SHOPPING CENTER PARKING TABULATION

PARKING REQUIRED: 770 SPACES
± 131,736 SF OF GFA OF SHOPPING CENTER USES
± 131,736 SF OF GFA @ 4.0 SPACES/1,000 SF OF GFA (SHOPPING CENTER RATE)
= 527 SPACES
± 19,890 SF OF GFA OF EATING ESTABLISHMENTS
663 SEATS + 54 EMPLOYEES @ 1 SPACE/4 SEATS + 1 SPACE/2 EMPLOYEES
= 193 SPACES
± 13,942 SF OF GFA OF OFFICE USES
± 13,942 SF OF GFA @ 3.6 SPACES/1,000 SF OF GFA (OFFICE USE)
= 50 SPACES

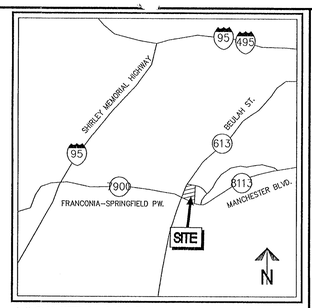
EXISTING PARKING ON-SITE: 885 SPACES
TOTAL PARKING PROVIDED ON-SITE THIS PLAN: 857 SPACES

ZONING ORDINANCE TABULATION:

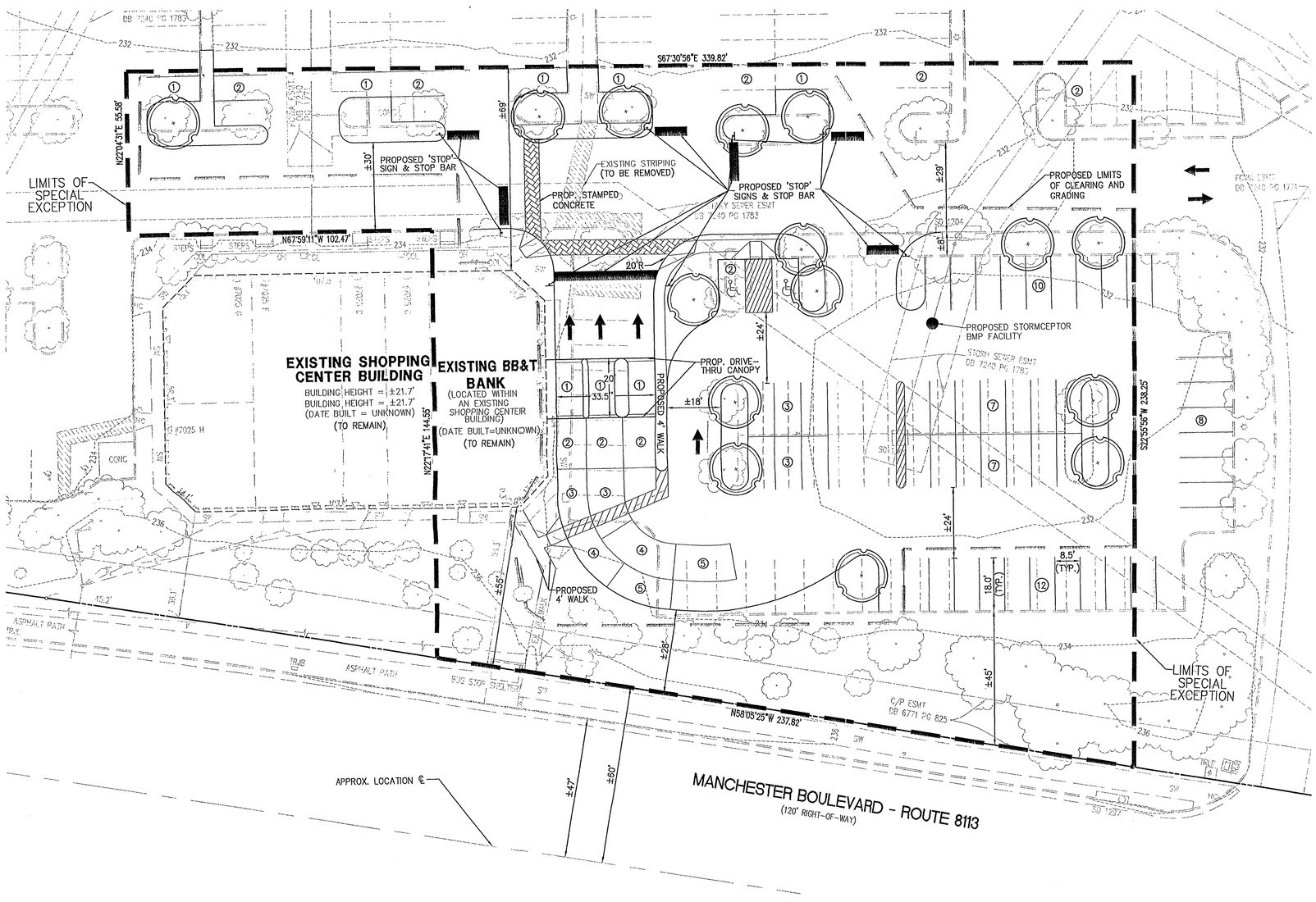
(BASED ON LIMITS OF SPECIAL EXCEPTION)

C-8 ZONING REQUIREMENTS:

	MINIMUM REQUIRED UNLESS SPECIFIED	PROVIDED
LOT AREA:	40,000 SF	±57,314 SF
LOT WIDTH:	200 FT	± 200 FT
MAXIMUM BUILDING HEIGHT:	40 FT	± 22 FT
YARD REQUIREMENTS:		
FRONT	45° ABP; 40'	± 55 FT
SIDE	NONE	N/A
REAR	20 FT	± 69 FT
MAXIMUM FAR:	0.50	± 0.05
OPEN SPACE:	15%	± 20%
INTERIOR PARKING LOT LANDSCAPING:	5%	± 5%
TREE COVER:	10%	± 10%



VICINITY MAP SCALE: 1"=2000'



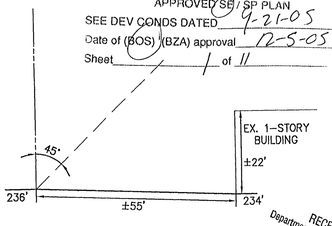
NOTES:

1. OWNER/APPLICANT:
   USRP I LLC, SUITE 400, 4350 EAST WEST HY., BETHESDA, MD 20814
   BRANCH BANKING & TRUST COMPANY OF VIRGINIA, 6400 ARLINGTON BOULEVARD, FALLS CHURCH, VIRGINIA 22042
2. PROPERTY IS DELINEATED ON ASSESSMENT MAP NUMBER 091-1-12-N AND IS ZONED C-8 (HIGHWAY COMMERCIAL).
3. THIS SPECIAL EXCEPTION APPLICATION IS FOR A CATEGORY 5 SPECIAL EXCEPTION TO ALLOW FOR THE ADDITION OF A DRIVE-THRU TO THE EXISTING BANK BUILDING.
4. THE TOTAL SITE AREA IS 702,684 SF OR 16.1314 AC. THE SITE AREA FOR THE LIMITS OF SPECIAL EXCEPTION IS ±57,314 SF OR ±1.32 AC.
5. THIS SPECIAL EXCEPTION IS FOR A PORTION OF 091-1-12-N CONSISTING OF ±57,314 SF OR ±1.32 AC. FLOOR AREA RATIO FOR THE PROPOSED AND EXISTING BUILDINGS ON THE ENTIRE SITE IS 0.229. THE FLOOR AREA RATIO FOR THE EXISTING BUILDING IN THE LIMITS OF SPECIAL EXCEPTION IS ±0.05.
6. TO THE BEST OF OUR KNOWLEDGE, ALL UTILITY EASEMENTS HAVING A WIDTH OF 25 FEET OR MORE ON THIS PROPERTY ARE SHOWN.
7. THIS PLAT DOES NOT SHOW ALL COVENANTS, EASEMENTS, RESTRICTIONS, OR DEDICATIONS WHICH MAY EXIST IN THE CHAIN OF TITLE.
8. THE PROPOSED DEVELOPMENT CONFORMS TO ALL APPLICABLE FAIRFAX COUNTY ORDINANCES, REGULATIONS, AND ADOPTED STANDARDS.
9. EXISTING CONDITIONS, BOUNDARY, AND TOPOGRAPHY INFORMATION TAKEN FROM A FIELD SURVEY BY THIS FIRM DATED SEPTEMBER, 2003. CONTOUR INTERVAL IS 2 FEET.
10. PROPERTY IS SERVED BY PUBLIC SEWER AND WATER.
11. NO RESOURCE PROTECTION AREAS OR ENVIRONMENTAL QUALITY CORRIDORS, AS DEFINED, ARE LOCATED ON THIS PROPERTY.
12. NO GRAVES OR OTHER EVIDENCE OF BURIAL PLACES ARE FOUND ON THIS PROPERTY.
13. PROPOSED CHANGES TO THE SITE WILL NOT RESULT IN AN INCREASE IN IMPERVIOUS AREA, THEREFORE, NO NEW DETENTION FACILITIES WILL BE PROVIDED AS PART OF THIS DEVELOPMENT.
14. THIS PLAN IS CONCEPTUAL AND IS INTENDED TO BE USED IN CONJUNCTION WITH THE LAND USE APPROVAL PROCESS ONLY. IT IS NOT AN ENGINEERING CONSTRUCTION DRAWING, AND MINOR DEVIATIONS AND ADJUSTMENTS MAY BE REQUIRED.
15. A REVIEW OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY'S FLOOD INSURANCE RATE MAP, COMMUNITY PANEL NUMBER 515525 0150D, REVISED MARCH 5, 1990, SHOWS THE PROPERTY TO LIE IN FLOOD PLAIN X, "AREAS DETERMINED TO BE OUTSIDE THE 500-YEAR FLOODPLAIN".
16. THERE ARE NO SIGNS LOCATED WITHIN THE PROPOSED LIMITS OF SPECIAL EXCEPTION. THE PYLON "FESTIVAL AT MANCHESTER LAKES" SIGN IS LOCATED ON THE CORNER OF MANCHESTER BLVD. AND BEULAH STREET.

LANDSCAPING LEGEND

PROPOSED DECIDUOUS TREES (MIN. 2 1/2" CALIPER)

Application No. SE 2005-LE-015 Staff C. Lewis
APPROVED SE / SP PLAN
SEE DEV CONDS DATED 9-21-05
Date of (BOS) (BZA) approval 12-5-05
Sheet 1 of 11



BULK ANGLE PLANE DETAIL
1"= 20'

RECEIVED
Department of Planning & Zoning
SEP 16 2005
Zoning Evaluation Division

SHEET INDEX:

1. SPECIAL EXCEPTION PLAN
1A. SITE CONTEXT EXHIBIT
2. EXISTING VEGETATION MAP
3. PRELIMINARY STORMWATER MANAGEMENT PLAN
4. OUTFALL ANALYSIS
5. OUTFALL ANALYSIS CHANNEL SECTIONS
6. OUTFALL ANALYSIS COMPUTATIONS
7. LAKE "A" SITE AND GRADING PLAN
8. LAKE "A" SORM HYDROGRAPHS AND ROUTINGS
9. LAKE "A" OUTLET STRUCTURE DETAIL, PROFILES AND HGL
10. LAKE "A" LANDSCAPE PLAN

0 10 20
(IN FEET)
1 INCH = 20'

WALTER L. PHILLIPS
INCORPORATED
CIVIL ENGINEERS LAND SURVEYORS PLANNERS LANDSCAPE ARCHITECTS
207 PARK AVENUE FALLS CHURCH, VIRGINIA 22046 WWW.WLPINC.COM
(703) 532-6163 FAX (703) 533-1301

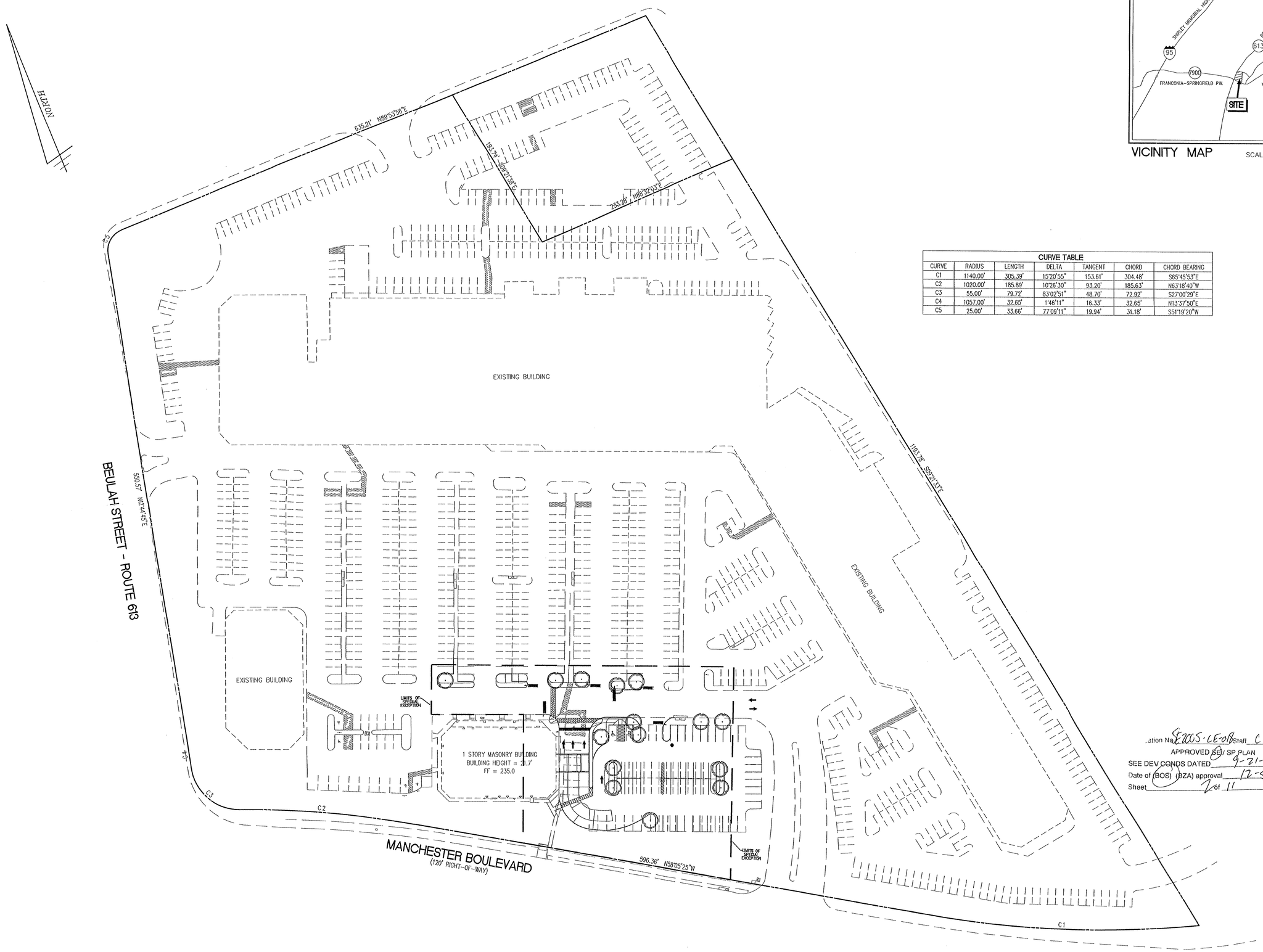
DATE: 1/19/05 REV. 4/28/05
REV. 4/5/05, REV. 6/10/05, REV. 9/16/05
DRAWN: JLH
SCALE: 1" = 20'

