

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

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

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

____ C13. Observation well provided.

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

VI. **Group D – Filtering Systems** *Includes D-1 Bioretention Cells; D-2 Surface Sand Filters; D-3 Underground Sand Filters; D-4 Perimeter Sand Filters; D-5 Organic Filters; and D-6 Pocket Sand Filters)*

XX D1. All requirements of Section II, Minimum Standards, apply to Group D facilities.

____ D2. Sediment pretreatment devices provided.

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

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

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

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

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

____ D8. Overflow outlet has adequate erosion protection.

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

VII. Group E – Open Channel Systems *(Includes E-1 Wet Swales (Check Dams); E-2 Dry Swales; and E-3 Biofilters)*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

VIII. Group F – Extended Dry Detention *(Includes F-1 Timber Walls; and F-2 Dry Extended Detention with Forebay)*

N/A F1. All requirements of Section II, Minimum Standards, apply to Group F facilities.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

N/A	G1.	All requirements of Section II, Minimum Standards, apply to Group G facilities as applicable.
	G2.	Constructed impervious areas appear to conform with locations indicated on the approved plan and appear less than sixty (60) percent impervious in accordance with the requirements of the James City County Chesapeake Bay Preservation Ordinance.
	G3.	Dedicated open space areas are in undisturbed common areas, conservation easements or are protected by other enforceable instruments that ensures perpetual protection.
	G4.	Provisions included to clearly specify how the natural vegetated areas utilized as dedicated open space will be managed and field identified (marked).
	G5.	Adequate protection measures were implemented during construction to protect the defined dedicated open space areas.
✓	G6.	Dedicated open space areas were not disturbed during construction (ie. cleared, grubbed or graded).

STORMWATER MANAGEMENT / BMP FACILITIES
RECORD DRAWING CHECKLIST

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

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

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

XX SD1. All requirements of Section II, Minimum Standards, apply to Storm Drainage Systems.

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

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

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

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

XII. Other Systems

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

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

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

Frank Kowaleski

From: William Wills Contractor, Inc. [wwci@williamwillscontractor.com]
Sent: Thursday, October 11, 2012 10:06 AM
To: (St. Olaf)Kowaleski, Frank
Subject: FW: Inspection

Good News....We got an inspection finally. Please see notes below. Just wanted to let you know.

Have a great weekend,

Robin Brooks

Office Assistant

William Wills Contractor, Inc.

P.O. Box 189

165 White Oak Lane

Locust Hill, VA 23092

Office: (804) 758-5244

Fax: (804) 980-7779

Email: mailto:wwci@williamwillscontractor.com

PLEASE VISIT OUR WEBSITE @ williamwillscontractor.com

From: Michael Majdeski

Date: 10/11/12 13:50

Subject: Inspection

William,

POOR
QUALITY

ORIGINAL(S)
FOLLOW

THIS IS THE BEST
COPY AVAILABLE

VCE DOCUMENT CONVERSION

The Chief Engineer and I inspected St. Olaf's yesterday and did not find any field issues that will necessitate any further remediation work. We will be issuing a standard letter to the Church outlining this as well as the need for revised as-builts of the pond from the engineering firm. As your involvement is only related to the field issues I wanted to let you know where we stood with those items.

If you have any questions please let me know.

Thanks,

Mike Majdeski

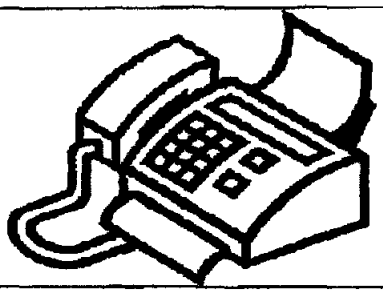
Michael Majdeski
Senior Resource Protection Inspector

James City County
Jamestown 1607

Engineering & Resource Protection

Michael.Majdeski@jamescitycountyva.gov
101-E Mounts Bay Road
Williamsburg, VA 23187
P: 757-253-6829

F: 757-259-4837
jamescitycountyva.gov



Saint Olaf
Catholic Church
Tele. – 757-564-3819
Fax. – 757-565-1099

To: Joe Buchite
1-757-259-4032

Date: 3/4/13

Regarding: St. Olaf

Number of pages (including cover) 3 pages

As per your request here is a copy of the e-mail we discussed.

Return to:
JCC Attorney's Office
101-C Mount's Bay Road
Williamsburg, VA 23185
(757) 253-6612

100006594

COPY

COUNTY OF JAMES CITY, VIRGINIA

DECLARATION OF COVENANTS
INSPECTION/MAINTENANCE OF DRAINAGE SYSTEM

Please type or print legibly in black ink. Covenantor(s) should submit this form to the JCC Environmental Division, 101-E Mounts Bay Road, Williamsburg, VA 23185.

THIS DECLARATION OF COVENANTS, made this 23 day of MARCH, 2010, between ST. OLAF Catholic Church, and all successors in interest, ("COVENANTOR(S)"), owner(s) of the following property:

Parcel Identification Number: 2320100016
Legal Description: ST. OLAF PARTON OF NORWAY CATHOLIC CHURCH
Project or Subdivision Name: ST. OLAF CHURCH EXPANSION
Document/Instrument No. 434 118 or Deed Book _____, Page No. _____,
and the County of James City, Virginia ("COUNTY.")

WITNESSETH:

I (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, monitoring, operating, installing, constructing, reconstructing, maintaining or repairing 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.

IN WITNESS WHEREOF, the COVENANTOR(S) has executed this DECLARATION OF COVENANTS as of the date first above written.

COVENANTOR(S)

Bob Williams
Signature

BOB WILLIAMS, ADMINISTRATOR
Print Name and Title

ACKNOWLEDGMENT

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF James City, to wit:

I hereby certify that on this 23 day of March, 20 10, before the subscribed, a Notary Public for the Commonwealth of Virginia, personally appeared Bob Williams and did acknowledge the foregoing instrument to be his/her Act.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 23 day of March, 20 10.

MELANIE J. DAVIS COMMONWEALTH OF VIRGINIA NOTARY PUBLIC

[SEAL]

Melanie J. Davis
Notary Public

Notary Registration Number: 7014335
My Commission expires: 12/31/2010

Approved as to form:

SP-0017-2012

SITE PLAN

FOR

ST. OLAF CATHOLIC CHURCH

STONEHOUSE DISTRICT

JAMES CITY COUNTY, VIRGINIA

APR 1 3 2012

RECEIVED FEB 2012 Planning Department

FEB 2 7 2012

COUNTY OF JAMES CITY
FINAL SITE PLAN

APPROVALS		DATE
Fire Dept.	JB/LC	2/27/12
Health Dept.		
VDOT		
Planning	CMJ	3-16-12
Environ.	ST/LC	03/12/12
Cdg Adm	MAB	3/16/12
JCSA	CP/LC	03/12/12
County Eng.		
REA		
Other		

INDEX OF SHEETS

SHEET NUMBER	DESCRIPTION
1	COVER SHEET
2	ENVIRONMENTAL INVENTORY AND DEMOLITION PLAN
3	INITIAL EROSION & SEDIMENT CONTROL PLAN
4	SITE LAYOUT PLAN
5	UTILITY PLAN
6	GRADING PLAN
7	DETAILED GRADING PLAN
8	DRAINAGE, EROSION & SEDIMENT CONTROL PLAN
9	POND BMP
10	LANDSCAPE PLAN
11	LIGHTING PLAN
12	NOTES & DETAILS
13	NOTES & DETAILS
14	NOTES & DETAILS
15	NOTES & DETAILS
16	NOTES & DETAILS
17	PHASE PARKING PLAN

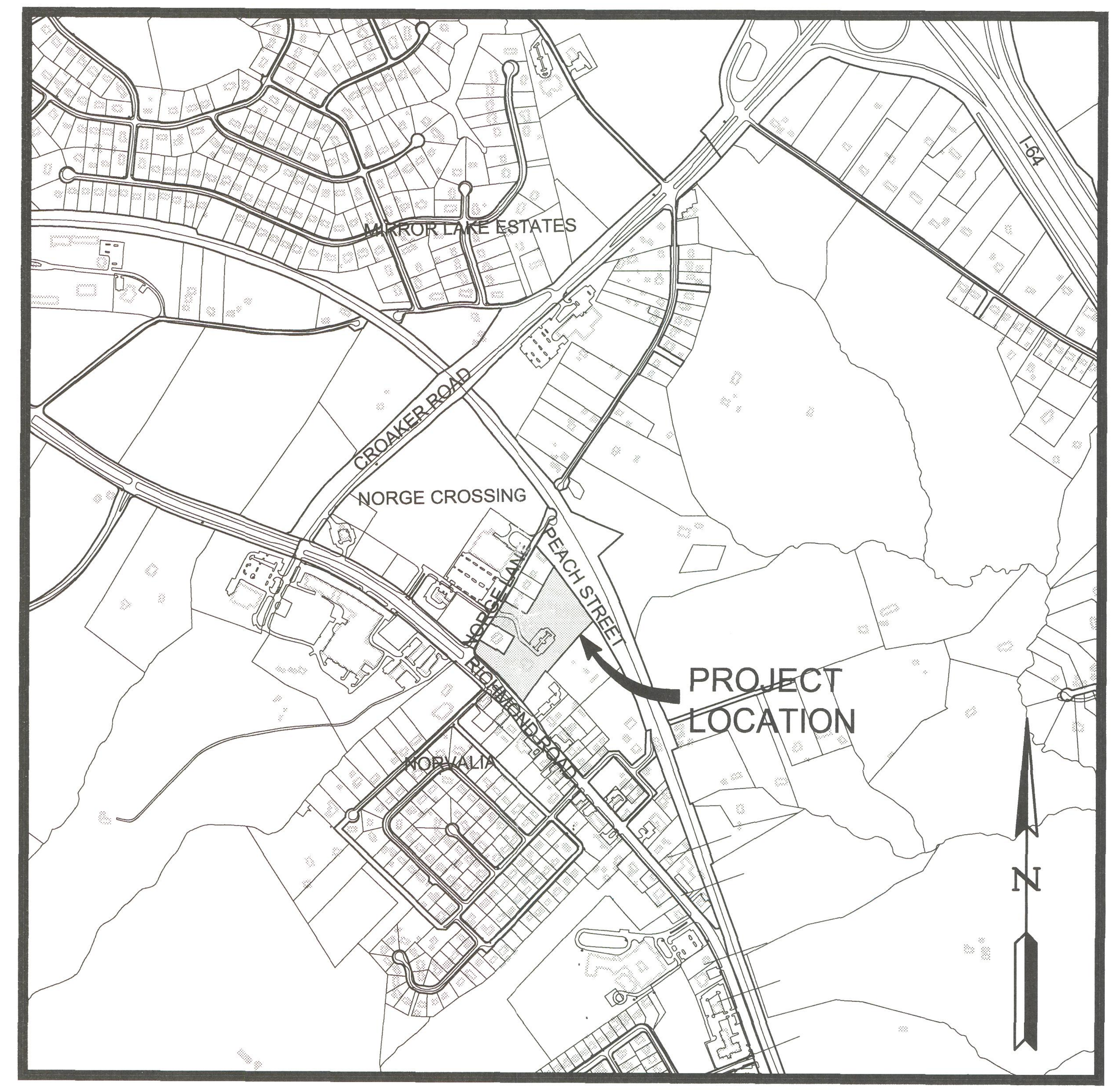
SITE PLAN AMENDMENT #1

--ADDITION OF A 12'x20' STORAGE SHED (SHEETS 1 & 4 UPDATED AS PART OF AMENDMENT).

SITE PLAN AMENDMENT #2

--ADDITION OF A CURB DROP INLET AND OUTFALL PIPE (SHEETS 1, 8 & 17 UPDATED AS PART OF AMENDMENT).

THIS SITE PLAN PROVIDES ONLY THOSE IMPROVEMENTS SHOWN ON THIS PLAN. THIS INCLUDES PHASE 1A, 1B AND 1C OF THE BUILDING AND ALL PARKING IMPROVEMENTS SHOWN ON THIS PLAN.
PHASE II OF THE BUILDING IS NOT INCLUDED WITHIN THIS SITE PLAN.



VICINITY MAP (APPROX. SCALE 1"=1000')

ORIGINAL SUBMITTAL DATE: NOVEMBER 3, 2008
ORIGINAL: JCC-SP-0122-2008
AMENDMENT #1: JCC-SP-0088-2011
AES PROJECT NO.: 9882-01
SHEET 1

COMMONWEALTH OF VIRGINIA
ROBERT E. COSBY III
Lic. No. 35664
02/13/12
PROFESSIONAL ENGINEER

SITE DATA

SITE ADDRESS: 104 NORGE LANE, WILLIAMSBURG, VIRGINIA 23188

TAX MAP PARCEL NO.: 23201000016

LEGAL DESCRIPTION: ST. OLAF PATRON OF NORWAY CATHOLIC CHURCH

ZONING: R8 WITH CONDITIONS REFERENCING JCC CASE Z-0001-2008/MP-0001-2008/SUP-0006-2008/HW-0002-2008 APPROVED BY THE BOARD OF SUPERVISORS ON JULY 22, 2008.

TOTAL SITE AREA: 408,636 S.F.± OR 9.38 AC.±

EXISTING IMPERVIOUS AREA:	PAVEMENT:	31,289 S.F.± OR 0.72 AC.±	8%
	SIDEWALKS:	4,106 S.F. ± OR 0.09 AC.±	1%
	BUILDINGS:	8,415 S.F.± OR 0.19 AC.±	2%
TOTAL:		43,810 S.F. OR 1.01 AC.±	11%
EXISTING OPEN SPACE:	OPEN SPACE	364,826 SF± OR 8.37 Ac±	89%
	TOTAL AREA	408,636 SF± OR 9.38 Ac.±	100%
PROPOSED IMPERVIOUS AREA:	PAVEMENT:	116,871 S.F.± OR 2.68 AC.±	29%
	SIDEWALKS:	5,687 S.F. ± OR 0.13 AC.±	1%
	BUILDINGS:	14,725 S.F.± OR 0.34 AC.±	4%
	STORAGE SHED:	240 S.F.± OR 0.01 AC.±	0%
TOTAL:		137,523 S.F. OR 3.16 AC.±	34%
PROPOSED OPEN SPACE:	OPEN SPACE	271,113 SF± OR 6.22 Ac±	66%
	TOTAL AREA	408,636 SF± OR 9.38 Ac.±	100%

8

DISTURBED AREA: 261,187 S.F.± OR 6.00± AC.±

FLOOD HAZARD MAP: THIS PROPERTY IS IN FLOOD ZONE "X" AS SHOWN ON MAP NUMBER 51095C, PANEL 0110C, FOR COMMUNITY NUMBER 510201, DATED SEPTEMBER 28, 2007 OF THE FLOOD INSURANCE RATE MAPS FOR JAMES CITY COUNTY, VIRGINIA.

OWNER/DEVELOPER: CATHOLIC DIOCESE OF RICHMOND
C/O ST OLAF'S CATHOLIC CHURCH
104 NORGE LANE
WILLIAMSBURG, VA. 23188
CONTACT: JAMES SIMCOX
PHONE NO: 757-564-3819
FAX NO: 757-565-1099

PARKING CALCULATIONS

PHASE 1: 600 WORSHIP SEATS

175 OVERFLOW HOLIDAY SEATING IN COMMONS AREA (REMOVABLE FOLDING CHAIRS)

PHASE 1B: 150 FUTURE EXPANSION SEATING

REQUIRED: 600+175+150=925 SEATS @ 1 PER 5 SEATS= 185 PARKING SPACES
HANDICAP SPACES= 7 SPACES

PROVIDED: 186 PARKING SPACES (CONSTRUCTED IN PHASE 1)
114 PARKING SPACES (CONSTRUCTED IN FUTURE)
HANDICAP SPACES= 17 SPACES

186 PARKING SPACES MUST BE INSTALLED PRIOR TO ISSUANCE OF A CERTIFICATE OF OCCUPANCY FOR THE NEW BUILDING. SEE SHEET 17 FOR PHASE PARKING PLAN.

ON JANUARY 06, 2009, THE JAMES CITY COUNTY DEVELOPMENT REVIEW COMMITTEE (DRC) REVIEWED AND APPROVED THE LANDSCAPE PLAN ASSOCIATED WITH SP-0122-2008

GENERAL NOTES

1. ALL ERRORS OR DISCREPANCIES WITH THE PLANS OR EXISTING SITE CONDITIONS SHALL BE REPORTED TO THE ENGINEER OR SURVEYOR OF RECORD BEFORE PROCEEDING WITH THE WORK.
2. CONTOUR INTERVAL IS 1 FOOT.
3. ANY EXISTING, UNUSED WELLS SHALL BE ABANDONED IN ACCORDANCE WITH THE VIRGINIA PRIVATE WELL REGULATIONS AND JAMES CITY COUNTY CODE.
4. SOLID WASTE DISPOSAL SHALL BE PROVIDED BY A PRIVATE HAULER.
5. EVERYTHING BEYOND THE RIGHT-OF-WAY LINE WILL BE CONSIDERED PRIVATE AND NOT MAINTAINED BY VDOT.
6. A VDOT CE-7 PERMIT IS REQUIRED FOR ALL WORK WITHIN THE VDOT RIGHT-OF-WAY. THE CONTRACTOR SHALL NOTIFY VDOT IN WRITING 48 HOURS PRIOR TO COMMENCEMENT OF ANY WORK WITHIN THE VDOT RIGHT-OF-WAY.
7. THE CONTRACTOR SHALL MAINTAIN A COMPLETE SET OF THE APPROVED PLANS AT THE PROJECT SITE AT ALL TIMES DURING CONSTRUCTION.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING MISS UTILITY (1-800-552-7001) FOR EXISTING UTILITY LOCATIONS AT LEAST 3 WORKING DAYS PRIOR TO COMMENCING CONSTRUCTION, AND A PRIVATE UTILITY LOCATOR FOR THE LOCATING OF PRIVATE UTILITIES.
9. THE ABSENCE OF THE DEVELOPER OR THE ENGINEER AT THE JOB SITE DOES NOT, IN ANY WAY, RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO PERFORM THE WORK IN ACCORDANCE WITH THE DRAWINGS, CONTRACT DOCUMENTS, ADDENDA, AND WRITTEN AUTHORIZED PLAN REVISIONS.
10. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE LAWS, ORDINANCES, RULES, REGULATIONS, AND ORDERS OF ANY BODY HAVING JURISDICTION. THE CONTRACTOR SHALL ERECT AND MAINTAIN, AS REQUIRED BY THE CONDITIONS AND PROGRESS OF THE WORK, ALL NECESSARY SAFEGUARDS FOR SAFETY AND PROTECTION.
11. ALL CONSTRUCTION METHODS AND MATERIALS SHALL CONFORM WITH THE CURRENT JAMES CITY COUNTY STANDARDS AND SPECIFICATIONS, VIRGINIA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE STANDARDS AND SPECIFICATIONS, VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS AND ANY OTHER APPLICABLE CITY OR STATE ORDINANCES, CODES, AND LAWS PRIOR TO ANY CONSTRUCTION ACTIVITY.
12. THE CONTRACTOR SHALL USE ONLY NEW MATERIALS, PARTS AND PRODUCTS ON ALL PROJECTS. ALL MATERIALS SHALL BE STORED SO AS TO ASSURE THE PRESERVATION OF THEIR QUALITY AND FITNESS FOR THE WORK.
13. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS PRIOR TO COMMENCEMENT OF WORK INCLUDING, BUT NOT LIMITED TO, LAND DISTURBING, BUILDING, RIGHT-OF-WAY, AND UTILITY PERMITS.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF CONSTRUCTION EFFORTS WITH THE VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT), LOCAL EMERGENCY SERVICES, AND ALL NECESSARY UTILITY COMPANIES INCLUDING, BUT NOT LIMITED TO, ELECTRICITY, NATURAL GAS, TELECOMMUNICATIONS, CABLE TELEVISION, WATER, SEWER, PETROLEUM TRANSMISSION, AND OTHERS THAT MAY BE REQUIRED.
15. THE CONTRACTOR SHALL SATISFY HIMSELF AS TO ALL SITE CONDITIONS PRIOR TO CONSTRUCTION.
16. THE CONTRACTOR SHALL REMOVE ALL EXCESS MATERIAL, INCLUDING SOIL AND DEBRIS, FROM THE SITE.
17. ANY UTILITIES TO BE RELOCATED SHALL BE RELOCATED AT THE OWNER/DEVELOPER'S EXPENSE, INCLUDING UTILITIES WITHIN THE RIGHT-OF-WAY OF THE COUNTY. PLEASE CHECK WITH WILLIAMSBURG RESIDENT ENGINEER'S OFFICE OF THE VIRGINIA DEPARTMENT OF TRANSPORTATION FOR A CE-7 PERMIT (LAND USE PERMIT) TO WORK WITHIN RIGHT-OF-WAY AREAS IN JAMES CITY COUNTY.
18. THE CONTRACTOR SHALL COMPLY WITH ALL PROVISIONS OF THE VIRGINIA UNDERGROUND UTILITY DAMAGE PREVENTION ACT (SECTION 56-265.14 ET. SEQ. CODE OF VIRGINIA, 1950, AS AMENDED) AND HEREBY AGREES TO HOLD THE DEVELOPER AND THE ENGINEER HARMLESS AGAINST ANY LOSS, DAMAGE, OR CLAIMS OF ANY NATURE WHATSOEVER ARISING OUT OF THE CONTRACTOR'S FAILURE TO COMPLY WITH THE REQUIREMENTS OF SAID ACT.
19. THE CONTRACTOR IS REQUIRED TO COMPLY WITH THE VIRGINIA OVERHEAD HIGH VOLTAGE LINE SAFETY ACT (SECTIONS 59.1-406 THROUGH 59.1-414, CODE OF VIRGINIA, 1950, AS AMENDED). THE CONTRACTOR IS REQUIRED TO VISIT THE SITE AND NOTE THE POSITION OF OVERHEAD CABLES PRIOR TO CONSTRUCTION.
20. BENCHMARK STATION NO. 306, EASTING (X) 11986404.356, NORTHING (Y) 3661140.546, ELEVATION = 100.40
    HORIZONTAL DATUM: JAMES CITY COUNTY GEODETIC CONTROL NETWORK
    VIRGINIA STATE PLANE COORDINATE SYSTEM - SOUTH ZONE
    NAD83(1986)
    VERTICAL DATUM: JAMES CITY COUNTY GEODETIC CONTROL NETWORK
    NGVD 29
21. THE CONTRACTOR IS REQUIRED TO SECURE ALL NECESSARY DEMOLITION PERMITS FOR EXISTING STRUCTURES INDICATED ON THE PLAN. CONTACT JAMES CITY COUNTY CODE COMPLIANCE AT 1-757-253-6626.
22. A LAND DISTURBING PERMIT AND SILTATION AGREEMENT, WITH SURETY, ARE REQUIRED FOR THIS PROJECT.
23. PRIOR TO OBTAINING A LAND DISTURBING PERMIT, THE OWNER OR CONTRACTOR SHALL OBTAIN A VSMP PERMIT (VIRGINIA STORMWATER MANAGEMENT PROGRAM) FROM THE VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION FOR THE DISCHARGE OF STORMWATER FROM THE CONSTRUCTION ACTIVITIES. THIS PERMIT WILL REQUIRE DAILY LOGS OF EARTHWORK, RECORDATION OF STORM EVENTS, LOGS OF MAINTENANCE OF EROSION AND SEDIMENT CONTROL MEASURES, AND OTHER ACTIONS DURING CONSTRUCTION.
24. THE PROFESSIONAL WHOSE SEAL IS AFFIXED HEREON SHALL ACT AS THE "RESPONSIBLE LAND DISTURBER" FOR PURPOSES OF PLAN APPROVAL ONLY. PRIOR TO ISSUANCE OF THE LAND DISTURBING PERMIT, THE OWNER OR DEVELOPER SHALL PROVIDE THE NAME OF THE "RESPONSIBLE LAND DISTURBER" WHO SHALL ASSUME RESPONSIBILITY AS THE "RESPONSIBLE LAND DISTURBER" FOR THE CONSTRUCTION PHASE OF THE PROJECT. THE OWNER OR DEVELOPER SHALL PROVIDE WRITTEN NOTIFICATION SHOULD THE "RESPONSIBLE LAND DISTURBER" CHANGE DURING CONSTRUCTION.
25. NO OFFSITE LAND DISTURBANCE IS ANTICIPATED FOR THIS PROJECT.
26. THE CONTRACTOR SHALL REESTABLISH ALL EXISTING PROPERTY PINS, MONUMENTS, WATER METERS, DRAINAGE CULVERTS, FENCES, UTILITY POLES, DRIVEWAYS, CURBS, GUTTERS, ETC. DISTURBED DURING CONSTRUCTION AT NO ADDITIONAL COST TO THE DEVELOPER.
27. TEMPORARY TRAFFIC CONTROL SHALL CONFORM TO THE LATEST EDITION OF THE VIRGINIA WORK AREA PROTECTION MANUAL.
28. ALL TRAFFIC CONTROL SIGNS AND PAVEMENT MARKINGS SHALL CONFORM TO THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) FOR STREETS AND HIGHWAYS.
29. ALL PARKING SPACES ARE TO BE PROVIDED WITH 4-INCH WHITE PAINTED STRIPING AND HANDICAP ACCESS AISLES WITH 1FT. WIDE BLUE PAINTED HATCHING. HANDICAP PARKING SPACES SHALL BE DESIGNATED BY ABOVE GROUND SIGNS PER UNIFORM STATEWIDE BUILDING CODE (USBC) REQUIREMENTS.
30. THIS PROJECT IS LOCATED IN JAMES CITY COUNTY SUB WATERSHED 103 OF THE YARMOUTH CREEK WATERSHED AND THE YORK RIVER WATERSHED.
31. ALL OBJECTIONABLE AND DELETERIOUS MATERIAL IS TO BE REMOVED FROM THIS SITE AND DISPOSED OF IN A STATE APPROVED FACILITY MEETING THE REQUIREMENTS OF ALL APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS.
32. PRIVATELY OWNED UTILITIES (I.E. WATER & SEWER LINES) SHOWN ON THIS SITE PLAN ARE REGULATED BY THE VIRGINIA UNIFORM STATEWIDE BUILDING CODE AND ENFORCED BY THE CODE COMPLIANCE DIVISION. THESE PRIVATELY OWNED UTILITIES MUST COMPLY FULLY WITH THE INTERNATIONAL PLUMBING CODE, THE NATIONAL FIRE PREVENTION ASSOCIATION STANDARD 24, AND THE INTERNATIONAL FIRE CODE. CONTRACTORS WORKING FROM THIS SITE PLAN ARE CAUTIONED NOT TO INSTALL OR CONCEAL PRIVATELY OWNED SITE UTILITIES WITHOUT OBTAINING REQUIRED PERMITS AND INSPECTIONS.

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

APPROVAL DATE	No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
	A	02/13/12	REVISED BASED ON EROSION ISSUE	GVC	REC
	8	12/05/11	ADDED SIDEWALK CONNECTION AND LANDSCAPING TO STORAGE SHED	GVC	REC
	7	09/06/11	SITE PLAN AMENDMENT #1	GVC	REC
	5	06/14/10	REVISED WATER & SEWER CONNECTION PER JCSA	MJS	REC
	4	03/12/10	REVISED PER JCC AND JCSA	RMK	REC
	3	02/08/10	ISSUED FOR BUILDING PERMIT	REC	REC
	2	04/01/09	REVISED PER COUNTY COMMENTS DATED 02/20/09	REC	REC

ST. OLAF CATHOLIC CHURCH
JOB # 9882-01

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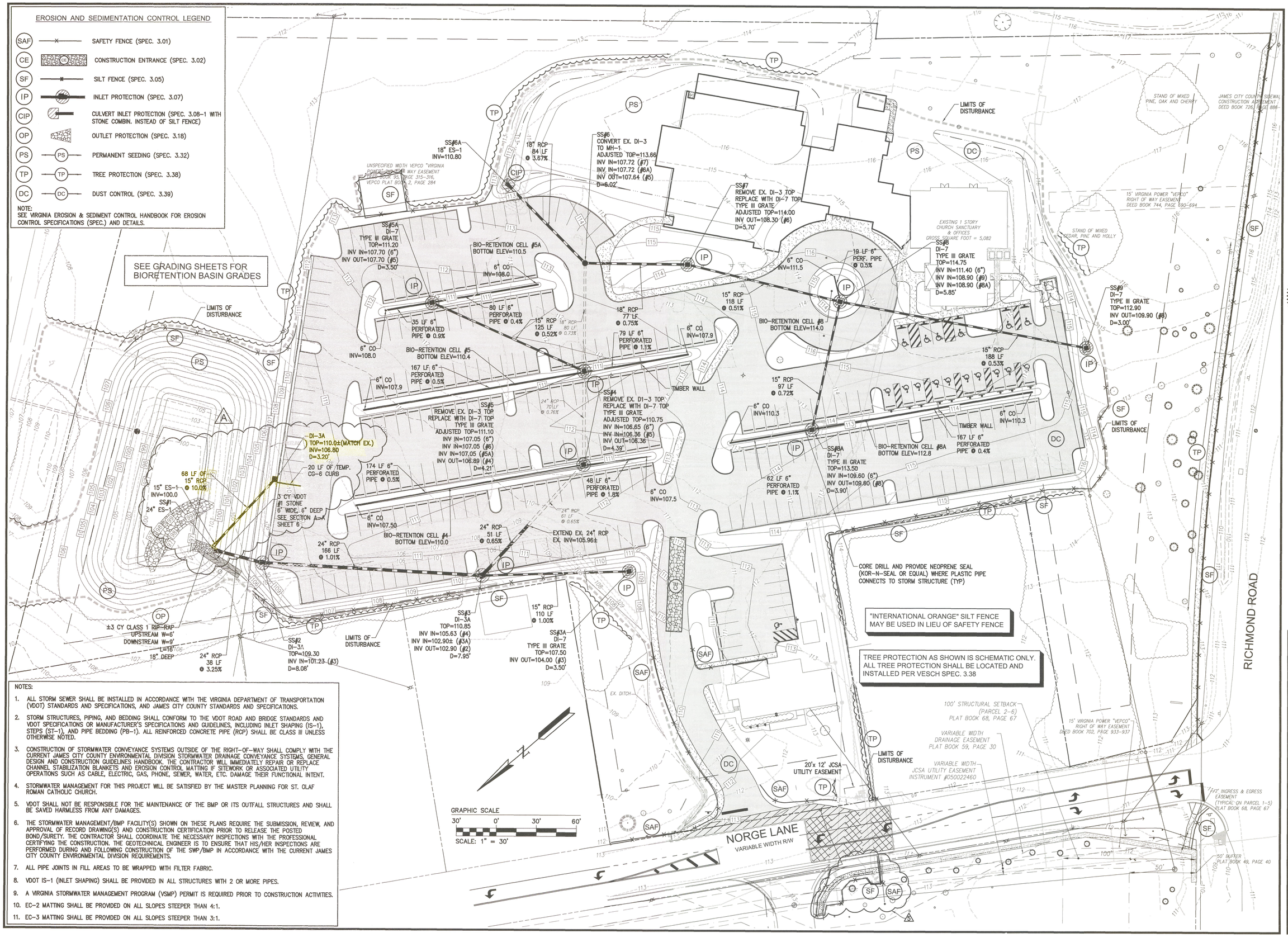
EROSION AND SEDIMENTATION CONTROL LEGEND

SAF	SAFETY FENCE (SPEC. 3.01)
CE	CONSTRUCTION ENTRANCE (SPEC. 3.02)
SF	SILT FENCE (SPEC. 3.05)
IP	INLET PROTECTION (SPEC. 3.07)
CIP	CULVERT INLET PROTECTION (SPEC. 3.08-1 WITH STONE COMBIN. INSTEAD OF SILT FENCE)
OP	OUTLET PROTECTION (SPEC. 3.18)
PS	PERMANENT SEEDING (SPEC. 3.32)
TP	TREE PROTECTION (SPEC. 3.38)
DC	DUST CONTROL (SPEC. 3.39)

NOTE:
SEE VIRGINIA EROSION & SEDIMENT CONTROL HANDBOOK FOR EROSION CONTROL SPECIFICATIONS (SPEC.) AND DETAILS.



NOTES:

1. ALL STORM SEWER SHALL BE INSTALLED IN ACCORDANCE WITH THE VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT) STANDARDS AND SPECIFICATIONS, AND JAMES CITY COUNTY STANDARDS AND SPECIFICATIONS.
2. STORM STRUCTURES, PIPING, AND BEDDING SHALL CONFORM TO THE VDOT ROAD AND BRIDGE STANDARDS AND VDOT SPECIFICATIONS OR MANUFACTURER'S SPECIFICATIONS AND GUIDELINES, INCLUDING INLET SHAPING (IS-1), STEPS (ST-1), AND PIPE BEDDING (PB-1). ALL REINFORCED CONCRETE PIPE (RCP) SHALL BE CLASS III UNLESS OTHERWISE NOTED.
3. CONSTRUCTION OF STORMWATER CONVEYANCE SYSTEMS OUTSIDE OF THE RIGHT-OF-WAY SHALL COMPLY WITH THE CURRENT JAMES CITY COUNTY ENVIRONMENTAL DIVISION STORMWATER DRAINAGE CONVEYANCE SYSTEMS, GENERAL DESIGN AND CONSTRUCTION GUIDELINES HANDBOOK. THE CONTRACTOR WILL IMMEDIATELY REPAIR OR REPLACE CHANNEL STABILIZATION BLANKETS AND EROSION CONTROL MATTING IF SITEWORK OR ASSOCIATED UTILITY OPERATIONS SUCH AS CABLE, ELECTRIC, GAS, PHONE, SEWER, WATER, ETC. DAMAGE THEIR FUNCTIONAL INTENT.
4. STORMWATER MANAGEMENT FOR THIS PROJECT WILL BE SATISFIED BY THE MASTER PLANNING FOR ST. OLAF ROMAN CATHOLIC CHURCH.
5. VDOT SHALL NOT BE RESPONSIBLE FOR THE MAINTENANCE OF THE BMP OR ITS OUTFALL STRUCTURES AND SHALL BE SAVED HARMLESS FROM ANY DAMAGES.
6. THE STORMWATER MANAGEMENT/BMP FACILITY(S) SHOWN ON THESE PLANS REQUIRE THE SUBMISSION, REVIEW, AND APPROVAL OF RECORD DRAWING(S) AND CONSTRUCTION CERTIFICATION PRIOR TO RELEASE THE POSTED BOND/SURETY. THE CONTRACTOR SHALL COORDINATE THE NECESSARY INSPECTIONS WITH THE PROFESSIONAL CERTIFYING THE CONSTRUCTION. THE GEOTECHNICAL ENGINEER IS TO ENSURE THAT HIS/HER INSPECTIONS ARE PERFORMED DURING AND FOLLOWING CONSTRUCTION OF THE SWP/BMP IN ACCORDANCE WITH THE CURRENT JAMES CITY COUNTY ENVIRONMENTAL DIVISION REQUIREMENTS.
7. ALL PIPE JOINTS IN FILL AREAS TO BE WRAPPED WITH FILTER FABRIC.
8. VDOT IS-1 (INLET SHAPING) SHALL BE PROVIDED IN ALL STRUCTURES WITH 2 OR MORE PIPES.
9. A VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) PERMIT IS REQUIRED PRIOR TO CONSTRUCTION ACTIVITIES.
10. EC-2 MATTING SHALL BE PROVIDED ON ALL SLOPES STEEPER THAN 4:1.
11. EC-3 MATTING SHALL BE PROVIDED ON ALL SLOPES STEEPER THAN 3:1.

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
5	2/13/12	REVISED BASED ON EROSION ISSUE	GVC	REC
4	12/05/11	ADDED SIDEWALK CONNECTION AND LANDSCAPING TO STORAGE SHED	GVC	REC
3	09/06/11	SITE PLAN AMENDMENT #1	GVC	REC
2	06/22/10	GRADE CHANGE PER CONTRACTOR FOR BUILDING PAD	MJS	REC
1	06/14/10	REVISED WATER & SEWER CONNECTION PER JCSA	MJS	REC
4	03/12/10	REVISED PER JCC AND JCSA	RMK	REC
3	02/08/10	ISSUED FOR BUILDING PERMIT	REC	REC

COMMONWEALTH OF VIRGINIA
ROBERT E. COSBY III
Lic. No. 35664
12/5/11
PROFESSIONAL ENGINEER

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CONSULTING ENGINEERS
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DRAINAGE, EROSION & SEDIMENT CONTROL PLAN
ST. OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VAB	BBS
Scale	Date
1"=30'	11/3/08

Project No. 9882-01

Drawing No. 8

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No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
1	2/13/12	REVISED BASED ON EROSION ISSUE	CVC	REC
2	12/05/11	ADDED SIDEWALK CONNECTION AND LANDSCAPING TO STORAGE SHED	CVC	REC
3	09/06/11	SITE PLAN AMENDMENT #1	CVC	REC
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COMMONWEALTH OF VIRGINIA
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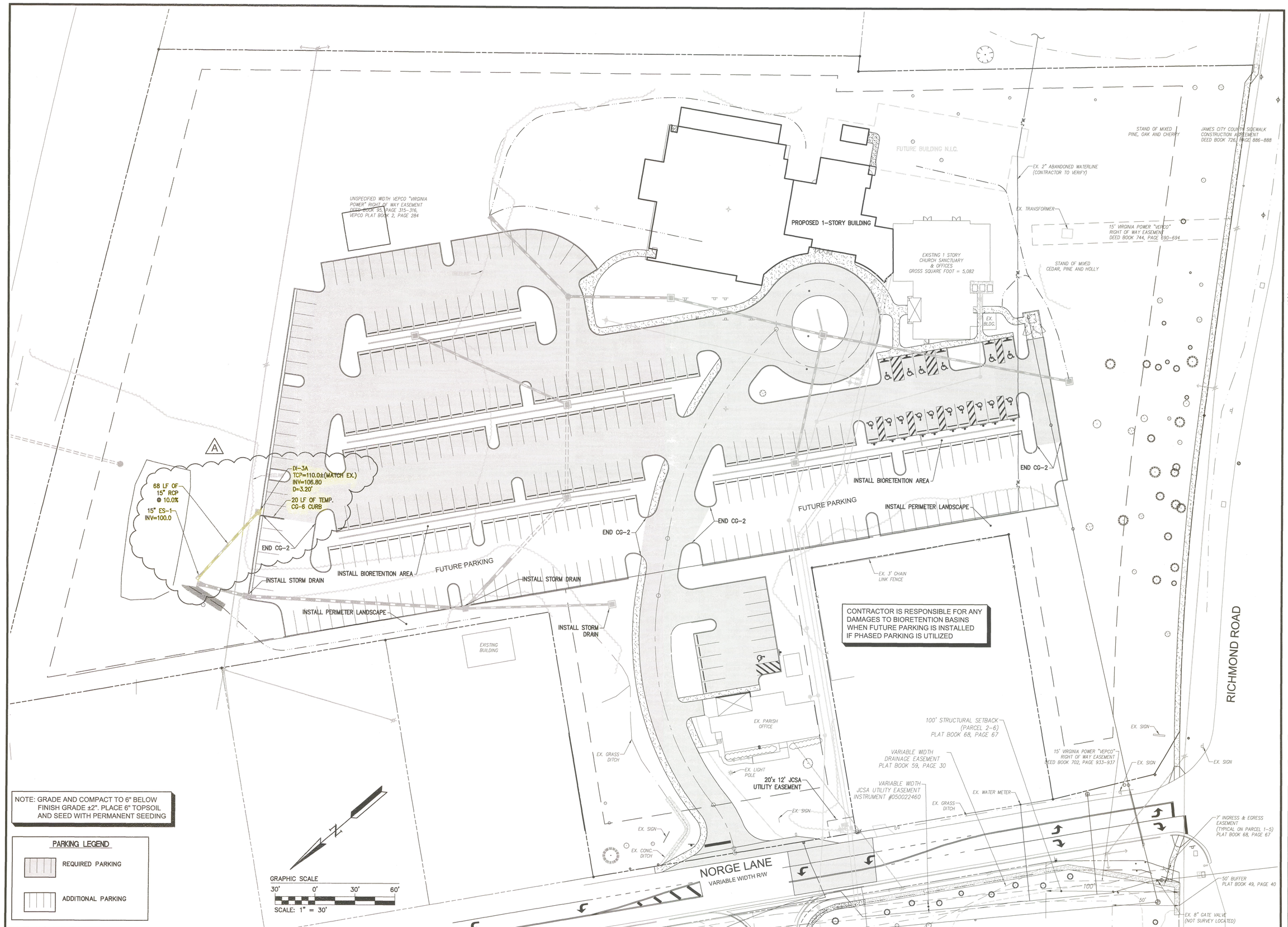
PHASE PARKING PLAN
ST. OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VAB	BBS
Scale	Date
1"=30'	11/3/08
Project No.	
9882-01	
Drawing No.	
17	



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SUP- 0006-2008

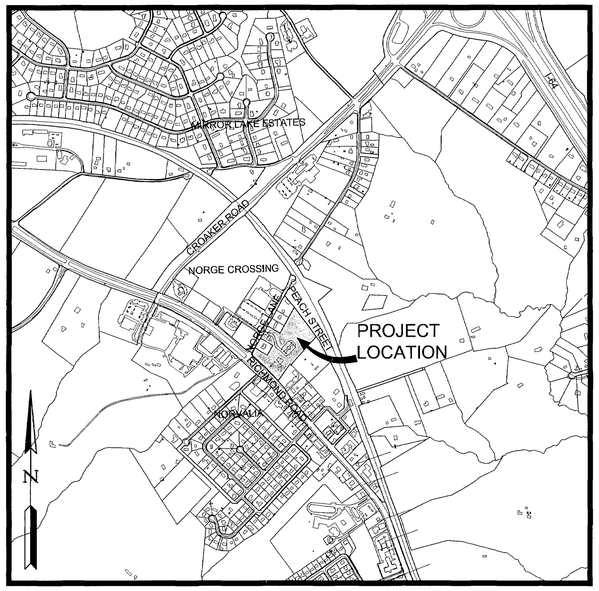
SPECIAL USE PERMIT/REZONING

FOR

ST. OLAF ROMAN CATHOLIC CHURCH

STONEHOUSE DISTRICT
JAMES CITY COUNTY VA

RECEIVED
MAY 2008
Planning Department



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

INDEX OF SHEETS

1 COVER SHEET
2 ENVIRONMENTAL INVENTORY
3 MASTER PLAN
4 CONCEPTUAL STORMWATER MANAGEMENT & UTILITIES PLAN

REVISED SUBMITTAL DATE: 05/14/2008
ORIGINAL SUBMITTAL DATE: 03/26/2008
AES PROJECT NO.: 9882-00
SHEET 01

COMMONWEALTH OF VIRGINIA
RICHARD [illegible]ELLO
Lic. No. 13250
03/26/08
PROFESSIONAL ENGINEER

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ENVIRONMENTAL INVENTORY:

SOILS:
INFORMATION TAKEN FROM "SOIL SURVEY OF JAMES CITY AND YORK COUNTIES AND THE CITY OF WILLIAMSBURG VIRGINIA" ISSUED APRIL 1985 BY THE UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE, IN COOPERATION WITH VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY.

