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: **YR012**

DATE VERIFIED: **April 6, 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: YR012

PIN: 3330100011A

Subdivision, Tract, Business or Owner Name (if known): 60 West Business Park

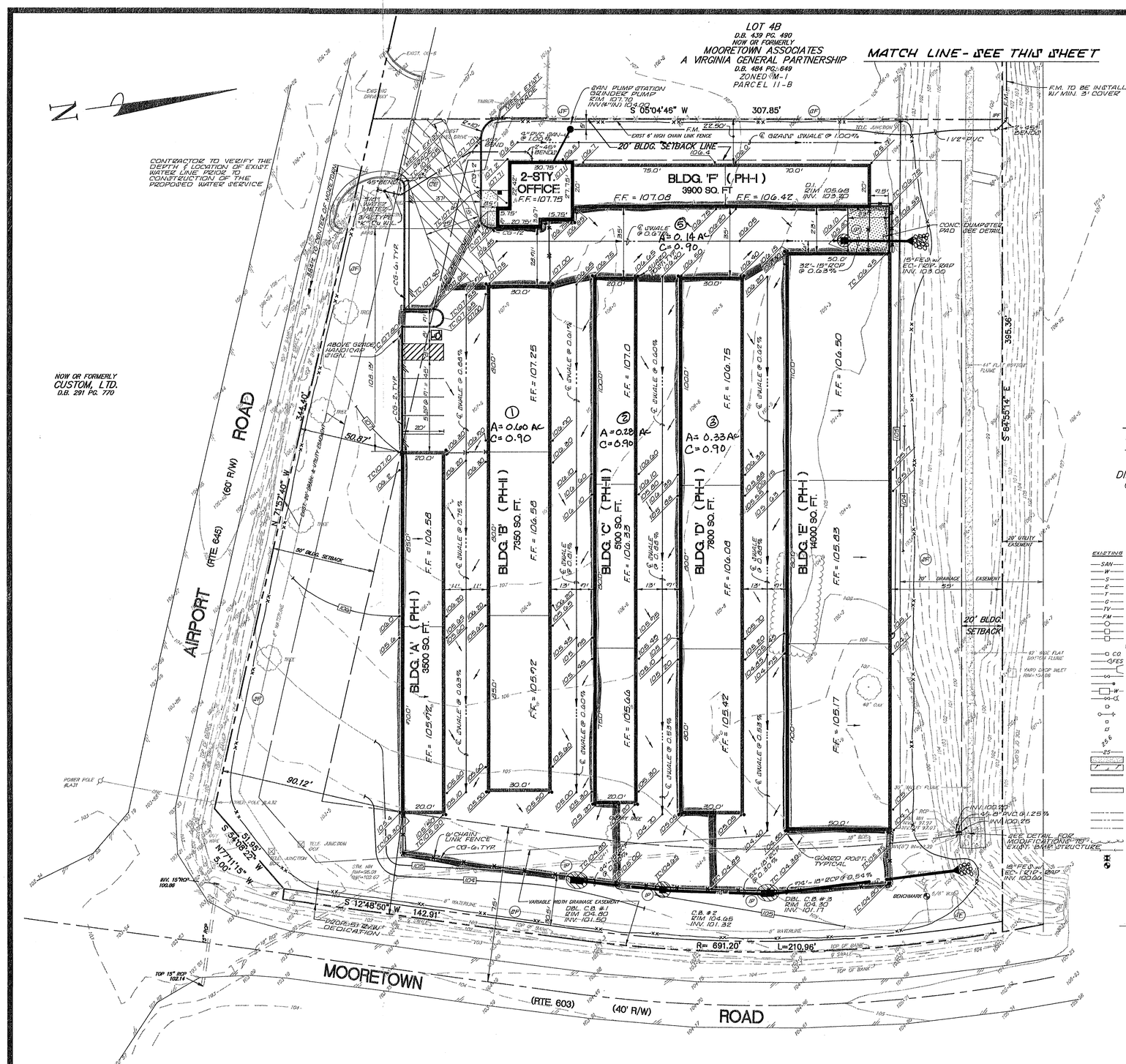
Property Description: Lot 4; Mini-Storage Facility

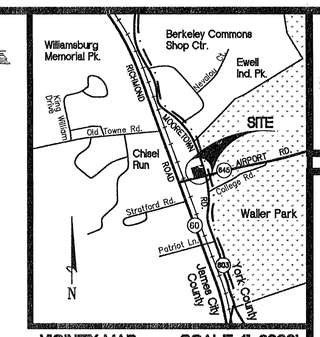
Site Address: 5424 Airport Road

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

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

Comments
As of 3/10/10, Owner or Responsible Party: Fine, Louis B Family Limited Partnership





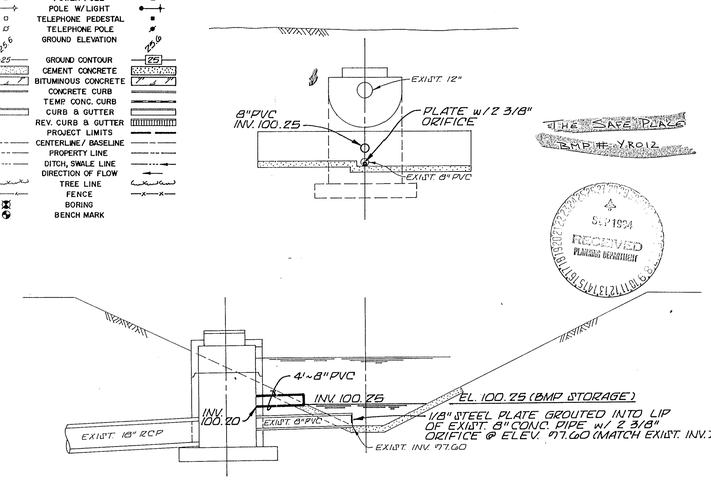
VICINITY MAP SCALE: 1"=2000'