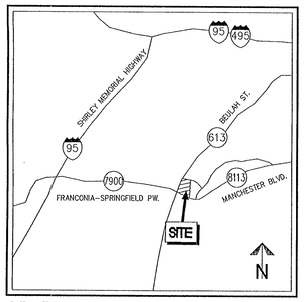
COMMONWEALTH OF VIRGINIA
TERRY ANDERSON No. 0806
9-16-05
PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE	REV. BY	APPROVED	DATE
REVISION APPROVED BY					

SPECIAL EXCEPTION PLAN

BB&T BANK
FESTIVAL AT MANCHESTER LAKES
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA





VICINITY MAP SCALE: 1"=2000'

CURVE TABLE

CURVE	RADIUS	LENGTH	DELTA	TANGENT	CHORD	CHORD BEARING
C1	1140.00'	305.39'	15°20'55"	153.61'	304.48'	S65°45'53"E
C2	1020.00'	185.89'	10°26'30"	93.20'	185.63'	N63°18'40"W
C3	55.00'	79.72'	83°02'51"	48.70'	72.92'	S27°00'29"E
C4	1057.00'	32.65'	1°46'11"	16.33'	32.65'	N13°37'50"E
C5	25.00'	33.66'	77°09'11"	19.94'	31.18'	S51°19'20"W

...ation No. SE2005-LE-018 Staff C. Lewis
APPROVED SE / SP PLAN
SEE DEV CONDS DATED 9-21-05
Date of (BOS) (BZA) approval 12-5-05
Sheet 2 of 11

SITE CONTEXT PLAN

BB&T BANK
FESTIVAL AT MANCHESTER LAKES
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

WALTER L. PHILLIPS
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CIVIL ENGINEERS LAND SURVEYORS PLANNERS LANDSCAPE ARCHITECTS
207 PARK AVENUE FALLS CHURCH, VIRGINIA 22046
(703) 532-6163 FAX (703) 533-1301 WWW.WLPINC.COM

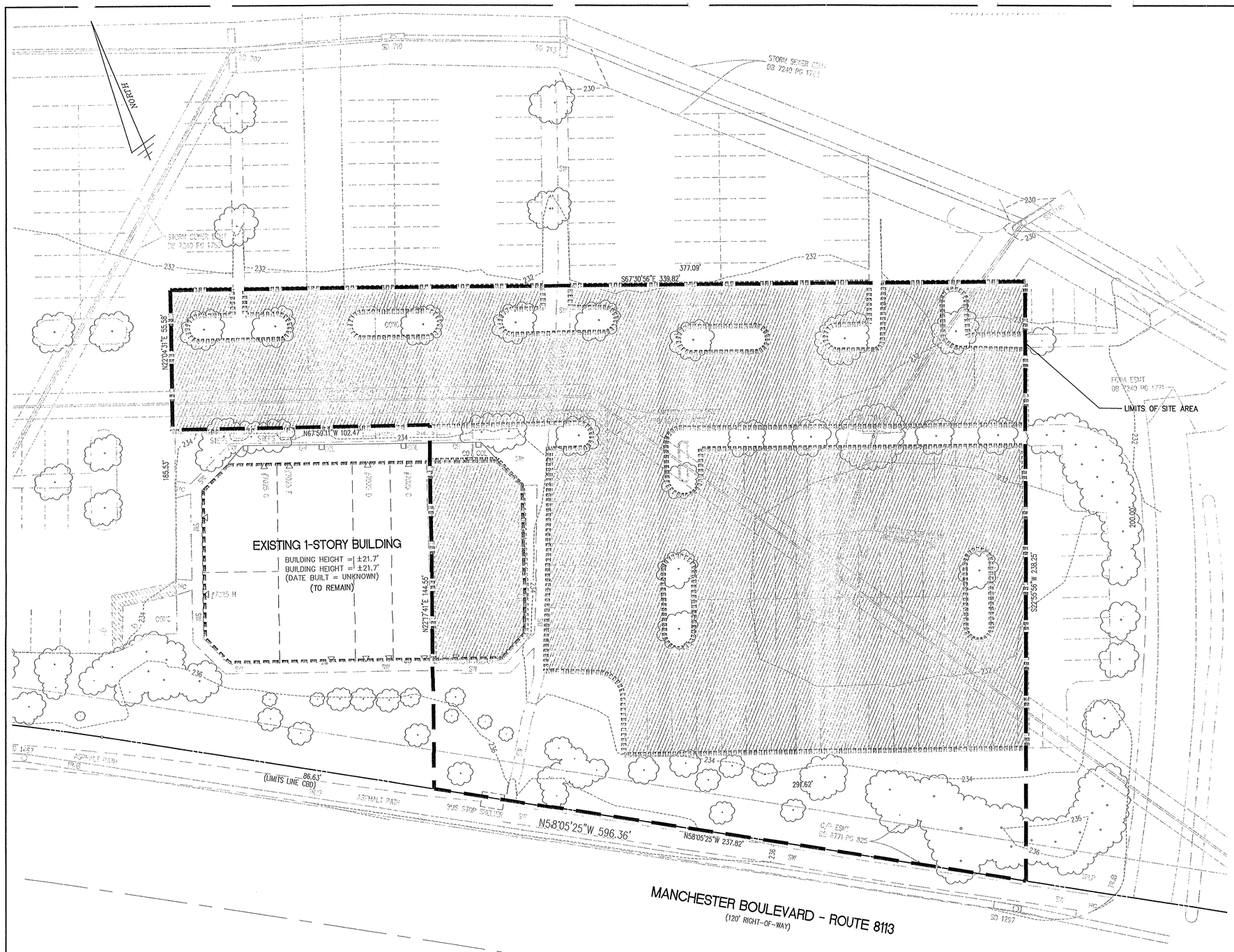
SCALE: 1" = 50' DATE: 9/16/05 DRAWN: TT

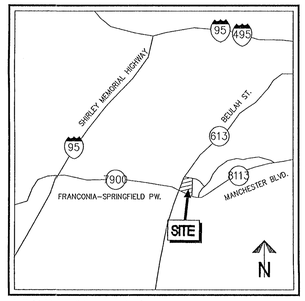
COMMONWEALTH OF VIRGINIA
TERRACE ANDERSON
No. 9909
9-16-05
PROFESSIONAL ENGINEER

REVISION APPROVED BY

NO.	DESCRIPTION	DATE	REV. BY	APPROVED	DATE

File No. FF-9 Tax Map No. 91-1 Job No. 00- Cadd Dwg. File: 001040VA2 Xref:





VICINITY MAP SCALE: 1"=2000'

LEGEND

AREA A

AREA B

EXISTING VEGETATION MAP INFORMATION

	COVER TYPE	PRIMARY SPECIES	SUCCESSIONAL STAGE	CONDITION*	ACREAGE	COMMENTS
A	DEVELOPED	N/A	N/A	N/A	42,727 SF OR .98 AC	
B	MAINTAINED GRASSLAND	PLATANUS X ACERIFOLIA, PINUS NIGRA, PRUNUS X YEDOENSIS	SEE COMMENTS	FAIR-GOOD	14,587 SF OR .34 AC	TREES AND EVERGREENS ARE 12" CALIPER OR LESS
TOTAL ACREAGE:					57,314 SF OR 1.32 AC	

*CONDITION DESCRIPTIONS:

COVER TYPE A: PAVED PARKING LOT AREAS, EXISTING BUILDINGS, & CONCRETE

COVER TYPE B: LAWN AND LANDSCAPED AREAS

0 10 20

(IN FEET)
1 INCH = 20'

ation No. SE2005-LE-018 Staff C. Lewis
APPROVED SE/ SP PLAN
SEE DEV CONDS DATED 9-21-05
Date of (BOS) (BZA) approval 12-5-05
Sheet 3 of 11

File No. FF-9 Tax Map No. 91-1 Job No. 00 Cadd Dwg. File: 00104EVMI Xref:

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(703) 532-6163 FAX (703) 533-1301 WWW.WLPINC.COM

DATE: 1/19/05
REV. 04/25/05, REV. 06/10/05, REV. 9/19/05
DRAWN: KLM
SCALE: 1" = 20'

COMMONWEALTH OF VIRGINIA
TERRY L. ANDERSON
No. 9909
9-19-05
PROFESSIONAL ENGINEER

REVISION APPROVED BY

NO.	DESCRIPTION	DATE	REV. BY	APPROVED	DATE

EXISTING VEGETATION MAP

BB&T BANK
FESTIVAL AT MANCHESTER LAKES
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

STORMWATER MANAGEMENT SUMMARY (ENTIRE SITE)

I. TOTAL SITE PRE-DEVELOPMENT (EXISTING CONDITIONS)

A. CONTRIBUTING AREAS:

0.33 AC. @ 0.30 (GREEN AREA ON-SITE)
0.98 AC. @ 0.90 (ROOFS, DRIVEWAYS, SIDEWALKS, ETC.)
1.31 AC.

B. WEIGHTED "C":

$$\frac{(0.33)(0.30)+(0.98)(0.90)}{1.31} = 0.75$$

C. TIME OF CONCENTRATION = 5 MIN.

D. RUNOFF: Q2 = (0.75)(5.45)(1.31) = 5.35 CFS
Q10 = (0.75)(7.27)(1.31) = 7.14 CFS

II. TOTAL SITE POST-DEVELOPMENT (PROPOSED CONDITIONS)

A. CONTRIBUTING AREAS:

0.34 AC. @ 0.30 (GREEN AREA ON-SITE)
0.97 AC. @ 0.90 (ROOFS, DRIVEWAYS, SIDEWALKS, ETC.)
1.31 AC.

B. WEIGHTED "C":

$$\frac{(0.34)(0.30)+(0.97)(0.90)}{1.31} = 0.74$$

C. TIME OF CONCENTRATION = 5 MIN.

D. RUNOFF: Q2 = (0.74)(5.45)(1.31) = 5.28 CFS
Q10 = (0.74)(7.27)(1.31) = 7.05 CFS

BMP FACILITY DESIGN CALCULATIONS

II. WATERSHED INFORMATION

PART 1: LIST ALL OF THE SUBAREAS AND "C" FACTORS USED IN THE BMP COMPUTATIONS

SUBAREA DESIGNATION AND DESCRIPTION (1)		"C"	ACRES (3)
A_1	AREA INSIDE SE LIMITS TO SD 818	0.72	0.82
A_2	AREA OUTSIDE SE LIMITS TO SD 818	0.59	0.29
A_3	AREA INSIDE SE LIMITS TO OTHER INLETS	0.78	0.49
	TOTAL		1.60

PART 2: COMPUTE THE WEIGHTED AVERAGE "C" FACTOR FOR THE SITE

(A) AREA OF THE SITE (a) 1.60 ACRES

(B)	SUBAREA DESIGNATION (1)	"C" (2)		ACRES (3)	PRODUCT (4)
A_1	AREA INSIDE SE LIMITS TO SD 818	0.72	x	0.82	= 0.59
A_2	AREA OUTSIDE SE LIMITS TO SD 818	0.59	x	0.29	= 0.17
A_3	AREA INSIDE SE LIMITS TO OTHER INLETS	0.78	x	0.49	= 0.38
					(b) TOTAL = 1.14

(C) WEIGHTED AVERAGE "C" FACTOR (b)/(a) = (c) 0.71

PART 3: COMPUTE THE TOTAL PHOSPHORUS REMOVAL FOR THE SITE

SUBAREA DESIGNATION (1)	BMP TYPE (2)	REMOVAL EFF. (%) (3)		AREA RATIO (4)		"C" FACTOR RATIO (5)	PRODUCT (6)
A_1	STORMCEPTOR	15	x	0.82/1.60	x	0.72/0.71	= 7.80
A_2	STORMCEPTOR	15	x	0.29/1.60	x	0.59/0.71	= 2.26
							(a) TOTAL = 10.06%

PART 4: DETERMINE COMPLIANCE WITH PHOSPHORUS REMOVAL REQUIREMENT

(A) SELECT REQUIREMENT (a) 8.78%

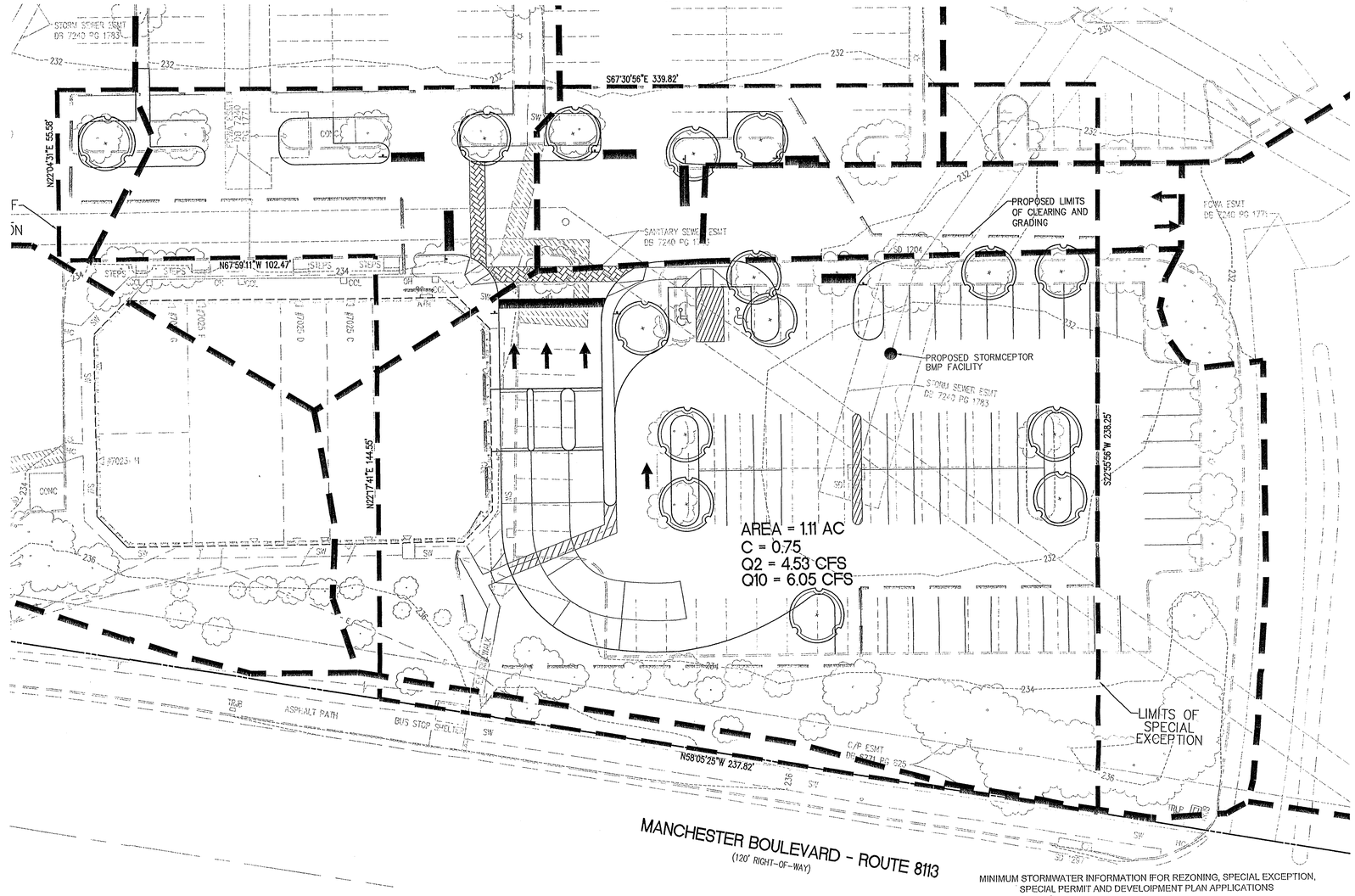
* WATER SUPPLY OVERLAY DISTRICT (OCCOQUAN WATERSHED) = 50 %

* CHESAPEAKE BAY PRESERVATION AREA (NEW DEVELOPMENT) = 40 %

* CHESAPEAKE BAY PRESERVATION AREA (REDEVELOPMENT) =
[1-0.9 x (C PRE/C POST)] x 100 =
[1-0.9 x (0.75/0.74)] x 100 = 8.78%

(B) IF LINE 3(a) 10.06 ≥ LINE 4(a) 8.78 THEN PHOSPHORUS REMOVAL REQUIREMENT IS SATISFIED.