THE MAJORITY OF THE SITE HAS BEEN IDENTIFIED AS SOIL TYPE 19B- KEMPSVILLE-EMPORIA FINE SANDY LOAM WITH 2-6% SLOPES. THIS SOIL TYPE CONSISTS OF GENERALLY WELL-DRAINED SOILS WITH MODERATE PERMEABILITY AND MODERATE SHRINK-SWELL POTENTIAL.

THE FOLLOWING SOIL TYPES ARE ALSO PRESENT ON-SITE:
29A- SLAGLE FINE SANDY LOAM, 0-2%
34B- UCHEE LOAMY FINE SAND, 2-6%
20B- KENANSVILLE LOAMY FINE SAND, 2-6%
34C-UCHEE LOAMY FINE SAND, 6-10%
31B- SUFFOLK FINE SANDY LOAM, 2-6%

WETLANDS:
BY SOIL SURVEY THERE ARE NO HYDRIC SOILS ON THIS SITE.

SLOPES:
THERE ARE NO IMPACTED SLOPES IN EXCESS OF 25% ON THIS SITE.

FLOOD ZONE:
THIS PROPERTY LIES IN F.I.R.M. ZONE X (AREAS DETERMINED TO BE OUTSIDE OF THE 500-YEAR FLOODPLAIN) AS SHOWN ON COMMUNITY PANEL # 51095C0110C EFFECTIVE 9/28/07 OF THE FLOOD INSURANCE RATE MAPS FOR JAMES CITY COUNTY, VIRGINIA.

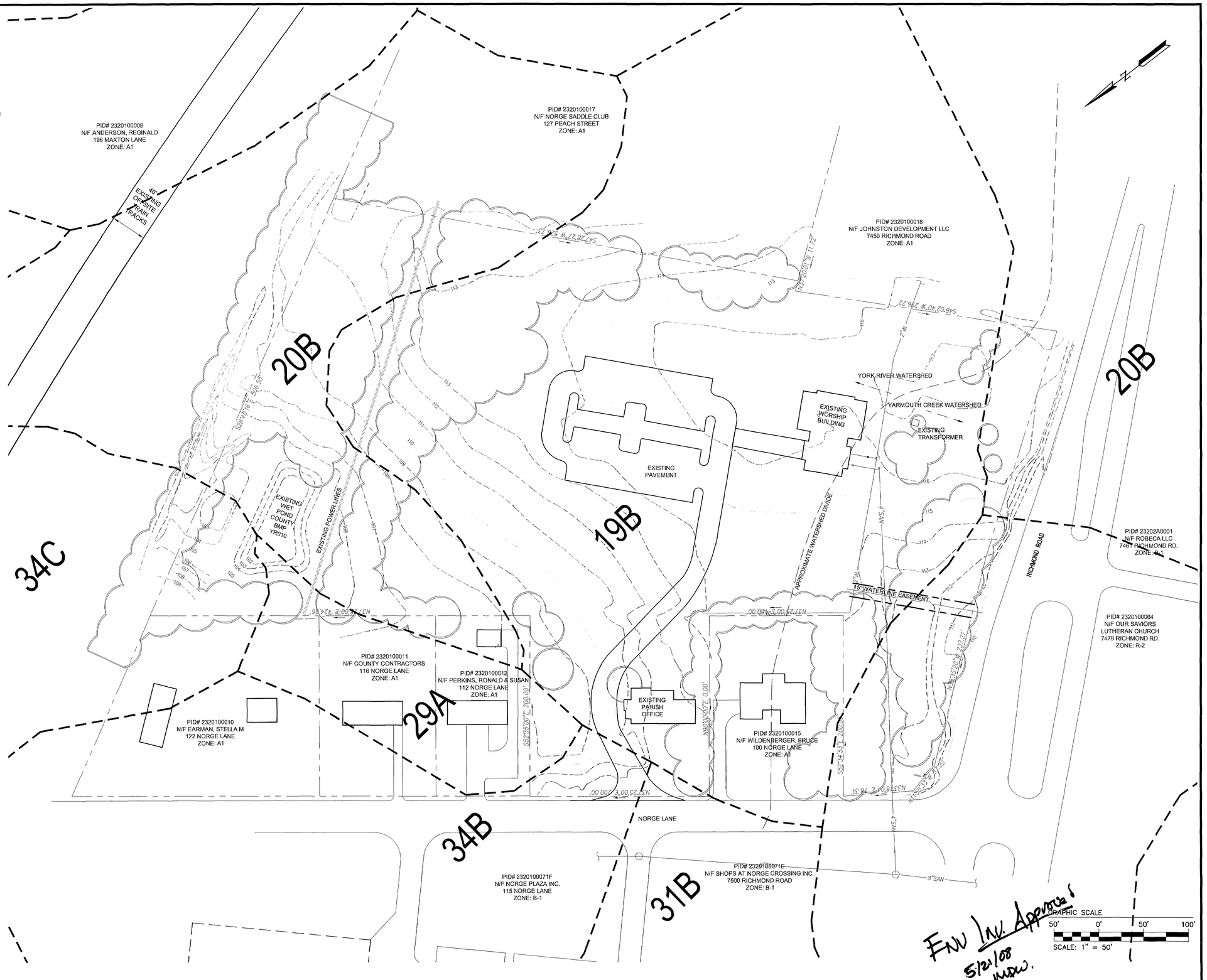
PROTECTED SPECIES:
THERE ARE NO KNOWN RTE SPECIES OR SMALL WHORLED POGONIA POPULATIONS ON THIS SITE.

WATERSHED INFORMATION:
THIS SITE DRAINS TO TWO WATERSHEDS; THE MAJORITY OF THE SITE DRAINS TO THE YORK RIVER, WHILE THE PORTION OF THE SITE ALONG THE COMMUNITY CHARACTER CORRIDOR BUFFER AND RICHMOND ROAD DRAINS TO YARMOUTH CREEK.

ENVIRONMENTAL INVENTORY IMPACTS	
TIDAL WETLANDS:	NONE ON SITE
TIDAL SHORES:	NONE ON SITE
NON-TIDAL WETLANDS IN RPA:	NONE ON SITE
100 FT RPA BUFFER:	NONE ON SITE
NON-TIDAL WETLANDS IN RMA:	NONE ON SITE
IMPACTED 25% SLOPES:	NONE ON SITE

NOTE: INFORMATION ON THIS DRAWING IS PRELIMINARY AND BASED IN PART ON DJG SITE PLAN DRAWINGS DJG, DATED SEPTEMBER 28, 1994.

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



Env Inv. Approved 5/21/08 MDW.

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
1	05/14/08	REVISIONS PER COUNTY COMMENTS	SJR	RAC

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ES CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

ENVIRONMENTAL INVENTORY
ST OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG

STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
BHA	SJR
Scale	Date
1"=50'	03/26/08

Project No. 9882-00

Drawing No. 2 of 4

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SITE SUMMARY:

ADDRESS: 104 NORGE LANE, WILLIAMSBURG, VA 23188

PARCEL ID: 23201000016

TOTAL LAND AREA: 409,242 SF (9.39± AC)

COMPREHENSIVE PLAN DESIGNATION: LOW DENSITY RESIDENTIAL

EXISTING ZONING: R8 (RURAL RESIDENTIAL) (SUP 30-5) WITH CONDITIONS PER Z-0007-1994, APPROVED 9/6/94.

PROPOSED ZONING: R8 (RURAL RESIDENTIAL) WITH AMENDED CONDITIONS.

AREA CALCULATIONS:

OPEN SPACE (PERVIOUS AREA): 251,608 SF (61.5% OF TOTAL SITE AREA)

IMPERVIOUS AREA
EXISTING:
PARISH OFFICE FOOTPRINT: 2,601 SF
WORSHIP BUILDING FOOTPRINT: 5,214 SF
PAVED SURFACES: APPROX. 35,120 SF
TOTAL EXISTING IMPERVIOUS: APPROX. 42,935 SF

PROPOSED:
PHASE I: 19,465 SF
PHASE 1A: 960 SF
PHASE II: 5,175 SF
PHASE III: 2,025 SF
TOTAL PROPOSED EXPANSION FOOTPRINT: 27,625 SF

TOTAL EXISTING BUILDING: 7,815 SF

PAVED SURFACES: 122,194 SF

TOTAL IMPERVIOUS COVERAGE: 157,634 SF 3.6 AC

PERCENTAGE IMPERVIOUS COVERAGE: 38.5%

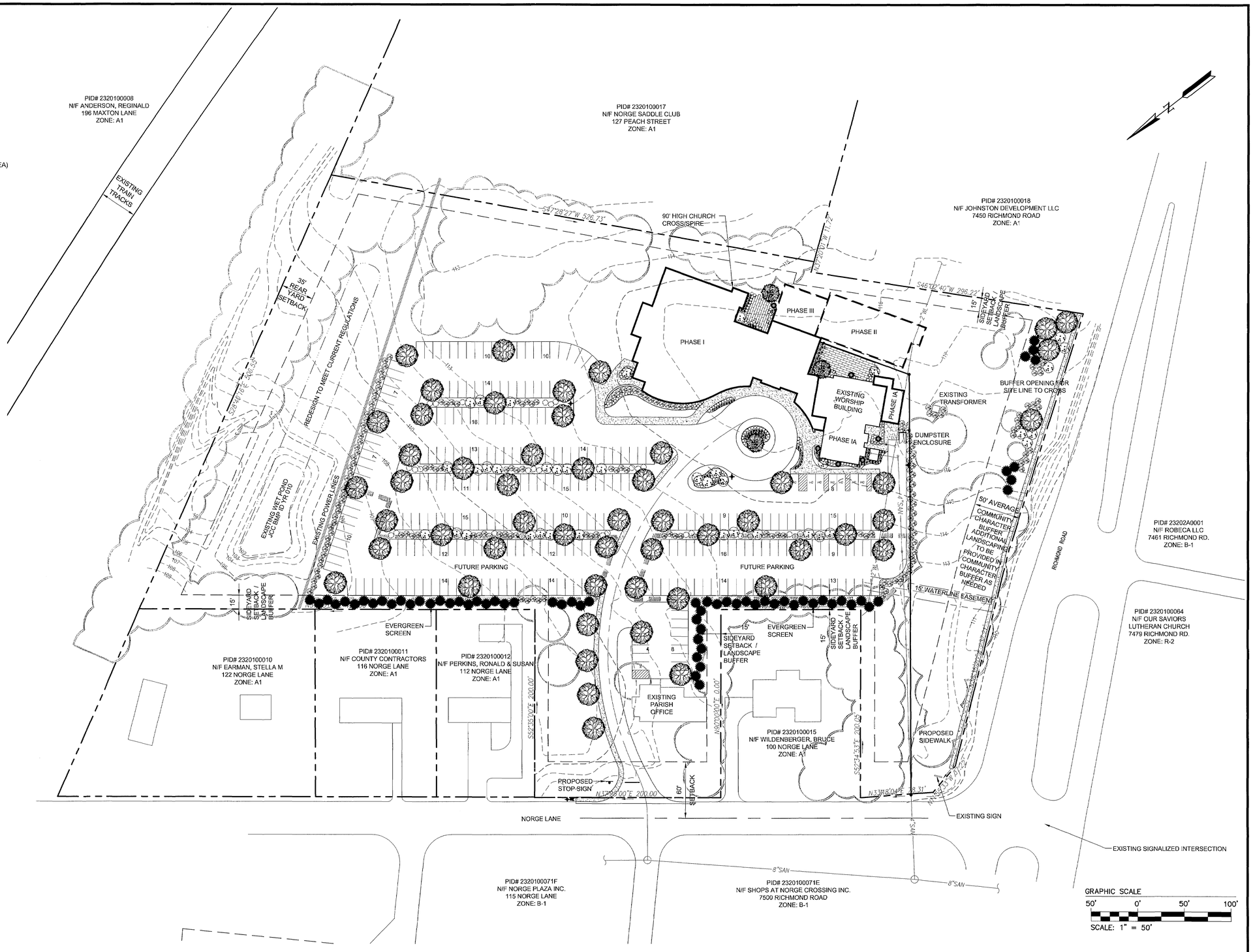
PARKING CALCULATIONS:
600 WORSHIP SEATS

REQUIRED:
1 PER 5 SEATS = 190 SPACES

PROVIDED:
1 PER 2 SEATS = 300 SPACES

NOTE: INFORMATION ON THIS DRAWING IS PRELIMINARY AND BASED IN PART ON DJG SITE PLAN DRAWINGS DJG, DATED SEPTEMBER 28, 1994.

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



No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
1	05/14/08	REVISIONS PER COUNTY COMMENTS	SJR	RAC

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CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

BINDING MASTER PLAN
PER ZONING ORDINANCE SECTIONS 24-484 (b) (1)-(3) & 24-654 (a)-(e)
ST OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
BHA	SJR
Scale	Date
1"=50'	03/26/08

Project No. 9882-00

Drawing No. 3 of 4

S:\Jobs\9882\00-StOlaf-SUP&SP\dwg\Pln\SUP REZONING AMENDED 05_13_08\9882SUP03MASTER.dwg, 5/14/2008 3:14:25 PM, saira.rivera

PRELIMINARY BMP POINT CALCULATIONS WORKSHEET

St. Olof Existing BMP W/ LID, AES PROJECT No. 9882-00
TOTAL AREA = 9.39 ACRE(s)

A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP Drainage Area	BMP Points		Fraction of Site Served by BMP (BMP Drainage Area/Total Area)		Weighted BMP Points
ED-Wet Pond	6.17	10	X	0.657	=	6.57
Bio-Retention	1.32	10	X	0.141	=	1.41
Bio-Retention thru BMP	1.32	5	X	0.141	=	0.70
off-site area	1.80	10	X	0.192	=	1.92
				TOTAL WEIGHTED STRUCTURAL BMP POINTS:		10.60

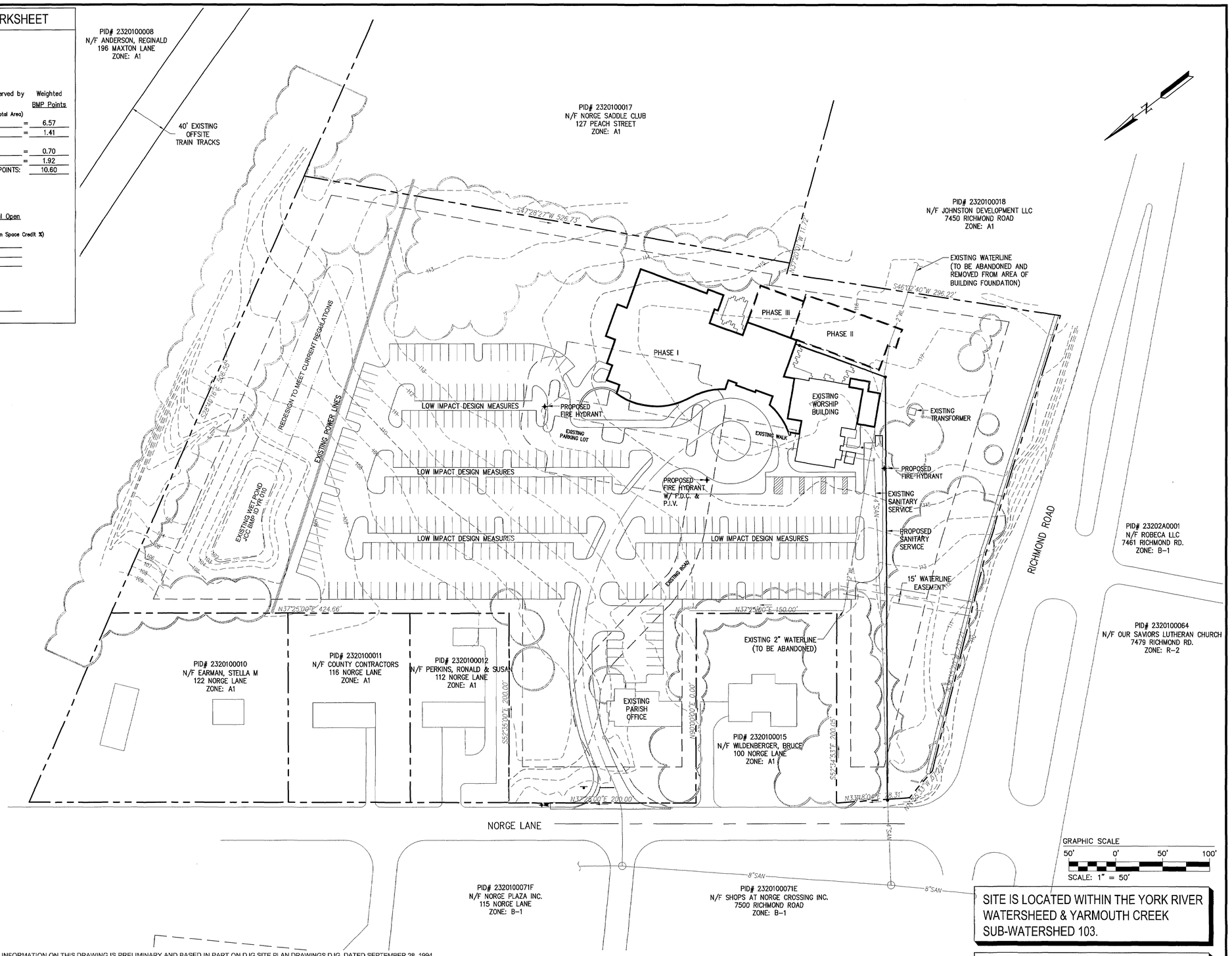
B. NATURAL OPEN SPACE CREDIT

Open Space Area	Fraction of Site (Open Space Area/Total Area)	Natural Open Space Credit		Points for Natural Open Space (Fraction of Site * Natural Open Space Credit %)
		(0.1 per 1%)	=	
		(0.15 per 1%)	=	
		TOTAL OPEN SPACE POINTS:		0.00

C. TOTAL WEIGHTED POINTS

10.60	+	0.00	=	10.60
Structural BMP Points		Natural Open Space Points		TOTAL

6.17
+ 1.32
7.49 Ac



NOTE: INFORMATION ON THIS DRAWING IS PRELIMINARY AND BASED IN PART ON DJG SITE PLAN DRAWINGS DJG, DATED SEPTEMBER 28, 1994.

SITE IS LOCATED WITHIN THE YORK RIVER WATERSHEED & YARMOUTH CREEK SUB-WATERSHED 103.

ALL DISTURBED AREA DRAINS TO ONSITE BMP WHICH IS LOCATED IN THE YORK RIVER WATERSHED.

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

No.	DATE	REVISION / COMMENT / NOTE	REVIEWED BY
1	05/14/08	REVISIONS PER COUNTY COMMENTS	SJR RAC

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CONCEPTUAL STORMWATER MANAGEMENT & UTILITIES PLAN
ST OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
BHA	SJR
Scale	Date
1"=50'	03/26/08
Project No.	
9882-00	
Drawing No.	
4 of 4	

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SP-0122-2008

COUNTY OF JAMES CITY
FINAL SITE PLAN

APPROVALS	DATE
Fire Dept TB/JC	01/26/2009
Health Dept	
VDOT BW/JC	04/24/2009
Planning CMS	3/16/10
Environ JT/JC	07/23/2010
Zoning Adm MCB(CMS)	3/16/10
JCSA DV/JC	03/10/2010
County Eng DC/JC	11/12/2008
FIEA	
Other	

Environmental Division MAR 26 2010 RECEIVED

RECEIVED MAR 2010 Planning Department

SITE PLAN

FOR

ST. OLAF CATHOLIC CHURCH

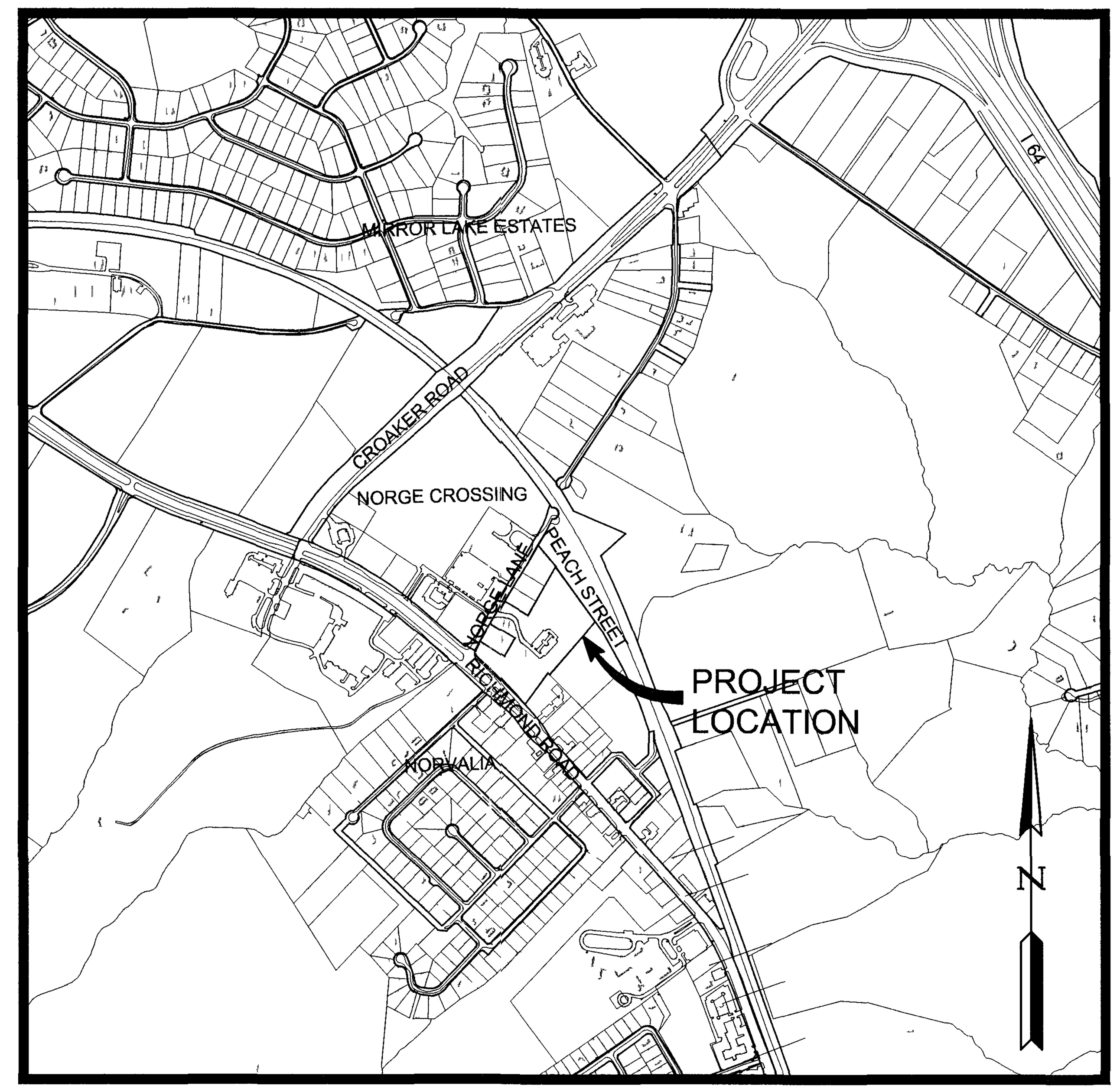
STONEHOUSE DISTRICT

JAMES CITY COUNTY, VIRGINIA

INDEX OF SHEETS

SHEET NUMBER	DESCRIPTION
1	COVER SHEET
2	ENVIRONMENTAL INVENTORY AND DEMOLITION PLAN
3	INITIAL EROSION & SEDIMENT CONTROL PLAN
4	SITE LAYOUT PLAN
5	UTILITY PLAN
6	GRADING PLAN
7	DETAILED GRADING PLAN
8	DRAINAGE EROSION & SEDIMENT CONTROL PLAN
9	POND BMP
10	LANDSCAPE PLAN
11	LIGHTING PLAN
12	NOTES & DETAILS
13	NOTES & DETAILS
14	NOTES & DETAILS
15	NOTES & DETAILS
16	NOTES & DETAILS
17	PHASE PARKING PLAN

THIS SITE PLAN PROVIDES ONLY THOSE IMPROVEMENTS SHOWN ON THIS PLAN
THIS INCLUDES PHASE 1A 1B AND 1C OF THE BUILDING AND ALL PARKING IMPROVEMENTS SHOWN ON THIS PLAN
PHASE II OF THE BUILDING IS NOT INCLUDED WITHIN THIS SITE PLAN



VICINITY MAP (APPROX SCALE 1"=1000')

ORIGINAL SUBMITTAL DATE NOVEMBER 3, 2008

JCC-SP-0122-2008

AES PROJECT NO 9882-01

SHEET 1

COMMONWEALTH OF VIRGINIA
ROBERT E COSBY III
Lic No 35664
03/12/10
PROFESSIONAL ENGINEER

SITE DATA

SITE ADDRESS 104 NORGE LANE WILLIAMSBURG VIRGINIA 23188

TAX MAP PARCEL NO 23201000016

LEGAL DESCRIPTION ST OLAF PATRON OF NORWAY CATHOLIC CHURCH

ZONING R8 WITH CONDITIONS REFERENCING JCC CASE
Z-0001-2008/MP-0001-2008/SUP-0006-2008/HW-0002-2008
APPROVED BY THE BOARD OF SUPERVISORS ON JULY 22 2008

TOTAL SITE AREA 408 636 S F ± OR 9 38 AC ±

EXISTING IMPERVIOUS AREA	PAVEMENT	31 289 S F ± OR 0 72 AC ±	8%
	SIDEWALKS	4 106 S F ± OR 0 09 AC ±	1%
	BUILDINGS	8,415 S F ± OR 0 19 AC ±	2%
TOTAL		43 810 S F OR 1 01 AC ±	11%
EXISTING OPEN SPACE	OPEN SPACE	364,826 SF± OR 8 37 Ac±	89%
	TOTAL AREA	408 636 SF± OR 9 38 Ac ±	100%
PROPOSED IMPERVIOUS AREA	PAVEMENT	116 871 S F ± OR 2 68 AC ±	29%
	SIDEWALKS	5,548 S F ± OR 0 13 AC ±	1%
	BUILDINGS	14,725 S F ± OR 0 34 AC ±	4%
TOTAL		137 225 S F OR 3 15 AC ±	34%
PROPOSED OPEN SPACE	OPEN SPACE	271,665 SF± OR 6.24 Ac±	66%
	TOTAL AREA	408,636 SF± OR 9 38 Ac ±	100%

DISTURBED AREA 259 239 S F ± OR 5 95 AC ±

FLOOD HAZARD MAP THIS PROPERTY IS IN FLOOD ZONE "X" AS SHOWN ON MAP NUMBER 51095C PANEL 0110C FOR COMMUNITY NUMBER 510201 DATED SEPTEMBER 28 2007 OF THE FLOOD INSURANCE RATE MAPS FOR JAMES CITY COUNTY, VIRGINIA

OWNER/DEVELOPER CATHOLIC DIOCESE OF RICHMOND
C/O ST OLAF S CATHOLIC CHURCH
104 NORGE LANE
WILLIAMSBURG VA 23188
CONTACT JAMES SIMCOX
PHONE NO 757-564-3819
FAX NO 757-565-1099

PARKING CALCULATIONS

PHASE 1 600 WORSHIP SEATS

175 OVERFLOW HOLIDAY SEATING IN COMMONS AREA (REMOVABLE FOLDING CHAIRS)

PHASE 1B 150 FUTURE EXPANSION SEATING

REQUIRED 600+175+150=925 SEATS @ 1 PER 5 SEATS= 185 PARKING SPACES
HANDICAP SPACES= 7 SPACES

PROVIDED 186 PARKING SPACES (CONSTRUCTED IN PHASE 1)
114 PARKING SPACES (CONSTRUCTED IN FUTURE)
HANDICAP SPACES= 17 SPACES

186 PARKING SPACES MUST BE INSTALLED PRIOR TO ISSUANCE OF A CERTIFICATE OF OCCUPANCY FOR THE NEW BUILDING SEE SHEET 17 FOR PHASE PARKING PLAN

ON JANUARY 06 2009 THE JAMES CITY COUNTY DEVELOPMENT REVIEW COMMITTEE (DRC) REVIEWED AND APPROVED THE LANDSCAPE PLAN ASSOCIATED WITH SP-0122-2008

GENERAL NOTES

1 ALL ERRORS OR DISCREPANCIES WITH THE PLANS OR EXISTING SITE CONDITIONS SHALL BE REPORTED TO THE ENGINEER OR SURVEYOR OF RECORD BEFORE PROCEEDING WITH THE WORK

2 CONTOUR INTERVAL IS 1 FOOT

3 ANY EXISTING UNUSED WELLS SHALL BE ABANDONED IN ACCORDANCE WITH THE VIRGINIA PRIVATE WELL REGULATIONS AND JAMES CITY COUNTY CODE

4 SOLID WASTE DISPOSAL SHALL BE PROVIDED BY A PRIVATE HAULER

5 EVERYTHING BEYOND THE RIGHT-OF-WAY LINE WILL BE CONSIDERED PRIVATE AND NOT MAINTAINED BY VDOT

6 A VDOT CE-7 PERMIT IS REQUIRED FOR ALL WORK WITHIN THE VDOT RIGHT-OF-WAY THE CONTRACTOR SHALL NOTIFY VDOT IN WRITING 48 HOURS PRIOR TO COMMENCEMENT OF ANY WORK WITHIN THE VDOT RIGHT-OF-WAY

7 THE CONTRACTOR SHALL MAINTAIN A COMPLETE SET OF THE APPROVED PLANS AT THE PROJECT SITE AT ALL TIMES DURING CONSTRUCTION

8 THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING MISS UTILITY (1-800-552-7001) FOR EXISTING UTILITY LOCATIONS AT LEAST 3 WORKING DAYS PRIOR TO COMMENCING CONSTRUCTION AND A PRIVATE UTILITY LOCATOR FOR THE LOCATING OF PRIVATE UTILITIES

9 THE ABSENCE OF THE DEVELOPER OR THE ENGINEER AT THE JOB SITE DOES NOT IN ANY WAY RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO PERFORM THE WORK IN ACCORDANCE WITH THE DRAWINGS CONTRACT DOCUMENTS, ADDENDA AND WRITTEN AUTHORIZED PLAN REVISIONS

10 THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE LAWS ORDINANCES RULES, REGULATIONS AND ORDERS OF ANY BODY HAVING JURISDICTION THE CONTRACTOR SHALL ERECT AND MAINTAIN AS REQUIRED BY THE CONDITIONS AND PROGRESS OF THE WORK ALL NECESSARY SAFEGUARDS FOR SAFETY AND PROTECTION

11 ALL CONSTRUCTION METHODS AND MATERIALS SHALL CONFORM WITH THE CURRENT JAMES CITY COUNTY STANDARDS AND SPECIFICATIONS VIRGINIA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE STANDARDS AND SPECIFICATIONS VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS AND ANY OTHER APPLICABLE CITY OR STATE ORDINANCES CODES AND LAWS PRIOR TO ANY CONSTRUCTION ACTIVITY

12 THE CONTRACTOR SHALL USE ONLY NEW MATERIALS PARTS AND PRODUCTS ON ALL PROJECTS ALL MATERIALS SHALL BE STORED SO AS TO ASSURE THE PRESERVATION OF THEIR QUALITY AND FITNESS FOR THE WORK

13 THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS PRIOR TO COMMENCEMENT OF WORK INCLUDING BUT NOT LIMITED TO LAND DISTURBING, BUILDING, RIGHT-OF-WAY AND UTILITY PERMITS

14 CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF CONSTRUCTION EFFORTS WITH THE VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT) LOCAL EMERGENCY SERVICES AND ALL NECESSARY UTILITY COMPANIES INCLUDING BUT NOT LIMITED TO ELECTRICITY NATURAL GAS TELECOMMUNICATIONS CABLE TELEVISION WATER SEWER PETROLEUM TRANSMISSION AND OTHERS THAT MAY BE REQUIRED

15 THE CONTRACTOR SHALL SATISFY HIMSELF AS TO ALL SITE CONDITIONS PRIOR TO CONSTRUCTION

16 THE CONTRACTOR SHALL REMOVE ALL EXCESS MATERIAL, INCLUDING SOIL AND DEBRIS FROM THE SITE

17 ANY UTILITIES TO BE RELOCATED SHALL BE RELOCATED AT THE OWNER/DEVELOPER S EXPENSE INCLUDING UTILITIES WITHIN THE RIGHT-OF-WAY OF THE COUNTY PLEASE CHECK WITH WILLIAMSBURG RESIDENT ENGINEER S OFFICE OF THE VIRGINIA DEPARTMENT OF TRANSPORTATION FOR A CE-7 PERMIT (LAND USE PERMIT) TO WORK WITHIN RIGHT-OF-WAY AREAS IN JAMES CITY COUNTY

18 THE CONTRACTOR SHALL COMPLY WITH ALL PROVISIONS OF THE VIRGINIA UNDERGROUND UTILITY DAMAGE PREVENTION ACT (SECTION 56-265 14 ET SEQ CODE OF VIRGINIA 1950 AS AMENDED) AND HEREBY AGREES TO HOLD THE DEVELOPER AND THE ENGINEER HARMLESS AGAINST ANY LOSS DAMAGE OR CLAIMS OF ANY NATURE WHATSOEVER ARISING OUT OF THE CONTRACTOR S FAILURE TO COMPLY WITH THE REQUIREMENTS OF SAID ACT

19 THE CONTRACTOR IS REQUIRED TO COMPLY WITH THE VIRGINIA OVERHEAD HIGH VOLTAGE LINE SAFETY ACT (SECTIONS 59 1-406 THROUGH 59 1-414 CODE OF VIRGINIA 1950 AS AMENDED) THE CONTRACTOR IS REQUIRED TO VISIT THE SITE AND NOTE THE POSITION OF OVERHEAD CABLES PRIOR TO CONSTRUCTION

20 BENCHMARK STATION NO 306 EASTING (X) 11986404 356 NORTHING (Y) 3661140 546 ELEVATION = 100 40
HORIZONTAL DATUM JAMES CITY COUNTY GEODETIC CONTROL NETWORK
VIRGINIA STATE PLANE COORDINATE SYSTEM - SOUTH ZONE
NAD83(1986)
VERTICAL DATUM JAMES CITY COUNTY GEODETIC CONTROL NETWORK
NGVD 29

21 THE CONTRACTOR IS REQUIRED TO SECURE ALL NECESSARY DEMOLITION PERMITS FOR EXISTING STRUCTURES INDICATED ON THE PLAN CONTACT JAMES CITY COUNTY CODE COMPLIANCE AT 1-757-253-6626

22 A LAND DISTURBING PERMIT AND SILTATION AGREEMENT WITH SURETY ARE REQUIRED FOR THIS PROJECT

23 PRIOR TO OBTAINING A LAND DISTURBING PERMIT THE OWNER OR CONTRACTOR SHALL OBTAIN A VSMP PERMIT (VIRGINIA STORMWATER MANAGEMENT PROGRAM) FROM THE VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION FOR THE DISCHARGE OF STORMWATER FROM THE CONSTRUCTION ACTIVITIES THIS PERMIT WILL REQUIRE DAILY LOGS OF EARTHWORK RECORDATION OF STORM EVENTS LOGS OF MAINTENANCE OF EROSION AND SEDIMENT CONTROL MEASURES AND OTHER ACTIONS DURING CONSTRUCTION

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

25 NO OFFSITE LAND DISTURBANCE IS ANTICIPATED FOR THIS PROJECT

26 THE CONTRACTOR SHALL REESTABLISH ALL EXISTING PROPERTY PINS MONUMENTS WATER METERS DRAINAGE CULVERTS FENCES UTILITY POLES DRIVEWAYS CURBS GUTTERS ETC DISTURBED DURING CONSTRUCTION AT NO ADDITIONAL COST TO THE DEVELOPER

27 TEMPORARY TRAFFIC CONTROL SHALL CONFORM TO THE LATEST EDITION OF THE VIRGINIA WORK AREA PROTECTION MANUAL

28 ALL TRAFFIC CONTROL SIGNS AND PAVEMENT MARKINGS SHALL CONFORM TO THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) FOR STREETS AND HIGHWAYS

29 ALL PARKING SPACES ARE TO BE PROVIDED WITH 4-INCH WHITE PAINTED STRIPING AND HANDICAP ACCESS AISLES WITH 1FT WIDE BLUE PAINTED HATCHING HANDICAP PARKING SPACES SHALL BE DESIGNATED BY ABOVE GROUND SIGNS PER UNIFORM STATEWIDE BUILDING CODE (USBC) REQUIREMENTS

30 THIS PROJECT IS LOCATED IN JAMES CITY COUNTY SUB WATERSHED 103 OF THE YARMOUTH CREEK WATERSHED AND THE YORK RIVER WATERSHED

31 ALL OBJECTIONABLE AND DELETERIOUS MATERIAL IS TO BE REMOVED FROM THIS SITE AND DISPOSED OF IN A STATE APPROVED FACILITY MEETING THE REQUIREMENTS OF ALL APPLICABLE LOCAL STATE AND FEDERAL REGULATIONS

32 PRIVATELY OWNED UTILITIES (I E WATER & SEWER LINES) SHOWN ON THIS SITE PLAN ARE REGULATED BY THE VIRGINIA UNIFORM STATEWIDE BUILDING CODE AND ENFORCED BY THE CODE COMPLIANCE DIVISION THESE PRIVATELY OWNED UTILITIES MUST COMPLY FULLY WITH THE INTERNATIONAL PLUMBING CODE THE NATIONAL FIRE PREVENTION ASSOCIATION STANDARD 24 AND THE INTERNATIONAL FIRE CODE CONTRACTORS WORKING FROM THIS SITE PLAN ARE CAUTIONED NOT TO INSTALL OR CONCEAL PRIVATELY OWNED SITE UTILITIES WITHOUT OBTAINING REQUIRED PERMITS AND INSPECTIONS

AES

CONSULTING ENGINEERS

WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

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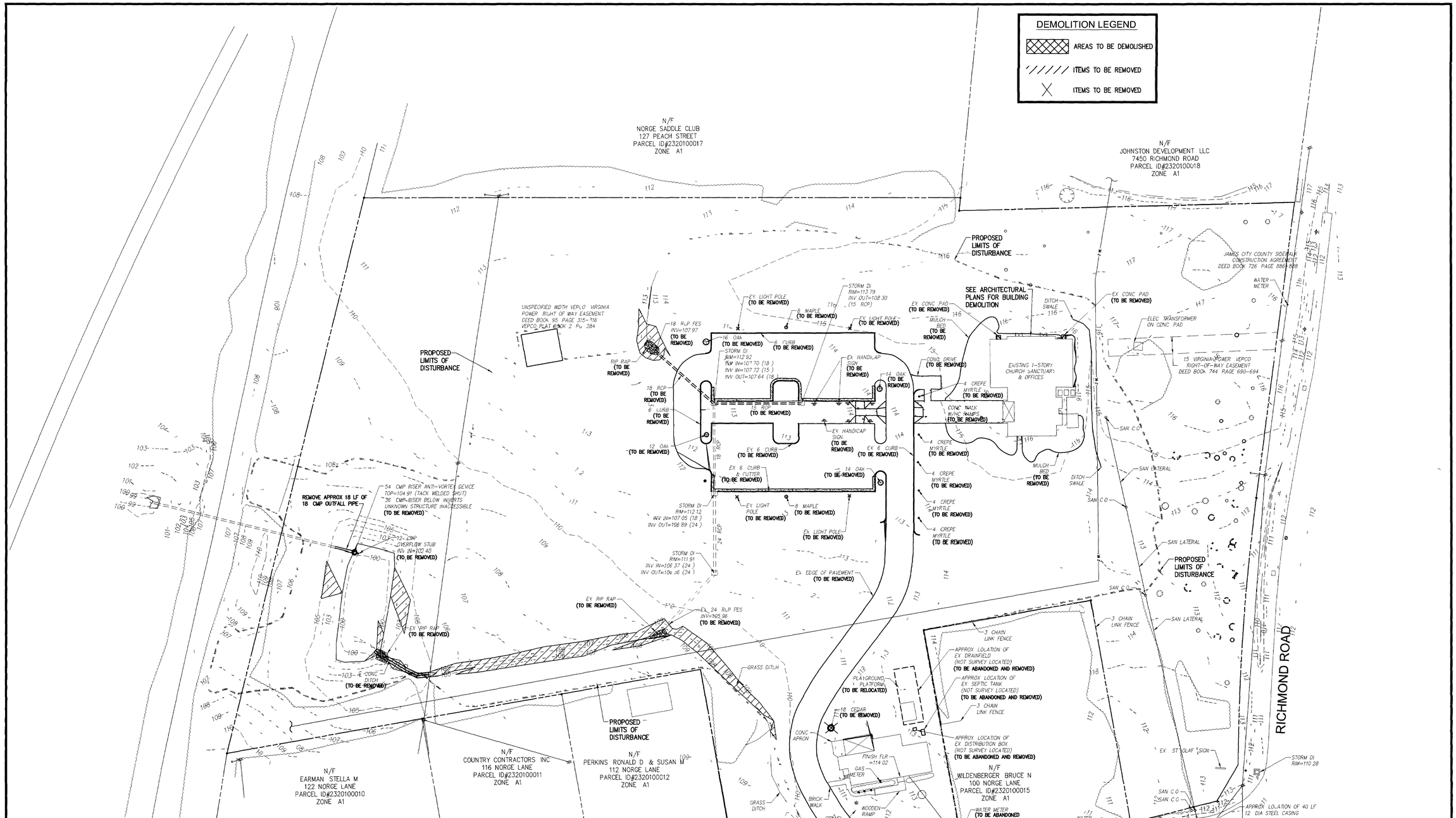
Phone (757) 253-0040 • Fax (757) 220-8994