Statistical Data

Client/Proposed Owner		The Safe Place Mathew D. Fine 15900 Warwick Blvd. Newport News, VA 23602
Tax Map Number		33-3
Parcel #		11-A
Site is Zoned		M-1
Area of Proposed Buildings		42,610 SF = 30.7%
Area of Proposed Parking and Walk		39,718 SF = 28.7%
Green Area		56,280 SF = 40.6%
Total Site Area		138,608 SF = 100%
Parking Required		4 Reg + 1 HP = 5 total
Parking Provided		5 Reg + 1 HP = 6 total
Height of Building	Office	34' - 6'
	Building A	8' - 8"
	Building B	8' - 10½"
	Building C	8' - 8"
	Building D	8' - 10½"
	Building E	9' - 3½"
	Building F	8' - 8"

NOTE: ALL SIGNS SHALL MEET THE REQUIREMENTS OF ARTICLE 7 OF JAMES CITY COUNTY ZONING ORDINANCE

SITE APPEARS TO LIE WITHIN FLOOD ZONE X ACCORDING TO THE F.E.M.A. FLOOD HAZARD BOUNDRY MAP COMM. No. 510201 PANEL 0035 B, DATED 02/10/91.



MODIFICATIONS TO EXISTING BMP STRUCTURE
N.T.S.

THE SAFE PLACE
SP#118 YR012

RECEIVED
SEP 1994
PLANNING DEPARTMENT

DRAINAGE AREA MAP

GRAPHIC SCALE SCALE: 1" = 25'
25 0 12.5 25 50 100

COMMONWEALTH OF VIRGINIA
LARRY S. BARRY
No. 009490
PROFESSIONAL ENGINEER

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

DES.	WC
DWN.	CFR/JAM
CHK.	KSM
DATE	9/28/94

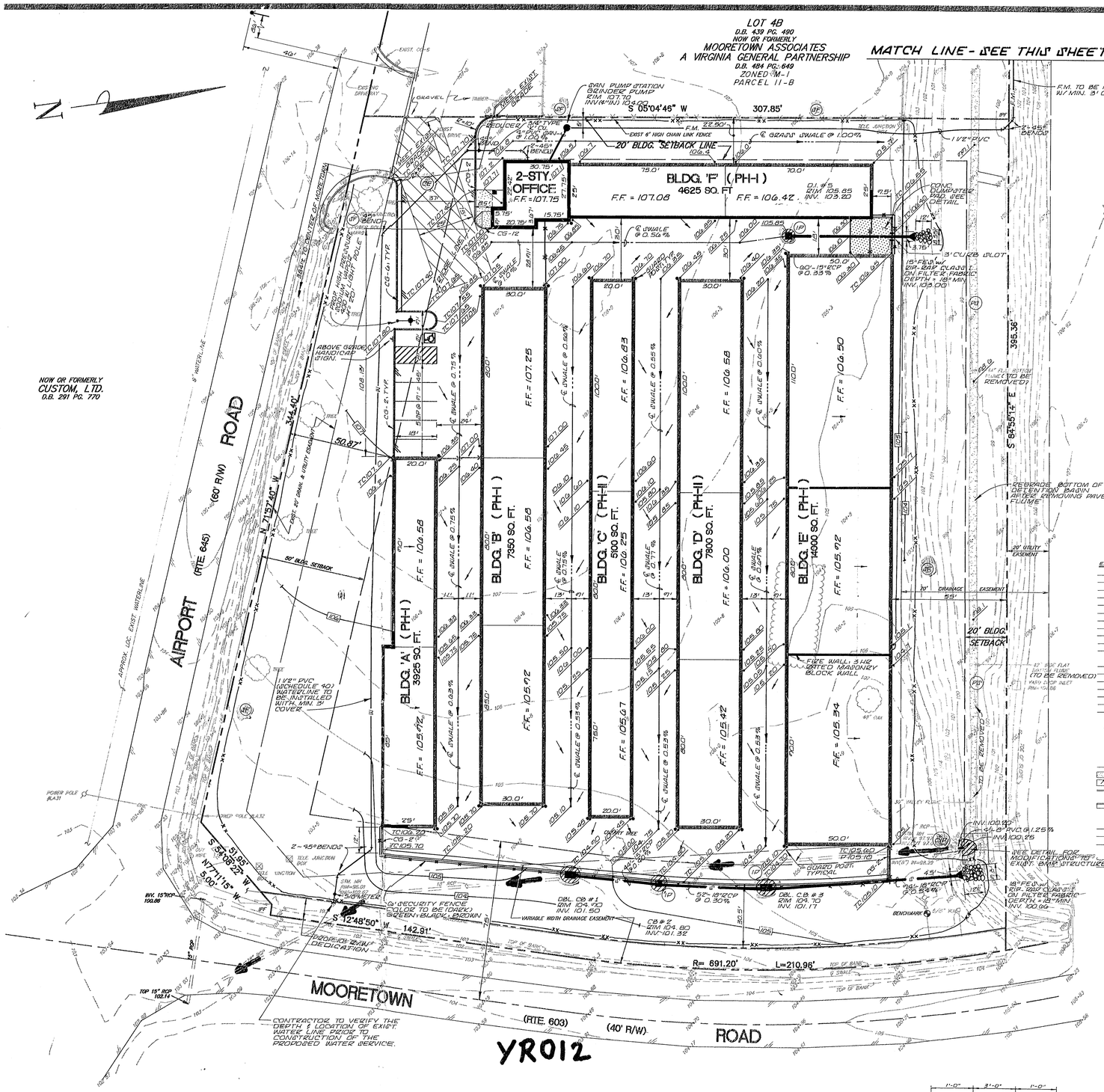
SITE DEVELOPMENT PLAN
FOR
MINI-STORAGE FACILITIES
ON
PARCEL 4A
60 West Business Park
James City County, Virginia