NOTE: THE SWM, BMP AND OUTFALL CALCULATIONS ARE PRELIMINARY. FINAL ENGINEERING TO OCCUR AT SITE PLAN, AT WHICH TIME SOME MINOR DEVIATIONS MAY OCCUR.



BMP NARRATIVE

BMP WILL BE PROVIDED IBY A STORMCEPTOR STRUCTURAL DEVICE, WHICH HAS A PHOSPHORUS REMOVAL EFFICIENCY OF 15%. ±1.11 ACRES OF SITE AREA FLOW THROUGH THE STORMCEPTOR, PROVIDING ±10% TOTAL PHOSPHORUS REMOVAL. THIS EXCEEDS THE ±8.76% REDEVELOPMENT PHOSPHORUS REMOVAL IREQUIREMENT.

MINIMUM STORMWATER INFORMATION IFOR REZONING, SPECIAL EXCEPTION, SPECIAL PERMIT AND DEVELOIPMENT PLAN APPLICATIONS

The following information is required to be shown or provided in all zoning applications, or a waiver request of the submission requirement with justification shall be attached. Note: Waivers will be acted upon separately. Failure to adequately address the required submission information may result in a delay in processing this application.

This information is required under the following Zoning Ordinance paragraphs:

Special Permits (8-011 2J & 2L)	Special Exceptions (9-011 2J & 2L)
Cluster Subdivision (9-815 1G & 1N)	Commercial Revitalization Districts (9-622 2A (12) & (14))
Development Plans PRC District (16-302 3 & 4L)	PRC Plan (16-303 1E & 1O)
FDP P Districts (except PRC) (16-502 1F & 1Q)	Amendments (18-202 10F & 10I)

☑ 1. Plat is at a minimum scale of 1"=50' (unless it is depicted on one sheet with a minimum scale of 1"=100').

☑ 2. A graphic depicting the stormwater management facility(ies) and limits of clearing and grading accommodate the stormwater management facility(ies), storm drainage pipe systems and outlet protection, pond spillways, access roads, site outfalls, energy dissipation devices, and stream stabilization measures as shown on Sheet 4+7

☑ 3. Provide:

Facility Name/ Type & No. (dry, wet, pond A, B, C, etc.)	On-site area served (acres)	Off-site area served (acres)	Drainage area (acres)	Footprint area (sf)	Storage Volume (cf)	If pond, dam height (ft)
EX. WET POND	1.32	51.27	52.59	121,000	249,647	N/A
Totals						

☑ 4. Onsite drainage channels, outfalls and pipe systems are shown on Sheet 3,4.
Pond inlet and outet pipe systems are shown on Sheet 4,7,9

☑ 5. Maintenance access (road) to stormwater management facility(ies) are shown on Sheet 7.
Type of maintenance access road surface noted on the plat is ASPHALT (asphalt, geoblock, gravel, etc.).

☑ 6. Landscaping and tree preservation shown in and near the stormwater management facility is shown on Sheet 10.

☑ 7. A 'stormwater management narrative' which contains a description of how detention and best management practices requirements will be met is provided on Sheet 3.

☑ 8. A description of the existing conditions of each numbered site outfall extended downstream from the site to a point which is at least 100 times the site area or which has a drainage area of at least one square mile (640 acres) is provided on Sheet 4,5+6

☑ 9. A description of how the outfall requirements, including contributing drainage areas of the Public Facilities Manual will be satisfied is provided on Sheet 4.

☑ 10. Existing topography with maximum contour intervals of two (2) feet and a note as to whether the topo survey or field run is provided on Sheets 1,3+5.

☐ 11. A submission waiver is requested for _____

☐ 12. Stormwater management is not required because _____

ation No. S2005-LE-0
APPROVED SE PLAN
SEE DEV CONDS DATED 12-21-05
Date of (BOS) (BZA) approval 12-5-05
Sheet 4 of 11

PRELIMINARY STORMWATER MANAGEMENT PLAN

REVISION APPROVED BY

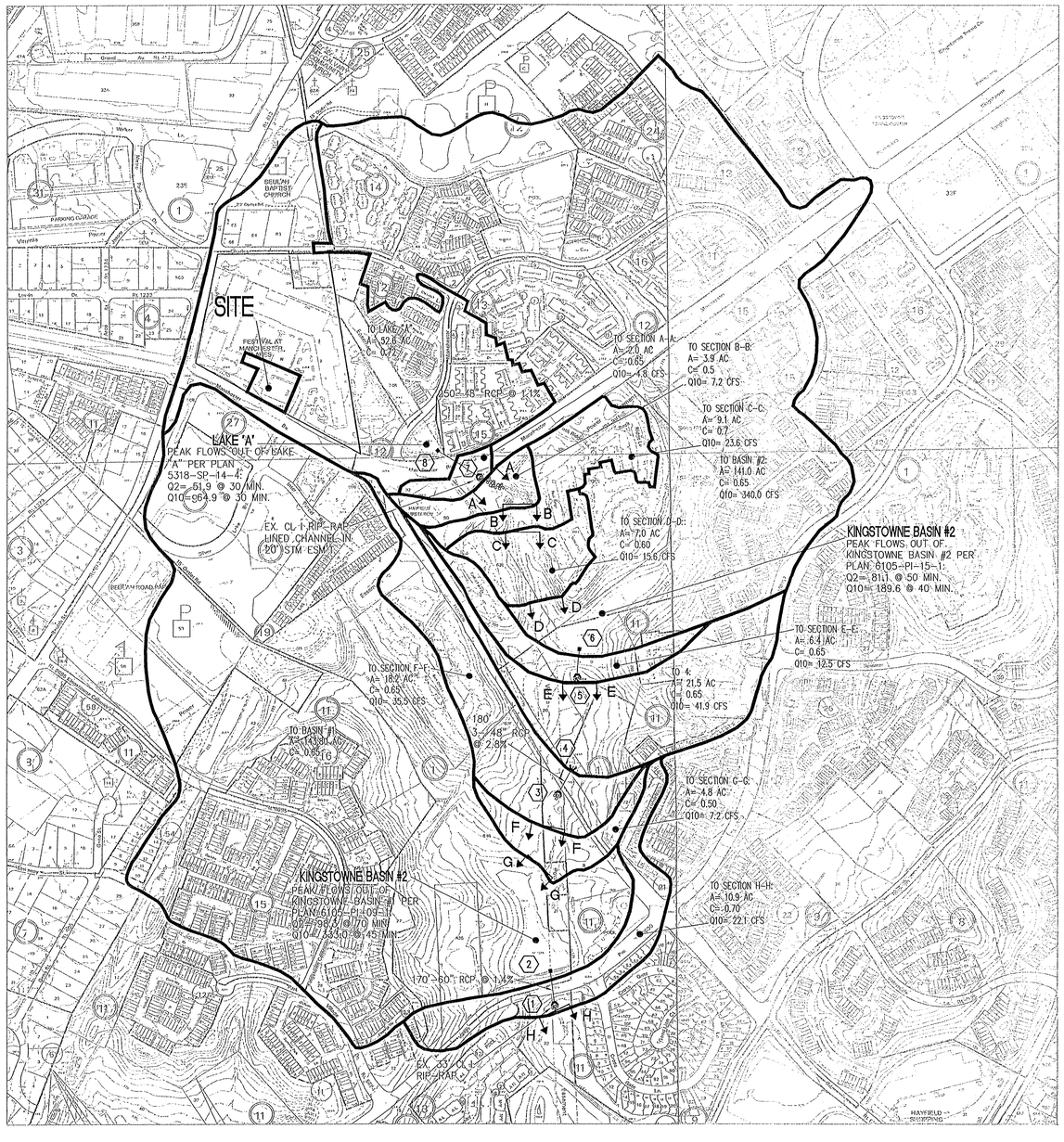
NO.	DESCRIPTION	DATE	REV. BY	APPROVED	DATE

BB&T BANK
FESTIVAL AT MANCHESTER LAKES
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

WALTER L. PHILLIPS
INCORPORATED
CIVIL ENGINEERS LAND SURVEYORS PLANNERS LANDSCAPE ARCHITECTS
207 PARK AVENUE, FALLS CHURCH, VIRGINIA 22046 WWW.WLPINC.COM
(703) 532-6163 FAX (703) 533-1301

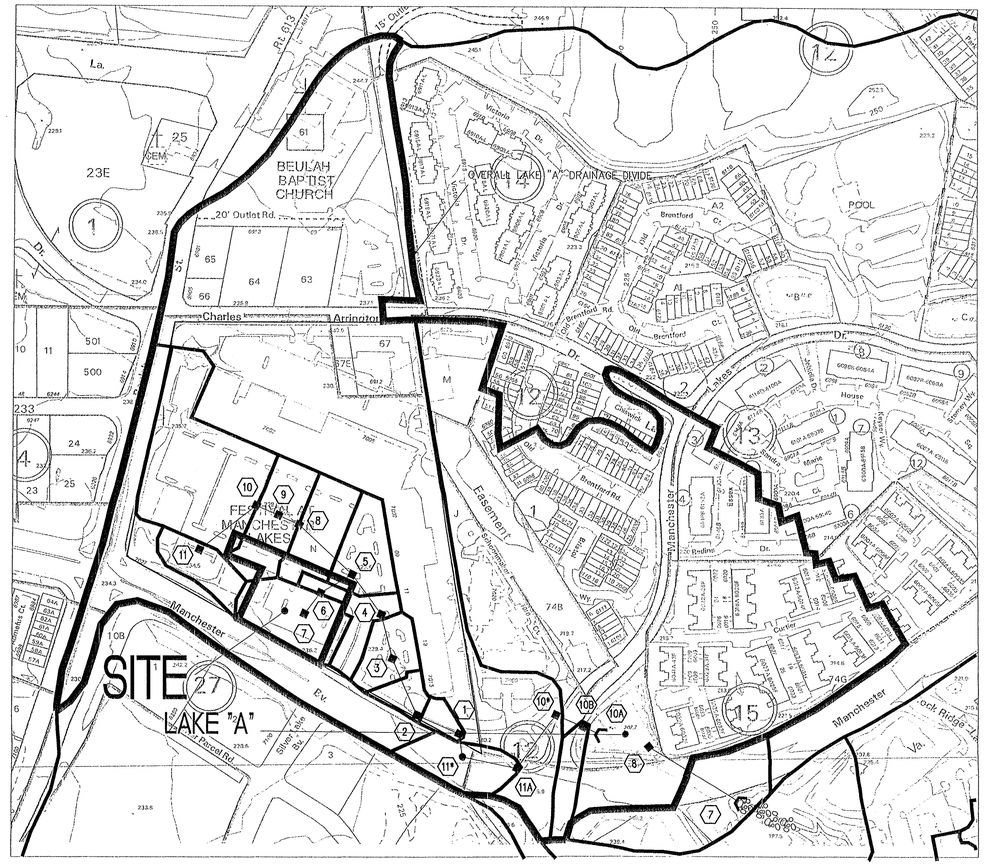
DATE: 1/19/05
REV. 4/05/05, REV. 6/10/05, REV. 9/16/05
REV. 4/28/05
DRAWN: JLH
SCALE: 1" = 20'

COMMONWEALTH OF VIRGINIA
TERRANCE M. SHEEHY
No. 9909
9-16-05
PROFESSIONAL ENGINEER



OUTFALL DRAINAGE AREA MAP

1" = 400'



OUTFALL DRAINAGE AREA MAP- STORM SEWER DETAIL

1" = 200'

ADEQUATE OUTFALL NARRATIVE

ONSITE STORMWATER MANAGEMENT DETENTION MEASURES ARE NOT PROVIDED FOR THE PROPOSED PROJECT DUE TO A DECREASE IN IMPERVIOUS AREA POST-DEVELOPMENT. THE STORMWATER OUTFALL FOIR THIS SITE IS CONVEYED DOWNSTREAM VIA STORM SEWER AND AN OPEN CHANNEL FLOW AND CULVERT SYSTEM. WE HAVE DETERMINED THE EXISTING DRAINAGE DIVIDES, AND VERIFIED THE EXISTING OFFSITE STORM SEWER, CULVERTS, AND CHANNEL SECTIONS USING RECORD AS-BUILT AND TOPOGRAPHY INFORMATION.