APPROVAL DATE	No	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
	4	03/12/10	REVISED PER JCC AND JCSA	RMK	REC
	3	02/08/10	ISSUED FOR BUILDING PERMIT	REC	REC
	2	04/01/09	REVISED PER COUNTY COMMENTS DATED 02/20/09	REC	REC
	1	01/14/09	REVISED PER COUNTY COMMENTS DATED 12/03/08	VAB	VAB

ST OLAF CATHOLIC CHURCH
JOB # 9882-01



SOIL CHARACTERISTICS

SOIL#	SOIL NAME	TYPICAL SLOPES	EROSION FACTOR (K)	EROSION FACTOR (T)
14C	EMPORIA	6-10/	0 20-0 28	4
19B	KEMPSVILLE-EMPORIA	2-6/	0 20-0 32	3-4
20B	KENANSVILLE	2-6/	0 10-0 15	5
29A	SLAGLE	0-2/	0 24	3
31B	SUFFOLK	2-6/	0 17-0 28	4
34B	UCHEE	2-6/	0 20-0 28	5
34C	UCHEE	6-10/	0 20-0 28	5

INFORMATION TAKEN FROM SOIL SURVEY OF JAMES CITY AND YORK COUNTIES AND THE CITY OF WILLIAMSBURG VIRGINIA ISSUED IN APRIL 1985 BY THE UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE IN COOPERATION WITH VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

SOIL SUSCEPTIBILITY TO EROSION CLASSIFICATION (K)
0 23 AND LOWER - LOW ERODIBILITY
0 23 - 0 36 - MODERATE ERODIBILITY
0 36 AND UP - HIGH ERODIBILITY

THE MAP SHOWN IS A BEST FIT MODEL OF THE SCS MAPS WITH EXISTING BASE INFORMATION

DENOTED 25/ OR GREATER SLOPES

DENOTES 25/ OR GREATER SLOPE IMPACTS

NOTES

1 THIS PROPERTY IS IN FLOOD ZONE "X" AS SHOWN ON MAP NUMBER 51095C PANEL 0110C FOR COMMUNITY NUMBER 510201 DATED SEPTEMBER 28 2007 OF THE FLOOD INSURANCE RATE MAPS FOR JAMES CITY COUNTY VIRGINIA

2 BY SOIL SURVEY HYDRIC SOILS DO NOT EXIST ON THIS SITE

ENVIRONMENTAL INVENTORY IMPACTS	
TIDAL WETLANDS	NONE ON SITE
TIDAL SHORES	NONE ON SITE
NON-TIDAL WETLANDS IN RPA	NONE ON SITE
100 FT RPA BUFFER	NONE ON SITE
NON-TIDAL WETLANDS IN RMA	NONE ON SITE
IMPACTED 25/ SLOPES	5171 S F OR 0 12 AC

No	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
3	02/08/10	ISSUED FOR BUILDING PERMIT	REC	REC
2	04/01/09	REVISED PER COUNTY COMMENTS DATED 02/20/09	REC	REC
1	01/14/09	REVISED PER COUNTY COMMENTS DATED 12/03/08	VAB	VAB

COMMONWEALTH OF VIRGINIA
ROBERT E COSBY III
Lic No 35664
02/08/10
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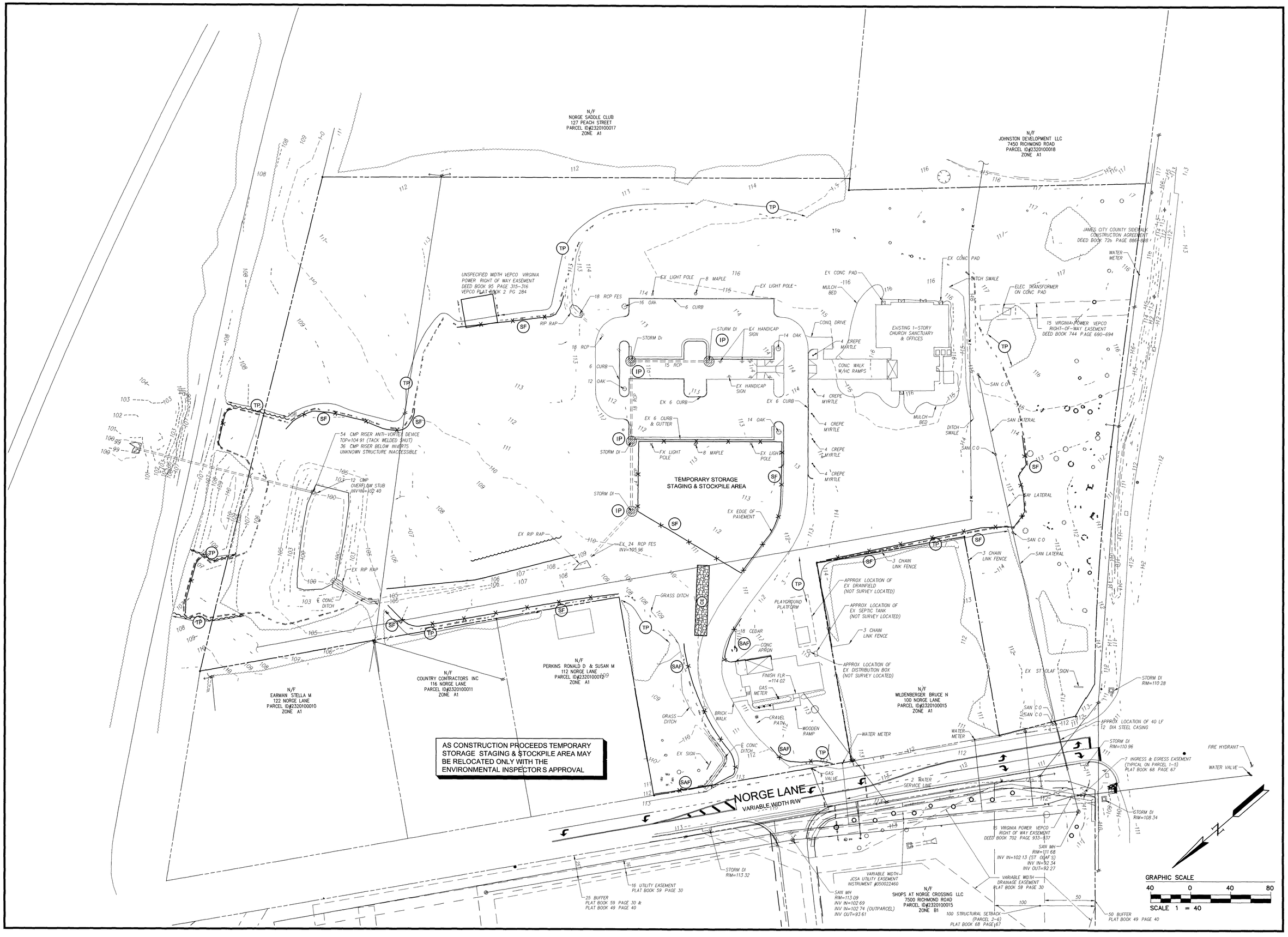
CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND GLOUCESTER FREDERICKSBURG

ENVIRONMENTAL INVENTORY AND DEMOLITION PLAN
ST OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG

STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VAB	BBS
Scale	Date
1"=40	11/3/08
Project No	
9882-01	
Drawing No	
2	



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3	02/08/10	ISSIED FOR BUILDING PERMIT	REC	REC
2	04/01/09	REVISED PER COUNTY COMMENTS DATED 02/20/09	REC	REC
1	01/14/09	REVISED PER COUNTY COMMENTS DATED 12/03/08	VAB	VAB

COMMONWEALTH OF VIRGINIA
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CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER FREDERICKSBURG

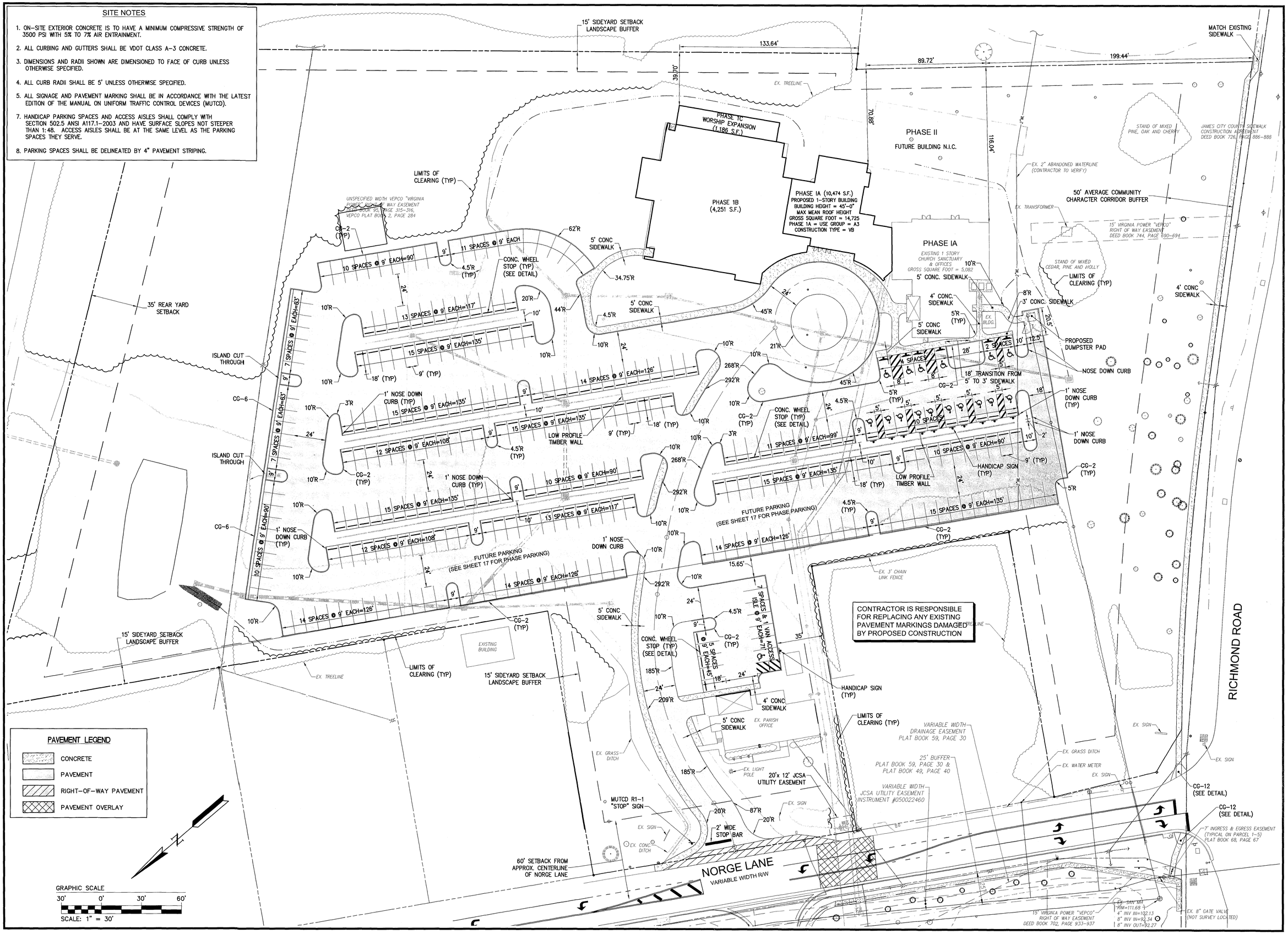
INITIAL EROSION & SEDIMENT CONTROL PLAN
ST OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG

STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed VAB	Drawn BBS
Scale 1"=40	Date 11/3/08
Project No 9882-01	
Drawing No 3	

SITE NOTES

1. ON-SITE EXTERIOR CONCRETE IS TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3500 PSI WITH 5% TO 7% AIR ENTRAINMENT.
2. ALL CURBING AND GUTTERS SHALL BE VDOT CLASS A-3 CONCRETE.
3. DIMENSIONS AND RADII SHOWN ARE DIMENSIONED TO FACE OF CURB UNLESS OTHERWISE SPECIFIED.
4. ALL CURB RADII SHALL BE 5' UNLESS OTHERWISE SPECIFIED.
5. ALL SIGNAGE AND PAVEMENT MARKING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
7. HANDICAP PARKING SPACES AND ACCESS AISLES SHALL COMPLY WITH SECTION 502.5 ANSI A117.1-2003 AND HAVE SURFACE SLOPES NOT STEEPER THAN 1:48. ACCESS AISLES SHALL BE AT THE SAME LEVEL AS THE PARKING SPACES THEY SERVE.
8. PARKING SPACES SHALL BE DELINEATED BY 4" PAVEMENT STRIPING.



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COMMONWEALTH OF VIRGINIA
ROBERT E. COSBY III
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02/08/10
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SITE LAYOUT PLAN
ST. OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VAB	BBS
Scale	Date
1"=30'	11/3/08
Project No.	
9882-01	
Drawing No.	
4	

UTILITY NOTES

1. ALL PROPOSED UTILITIES SHALL BE PLACE UNDERGROUND.
2. SITE IS SERVED BY PUBLIC WATER AND SEWER.
3. EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES. IF EXISTING UTILITIES ARE FOUND TO BE IN CONFLICT WITH PROPOSED SITE IMPROVEMENTS, THE CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER, OWNER, AND THE UTILITY COMPANY TO EITHER REDESIGN THE PROPOSED IMPROVEMENTS OR RELOCATE THE EXISTING UTILITIES AT THE OWNER'S/DEVELOPER'S EXPENSE.
4. ANY AND ALL UTILITIES AND/OR OBSTRUCTIONS (POWER POLES, TELEPHONE PEDESTALS, GUY WIRES, WATER METERS, ETC.) THAT ARE REQUIRED TO BE RELOCATED OR ADJUSTED DUE TO CONSTRUCTION SHALL BE DONE SO AT THE OWNER'S/DEVELOPER'S EXPENSE, INCLUDING THOSE WITHIN THE RIGHT-OF-WAY.
5. THE CONTRACTOR SHALL MAINTAIN A CURRENT COPY OF THE JAMES CITY COUNTY STANDARDS AND SPECS., AT THE PROJECT SITE AT ALL TIMES DURING CONSTRUCTION.
6. THE CONTRACTOR SHALL VERIFY THE SEPTIC TANK AND DRAIN FIELD ARE CURRENTLY SERVING THE EXISTING SITE. THE CONTRACTOR SHALL REMOVE THE SEPTIC SYSTEM IN ACCORDANCE WITH STATE AND LOCAL HEALTH DEPARTMENT REGULATIONS.
7. WATER AND SEWER SYSTEMS SHALL MEET THE REQUIREMENTS OF THE LATEST EDITIONS OF THE JAMES CITY SERVICE AUTHORITY (JCSA) DESIGN AND ACCEPTANCE CRITERIA AND THE HAMPTON ROADS PLANNING COMMISSION (HRPDC) REGIONAL CONSTRUCTION STANDARDS.
8. PRIVATELY OWNED UTILITIES (I.E. WATER & SEWER LINES) SHOWN ON THIS SITE PLAN ARE REGULATED BY THE VIRGINIA UNIFORM STATEWIDE BUILDING CODE AND ENFORCED BY THE CODE COMPLIANCE DIVISION. THESE PRIVATELY OWNED UTILITIES MUST COMPLY FULLY WITH THE INTERNATIONAL PLUMBING CODE, THE NATIONAL FIRE PREVENTION ASSOCIATION STANDARD 24, AND THE INTERNATIONAL FIRE CODE. CONTRACTORS WORKING FROM THIS SITE PLAN ARE CAUTIONED NOT TO INSTALL OR CONCEAL PRIVATELY OWNED SITE UTILITIES WITHOUT OBTAINING REQUIRED PERMITS AND INSPECTIONS.
9. NOTIFY JAMES CITY SERVICE AUTHORITY PRIOR TO ANY EXCAVATION WITHIN UTILITY CORRIDORS.
10. THE CONTRACTOR IS REQUIRED TO SECURE ALL NECESSARY PERMITS FOR THE ABANDONMENT OR DEMOLITION OF ALL EXISTING WELLS/WATERLINES AND SEPTIC FIELDS IN ACCORDANCE WITH JAMES CITY COUNTY AND VIRGINIA DEPARTMENT OF HEALTH REGULATIONS. CONTACT VIRGINIA DEPARTMENT OF HEALTH AT 757-253-4813.
11. ONLY JCSA PERSONNEL ARE AUTHORIZED TO OPERATE JCSA VALVES.
12. ALL WATER MAINS, 6" OR LARGER, SHALL BE RESTRAINED JOINT.
13. PRIVATE WATER SERVICE LINES, 4" OR SMALLER, SHALL BE TYPE K SOFT COPPER OR SCH. 40 PVC.
14. THE PROPOSED OIL/GREASE SEPARATOR MUST BE INSPECTED BY JOHN WILSON, JCSA UTILITY SPECIAL PROJECTS COORDINATOR AT (757) 259-4138.
15. THE PLUMBING INSIDE THE BUILDING MUST BE INSPECTED BY JCSA OPERATIONS, AT (757) 229-7421, FOR POTENTIAL CROSS CONNECTIONS. ANY CROSS CONNECTIONS MUST BE PROTECTED BY THE APPROPRIATE BACK FLOW PREVENTION DEVICE(S). A RPZ BACKFLOW PREVENTER SHALL BE INSTALLED IN THE BUILDING OR IN A HOT BOX.
16. SEE DETAIL SHEET FOR JCSA/HRPDC DETAIL REFERENCES.

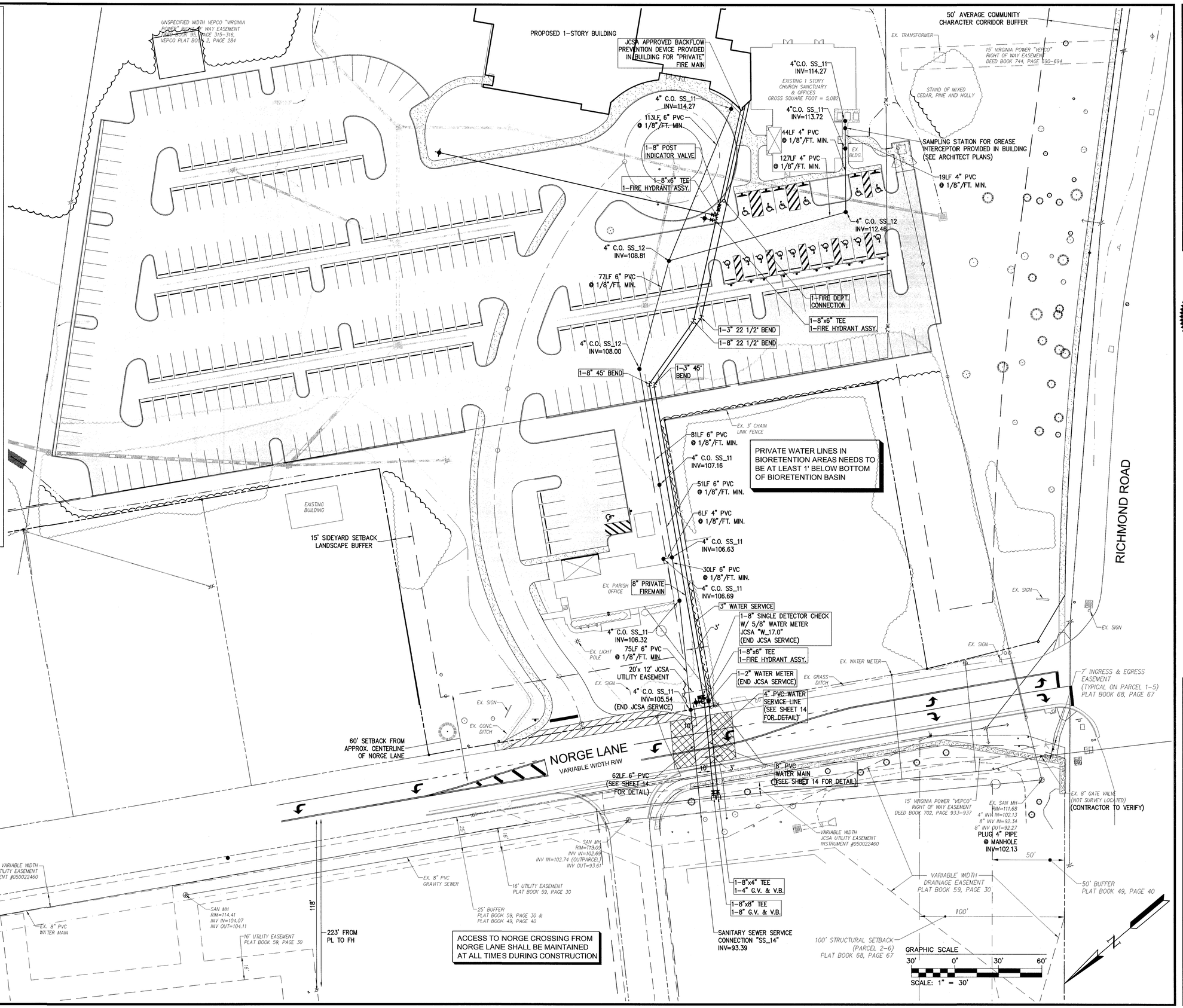
PAVEMENT LEGEND

- CONCRETE
- PAVEMENT
- RIGHT-OF-WAY PAVEMENT
- PAVEMENT OVERLAY

THIS PROJECT HAS BEEN DESIGNED IN ACCORDANCE WITH REGIONAL DESIGN GUIDELINES.

EXISTING GATE VALVES SHOWN ARE TO BE USED TO SHUT DOWN WATER SYSTEM TO INSTALL TEES.

ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH HRPDC SECTION 801.



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1	07/14/08	REVISED PER COUNTY COMMENTS DATED 12/03/08	VAB

COMMONWEALTH OF VIRGINIA
ROBERT E. COSBY III
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02/09/10
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CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

UTILITY PLAN
ST. OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VAB	BBS
Scale	Date
1"=30'	11/3/08

Project No. 9882-01

Drawing No. 5

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
3	02/08/10	ISSUED FOR BUILDING PERMIT	REC	REC
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GRADING PLAN
ST. OLAF CATHOLIC CHURCH

104 NORGE LANE, WILLIAMSBURG — JAMES CITY COUNTY — VIRGINIA

STONEHOUSE DISTRICT

Designed	Drawn
VAB	BBS
Scale	Date
1"=30'	11/3/08

Project No. 9882-01

Drawing No. 6

304 LF OF GRASS LINED SWALE @ 1.6%

SEE SHEET 6 FOR DETAILED GRADING PLAN

PROPOSED BUILDING
FF=116.77
(MATCH EX. BUILDING FF)

EXISTING 1 STORY CHURCH SANCTUARY & OFFICES
GROSS SQUARE FOOT = 5,082

EX. FF=116.77

35 LF OF GRASS LINED SWALE @ 5.9%

219 LF OF GRASS LINED SWALE @ 1.4%

EX. 2" ABANDONED WATERLINE (CONTRACTOR TO VERIFY)

STAND OF MIXED PINE, OAK AND CHERRY

JAMES CITY COUNTY SIDEW CONSTRUCTION AGREEMENT DEED BOOK 726, PAGE 88

15' VIRGINIA POWER "VEPCO" RIGHT OF WAY EASEMENT DEED BOOK 744, PAGE 690-694

STAND OF MIXED CEDAR, PINE AND HOLLY

UNSPECIFIED WIDTH VEPCO "VIRGINIA POWER" RIGHT OF WAY EASEMENT DEED BOOK 95, PAGE 315-316, VEPCO PLAT BOOK 2, PAGE 284

EXISTING BUILDING

GRADE TO DRAIN
MIN SLOPE 1%
MAX SLOPE 4%

3 CY VDOT #1 STONE
6' WIDE 6" DEEP
SEE SECTION A-A
THIS SHEET

100' STRUCTURAL SETBACK (PARCEL 2-6) PLAT BOOK 68, PAGE 67

VARIABLE WIDTH DRAINAGE EASEMENT PLAT BOOK 59, PAGE 30

VARIABLE WIDTH JCSA UTILITY EASEMENT INSTRUMENT #050022460

20'x 12' JCSA UTILITY EASEMENT

15' VIRGINIA POWER "VEPCO" RIGHT OF WAY EASEMENT DEED BOOK 702, PAGE 933-937

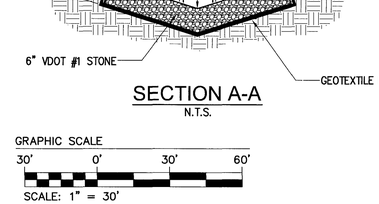
42' INGRESS & EGRESS EASEMENT (TYPICAL ON PARCEL 1-5) PLAT BOOK 68, PAGE 67

50' BUFFER PLAT BOOK 49, PAGE 40

NORGE LANE
VARIABLE WIDTH R/W

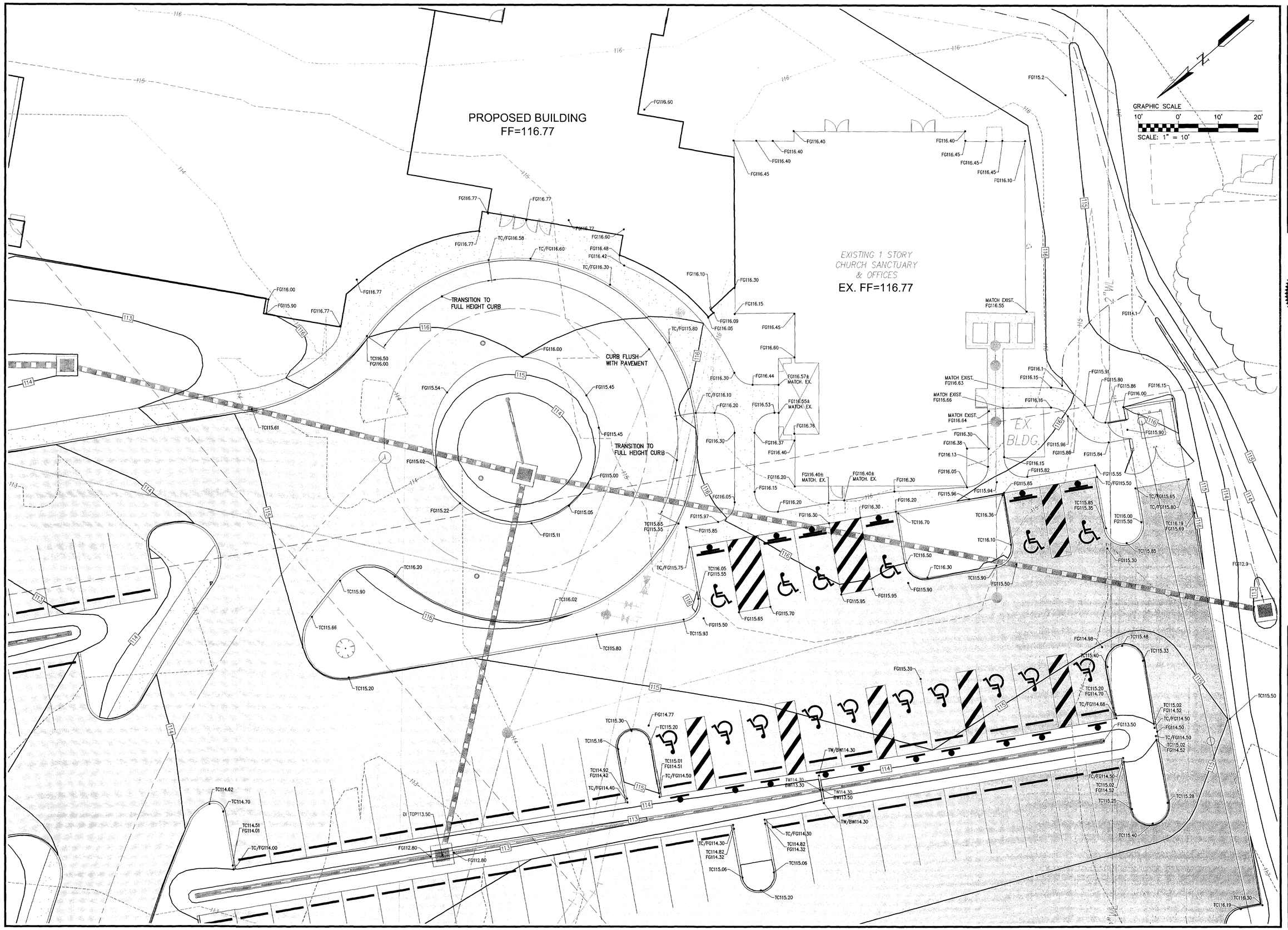
RICHMOND ROAD

VDOT SHALL NOT BE RESPONSIBLE FOR THE MAINTENANCE OF THE BMP OR ITS OUTFALL STRUCTURES AND SHALL BE SAVED HARMLESS FROM ANY DAMAGES



SECTION A-A
N.T.S.

GRAPHIC SCALE
30' 0' 30' 60'
SCALE: 1" = 30'



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DETAILED GRADING PLAN
ST. OLAF CATHOLIC CHURCH

104 NORGE LANE, WILLIAMSBURG

STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
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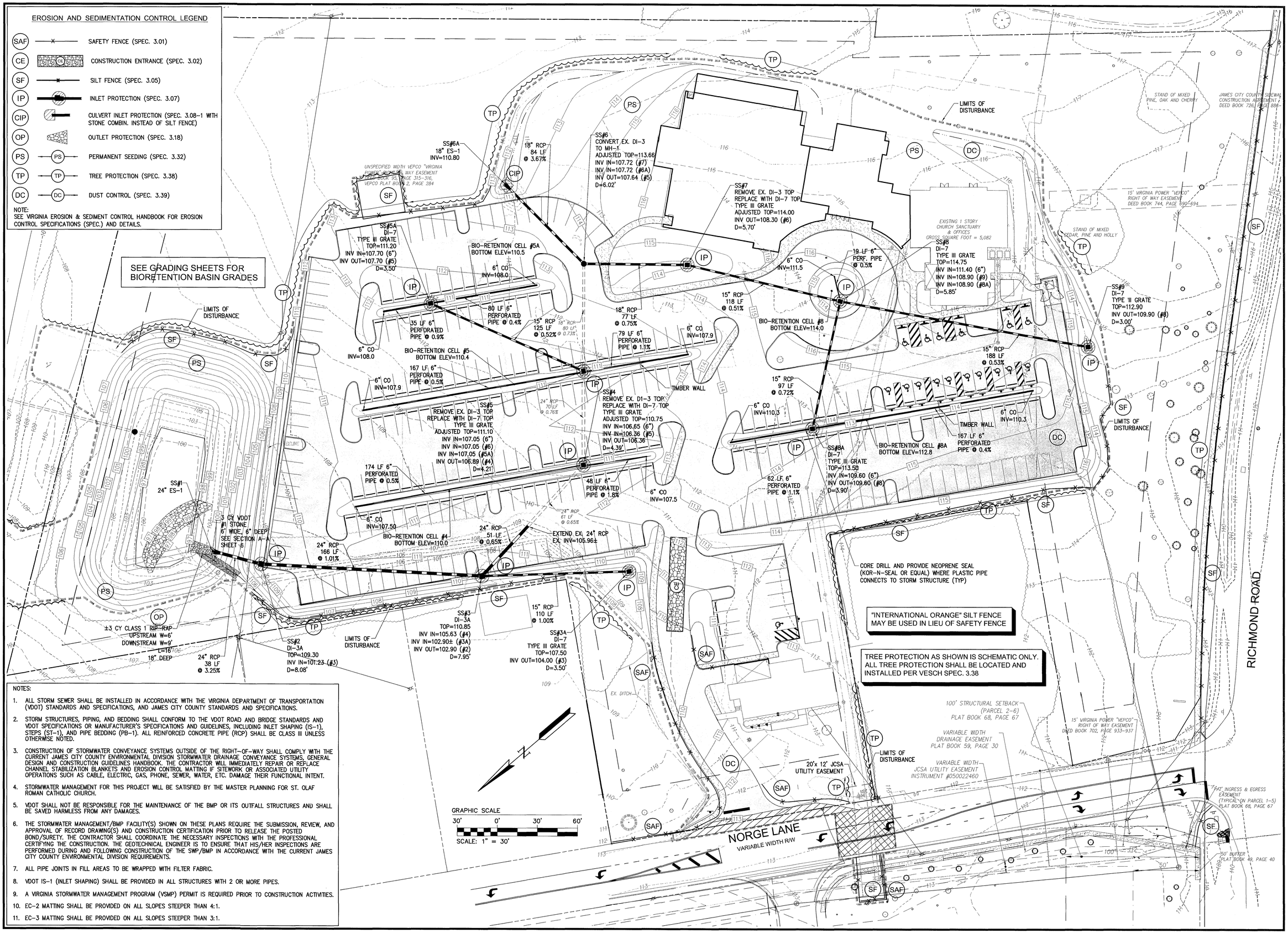
Project No. 9882-01

Drawing No. 7

EROSION AND SEDIMENTATION CONTROL LEGEND

- SAF — SAFETY FENCE (SPEC. 3.01)
- CE — CONSTRUCTION ENTRANCE (SPEC. 3.02)
- SF — SILT FENCE (SPEC. 3.05)
- IP — INLET PROTECTION (SPEC. 3.07)
- CIP — CULVERT INLET PROTECTION (SPEC. 3.08-1 WITH STONE COMBIN. INSTEAD OF SILT FENCE)
- OP — OUTLET PROTECTION (SPEC. 3.18)
- PS — PERMANENT SEEDING (SPEC. 3.32)
- TP — TREE PROTECTION (SPEC. 3.38)
- DC — DUST CONTROL (SPEC. 3.39)

NOTE:
SEE VIRGINIA EROSION & SEDIMENT CONTROL HANDBOOK FOR EROSION CONTROL SPECIFICATIONS (SPEC.) AND DETAILS.



NOTES:

1. ALL STORM SEWER SHALL BE INSTALLED IN ACCORDANCE WITH THE VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT) STANDARDS AND SPECIFICATIONS, AND JAMES CITY COUNTY STANDARDS AND SPECIFICATIONS.
2. STORM STRUCTURES, PIPING, AND BEDDING SHALL CONFORM TO THE VDOT ROAD AND BRIDGE STANDARDS AND VDOT SPECIFICATIONS OR MANUFACTURER'S SPECIFICATIONS AND GUIDELINES, INCLUDING INLET SHAPING (IS-1), STEPS (ST-1), AND PIPE BEDDING (PB-1). ALL REINFORCED CONCRETE PIPE (RCP) SHALL BE CLASS III UNLESS OTHERWISE NOTED.
3. CONSTRUCTION OF STORMWATER CONVEYANCE SYSTEMS OUTSIDE OF THE RIGHT-OF-WAY SHALL COMPLY WITH THE CURRENT JAMES CITY COUNTY ENVIRONMENTAL DIVISION STORMWATER DRAINAGE CONVEYANCE SYSTEMS, GENERAL DESIGN AND CONSTRUCTION GUIDELINES HANDBOOK. THE CONTRACTOR WILL IMMEDIATELY REPAIR OR REPLACE CHANNEL STABILIZATION BLANKETS AND EROSION CONTROL MATTING IF SITEWORK OR ASSOCIATED UTILITY OPERATIONS SUCH AS CABLE, ELECTRIC, GAS, PHONE, SEWER, WATER, ETC. DAMAGE THEIR FUNCTIONAL INTENT.
4. STORMWATER MANAGEMENT FOR THIS PROJECT WILL BE SATISFIED BY THE MASTER PLANNING FOR ST. OLAF ROMAN CATHOLIC CHURCH.
5. VDOT SHALL NOT BE RESPONSIBLE FOR THE MAINTENANCE OF THE BMP OR ITS OUTFALL STRUCTURES AND SHALL BE SAVED HARMLESS FROM ANY DAMAGES.
6. THE STORMWATER MANAGEMENT/BMP FACILITY(S) SHOWN ON THESE PLANS REQUIRE THE SUBMISSION, REVIEW, AND APPROVAL OF RECORD DRAWING(S) AND CONSTRUCTION CERTIFICATION PRIOR TO RELEASE THE POSTED BOND/SURETY. THE CONTRACTOR SHALL COORDINATE THE NECESSARY INSPECTIONS WITH THE PROFESSIONAL CERTIFYING THE CONSTRUCTION. THE GEOTECHNICAL ENGINEER IS TO ENSURE THAT HIS/HER INSPECTIONS ARE PERFORMED DURING AND FOLLOWING CONSTRUCTION OF THE SWP/BMP IN ACCORDANCE WITH THE CURRENT JAMES CITY COUNTY ENVIRONMENTAL DIVISION REQUIREMENTS.
7. ALL PIPE JOINTS IN FILL AREAS TO BE WRAPPED WITH FILTER FABRIC.
8. VDOT IS-1 (INLET SHAPING) SHALL BE PROVIDED IN ALL STRUCTURES WITH 2 OR MORE PIPES.
9. A VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) PERMIT IS REQUIRED PRIOR TO CONSTRUCTION ACTIVITIES.
10. EC-2 MATTING SHALL BE PROVIDED ON ALL SLOPES STEEPER THAN 4:1.
11. EC-3 MATTING SHALL BE PROVIDED ON ALL SLOPES STEEPER THAN 3:1.

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DRAINAGE, EROSION & SEDIMENT CONTROL PLAN
ST. OLAF CATHOLIC CHURCH

104 NORGE LANE, WILLIAMSBURG
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VAB	BBS
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1"=30'	11/3/08
Project No.	
9882-01	
Drawing No.	
8	

BMP MAINTENANCE AND INSPECTION REQUIREMENTS

A MAINTENANCE PROGRAM IS REQUIRED TO ENSURE THE STORMWATER MANAGEMENT (SWM) / BEST MANAGEMENT PRACTICE (BMP) FACILITY FUNCTIONS AS DESIGNED AND TO PROVIDE FOR REASONABLE AESTHETIC CONDITIONS. PROPER MAINTENANCE IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT AT INFLOW LOCATIONS, PRETREATMENT AREAS, THE BMP ITSELF, ITS PRINCIPAL CONTROL STRUCTURES, AND DOWNSTREAM WATERWAYS. FOLLOWING INSTALLATION AND ESTABLISHMENT OF VEGETATION IN DISTURBED SITE AREAS, INSPECTIONS FOR SEDIMENT BUILDUPS WILL BE PERFORMED AT LEAST QUARTERLY. IT IS ANTICIPATED THAT UNDER NORMAL CONDITIONS, SEDIMENT REMOVAL WILL BE REQUIRED ONCE EVERY 5 TO 10 YEARS. IF OTHER CONSTRUCTION OR RELATED LAND-DISTURBING ACTIVITIES ARE PERFORMED UPSLOPE OF THE BMP, ADEQUATE PROTECTION MEASURES SHOULD BE IMPLEMENTED WITH INSPECTIONS PERFORMED AT LEAST ONCE WEEKLY.

THE OWNER OR ITS DESIGNATED REPRESENTATIVE WILL INSPECT THE SWM/BMP STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING WORKING DAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF GAUGED RAINFALL WITHIN A 24-HOUR PERIOD. ONCE PER YEAR (MORE OR LESS) A REPRESENTATIVE OF THE COUNTY MAY JOINTLY INSPECT THE STRUCTURE. APPROPRIATE ACTION, PERFORMED AT THE COST OF THE OWNER WILL BE TAKEN TO ENSURE APPROPRIATE MAINTENANCE. KEYS TO LOCKED ACCESS POINTS OR STRUCTURES SHALL BE MADE AVAILABLE TO THE COUNTY UPON REQUEST.

BMP DESCRIPTION: THE BMP SERVES A DRAINAGE AREA OF 9.60 ACRES. THE FACILITY IS A 10 POINT, WET-TYPE DETENTION FACILITY, COUNTY TYPE A-3 BMP. A WET-TYPE DETENTION POND PERMANENTLY STORES RUNOFF AND HAS A NORMAL POOL DURING NON-RAINFALL PERIODS. TYPICALLY DRAW DOWN TIMES RANGE FROM 24 TO 72 HOURS FOLLOWING A STORM EVENT. PRINCIPAL STRUCTURES ASSOCIATED WITH THE BMP CONSIST OF A 24-INCH INFLOW STORM DRAIN, A 48-INCH VERTICAL RCP RISER. THERE IS 1 OPENING IN THE RISER TO PROVIDE FOR WATER QUALITY DRAWDOWN AND TO OFFER CONTROL FOR THE 1-, 2- AND 10-YEAR DESIGN STORM EVENTS. DURING THE 100-YEAR STORM, THE MAXIMUM WATER LEVEL SHOULD RISE TO ABOUT 3.0 FEET ABOVE THE TOP OF THE RISER AND WITHIN 1 FOOT BELOW THE TOP OF DAM.