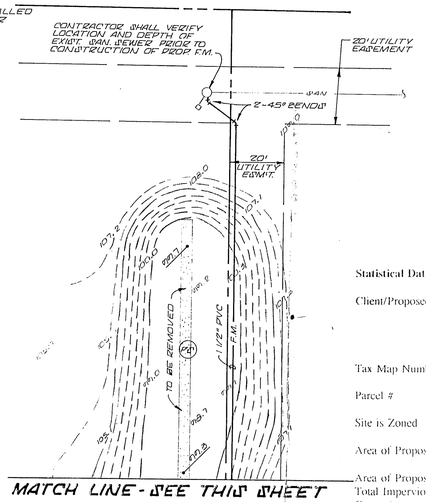
PROJ. NO.	94051
SCALE:	1" = 25'
SHEET	1 OF
DWG. NO.	

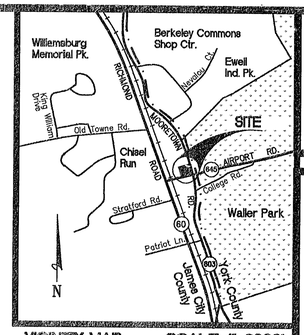
\94051\MINITOPO.dwg, 1" = 25' , 09/24/94 at 12:47

SP-118-94

YR012_60_WEST_BUSINESS_PARK - 003







VICINITY MAP SCALE: 1"=2000'

COMMONWEALTH OF VIRGINIA
LARRY S. BARRY
No. 002490
PROFESSIONAL ENGINEER

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

Statistical Data

Client/Proposed Owner	The Safe Place Mathew D. Fine 15900 Warwick Blvd. Newport News, VA. 23602
Tax Map Number	33-3-01-0-0011-A
Parcel #	11-A
Site is Zoned	M-1
Area of Proposed Buildings	42,800 SF = 30.9%
Area of Proposed Parking and Walk	39,000 SF = 28.1%
Total Impervious Area	81,800 SF = 59.0%
Green Area	56,808 SF = 41.0%
Total Site Area	138,608 SF = 100%
Parking Required	2 Reg.
(1 space per employee 2 employees)	
Parking Provided	5 Reg. + 1 HP = 6 total
Height of Building — Office	34' - 6"
Building A	8' - 8"
Building B	8' - 10 1/2"
Building C	8' - 8"
Building D	8' - 10 1/2"
Building E	9' - 3 1/2"
Building F	8' - 8"

NOTE: ALL SIGNS SHALL MEET THE REQUIREMENTS OF ARTICLE 7 OF JAMES CITY COUNTY ZONING ORDINANCE

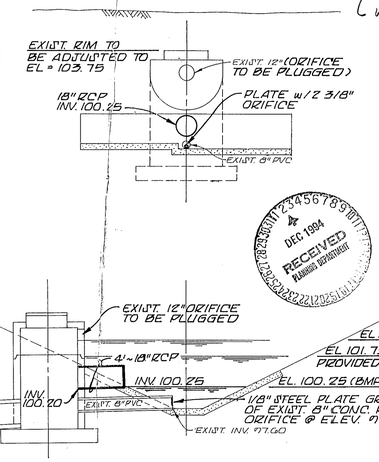
SITE APPEARS TO LIE WITHIN FLOOD ZONE X ACCORDING TO THE F.E.M.A. FLOOD HAZARD BOUNDRY MAP COMM. No. 510201 PANEL 0035 B, DATED 02/16/91.

AS-BUILT DRAWING MUST BE PROVIDED FOR THE DETENTION BASIN WITH THE MODIFICATIONS ON COMPLETION OF CONSTRUCTION.

WHERE IS IT ??

LEGEND

EXISTING		PROPOSED
SAN	SANITARY SEWER	SAN
W	WATER	W
S	STORM SEWER	S
E	ELECTRIC LINE	E
T	TELEPHONE	T
G	GAS LINE	G
TV	CABLE T.V. LINE	TV
FM	FORCE MAIN	FM
	MANHOLE	MH
	CURB DROP INLET	CB
	YARD DROP INLET	DI
	PLASTIC YARD DROP INLET	
CO	CLEANOUT	CO
FES	FLARED END SECTION (W/WINGS)	FES
	HEADWALL	
	VALVE	
	WATER METER	
W	METER VAULT	W
	FIRE HYDRANT	
	POWER POLE	
	POLE W/ LIGHT	
	TELEPHONE PEDESTAL	
	TELEPHONE POLE	
	GROUND ELEVATION	78.6
25	GROUND CONTOUR	25
	CEMENT CONCRETE	
	BITUMINOUS CONCRETE	
	CONCRETE CURB	
	TEMP. CONC. CURB	
	CURB & GUTTER	
	REV. CURB & GUTTER	
	PROJECT LIMITS	
	CENTERLINE/ BASELINE	
	PROPERTY LINE	
	DITCH, SWALE LINE	
	DIRECTION OF FLOW	
	TREE LINE	
	FENCE	
	BORING	
	BENCH MARK	



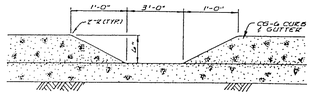
MODIFICATIONS TO EXISTING BMP STRUCTURE
N.T.S.