AFTER THE RUNOFF FLOWS THROUGH THE STORM SEWER SYSTEM TO LAKE "A" WHERE IT IS DETAINED AND RELEASED, THE RUNOFF FLOWS DOWNSTREAM CIA OPEN CHANNEL FLOW INTO KINGSTOWNE BASIN #2. AT THIS POINT, THE RUNOFF ENTERS A FAIRFAX COUNTY MAPPED RESOURCE PROTECTION AREA (RPA). AFTER THE RUNOFF IS DETAINED AND RELEASED FROM KINGSTOWNE BASIN #2, IT TRAVELS DOWNSTREAM VIA A CULVERT AND OPEN CHANNEL FLOW TO KINGSTOWNE BASIN #1. ONCE THE RUNOFF HAS BEEN DETAINED AND RELEASED FROM KINGSTOWNE BASIN #1, IT IS DISCHARGED INTO A FAIRFAX COUNTY MAPPED FLOODPLAIN WHICH HAS A DRAINAGE AREA GREATER THAN ONE SQUARE MILE. THE OUTFALL ANALYSIS IS COMPLETE AT THIS POINT PER FAIRFAX COUNTY PFM SECTION 6-0203.6C. THE TOTAL DRAINAGE AREA TO THIS OUTFALL POINT IS ±421 ACRES. THE AREA ENCLOSED BY THE LIMITS OF SPECIAL EXCEPTION IS 1.32 AC. THE PEAK 10-YR RELEASE RATE AT THE OUTFALL POINT (SECTION H-H) IS 355 CFS. SEE CHANNEL SECTIONS, STORM SEWER COMPUTATIONS AND CULVERT COMPUTATION FOR ADEQUACY ANALYSIS. THE LIMITS OF THIS STUDY ARE AS DEPICTED ON THE OFFSITE DRAINAGE AREA MAP SHOWN ON THIS SHEET.

AT THE POINT OF OUTFALL INTO THE FLOODPLAIN, THERE IS AN ENDWALL WHICH DISCHARGES INTO A CHANNEL THAT IS LINED WITH 33LF OF CL I RIP-RAP. THERE ARE NO VISIBLE SIGNS OF EROSION ALONG THE CHANNEL.

NO EASEMENTS ARE REQUIRED SINCE THE OFFSITE CONVEYANCES ARE SHOWN TO BE ADEQUATE AND NO IMPROVEMENTS ARE PROPOSED. ALSO, THE MAJORITY OF THE OUTFALL ROUTE IS CONTAINED WITHIN PARKLAND.

THEREFORE, BECAUSE THE OFFSITE STORM SEWER, CHANNELS AND CULVERTS ARE CURRENTLY ADEQUATE AND WE ARE NOT NEGATIVELY AFFECTING THE FUNCTIONALITY OF THE STORM SEWER OR THE POINT AT WHICH IT OUTFALLS, IT IS IN THE OPINION OF THE SUBMITTING ENGINEER THAT THE OUTFALL IS ADEQUATE AND NO ADVERSE DOWNSTREAM IMPACTS WILL RESULT FROM THIS DEVELOPMENT.

APPL No. S2005-LE-019 Staff C. Lee
APPROVED SE/SP PLAN
SEE DEV CONDS DATED 9-21-05
Date of (BOS) (BZA) approval 12-5-05
5 of 11

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SCALE: 1" = 20'

COMMONWEALTH OF VIRGINIA
TERRANCE W. PHILLIPS
No. 9909
9-16-05
PROFESSIONAL ENGINEER

REVISION APPROVED BY

NO.	DESCRIPTION	DATE	REV. BY	APPROVED	DATE

OUTFALL ANALYSIS

BB&T BANK
FESTIVAL AT MANCHESTER LAKES
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

CHANNEL SECTION A-A

Input Data

Slope 0.040000 ft/ft
10 YR Discharge 69.70 cfs

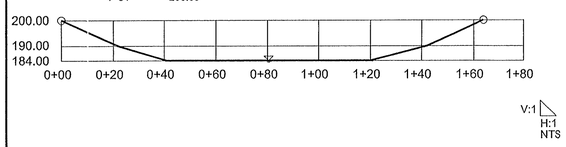
Results

Mannings Coefficient	0.045
Water Surface Elevation	184.30 ft
Elevation Range	184.00 to 200.00
Flow Area	23.9 ft²
Wetted Perimeter	81.12 ft
Top Width	81.04 ft
Actual Depth	0.30 ft
Critical Elevation	184.29 ft
Critical Slope	0.044926 ft/ft
Velocity	2.92 ft/s
Velocity Head	0.13 ft
Specific Energy	184.43 ft
Froude Number	0.95
Flow Type	Subcritical

2- YR STORM:
2 YR Discharge 55.5 cfs
2 YR Velocity 2.67 fps

Channel Points

Station (ft)	Elevation (ft)
0+00	200.00
0+22	190.00
0+41	184.00
1+20	184.00
1+42	190.00
1+64	200.00



CHANNEL SECTION C-C

Input Data

Slope 0.023000 ft/ft
10 YR Discharge 100.50 cfs

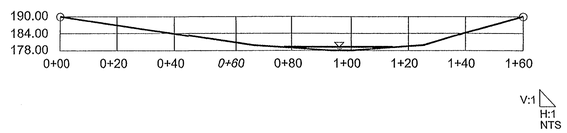
Results

Mannings Coefficient	0.045
Water Surface Elevation	179.16 ft
Elevation Range	178.00 to 190.00
Flow Area	25.7 ft²
Wetted Perimeter	37.33 ft
Top Width	37.24 ft
Actual Depth	1.16 ft
Critical Elevation	179.06 ft
Critical Slope	0.034361 ft/ft
Velocity	3.91 ft/s
Velocity Head	0.24 ft
Specific Energy	179.40 ft
Froude Number	0.83
Flow Type	Subcritical

2- YR STORM:
2 YR Discharge 78.5 cfs
2 YR Velocity 3.67 fps

Channel Points

Station (ft)	Elevation (ft)
0+00	190.0l0
0+66	180.0l0
0+93	178.0l0
1+00	178.0l0
1+25	180.0l0
1+60	190.0l0



CHANNEL SECTION E-E

Input Data

Slope 0.015000 ft/ft
10 YR Discharge 202.10 cfs

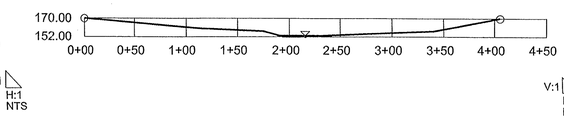
Results

Mannings Coefficient	0.045
Water Surface Elevation	153.53 ft
Elevation Range	152.00 to 170.00
Flow Area	51.1 ft²
Wetted Perimeter	52.89 ft
Top Width	52.62 ft
Actual Depth	1.53 ft
Critical Elevation	153.29 ft
Critical Slope	0.031499 ft/ft
Velocity	3.95 ft/s
Velocity Head	0.24 ft
Specific Energy	153.78 ft
Froude Number	0.71
Flow Type	Subcritical

2- YR STORM:
2 YR Discharge 87.3 cfs
2 YR Velocity 3.16 fps

Channel Points

Station (ft)	Elevation (ft)
0+00	170.00
1+15	160.00
1+75	158.00
1+94	152.00
2+08	152.00
3+40	158.00
4+05	170.00



CHANNEL SECTION G-G

Input Data

Slope 0.015000 ft/ft
10 YR Discharge 286.70 cfs

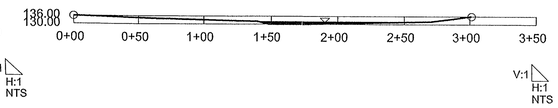
Results

Mannings Coefficient	0.045
Water Surface Elevation	131.30 ft
Elevation Range	130.00 to 136.00
Flow Area	79.7 ft²
Wetted Perimeter	95.01 ft
Top Width	94.83 ft
Actual Depth	1.30 ft
Critical Elevation	131.07 ft
Critical Slope	0.033045 ft/ft
Velocity	3.60 ft/s
Velocity Head	0.20 ft
Specific Energy	131.50 ft
Froude Number	0.69
Flow Type	Subcritical

2- YR STORM:
2 YR Discharge 129.60 cfs
2 YR Velocity 2.90 fps

Channel Points

Station (ft)	Elevation (ft)
0+00	136.00
0+63	134.00
1+40	132.00
1+48	130.00
1+76	130.00
2+71	132.00
2+87	134.00
3+01	136.00



CHANNEL SECTION B-B

Input Data

Slope 0.052000 ft/ft
10 YR Discharge 76.90 cfs

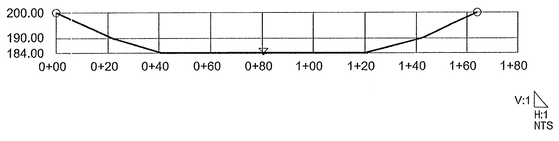
Results

Mannings Coefficient	0.045
Water Surface Elevation	184.29 ft
Elevation Range	184.00 to 200.00
Flow Area	23.4 ft²
Wetted Perimeter	81.08 ft
Top Width	81.00 ft
Actual Depth	0.29 ft
Critical Elevation	184.31 ft
Critical Slope	0.043976 ft/ft
Velocity	3.29 ft/s
Velocity Head	0.17 ft
Specific Energy	184.46 ft
Froude Number	1.08
Flow Type	Supercritical

2- YR STORM:
2 YR Discharge 60.90 cfs
2 YR Velocity 3.00 fps

Channel Points

Station (ft)	Elevation (ft)
0+00	200.00
0+22	190.00
0+41	184.00
1+20	184.00
1+42	190.00
1+64	200.00



CHANNEL SECTION D-D

Input Data

Slope 0.065000 ft/ft
10 YR Discharge 116.10 cfs

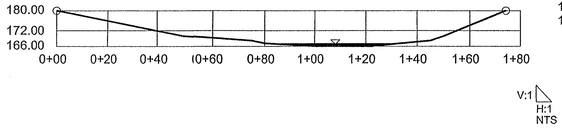
Results

Mannings Coefficient	0.045
Water Surface Elevation	166.67 ft
Elevation Range	1636.00 to 180.00
Flow Area	21.8 ft²
Wetted Perimeter	43.11 ft
Top Width	43.07 ft
Actual Depth	0.67 ft
Critical Elevation	166.78 ft
Critical Slope	0.035500 ft/ft
Velocity	5.34 ft/s
Velocity Head	0.44 ft
Specific Energy	167.11 ft
Froude Number	1.32
Flow Type	Supercritical

2- YR STORM:
2 YR Discharge 90.1 cfs
2 YR Velocity 4.95 fps

Channel Points

Station (ft)	Elevation (ft)
0+00	180.00
0+50	170.00
0+75	168.00
0+80	167.00
1+00	166.00
1+22	166.00
1+45	168.00
1+50	170.00
1+74	180.00



CHANNEL SECTION F-F

Input Data

Slope 0.015000 ft/ft
10 YR Discharge 279.50 cfs

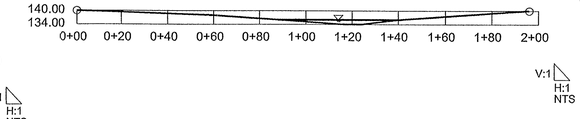
Results

Mannings Coefficient	0.045
Water Surface Elevation	136.05 ft
Elevation Range	134.00 to 140.00
Flow Area	62.4 ft²
Wetted Perimeter	53.52 ft
Top Width	53.32 ft
Actual Depth	2.05 ft
Critical Elevation	135.77 ft
Critical Slope	0.029324 ft/ft
Velocity	4.48 ft/s
Velocity Head	0.31 ft
Specific Energy	136.36 ft
Froude Number	0.73
Flow Type	Subcritical

2- YR STORM:
2 YR Discharge 126.0 cfs
2 YR Velocity 3.67 fps

Channel Points

Station (ft)	Elevation (ft)
0+00	140.00
0+58	138.00
0+88	136.00
1+16	134.00
1+24	134.00
1+40	136.00
1+68	138.00
1+96	140.00



CHANNEL SECTION H-H

Input Data

Slope 0.015000 ft/ft
10 YR Discharge 355.10 cfs

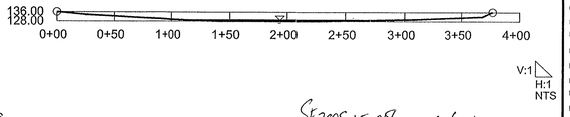
Results

Mannings Coefficient	0.045
Water Surface Elevation	128.91 ft
Elevation Range	128.00 to 136.00
Flow Area	107.3 ft²
Wetted Perimeter	145.02 ft
Top Width	144.98 ft
Actual Depth	0.91 ft
Critical Elevation	128.71 ft
Critical Slope	0.034942 ft/ft
Velocity	3.31 ft/s
Velocity Head	0.17 ft
Specific Energy	129.08 ft
Froude Number	0.68
Flow Type	Subcritical

2- YR STORM:
2 YR Discharge 109.0 cfs
2 YR Velocity 2.23 fps

Channel Points

Station (ft)	Elevation (ft)
0+00	136.00
0+25	134.00
0+98	130.00
1+39	128.00
2+31	128.00
3+07	130.00
3+68	132.00
3+77	136.00



ation No. S-2005-LE-058 Staff R. Lewis
APPROVED SE / SP PLAN
SEE DEV COINDS DATED 9-21-05
Date of (BOS) / (BZA) approval 12-5-05
Sheet 6 of 11

WALTER L. PHILLIPS
INCORPORATED
CIVIL ENGINEERS LAND SURVEYORS PLANNERS LANDSCAPE ARCHITECTS
207 PARK AVENUE FALLS CHURCH, VIRGINIA 22046 WWW.WLPINC.COM
(703) 532-6163 FAX (703) 533-1301

DATE: 1/19/05
REV. 4/25/05, REV. 6/10/05, REV. 9/19/05
SCALE: 1" = 20'
DRAWN: JV

COMMONWEALTH OF VIRGINIA
TERRANCE M. ANDERSON
No. 9905
9/16/05
PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE	REV. BY	APPROVED	DATE

REVISION APPROVED BY

OUTFALL ANALYSIS CROSS SECTIONS

BB&T BANK
FESTIVAL AT MANCHESTER LAKES
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

Storm Sewer Computation Sheet

Structure From	Structure To	Length (ft)	Drainage Area (acres) Increment	Drainage Area (acres) Total	Runoff Coefficient "C"	"A" * "C" Increment	"A" * "C" Total	Flow Time Min. To Upper End	Flow Time Min. In Section	Rainfall Intensity (In/hr)	Total Runoff (cfs)	Pipe Diameter (inches)	Full Capacity (cfs)	Velocity (fps) Flowing Full	Velocity (fps) Design Flow	Invert Flow Upper End	Invert Flow Lower End	Slope of Sewer (ft/ft)	Pipe Type
13	12	264	0.51	0.51	0.69	0.35	0.35	5	5	7.27	2.54	18	10.29		4.82	229.81	227.28	0.0096	RCP
12	10	125	1.83	2.34	0.83	1.52	1.87	5	5	7.27	13.59	21	16.69		7.73	227.13	225.74	0.0111	RCP
11	10	197	0.72	0.72	0.75	0.54	0.54	5	5	7.27	3.93	18	12.20		6.15	228.64	225.98	0.0135	RCP
10	9	63	0.92	3.98	0.90	0.83	3.24	5	5	7.27	23.55	24	24.70		8.32	225.64	224.99	0.0103	RCP
9	8	67	1.08	5.06	0.85	0.92	4.16	5	5	7.27	30.24	33	44.25		6.51	224.89	224.42	0.0070	RCP
8	5	197	0.82	5.88	0.90	0.74	4.90	5	5	7.27	35.62	33	43.61		7.80	224.12	222.78	0.0068	RCP
7	6	71	1.11	1.11	0.75	0.83	0.83	5	5	7.27	6.03	18	9.28		5.59	225.52	224.97	0.0078	RCP
6	5	101	0.11	1.22	0.90	0.10	0.93	5	5	7.27	6.76	18	12.02		7.00	224.70	223.38	0.0131	RCP
5	4	130	0.85	7.95	0.90	0.77	6.60	5	5	7.27	47.98	33	51.20		9.13	222.48	221.43	0.0081	RCP
4	3	131	0.44	8.39	0.90	0.40	7.00	5	5	7.27	50.89	33	SEE HGL		8.57	221.33	220.50	0.0063	RCP
3	2	167	0.72	9.11	0.85	0.61	7.61	5	5	7.27	55.32	36	SEE HGL		7.83	220.40	219.78	0.0037	RCP
2	1	133	0.36	9.47	0.75	0.27	7.88	5	5	7.27	57.29	36	65.35		10.43	219.68	218.40	0.0096	RCP
1	11*	59	0.22	9.69	0.72	0.16	8.04	5	5	7.27	58.45	36	74.87		11.71	218.30	217.56	0.0126	RCP
11*	11A	165	4.10	13.79	0.85	3.49	11.53	5	5	7.27	83.82	36	97.59		14.57			0.0185	RCP
11A	10*	185	0.80	14.59	0.85	0.68	12.21	5	5	7.27	88.77	36	94.37		14.14			0.0173	RCP
10*	10B	55	18.10	32.69	0.72	13.03	25.24	5	5	7.27	183.49	48	189.25		15.89			0.0150	RCP
10B	10A	40	0.40	33.09	0.85	0.34	25.58	5	5	7.27	185.97	48	189.25		15.82			0.0150	RCP