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

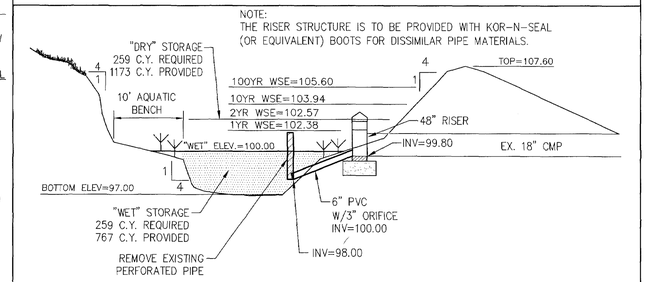
1. INSPECT FOR SEDIMENT BUILDUP BY VISUAL OBSERVATION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN SEDIMENT FOREBAY AREA. SEDIMENT REMOVAL IN THE FOREBAY SHALL OCCUR EVERY 5 TO 7 YEARS OR AFTER 50% OF TOTAL FOREBAY CAPACITY HAS BEEN LOST. IF THE DEPTH OF SEDIMENT REACHES THE DEPTH OF 2 ' _ 0 " ABOVE THE BOTTOM OF THE SEDIMENT FOREBAY (OR CLEANOUT ELEVATION OF 98.5), REMOVAL IS REQUIRED. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, CLEAN PRETREATMENT DEVICES, THE RISER BOTTOM, AND OUTLET PIPES OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA. (NOTE: CLEANOUT ELEVATION CORRESPONDS TO 10 PERCENT OF THE WATER QUALITY VOLUME).
2. PERFORM MAINTENANCE MOWING OF POND GRASSES AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT. TREES, SHRUBS, AND WOODY VEGETATION ARE NOT BE PERMITTED TO GROW ALONG OR ON ANY PART OF THE EMBANKMENT, THAT WAS CONSTRUCTED USING ENGINEERED (COMPACTED) FILLS.
3. PERFORM SOIL SAMPLING ON STABILIZED POND SOIL AREAS AT LEAST ONCE EVERY 4 YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY QUALIFIED INDEPENDENT SOIL TESTING LABORATORY SUCH AS VPI&SU. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.
4. IN STABILIZED POND AREAS, IF VEGETATION COVERS LESS THAN 40 % OF SOIL SURFACES, LIME, FERTILIZE AND SEED IN ACCORDANCE WITH RECOMMENDATIONS FOR NEW SEEDLINGS. IF VEGETATION COVERS MORE THAN 40 % BUT LESS THAN 70 % OF SOIL SURFACES, LIME, FERTILIZE AND OVER SEED IN ACCORDANCE WITH CURRENT SEEDING RECOMMENDATIONS OR REQUIREMENTS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH).
5. PERFORM QUARTERLY INSPECTIONS OF THE RISER SECTION AND CREST SPILLWAY FOR THE OBSERVANCE OF COLLECTED TRASH AND DEBRIS. IMMEDIATELY REMOVE ANY TRASH OR DEBRIS THAT PREVENTS THE MOVEMENT OF WATER. REMOVE ANY TRASH AND LITTER DOWNSTREAM AND AT STORM DRAIN OR CHANNEL INFLOW LOCATIONS TO MAINTAIN THE INTEGRITY OF THE STRUCTURE AND PROVIDE AN ATTRACTIVE APPEARANCE.
6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, TRASH RACK, ORIFICES/WEIRS, OUTLET BARREL AND POND EMBANKMENT. EXPOSED METAL SURFACES SHALL BE RE-PAINTED OR RE-GALVANIZED TO MINIMIZE RUST DAMAGE OR REPLACED IF RUST DAMAGE IS IRREVERSIBLE. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE INTEGRITY OF THE STRUCTURE.ANY REPAIRS MADE TO THE PRINCIPAL SPILLWAY (RISER OR BARREL) SHALL BE REVIEWED BY A PROFESSIONAL ENGINEER. VERTICAL TRENCHING TO EXPOSE THE BARREL SHALL NOT BE ALLOWED UNDER ANY CIRCUMSTANCES. THE TRENCH SIDE SLOPES SHOULD BE STEPPED BACK AT A 2:1 SLOPE, MINIMUM.
7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE FACILITY FOR SIGNS OF ANIMAL/RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING.
8. PERFORM YEARLY OBSERVATIONS OF PERIMETER AREAS SURROUNDING THE FACILITY TO ENSURE CHANGES IN LAND USE, TOPOGRAPHY, OR ACCESS HAVE NOT OCCURRED AND DO NOT AFFECT THE OPERATION, MAINTENANCE, ACCESS, OR SAFETY FEATURES AS PROVIDED. APPROPRIATE ACTION IS REQUIRED TO ENSURE ADEQUACY AND TO PROVIDE A CLEAR, SAFE PASSAGE FOR MAINTENANCE VEHICLES TO THE ENGINEERED EMBANKMENT AND PRINCIPAL FLOW CONTROL STRUCTURES.
9. RECORD KEEPING. THE OWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OF INSPECTIONS PERFORMED FOR THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.
10. THE FACILITY SHALL NOT ACCEPT ADDITIONAL DRAINAGE OR BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT OR APPROVAL BY THE ENVIRONMENTAL DIVISION OF JAMES CITY COUNTY.

BMP CONSTRUCTION NOTES

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

2. EMBANKMENT: (EXISTING GROUND, REPLACEMENT OF UNSUITABLE MATERIALS AS NEEDED)
THE EXPOSED SUB GRADE SOILS SHALL BE CAREFULLY INSPECTED BY THE GEOTECHNICAL ENGINEER ANY UNSUITABLE MATERIALS THUS EXPOSED SHALL BE REMOVED AND REPLACED WITH A WELL COMPACTED, SUITABLE MATERIAL. DENSITY TESTING, AT THE DISCRETION OF THE OWNER/GEOTECHNICAL ENGINEER, SHALL BE PERFORMED AT THIS TIME. THE EMBANKMENT FOUNDATION SHALL BEAR ON FIRM AND STABLE EXISTING SUB-GRADE WHICH HAS BEEN PREPARED SO AS TO REMOVE ALL ORGANIC, LOOSE, AND GENERALLY UNSUITABLE MATERIAL. THE FILL MATERIAL SHALL BE TAKEN FROM APPROVED BORROW AREAS. IT SHALL BE CLEAN MINERAL SOIL, FREE OF ROOTS, WOOD VEGETATION, OVERSIZED STONES, ROCKS, OR OTHER OBJECTIONABLE MATERIALS. SUITABLE SOILS FOR CONSTRUCTION OF THE DAMS WOULD CONSIST OF CLAYEY SAND (SC) WITH A MINIMUM PLASTICITY INDEX (PI) OF 20 OR BETTER MATERIAL SUCH AS A SANDY LEAN OR FAT CLAY (CL OR CH) MATERIAL. THESE MATERIALS SHALL BE PLACED IN HORIZONTAL LIFTS NOT EXCEEDING 8 INCHES IN LOOSE THICKNESS, MOISTURE CONDITIONED TO WITHIN -1% TO +3% OF THE OPTIMUM MOISTURE CONTENT, AND COMPACTED TO A MINIMUM 95% OF THE MAXIMUM DRY DENSITY OBTAINED IN ACCORDANCE WITH ASTM SPECIFICATION D-698, STANDARD PROCTOR METHOD. SIDE SLOPES SHOULD BE SEEDED TO PROMOTE VEGETATION GROWTH AND FURTHER ADD STABILITY OF THE SLOPES.

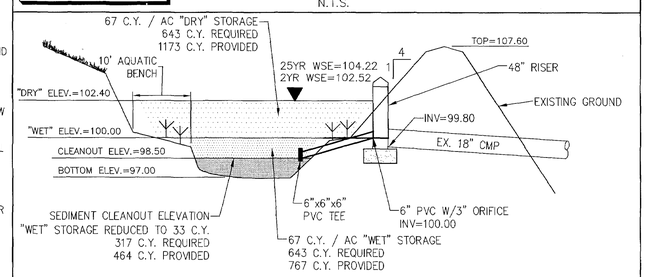
3. PRINCIPAL SPILLWAY:
THE BOTTOM OF THE SPILLWAY RISER FOUNDATION BASE EXCAVATION SHALL BE OBSERVED BY THE GEOTECHNICAL ENGINEER TO ENSURE THAT ALL UNSUITABLE AND LOOSE MATERIALS ARE REMOVED AND THAT ACCEPTABLE BEARING CONDITIONS EXIST IN THE FOUNDATION'S BASE. ALL JOINTS IN THE PRINCIPAL SPILLWAY STRUCTURE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



NOTE: ALL CONNECTIONS TO RISER SHALL BE WATERTIGHT

CONVERSION TO BMP

N.T.S.

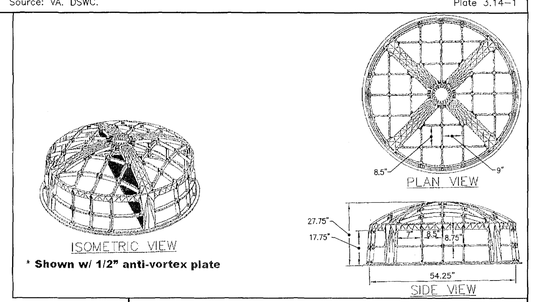


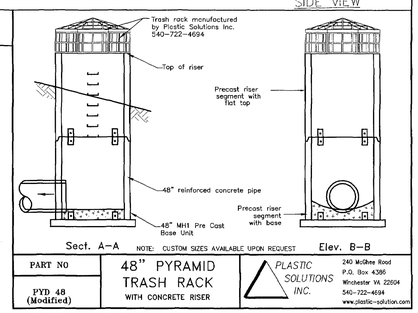
MINIMUM STORAGE VOLUME AND SEDIMENT STORAGE

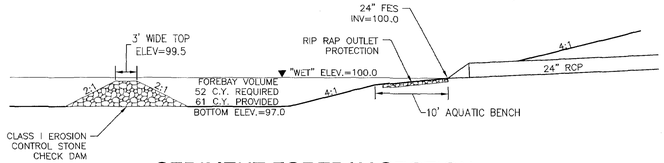
NOTE: ALL CONNECTIONS TO RISER SHALL BE WATERTIGHT

Source: VA. DSWC.

Plate 3.14-1

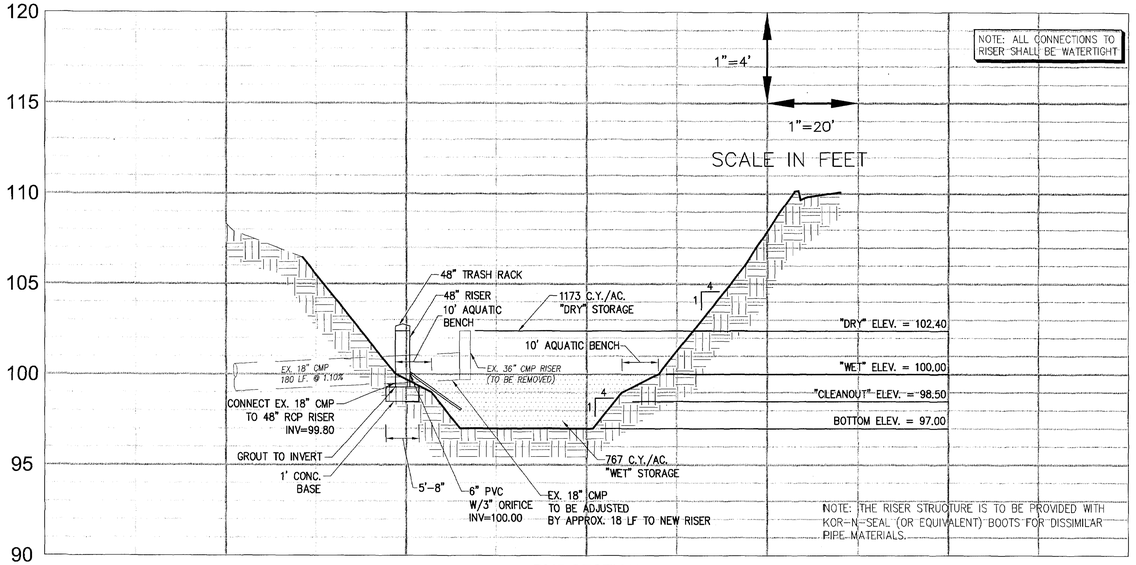




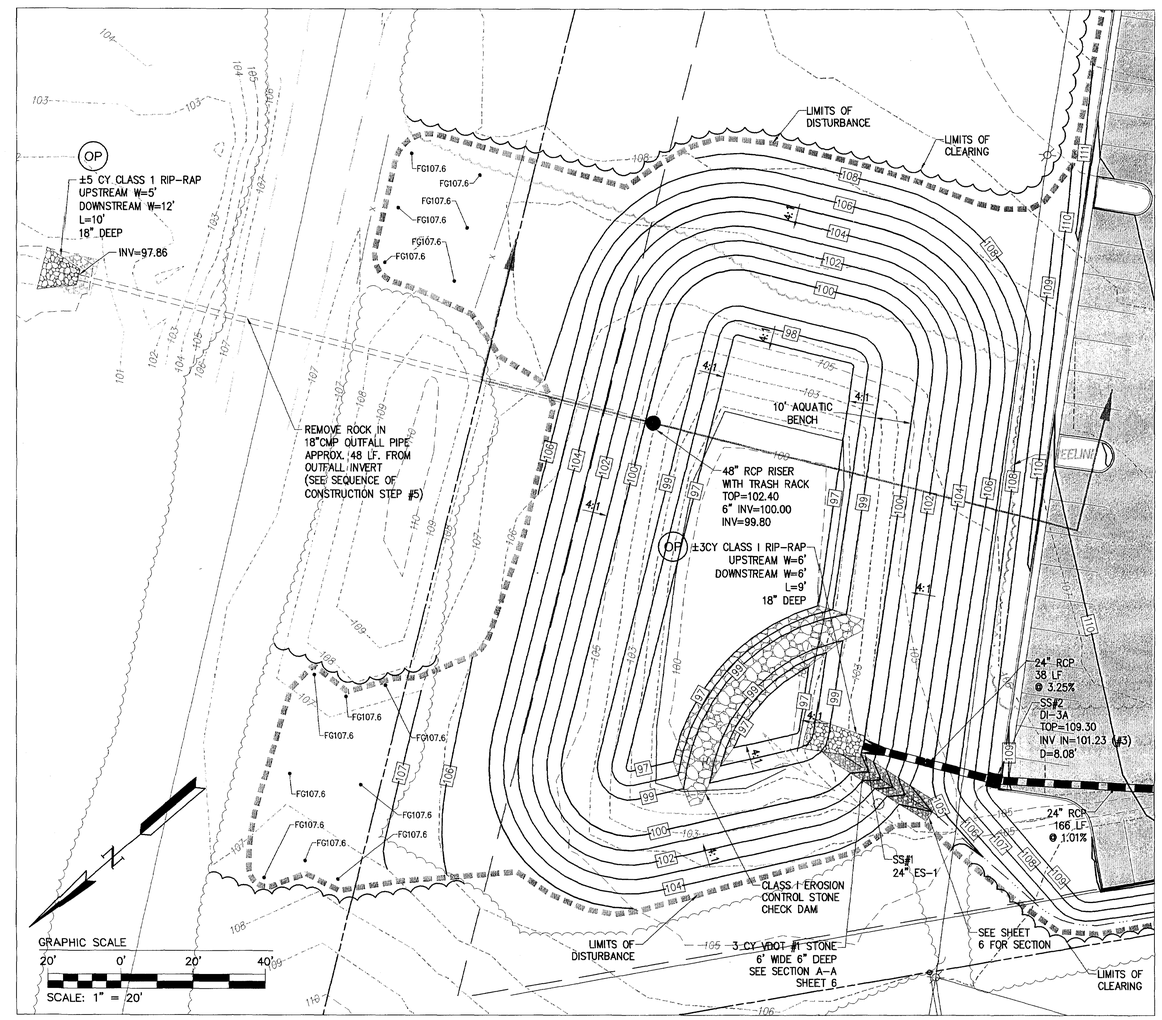


SEDIMENT FOREBAY SECTION

N.T.S.



BMP SECTION



BMP PLAN VIEW

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY
3	02/09/10	ISSUED FOR BUILDING PERMIT	REC
2	04/30/09	REVISED PER COUNTY COMMENTS DATED 12/30/09	REC
1	01/14/09	REVISED PER COUNTY COMMENTS DATED 12/03/08	VAB

COMMONWEALTH OF VIRGINIA
ROBERT E. COSBY III
Lic. No. 35664
02/09/10
PROFESSIONAL ENGINEER

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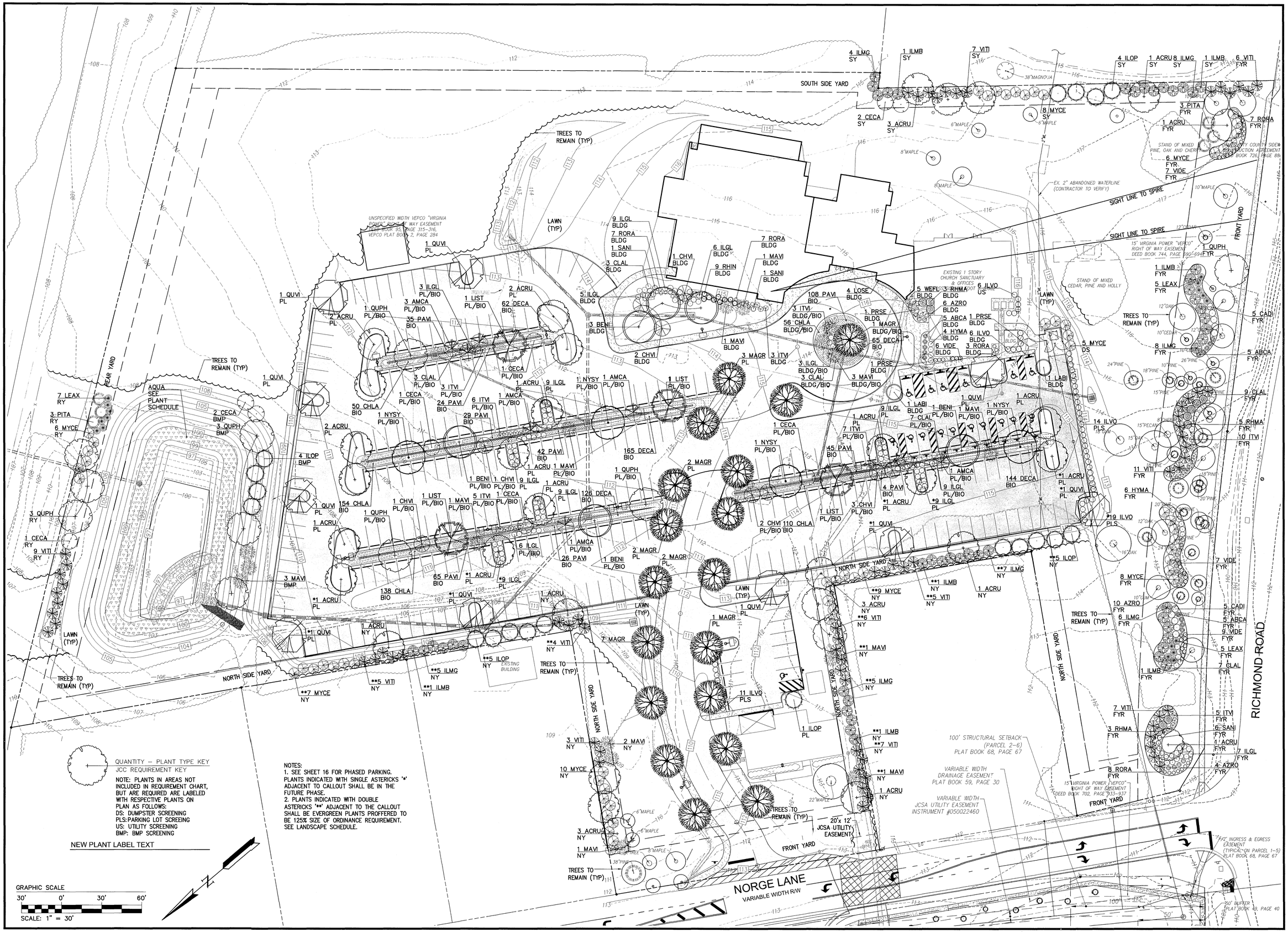
WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

POND BMP
ST. OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed VAB	Drawn BBS
Scale 1"=20'	Date 11/3/08
Project No. 9882-01	
Drawing No. 9	



QUANTITY – PLANT TYPE KEY
JCC REQUIREMENT KEY

NOTE: PLANTS IN AREAS NOT INCLUDED IN REQUIREMENT CHART, BUT ARE REQUIRED ARE LABELED WITH RESPECTIVE PLANTS ON PLAN AS FOLLOWS:
DS: DUMPSTER SCREENING
PLS: PARKING LOT SCREEING
US: UTILITY SCREENING
BMP: BMP SCREENING

NEW PLANT LABEL TEXT

NOTES:
1. SEE SHEET 16 FOR PHASED PARKING. PLANTS INDICATED WITH SINGLE ASTERICKS '*' ADJACENT TO CALLOUT SHALL BE IN THE FUTURE PHASE.
2. PLANTS INDICATED WITH DOUBLE ASTERICKS '**' ADJACENT TO THE CALLOUT SHALL BE EVERGREEN PLANTS PROFFERED TO BE 125% SIZE OF ORDINANCE REQUIREMENT. SEE LANDSCAPE SCHEDULE.

No.	DATE	REVISION / COMMENT / NOTE	BY
3	02/08/10	ISSUED FOR BUILDING PERMIT	REC
2	04/01/09	REVISED PER COUNTY COMMENTS DATED 02/20/09	REC
1	01/14/09	REVISED PER COUNTY COMMENTS DATED 12/03/08	VAB
			REVISED BY

COMMONWEALTH OF VIRGINIA
JAMES S. PETERS
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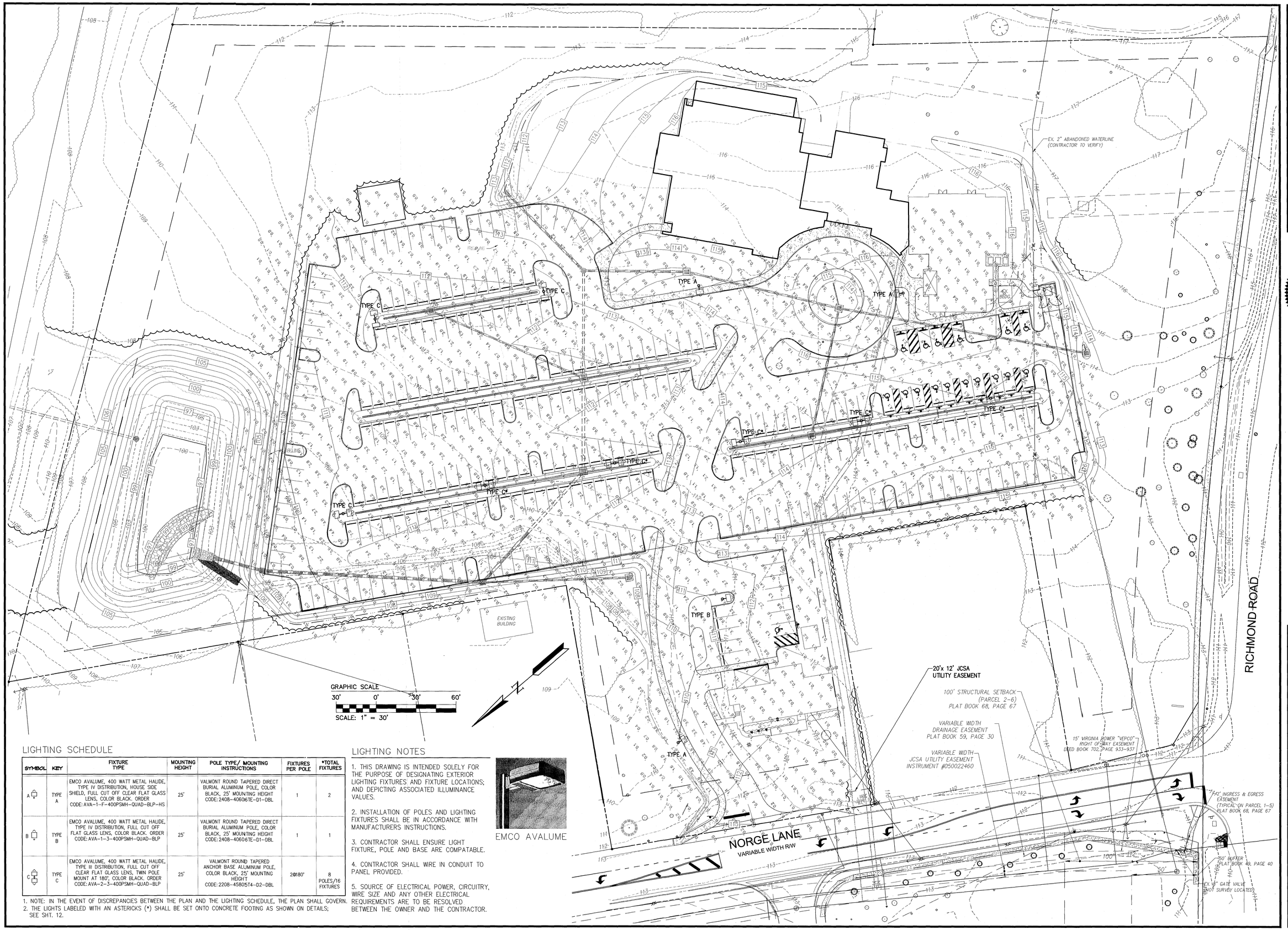
LANDSCAPE PLAN
ST. OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG VIRGINIA

STONEHOUSE DISTRICT JAMES CITY COUNTY

Designed SJR	Drawn SJR
Scale 1"=30'	Date 11/3/08
Project No. 9882-01	
Drawing No. 10	



LIGHTING SCHEDULE

SYMBOL	KEY	FIXTURE TYPE	MOUNTING HEIGHT	POLE TYPE/ MOUNTING INSTRUCTIONS	FIXTURES PER POLE	*TOTAL FIXTURES
A	TYPE A	EMCO AVALUME, 400 WATT METAL HALIDE, TYPE IV DISTRIBUTION, HOUSE SIDE SHIELD, FULL CUT OFF CLEAR FLAT GLASS LENS, COLOR BLACK. ORDER CODE: AVA-1-F-400PSMH-QUAD-BLP-HS	25'	VALMONT ROUND TAPERED DIRECT BURIAL ALUMINUM POLE, COLOR BLACK, 25' MOUNTING HEIGHT CODE: 2408-406061E-D1-DBL	1	2
B	TYPE B	EMCO AVALUME, 400 WATT METAL HALIDE, TYPE IV DISTRIBUTION, FULL CUT OFF FLAT GLASS LENS, COLOR BLACK. ORDER CODE: AVA-1-3-400PSMH-QUAD-BLP	25'	VALMONT ROUND TAPERED DIRECT BURIAL ALUMINUM POLE, COLOR BLACK, 25' MOUNTING HEIGHT CODE: 2408-406061E-D1-DBL	1	1
C	TYPE C	EMCO AVALUME, 400 WATT METAL HALIDE, TYPE III DISTRIBUTION, FULL CUT OFF CLEAR FLAT GLASS LENS, TWIN POLE MOUNT AT 180°, COLOR BLACK. ORDER CODE: AVA-2-3-400PSMH-QUAD-BLP	25'	VALMONT ROUND TAPERED ANCHOR BASE ALUMINUM POLE, COLOR BLACK, 25' MOUNTING HEIGHT CODE: 2208-458051T4-D2-DBL	2@180°	8 POLES/16 FIXTURES

1. NOTE: IN THE EVENT OF DISCREPANCIES BETWEEN THE PLAN AND THE LIGHTING SCHEDULE, THE PLAN SHALL GOVERN.
2. THE LIGHTS LABELED WITH AN ASTERICKS (*) SHALL BE SET ONTO CONCRETE FOOTING AS SHOWN ON DETAILS; SEE SHT. 12.

LIGHTING NOTES

1. THIS DRAWING IS INTENDED SOLELY FOR THE PURPOSE OF DESIGNATING EXTERIOR LIGHTING FIXTURES AND FIXTURE LOCATIONS; AND DEPICTING ASSOCIATED ILLUMINANCE VALUES.

2. INSTALLATION OF POLES AND LIGHTING FIXTURES SHALL BE IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.

3. CONTRACTOR SHALL ENSURE LIGHT FIXTURE, POLE AND BASE ARE COMPATABLE.

4. CONTRACTOR SHALL WIRE IN CONDUIT TO PANEL PROVIDED.

5. SOURCE OF ELECTRICAL POWER, CIRCUITRY, WIRE SIZE AND ANY OTHER ELECTRICAL REQUIREMENTS ARE TO BE RESOLVED BETWEEN THE OWNER AND THE CONTRACTOR.

EMCO AVALUME

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
3	02/08/10	ISSUED FOR BUILDING PERMIT	REC	REC
2	04/01/09	REVISED PER COUNTY COMMENTS DATED 02/20/09	REC	REC
1	01/14/09	REVISED PER COUNTY COMMENTS DATED 12/03/08	VAB	VAB

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LIGHTING PLAN
ST. OLAF CATHOLIC CHURCH

104 NORGE LANE, WILLIAMSBURG VIRGINIA
STONEHOUSE DISTRICT JAMES CITY COUNTY

Designed	Drawn
TRC	SJR
Scale	Date
1"=30'	11/3/08

Project No. 9882-01

Drawing No. 11

JAMES CITY COUNTY LANDSCAPE REQUIREMENTS

AREAS			TREES AND SHRUBS					
KEY	LANDSCAPE YARD	QUANTITY	COUNTY REQ. RATIO	MIN. NUMBER REQUIRED	SUPPLEMENTAL*	MIN. NUMBER REQUIRED	NEW PLANTINGS PROVIDED
FYR	50' FRONT YARD Richmond Road	26,464 SQ.FT.	1 TREE: 400 SQ.FT. AND 3 SHRUBS: 400 SQ.FT.	66 TREES 40% 26 DECIDUOUS SHADE 15-20% 10-17 ORNAMENTAL 35% 23 LG EVERGREEN 198 SHRUBS 35% 69 EVERGREEN	2,600 SQ.FT.	7 TREES 40% 3 DECIDUOUS SHADE 15-20% 1-2 ORNAMENTAL 35% 3 LG EVERGREEN 0 SHRUBS 35% – EVERGREEN	7 TREES 3 DECIDUOUS SHADE 1 ORNAMENTAL 3 LG EVERGREEN 198 SHRUBS 91 EVERGREEN
FYN	30' FRONT YARD Norge Lane	7,472 SQ.FT.	1 TREE: 400 SQ.FT. AND 3 SHRUBS: 400 SQ.FT.	19 TREES 40% 8 DECIDUOUS SHADE 15-20% 3-5 ORNAMENTAL 35% 7 LG EVERGREEN 56 SHRUBS 35% 20 EVERGREEN	N/A	0 TREES 40% – DECIDUOUS SHADE 15-20% – ORNAMENTAL 35% – LG EVERGREEN 0 SHRUBS 35% – EVERGREEN	0 TREES – DECIDUOUS SHADE – ORNAMENTAL – LG EVERGREEN 0 SHRUBS – EVERGREEN
NY	15' NORTH SIDE YARD	16,640 SQ.FT.	1 TREE: 400 SQ.FT. AND 3 SHRUBS: 400 SQ.FT.	42 TREES 40% 17 DECIDUOUS SHADE 15-20% 6-10 ORNAMENTAL 35% 15 LG EVERGREEN 125 SHRUBS 35% 44 EVERGREEN	10,134 SQ.FT.	25 TREES 40% 10 DECIDUOUS SHADE 15-20% 4-7 ORNAMENTAL 35% 8 LG EVERGREEN 76 SHRUBS 35% 27 EVERGREEN	25 TREES 10 DECIDUOUS SHADE 3 ORNAMENTAL 10 LG EVERGREEN 76 SHRUBS 76 EVERGREEN
SY	15' SOUTH SIDE YARD	11,546 SQ.FT.	1 TREE: 400 SQ.FT. AND 3 SHRUBS: 400 SQ.FT.	29 TREES 40% 12 DECIDUOUS SHADE 15-20% 4-7 ORNAMENTAL 35% 10 LG EVERGREEN 87 SHRUBS 35% 30 EVERGREEN	3,863 SQ.FT.	10 TREES 40% 4 DECIDUOUS SHADE 15-20% 2 ORNAMENTAL 35% 4 LG EVERGREEN 29 SHRUBS 35% 10 EVERGREEN	10 TREES 4 DECIDUOUS SHADE 2 ORNAMENTAL 4 LG EVERGREEN 29 SHRUBS 29 EVERGREEN
RY	15' REAR YARD	7,576 SQ.FT.	1 TREE: 400 SQ.FT. AND 3 SHRUBS: 400 SQ.FT.	19 TREES 40% 8 DECIDUOUS SHADE 15-20% 3-5 ORNAMENTAL 35% 7 LG EVERGREEN 57 SHRUBS 35% 20 EVERGREEN	2,890 SQ.FT.	7 TREES 40% 3 DECIDUOUS SHADE 15-20% 1 ORNAMENTAL 35% 3 LG EVERGREEN 22 SHRUBS 35% 8 EVERGREEN	7 TREES 3 DECIDUOUS SHADE 1 ORNAMENTAL 3 LG EVERGREEN 22 SHRUBS 22 EVERGREEN
PL	PARKING LOT (LANDSCAPE AREA IS 16% OF PARKING)	300 SPACES	1 TREE: 5 SPACES AND 2 SHRUBS: 5 SPACES	60 TREES 35% 21 LG EVERGREEN 50% 30 DECID. SHADE 120 SHRUBS 50% 90 EVERGREEN	N/A	0 TREES 40% – DECIDUOUS SHADE 15-20% – ORNAMENTAL 35% – LG EVERGREEN 0 SHRUBS 35% – EVERGREEN	72 TREES 21 LG EVERGREEN 30 DECID. SHADE 21 ORNAMENTAL 120 SHRUBS 77 EVERGREEN
BLDG	10' BLDG PERIMETER	6,684 SQ.FT.	1 PLANTING UNIT** 200 SQ.FT	33 PLANTING UNITS	N/A	0 PLANTING UNITS	33 PLANTING UNITS 33 TREES 99 SHRUBS

* SUPPLEMENTAL PLANTINGS FILL IN THIN OR DISTURBED AREAS PER SUP CONDITIONS. SEE PLAN THIS SHEET FOR MORE INFORMATION.
** 1 PLANTING UNIT = 1 ORNAMENTAL TREE OR FIVE SHRUBS
*** EXISTING TREES WERE EITHER SURVEYED & SHOWN AS INDIVIDUAL TREES OR OBSERVED IN THE FIELD BY A LANDSCAPE ARCHITECT & ARE SHOWN AS A TREELINE. ALL BUFFERS CONTAIN MORE TREES THAN IS CREDITED.

EXISTING PLANT CREDITS***

FYR	TYPE	CREDITS
(1) 5" CEDAR	VIABLE	1
(2) 8"–15" PECANS	MATURE	4
(3) 8"–12" CHERRIES	MATURE	6
(1) 10" GUM	MATURE	2
(1) 10" WALNUT	MATURE	2
(2) 10" MAPLES	MATURE	4
(4) 10" CEDARS	MATURE	8
(3) 12" OAKS	MATURE	6
(1) 14" POPLAR	MATURE	2
(14) 10–22" PINES	MATURE	28
(4) 24"–26" PINES	SPECIMEN	12
		75

FYN	TYPE	CREDITS
(1) SASSAFRAS	VIABLE	1
(3) REDBUDS	VIABLE	3
(2) CRAPE MYRTLES	VIABLE	2
(1) 8" CHERRY	MATURE	1
(1) 8" MAPLE	MATURE	2
(2) 10" OAKS	MATURE	4
(1) 24" PECAN	SPECIMEN	3
(1) 38" PINE	SPECIMEN	3
		19

NY	TYPE	CREDITS
(2) 6" PECANS	VIABLE	2
(4) 2"–6" OAKS	VIABLE	4
(4) 10"–14" OAKS	MATURE	8
(13) 2"–6" WALNUTS	VIABLE	13
(6) 8"–14" WALNUTS	MATURE	12
(12) 2"–6" CHERRIES	VIABLE	12
(2) 8" CHERRIES	MATURE	4
(2) 24" CHERRIES	SPECIMEN	6
(13) 2"–6" PINES	VIABLE	13
(7) 8"–14" PINES	MATURE	14
(1) 36" PINE	SPECIMEN	3
(1) 12" CEDAR	MATURE	2
(1) SPRUCE	SPECIMEN	3
		96

SY	TYPE	CREDITS
(1) 3" HOLLY	VIABLE	1
(1) 4" DOGWOOD	VIABLE	1
(2) 2"–3" POPLARS	VIABLE	2
(1) 10" POPLAR	MATURE	2
(8) 2"–6" CHERRIES	VIABLE	8
(7) 8"–18" CHERRIES	MATURE	14
(1) 40" CHERRY	SPECIMEN	3
(2) 8"–12" PINES	MATURE	4
(1) 2" MAPLE	VIABLE	1
(14) 2"–6" SASSAFRAS	VIABLE	14
		50

NOTES:
1. REAR YARD IS SIMILARILY VEGETATED AS THE NORTH & SOUTH YARDS & LIKEWISE TREE CREDITS EXCEED COUNTY REQUIREMENT.

2. THE LANDSCAPE YARDS CONTAIN A SHRUB LAYER THAT SIMILARLY WOULD EXCEED COUNTY REQUIRED NEW PLANTINGS EXCEPT THE RICHMOND ROAD FRONTAGE. SHRUB SPECIES THAT WERE FOUND INCLUDE, BUT ARE NOT LIMITED TO WAXMYRTLE, PRIVET, BEAUTYBERRY, HOLLY, SWEETSHRUB AND SUMMERSWEET.

BIORETENTION LANDSCAPE REQUIREMENTS

AREAS			TREES AND SHRUBS		
KEY	BIORETENTION AREA	QUANTITY	REQ. RATIO	MIN. NUMBER REQUIRED	NEW PLANTINGS PROVIDED
BIO1	BIORETENTION AREA 1	1,358 SQ.FT.	10 STEMS/1,000 SF (3:1 SHRUB/TREE RATIO)	5 TREES AND 9 SHRUBS	5 TREES AND 9 SHRUBS
BIO2	BIORETENTION AREA 2	2,681 SQ.FT.	10 STEMS/1,000 SF (3:1 SHRUB/TREE RATIO)	9 TREES AND 18 SHRUBS	9 TREES AND 18 SHRUBS
BIO3	BIORETENTION AREA 3	2,435 SQ.FT.	10 STEMS/1,000 SF (3:1 SHRUB/TREE RATIO)	8 TREES AND 16 SHRUBS	8 TREES AND 16 SHRUBS
BIO4	BIORETENTION AREA 4	3,515 SQ.FT.	10 STEMS/1,000 SF (3:1 SHRUB/TREE RATIO)	12 TREES AND 23 SHRUBS	12 TREES AND 23 SHRUBS
BIO5	BIORETENTION AREA 5	1,320 SQ.FT.	10 STEMS/1,000 SF (3:1 SHRUB/TREE RATIO)	4 TREES AND 9 SHRUBS	4 TREES AND 9 SHRUBS
BIO6	BIORETENTION AREA 6	1,810 SQ.FT.	10 STEMS/1,000 SF (3:1 SHRUB/TREE RATIO)	6 TREES AND 12 SHRUBS	6 TREES AND 12 SHRUBS

NOTES:
1. HATCHED AREAS SHOWN ON PLAN WITHIN BIORETENTION AREAS DENOTE AREAS THAT SHALL BE COVERED WITH A 3" LAYER OF MULCH TO BE SPREAD OVER SOIL.
2. HATCHED LANDSCAPE ISLANDS SHOWN ON PLAN DENOTE AREAS THAT SHALL BE COVERED WITH A 3" LAYER OF MULCH INSTEAD OF SEEDED AS LAWN.