COUNTY OF JAMES CITY
FINAL SITE PLAN

Received .....

APPROVALS		DATE
Fire Dept.	H.O.	11/23/94
Health Dept.	OSE	10/17/94
Highway Dept.	R.C.B.	11/29/94
Plan. Comm.	AC	12/5/94
Pub. Wks. Dept.	D.E.G.	12/2/94
Zoning Adm.	BT	12/7/94
JCSA	J.C.D.	12/1/94
Other	W.H.B.	11/21/94
Other		

DEC 1994 RECEIVED PLANNING DEPARTMENT



CURB SLOT DETAIL

GRAPHIC SCALE SCALE : 1" = 25'
25 0 12.5 25 50 100

DES.	WC
DWN.	CFR/JAM
CHK.	KSM
DATE	9/28/94

SITE DEVELOPMENT PLAN
FOR
THE SAFE PLACE – MINI STORAGE
ON
PARCEL 4A
60 West Business Park
James City County, Virginia

REV. AS PER CITY REVIEW COMMENTS 11-8-94; REV. PER REQ. 11-19-94

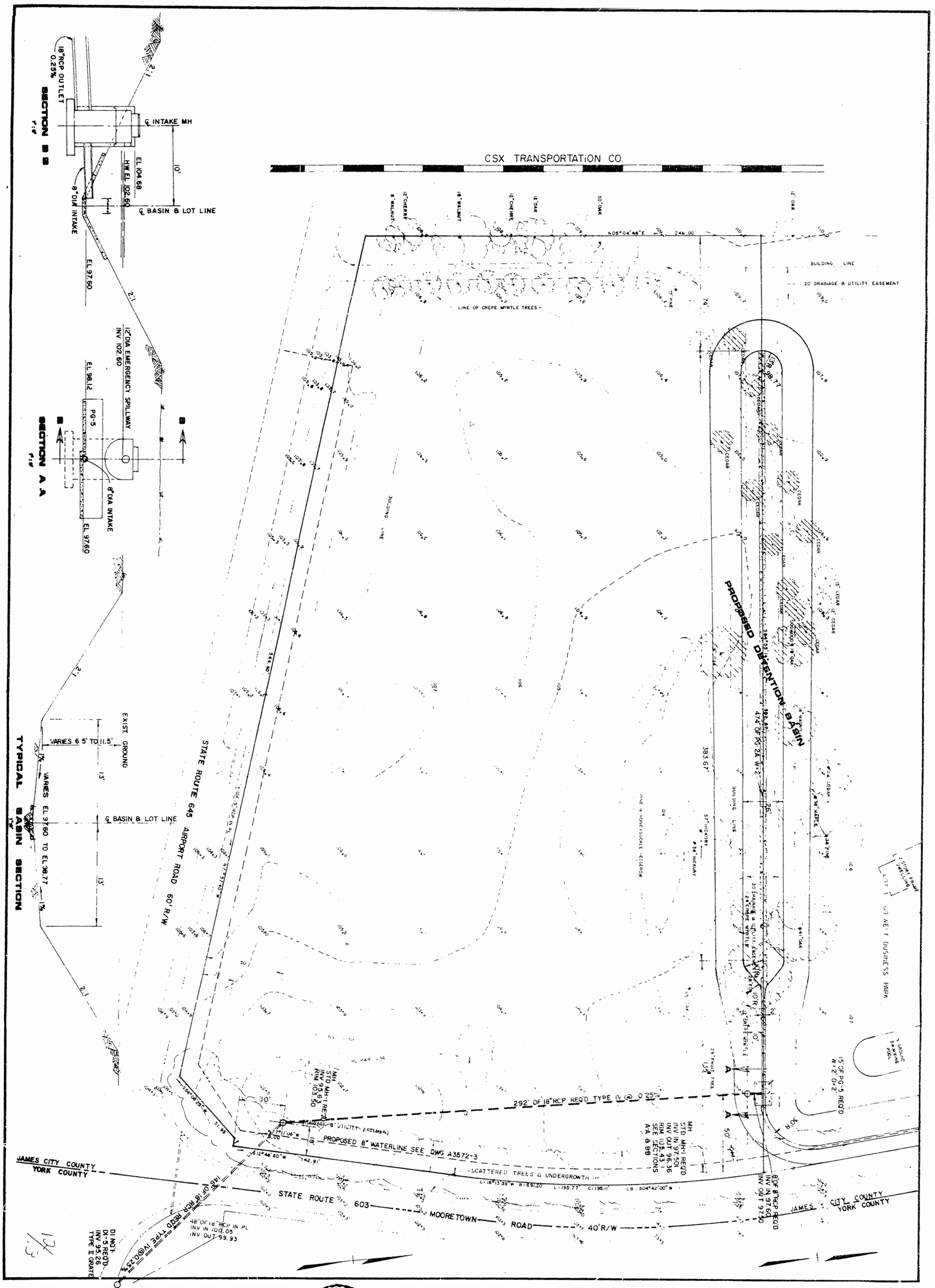
PROJ. NO.	94051
SCALE:	1" = 25'
SHEET	1 OF 5
DWG. NO.	23776 E

1051\MINITOPO.dwg, 1" = 25', 09/24/94 at 12:47

SP-117-94

YR012_60_WEST_BUSINESS_PARK - 004

YR012_60_WEST_BUSINESS_PARK - 005



Designed	Drawn	
Scale 1"=20'	Date DEC. 1987	
Project No. A3572		
Drawing No. A3572-5		