HGL Computations (V1.3)

Inlet Station	Structure Type (M,I)	Outlet Water Surface Elevation	D_O(In)	Q_O	L_O	Sf_O	Hf	Junction Loss: V_O	H_O	D_I (In)	Q_I	V_I	Q_IV_I	$V_I^2/2g$	IH_I	Angle (°)	H_{delta}	Ht	1.3Ht	.5(Ht)	Final H	Inlet Water Surface Elevation	Max Water Surface Elevation	Difference
1*	*	2*	3*	4*	5*	6	7	8	9	*	10*	11	12		13	14*	15	16	17	18	19	20	*	
2	I	222.18	36	57.29	133	0.007	0.98	8.10	0.25	36	55.32	7.83	432.92	0.95	0.10	40	0.26	0.61	0.79	0.39	1.38	223.56	229.24	5.68
3	I	223.56	36	55.32	167	0.007	1.15	7.83	0.24	33	50.89	8.57	435.99	1.14	0.11	10	0.00	0.35	0.46	0.23	1.38	224.94	229.44	4.50
4	I	224.94	33	50.89	131	0.009	1.21	8.57	0.28	33	47.98	8.08	387.56	1.01	0.10	20	0.15	0.54	0.70	0.35	1.56	226.50	231.28	4.78
5	I	226.30	33	47.98	130	0.008	1.07	8.08	0.25	18	6.76	3.83	25.86	0.23	0.02	80	0.09	0.37	0.48	0.24	1.31	227.61	230.18	2.57
6	I	227.61	18	6.76	101	0.004	0.42	3.83	0.06	18	6.03	3.41	20.58	0.18	0.02	10	0.00	0.07	0.10	0.05	0.47	228.08	231.90	3.82
7	I	228.08	18	6.03	71	0.003	0.23	3.41	0.05			---	---	---	---		---	0.05	0.06	0.03	0.26	228.34	231.07	2.73

CULVERT COMPUTATION (STR. #4 TO #3)- 10 YEAR STORM

Project BB&T

Plan Sheet No.__ Designer ____ Sheet ___ of ___
Rev. Date ____ Date 06/09/05

HYDROLOGICAL DATA:
D.A.=243.5 AC.

AHW Controls STATION ____
100YR FLOOD PLAIN ____ ELEV. ____
DESIGN AHW DEPTH ____ ELEV. ____
STRUCTURES ____ ELEV. ____

FREQ. TW ELEV.
__ = ____
__ = ____
__ = ____
__ = ____
__ = ____

SHOULDER ELEV. ____
℄ ELEV. 152
SKEW ____ COVER ____
INV. EL. 143 So= 2.8% INV. EL138
ORIG. GR. ELEV. N/A L= 180 FT ORIG. GR. ELEV. N/A

DISCHARGE'S USED
Q10 YR= 244.0 CFS
Q____= ____ CFS
Q____= ____ CFS
Q____= ____ CFS
Q____= ____ CFS

RISK ASSESSMENT ADT ____
DETOURS AVAILABLE ____ LENGTH ____
OVER TOPPING STAGE ____
FLOOD PLAIN MANAGEMENT ____
CRITERIA AND SIGNIFICANT IMPACT ____

CULVERT TYPE & SIZE	Q	Q/B	HEADWATER COMPUTATIONS: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL Ko	dc	dc+D/2	ho	H	LSo	HW	CONT. HW ELEV.	OUTLET VELOCITY		END TREAT.	COMMENTS
EX. TRIPLE 48" DIAM. CULVERTS	244.0	81.3	1.5	6.0								149		6.5 FPS		

NOTE: CULVERT IS ADEQUATE TO CARRY 10 YEAR DESIGN FLOW WITHOUT OVER TOPPING

DESIGN FLOOD EXCEED. PROB ____ ELEV. ____
OVERTOP FLOOD EXCEED. PROB ____ ELEV. ____
BASE FLOOD 1% EXCEED. PROB ____ ELEV. ____

Application No. SE 2005-LE-011 Staff C. Lewis
APPROVED SE / SP PLAN
SEE DEV CONDS DATED 9-21-05
Date of (BOS) (BZA) approval 12-5-05
Sheet 7 of 11

WALTER L. PHILLIPS
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(703) 532-6163 FAX (703) 533-1301

REV. 4/28/05
REV. 9/9/05
DATE: 1/19/05
REV. 4/5/05, REV. 6/10/05, REV. 9/9/05
DRAWN: JLH
SCALE: 1" = 20'

COMMONWEALTH OF VIRGINIA
TERRY L. PARKINSON
No. 9909
9-16-05
REGISTERED PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE	REV. BY	APPROVED	DATE

REVISION APPROVED BY

OUTFALL ANALYSIS COMPUTATIONS

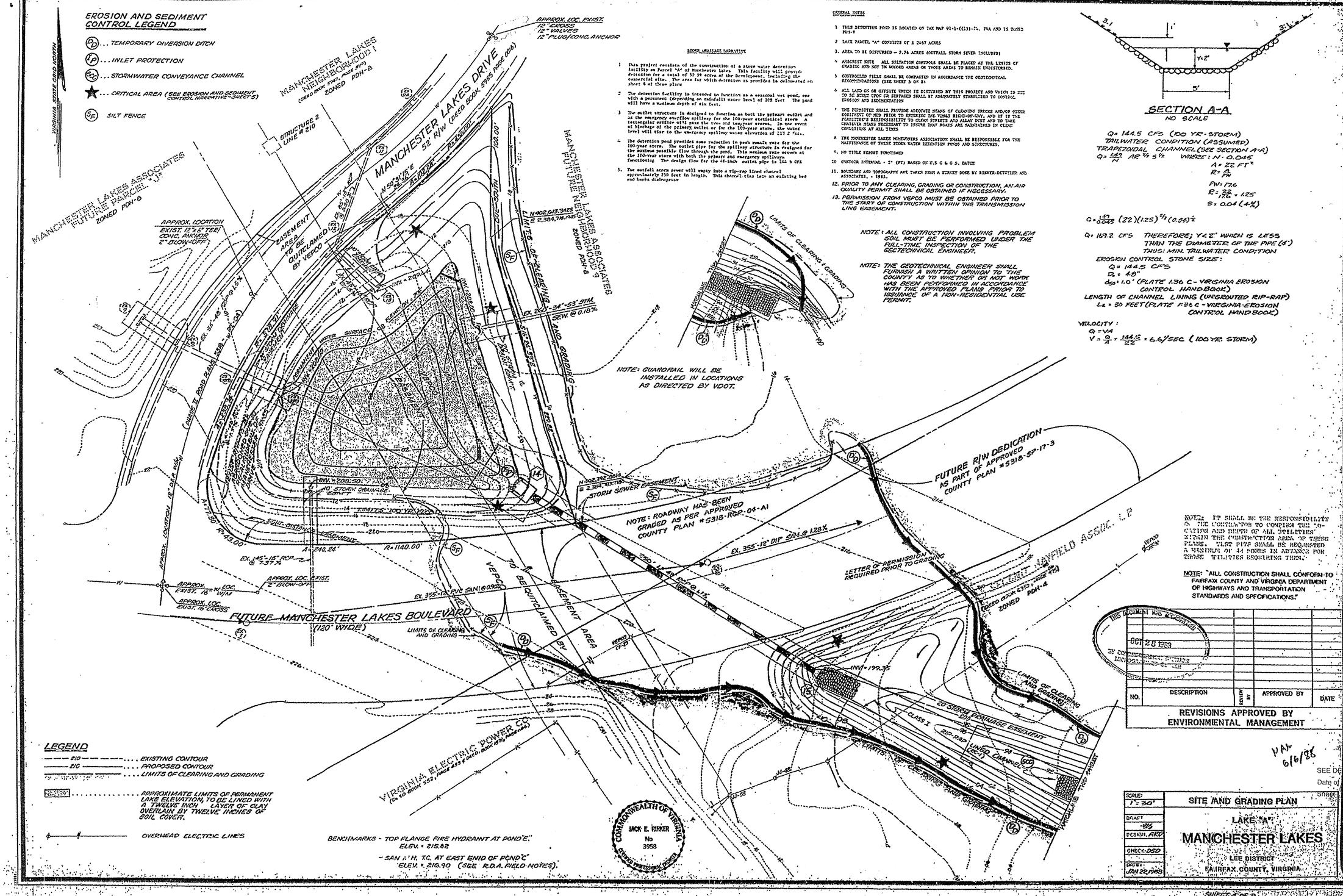
BB&T BANK
FESTIVAL AT MANCHESTER LAKES
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

82-013-H-H

EROSION AND SEDIMENT CONTROL LEGEND

- (DD) ... TEMPORARY DIVERSION DITCH
- (IP) ... INLET PROTECTION
- (SC) ... STORMWATER CONVEYANCE CHANNEL
- ★ ... CRITICAL AREA (SEE EROSION AND SEDIMENT CONTROL NARRATIVE - SHEET 5)
- (SF) SILT FENCE

VIRGINIA STATE GRID NORTH



GENERAL NOTES

1. THIS DETENTION POND IS LOCATED ON TAX MAP 91-1-((1))-74. THA AND IS ZONED PDH-8
2. LAKE PARCEL "A" CONSISTS OF 1 2467 ACRES
3. AREA TO BE DISTURBED = 9.76 ACRES (COTTAGE STORM SEWER INCLUDED)
4. ARCHIVE NOTE ALL SILTATION CONTROLS SHALL BE PLACED AT THE LIMITS OF GRADING AND NOT IN WOODED AREAS OR THOSE AREAS TO REMAIN UNDISTURBED.
5. CONTROLLED FILLS SHALL BE COMPACTED IN ACCORDANCE THE GEOTECHNICAL RECOMMENDATIONS (SEE SHEET 3 OF 3)
6. ALL LAND ON OR OFFSITE WHICH IS DISTURBED BY THIS PROJECT AND WHICH IS NOT TO BE BUILT UPON OR SURFACED SHALL BE ADEQUATELY STABILIZED TO CONTROL EROSION AND SEDIMENTATION
7. THE PERMITTEE SHALL PROVIDE ADEQUATE MEANS OF CLEANING TRUCKS AND/OR OTHER EQUIPMENT ON SITE PRIOR TO ENTERING THE PUBLIC RIGHT-OF-WAY, AND IT IS THE PERMITTEE'S RESPONSIBILITY TO CLEAN STREETS AND ALLAY DUST AND TO TAKE WHATEVER STEPS NECESSARY TO ENSURE THAT ROADS ARE MAINTAINED IN CLEAN CONDITIONS AT ALL TIMES
8. THE MANCHESTER LAKES HOMEOWNERS ASSOCIATION SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF THESE STORM WATER DETENTION PONDS AND STRUCTURES.
9. NO TITLE REPORT FURNISHED
10. CONTOUR INTERVAL = 2' (FT) BASED ON U.S C & G S. DATUM
11. BOUNDARY AND TOPOGRAPHY ARE TAKEN FROM A SURVEY DONE BY RINKER-DETWILER AND ASSOCIATES, - 1983.
12. PRIOR TO ANY CLEARING, GRADING OR CONSTRUCTION, AN AIR QUALITY PERMIT SHALL BE OBTAINED IF NECESSARY.
13. PERMISSION FROM VEPCO MUST BE OBTAINED PRIOR TO THE START OF CONSTRUCTION WITHIN THE TRANSMISSION LINE EASEMENT.

NOTE: ALL CONSTRUCTION INVOLVING PROBLEM SOIL MUST BE PERFORMED UNDER THE FULL-TIME INSPECTION OF THE GEOTECHNICAL ENGINEER.

NOTE: THE GEOTECHNICAL ENGINEER SHALL FURNISH A WRITTEN OPINION TO THE COUNTY AS TO WHETHER OR NOT WORK WAS BEEN PERFORMED IN ACCORDANCE WITH THE APPROVED PLANS PRIOR TO ISSUANCE OF A NON-RESIDENTIAL USE PERMIT.

STORM DRAINAGE NARRATIVE

1. This project consists of the construction of a storm water detention facility on Parcel "A" of Manchester Lakes. This facility will provide detention for a total of 52.58 acres of the development, including the commercial site. The area for which detention is provided is delineated on sheet 4 of these plans
2. The detention facility is intended to function as a seasonal wet pond, one with a permanent (depending on rainfall) water level of 208 feet. The pond will have a maximum depth of six feet.
3. The outlet structure is designed to function as both the primary outlet and as the emergency overflow spillway for the 100-year statistical storm. A rectangular orifice will pass the two- and ten-year storms. In the event of blockage of the primary outlet or for the 100-year storm, the water level will rise to the emergency spillway water elevation of 213.2 feet.
4. The detention pond provides some reduction in peak runoff rate for the 100-year storm. The outlet pipe for the spillway structure is designed for the maximum possible flow through the pond. This maximum rate occurs at the 100-year storm with both the primary and emergency spillways functioning. The design flow for the 48-inch outlet pipe is 144.5 CFS
5. The outfall storm sewer will empty into a rip-rap lined channel approximately 350 feet in length. This channel ties into an existing bed and banks drainageway

SECTION A-A

NO SCALE

$Q = 144.5$ CFS (100 YR-STORM)
TAILWATER CONDITION (ASSUMED)
TRAPEZOIDAL CHANNEL (SEE SECTION A-A)

$Q = \frac{1.49}{N} AR^{2/3} S^{1/2}$ WHERE: $N = 0.045$

$A = 22\ FT^2$

$R = \frac{A}{PW}$

$PW = 17.6$

$R = \frac{22}{17.6} = 1.25$

$S = 0.04\ (4\%)$

$Q = \frac{1.49}{0.045}(22)(1.25)^{2/3}(0.04)^{1/2}$

$Q = 189.2$ CFS THEREFORE; Y<2' WHICH IS LESS THAN THE DIAMETER OF THE PIPE (4') THUS: MIN. TAILWATER CONDITION

EROSION CONTROL STONE SIZE:

$Q = 144.5$ CFS

$D_{50} = 4.5"$

$d_{50} = 1.0'$ (PLATE 1.36 C - VIRGINIA EROSION CONTROL HANDBOOK)

LENGTH OF CHANNEL LINING (UNGROUTED RIP-RAP)

$L_2 = 30$ FEET (PLATE 1.36 C - VIRGINIA EROSION CONTROL HANDBOOK)

VELOCITY:

$Q = VA$

$V = \frac{Q}{A} = \frac{144.5}{22} = 6.6'/SEC$ (100 YR. STORM)

NOTE: IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL UTILITIES WITHIN THE CONSTRUCTION AREA OF THESE PLANS. VDOT PIPE SHALL BE REQUESTED A MINIMUM OF 48 HOURS IN ADVANCE FOR CROSS UTILITIES REQUIRING THEM.