PLANT SCHEDULE

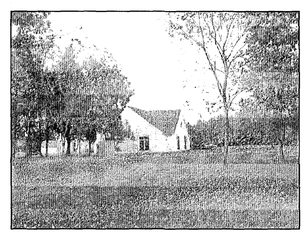
KEY	QTY	SCIENTIFIC NAME	COMMON NAME	SIZE	SPACING	ROOT	COMMENTS
CANOPY TREES							
ACRU	30	ACER RUBRUM 'JAMESTOWN'	JAMESTOWN RED MAPLE	2 1/2" CAL.	AS SHOWN	B&B/CONT.	
BENI	6	BETULA NIGRA 'DURA HEAT'	DURA HEAT RIVER BIRCH	8' HT.	AS SHOWN	B&B/CONT.	CLUMP
ILOP	9	ILEX OPACA	AMERICAN HOLLY	8' HT.	AS SHOWN	B&B/CONT.	15' O.C.
LIST	4	LIQUIDAMBAR STYRACIFLUA 'ROTUNDILOBA'	FRUITLESS SWEETGUM	2 1/2" CAL.	AS SHOWN	B&B/CONT.	
MAGR	18	MAGNOLIA GRANDIFLORA 'D.D. BLANCHARD'	D.D. BLANCHARD SOUTHERN MAGNOLIA	2 1/2" CAL.	AS SHOWN	B&B/CONT.	LIMB UP LOWER BRANCHES
NYSY	4	NYSSA SYLVATICA "WILDFIRE"	WILDFIRE BLACK TUPELO	2 1/2" CAL.	AS SHOWN	B&B/CONT.	
PITA	6	PINUS TAEDA	LOBLOLLY PINE	8' HT.	AS SHOWN	B&B/CONT.	10' O.C.
QUPH	12	QUERCUS PHELLOS	WILLOW OAK	2 1/2" CAL.	AS SHOWN	B&B/CONT.	
QUVI	10	QUERCUS VIRGINIANA	LIVE OAK	2 1/2" CAL.	AS SHOWN	B&B/CONT.	
UNDERSTORY TREES							
AMCA	7	AMELANCHIER CANADENSIS 'AUTUMN BRILLIANCE'	AUTUMN BRILLIANCE SERVICEBERRY	8' HT.	AS SHOWN	B&B/CONT.	
CECA	9	CERCIS CANADENSIS 'FOREST PANSY'	FOREST PANSY EASTERN REDBUD	8' HT.	AS SHOWN	B&B/CONT.	
CHVI	10	CHIONATHUS VIRGINICUS	FRINGETREE	8' HT.	AS SHOWN	B&B/CONT.	
LABI	2	LAGESTROEMIA X BILOXI	BILOXI CRAPE MYRTLE	8' HT.	AS SHOWN	B&B/CONT.	
MAVI	14	MAGNOLIA VIRGINIANA	SWEETBAY MAGNOLIA	8' HT.	AS SHOWN	B&B/CONT.	
PRSE	5	PRUNUS SERRULATA 'KWANSAN'	KWANZSAN CHERRY	8' HT.	AS SHOWN	B&B/CONT.	
SHRUBS							
ABCA	15	ABELIA X "CANYON CREEK"	CANYON CREEK GLOSSY ABELIA	22"–24" HT.	4' O.C.	B&B/CONT.	
AZRO	20	AZALEA 'ROBLEJA' PP#16249	AUTUMN SWEETHEART ENCORE AZALEA	18"–24" HT.	4' O.C.	B&B/CONT.	
CADI	10	CALLICARPA DICHOTOMA 'EARLY AMETHYST'	EARLY AMETHYST BEAUTYBERRY	22"–24" HT.	5' O.C.	B&B/CONT.	
CLAL	43	CLETHRA ALNIFOLIA	SUMMERSWEET	22"–24" HT.	4' O.C.	B&B/CONT.	
HYMA	14	HYDRANGEA MACROPHYLLA 'ENDLESS SUMMER'	ENDLESS SUMMER HYDRANGEA	22"–24" HT.	4' O.C.	B&B/CONT.	
ILGL	108	ILEX GLABRA "SHAMROCK"	SHAMROCK INKBERRY	18"–24" HT.	4' O.C.	B&B/CONT.	6:1 FEMALE TO MALE RATIO, DISTRIBUTE
ILMB	4	ILEX MESERVEAE 'CHINA BOY"	CHINA BOY BLUE HOLLY	18"–24" HT.	8' O.C.	B&B/CONT.	
ILMG	26	ILEX MESERVEAE 'CHINA GIRL'	CHINA GIRL BLUE HOLLY	18"–24" HT.	8' O.C.	B&B/CONT.	
ILVO	56	ILEX VOMITORIA 'NANA'	DWARF YAUPON HOLLY	36" HT.	4' O.C.	B&B/CONT.	6:1 FEMALE TO MALE RATIO, DISTRIBUTE
ITVI	42	ITEA VIRGINICA 'HENRY'S GARNET'	HENRY'S GARNET VIRGINIA SWEETSPIRE	22"–24" HT.	4' O.C.	B&B/CONT.	
LEAX	17	LEUCOTHOE AXILLARIS	COASTAL DOGHOBBLE	18"–24" HT.	5' O.C.	B&B/CONT.	
MYCE	59	MYRICA CERIFERA	SOUTHERN WAXMYRTLE	18"–24" HT.	8' O.C.	B&B/CONT.	
RHIN	9	RHAPHIOLEPIS INDICA 'ELEANOR TABOR'	ELEANOR TABOR INDIAN HAWTHORN	18"–24" HT.	4' O.C.	B&B/CONT.	
RHMA	11	RHODODENDRON MAXIMUM 'ROSEUM'	ROSEBAY RHODENDRON	18"–24" HT.	6' O.C.	B&B/CONT.	
RORA	32	ROSA X 'RADTKO'	DOUBLE KNOCKOUT ROSE	22"–24" HT.	3' O.C.	B&B/CONT.	
SANI	8	SAMBUCUS NIGRA 'EVA'	BLACK LACE ELDERBERRY	18"–24" HT.	4' O.C.	B&B/CONT.	
VIDE	29	VIBURNUM DENTATUM 'BLUE MUFFIN'	BLUE MUFFIN VIBURNUM	22"–24" HT.	3' O.C.	B&B/CONT.	
VITI	43	VIBURNUM TINUS 'COMPACTUM'	SPRING BOQUET VIBURNUM	18"–24" HT.	8' O.C.	B&B/CONT.	
WEFL	5	WEIGELA FLORIDA 'WINE AND ROSES'	WINE AND ROSES WEIGELA	22"–24" HT.	3' O.C.	B&B/CONT.	
GRASSES & VINES							
CHLA	508	CHASMANTHIUM LATIFOLIUM	NORTHERN SEA OATS	1 QT. POT	24" O.C.	CONTAINER	
DECA	562	DECHAMPSIA CESPITOSA	TUFTED HAIR GRASS	1 QT. POT	24" O.C.	CONTAINEK	
AQUA	*164	LEERSIA ORYZOIDES	RICE CUTGRASS	PEAT POT	12" O.C.	CONTAINER	UNIFORMLY THROUGHOUT PRESCRIBED AREA DISTRIBUTE GROUPS OF 5-10 PLANTS
LOSE	4	LONICERA SEMPERVIRENS 'MAJOR WHEELER'	MAJOR WHEELER HONEYSUCKLE	#1 CONT.	6' O.C.	CONTAINER	
PAVI	378	PANICUM VIRGATUM 'SHENANDOAH'	SHENANDOAH SWITCHGRASS	#1 CONT.	24" O.C.	CONTAINER	
AQUA	*164	PONTEDERIA CORDATA	PICKERELWEED	1 QT. POT	24" O.C.	CONTAINER	UNIFORMLY THROUGHOUT PRESCRIBED AREA DISTRIBUTE GROUPS OF 10-20 PLANTS
AQUA	*164	SAURES CERNUUS	LIZARD'S TAIL	1 QT. POT	24" O.C.	CONTAINER	UNIFORMLY THROUGHOUT PRESCRIBED AREA JUST ABOVE WATERLINE DISTRIBUTE GROUPS OF 5-10 PLANTS
AQUA	*164	SCIRPUS PUNGENS	THREE SQUARE	1 QT. POT	24" O.C.	CONTAINER	UNIFORMLY THROUGHOUT PRESCRIBED AREA DISTRIBUTE GROUPS OF 5-10 PLANTS
EVERGREEN BUFFER PLANTS 125% SIZE OF ORDINANCE***							
ILOP	10	ILEX OPACA	AMERICAN HOLLY	10'–12' HT.	AS SHOWN	B&B/CONT.	15' O.C.
MAVI	2	MAGNOLIA VIRGINIANA	SWEETBAY MAGNOLIA	10'–12' HT.	AS SHOWN	B&B/CONT.	
ILMB	3	ILEX MESERVEAE 'CHINA BOY"	CHINA BOY BLUE HOLLY	22"–24" HT.	8' O.C.	B&B/CONT.	
ILMG	17	ILEX MESERVEAE 'CHINA GIRL'	CHINA GIRL BLUE HOLLY	22"–24" HT.	8' O.C.	B&B/CONT.	
MYCE	16	MYRICA CERIFERA	SOUTHERN WAXMYRTLE	22"–24" HT.	8' O.C.	B&B/CONT.	
VITI	27	VIBURNUM TINUS 'COMPACTUM'	SPRING BOQUET VIBURNUM	22"–24" HT.	8' O.C.	B&B/CONT.	

* PLANT QUANTITIES BASED ON 50% OF TOTAL AQUATIC BENCH AREA.
** WHERE BIORETENTION OCCURS WITHIN PARKING LOTS, AND WHERE FEASIBLE, REQUIRED PARKING LOT PLANTING HAS BEEN UTILIZED TO SATISFY BOTH REQUIREMENTS.
*** EVERGREEN TREES & SHRUBS PROFFERED TO BE 125% SIZE OF ORDINANCE ARE INDICATED ON PLAN BY ** ADJACENT TO CALLOUT.

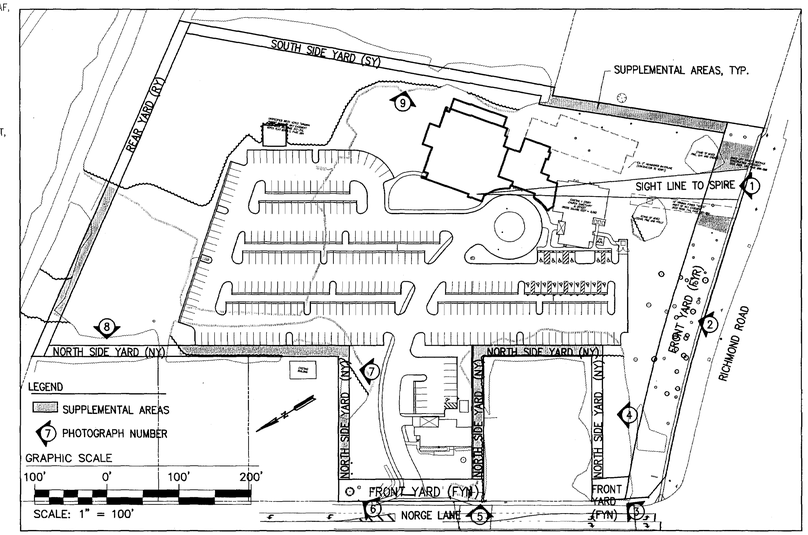
GENERAL NOTES:

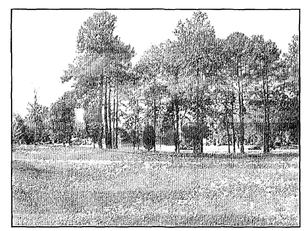
1. THIS SHEET SET IS FOR PLANT MATERIAL PURPOSES ONLY. SEE SHEETS FROM OTHER DISCIPLINES, I.E. CIVIL, ELECTRICAL, ARCHITECTURAL, ETC. FOR THE MOST CURRENT INFORMATION PERTAINING TO THOSE DISCIPLINES.
2. ALL PLANT MATERIALS SHALL MEET THE MINIMUM STANDARDS & SPECIFICATIONS DESCRIBED IN THE "AMERICAN STANDARD FOR NURSERY STOCK," LATEST EDITION, PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN.
3. ALL PLANT MATERIAL SHALL BE INSTALLED AS SPECIFIED IN THE VNLA STANDARDIZED LANDSCAPE SPECIFICATIONS, LATEST EDITION.
4. THE CONTRACTOR SHALL SUPPLY ALL NEW PLANT MATERIAL IN QUANTITIES SUFFICIENT TO COMPLETE ALL PLANTING SHOWN ON THE DRAWINGS. WHERE DISCREPANCIES EXIST BETWEEN THE PLANS & THE PLANT LIST, THE PLANS SHALL TAKE PRECEDENCE.
5. AREAS DISTURBED BY CONSTRUCTION NOT OTHERWISE PLANTED OR COVERED IN SITE CONTRACT ARE TO BE SODDED OR SEEDED WITH A STATE CERTIFIED TURF TYPE TALL FESCUE VARIETY SELECTED FROM THE FOLLOWING LIST:

   BILTMORE, BINGO, COCHISE III, CONSTITUTION, COYOTE II, CROSSFIRE II, ENDEAVOR, FIDELITY, GOOD–EN, GRANDE, GREENKEEPER WAF, INFERNO, KALAHARI, MAGELLAN, MASTERPIECE, ONYX, PADRE, PICASSO, PENN 1901, QUEST, RAPTOR, REBEL EXEDA, REMBRANDT, RENDITION, SR 8250, SR 8300, TARHEEL, TITANIUM, WATCHDOG, WOLFPACK, WPEZE.
6. GROUPINGS OF PLANTS SHALL BE MULCHED IN CONTINUOUS BEDS.
7. TREES SHALL NOT BE STAKED UNLESS SPECIFICALLY NOTED ON THE PLANTING PLAN.
8. PLANT SUBSTITUTIONS WILL NOT BE MADE WITHOUT THE WRITTEN CONSENT OF THE OWNER/OWNER'S AGENT AND THE GOVERNING MUNICIPALITY PRIOR TO INSTALLATION.
9. ALL INSTALLED PLANT MATERIAL SHALL BE SUBJECT TO REGULAR MAINTENANCE, INCLUDING FERTILIZATION, PRUNING, REPLACEMENT, INSECT & DISEASE CONTROL, WATERING, MULCHING, & WEED CONTROL.
10. CONTRACTORS ARE RESPONSIBLE FOR LOCATING & AVOIDING UTILITIES & UTILITY EASEMENTS DURING LANDSCAPING OPERATIONS.
11. IF A DISCREPANCY EXISTS BETWEEN THE PLANT QUANTITIES SHOWN ON THE SCHEDULE AND THE PLANS, THE PLANT QUANTITIES SHOWN ON THE PLAN OVERRIDES THE QUANTITIES SHOWN ON THE SCHEDULE.
12. EXISTING PLANT MATERIALS BEYOND PLANTING LIMITS ARE NOT TO BE DISTURBED. THE CONTRACTOR SHALL ADJUST PLACEMENT TO ENSURE MINIMAL DAMAGE TO EXISTING PLANTS AND OPTIMAL GROWING CONDITIONS FOR THE NEW MATERIAL.

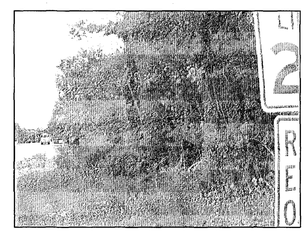


1. FRONT YARD RICHMOND ROAD (SIGHT LINE TO CHURCH SPIRE)



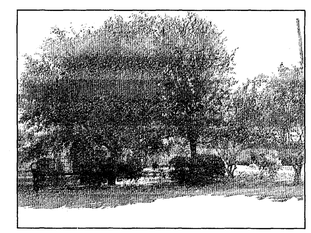


2. FRONT YARD RICHMOND ROAD

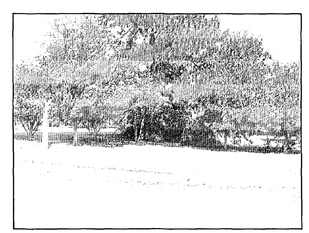


3. FRONT YARD NORGE LANE

4. NORTH SIDE YARD

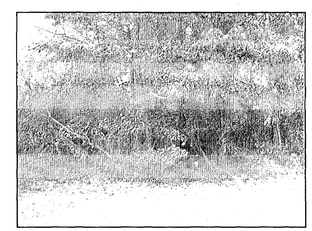


5. FRONT YARD NORGE LANE

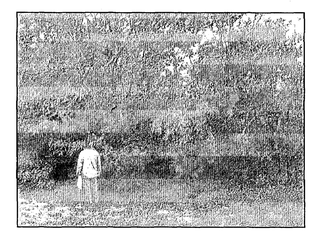


6. FRONT YARD NORGE LANE

7. NORTH SIDE YARD



8. NORTH SIDE YARD



9. SOUTH SIDE YARD

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY
3	02/09/10	ISSUED FOR BUILDING PERMIT	REC
2	04/01/09	REVISED PER COUNTY COMMENTS DATED 02/20/09	REC
1	01/14/09	REVISED PER COUNTY COMMENTS DATED 12/03/08	VAB

COMMONWEALTH OF VIRGINIA
JAMES S. PETERS
Cert. No. 393
02/09/10
LANDSCAPE ARCHITECT

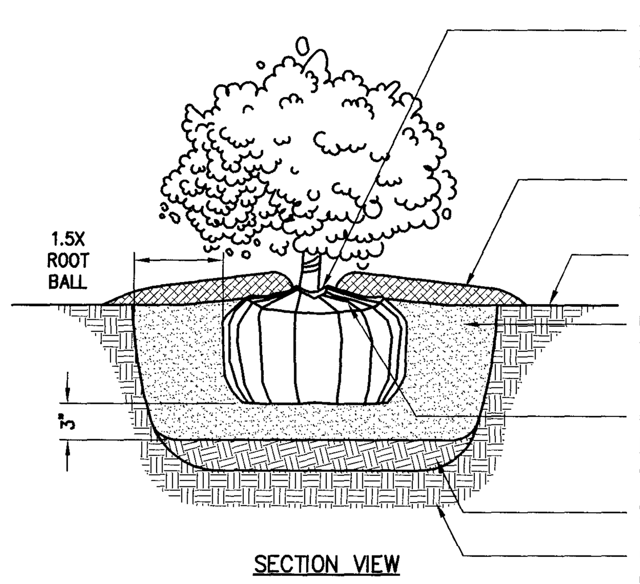
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
Fax (757) 220-8994

CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

NOTES & DETAILS
ST. OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
SJR	SJR
Scale	Date
AS NOTED	11/3/08

Project No. 9882–01
Drawing No. 12



SET TOP OF ROOTBALL 3" ABOVE FINISH GRADE; COVER EDGES OF ROOTBALL W/ SOIL, TAPERING DOWN TO SURROUNDING SOIL LINE; CUT ROPE SURROUNDING CROWN OF SHRUB AFTER BACKFILLING BUT BEFORE MULCHING.

4" HT. SAUCER, FILL WITH SHREDDED HARDWOOD MULCH

EXISTING/FINISH GRADE

BACKFILL W/ NATIVE SOIL; PARTIALLY BACKFILL, WATER TO SETTLE SOIL; FINISH BACKFILLING; TAMP LIGHTLY

CUT CIRCLING ROOTS; SCARIFY SIDES BEFORE PLANTING; REMOVE BURLAP FROM TOP 1/3 OF BALL ROOT.

SCARIFY SUBSOIL TO MIN. 4" DEPTH

COMPACTED SUBGRADE

NOTES:
1. SPACE AS SHOWN ON PLAN OR AS INDICATED ON PLANT CHART.
2. WATER IMMEDIATELY AFTER PLANTING

1.5X ROOT BALL

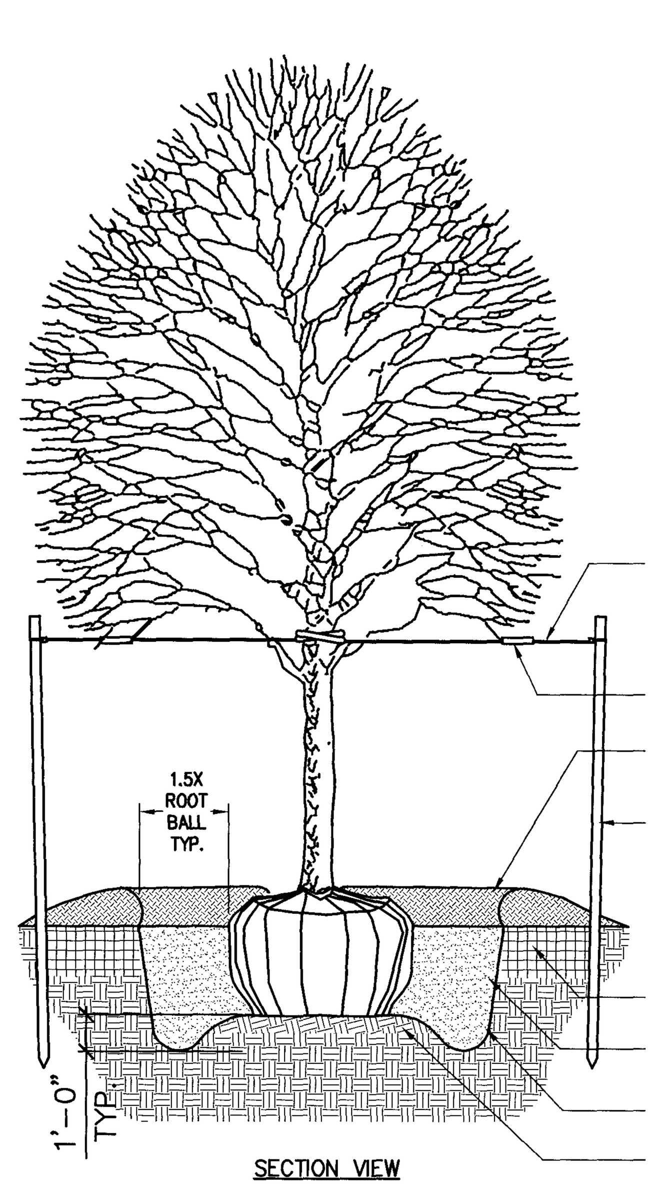
3"

SECTION VIEW

SHRUB PLANTING

NOT TO SCALE

NOTES:
1. ALL TREES ARE TO BE PLANTED SO TOP OF ROOT BALL IS 3" ABOVE FINISH GRADE.
2. TREE SHALL BE INSTALLED PLUMB & STRAIGHT.
3. REMOVE TAGS, LABELS & PLASTIC SLEEVING.
4. DO NOT WRAP TRUNK.
5. IF CONTAINER–GROWN, REMOVE TOP OF WIRE BASKET, OR REMOVE CONTAINER & CUT CIRCLING ROOT; IF FIELD–GROWN, CUT ROPE SURROUNDING BOTTOM OF TREE TRUNK AFTER BACKFILLING BUT BEFORE MULCHING & REMOVE BURLAP FROM TOP 1/3 OF BALL ROOT
6. STAKE ONLY IF NECESSARY. REMOVE STAKES, WIRES, RUBBER HOSES, ETC. AFTER ONE YEAR.



ATTACH 3 STRANDS NO. 12 PLIABLE STEEL WIRE TO STAKE; ENCASE WIRE AROUND THE TRUNK IN 3/4" DIA. MIN. RUBBER HOSE ABOVE FIRST BRANCH; SECURE ALL ENDS OF CABLE WITH GALV. CLAMPS.

TURNBUCKLE

3" HT. SHREDDED HARDWOOD MULCH; KEPT AWAY FROM TRUNK

3" ø x 8'–0" CEDAR STAKES, 3 PER TREE. STAKES TO BE SAME HEIGHT, DRIVEN IN ON AN SLIGHT ANGLE. STAKES TO BE OUTSIDE OF ROOT BALL

EXISTING/FINISH GRADE

TILL 30" WIDTH AT TOP EDGE OF HOLE TO A 12" DEPTH

BACKFILL W/ NATIVE SOIL; PARTIALLY BACKFILL, WATER TO SETTLE SOIL; FINISH BACKFILLING; TAMP LIGHTLY

SCORE HOLE WALL

LOOSEN SUBSOIL AT BOTTOM OF EXCAVATION TO 6" HT. MIN. & TAMP; TRENCH AROUND PERIMETER OF MOUND TO DEPTH SHOWN.

1.5X ROOT BALL TYP.

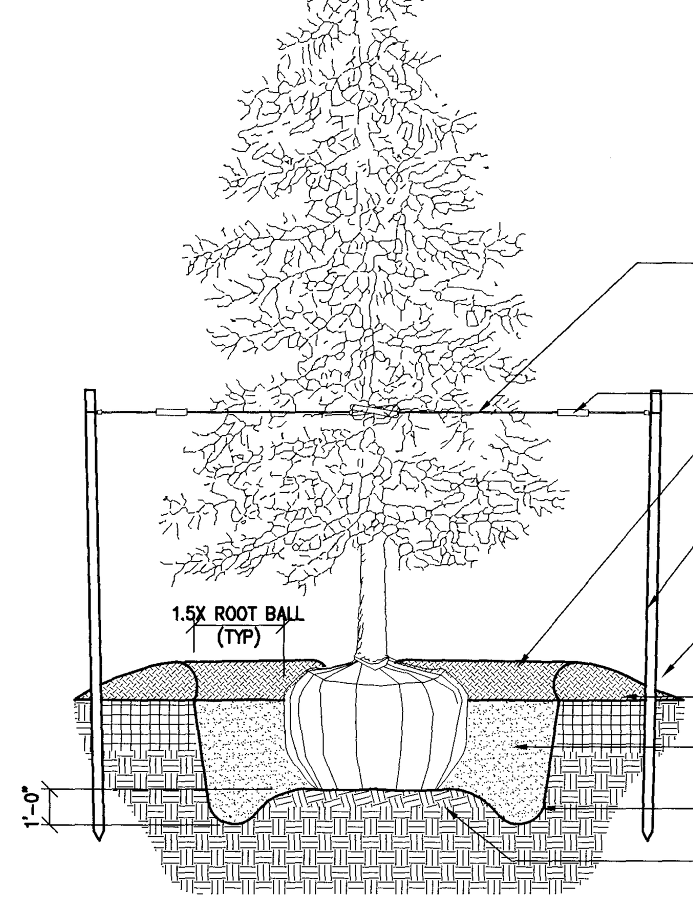
1'–0" TYP.

SECTION VIEW

DECIDUOUS TREE PLANTING

NOT TO SCALE

NOTES:
1. ALL TREES ARE TO BE PLANTED SO TOP OF ROOT BALL IS 3" ABOVE FINISH GRADE.
2. TREE SHALL BE INSTALLED PLUMB & STRAIGHT.
3. REMOVE TAGS, LABELS & PLASTIC SLEEVING.
4. DO NOT WRAP TRUNK.
5. IF CONTAINER–GROWN, REMOVE TOP OF WIRE BASKET, OR REMOVE CONTAINER & CUT CIRCLING ROOT; IF FIELD–GROWN, CUT ROPE SURROUNDING BOTTOM OF TREE TRUNK AFTER BACKFILLING BUT BEFORE MULCHING & REMOVE BURLAP FROM TOP 1/3 OF BALL ROOT
6. STAKE ONLY IF NECESSARY. REMOVE STAKES, WIRES, RUBBER HOSES, ETC. AFTER ONE YEAR.



ATTACH 3 STRANDS NO. 12 PLIABLE STEEL WIRE TO STAKE; ENCASE WIRE AROUND THE TRUNK IN 3/4" DIA. MIN. RUBBER HOSE ABOVE FIRST BRANCH; SECURE ALL ENDS OF CABLE WITH GALV. CLAMPS.

TURNBUCKLE

3" HT. SHREDDED HARDWOOD MULCH; KEPT AWAY FROM TRUNK

3" ø x 8'–0" CEDAR STAKES, 3 PER TREE. STAKES TO BE SAME HEIGHT, DRIVEN IN ON AN SLIGHT ANGLE. STAKES TO BE OUTSIDE OF ROOT BALL

EXISTING/FINISH GRADE

TILL 30" WIDTH AT TOP EDGE OF HOLE TO A 12" DEPTH

BACKFILL W/ NATIVE SOIL; PARTIALLY BACKFILL, WATER TO SETTLE SOIL; FINISH BACKFILLING; TAMP LIGHTLY

SCORE HOLE WALL

LOOSEN SUBSOIL AT BOTTOM OF EXCAVATION TO 6" HT. MIN. & TAMP; TRENCH AROUND PERIMETER OF MOUND TO DEPTH SHOWN.

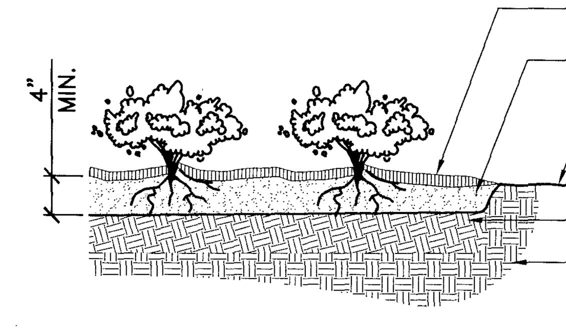
1.5X ROOT BALL (TYP)

1'–0"

SECTION VIEW

EVERGREEN TREE PLANTING

NOT TO SCALE



3" HT. SHREDDED HARDWOOD MULCH

BACKFILL W/ NATIVE SOIL; PARTIALLY BACKFILL, WATER TO SETTLE SOIL. FINISH BACKFILLING; TAMP LIGHTLY

EXISTING/FINISH GRADE

SCARIFY SUBGRADE TO MIN. 4" DEPTH

COMPACTED SUBGRADE

NOTES:
1. SPACE AS SHOWN ON PLAN OR AS INDICATED ON PLANT CHART.
2. WATER IMMEDIATELY AFTER PLANTING

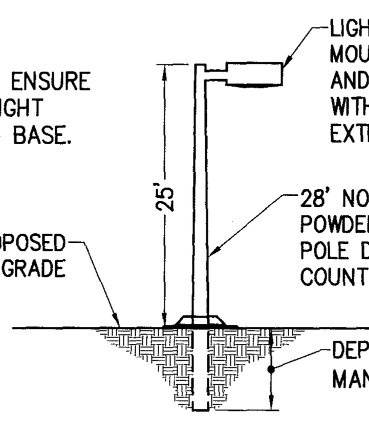
4" MIN.

SECTION VIEW

GROUND COVER PLANTING BED

N.T.S.

NOTE:
CONTRACTOR SHALL ENSURE COMPATIBILITY OF LIGHT FIXTURE, POLE, AND BASE.



LIGHT FIXTURE. LUMINARIES SHALL BE MOUNTED ON LIGHT POLES HORIZONTALLY AND SHALL BE RECESSED FIXTURES WITH NO BULB, LENS, OR GLOBE EXTENDING BELOW THE CASING.

25'

28' NOM. TAPERED STEEL POLE, POWDER–COATED, COLOR TO MATCH LIGHT FIXTURE. POLE DIAMETER, AND GAUGE BASED ON FIXTURE COUNT, FIXTURE SPECIFICATIONS, AND WIND LOAD.

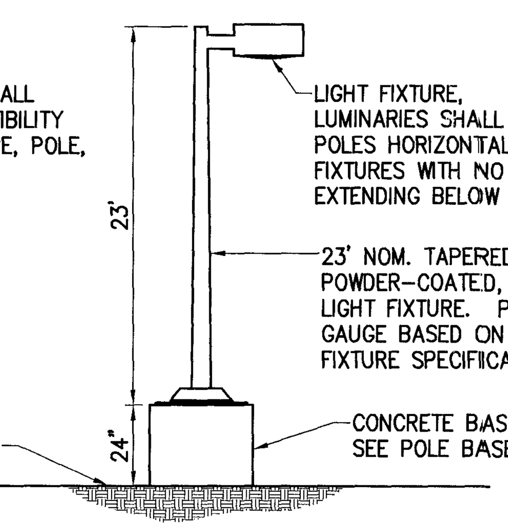
PROPOSED FINISHED GRADE

DEPTH VARIES – INSTALL PER MANUFACTURER'S SPECIFICATIONS

DIRECT-BURY TAPERED POLE

N.T.S.

NOTE:
CONTRACTOR SHALL ENSURE COMPATIBILITY OF LIGHT FIXTURE, POLE, AND BASE.



LIGHT FIXTURE,
LUMINARIES SHALL BE MOUNTED ON LIGHT POLES HORIZONTALLY AND SHALL BE RECESSED FIXTURES WITH NO BULB, LENS, OR GLOBE EXTENDING BELOW THE CASING.

23'

23' NOM. TAPERED STEEL POLE, POWDER–COATED, COLOR TO MATCH LIGHT FIXTURE. POLE DIAMETER AND GAUGE BASED ON FIXTURE COUNT, FIXTURE SPECIFICATIONS AND WIND LOAD.

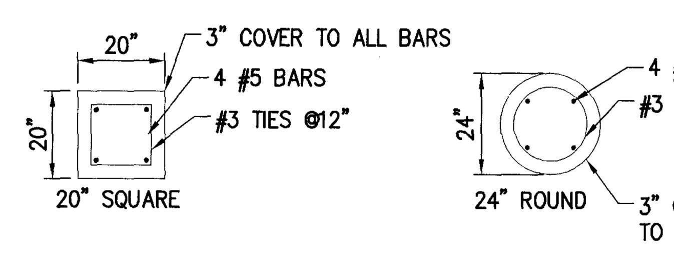
PROPOSED FINISHED GRADE

24"

CONCRETE BASE
SEE POLE BASE DETAIL

TAPERED POLE ON CONCRETE BASE

N.T.S.



20"

3" COVER TO ALL BARS

4 #5 BARS

#3 TIES @12"

20"

20" SQUARE

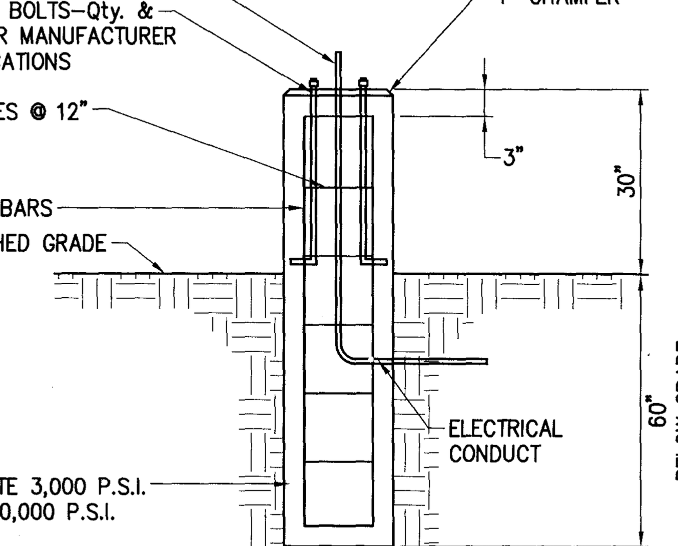
24"

4 #5 BARS

#3 TIES @12"

24" ROUND

3" COVER TO #5 BARS



STUB CONDUIT 6" ABOVE TOP OF BASE

ANCHOR BOLTS–Qty. & SIZE PER MANUFACTURER SPECIFICATIONS

#3 TIES @ 12"

4–#5 BARS

FINISHED GRADE

1" CHAMFER

3"

30"

60" BELOW GRADE

ELECTRICAL CONDUCT

CONCRETE 3,000 P.S.I.
STEEL 60,000 P.S.I.

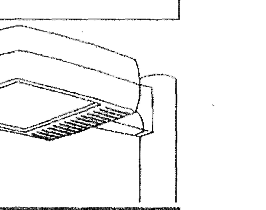
NOTE: ELECTRICAL CONDUITS SIZING AND DEPTHS SHALL MEET NEC REQUIREMENTS. CONDUIT ELBOWS SHALL HAVE A 90° BEND. THE BEND RADIUS SHALL BE IN ACCORDANCE WITH THE NEC.

25' POLE BASE DETAIL

N.T.S

Notes
Job
Type

AVALUME



GENERAL DESCRIPTION: The EMCO Avalume is a rectilinear area luminaire defined by its sleek rounded profile and rugged construction. The housing is one piece, diecast aluminum and mounts directly to a pole or wall without the need of a separate support arm. The multifaceted image duplicating optical systems provide IES Types III and IV distributions. The door frame is single piece diecast aluminum and retains an optically clear tempered flat glass lens. The luminaire is completely sealed and gasketed preventing intrusion from moisture, dust and insects. The Avalume luminaires are finished with a fade and abrasion resistant TGIC powdercoat.
CUTOFF PERFORMANCE: Flat glass lens luminaires provide full cutoff performance.

ORDERING

PREFIX | CONFIGURATION | DISTRIBUTION | WATTAGE | VOLTAGE | FINISH | OPTIONS

CONFIGURATION
1 Single Pole Mount
2 Twin Pole Mount at 180
2@90 Twin Pole Mount at 90
3 3-way Pole Mount at 90
3@120 3-way Pole Mount at 120
4 4-way Pole Mount
W Wall Mount
WS Wall Mount with Surface Conduit

DISTRIBUTION
3 IES Type III
F IES Type IV Forward Throw
NOTE: Type III reflectors ship as Type F. Removal of an insert converts the reflector to Type 3.
5 IES Type V
MTS Medium Throw with Solite® Lens Fluorescent only

WATTAGE
150HPS 100MH 250PSMH
250HPS 150MH 320PSMH (2)60CF
400HPS 175MH 350PSMH (3)42TRF
250MH 400PSMH
400MH

VOLTAGE
120
208
240
277
347
480
UNIV

FINISH
BRP Bronze Paint
BLP Black Paint
WP White Paint
NP Natural Aluminum Paint
BGP Beige Paint
OC Optional Color Paint
SC Special Color Paint

OPTIONS (All are Field Installed)
HS External House Side Shield
LF In-Pole In-Line Fusing
PC Locking Type Photocontrol Receptacle w/Photocontrol
Locking Type Photocontrol Receptacle
MF Mast Arm Fitter
PTF2 Pole Top Fitter 2.375" X 4"
PTF3 Pole Top Fitter 3" - 3.5" X 6"
PTF4 Pole Top Fitter 3.5" - 4" X 6"
QS Quartz Standby
QST Quartz Standby - Timed Delay
WG Wire Guard
FOLY External Polycarbonate Shield

EMCO Lighting
1611 Clovis Barker Road
San Marcos, TX 78666

EMCO LIGHTING

AVALUME

SPECIFICATIONS

GENERAL SPECIFICATIONS: Each Emco Avalume luminaire is a rectilinear area luminaire defined by its sleek rounded profile and rugged construction.

HOUSING: The housing is one-piece diecast aluminum, and mounts directly to a pole or wall without the need of a separate support arm. The low profile rounded form reduces the E.P.A. (effective Projected Area) of the luminaire to only 1.1 square feet (0.10 square meters).

DOOR/LENS ASSEMBLY: The door frame is single-piece diecast aluminum and retains an optically clear tempered flat glass lens. The diecast aluminum lens frame hinges down from the housing and is secured by a stainless steel lanyard and hinge pin. The tempered flat glass lens is mechanically secured with four (4) retainers. The electrical and optical chambers are thoroughly sealed with an extruded one-piece memory retentive extruded silicone gasket to prevent intrusion from moisture, dust, insects and other contaminants.

OPTICAL SYSTEMS: The segmented reflector system consists of two tiers of highly specular aluminum facets, precisely aligned to achieve specific photometric distributions. Optical systems are of the fixed position type with the lampholder be positioned on the arm-side of the luminaire.

The position-oriented mogul base lampholder is glazed porcelain with a nickel plated screw shell.

Fluorescent luminaires use a Medium Throw reflector with a Solite® glass lens (MTS).

ELECTRICAL: Each high power factor ballast is the separate component type, capable of providing reliable lamp starting down to -20°F/-29°C. Component to component wiring within the luminaire will carry no more than 80 percent of rated current and is listed by U.L. for use at 600 VAC at 150°C or higher. Plug disconnects are listed by U.L. for use at 600 VAC, 15 A or higher. Standard fluorescent ballasts are solid state.

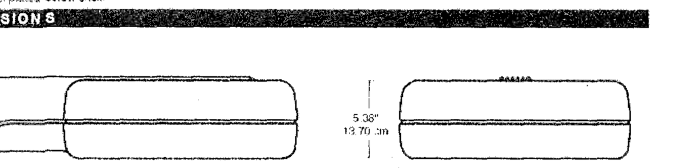
FINISH: Each standard color luminaire receives a fade and abrasion resistant electrostatically applied thermally cured triglycidal isocyurate (TGIC) textured polyester powdercoat finish. Standard colors include Bronze (BRP), Black (BLP), White (WP), Natural Aluminum (NP). Consult factory for specifications on custom colors.

LABELS: All luminaires bear U.L. or C.U.L. (where applicable) Wet Location labels.

FULL CUTOFF PERFORMANCE

CUTOFF PERFORMANCE

DIMENSIONS



6.83" 17.40 cm
16.50" 41.90 cm
5.38" 13.70 cm
16.00" 40.60 cm

EPA

1	2	3/4
1.1 ft²	2.2 ft²	2.7 ft²
0.10 m²	0.20 m²	0.25 m²

with House Side Shield

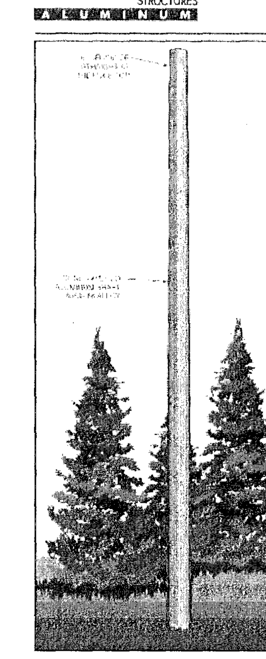
1	2	3/4
1.2 ft²	2.2 ft²	3.2 ft²
0.11 m²	0.20 m²	0.30 m²

EMCO Lighting
1611 Clovis Barker Road
San Marcos, TX 78666
(800) 227-0758
(512) 753-1000
FAX (512) 753-7855
www.sltlighting.com

EMCO LIGHTING

valmont STRUCTURES ALUMINUM

8' TO 30' ROUND TAPERED EMBEDDED (DIRECT BURIAL) POLES



- 8' to 30' mounting heights.
- Tenons, brackets, and arms designed for single or multiple luminaire mounting.
- Luminaires may be mounted on tenons, brackets or shaft may be drilled to manufacturer's mounting specifications.

SPECIFICATIONS

All aluminum alloys shall comply with metallurgical and mechanical properties set forth in the Aluminum Association Standards.

Shaft: The shaft shall be spun tapered from all new seamless 6063 alloy aluminum tubing and shall be heat treated to produce a T6 temper. Each shaft shall have a minimum of 6" straight length at the top. Top straight section serves as a slipfitter for a luminaire or for the hub of the appropriate Valmont bracket or tapered arm. Alternatively, the straight section may be drilled for mounting luminaires. The shaft shall be cone tapered to the base diameter. All Valmont shafts shall be polished with fine grain aluminum oxide cloths, resulting in a high quality circumferential satin brushed finish. After finishing, each pole shall be wrapped for protection in shipment.

Direct Embedment: Unless otherwise specified, the length of the embedded section of a 4" diameter shaft shall be 3', 5" and 6" shall be 4', 7" and 8" shall be 5'. A 1-1/2" diameter grommetted wire inlet hole located 1' 6" below grade shall be included. The embedded section of the pole shall be coated inside and outside with zinc rich paint.

Special Finishes: Natural anodize, duranodic, or painted finishes may be specified as an addition to the satin brushed finish, if required. All aluminum parts and accessories shall receive a finish similar to that specified.

Ground Lug: Each pole shall include a 5/16"-18 tapped provision for ground connector.

Handhole: Available as an option.

Anti-Rotation Device: Available as an option.

CATALOG LOGIC

2408 | 40 | 60 | 5 | T | E | D1 | DBL

Customer Approval

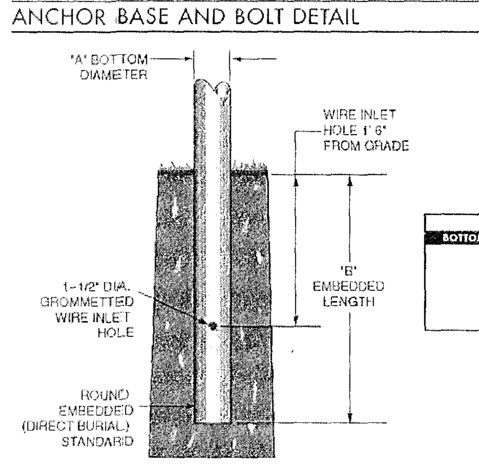
Job Name
Client Name
Created By
Quote
Date

Valmont Industries, Inc. ~ 20805 Eaton Avenue ~ Farmington, Minnesota 55024-7932 (800)899-7577 ~ valmontstructures.com A2-11

8' TO 30' ROUND TAPERED EMBEDDED (DIRECT BURIAL) POLES

valmont STRUCTURES ALUMINUM

ANCHOR BASE AND BOLT DETAIL



'A' BOTTOM DIAMETER

WIRE INLET HOLE 1' 6" FROM GRADE

1-1/2" DIA. GROMMETTED WIRE INLET HOLE

'B' EMBEDDED LENGTH

ROUND EMBEDDED (DIRECT BURIAL) STANDARD

A BOTTOM DIAMETER	B* EMBEDDED LENGTH
4"	3'
5"	4'
6"	4'
7"	5'
8"	5'

* 5' minimum embedded length for Canadian market.