No.	DATE	REVISION / COMMENT / NOTE	BY
2	11/4/88	ADDED PAVED DITCH TO BASIN	
1	7/7/88		

COMMONWEALTH OF VIRGINIA
L. V. Woodson
CERTIFICATE NO. 3122
PROFESSIONAL ENGINEER

60 WEST BUSINESS PARK

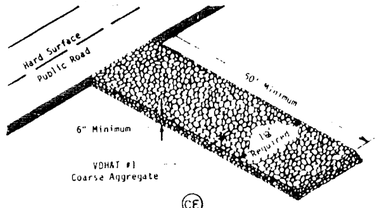
DRAINAGE

MOORETOWN ASSOCIATES OWNER / DEVELOPER

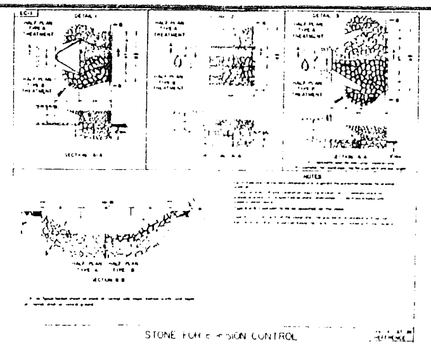
JAMES CITY COUNTY VIRGINIA

L. V. WOODSON & ASSOCIATES, INC.
ENGINEERS, SURVEYORS & PLANNERS
105 BACON AVENUE
WILLIAMSBURG, VIRGINIA 23185

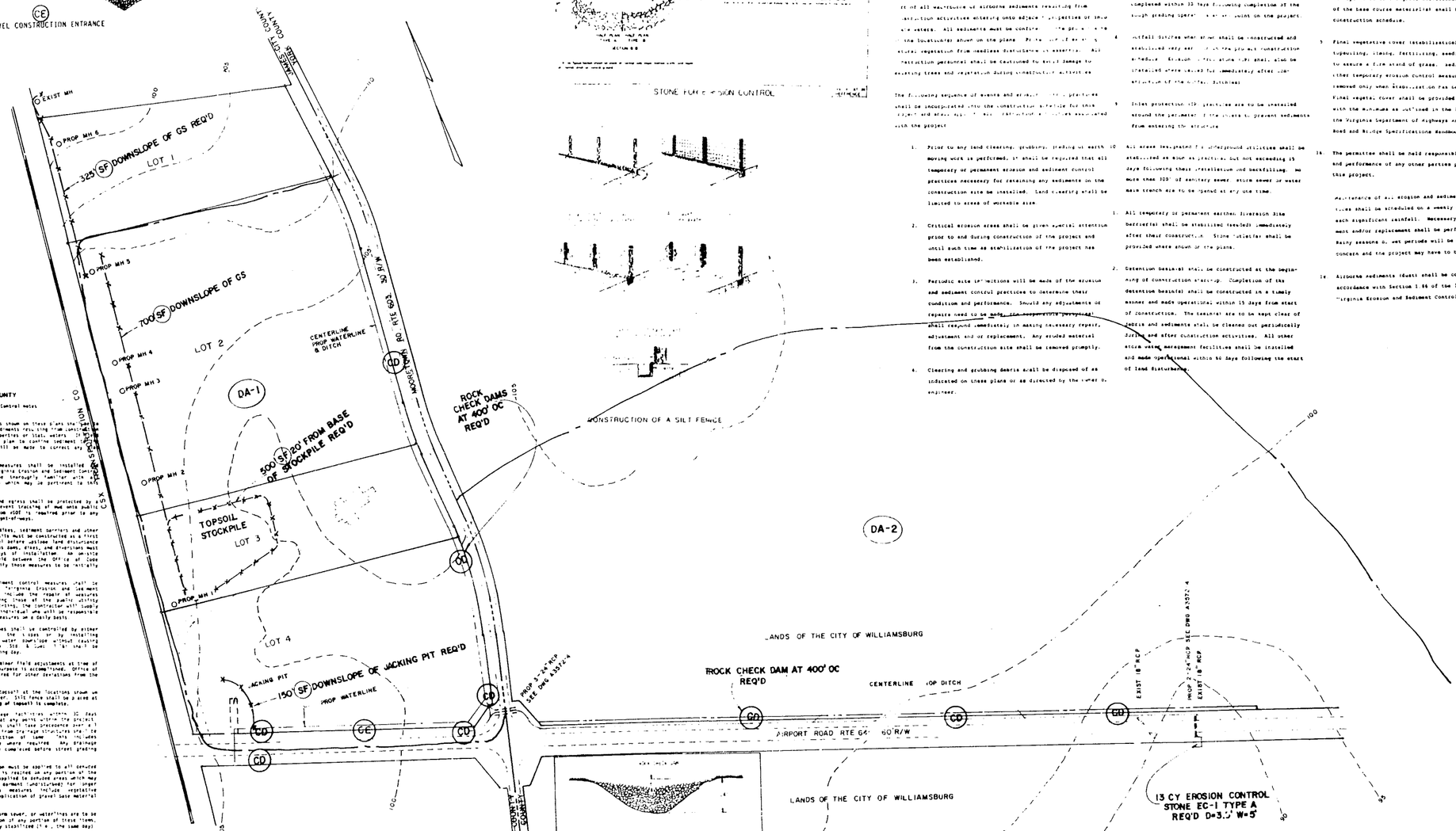
DISCHARGE LINE

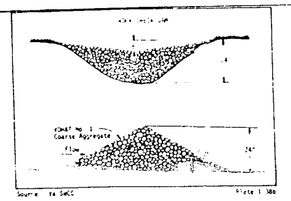


(CE) GRAVEL CONSTRUCTION ENTRANCE



STONE FOR EROSION CONTROL





Source: VA SWCC Plate 1.36b

Source: VA SWCC Plate 1.36c

JAMES CITY COUNTY

Erosion and Sediment Control Notes

The purpose of the erosion control measures shown on these plans and specifications is to control the transport of all waterborne sediments resulting from construction activities from entering onto adjacent properties or state waters. If subsequent inspection reveals the inadequacy of the plan to confine sediment within the project site, appropriate modifications will be made to correct any deficiencies.