NOTE: "ALL CONSTRUCTION SHALL CONFORM TO FAIRFAX COUNTY AND VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION STANDARDS AND SPECIFICATIONS."

THIS DOCUMENT HAS BEEN REVIEWED
OCT 28 1988
BY COMMONWEALTH OF VIRGINIA

NO.	DESCRIPTION	REVIEW BY	APPROVED BY	DATE

REVISIONS APPROVED BY ENVIRONMIENTAL MANAGEMENT

VAF 6/6/86

LEGEND

- 210 ... EXISTING CONTOUR
- 210 ... PROPOSED CONTOUR
- ... LIMITS OF CLEARING AND GRADING
- ... APPROXIMATE LIMITS OF PERMANENT LAKE ELEVATION, TO BE LINED WITH A TWELVE INCH LAYER OF CLAY OVERLAIN BY TWELVE INCHES OF SOIL COVER.
- OVERHEAD ELECTRIC LINES

BENCHMARKS - TOP FLANGE FIRE HYDRANT AT POND "E" ELEV. = 215.82

- SAN. M.H. T.C. AT EAST END OF POND "C" ELEV. = 210.90 (SEE R.D.A. FIELD NOTES).

COMMONWEALTH OF VIRGINIA
JACK E. RINKER
No 3958
Registered Professional Engineer

SCALE: 1" = 30'	SITE AND GRADING PLAN
DRAFT: HRS	LAKE "A"
DESIGN: ART	MANCHESTER LAKES
CHECK: DSD	LEE DISTRICT
DATE: JAN 22, 1988	FAIRFAX COUNTY, VIRGINIA

SHEET 4 OF 9

RINKER-DETWILER AND ASSOCIATES, P.C.
ENGINEERING • SURVEYING • LAND PLANNING
FAIRFAX, VIRGINIA

Name: DETWILER Staff: C. Lewis
Approved: PROPOSED SP PLAN
SEE DEVELOPMENT CONDITIONS Date of Approval: 9-21-05
Date of Original Approval: 12-5-05
Sheet 11 of 11

FOR INFORMATION ONLY

82-013-H-H

LAKE "A" - MANCHESTER LAKES 2 YR.- 2 HR. STORM

TIME min.	INFL. RT. CFS	AVE. INFL. RATE	VOLUME CF	STORAGE CARRYOVER	TOTAL CF	TRIAL W.S.ELEV	OUTFLOW CFS	AVE. OUT. RATE	VOLUME OUT	BAL. IN STORAGE	CORRES. W.S.ELEV.
0	0.0		0.0			208.0	0.0		0.0	77186.0	
5	87.6	43.8	13134.0	77186.0	90248.0	208.5	6.4	3.2	957.8	89283.0	208.5
10	154.2	120.9	36267.0	89283.0	125550.0	209.7	32.8	19.6	5879.5	119671.4	209.7
15	120.2	137.2	41160.0	119671.4	160840.2	210.7	44.4	38.6	11585.7	149254.6	210.7
20	82.3	101.3	30386.5	149254.6	179641.1	211.2	49.2	46.8	14046.5	165594.6	211.2
25	64.0	73.2	21956.7	165594.6	187551.3	211.4	51.0	50.1	15033.6	172517.0	211.4
30	51.0	57.5	17251.7	172517.0	189769.5	211.5	51.9	51.4	15432.9	174336.6	211.5
35	43.1	47.1	14115.0	174336.6	188451.6	211.4	51.0	51.4	15432.9	173018.7	211.5
40	37.9	40.5	12154.6	173018.7	185173.3	211.3	50.1	50.6	15149.0	170084.3	211.3
45	31.4	34.6	10390.2	170084.3	180394.5	211.2	49.2	49.7	14900.5	165494.8	211.2
50	26.1	28.8	8625.9	165494.0	174119.0	211.1	48.3	48.8	14627.0	159492.8	211.1
55	23.5	24.8	7449.6	159492.8	166942.4	210.8	45.4	46.9	14058.3	152884.2	210.8
60	20.9	22.2	6665.4	152884.2	159549.6	210.6	43.4	44.4	13324.5	146225.1	210.6
65	18.3	19.6	5881.3	146225.1	152106.3	210.4	41.3	42.3	12703.7	139402.6	210.4
70	15.7	17.0	5097.1	139402.6	144499.7	210.1	37.9	39.6	11876.0	132623.7	210.1
75	13.1	14.4	4312.9	132623.7	136936.6	209.8	34.2	36.0	10805.7	126130.9	209.8
80	11.8	12.4	3724.0	126130.9	129855.7	209.6	31.4	32.8	9834.8	120020.9	209.6
85	9.9	10.8	3254.3	120020.9	123275.2	209.4	28.4	29.9	8974.4	114300.8	209.4
90	7.8	8.9	2666.2	114300.8	116966.9	209.2	25.1	26.7	8021.3	108945.6	209.2
95	6.5	7.2	2156.5	108945.6	111102.1	209.0	21.2	23.1	6935.9	104166.2	209.0
100	5.8	6.2	1848.4	104166.2	106014.6	208.9	15.4	18.3	5499.9	100524.7	208.8
105	3.9	4.9	1456.4	100524.7	101981.1	208.6	8.4	11.9	3572.0	98409.0	208.6
110	2.6	3.3	980.2	98409.0	99389.3	208.5	6.4	7.4	2216.0	97172.5	208.5
115	1.3	2.0	588.1	97172.5	97760.6	208.5	6.4	6.4	1915.6	95845.0	208.5

MAX. STORAGE = 189770 FT^3
MAX. ELEV. = 211.5 FT.
MAX. DISCHARGE = 51.9 CFS

LAKE "A" - MANCHESTER LAKES 10 YR.- 2 HR. STORM

TIME min.	INFL. RT. CFS	AVE. INFL. RATE	VOLUME CF	STORAGE CARRYOVER	TOTAL CF	TRIAL W.S.ELEV	OUTFLOW CFS	AVE. OUT. RATE	VOLUME OUT	BAL. IN STORAGE	CORRES. W.S.ELEV.
0	0.0		0.0			208.0	0.0		0.0	77186.0	
5	126.0	63.0	18899.0	77186.0	96085.0	208.6	8.4	4.2	1259.0	94746.0	208.6
10	221.9	173.9	52183.9	94746.0	146929.9	210.4	41.3	24.8	7452.0	139477.9	210.4
15	173.0	197.5	59235.0	139477.9	198713.6	211.8	54.4	47.8	14334.6	184359.0	211.8
20	118.5	145.7	43721.6	184359.0	228080.6	212.6	60.6	57.2	17259.0	210821.6	212.6
25	92.1	105.3	31592.4	210821.6	242414.0	213.0	63.5	62.1	18628.1	223785.9	213.0
30	73.3	82.7	24822.6	223785.9	248608.5	213.2	64.9	64.2	19271.1	229337.4	213.2
35	62.1	67.7	20309.4	229337.4	249646.8	213.2	64.9	64.9	19480.6	230166.2	213.2
40	54.5	58.3	17488.7	230166.2	247654.9	213.1	64.4	64.6	19376.4	228278.5	213.1
45	45.1	49.8	14950.0	228278.5	243228.5	213.0	63.5	63.9	19166.9	224061.6	213.0
50	37.6	41.4	12411.3	224061.6	236472.9	212.8	62.1	62.8	18847.4	217625.5	212.8
55	33.8	35.7	10718.9	217625.5	228344.4	212.6	60.6	61.4	18413.9	209930.5	212.6
60	30.1	32.0	9590.6	209930.5	219521.0	212.4	59.2	59.9	17970.0	201551.0	212.4
65	26.3	28.2	8462.3	201551.0	210013.3	212.1	56.8	58.0	17397.3	192616.0	212.1
70	22.6	24.4	7334.0	192616.0	199949.9	211.8	54.4	55.6	16686.3	183263.7	211.8
75	18.8	20.7	6205.7	183263.7	189469.3	211.4	51.0	52.7	15812.7	173656.6	211.4
80	16.9	17.9	5359.4	173654.6	179016.0	211.2	49.2	50.1	15033.6	163982.4	211.2
85	14.3	15.6	4682.4	163982.4	168664.9	210.9	46.4	47.8	14342.0	154322.1	210.9
90	11.3	12.8	3836.2	154322.1	158158.3	210.6	43.4	44.9	13471.1	144687.2	210.6
95	9.4	10.3	3102.8	144687.2	147792.1	210.3	40.2	41.8	12530.6	135261.5	210.3
100	7.5	8.5	2538.7	135251.5	137790.2	210.0	36.7	38.4	11532.4	126259.8	210.0
105	5.6	6.6	1974.5	126259.8	128234.3	209.7	32.8	34.7	10424.3	117818.0	209.7
110	3.8	4.7	1410.4	117810.0	119220.4	209.3	26.8	29.8	8940.2	110280.2	209.3
115	1.9	2.8	846.2	110280.2	111126.4	209.1	23.2	25.0	7498.7	103627.7	209.1
120	0.0	0.9	282.1	103627.7	103929.8	208.8	12.9	18.1	5418.6	98491.3	208.8