DIMENSIONAL AND LOAD DATA

TYPICAL WEIGHT AND ALLOWABLE SIZE OF LUMINAIRES*							DIMENSIONS OF POLES					
NOMINAL MOUNTING HEIGHT	TYPICAL LUMINAIRE WEIGHT (LBS.)	EFFECTIVE PROJECTED AREA IN SQUARE FEET AT: 70 MPH	80 MPH	90 MPH	100 MPH	110 MPH	EXPOSED HEIGHT	OVERALL SHAFT LENGTH	TOP	BASE	WALL	MODEL NUMBER**
8'	75	19.1	14.4	11.1	8.8	7.1	7'8"	10'8"	3"	4"	.125"	0708-30404TE
10'	75	14.3	10.6	8.1	6.3	5.0	9'8"	12'8"	3"	4"	.125"	0908-30404TE
12'	75	11.0	8.0	6.0	4.5	3.5	11'8"	14'8"	3"	4"	.125"	1108-30404TE
12'	75	18.5	13.8	10.5	8.3	6.6	11'8"	15'8"	3"	5"	.125"	1108-30504TE
14'	75	8.5	6.0	4.4	3.2	2.4	13'8"	16'8"	3"	4"	.125"	1308-30404TE
14'	75	14.8	10.8	8.2	6.3	5.0	13'8"	17'8"	3"	5"	.125"	1308-30504TE
16'	75	7.1	5.0	3.5	2.4	1.7	15'8"	18'8"	3"	4"	.125"	1508-30404TE
16'	75	12.0	8.6	6.4	4.8	3.8	15'8"	19'8"	3"	5"	.125"	1508-30504TE
16'	75	15.3	11.1	8.4	6.5	5.1	15'8"	19'8"	3"	5"	.156"	1508-30505TE
18'	75	9.7	6.7	4.9	3.6	2.7	17'8"	21'8"	3"	5"	.125"	1708-30504TE
18'	150	12.2	8.7	6.4	4.9	3.8	17'8"	21'8"	3"	5"	.156"	1708-30505TE
18'	150	19.1	14.1	10.8	8.5	6.9	17'8"	21'8"	4"	6"	.156"	1708-40605TE
20'	75	8.2	5.5	3.8	2.6	1.9	19'8"	23'8"	3"	5"	.125"	1908-30504TE
20'	75	10.4	7.2	5.1	3.7	2.8	19'8"	23'8"	3"	5"	.156"	1908-30505TE
25'	150	10.5	7.1	5.1	3.8	2.9	24'8"	28'8"	4"	6"	.156"	2408-40605TE
25'	150	13.5	9.4	6.9	5.3	4.2	24'8"	28'8"	4"	6"	.188"	2408-40606TE
30'	150	11.1	7.5	5.3	4.0	3.0	29'8"	34'8"	4"	7"	.156"	2908-40705TE
30'	150	16.7	12.0	9.1	7.0	5.5	29'8"	34'8"	4.5"	8"	.156"	2908-45805TE

* EPA calculations are based on a 1.3 Gust Factor. Variations from sizes listed above, available upon inquiry at the factory. Satisfactory performance of lighting poles is dependent upon the pole being properly attached to a supporting foundation of adequate design. Valmont does not design or offer recommendations for foundations.
** Model number does not include mounting options or finish designation.

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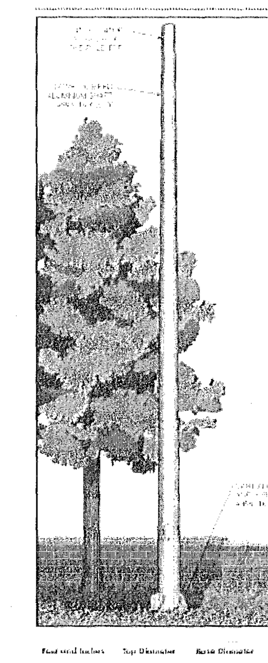
valmont STRUCTURES ALUMINUM

20' TO 28' ROUND TAPERED 4-BOLT ANCHOR BASE POLES



- 20' to 28' mounting heights.
- For single or multiple luminaire mounting.
- Luminaires may be mounted on tenons, brackets or shaft may be drilled to manufacturer's mounting specifications.

SPECIFICATIONS

All aluminum alloys shall comply with metallurgical and mechanical properties set forth in the Aluminum Association Standards.

Shaft: The shaft shall be spun tapered from all new seamless 6063 alloy aluminum and shall be heat treated to produce a T6 temper. Each shaft shall have a minimum 6" long straight section at the top to accommodate the center hub of the appropriate Valmont flood light bracket or tapered arm. Alternatively, the straight section may be drilled for mounting luminaires. All Valmont shafts shall be polished with fine grain aluminum oxide cloths, resulting in a high quality, circumferential satin brushed finish. After finishing each pole shall be fully wrapped for protection in shipment.

Anchor Base: The anchor base is cast from A356 alloy aluminum and is circumferentially welded to the shaft. The completed assembly will be heat treated to T6 temper after all structural welding is completed. A356 alloy aluminum nut covers shall be included with each anchor base unless otherwise specified.

Ground Lug Provision: Each pole shall include a 5/16"-18 tapped provision for ground connector.

Handholes: All poles include a flush covered handhole. The opening in the 5" and 6" diameter pole shall measure 3" x 5". The opening in the 7", 8" and 10" diameter pole shall measure 4" x 6". An optional 4" x 8" opening is available for 8" and 10" diameter poles.

Anchor Bolts: Each pole shall include: (4) steel hot dip galvanized anchor bolts each with (2) nuts and (2) flat washers sized to match the anchor bolts.

Special Finishes: Natural anodize, duranodic, or painted finishes may be specified as an addition to the satin brushed finish, if required. All aluminum parts and accessories shall receive a finish similar to that specified.

CATALOG LOGIC

T | 4

Customer Approval

Job Name
Client Name
Created By
Quote
Date

Valmont Industries, Inc. ~ 20805 Eaton Avenue ~ Farmington, Minnesota 55024-7932 (800)899-7577 ~ valmontstructures.com A2-3

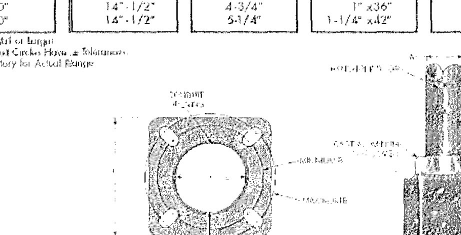
20' TO 28' ROUND TAPERED 4-BOLT ANCHOR BASE POLES

valmont STRUCTURES ALUMINUM

ANCHOR BASE AND BOLT DETAIL

A POLE DIAMETER	B BOLT CIRCLE	C BOLT PROJECTION	D BOLT SIZE	E CONDUIT OPENING	F BASE SIZE
5"	7-1/2"-9-1/2"	3-1/4"	3/4"x17"	4-1/2"	9-1/4"
6"	8-3/4"-10-1/4"	3-1/2"	3/4"x17"	5-1/2"	10-1/4"
7"	10"-11"	4-1/8"	1"x36"	6-1/2"	11-3/16"
8"	11"-12"	4-1/8"	1"x36"	7-1/2"	12"
10"	14"-1/2"	4-3/4"	1"x36"	9-1/2"	13"
*10"	14"-1/2"	5-1/4"	1-1/4"x42"	9-1/2"	14"

*0.250" Wall or larger
10" Base Bolt Circles Have ± Tolerances
Contact Factory for Actual Range



DIMENSIONAL AND LOAD DATA

TYPICAL WEIGHT AND ALLOWABLE SIZE OF LUMINAIRES*							DIMENSIONS OF POLES				
NOMINAL MOUNTING HEIGHT	TYPICAL LUMINAIRE† WEIGHT (LBS.)	EFFECTIVE PROJECTED AREA IN SQUARE FEET AT: 70 MPH	80 MPH	90 MPH	100 MPH	110 MPH	POLE HEIGHT	TOP	BASE	WALL	MODEL NUMBER**
20'	150	7.1	4.6	2.9	1.9	1.2	19'8"	3'	5"	.125"	1908-30504T4
20'	150	9.8	6.6	4.6	3.2	2.2	19'8"	3'	5"	.156"	1908-30505T4
20'	150	12.5	8.7	6.1	4.5	3.3	19'8"	3'	5"	.188"	1908-30506T4
20'	150	15.9	11.3	8.4	6.6	5.2	19'8"	4'	6"	.156"	1908-40605T4
20'	150	19.9	14.4	10.8	8.5	6.8	19'8"	4'	6"	.188"	1908-40606T4
20'	150	23.9	17.6	13.4	10.6	8.6	19'8"	4'	7"	.156"	1908-40705T4
23'	150	11.8	8.0	5.6	4.4	3.3	22'8"	4'	6"	.156"	2208-40605T4
23'	150	14.2	10.6	7.8	6.0	4.7	22'8"	4'	6"	.188"	2208-40606T4
23'	150	17.7	13.4	10.0	7.8	6.2	22'8"	4'	7"	.156"	2208-40705T4
23'	150	26.5	19.5	15.1	11.9	9.5	22'8"	4.5'	8"	.156"	2208-45805T4
23'	150	32.8	24.4	18.8	15.1	12.1	22'8"	4.5'	8"	.188"	2208-45806T4
25'	150	9.5	6.2	4.2	3.1	2.4	24'8"	4'	6"	.156"	†2408-40605T4
25'	150	12.7	8.6	6.1	4.6	3.5	24'8"	4'	6"	.188"	2408-40606T4
25'	150	15.8	11.2	8.2	6.4	4.9	24'8"	4'	7"	.156"	2408-40705T4
25'	150	22.8	16.7	12.8	10.0	8.0	24'8"	4.5'	8"	.156"	2408-45805T4
25'	150	28.5	21.2	16.2	12.8	10.4	24'8"	4.5'	8"	.188"	2408-45806T4
28'	150	12.0	8.1	5.8	4.2	3.3	27'8"	4'	7"	.156"	†2708-40705T4
28'	150	18.2	13.1	9.9	7.6	6.0	27'8"	4.5'	8"	.156"	2708-45805T4
28'	150	23.2	16.9	12.9	10.1	8.0	27'8"	4.5'	8"	.188"	2708-45806T4
28'	150	32.6	24.1	18.6	14.7	11.8	27'8"	4.5'	8"	.250"	2708-45808T4
28'	200	41.6	31.3	24.2	19.2	15.3	27'8"	6'	10"	.188"	2708-60106T4
28'	300	56.2	42.6	33.2	26.4	21.2	27'8"	6'	10"	.250"	2708-60108T4

SEE SECTIONS 8 AND 9 FOR MOUNTING ARMS ON POLES.
* EPA calculations are based on a 1.3 Gust Factor. Variations from sizes listed above, available upon inquiry at the factory. Satisfactory performance of lighting poles is dependent upon the pole being properly attached to a supporting foundation of adequate design. Valmont does not design or offer recommendations for foundations.
** Model number does not include mounting options or finish designation.
† Pole includes factory installed vibration dampener.

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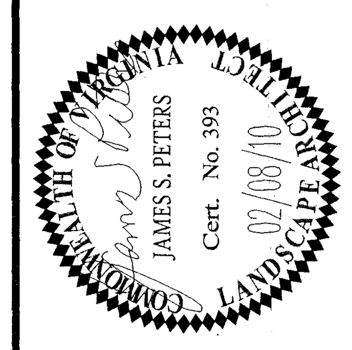
No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
3	02/08/10	ISSUED FOR BUILDING PERMIT	REC	REC
2	04/01/09	REVISED PER COUNTY COMMENTS DATED 02/20/09	REC	REC
1	01/14/09	REVISED PER COUNTY COMMENTS DATED 12/03/08	VAB	VAB



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

CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

NOTES & DETAILS

ST. OLAF CATHOLIC CHURCH

104 NORGE LANE, WILLIAMSBURG

STONEHOUSE DISTRICT | JAMES CITY COUNTY | VIRGINIA

Designed	Drawn
TRC	SJR
Scale	Date
N.T.S.	11/3/08

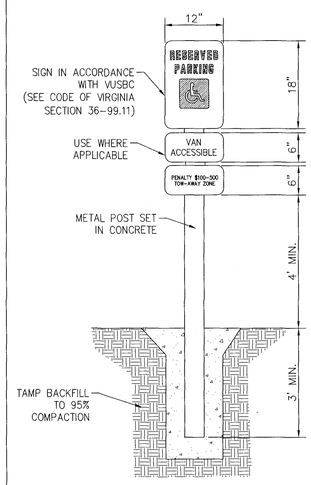
Project No.
9882–01

Drawing No.
13

VDOT GENERAL NOTES

REVISED 07/08

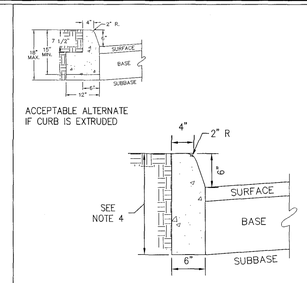
1. A LAND USE PERMIT MUST BE OBTAINED FROM VDOT BEFORE ANY CONSTRUCTION IS STARTED WITHIN THE STATE RIGHT OF WAY LIMITS. CONTACT THE VDOT WILLIAMSBURG RESIDENCY (TEL. # (757) 253-4832) FOR THE PERMIT FEE AND BOND AMOUNT. ALL LAND USE PERMIT APPLICATIONS MUST HAVE TWO (2) SETS OF APPROVED PLANS, A CHECK FOR THE PROCESSING FEE MADE PAYABLE TO TREASURER OF VIRGINIA, AND SURETY OR BOND IN THE REQUIRED AMOUNT.
2. THE CONTRACTOR SHALL HAVE AVAILABLE A COPY OF THE FINAL, APPROVED PLANS AND ANY APPROVED REVISIONS ON-SITE. THIS INCLUDES THE COUNTY'S STAMP OR LETTER OF APPROVAL.
3. VDOT IS TO RECEIVE WRITTEN NOTIFICATION 48 HOURS PRIOR TO THE START OF ANY WORK. A PRE-CONSTRUCTION MEETING SHOULD BE HELD AT LEAST ONE WEEK PRIOR TO ANY LAND DISTURBANCE OF THE SITE. THE DEVELOPER, HIS ENGINEER, GEOTECHNICAL (SOILS) ENGINEER, AND CONTRACTOR SHALL ATTEND THE PRE-CONSTRUCTION MEETING WITH INVITATIONS TO THE APPROPRIATE VDOT AND COUNTY PERSONNEL. THE DEVELOPER'S CONTRACTOR SHOULD SUBMIT A PROPOSED PROGRESS SCHEDULE OF WORK.
4. ANY ERRORS, CONFLICTS, OR DISCREPANCIES FOUND ON THE APPROVED PLANS SHALL BE REPORTED TO THE DEVELOPER'S ENGINEER. VDOT SHOULD BE NOTIFIED FOR RESOLUTION BEFORE PROCEEDING FURTHER WITH THE WORK IF THE RIGHT-OF-WAY IS AFFECTED.
5. AN OPERATIONAL PROJECT (ACCOUNTS RECEIVABLE) NUMBER MAY BE ASSIGNED TO THE SITE/SUBDIVISION. THE DEVELOPER WILL BE FINANCIALLY RESPONSIBLE FOR THIS BY PROVIDING THE NECESSARY INFORMATION REQUESTED BY VDOT. THE DEVELOPER IS RESPONSIBLE FOR THE COST OF A TRAFFIC SIGNAL OR ANY MODIFICATIONS TO AN EXISTING TRAFFIC SIGNAL THAT ARE DETERMINED TO BE NECESSARY. THESE COSTS WILL BE CHARGED UNDER AN OPERATIONAL PROJECT (ACCOUNTS RECEIVABLE) NUMBER OR PROFFERED TO THE COUNTY.
6. DURING CONSTRUCTION, THE MAINTENANCE OF TRAFFIC SHALL CONFORM TO THE REQUIREMENTS IN THE MOST RECENT VERSION OF THE VIRGINIA WORK AREA PROTECTION MANUAL AND THE MUTCD.
7. ALL MATERIALS AND CONSTRUCTION WITHIN THE VDOT RIGHT-OF-WAY SHALL CONFORM TO THE CURRENT VDOT STANDARDS AND SPECIFICATIONS AS OUTLINED IN THE ROAD & BRIDGE STANDARDS, ROAD & BRIDGE SPECIFICATIONS, ROAD DESIGN MANUAL, MINIMUM STANDARDS OF ENTRANCES TO STATE HIGHWAYS, DRAINAGE MANUAL, PAVEMENT DESIGN GUIDE FOR SUBDIVISIONS AND SECONDARY ROADS, AND AASHTO GREEN BOOK.
8. THE DEVELOPER WILL BE RESPONSIBLE FOR HIRING A GEOTECHNICAL (SOILS) ENGINEER. A PROFESSIONAL ENGINEER OR PROFESSIONAL GEOLOGIST SHALL SUBMIT A COMPLETE REPORT WITH BORING DATA AND RECOMMENDATIONS TO VDOT FOR APPROVAL OF HIS PROPOSED METHOD OF CONSTRUCTION. THIS INCLUDES A RECOMMENDATION FOR PAVEMENT DESIGN AND TREATMENT OR DISPOSAL OF ANY UNSUITABLE SOILS. APPROPRIATE GEOTECHNICAL REPORTS SHOULD ALSO BE SUBMITTED DURING CONSTRUCTION OF THE ROADWAY OR ENTRANCE.
9. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR IN ACCORDANCE WITH THE VA EROSION & SEDIMENT CONTROL MANUAL. AN INDIVIDUAL CERTIFIED BY THE VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION, HOLDING A RESPONSIBLE LAND DISTURBER CERTIFICATION, IS TO BE IN CHARGE OF THE LAND DISTURBING ACTIVITY AND ON THE WORK SITE AT ALL TIMES.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL UNDERGROUND AND OVERHEAD UTILITIES, WHETHER OR NOT THEY ARE SHOWN ON THE PLANS. THE CONTRACTOR WILL BE RESPONSIBLE FOR REPAIRS AT HIS OWN EXPENSE OF ANY UTILITIES DAMAGED BY HIS CONSTRUCTION METHODS. MISS UTILITY MUST BE CONTACTED (TEL. 1-800-552-7001) AT LEAST 72 HOURS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
11. ALL FIXED OBJECTS SUCH AS UTILITY CABINETS, PEDESTALS, AND STREETLIGHTS SHALL BE LOCATED IN ACCORDANCE WITH CLEAR ZONE REQUIREMENTS, AS NOTED IN APPENDIX A OF THE ROAD DESIGN MANUAL OR AASHTO ROADSIDE DESIGN GUIDE. THERE SHALL NOT BE ANY CABINETS, PEDESTALS, OR FIRE HYDRANTS LOCATED ON THE SHOULDER.
12. FLOWERS, SHRUBS, AND TREES SHALL NOT BE PLACED WITHIN THE PROPOSED RIGHT OF WAY BY THE DEVELOPER OR HOMEOWNER WITHOUT AN APPROVED SET OF PLANS AND AN APPROVED PLANTING AGREEMENT. NO IRRIGATION (SPRINKLER) SYSTEMS SHALL BE LOCATED WITHIN THE PROPOSED RIGHT OF WAY. ANY IRRIGATION SYSTEM FOUND WITHIN THE RIGHT OF WAY WILL BE REMOVED PRIOR TO THE ACCEPTANCE OF THE STREETS AND ALL COSTS WILL BE BORNE BY THE OWNER. NO BRICK COLUMNS, ENDWALLS, AND/OR BRICK MAILBOXES WILL BE CONSTRUCTED OR INSTALLED IN THE PROPOSED RIGHT OF WAY. ANY OF THE ABOVE ITEMS FOUND IN THE PROPOSED RIGHT OF WAY WILL BE REMOVED, AND ALL COSTS OF THE REMOVAL WILL BE BORNE BY THE OWNER AND/OR DEVELOPER. THE DEVELOPER IS RESPONSIBLE FOR INSTALLING MAILBOX POSTS.
13. CONTACT VDOT'S REGIONAL OPERATIONS SIGNING/PAVEMENT MARKING MANAGER 72 HOURS IN ADVANCE OF ALL PAVEMENT MARKINGS/SIGN INSTALLATIONS AT (757) 925-2665. FAILURE TO DO SO MAY RESULT IN ADDITIONAL COST TO THE DEVELOPER.
14. CONTACT TRAFFIC ENGINEERING AT (757) 925-2693 A MINIMUM OF 48 HOURS IN ADVANCE WHENEVER AN OPEN CUT OR BORING OF A UTILITY LINE ACROSS A ROAD IS WITHIN 400 FEET OF A TRAFFIC SIGNAL, SO THE LINES CAN BE MARKED. FAILURE TO DO SO COULD BE A COSTLY REPAIR FOR THE DEVELOPER.
15. SIGHT DISTANCES AT ENTRANCES AND INTERSECTIONS SHALL BE MAINTAINED AT ALL TIMES DURING AND AFTER CONSTRUCTION. ANY FIXED OBJECTS OR LANDSCAPING THAT OBSTRUCTS DRIVER VIEW SHALL BE RELOCATED AT DEVELOPER'S EXPENSE OR THE ENTRANCE MAY BE CLOSED AT VDOT'S DISCRETION.
16. THE COUNTY STANDARD OR REQUIREMENT SHALL BE IN FORCE IF IT IS MORE STRINGENT THAN VDOT'S. THE VDOT RESIDENT ENGINEER OR ADMINISTRATOR SHOULD BE CONTACTED FOR ANY CLARIFICATION.



NOTES:
THE SIGN SHALL BE FABRICATED IN ACCORDANCE WITH SECTION 701 AND INSTALLED PER INSTALLATION DETAIL WSP-1 TYPE C OF THE VDOT ROAD AND BRIDGE STANDARDS AND SPECIFICATIONS.

HANDICAP SIGN DETAIL

N.T.S.



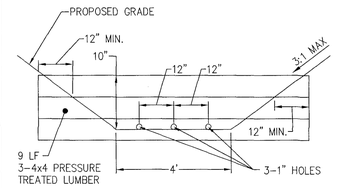
STANDARD 6" CURB

N.T.S.

CG-2

NOTES:

1. THIS ITEM MAY BE PRECAST OR CAST IN PLACE.
2. CONCRETE TO BE CLASS A3 IF CAST IN PLACE, 4000 PSI IF PRECAST.
3. CURB HAVING A RADIUS OF 300' OR LESS (ALONG FACE OF CURB) WILL BE PAID FOR AS RADIAL CURB.
4. THE DEPTH OF CURB MAY BE REDUCED AS MUCH AS 3" (15" DEPTH) OR INCREASED AS MUCH AS 3" (21" DEPTH) IN ORDER THAT THE BOTTOM OF THE CURB WILL COINCIDE WITH THE TOP OF A COURSE OF THE PAVEMENT SUBSTRUCTURE. OTHERWISE, THE DEPTH IS TO BE 18" AS SHOWN. NO ADJUSTMENT IN THE PRICE BID IS TO BE MADE FOR A DECREASE OR AN INCREASE IN DEPTH.
5. CG-2 IS TO BE USED ON ROADWAYS MEETING THE REQUIREMENTS FOR CG-6 AS SHOWN IN APPENDIX A OF THE VDOT ROAD DESIGN MANUAL.



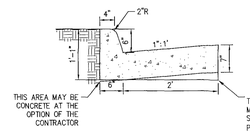
LOW PROFILE TIMBER WALL

N.T.S.

CG-6

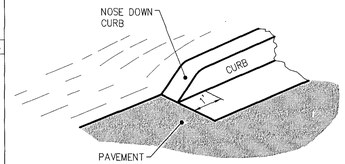
NOTES:

1. THIS ITEM MAY BE PRECAST OR CAST IN PLACE.
2. CONCRETE TO BE CLASS A3 IF CAST IN PLACE, 4000 PSI IF PRECAST.
3. COMBINATION CURB AND GUTTER HAVING A RADIUS OF 300' OR LESS (ALONG FACE OF CURB) SHALL BE PAID FOR AS A RADIAL COMBINATION CURB AND GUTTER.
4. FOR USE WITH STABILIZED OPEN-GRADED DRAINAGE LAYER, THE BOTTOM OF THE CURB AND GUTTER SHALL BE CONSTRUCTED PARALLEL TO THE SLOPE OF THE PAVEMENT.
5. ALLOWABLE CRITERIA FOR THE USE OF CG-6 IS BASED ON ROADWAY CLASSIFICATION AND DESIGN SPEED AS SHOWN IN APPENDIX A OF THE VDOT ROAD DESIGN MANUAL.



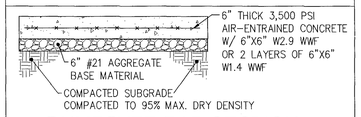
COMBINATION CURB AND GUTTER

N.T.S.



NOSE DOWN CURB

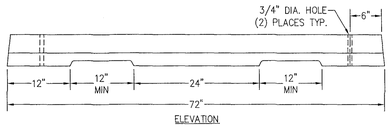
N.T.S.

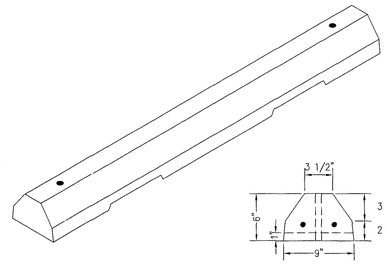


DUMPSTER PAD SECTION

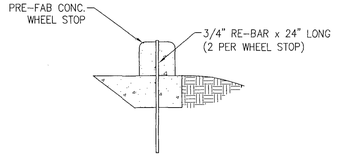
N.T.S.

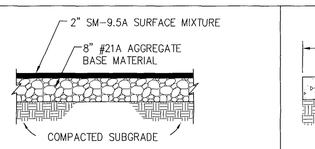
CONCRETE WHEEL STOP WITH DRAINAGE SLOT





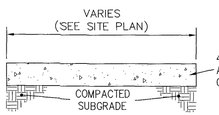
SECTION:
WEIGHT: 240LBS
CONCRETE: Fc=4,000 psi @ 28 DAYS
REINFORCEMENT: (2) - #4 REBAR
ASTM A-615 GRADE 60





TYPICAL PAVEMENT SECTION

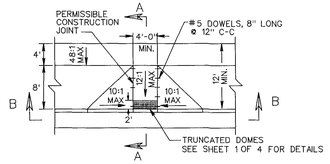
N.T.S.

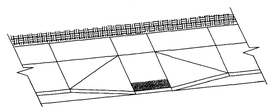


TYPICAL SIDEWALK SECTION

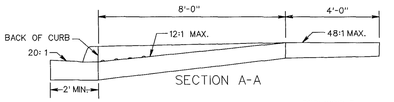
N.T.S.

CG-12

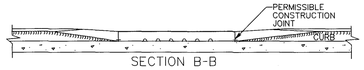




TYPICAL DESIGN

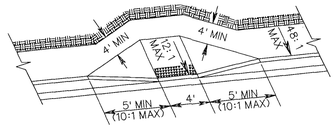


SECTION A-A

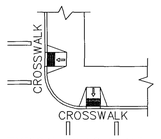


SECTION B-B

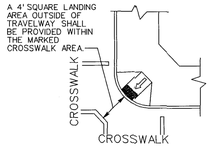
NOTE: FOR GENERAL NOTES ON THE DETECTABLE WARNING SURFACE, SEE SHEET 1 OF 4.



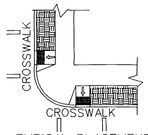
ALTERATIONS



TYPICAL PLACEMENT AT INTERSECTION WITHIN CROSSWALK



DIAGONAL VARIATION



TYPICAL PLACEMENT AT INTERSECTION WITHIN CROSSWALK (WITH BUFFER STRIP)

THIS DESIGN TO BE USED FOR CONSTRUCTION THAT INCORPORATES WIDER SIDEWALK. LANDING (48" WIDE) REQUIRED AT TOP OF CURB RAMP. MINIMUM CURB RAMP LENGTH 8 FEET FOR NEW CONSTRUCTION, 6 FEET FOR ALTERATIONS.

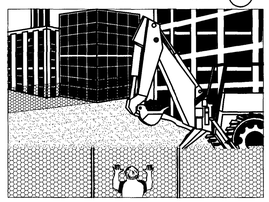
SHEET 2 OF 4

SPECIFICATION REFERENCE
105
502

CG-12 DETECTABLE WARNING SURFACE
TYPE A (PERPENDICULAR) APPLICATION
VIRGINIA DEPARTMENT OF TRANSPORTATION

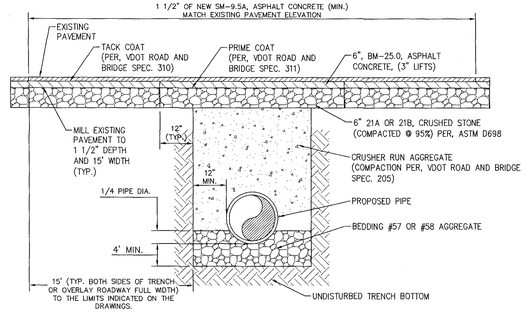
NEW 7/05
203.05A

SAFETY FENCE (SAF)



PERSPECTIVE VIEW

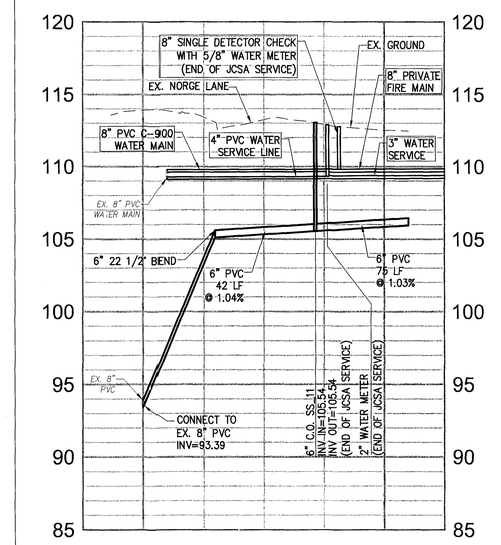
PERSPECTIVE VIEW
PLASTIC FENCE



NOTE:
MEASUREMENTS OF THE EXISTING ROADWAY WIDTH SHALL BE MADE PRIOR TO THE START OF THE OVERLAY PLACEMENT. THESE MEASUREMENTS SHALL BE THE BASIS FOR PAVEMENT QUANTITY CALCULATIONS. ALL THE BACKFILLING AND COMPACTION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS OUTLINED IN VDOT's ROAD AND BRIDGE SPECIFICATIONS (CURRENT EDITION). THE PERMITTEE WILL BE HELD RESPONSIBLE FOR ANY SETTLING OF BACKFILL OR PAVEMENT FOR A PERIOD OF 3 YEARS AFTER COMPLETION OF THE WORK. IF THE TRENCH WIDTH IS GREATER THAN 4' WIDE OR OPEN CUT GREATER THAN 16 SQUARE FEET, THE PERMITTEE SHALL THEN RESURFACE THE ROADWAY WITH LIKE MATERIAL THAT IS EXISTING, FOR A DISTANCE OF 15' ON EITHER SIDE OF THE DISTURBED AREA FROM THE EDGE OF PAVEMENT TO THE EDGE OF PAVEMENT. THIS APPLIES TO UTILITY INSTALLATION, EXCLUDING STORM SEWER PIPING.

PAVEMENT PATCH FOR SECONDARY ROADS

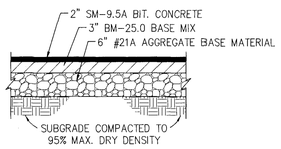
N.T.S.



PROFILE OF PROPOSED SANITARY SEWER & WATERLINES CROSSING NORGE ROAD

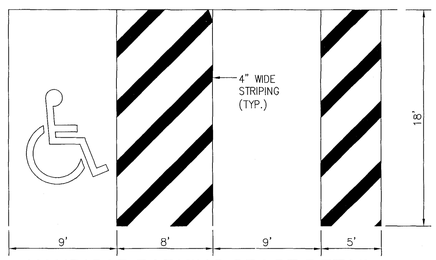
SCALE: 1"=30'H, 1"=5'V

*NOTE: THE TOP SIX INCHES OF THE SUBGRADE SHALL BE COMPACTED TO 100% MAX DRY DENSITY.



TYPICAL RIGHT OF WAY PAVEMENT SECTION

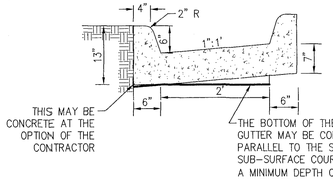
N.T.S.



HANDICAP PARKING SPACE DETAIL

N.T.S.

GUTTER SLOPES AWAY FROM PARKING ISLAND



THIS ITEM MAY BE PRECAST OR CAST IN PLACE

CONCRETE TO BE CLASS A3 IF CAST IN PLACE, 4000 PSI IF PRECAST

ISLAND CUT THROUGH

N.T.S.

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
3	02/28/10	ISSUED FOR BUILDING PERMIT	REC	REC
2	04/01/09	REVISED PER COUNTY COMMENTS DATED 02/20/09	REC	REC
1	01/14/09	REVISED PER COUNTY COMMENTS DATED 12/03/08	VAB	VAB

COMMONWEALTH OF VIRGINIA
ROBERT E. COSBY III
Lic. No. 35664
02/28/10
PROFESSIONAL ENGINEER

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(757) 253-0040
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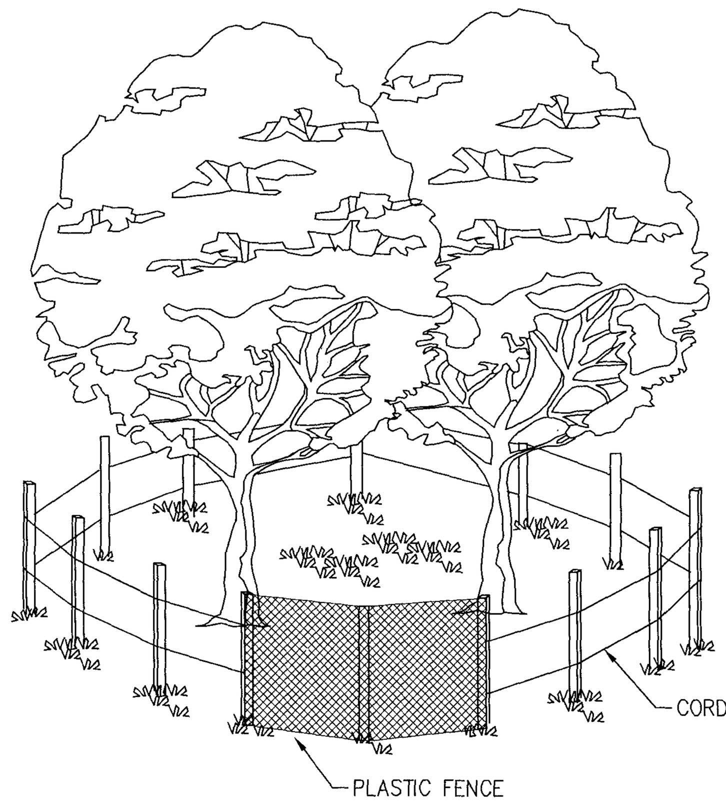
CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

NOTES & DETAILS
ST. OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VAB	BBS
Scale	Date
AS NOTED	11/3/08
Project No.	
9882-01	
Drawing No.	
14	



PLASTIC FENCING–40" HIGH "INTERNATIONAL ORANGE" PLASTIC (POLYETHYLENE) WEB FENCING SECURED TO CONVENTIONAL METAL "T" OR "U" POSTS DRIVEN TO A MINIMUM DEPTH OF 18" ON 6' MINIMUM CENTERS SHALL BE INSTALLED AT THE LIMITS OF CLEARING. THE FENCE SHALL HAVE THE FOLLOWING MINIMUM PHYSICAL QUALITIES:

TENSILE YIELD: AVERAGE 2,000 LBS. PER 4' WIDTH
(ASTM D638)

ULTIMATE
TENSILE YIELD: AVERAGE 2,900 LBS. PER 4' WIDTH
(ASTM D638)

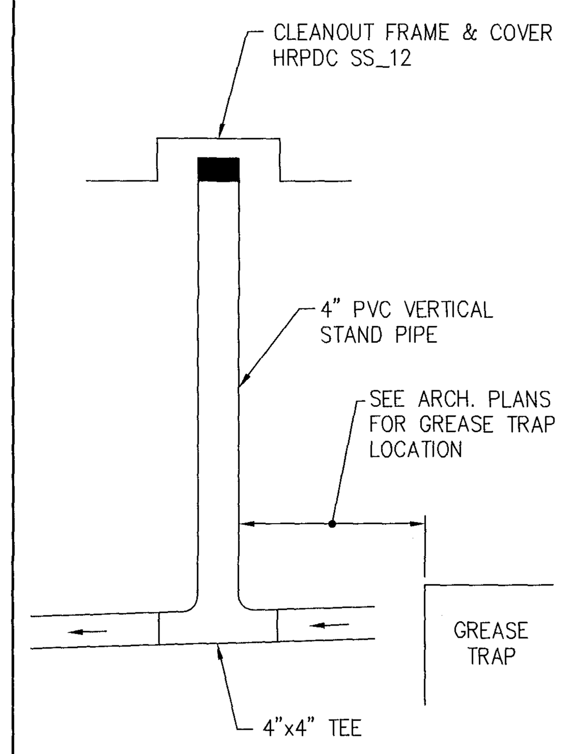
ELONGATION
AT BREAK (%): GREATER THAN 1000%
(ASTM D638)

CHEMICAL
RESISTANCE: INERT TO MOST CHEMICALS AND ACIDS

PLACE FENCE 5' OUTSIDE DRIPLINE

(TP) TREE PROTECTION

N.T.S.



SAMPLING STATION

N.T.S.

MH-1

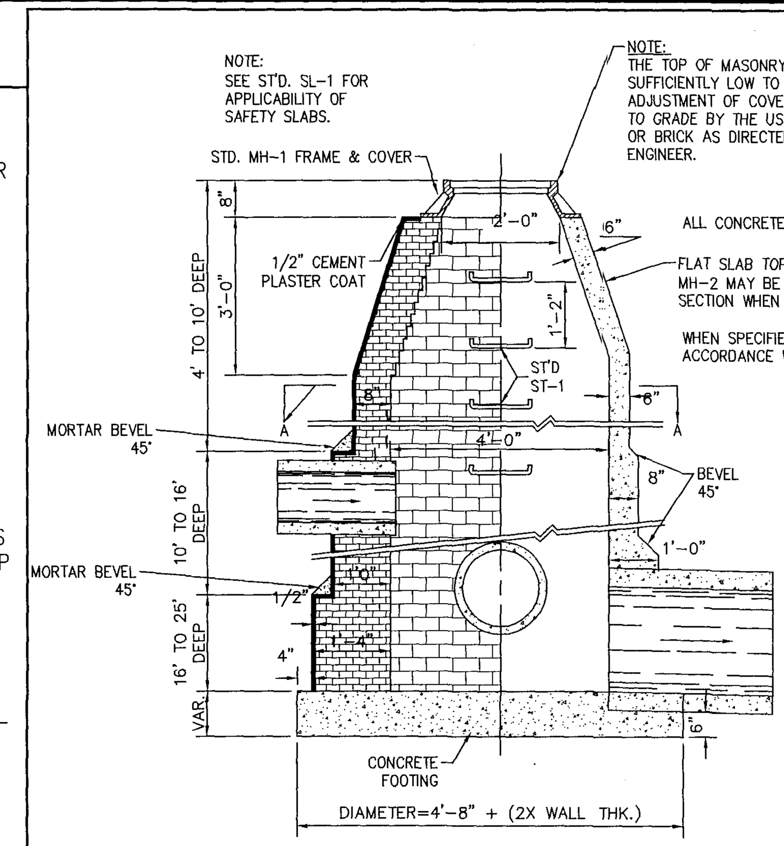
NOTE:
SEE ST'D. SL-1 FOR APPLICABILITY OF SAFETY SLABS.

NOTE:
THE TOP OF MASONRY IS TO BE LEFT SUFFICIENTLY LOW TO PERMIT PROPER ADJUSTMENT OF COVER AND FRAME TO GRADE BY THE USE OF MORTAR OR BRICK AS DIRECTED BY THE ENGINEER.

ALL CONCRETE TO BE CLASS A3.

FLAT SLAB TOP AS DETAILED ON ST'D. T-MH-2 MAY BE SUBSTITUTED FOR TAPERED SECTION WHEN APPROVED BY THE ENGINEER.

WHEN SPECIFIED ON PLANS THE INVERT IS TO BE SHAPED IN ACCORDANCE WITH STANDARD PLAN IS-1.



SECTION B-B
BRICK CONCRETE OR CONCRETE BLOCK

TABLE OF QUANTITIES			*
DEPTH	BRICK	MANHOLE BRICK	CONCRETE MANHOLE CONCRETE
FEET	THOUSANDS	CU.YDS.	CU.YDS.
4	0.5	0.785	1.437
5	0.7	0.785	1.699
6	0.9	0.785	1.961
7	1.0	0.785	2.223
8	1.2	0.785	2.485
9	1.4	0.785	2.747
10	1.6	0.785	3.009
11	1.9	0.970	3.455
12	2.2	0.970	3.817
13	2.5	0.970	4.179
14	2.8	0.970	4.541
15	3.1	0.970	4.903
16	3.4	0.970	5.265
17	4.0	1.173	6.032
INCREMENTS	0.45	—	0.582

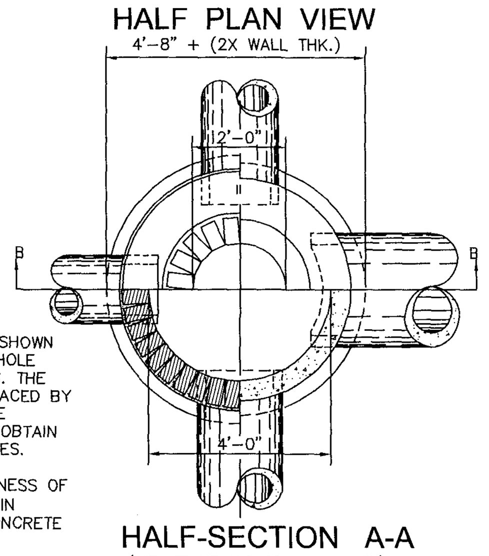
QUANTITIES SHOWN ARE FOR MANHOLE WITHOUT PIPES. THE AMOUNT DISPLACED BY PIPES MUST BE DEDUCTED TO OBTAIN TRUE QUANTITIES.

A BASE THICKNESS OF 9" WAS USED IN COMPUTING CONCRETE QUANTITIES.

INCREMENTS TO BE ADDED FOR EACH ADDITIONAL FOOT OF DEPTH.

MATERIALS MAY BE BRICK, CONCRETE OR APPROVED CONCRETE MANHOLE BLOCK. IF BLOCKS ARE USED THE MINIMUM THICKNESS OF SAME IS TO BE 5". OTHER THICKNESSES ARE TO CONFORM TO WALL THICKNESS SHOWN FOR CONCRETE.