1. All erosion and sediment control measures shall be installed and maintained in accordance with the "Virginia Erosion and Sediment Control Handbook". The contractor shall be thoroughly familiar with the applicable measures contained therein which may be pertinent to this project.

2. All points of construction ingress and egress shall be protected by a VDH 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.

3. Sediment basins and traps, perimeter dikes, sediment barriers and other measures intended to trap sediment on-site must be constructed as a first step in grading and be made functional before upslope land disturbance takes place. Earthen structures such as dams, dikes, and diversions must be seeded and mulched within 15 days of installation. An on-site pre-construction meeting will be held between the Office of Code Compliance and the contractor to identify these measures to be initially installed.

4. Maintenance of all erosion and sediment control measures shall be accomplished in accordance with the "Virginia Erosion and Sediment Control Handbook". Maintenance will include the repair of measures damaged by any subcontractor including those of the public utility companies. At the pre-construction meeting, the contractor will supply Code Compliance with the name of the individual who will be responsible for ensuring maintenance of installed measures on a daily basis.

5. Surface flows over cut and fill slopes shall be controlled by either redirecting flows from transversing the slopes or by installing mechanical devices to safely direct water downslope without causing erosion. A temporary fill diversion DIS & SWC 1.01 shall be installed prior to the end of each working day.

6. Sediment control measures may require minor field adjustments at time of construction to insure their intended purpose is accomplished. Office of Code Compliance approval will be required for other deviations from the approved plans.

7. The contractor shall strip and pile topsoil at the locations shown on this plan or as directed by the engineer. Silt fence shall be placed at the toe of the stockpile after stripping of topsoil is complete.

8. The contractor shall complete drainage facilities within 30 days following completion of rough grading at any point within the project. The installation of drainage facilities shall take precedence over all underground utilities. Outfall ditches from drainage structures shall be stabilized immediately after construction of same. This includes installation of erosion control stone where required. Any drainage outfalls required for a street must be completed before street grading begins.

9. Permanent or temporary soil stabilization must be applied to all denuded areas within 15 days after final grade is reached on any portion of the site. Soil stabilization must also be applied to denuded areas which may not be at final grade but will remain dormant (undisturbed) for longer than 30 days. Soil stabilization measures include vegetative establishment, mulching and the early application of gravel base material on areas to be paved.

10. No more than 300' of sanitary sewer, storm sewer, or waterlines are to be open at one time. Following installation of any portion of these items, all disturbed areas are to be immediately stabilized (if e. the same day).

11. If disturbed area stabilization is to be accomplished during the months of December, January, or February, stabilization shall consist of mulching in accordance with Specification 1.13. Seeding will then take place as soon as the season permits.

12. The term Seeding, Final Vegetative Cover or Stabilization, on this plan shall mean the successful germination and establishment of a stand of grass cover from a properly prepared seedbed in accordance with Specification 1.01, the application of seed, lime, and fertilizer in accordance with Specification 1.02, Permanent Seeding. Irrigation shall be required as necessary to ensure establishment of grass cover.

13. All slopes steeper than 3:1 shall require the use of erosion control blankets such as excelsior blankets to aid in the establishment of a vegetative cover. Installation shall be in accordance with Specification 1.15, Mulching and Manufacturer's Instructions.

14. Inlet protection in accordance with Specification 1.06 shall be provided for all storm drain inlets as soon as practical in the course construction of same.

15. Temporary liners, such as polyethylene sheets, shall be provided for all paved ditches until the permanent concrete liner is installed.

16. Paved ditches shall be required wherever erosion is evident. Particular attention shall be paid to those areas where grades exceed 2%.

17. Temporary erosion control measures are not to be removed until all disturbed areas are stabilized. After stabilization is complete, all measures shall be removed within 30 days. Trapped sediment shall be spread and seeded.

18. Off-site waste or borrow areas are to be approved by the Office of Code Compliance or at the option of any person or agent of any water in or from the project site.

19. All paved and/or 2 pipe outfalls will be constructed before road grading and utility installation begins.

20. Temporary vegetative cover (seeding & mulching) shall be provided to all denuded areas that are not designated for paving, underground utilities or structural uses for periods exceeding 30 days. Temporary vegetal cover shall consist of seeding with ryegrass at the rate of 1400/acre, limestone at 2000#/acre, 10-10-10 fertilizer at 1000#/acre and mulch at 2000#/acre. Temporary vegetal cover may be eliminated in favor of the final vegetal cover if site conditions permit and the owner and/or engineer so directs.

21. Pavement base course material(s) shall be placed within 15 days of final sub-grade elevations. Early placement of the base course material(s) shall be included in the construction schedule.