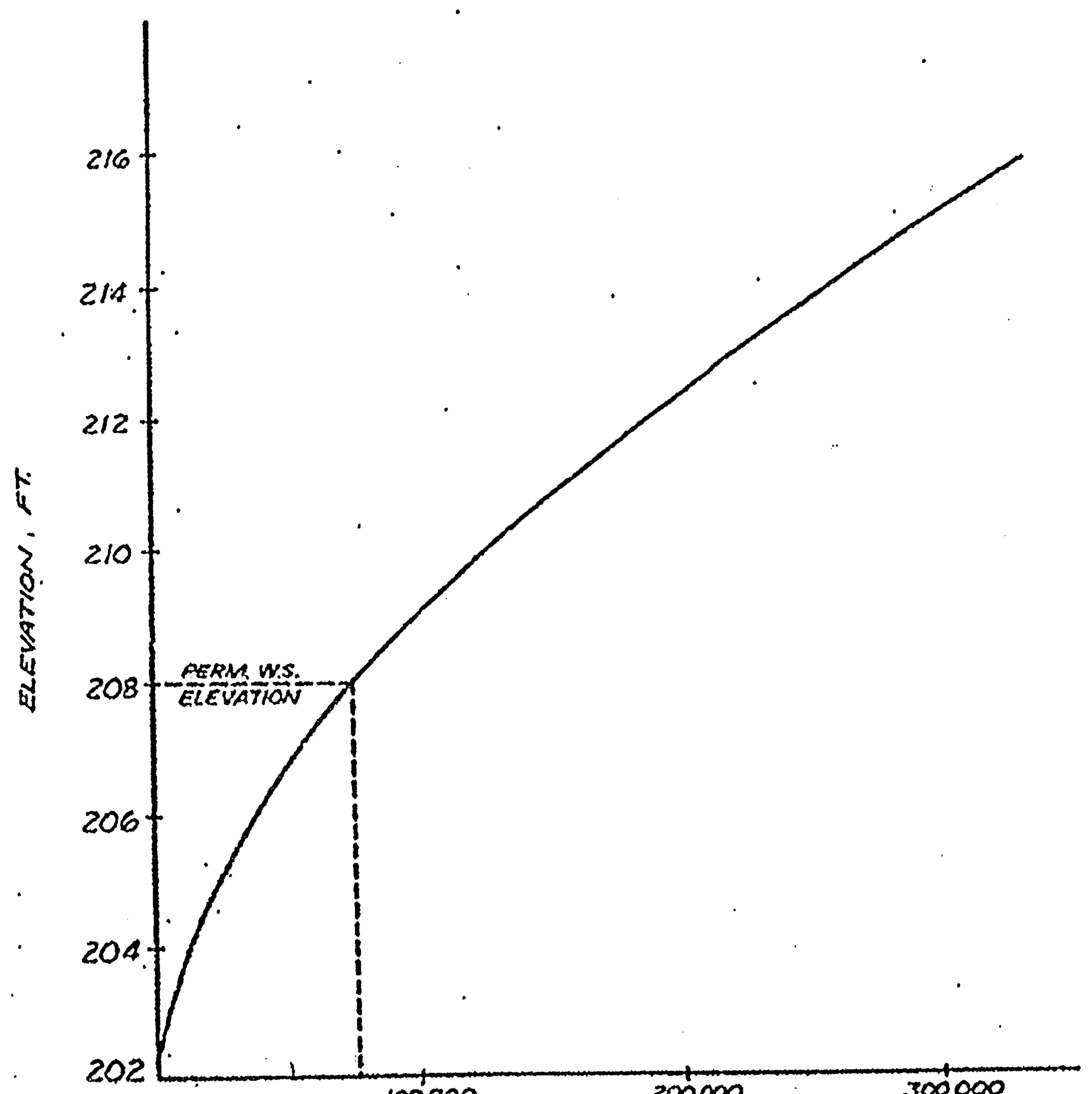
MAX. STORAGE = 249647 FT^3
MAX. ELEVATION = 213.2 FT.
MAX. DISCHARGE = 64.9 CFS

LAKE "A" - MANCHESTER LAKES 100 YR.- 2 HR. STORM

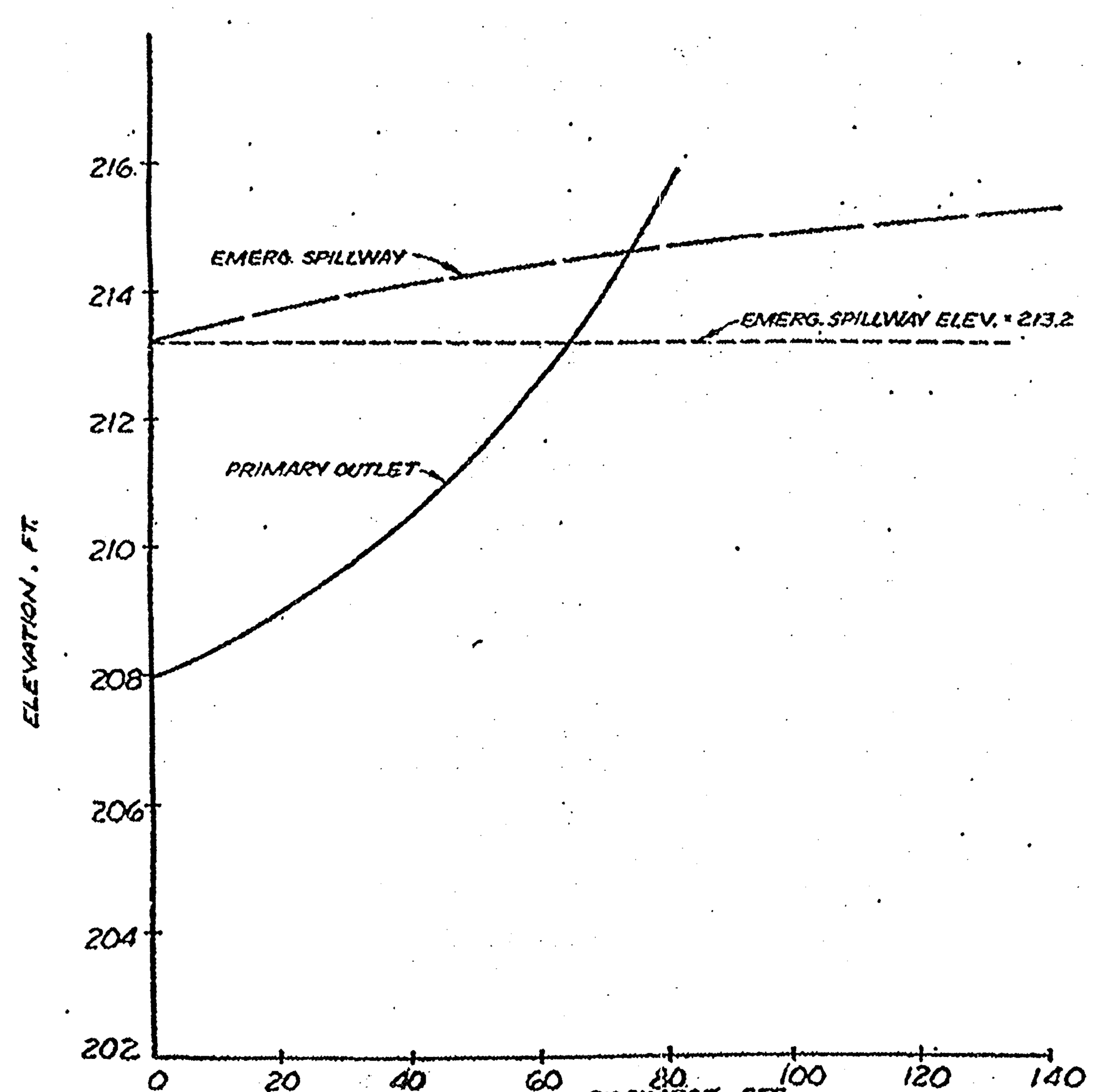
NOTE: ASSUMES BLOCKAGE OF PRIMARY OUTLET

TIME min.	INFL. RT. CFS	AVE. INFL. RATE	VOLUME CF	STORAGE CARRYOVER	TOTAL CF	TRIAL W.S.ELEV	OUTFLOW CFS	EMER.SPL. OUTFLOW	AVE. OUT. RATE	VOLUME OUT	BAL. IN STORAGE	CORRES. W.S.ELEV.
0	0.0		0.0			208.0	0.0			0.0	77186.0	
5	190.1	94.0	28207.5	77186.0	105313.5	209.2	0.0	0.0	0.0	0.0	105313.5	209.2
10	308.4	249.2	74467.8	105313.5	179781.3	211.7	0.0	0.0	0.0	0.0	179781.3	211.7
15	259.1	279.3	83776.3	179781.3	263557.6	214.0	0.0	34.3	17.2	5151.9	258405.7	214.0
20	164.0	207.0	62112.9	258405.7	320518.6	215.0	0.0	115.9	75.1	22539.6	297979.8	214.9
25	127.9	145.9	43778.0	297979.8	341757.1	215.2	0.0	135.8	125.8	37752.3	304004.7	215.2
30	103.4	115.7	34695.2	304004.7	338699.9	215.0	0.0	115.9	125.8	37752.3	300947.6	215.1
35	88.4	95.9	28771.7	300947.6	329719.3	214.9	0.0	106.4	111.2	33346.7	296372.6	214.9
40	79.0	83.7	25104.7	296372.6	321477.3	214.8	0.0	97.1	101.8	30530.8	290946.5	214.8
45	69.6	74.3	22283.9	290946.5	313230.4	214.7	0.0	88.2	92.7	27799.0	285431.4	214.7
50	60.9	65.3	19576.0	285431.4	305007.4	214.6	0.0	79.5	83.8	25154.1	279853.3	214.6
55	56.4	58.7	17601.5	279853.3	297454.8	214.5	0.0	71.1	75.3	22598.9	274855.9	214.5
60	49.6	53.0	15909.0	274855.9	290765.0	214.3	0.0	55.4	63.3	18978.6	271786.4	214.3
65	44.4	47.0	14103.8	271786.4	285890.1	214.3	0.0	55.4	55.4	16613.1	269277.0	214.2
70	39.1	41.7	12524.1	269277.0	281801.1	214.2	0.0	48.0	51.7	15506.6	266294.6	214.2
75	37.0	38.4	11508.7	266294.6	277803.2	214.1	0.0	41.0	44.5	13347.5	264455.7	214.1
80	30.1	33.8	10154.7	264455.7	274610.4	214.1	0.0	41.0	41.0	12294.9	262315.5	214.1
85	26.3	28.2	8462.3	262315.5	270777.8	214.0	0.0	34.3	37.7	11299.4	259478.4	214.0
90	21.8	24.1	7221.1	259478.4	266699.5	213.9	0.0	28.1	31.2	9360.7	257338.8	213.9
95	18.1	19.9	5980.0	257338.8	263318.8	213.8	0.0	22.3	25.2	7563.8	255747.0	213.8
100	14.3	16.2	4851.7	255747.0	260599.5	213.8	0.0	22.3	22.3	6692.5	253907.0	213.8
105	10.5	12.4	3723.4	253907.0	257630.4	213.7	0.0	17.8	19.6	5891.0	251738.5	213.7
110	7.1	8.8	2631.5	251738.5	254398.0	213.7	0.0	17.8	17.8	5091.2	249298.9	213.7
115	3.4	5.3	1579.6	249298.9	250878.5	213.6	0.0	12.1	14.6	4367.1	246511.4	213.6
120	0.0	1.7	507.7	246511.4	247019.2	213.5	0.0	7.9	10.0	3004.6	244014.6	213.5

MAX STORAGE = 341757 FT^3
MAX. ELEVATION = 215.2 FT
MAX. DISCHARGE = 135.8 CFS



ELEVATION/STORAGE DIAGRAM



ELEVATION/DISCHARGE DIAGRAM

POST-DEVELOPMENT DRAIN. AREA/RUN-OFF COEFFICIENTS

NEIGHBORHOOD/SITE	DRAINAGE AREA (ACRES)	"C"	C×A
NEIGHBORHOODS 3 & 9	6.72	0.65	4.37
NEIGHBORHOOD 1	3.86	0.65	2.51
PHASE II ROADS	0.60	0.90	0.54
PARCEL "J"	3.30	0.65	2.15
DAY CARE CENTER	1.15	0.60	0.69
PARCEL "K"	1.86	0.25	0.47
FC PA ACCESS ROAD	0.62	0.90	0.56
PARCEL "N"	16.13	0.88	14.25
ARRINGTON TRACT	1.01	0.40	0.40
PHASE III A ROADS	4.27	0.90	3.84
PARCEL "O"	0.79	0.60	0.51
CHURCH & RES PROP.	7.76	0.50	3.88
LAKE PARCEL "A"	1.25	0.40	0.50
PHASE III B ROADS	3.27	0.90	2.94
TOTAL	52.59	0.715	37.61

THIS DOCUMENT WAS MICROFILMED
OCT 28 1988
BY COMMONWEALTH MICROGRAPHICS

PRE-DEVEL. FLOW AT OUTFALL POINT

DRAINAGE AREA = 42.36 ACRES
C = 0.35
tc = 15 MIN.
I_2 = 3.5 IN/HR
I_{10} = 5.0 IN/HR
I_{100} = 7.0 IN/HR

Q_2 = 0.35 (3.5) 42.36 = 51.9 CFS
Q_{10} = 0.35 (5.0) 42.36 = 74.1 CFS
Q_{100} = 0.35 (7.0) 42.36 = 103.8 CFS

POST-DEVELOPMENT FLOW tc = 10 MIN.

Q_2 = 0.715 (4.1) 52.59 = 154.20 CFS
Q_{10} = 0.715 (5.9) 52.59 = 221.9 CFS
Q_{100} = 0.715 (8.2) 52.59 = 308.4 CFS

...ation No. SE ... C. Lewis
APPROVED ... PLAN
SEE DEV. CONDS. DATED 9-21-05
Date of (BOS) (BZA) approval 12-5-05
Sheet

NOTE: IT SHALL BE THE RESPONSIBILITY OF THE CONTRTACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL UTILITIES WITHIN THE CONSTRUCTION AREA OF THESE PLANS. TEST PITS SHALL BE REQUESTED A MINIMUM OF 48 HOURS IN ADVANCE FOR THOSE UTILITIES REQUIRING THEM.

NOTE: ALL CONSTRUCTION SHALL CONFORM TO FAIRFAX COUNTY AND VIRGINIA DEPARTMENT OF TRANSPORTATION STANDARDS AND SPECIFICATIONS.

NOTE: FOR V.D.O.T REVIEW: ADDITIONAL STORAGE PROVIDED BY INFLUENT STORM PIPE CHANGES THE AVAILABLE VOLUME BY ≈ 0.4%, NOT SIGNIFICANT IN ACCURACY OF ROUTING.

COMMONWEALTH OF VIRGINIA
JACK E. RINKER
No. 3958
CERTIFIED PROFESSIONAL ENGINEER

NO.	DESCRIPTION	REVIEW BY	APPROVED BY	DATE

REVISIONS APPROVED BY ENVIRONMENTAL MANAGEMENT

STORM HYDROGRAPHS & ROUTINGS

LAKE PARCEL "A"
MANCHESTER LAKES
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

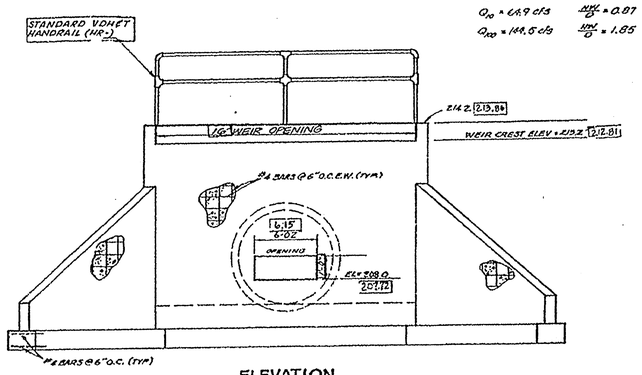
DRAFT: JBE
DESIGN: ARD
CHECK:
DATE: JAN. 22, 1988

RINKER-DETWILER AND ASSOCIATES, P.C.
ENGINEERING • SURVEYING • LAND PLANNING
FAIRFAX, VIRGINIA
rda

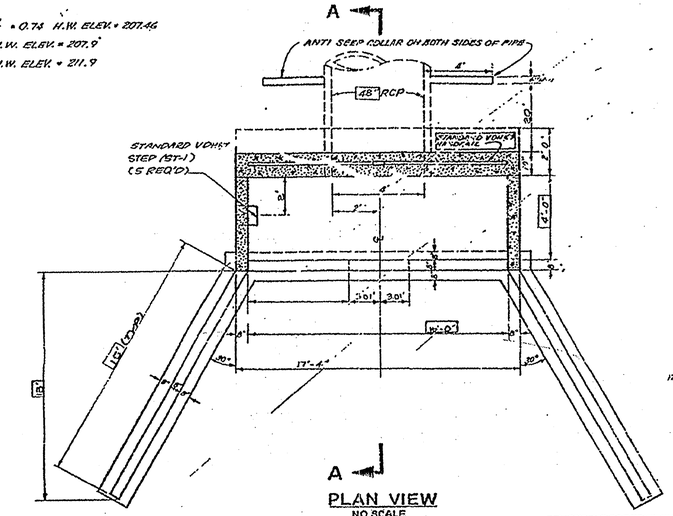
FOR INFORMATION ONLY

82-013-H-H

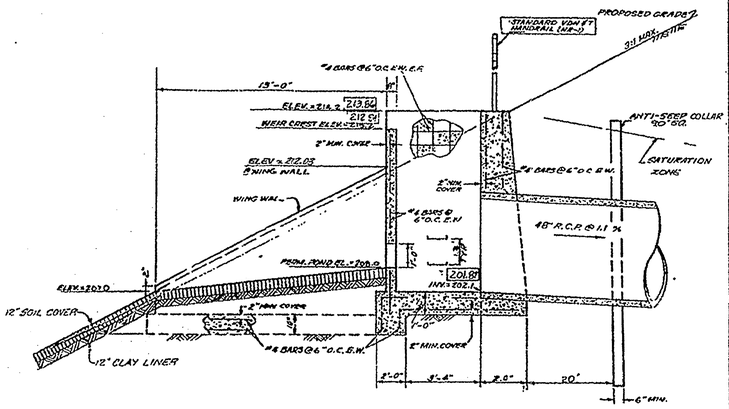
Q_{25} = 51.9 cfs FOR 48" PIPE $\frac{HW}{D}$ = 0.75 H.W. ELEV. = 207.46
Q_{10} = 64.9 cfs $\frac{HW}{D}$ = 0.87 H.W. ELEV. = 207.9
Q_{100} = 144.5 cfs $\frac{HW}{D}$ = 1.85 H.W. ELEV. = 211.9