HALF PLAN VIEW



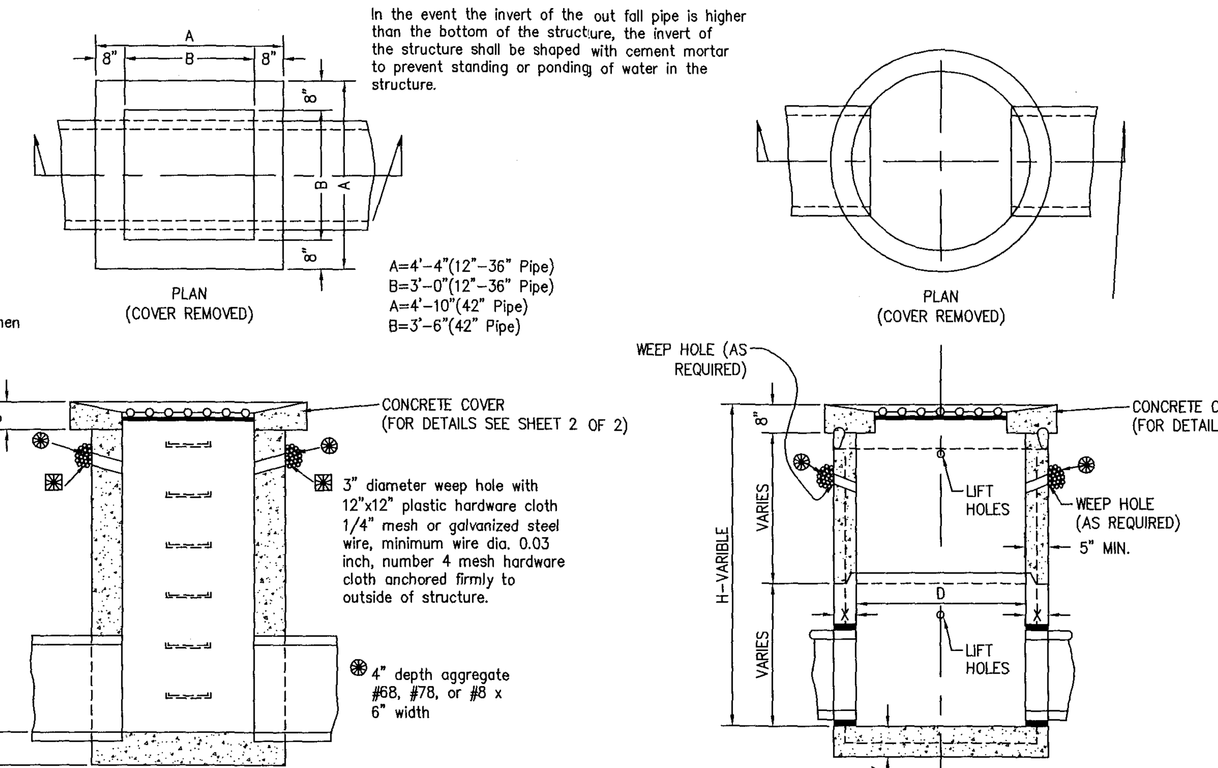
HALF-SECTION A-A
(WITH FRAME AND COVER REMOVED)
BRICK CONCRETE

MANHOLE FOR 12"-48" PIPE CULVERTS

N.T.S.

DI-7

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



A=4'-4"(12"-36" Pipe)
B=3'-0"(12"-36" Pipe)
A=4'-10"(42" Pipe)
B=3'-6"(42" Pipe)

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

3" diameter weep hole with 12"x12" plastic hardware cloth 1/4" mesh or galvanized steel wire, minimum wire dia. 0.03 inch, number 4 mesh hardware cloth anchored firmly to outside of structure.

4" depth aggregate #68, #78, or #8 x 6" width

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

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

For details of Pre cast DI-7 not shown hereon see Pre cast Unit Assembly Diagram, page 103.01, Pre cast General Notes, page 103.02 and Applicable Pre cast Base, Riser, and Top Details, pages 103.07 thru 103.12.

RECOMMENDED MINIMUM HEIGHT CHART		
PIPE	H. DIMENSION	
SIZE	CONC.	CORR. METAL
12"	2'-6"	2'-5"
15"	2'-9 1/4"	2'-8"
18"	3'-1/2"	2'-11"
21"	3'-3 3/4"	3'-2
24"	3'-7"	3'-5"
27"	3'-10 1/4"	3'-8"
30"	4'-1 1/2"	3'-11"
33"	4'-4 3/4"	4'-2"
36"	4'-8"	4'-5"
42"	5'-2 1/2"	4'-11"

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

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

Increments shown are for inlets without pipes. Pipe displacements must be deducted to obtain true quantities. Paved ditches are to be transitioned to meet inlet gutter as shown in St'd. PG-1.

Safety Slabs are to be provided at 8' minimum and 12' maximum vertical intervals and are to be spaced so as not to conflict with openings for pipes as directed by the Engineer.

NOTE: DROP INLET STRUCTURE IS TO BE PROVIDED WITH KOR-N-SEAL (OR EQUIVALENT) BOOTS FOR DISSIMILAR PIPE MATERIALS.

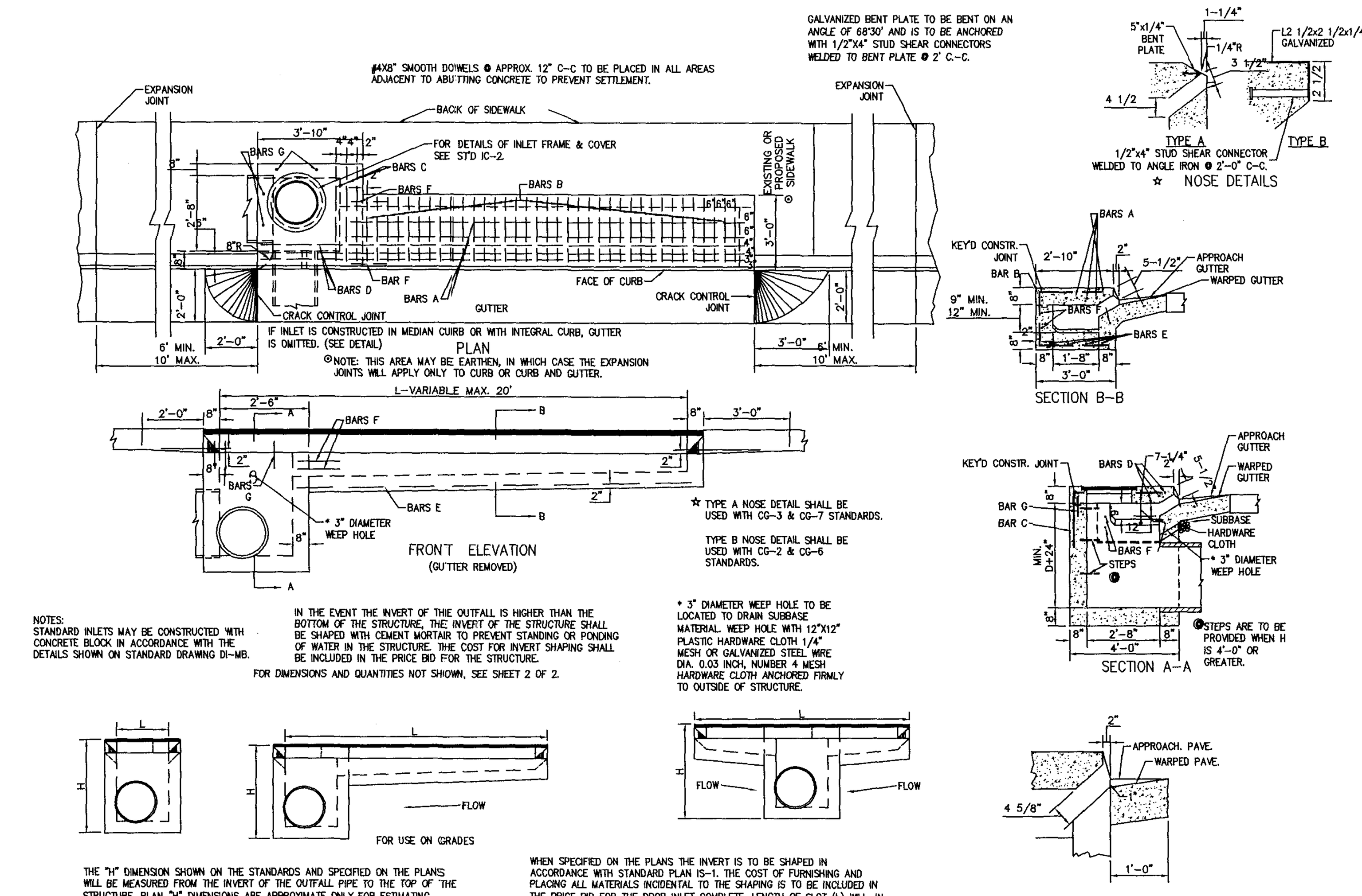
STANDARD MEDIAN DROP INLET

N.T.S.
VIRGINIA DEPARTMENT OF TRANSPORTATION

DI-3

GALVANIZED BENT PLATE TO BE BENT ON AN ANGLE OF 68°30' AND IS TO BE ANCHORED WITH 1/2"X4" STUD SHEAR CONNECTORS WELDED TO BENT PLATE @ 2' C.-C.

#4X8" SMOOTH DOWELS @ APPROX. 12" C-C TO BE PLACED IN ALL AREAS ADJACENT TO ABUTTING CONCRETE TO PREVENT SETTLEMENT.



☆ TYPE A NOSE DETAIL SHALL BE USED WITH CG-3 & CG-7 STANDARDS.

TYPE B NOSE DETAIL SHALL BE USED WITH CG-2 & CG-6 STANDARDS.

NOTES:
STANDARD INLETS MAY BE CONSTRUCTED WITH CONCRETE BLOCK IN ACCORDANCE WITH THE DETAILS SHOWN ON STANDARD DRAWING DI-MB.

IN THE EVENT THE INVERT OF THE OUTFALL IS HIGHER THAN THE BOTTOM OF THE STRUCTURE, THE INVERT OF THE STRUCTURE SHALL BE SHAPED WITH CEMENT MORTAR TO PREVENT STANDING OR PONDING OF WATER IN THE STRUCTURE. THE COST FOR INVERT SHAPING SHALL BE INCLUDED IN THE PRICE BID FOR THE STRUCTURE.

FOR DIMENSIONS AND QUANTITIES NOT SHOWN, SEE SHEET 2 OF 2.

• 3" DIAMETER WEEP HOLE TO BE LOCATED TO DRAIN SUBBASE MATERIAL. WEEP HOLE WITH 12"X12" PLASTIC HARDWARE CLOTH 1/4" MESH OR GALVANIZED STEEL WIRE DIA. 0.03 INCH, NUMBER 4 MESH HARDWARE CLOTH ANCHORED FIRMLY TO OUTSIDE OF STRUCTURE.

THE "H" DIMENSION SHOWN ON THE STANDARDS AND SPECIFIED ON THE PLANS WILL BE MEASURED FROM THE INVERT OF THE OUTFALL PIPE TO THE TOP OF THE STRUCTURE. PLAN "H" DIMENSIONS ARE APPROXIMATE ONLY FOR ESTIMATING PURPOSES AND THE ACTUAL DIMENSIONS SHALL BE DETERMINED BY THE CONTRACTOR FROM FIELD CONDITIONS.

WHEN SPECIFIED ON THE PLANS THE INVERT IS TO BE SHAPED IN ACCORDANCE WITH STANDARD PLAN IS-1. THE COST OF FURNISHING AND PLACING ALL MATERIALS INCIDENTAL TO THE SHAPING IS TO BE INCLUDED IN THE PRICE BID FOR THE DROP INLET COMPLETE. LENGTH OF SLOT (L) WILL, IN EVERY CASE, BE SHOWN ON PLANS. WHEN INLET IS USED IN 4'-0" MEDIAN, BACK OF INLET IS TO BE SHAPED TO CONFORM WITH PROPOSED CURB.

THIS ITEM MAY BE PRECAST OR CAST IN PLACE.

STANDARD CURB DROP INLET

12"-30" PIPE MAXIMUM DEPTH (H)=8'
VIRGINIA DEPARTMENT OF TRANSPORTATION

JCSA GENERAL NOTES FOR WATER DISTRIBUTION AND SANITARY SEWER SYSTEM

(Revised August 2005)

A. ALL COMPONENTS OF THE WATER DISTRIBUTION AND SANITARY SEWER SYSTEM SHALL BE INSTALLED AND TESTED IN ACCORDANCE WITH THE LATEST EDITION OF THE JCSA DESIGN AND ACCEPTANCE CRITERIA FOR WATER DISTRIBUTION AND SANITARY SEWER SYSTEMS, THE HRPDC REGIONAL CONSTRUCTION STANDARDS (THIRD EDITION WITH AMENDMENTS DATED JANUARY 2003), AND THE COMMONWEALTH OF VIRGINIA DEPARTMENT OF HEALTH WATERWORKS AND SANITARY SEWERAGE REGULATIONS. THE CONTRACTOR SHALL USE ONLY NEW MATERIALS, PARTS, AND PRODUCTS ON ALL PROJECTS. ALL MATERIALS SHALL BE STORED SO AS TO ASSURE THE PRESERVATION OF THEIR QUALITY AND FITNESS FOR THE WORK. A COPY OF THE JCSA DESIGN AND ACCEPTANCE CRITERIA AND HRPDC REGIONAL CONSTRUCTION STANDARDS MUST BE KEPT ON-SITE BY THE CONTRACTOR DURING TIME OF INSTALLING, TESTING, AND CONVEYING FACILITIES TO JCSA.

B. THE CONTRACTOR/DEVELOPER SHALL ACQUIRE A CERTIFICATE TO CONSTRUCT WATER AND SEWER FACILITIES PRIOR TO COMMENCEMENT OF CONSTRUCTION OF ANY WATER OR SANITARY SEWER FACILITIES.

C. THE DEVELOPER'S REPRESENTATIVE SHALL SUBMIT SHOP DRAWINGS FOR ALL MATERIALS FOR APPROVAL TO JCSA PRIOR TO COMMENCEMENT OF CONSTRUCTION. ALL MATERIALS ORDERED AND INSTALLED PRIOR TO JCSA'S REVIEW AND ACCEPTANCE WILL BE AT THE CONTRACTOR'S/DEVELOPER'S RISK.

D. PIPE LINES AND SERVICES SHALL BE INSTALLED AFTER GRADING TO WITHIN 6-INCHES OF FINAL GRADE AND PRIOR TO PLACEMENT OF BASE MATERIAL.

E. ALL WATER MAINS SHALL BE FULLY FLUSHED, PRESSURE TESTED, AND DISINFECTED AND SATISFACTORY BACTERIOLOGICAL SAMPLES OBTAINED, IN ACCORDANCE WITH JCSA DESIGN AND ACCEPTANCE CRITERIA.

F. ROUTINE PERIODIC INSPECTIONS DURING CONSTRUCTION WILL BE PROVIDED BY JCSA. THESE INSPECTIONS DO NOT RELIEVE THE DEVELOPER/CONTRACTOR/OWNER FROM HIS OBLIGATION AND RESPONSIBILITY FOR CONSTRUCTING A WATER DISTRIBUTION AND SANITARY SEWER SYSTEM IN STRICT ACCORDANCE WITH THE JCSA DESIGN AND ACCEPTANCE CRITERIA.

G. ANY FIELD MODIFICATIONS OR CHANGES TO THE APPROVED PLANS SHALL BE VERIFIED AND CHECKED BY THE ENGINEER OF RECORD AND ACCEPTED BY JCSA PRIOR TO ANY FIELD MODIFICATIONS OR CHANGES. ALL APPROVED CHANGE AND FIELD MODIFICATIONS SHALL BE ACCURATELY INDICATED ON THE RECORD DRAWINGS.

H. ALL LOTS SHALL BE PROVIDED WITH WATER SERVICE AND SANITARY SEWER CONNECTIONS. THE CONNECTIONS SHALL BE EXTENDED FROM THE MAIN TO THE PROPERTY LINE OR EASEMENT LINE, AND SHALL TERMINATE WITH A YOKE IN A METER BOX, OR AT THE CLEAN OUT, SET AT FINAL FINISHED GRADE. METERS FOR ALL LOTS (UNITS) SHALL BE PAID FOR BY THE DEVELOPER OR BUILDER AND INSTALLED BY JCSA.

I. ANY REQUIRED EASEMENTS, PERMITS AND APPROVALS SHALL BE ACQUIRED BY THE DEVELOPER PRIOR TO COMMENCEMENT OF WATER MAIN AND/OR SANITARY SEWER CONSTRUCTION.

J. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE LAWS, ORDINANCES, RULES, REGULATIONS AND ORDERS OF ANY PUBLIC BODY HAVING JURISDICTION. THE CONTRACTOR SHALL ERECT AND MAINTAIN, AS REQUIRED BY THE CONDITIONS AND PROGRESS OF THE WORK, ALL NECESSARY SAFEGUARDS FOR SAFETY AND PROTECTION. THE CONTRACTOR SHALL ALSO NOTIFY "MISS UTILITY" PRIOR TO PERFORMING ANY UNDERGROUND EXCAVATION.

K. WATER METER BOX INSTALLATION SHALL MAINTAIN A MINIMUM 18-INCH HORIZONTAL EDGE-TO-EDGE CLEARANCE FROM DRIVEWAYS AND/OR DRIVE PATHS, SIDEWALKS OR BIKE PATHS.

L. ONLY JCSA PERSONNEL ARE AUTHORIZED TO OPERATE VALVES ON EXISTING JCSA WATER MAINS AND SANITARY FORCE MAINS.

M. ANY EXISTING UNUSED WELL(S) SHALL BE ABANDONED IN ACCORDANCE WITH STATE PRIVATE WELL REGULATIONS AND JAMES CITY COUNTY CODE.

N. BEDDING OF JCSA UTILITIES SHALL BE IN ACCORDANCE WITH HRPDC DETAIL EW_01.

O. NO TREES, SHRUBS, FENCES OR OBSTACLES SHALL BE PLACED WITHIN A JCSA EASEMENT WHICH WOULD RENDER THE EASEMENT INACCESSIBLE BY EQUIPMENT. SHRUBS SHALL BE A MINIMUM OF 5-FEET, AND TREES A MINIMUM OF 10-FEET, FROM THE CENTER OF WATER AND SANITARY SEWER PIPELINES.

P. JOINT RESTRAINT SHALL BE PROVIDED IN ACCORDANCE WITH MINIMUM REQUIREMENTS OF JCSA DETAIL JR.1, UNLESS SHOWN OTHERWISE ON THE PLANS. ALL PRESSURE PIPELINES SHALL HAVE JOINT RESTRAINT.

Q. PROPOSED WATER AND SANITARY SEWER SYSTEMS SHALL MAINTAIN A MINIMUM HORIZONTAL SEPARATION OF 5-FEET FROM OTHER UTILITIES AND STRUCTURES, INCLUDING BUT NOT LIMITED TO STORM SEWERS, STREET LIGHTS, ETC. WATER AND SANITARY SEWER FACILITIES SHALL HAVE A MINIMUM 10-FOOT HORIZONTAL EDGE-TO-EDGE SEPARATION.

R. ANY PROPOSED BACKFLOW PREVENTION DEVICE AND/OR GREASE TRAP MUST BE INSPECTED BY THE JCSA UTILITY SPECIAL PROJECTS COORDINATOR AT (757) 259-4138.

S. PLUMBING INSIDE OF PROPOSED BUILDINGS MUST BE INSPECTED BY JCSA'S UTILITY SPECIAL PROJECTS COORDINATOR AT (757) 259-4138, FOR POTENTIAL CROSS CONNECTIONS. ANY CROSS CONNECTIONS MUST BE PROTECTED BY THE APPROPRIATE BACKFLOW PREVENTION DEVICE(S)".

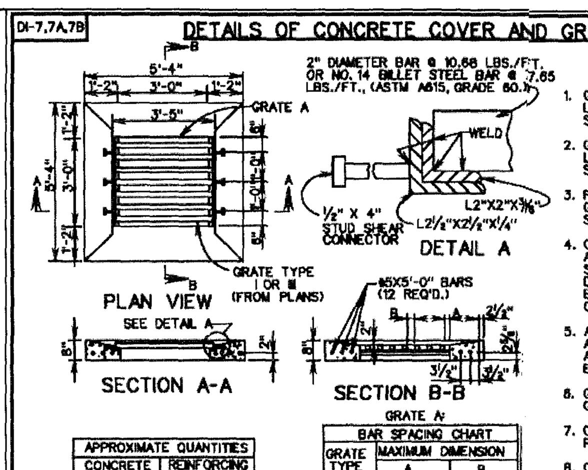
T. EASEMENTS DENOTED AS "JCSA UTILITY EASEMENTS" ARE FOR THE EXCLUSIVE USE OF THE JAMES CITY SERVICE AUTHORITY AND THE PROPERTY OWNER. OTHER UTILITY SERVICE PROVIDERS DESIRING TO USE THESE EASEMENTS WITH THE EXCEPTION OF PERPENDICULAR UTILITY CROSSINGS MUST OBTAIN AUTHORIZATION FOR ACCESS AND USE FROM JCSA AND THE PROPERTY OWNER. ADDITIONALLY, JCSA SHALL NOT BE HELD RESPONSIBLE FOR ANY DAMAGE TO IMPROVEMENTS WITHIN THIS EASEMENT, FROM ANY CAUSE.

U. JCSA SHALL NOT BE HELD RESPONSIBLE FOR ANY PAVEMENT SETTLEMENT DUE TO PIPE BEDDING, BACKFILLING, BACKFILL MATERIALS OR COMPACTION FOR WATER OR SANITARY SEWER FACILITIES FOR THIS PROJECT.

V. FIRE HYDRANTS TO BE INSTALLED WITHIN EXISTING OR PROPOSED VDOT RIGHT-OF-WAYS SHALL BE LOCATED IN ACCORDANCE WITH VDOT REQUIREMENTS.

DI-7,7A,7B

DETAILS OF CONCRETE COVER AND GRATE



APPROXIMATE QUANTITIES	
CONCRETE CLASS A3	REINFORCING STEEL
0.423 C.Y.	63 LBS.

GRATE A

BAR SPACING CHART		
GRATE TYPE	MAXIMUM DIMENSION A	B
I	1/2"	3"
II	1"	1"

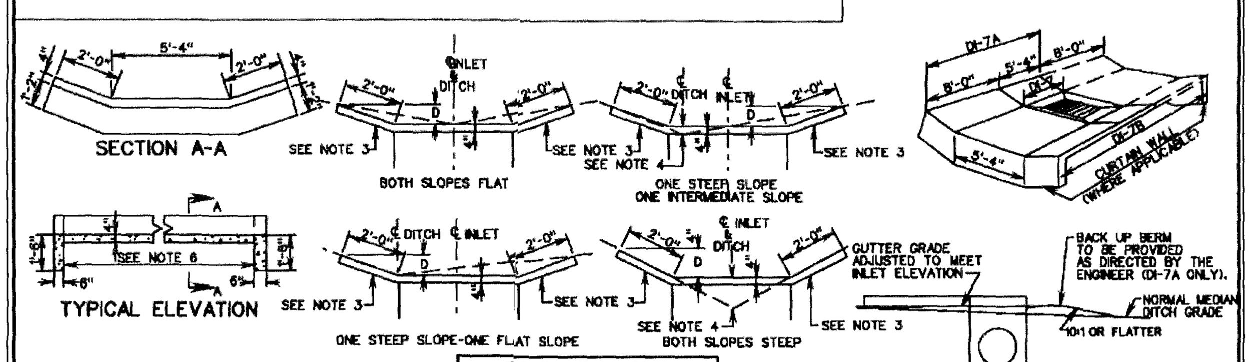
NOTES

1. GRATE A IS TO BE UTILIZED IN LOCATIONS NOT NORMALLY SUBJECT TO TRAFFIC.
2. GRATE B IS TO BE UTILIZED IN LOCATIONS NORMALLY SUBJECT TO TRAFFIC.
3. FOR DETAILS OF LOAD CARRYING GRATE (GRATE B), SEE T-DI-7, SHEET 103.08.
4. CONCRETE COVER AND GRATE ARE TO BE FURNISHED AS A SINGLE UNIT. OUTSIDE DIMENSIONS OF GRATE TO BE 3'-4" X 2'-1½" (GRATE A) OR 3'-4" X 2'-1½" (GRATE B).
5. ALTERNATE METHODS OF ANCHORING ANGLE IRON WILL BE ACCEPTABLE IF APPROVED BY THE ENGINEER.
6. GRATE AND COLLAR ARE TO BE GALVANIZED.
7. CONCRETE COVER MAY BE PRECAST OR CAST IN PLACE.
8. CONCRETE TO BE CLASS A3 IF CAST IN PLACE. 4000 PSI IF PRECAST.
9. GRATE BARS TO BE PARALLEL TO DITCH FLOW.

DETAILS OF GUTTER AND METHOD OF PLACEMENT

NOTES

1. DI-7 NO GUTTERS.
DI-7A NO GUTTER IN ONE DIRECTION.
DI-7B GUTTER IN BOTH DIRECTIONS.
2. JOINTS BETWEEN GUTTERS AND CONCRETE COVER ARE TO BE DOWELED WITH #4 X 8" SMOOTH RODS @ APPROX. 12" C-C TO PREVENT SETTLEMENT. IN LIEU OF DOWELS A 2" X 4" NOTCH MAY BE PROVIDED.
SEE STANDARD T-DI-3, 4 ALTERNATE DESIGN.
3. VARIABLE 2:1 OR FLATTER.
4. DITCH GRADE MUST BE ADJUSTED TO MEET DIFFERENCE IN ELEVATION. SEE LONGITUDINAL SECTION.
5. IF DEPTH (D) BECOMES LESS THEN 4", LENGTH OF WINGS ARE TO BE EXTENDED AS DIRECTED BY THE ENGINEER.
6. CURTAIN WALL TO BE LOCATED AT THE END OF THE PAVED DITCH SECTIONS OF THE DI-7A & DI-7B THAT ARE NOT ABUTTED BY OTHER DRAINAGE.
7. IF NORMAL DITCH GRADE IS TOO FLAT TO ALLOW FOR ADJUSTED GRADE TO INLET, A SPECIAL GUTTER DETAIL WILL BE REQUIRED ON PLANS.



APPROXIMATE QUANTITY FOR ONE CURTAIN WALL, MEASURED FROM BOTTOM OF GUTTER	
CONCRETE CLASS A3	0.241 CU. YDS.

APPROXIMATE QUANTITIES			
CONCRETE CLASS A3	DI-7	DI-7A	DI-7B
(CU. YDS.)	NONE	1.211	2.148

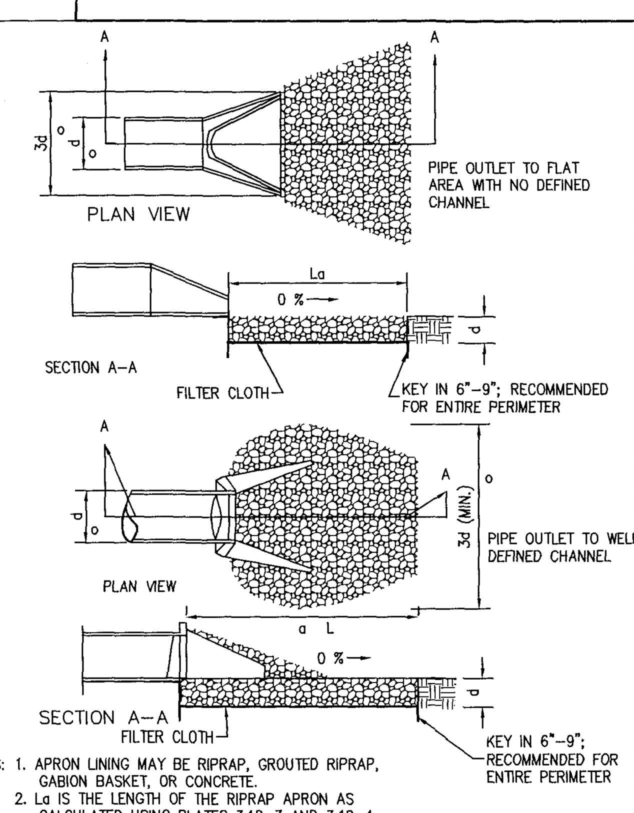
SHEET 2 OF 3

STANDARD MEDIAN DROP INLET
12" TO 42" PIPE

VIRGINIA DEPARTMENT OF TRANSPORTATION

REV. 7/05
104.23

SPECIFICATION REFERENCE
241
503



NOTES:
1. APRON LINING MAY BE RIPRAP, GROUTED RIPRAP, GABION BASKET, OR CONCRETE.
2. La IS THE LENGTH OF THE RIPRAP APRON AS CALCULATED USING PLATES 3.18-3 AND 3.18-4.
3. d = 1.5 TIMES THE MAXIMUM STONE DIAMETER, BUT NOT LESS THAN 6 INCHES.

(OP) SOURCE: VA. DSWC PLATE. 3.18-1

PIPE OUTLET CONDITIONS

N.T.S.

HRPDC/JCSA DETAIL REFERENCES

ITEM	DETAIL NO.
FIRE HYDRANT SETTING (TYPE I)	WD_06 *
TEMPORARY MANIFOLD FOR TEST AND CHLORINATION	WD_09 *
SANITARY SERVICE LATERAL CLEAN OUT FRAME & COVER	SS_11
SANITARY SERVICE LATERAL CLEAN OUT FRAME & COVER FOR HEAVY LOADS	SS_12
SANITARY SEWER SERVICE CONNECTIONS	SS_14
STANDARD VALVE BOX AND COVER	WS_01
VALVE SETTING DETAIL	WS_02
TYPICAL WATER METER INSTALLATION	W_13.0
PIPE BEDDING DETAIL	EW_01
JOINT RESTRAINT TABLE	JR-1 *
BITUMINOUS PAVEMENT PATCHING FOR UTILITY INSTALLATION WITHIN VDOT SECONDARY ROADS	PP-1

* SEE JCSA SPECIAL PROVISIONS TO REGIONAL STANDARDS (3rd EDITION; AUGUST 2005) (APPENDIX A TO JCSA STANDARDS AND SPECIFICATIONS)

	TOTAL LBS. PER ACRE
MINIMUM CARE LAWN	
COMMERCIAL OR RESIDENTIAL	
~~-KENTUCKY 31 OR TURF-TYPE TALL FESCUE~~	175–200 LBS.
OR	
-COMMON BERMUDA GRASS **	75 LBS.
HIGH-MAINTENANCE LAWN (crossed out)	
-KENTUCKY 31 OR TURF-TYPE TALL FESCUE	200–250 LBS.
OR	
-HYBRID BERMUDAGRASS (SEED)**	40 LBS. (UNHALLED)
OR	
-HYBRID BERMUDAGRASS (BY OTHER VEGETATIVE ESTABLISHMENT METHOD, SEE STD. & SPEC. 3.34)	30 LBS. (HULLED)

	TOTAL LBS. PER ACRE
GENERAL SLOPE (3:1 OR LESS)	
-KENTUCKY 31 FESCUE	128 LBS.
-RED TOP GRASS	2 LBS.
-SEASONAL NURSE CROP *	20 LBS.
	150 LBS.
LOW MAINTENANCE SLOPE (STEEPER THAN 3:1)	
-KENTUCKY 31 TALL FESCUE	93–108 LBS.
-COMMON BERMUDAGRASS **	0–15 LBS.
-RED TOP GRASS	2 LBS.
-SEASONAL NURSE CROP *	20 LBS.
-SERICEA LESPEDEZA **	20 LBS.
	150 LBS.

* USE SEASONAL CROP IN ACCORDANCE WITH SEEDING DATES AS STATED BELOW:
FEBRUARY, MARCH THROUGH APRIL....ANNUAL RYE
MAY 1ST THROUGH AUGUST....FOXTAIL MILLET
SEPTEMBER, OCTOBER THROUGH NOVEMBER 15TH....ANNUAL RYE
NOVEMBER 16TH THROUGH JANUARY....WINTER RYE

** MAY THROUGH OCTOBER, USE HULLED SEED. ALL OTHER SEEDING PERIODS, USE UNHULLED SEED. WEEPING LOVEGRASS MAY BE ADDED TO ANY SLOPE OR LOW-MAINTENANCE MIX DURING WARMER SEEDING PERIODS; ADD 10–20 LBS./ACRE IN MIXES.

(PS) VA DSWC PG. III – 304

SITE SPECIFIC SEEDING MIXTURES FOR COASTAL PLAIN AREA

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
4	03/12/10	REVISED PER JCC AND JCSA	RMK	REC
3	02/08/10	ISSUED FOR BUILDING PERMIT	REC	REC
2	04/01/09	REVISED PER COUNTY COMMENTS DATED 02/20/09	REC	REC
1	01/14/09	REVISED PER COUNTY COMMENTS DATED 12/03/08	VAB	VAB

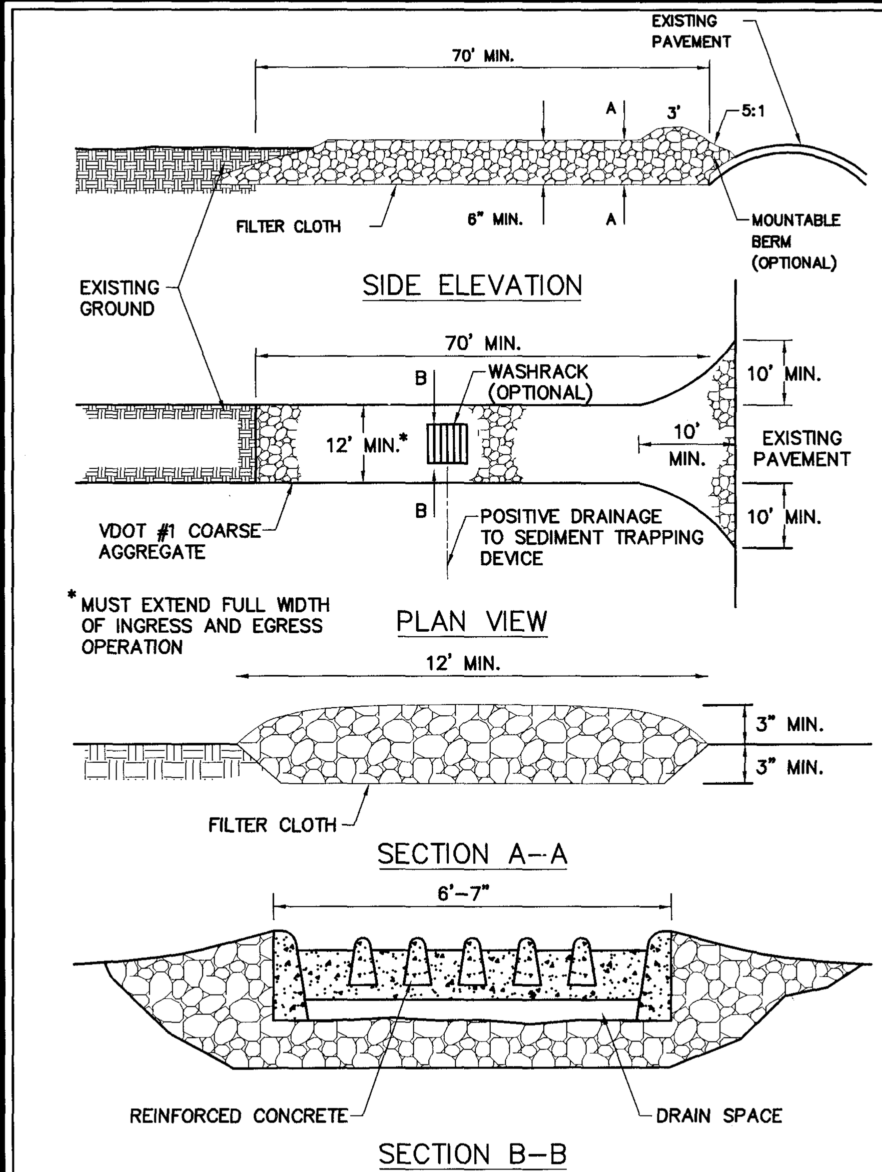
COMMONWEALTH OF VIRGINIA
ROBERT E. COSBY III
Lic. No. 35664
3/12/10
PROFESSIONAL ENGINEER

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

CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND • GLOUCESTER • FREDERICKSBURG

NOTES & DETAILS
ST. OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

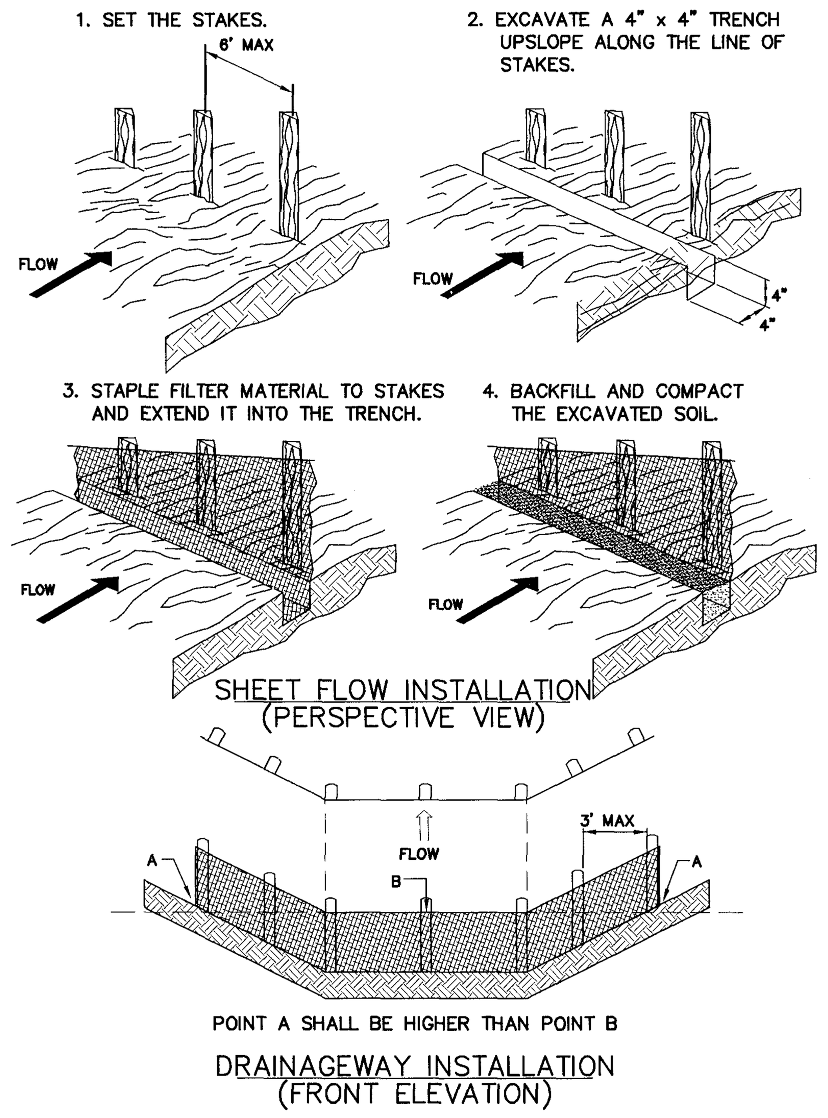
Designed	Drawn
VAB	BBS
Scale	Date
AS NOTED	11/3/08
Project No.	
9882–01	
Drawing No.	
15	



(CE) STONE CONSTRUCTION ENTRANCE

SOURCE: VA. DSWC
PLATE. 3.02–1

N.T.S.

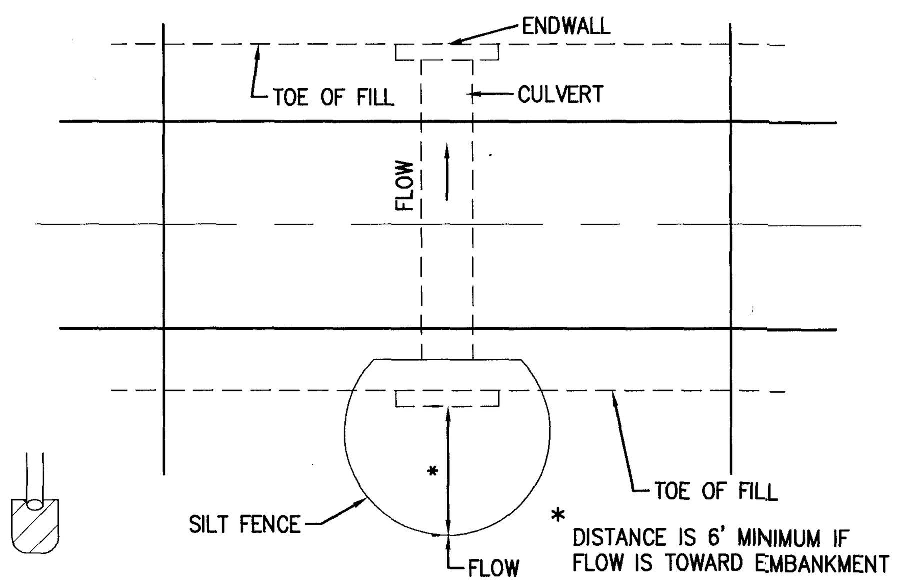


CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)

(SF)

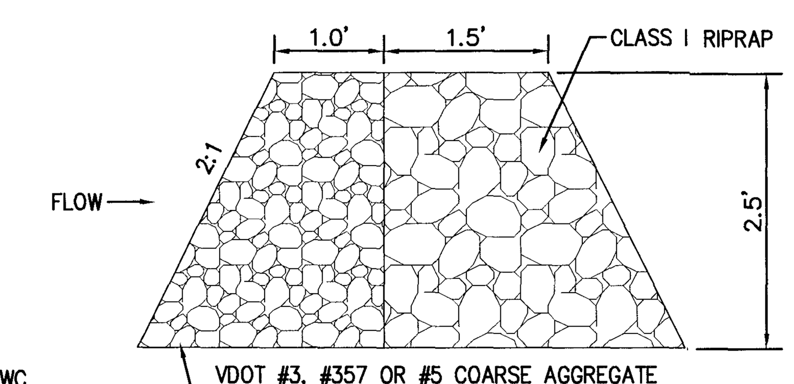
SOURCE: VA. DSWC
PLATE. 3.04–1

N.T.S.