22. Final vegetative cover (stabilization) shall consist of topsoiling, liming, fertilizing, seeding, and mulching to ensure a firm stand of grass. Sediment basins and other temporary erosion control measures are to be removed only when stabilization has been established. Final vegetal cover shall be provided in accordance with the minimums as outlined in the 1982 edition of the Virginia Department of Highways and Transportation Road and Bridge Specifications Handbook.

23. The permittee shall be held responsible for the actions and performance of any other parties performing work on this project.

24. Maintenance of all erosion and sediment control practices shall be scheduled on a weekly basis and after each significant rainfall. Necessary repair, adjustment and/or replacement shall be performed immediately. Rainy seasons or wet periods will be of particular concern and the project may have to be inspected daily.

25. Airborne sediments (dust) shall be controlled in accordance with Section 1.06 of the 1980 edition of the "Virginia Erosion and Sediment Control Handbook.

GENERAL

EROSION AND SEDIMENT CONTROL NOTES

County of York, Virginia

All erosion and sediment control practices shall be in accordance with the current County of York Erosion and Sediment Control Ordinance and the 1980 Virginia Erosion and Sediment Control Handbook. The permittee or his agent and/or contractor shall secure a copy of each publication and thoroughly familiarize themselves with all applicable practices contained therein which may be pertinent to this project.

The purpose of such practices including, but not limited to, those shown on these plan sheets shall be to preclude the transport of all waterborne or airborne sediments resulting from construction activities entering onto adjacent properties or into state waters. All sediments must be confined to the project site or the locations shown on the plans. Prior to commencement of any clearing, vegetation shall be left undisturbed to minimize disturbance as essential. All construction personnel shall be cautioned to avoid damage to existing trees and vegetation during construction activities.

The following sequence of events and erosion and sediment control practices shall be incorporated into the construction schedule for this project and strictly adhered to. All construction activities associated with the project:

1. Prior to any land clearing, grubbing, grading or earth moving work is performed, it shall be required that all temporary or permanent erosion and sediment control practices necessary for retaining any sediments on the construction site be installed. Land clearing shall be limited to areas of workable size.

2. Critical erosion areas shall be given special attention prior to and during construction of the project and until such time as stabilization of the project has been established.

3. Periodic site inspections will be made of the erosion and sediment control practices to determine their condition and performance. Should any adjustments or repairs need to be made, the responsible personnel shall respond immediately in making necessary repair, adjustment and or replacement. Any eroded material from the construction site shall be removed promptly.

4. Clearing and grubbing debris shall be disposed of as indicated on these plans or as directed by the owner or engineer.

5. Stripping and or stockpiling of topsoil operations shall be placed on locations shown on these plans and or as directed by owner or engineer. Silt fence or straw bale barriers shall be erected at the toe of the stockpile(s). The barriers shall be maintained continuously.

6. Construction entrance (CE) stone pad(s) shall be installed concurrently with the initiation of clearing and grubbing operations.

7. The installation of drainage facilities shall take precedence over all other construction activities. Site drainage facilities shall be scheduled to be completed within 30 days following completion of the rough grading operation at any point on the project.

8. Outfall ditches when shown shall be constructed and stabilized very early in the project construction schedule. Erosion control stone (EC-1) shall also be installed where shown or required immediately after construction of the outfall ditches.

9. Inlet protection (IP) practices are to be installed around the perimeter of the inlets to prevent sediments from entering the structure.

10. All areas designated for underground utilities shall be stabilized as soon as practical but not exceeding 15 days following their installation and backfilling. No more than 300' of sanitary sewer, storm sewer or water main trench are to be opened at any one time.

11. All temporary or permanent earthen diversion dike berms(s) shall be stabilized (seeded) immediately after their construction. Stone outlet(s) shall be provided where shown on the plans.

12. Detention basin(s) shall be constructed at the beginning of construction start-up. Completion of the detention basin(s) shall be constructed in a timely manner and made operational within 15 days from start of construction. The basin(s) are to be kept clear of debris and sediments shall be cleaned out periodically during and after construction activities. All other storm water management facilities shall be installed and made operational within 60 days following the start of land disturbance.

13. Temporary vegetative cover (seeding & mulching) shall be provided to all denuded areas that are not designated for paving, underground utilities or structural uses for periods exceeding 30 days. Temporary vegetal cover shall consist of seeding with ryegrass at the rate of 1400/acre, limestone at 2000#/acre, 10-10-10 fertilizer at 1000#/acre and mulch at 2000#/acre. Temporary vegetal cover may be eliminated in favor of the final vegetal cover if site conditions permit and the owner and/or engineer so directs.

14. Pavement base course material(s) shall be placed within 15 days of final sub-grade elevations. Early placement of the base course material(s) shall be included in the construction schedule.

15. Final vegetative cover (stabilization) shall consist of topsoiling, liming, fertilizing, seeding, and mulching to ensure a firm stand of grass. Sediment basins and other temporary erosion control measures are to be removed only when stabilization has been established. Final vegetal cover shall be provided in accordance with the minimums as outlined in the 1982 edition of the Virginia Department of Highways and Transportation Road and Bridge Specifications Handbook.

16. The permittee shall be held responsible for the actions and performance of any other parties performing work on this project.

17. Maintenance of all erosion and sediment control practices shall be scheduled on a weekly basis and after each significant rainfall. Necessary repair, adjustment and/or replacement shall be performed immediately. Rainy seasons or wet periods will be of particular concern and the project may have to be inspected daily.

18. Airborne sediments (dust) shall be controlled in accordance with Section 1.06 of the 1980 edition of the "Virginia Erosion and Sediment Control Handbook.