ELEVATION
NO SCALE



PLAN VIEW
NO SCALE

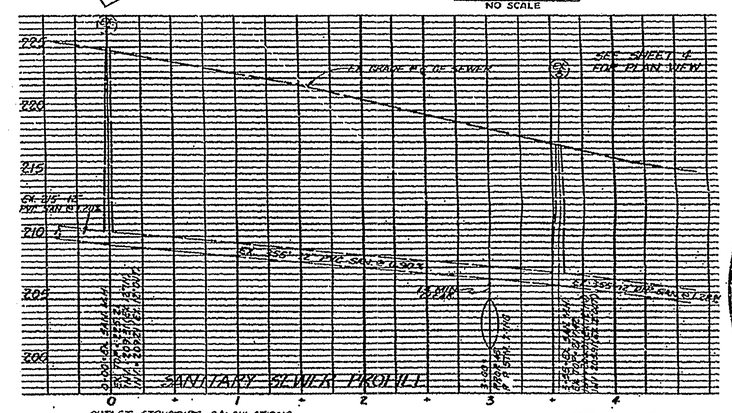


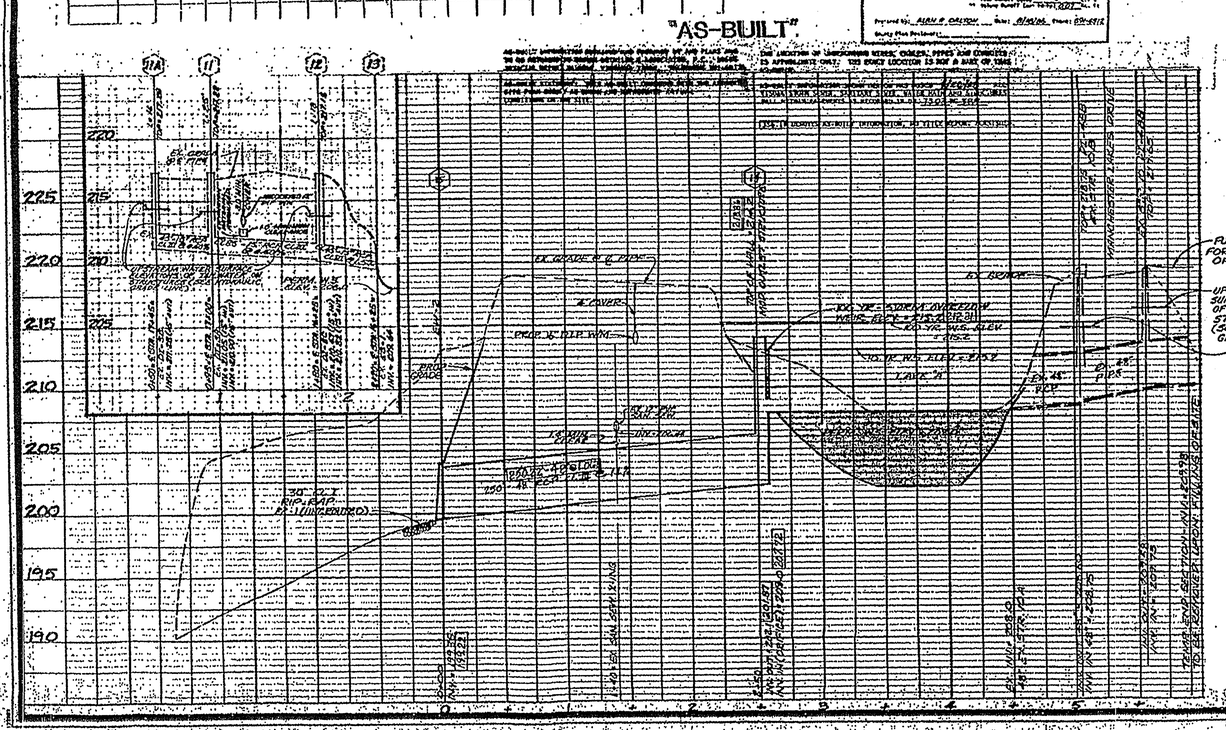
SECTION A-A
NO SCALE

HYDRAULIC GRADE LINE — PROJECT:

	INLET STATION	Outlet Water Surface Elev.	D_o	Q_o	L_o	S_{f_o} %	H_f	JUNCTION LOSS V_o	H_b	Q_i	V_i	Q_iV_i	$\frac{V_i^2}{2g}$	H_i	Angle	H_Δ	H_t	1.5 H_t	0.5 H_t	Final H	Inlet Water Surface Elev.	Rim Elev.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
	EX. 12	212.20	15	5.1	45	0.62	0.28	6.5	0.16	3.3	4.3	14.2	0.29	0.10	45°	0.17	0.43	0.56	0.28	0.56	213.76	217.15
	EX. 11	213.76	15	3.3	85	0.26	0.22	4.3	0.07	2.9	4.3	12.5	0.29	0.10	28°	0.08	0.25	0.33	0.17	0.38	214.14	217.00
SEE ROUTINGS	EX. 11A	214.14	15	2.9	45	0.19	0.09	4.3	0.29	—	—	—	—	—	—	—	0.29	0.38	0.19	0.29	214.43	217.28
	EX. 10B	215.20	48	16.8	40	1.39	0.56	11.9	0.55	16.6	11.9	195.9	2.2	0.77	0°	—	1.32	1.72	0.86	1.42	216.62	218.73
	EX. 10	214.62	48	16.6	55	1.38	0.76	11.9	0.55	115.9	10.5	1217	1.71	0.60	45°	0	1.15	1.50	0.75	1.51	216.13	219.65
SEE ROUTINGS	EX. 9	216.13	48	115.9	35	0.65	0.23	9.2	0.33	—	—	—	—	—	—	—	—	—	—	—	—	INV. = 210.08

"AS-BUILT"





OUTLET STRUCTURE CALCULATIONS

2-YEAR STORM - BASED ON ORIFICE FLOW

$Q_{25} = CA\sqrt{2gh}$ WHERE C = 0.62
A = 6.02 FT²
g = 32.2 FT/SEC²
h = HEIGHT OF WATER ABOVE ℄ OF OPENING = 211.5 - 208.5 = 3.0

$Q = 0.62(6.02)(2(32.2)(3))^{0.5}$

Q_{25} = 51.7 CFS (ALLOWABLE = 51.7)

10-YEAR STORM - BASED ON ORIFICE FLOW

$Q_{10} = CA\sqrt{2gh}$ C = 0.62
A = 6.02 FT²
g = 32.2 FT/SEC²
h = 213.0 - 208.5 = 4.5'

$Q_{10} = 0.62(6.02)(2(32.2)(4.5))^{0.5}$

Q_{10} = 64.9 CFS (ALLOWABLE = 74.1)

100-YEAR STORM

W/ PRIMARY OUTLET BLOCKED - WEIR FLOW

$Q = C_W L h^{3/2}$ WHERE C_W = 3
h = HEIGHT ABOVE WEIR = 2.0 (215.0 - 213.0)
L = LENGTH

$Q = (3.0)(16)(2)^{1.5}$ = 135.8 CFS

W/ PRIMARY OUTLET OPEN - ORIFICE & WEIR FLOW

MAX W.S. ELEV. = 214.5

PRIMARY OUTLET: $Q = CA\sqrt{2gh}$
$= 0.62(6.02)((44.4)(2))^{0.5}$
= 75.4 CFS

EMER. SPILLWAY: $Q = C_W L h^{3/2}$
$= (3.0)(16)(1.3)^{1.5}$
= 71.1 CFS

MAX. RATE = 144.6 CFS
∴ USE FOR OUTFALL SEWER DESIGN

COMMONWEALTH OF VIRGINIA
JACK E. RINKER
No. 3958
CERTIFIED PROFESSIONAL ENGINEER

NOTE: IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL UTILITIES WITHIN THE CONSTRUCTION AREA OF THESE PLANS. TEST PITS SHALL BE REQUESTED A MINIMUM OF 48 HOURS IN ADVANCE FOR THOSE UTILITIES REQUIRING THEM.

NOTE: "ALL CONSTRUCTION SHALL CONFORM TO FAIRFAX COUNTY AND VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION STANDARDS AND SPECIFICATIONS."

AS-BUILT

NO.	DESCRIPTION	REVIEW BY	APPROVED BY	DATE

REVISIONS APPROVED BY ENVIRONMENTAL MANAGEMENT

SCALE	OUTLET STRUCTURE DETAIL, PROFILES, AND HYD. GRADE LINE
HOR. 1"=50'	
VERT. 1"=5'	LAKE "A"
DRAFT.	MANCHESTER LAKES
DESIGN: ARD	LEE DISTRICT
CHECK	FAIRFAX COUNTY, VIRGINIA
DATE: JUN 22, 1988	

THIS DRAWING WAS MICROFILMED JAN 30 1990 BY COMMUNICATION DESIGNS MICROGRAPHIC CENTER

RINKER-DETWILER AND ASSOCIATES, P.C.
ENGINEERING • SURVEYING • LAND PLANNING
FAIRFAX, VIRGINIA

Date 12-8-05
APPROVED BY SR PLAN
(BOS) (BM) approval 12-8-05
Sheet 10 of 11

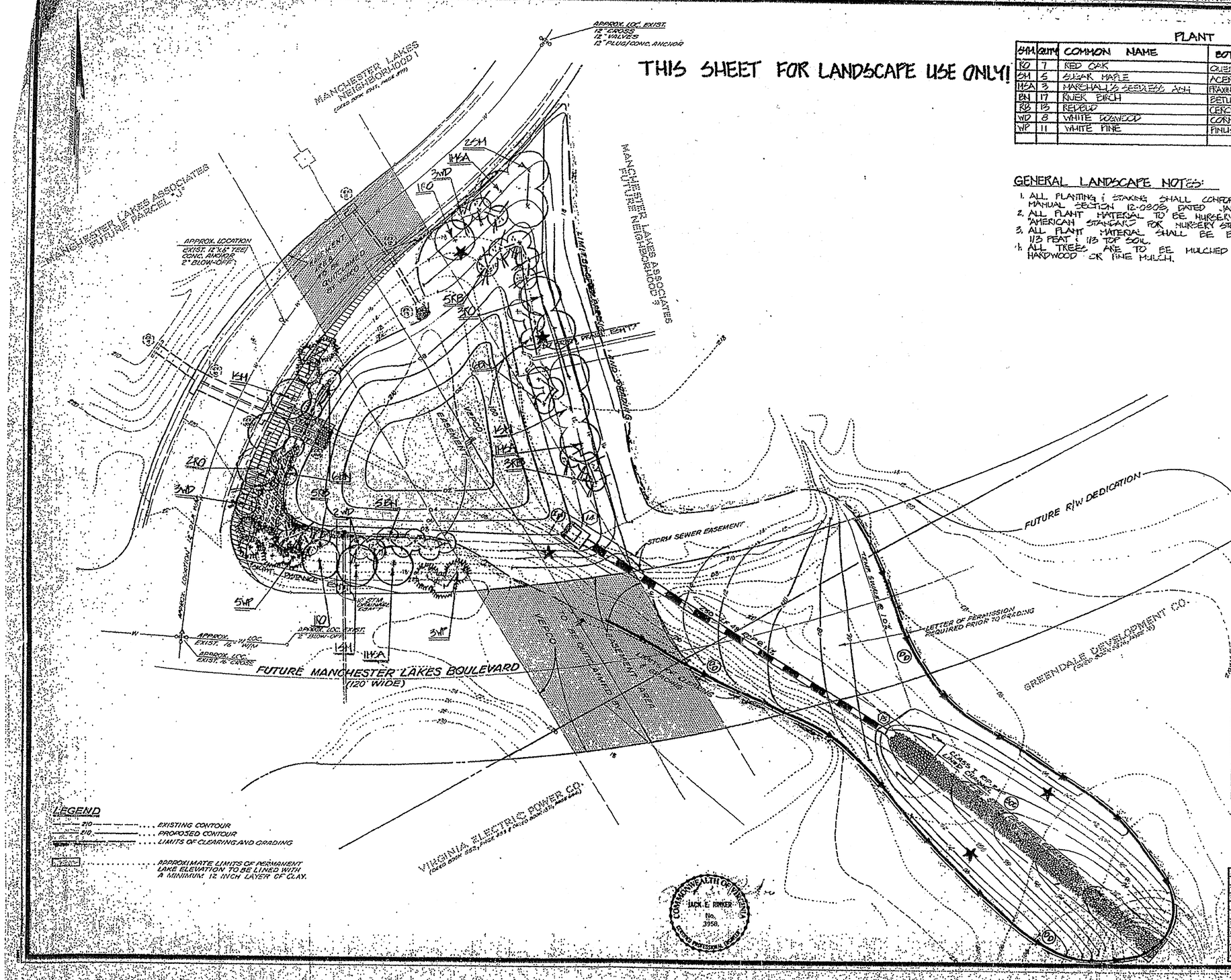
SHEET 7 OF 9

FOR INFORMATION ONLY

F 10

82-013-H-H

THIS SHEET FOR LANDSCAPE USE ONLY!



PLANT SCHEDULE

SYM.	QUTY.	COMMON NAME	BOTANICAL NAME	SIZE	REMARKS
RO	7	RED OAK	QUERCUS RUBRA	2-2 1/2" CAL.	B&B
SM	5	SUGAR MAPLE	ACER SACCHARUM	"	"
MSA	3	MARSHALL'S SEEDLESS ASH	FRAXINUS PENNSYLVANICA MARSHALL'S SEEDLESS	"	"
BN	17	RIVER BIRCH	BETULA NIGRA	6-8'	B&B MULTI STEM
RB	13	REDBUD	CERCIS CANADENSIS	6-8'	B&B
WD	8	WHITE DOGWOOD	CORNUS FLORIDA	6-8'	B&B
WP	11	WHITE PINE	PINUS STROBUS	6-8'	B&B

GENERAL LANDSCAPE NOTES:

1. ALL PLANTING & STAKING SHALL CONFORM TO FAIRFAX COUNTY PUBLIC FACILITIES MANUAL SECTION 12-0808, DATED JANUARY 1, 1985.
2. ALL PLANT MATERIAL TO BE NURSERY GROWN AND TO COMPLY WITH THE "AMERICAN STANDARD FOR NURSERY STOCK", ANSI Z601-1980.
3. ALL PLANT MATERIAL SHALL BE BACKFILLED WITH A MIXTURE OF 1/3 SOIL, 1/3 PEAT & 1/3 TOP SOIL.
4. ALL TREES ARE TO BE MULCHED WITH NO LESS THAN 3" SHREDDED HARDWOOD OR PINE MULCH.

NOTE: IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL UTILITIES WITHIN THE CONSTRUCTION AREA OF THESE PLANS. TEST PITS SHALL BE REQUESTED A MINIMUM OF 48 HOURS IN ADVANCE FOR THOSE UTILITIES REQUIRING THEM.

NOTE: "ALL CONSTRUCTION SHALL CONFORM TO FAIRFAX COUNTY AND VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION STANDARDS AND SPECIFICATIONS."

NO	DESCRIPTION	APPROVED BY	DATE

REVISIONS APPROVED BY ENVIRONMENTAL MANAGEMENT

Location No. SE 2005-LE-[illegible]
APPROVED BY [illegible]
SEE DEV. CONDS DATED [illegible]
Date of BOS [illegible]
Sheet [illegible]

COMMONWEALTH OF VIRGINIA JACK E. RINKER No. 3958 CERTIFIED PROFESSIONAL ENGINEER

SCALE: 1"=30'	LANDSCAPE PLAN
DESIGN: H.A.H.	LAKE "A"
DRAFT: H.A.H.	MANCHESTER LAKES
CHECK:	LEE DISTRICT
DATE: JAN. 22, 1988	FAIRFAX COUNTY, VIRGINIA

RINKER-DETWILER AND ASSOCIATES, P.C.
ENGINEERING • SURVEYING • LAND PLANNING
FAIRFAX, VIRGINIA

SHEET 9 OF 9

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