(CIP) SILT FENCE CULVERT INLET PROTECTION

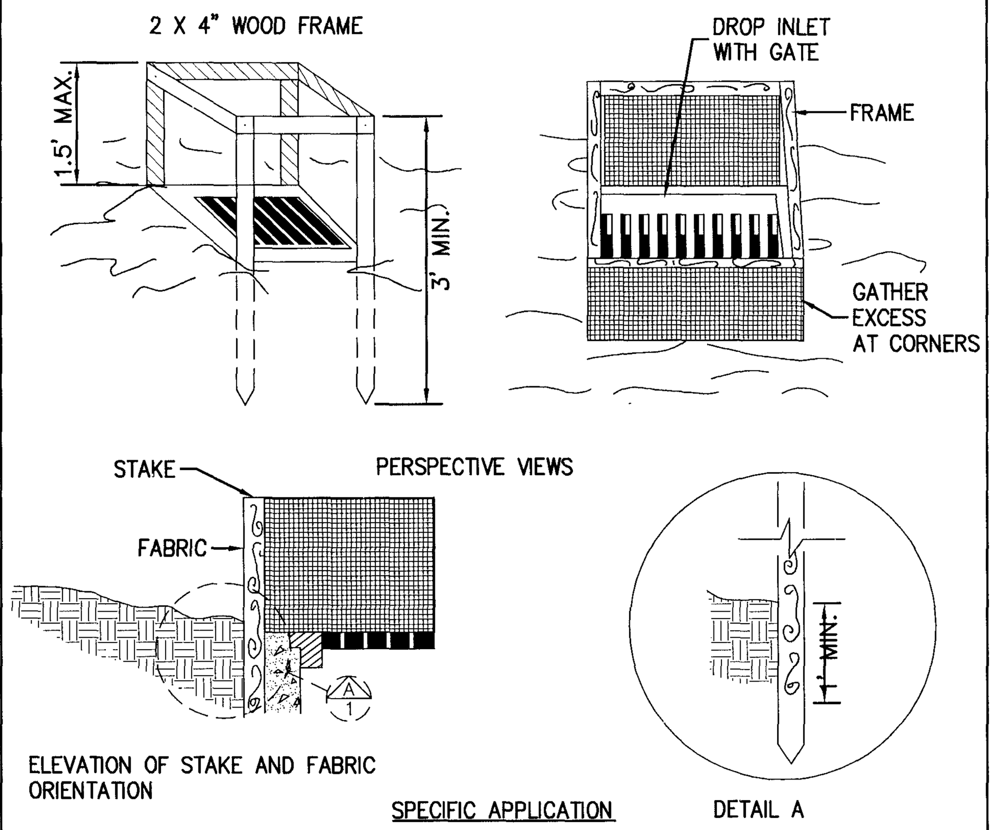
N.T.S.



SOURCE: VA. DSWC
PLATE. 3.08–1

WITH STONE COMBINATION

N.T.S.



SPECIFIC APPLICATION

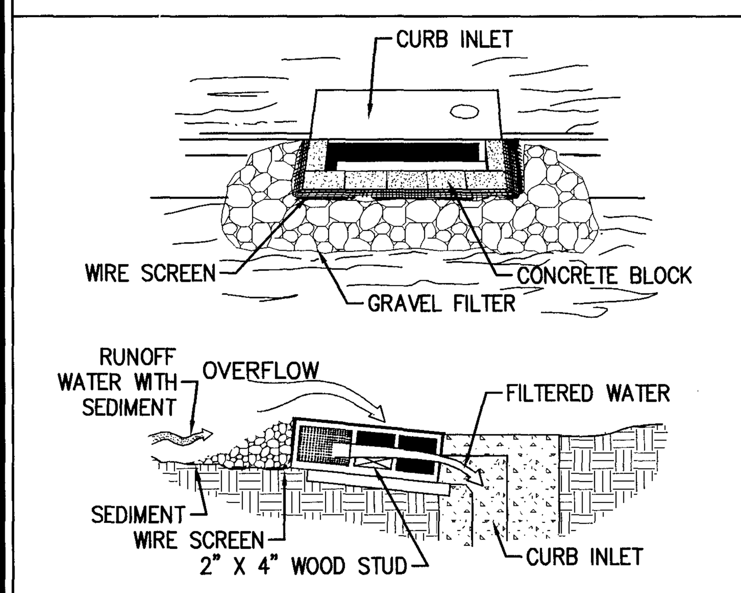
THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE THE INLET DRAINS A RELATIVELY FLAT AREA (SLOPE NO GREATER THAN 5%) WHERE THE INLET SHEET OR OVERLAND FLOWS (NOT EXCEEDING 1 C.F.S.) ARE TYPICAL. THE METHOD SHALL NOT APPLY TO INLETS RECEIVING CONCENTRATED FLOWS, SUCH AS IN STREET OR HIGHWAY MEDIANS.

(IP)

SOURCE: N.C. EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL PLATE. 3.07–1

SILT FENCE DROP INLET PROTECTION

N.T.S.



SPECIAL APPLICATION

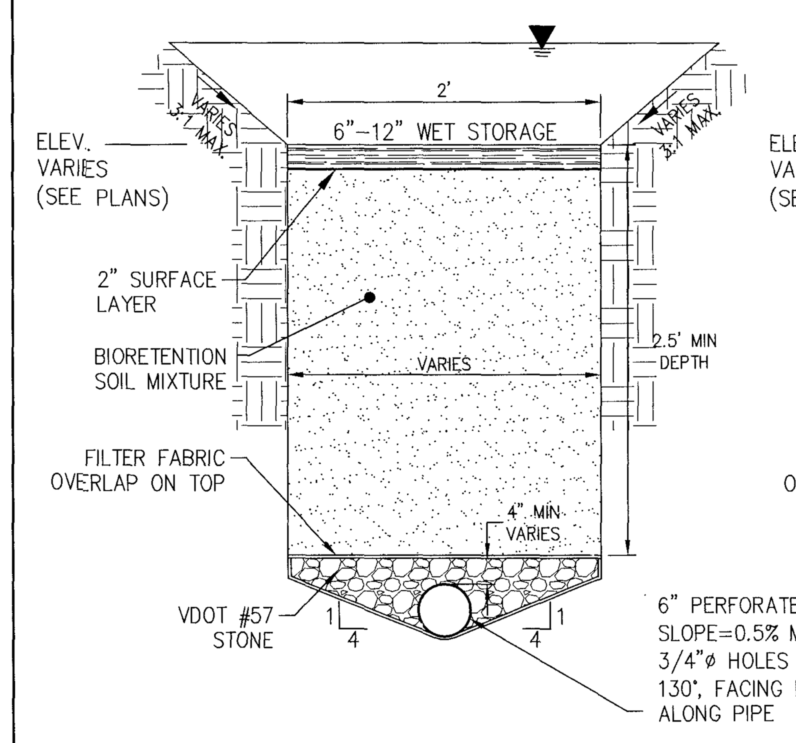
THIS METHOD OF INLET PROTECTION IS APPLICABLE AT CURB INLETS WHERE AN OVERFLOW CAPABILITY IS NECESSARY TO PREVENT EXCESSIVE PONDING IN FRONT OF THE STRUCTURE.

* GRAVEL SHALL BE VDOT #3, #357 OR #5 COARSE AGGREGATE

BLOCK & GRAVEL CURB INLET SEDIMENT FILTER (IP)

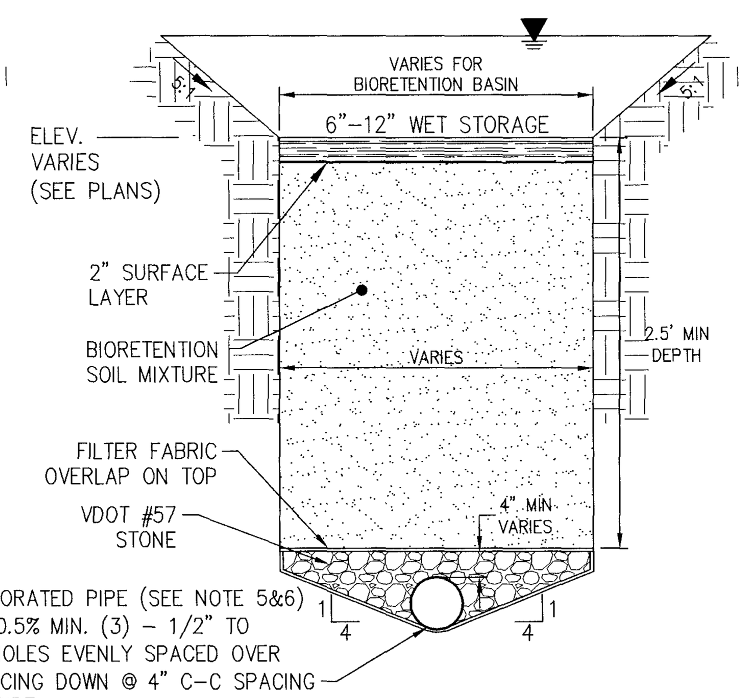
N.T.S.

SOURCE: VA. DSWC PLATE. 3.07–8



BIORETENTION AREAS - #4, 5, 5A, 8A

N.T.S.



BIORETENTION AREA - #8

N.T.S.

JAMES CITY COUNTY ENVIRONMENTAL DIVISION EROSION AND SEDIMENT CONTROL NOTES REVISED 7/6/01

THE PURPOSE OF THE EROSION CONTROL MEASURES SHOWN ON THESE PLANS SHALL BE TO PRECLUDE THE TRANSPORT OF ALL WATERBORNE SEDIMENTS RESULTING FROM CONSTRUCTION ACTIVITIES FROM ENTERING ONTO ADJACENT PROPERTIES OR STATE WATERS. IF FIELD INSPECTION REVEALS THE INADEQUACY OF THE PLAN TO CONFINE SEDIMENT TO THE PROJECT SITE, ALL APPROPRIATE MODIFICATIONS WILL BE MADE TO CORRECT ANY PLAN DEFICIENCIES. IN ADDITION TO THESE NOTES, ALL PROVISIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS SHALL APPLY TO THIS PROJECT.

1. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK, 3RD EDITION, 1992. THE CONTRACTOR SHALL BE THOROUGHLY FAMILIAR WITH ALL APPLICABLE MEASURES CONTAINED THEREIN THAT MAY BE PERTINENT TO THIS PROJECT, INCLUDING MINIMUM STANDARDS 1 THROUGH 19. IF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN IS FOUND TO BE INADEQUATE IN THE FIELD, THE MINIMUM STANDARDS WILL APPLY IN ADDITION TO THE PROVISIONS OF THE APPROVED PLAN.

2. AS A PREREQUISITE TO APPROVAL OF AN EROSION AND SEDIMENT CONTROL PLAN FOR LAND–DISTURBING ACTIVITIES, THE NAME OF A RESPONSIBLE LAND–DISTURBER SHALL BE PROVIDED. THE RESPONSIBLE LAND–DISTURBER SHALL BE AN INDIVIDUAL WHO HOLDS A VALID CERTIFICATE OF COMPETENCE ISSUED BY THE VIRGINIA DEPARTMENT OF CONSERVATION AND IS DEFINED AS THE PERSON IN CHARGE OF AND RESPONSIBLE FOR CARRYING OUT THE LAND–DISTURBING ACTIVITY. PERMITS OR PLANS WITHOUT THIS INFORMATION ARE DEEMED INCOMPLETE AND WILL NOT BE APPROVED UNTIL PROPER NOTIFICATION IS RECEIVED. ALSO, IF THE PERSON DESIGNATED AS RESPONSIBLE LAND–DISTURBER CHANGES BETWEEN THE TIME OF PLAN APPROVAL AND THE SCHEDULED PRECONSTRUCTION MEETING, THE ENVIRONMENTAL DIVISION SHALL BE INFORMED OF THE CHANGE, IN WRITING, 24–HOURS IN ADVANCE OF THE PRECONSTRUCTION MEETING.

3. A PRECONSTRUCTION MEETING SHALL BE HELD ON SITE BETWEEN THE COUNTY, THE DEVELOPER, THE PROJECT ENGINEER, THE RESPONSIBLE LAND–DISTURBER AND THE CONTRACTOR PRIOR TO ISSUANCE OF THE LAND DISTURBING PERMIT. THE CONTRACTOR SHALL SUBMIT A SEQUENCE OF CONSTRUCTION TO THE COUNTY FOR APPROVAL PRIOR TO THE PRECONSTRUCTION MEETING. THE DESIGNATED RESPONSIBLE LAND–DISTURBER IS REQUIRED TO ATTEND THE PRECONSTRUCTION MEETING FOR THE PROJECT.

4. ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS SHALL BE PROTECTED BY A TEMPORARY CONSTRUCTION ENTRANCE TO PREVENT TRACKING OF MUD ONTO PUBLIC RIGHT–OF–WAYS. AN ENTRANCE PERMIT FROM VDOT IS REQUIRED PRIOR TO ANY CONSTRUCTION ACTIVITIES WITHIN STATE RIGHT–OF–WAYS. WHERE SEDIMENT IS TRANSPORTED ONTO A PUBLIC ROAD SURFACE, THE ROAD SHALL BE THOROUGHLY CLEANED AT THE END OF EACH DAY (STD & SPEC 3.02).

5. SEDIMENT BASINS AND TRAPS (STD & SPEC 3.13 AND 3.14), PERIMETER DIKES (STD & SPEC 3.09 AND 3.12), SEDIMENT FILTER BARRIERS (STD. & AND SPEC 3.05) AND OTHER MEASURES INTENDED TO TRAP SEDIMENT ON–SITE MUST BE CONSTRUCTED AS A FIRST STEP IN GRADING AND MUST BE MADE FUNCTIONAL PRIOR TO ANY UPSLOPE LAND DISTURBANCE TAKING PLACE. EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS MUST BE SEEDED AND MULCHED IMMEDIATELY AFTER INSTALLATION. PERIODIC INSPECTIONS OF THE EROSION CONTROL MEASURES BY THE OWNER OR OWNER'S REPRESENTATIVE SHALL BE MADE TO ASSESS THEIR CONDITION. ANY NECESSARY MAINTENANCE OF THE MEASURES SHALL BE ACCOMPLISHED IMMEDIATELY AND SHALL INCLUDE THE REPAIR OF MEASURES DAMAGED BY ANY SUBCONTRACTOR INCLUDING THOSE OF THE PUBLIC UTILITY COMPANIES.

6. SURFACE FLOWS OVER CUT AND FILL SLOPES SHALL BE CONTROLLED BY EITHER REDIRECTING FLOWS FROM TRANSVERSING THE SLOPES OR BY INSTALLING MECHANICAL DEVICES TO SAFELY LOWER WATER DOWNSLOPE WITHOUT CAUSING EROSION. A TEMPORARY FILL DIVERSION (STD. & SPEC. 3.10) AND SLOPE DRAIN (STD. & SPEC. 3.15) SHALL BE INSTALLED PRIOR TO THE END OF EACH WORKING DAY.

7. SEDIMENT CONTROL MEASURES MAY REQUIRE MINOR FIELD ADJUSTMENTS AT TIME OF CONSTRUCTION TO INSURE THEIR INTENDED PURPOSE IS ACCOMPLISHED. ENVIRONMENTAL DIVISION APPROVAL WILL BE REQUIRED FOR OTHER DEVIATIONS FROM THE APPROVED PLAN.

8. THE CONTRACTOR SHALL PLACE SOIL STOCKPILES AT THE LOCATIONS SHOWN ON THE PLAN. SOIL STOCKPILES SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. OFF–SITE WASTE OR BORROW AREAS SHALL BE APPROVED BY THE ENVIRONMENTAL DIVISION PRIOR TO THE IMPORT OF ANY BORROW OR EXPORT OF ANY WASTE TO OR FROM THE PROJECT SITE.

9. THE CONTRACTOR SHALL COMPLETE DRAINAGE FACILITIES WITHIN 30 DAYS FOLLOWING COMPLETION OF ROUGH GRADING AT ANY POINT WITHIN THE PROJECT. THE INSTALLATION OF DRAINAGE FACILITIES SHALL TAKE PRECEDENCE OVER ALL UNDERGROUND UTILITIES. OUTFALL DITCHES FROM DRAINAGE STRUCTURES SHALL BE STABILIZED IMMEDIATELY AFTER CONSTRUCTION OF THE SAME (STD & SPEC 3.18). THIS INCLUDES INSTALLATION OF EROSION CONTROL STONE OR PAVED DITCHES WHERE REQUIRED. ANY DRAINAGE OUTFALLS REQUIRED FOR A STREET MUST BE COMPLETED BEFORE STREET GRADING OR UTILITY INSTALLATION BEGINS.

10. PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAT 30 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.

11. NO MORE THAN 300 FEET OF SANITARY SEWER, STORM DRAIN, WATER OR UNDERGROUND UTILITY LINES ARE TO BE OPEN AT ONE TIME. FOLLOWING INSTALLATION OF ANY PORTION OF THESE ITEMS, ALL DISTURBED AREAS ARE TO BE IMMEDIATELY STABILIZED (I.E., THE SAME DAY).

12. IF DISTURBED AREA STABILIZATION IS TO BE ACCOMPLISHED DURING THE MONTHS OF DECEMBER, JANUARY OR FEBRUARY, STABILIZATION SHALL CONSIST OF MULCHING (STD & SPEC 3.35). SEEDING WILL THEN TAKE PLACE AS SOON AS THE SEASON PERMITS.

13. THE TERM SEEDING, FINAL VEGETATIVE COVER OR STABILIZATION ON THIS PLAN SHALL MEAN THE SUCCESSFUL GERMINATION AND ESTABLISHMENT OF A STABLE GRASS COVER FROM A PROPERLY PREPARED SEEDBED CONTAINING THE SPECIFIED AMOUNTS OF SEED, LIME AND FERTILIZER (STD & SPEC 3.32). IRRIGATION SHALL BE REQUIRED AS NECESSARY TO ENSURE ESTABLISHMENT OF GRASS COVER.

14. ALL SLOPES STEEPER THAN 3H:1V SHALL REQUIRE THE USE OF EROSION CONTROL BLANKETS AND MATTINGS TO AID IN THE ESTABLISHMENT OF A VEGETATIVE COVER. INSTALLATION SHALL BE IN ACCORDANCE WITH STD. & SPEC. 3.35, MULCHING, STD. & SPEC. 3.36, SOIL STABILIZATION BLANKETS AND MATTING AND MANUFACTURER=S INSTRUCTIONS. NO SLOPES SHALL BE CREATED STEEPER THAN 2H:1V.

15. INLET PROTECTION (STD & SPEC 3.07 AND 3.08) SHALL BE PROVIDED FOR ALL STORM DRAIN AND CULVERT INLETS FOLLOWING CONSTRUCTION OF THE SAME.

16. TEMPORARY LINERS, SUCH AS POLYETHYLENE SHEETS, SHALL BE PROVIDED FOR ALL PAVED DITCHES UNTIL THE PERMANENT CONCRETE LINER IS INSTALLED.

17. PAVED DITCHES SHALL BE REQUIRED WHEREVER ACCELERATED EROSION IS EVIDENT. PARTICULAR ATTENTION SHALL BE PAID TO THOSE AREAS WHERE GRADES EXCEED 3 PERCENT.

18. TEMPORARY EROSION CONTROL MEASURES SUCH AS SILT FENCE ARE NOT TO BE REMOVED UNTIL ALL DISTURBED AREAS ARE STABILIZED. TRAPPED SEDIMENT SHALL BE SPREAD, SEEDED AND MULCHED. AFTER THE PROJECT AND STABILIZATION IS COMPLETE, ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS.

19. NO SEDIMENT TRAP OR SEDIMENT BASIN SHALL BE REMOVED UNTIL A) AT LEAST 75 PERCENT OF THE LOTS WITHIN THE DRAINAGE AREA TO THE TRAP OR BASIN HAVE BEEN SOLD TO A THIRD PARTY (UNRELATED TO THE DEVELOPER) FOR THE CONSTRUCTION OF HOMES AND/OR B) 60 PERCENT OF THE SINGLE FAMILY LOTS WITHIN THE DRAINAGE AREA TO THE TRAP OR BASIN HAVE BEEN COMPLETED AND THE SOIL STABILIZED. A BULK SALE OF THE LOTS TO ANOTHER BUILDER DOES NOT SATISFY THIS PROVISION. SEDIMENT TRAPS AND SEDIMENT BASINS SHALL NOT BE REMOVED WITHOUT THE EXPRESS AUTHORIZATION OF THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION.

20. RECORD DRAWINGS (AS–BUILTS) AND CONSTRUCTION CERTIFICATIONS ARE BOTH REQUIRED FOR NEWLY CONSTRUCTED OR MODIFIED STORMWATER MANAGEMENT/BMP FACILITIES. CERTIFICATION ACTIVITIES SHALL BE ADEQUATELY COORDINATED AND PERFORMED BEFORE, DURING AND FOLLOWING CONSTRUCTION IN ACCORDANCE WITH THE CURRENT VERSION OF THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION, STORMWATER MANAGEMENT/BMP FACILITIES, RECORD DRAWING AND CONSTRUCTION CERTIFICATION, STANDARD FORMS & INSTRUCTIONS.

21. DESIGN AND CONSTRUCTION OF PRIVATE–TYPE SITE DRAINAGE SYSTEMS OUTSIDE VDOT RIGHTS–OF–WAY SHALL BE PERFORMED IN ACCORDANCE WITH THE CURRENT VERSION OF THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION, STORMWATER DRAINAGE CONVEYANCE SYSTEMS (NON–BMP RELATED), GENERAL DESIGN AND CONSTRUCTION GUIDELINES.

MAINTENANCE PROGRAM & SCHEDULE

INSPECT AND REPAIR EROSION	MONTHLY
REMULCH ANY VOID AREAS	WHENEVER NEEDED
REMOVE PREVIOUS MULCH AND REAPPLY	EVERY 3 YEARS
REMOVAL AND REPLACEMENT OF ALL DISEASED VEGETATION CONSIDERED BEYOND TREATMENT	WHENEVER NEEDED
CHECK FOR ACCUMULATED SEDIMENTS	MONTHLY
INSPECT AND REMOVE ANY DEBRIS THAT MAY COLLECT AT THE DROP INLET AND WITHIN FACILITY	AFTER MAJOR STORM EVENTS/OR SEMI ANNUALLY
ADD FRESH LAYER OF MULCH	EVERY 6 MONTHS (SPRING & FALL)

SOIL SPECIFICATIONS

THE BIORETENTION AREAS SHALL CONTAIN A PLANTING SOIL MIXTURE OF 50% SAND, 30% LEAF COMPOST (FULLY COMPOSTED, NOT PARTIALLY ROTTED LEAVES), AND 20% TOPSOIL. TOPSOIL SHALL BE SANDY LOAM OR LOAMY SAND OF UNIFORM COMPOSITION, CONTAINING NO MORE THAN 5% CLAY, FREE OF STONES, STUMPS, ROOTS, OR SIMILAR OBJECTS GREATER THAN ONE INCH, BRUSH, OR ANY OTHER MATERIAL OR SUBSTANCE WHICH MAY BE HARMFUL TO PLANT GROWTH, OR A HINDRANCE TO PLANT GROWTH OR MAINTENANCE. THE TOPSOIL SHALL BE FREE OF PLANTS OR PLANT PARTS OF BERMUDA GRASS, QUACK GRASS, JOHNSON GRASS, MUGWORT, NUTSEDGE, POISON IVY, CANADIAN THISTLE, CATTAIL, OR OTHERS AS SPECIFIED. IT SHALL NOT CONTAIN TOXIC SUBSTANCES HARMFUL TO PLANT GROWTH.

THE TOP SOIL SHALL BE TESTED AND MEET THE MINIMUM CRITERIA SET FORTH IN SECTION 3.11–28 OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK (LATEST EDITION).

MULCH

A SURFACE LAYER OF SHREDDED HARDWOOD BARK SHALL BE PROVIDED ON TOP OF THE PLANTING SOIL. MULCH SHALL BE FREE OF WEED SEEDS, SOIL, ROOTS, OR ANY OTHER SUBSTANCE NOT CONSISTING OF EITHER BOLE OR BRANCH WOOD AND BARK. THE SHREDDED HARDWOOD BARK MULCH SHALL BE UNIFORMLY APPLIED.

STRAW MULCH SHALL NOT BE UTILIZED IN STABILIZATION OF BIORETENTION OR DRY SWALE AREA.

SEQUENCE OF CONSTRUCTION

1. CONTRACTOR SHALL FLAG LIMITS OF CLEARING.
2. CONTRACTOR SHALL SETUP AND ATTEND A PRECONSTRUCTION MEETING WITH JAMES CITY COUNTY ENVIRONMENTAL INSPECTOR.
3. THE CONTRACTOR SHALL INSTALL THE CONSTRUCTION ENTRANCE, TREE PROTECTION AND SILT FENCE.
4. CLEAR FOR ACCESS TO THE SEDIMENT BASIN, SEDIMENT BASIN AREA, AND TEMPORARY STOCKPILE AREA. ACCESS SHALL BE OBTAINED FROM ENTRANCE ON NORGE LANE.
5. REMOVE ROCK THAT IS LODGED IN THE EXISTING OUTFLOW PIPE FOR POND BY EXPOSING AREA OF PIPE APPROXIMATELY 48 FEET FROM OUTFALL INVERT. LOCATE ROCK AND CUT OUT SECTION OF PIPE WHERE THE ROCK IS LOCATED. THE PIPE UPSTREAM OF ROCK NEEDS TO BE EVALUATED. IF THE REST OF THE PIPE IS SATISFACTORY AND DOES NOT NEED TO BE REPLACED THEN REPLACE SECTION OF PIPE. PLACE SLEEVE OVER PIPE SECTION, AND PIPE SLEEVE SHALL BE WATERTIGHT TO PREVENT ANY EROSION.
6. CONSTRUCT THE SEDIMENT BASIN AND PROVIDE SILT FENCE AND TREE PROTECTION AS NECESSARY.
7. ONCE THE TEMPORARY SEDIMENT BASIN IS COMPLETE, FUNCTIONING, AND APPROVED BY COUNTY'S ENVIRONMENTAL INSPECTOR, CLEAR THE REMAINDER OF THE SITE AND REMOVE TOPSOIL AS NECESSARY, WITHIN THE LIMITS OF DISTURBANCE AS SHOWN ON PLANS.
8. BEGIN GRADING OPERATIONS FOR BUILDING AND PARKING LOT. BEGIN BUILDING CONSTRUCTION.
9. INSTALL STORM DRAINAGE AND ASSOCIATED EROSION AND SEDIMENT CONTROL MEASURES INCLUDING INLET PROTECTION.
10. BEFORE INSTALLING PROPOSED UTILITY CONNECTIONS, CONTRACTOR MUST LOCATE AND VERIFY INVERT OF SANITARY SEWER EFFLUENT PIPES FOR PARISH OFFICE AND EXISTING CHURCH BUILDINGS. IF INVERTS ARE LOWER THAN DESIGN CONTACT ENGINEER TO REDESIGN SYSTEM.
11. CONTACT JCSA TO ARRANGE SHUTOFF OF JCSA WATERMAIN TO MAKE CONNECTIONS DURING DAY TIME HOURS.
12. INSTALL UTILITIES IN RIGHT OF WAY WITH OPEN CUT WHILE MAINTAINING ONE LANE OPEN FOR TRAFFIC AT ALL TIMES. USE TRAFFIC CONTROL WITH WORK IN RIGHT OF WAY AND SEAL OPEN CUT AT THE END OF EACH WORK DAY
13. INSTALL GRAVITY SEWER AND WATER MAINS.
14. INSTALL BASE STONE AND PAVEMENT FOR PARKING LOT.
15. ESTABLISH VEGETATIVE COVER IN DENUDED AREAS.
16. INSTALL BIO–RETENTION BASINS, AFTER ALL UPLAND AREAS HAVE BEEN STABILIZED.
17. REMOVE SEDIMENT FROM BASIN IN ACCORDANCE WITH VESCH STANDARD AND SPECIFICATION 3.14, AS NECESSARY TO MAINTAIN ADEQUATE STORAGE, STOCKPILE MATERIAL ONSITE FOR DEWATERING AND SPREAD ON SITE.
18. THE TEMPORARY SEDIMENT BASIN SHOWN ON THIS SITE PLAN, SHALL BE CONVERTED TO THE "WET" BMP AS NOTED ON SHEET 7 AFTER DISTURBED AREAS ARE STABILIZED, AND CONSENT IS OBTAINED FROM JAMES CITY COUNTY ENVIRONMENTAL DIVISION.

GENERAL NOTES:

1. DUST CONTROL MEASURES IN ACCORDANCE WITH THE VESCH SHALL BE IMPLEMENTED AS NECESSARY.
2. THERE ARE NO OFF–SITE LAND DISTURBING AREAS PROPOSED WITH THIS PROJECT.
3. ALL EXCESS UNSUITABLE MATERIAL AND TOPSOIL SHALL BE REMOVED FROM PROJECT AREA AND DISPOSED OF OFF SITE.
4. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED DURING CONSTRUCTION PROGRESS AS DIRECTED BY THE ENGINEER OWNER, OR ENVIRONMENTAL DIVISION INSPECTOR TO MINIMIZE POTENTIAL FOR SEDIMENT TO LEAVE THE SITE.

E & S NARRATIVE

PROJECT DESCRIPTION
THIS PROJECT IS A COMMERCIAL DEVELOPMENT OF A BUILDING AND PARKING LOT EXPANSION FOR ST. OLAF CATHOLIC CHURCH LOCATED ON NORGE LANE AND RICHMOND ROAD WHICH CONSISTS OF APPROXIMATELY 9.38 ACRES IN JAMES CITY COUNTY.

EXISTING SITE CONDITIONS

THIS SITE IS CURRENTLY OCCUPIED BY ST. OLAF CATHOLIC CHURCH WHICH CONSISTS OF TWO EXISTING BUILDINGS AND PARKING LOT WITH THE REST OF THE SITE BEING GRASS THAT IS MOWED REGULARLY AND WOODS. STORMWATER IS CURRENTLY COLLECTED IN AN EXISTING STORM SYSTEM AND CARRIED TO THE EXISTING POND ON SITE.

ADJACENT PROPERTIES

THE PROPOSED SITE IS SURROUNDED TO THE NORTHEAST BY PEACH STREET AND CSX RAILROAD RIGHT–OF–WAY, TO THE SOUTHEAST AND SOUTH BY COMMERCIAL DEVELOPMENTS, TO THE NORTHWEST NORGE LANE AND TO THE SOUTHWEST BY RICHMOND ROAD.

OFF–SITE AREAS
NO OFFSITE AREAS ARE PROPOSED WITH THIS PROJECT. ALL TEMPORARY SOILS STOCKPILES WILL RESIDE WITHIN THE PROJECT LIMITS. EXCESS TOPSOIL AND FILL MATERIAL SHALL BE REMOVED FROM THE SITE AND DISPOSED OF PROPERLY.

SOILS DESCRIPTION
THE SOIL CONSERVATION SERVICE HAS IDENTIFIED THE PRESENCE OF THE SOILS TYPES AS INDICATED ON MAP NUMBER 9 OF THE SOIL SURVEY OF JAMES CITY AND YORK COUNTIES AND THE CITY OF WILLIAMSBURG VIRGINIA. SEE THE ENVIRONMENTAL INVENTORY SHEET (SHEET 2) FOR SOIL TYPES AND LOCATIONS.

CRITICAL AREAS
SEE THE ENVIRONMENTAL INVENTORY FOR THE LOCATION OF WETLANDS AND 25% SLOPES. (NOTE NO CRITICAL AREAS ARE NOTED IN PROJECT LIMITS).

EROSION AND SEDIMENT CONTROL MEASURES
UNLESS OTHERWISE INDICATED, ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH). THE MINIMUM STANDARDS OF THE VESCH SHALL BE ADHERED TO UNLESS OTHERWISE WAIVED AND APPROVED BY THE ON–SITE E&S CONTROL INSPECTOR. THESE MEASURES SHALL INCLUDE AND NOT TO BE LIMITED TO:

3.02 CONSTRUCTION ENTRANCE
A CONSTRUCTION ENTRANCE WILL BE INSTALLED TO REDUCE THE AMOUNT OF MUD TRANSPORTED ONTO PAVED ROADS BY VEHICLES AND/OR RUNOFF.

3.05 SILT FENCE
SILT FENCE WILL BE PLACED IN APPROPRIATE AREAS AS INDICATED ON THE PLANS TO PREVENT SILT LADEN RUNOFF FROM LEAVING THE SITE.

3.07 INLET PROTECTION
INLET PROTECTION SHALL BE USED TO REDUCE THE SEDIMENT ENTER THE STORM SYSTEM.

3.08 CULVERT INLET PROTECTION
INLET PROTECTION SHALL BE USED TO REDUCE THE SEDIMENT ENTERING THE STORM SYSTEM.

3.18 OUTLET PROTECTION
OUTLET PROTECTION SHALL BE USED TO PREVENT SCOUR AT STORMWATER OUTLET, TO PROTECT THE OUTLET STRUCTURE AND TO MINIMIZE THE POTENTIAL FOR DOWNSTREAM EROSION.

3.32 PERMANENT SEEDING
PERMANENT SEEDING MEASURES SHALL BE APPLIED IN AREAS INDICATED ON PLANS TO REDUCE EROSION OF AREAS THAT WILL NOT BE BROUGHT TO FINAL GRADE FOR MORE THAN 30 DAYS.

3.38 TREE PROTECTION
TREE PROTECTION SHALL BE UTILIZED ADJACENT TO EXISTING WOODLAND AREAS THAT ARE TO REMAIN UNDISTURBED.

MANAGEMENT STRATEGIES

1. CONSTRUCTION WILL BE SEQUENCED SO THAT GRADING OPERATIONS CAN BEGIN AND END AS QUICKLY AS POSSIBLE.
2. PERMANENT SEEDING OR OTHER STABILIZATION WILL FOLLOW IMMEDIATELY AFTER GRADING.
3. AREAS, WHICH ARE NOT TO BE DISTURBED, WILL BE CLEARLY MARKED BY FLAGS, SIGNS, ETC.
4. THE CONTRACTOR SHALL HAVE A CERTIFIED RESPONSIBLE LAND DISTURBER AND SHALL BE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL PRACTICES.
5. AFTER ACHIEVING ADEQUATE STABILIZATION, THE TEMPORARY E&S CONTROLS WILL BE CLEARED UP AND REMOVED.

PERMANENT STABILIZATION
ALL AREAS DISTURBED BY CONSTRUCTION SHALL BE STABILIZED WITH PERMANENT SEEDING IMMEDIATELY FOLLOWING FINISH GRADING.

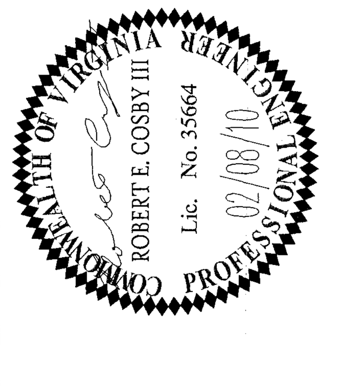
MAINTENANCE
IN GENERAL, ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CHECKED DAILY AND AFTER EACH SIGNIFICANT RAINFALL. THE FOLLOWING ITEMS WILL BE CHECKED IN PARTICULAR:
1. ALL INLET PROTECTION WILL BE CHECKED REGULARLY FOR SEDIMENT BUILDUP, WHICH COULD PREVENT POSITIVE DRAINAGE. IF THE INLET PROTECTION IS CLOGGED BY SEDIMENT, IT SHALL BE REMOVED AND CLEANED OR REPLACED.
2. THE SILT FENCE BARRIER WILL BE CHECKED REGULARLY FOR UNDERMINING OR DETERIORATION OF THE FABRIC. SEDIMENT SHALL BE REMOVED WHEN THE LEVEL OF SEDIMENT DEPOSITION REACHES HALF WAY TO THE TOP OF THE BARRIER.
3. THE SEEDED AREAS WILL BE CHECKED REGULARLY TO ENSURE THAT A GOOD STAND IS MAINTAINED. AREAS SHOULD BE FERTILIZED AND RE–SEEDED AS NEEDED.

PLANT SUBSTITUTIONS, SPECIES, SIZE OR ROOT, WILL REQUIRE WRITTEN REQUEST TO AND WRITTEN APPROVAL BY THE ENVIRONMENTAL DIVISION

NOTES

1. WATER PLANT MATERIAL EACH DAY FOR FOURTEEN CONSECUTIVE DAYS AFTER CONSTRUCTION.
2. CONTRACTOR SHALL REFER TO COUNTY BMP MANUAL (GROUP D, PGS. 48–50) AND MINIMUM STANDARD 3.11 AND 3.13 OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK FOR METHODS/MATERIAL ASSOCIATED WITH CONSTRUCTION OF THE BIORETENTION CELLS.
3. VDOT SHALL BE SAVED HARMLESS FROM THE MAINTENANCE RESPONSIBILITY OR LIABILITY ASSOCIATED WITH ANY FAILURE OF THE STORM WATER MANAGEMENT FACILITY AND ITS STRUCTURES.
4. A PROFESSIONAL ENGINEER WHO HAS INSPECTED THE BASIN DURING CONSTRUCTION SHALL CERTIFY THE CONSTRUCTION OF THE BIORETENTION BASIN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE BIORETENTION BASIN CONSTRUCTION SCHEDULE WITH THE ENGINEER TO ENSURE ON SITE MONITORING.
5. 6" PERFORATED PIPE SHALL BE RIGID SMOOTH WALL PE IN ACCORDANCE WITH ASTMF810 OR 6" SCH40 PVC OR EQUIVALENT APPROVED BY JAMES CITY COUNTY ENVIRONMENTAL DIVISION.
6. CORE DRILL AND PROVIDE NEOPRENE SEAL (KOR–N–SEAL) OR EQUAL WHERE PLASTIC PIPE CONNECTS TO STORM STRUCTURE.

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
3	02/08/10	ISSUED FOR BUILDING PERMIT	REC	REC
2	04/01/09	REVISED PER COUNTY COMMENTS DATED 02/20/09	REC	REC
1	01/14/09	REVISED PER COUNTY COMMENTS DATED 12/03/08	VAB	VAB



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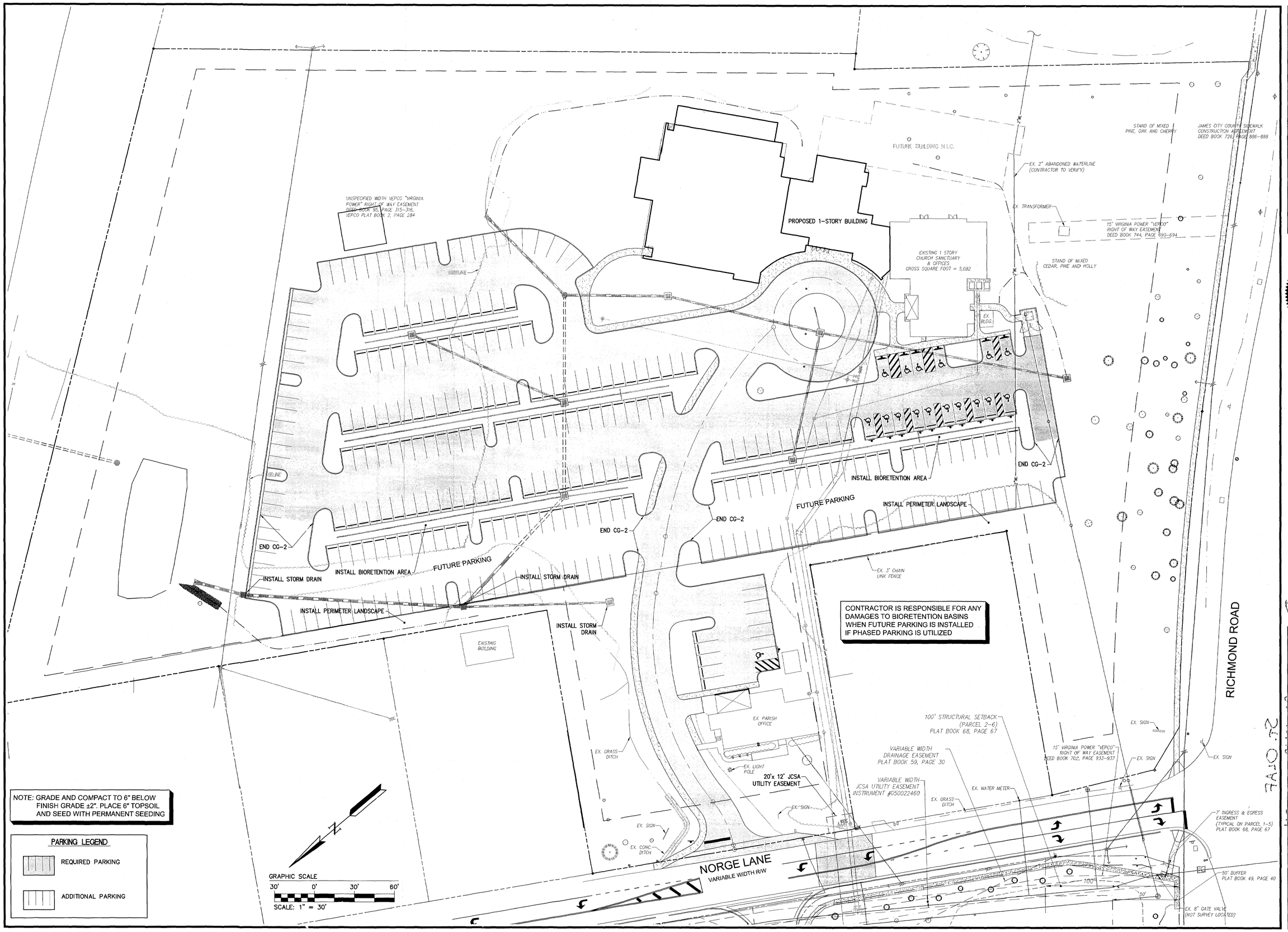
NOTES & DETAILS
ST. OLAF CATHOLIC CHURCH
104 NORGE LANE, WILLIAMSBURG
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
VAB	BBS
Scale	Date
N.T.S.	11/3/08

Project No. 9882–01

Drawing No. 16



NOTE: GRADE AND COMPACT TO 6" BELOW FINISH GRADE ±2". PLACE 6" TOPSOIL AND SEED WITH PERMANENT SEEDING

PARKING LEGEND

- REQUIRED PARKING
- ADDITIONAL PARKING

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
3	02/08/10	ISSUED FOR BUILDING PERMIT	REC.	REC.
2	04/01/09	REVISED PER COUNTY COMMENTS DATED 02/20/09	REC.	REC.
1	01/14/09	REVISED PER COUNTY COMMENTS DATED 12/03/08	VAB	VAB

COMMONWEALTH OF VIRGINIA
ROBERT E. COSBY III
Lic. No. 33664
02/08/10
PROFESSIONAL ENGINEER

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ST. OLAF CATHOLIC CHURCH

104 NORGE LANE, WILLIAMSBURG

VIRGINIA

8 PHASE PARKING PLAN

STONEHOUSE DISTRICT — JAMES CITY COUNTY

Designed	Drawn
VAB	BBS
Scale	Date
1"=30'	11/3/08

Project No. 9882-01

Drawing No. 17

ST. OLAF
CATHOLIC CHURCH
SP-122-08

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