SUMMARY OF RUNOFF

PREDEVELOPMENT: DA-1 + DA-2 = Q A = 13.67, + 26.02 = 39.69
overland from NW Cor Lot 2 to 1300'E of intersection of Rte 603 & 645 = 1200' + 1300' = 2500'
Diff in elev = 110-91.8 = 18.2
S = 18.2/2500' = 0.0073 Grass Ditch = 21 min
I_{10} = 4in/HR Q_{10} = (39.69)(4)(0.2)=31.75 CFS

POST DEVELOPMENT:
Q_{10}= DA-1 + DA-2
(13.67)(.8)(5) + (26.04)(.2)(5) = 54.68 + 26.04=80.72 CFS
increase in runoff = $\frac{80.72-31.75}{31.75}$ = 154%

LEGEND

SF SILT FENCE
SB SEDIMENT TRAP
TSC TEMPORARY STREAM CROSSING
CE CONSTRUCTION ENTRANCE
EC-1 EROSION CONTROL STONE
PG-2A PAVED DITCH
TID TEMPORARY INTERCEPTOR DIKE
TSB TEMPORARY STRAW BARRIER
CD CHECK DAM

11/13

L. V. WOODSON & ASSOCIATES, INC.
ENGINEERS, SURVEYORS & PLANNERS
105 BACON AVENUE
WILLIAMSBURG, VIRGINIA 23185

60 WEST BUSINESS PARK
EROSION CONTROL

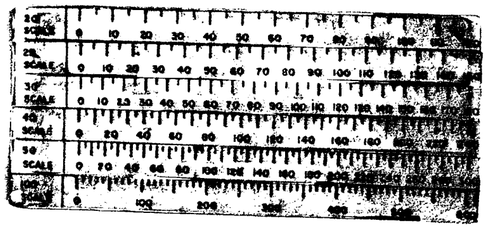
MOORETOWN ASSOCIATES OWNER/DEVELOPER

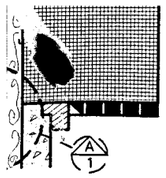
JAMES CITY & YORK COUNTIES VIRGINIA

COMMONWEALTH OF VIRGINIA L. V. WOODSON COMMISSION NO. 3182

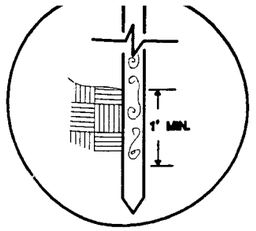
No.	DATE	REVISION / COMMENT / NOTE	BY

Designed LVW	Drawn LVW
Scale 1"=100'	Date MAR 3, 88
Project No. A3572	
Drawing No. A3572-6	





STAKE
ORIENTATION



DETAIL A

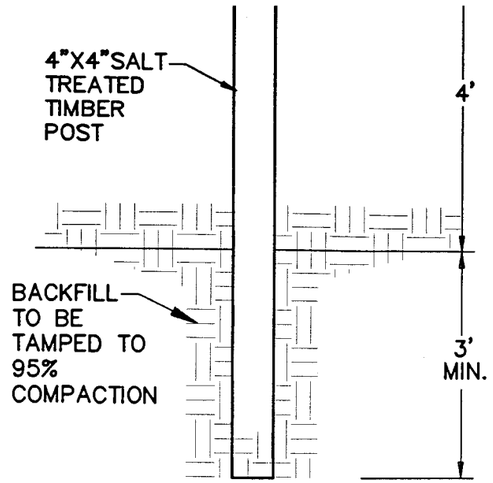
SPECIFIC APPLICATION

METHOD OF INLET PROTECTION IS APPLICABLE WHERE THE DRAINS A RELATIVELY FLAT AREA (SLOPE NO GREATER 5%) WHERE THE INLET SHEET OR OVERLAND FLOWS (NOT EDING 1 C.F.S.) ARE TYPICAL. THE METHOD SHALL NOT Y TO INLETS RECEIVING CONCENTRATED FLOWS, SUCH AS REET OR HIGHWAY MEDIANS.

SILT FENCE DROP INLET PROTECTION

AND SEDIMENT DESIGN MANUAL N.T.S.

D-IPSF.dwg



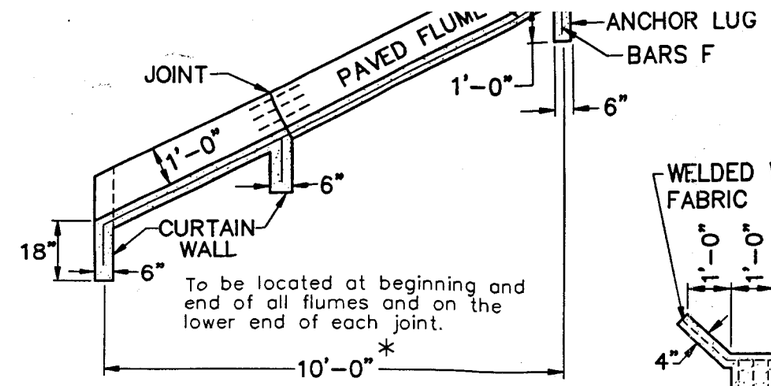
NOTE

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.

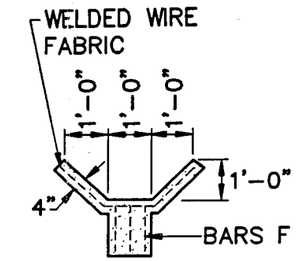
HANDICAP SIGN DETAIL

N.T.S.

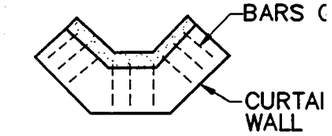
D-HCSIGN-2



SECTION A-A



SECTION B-B



SECTION C-C

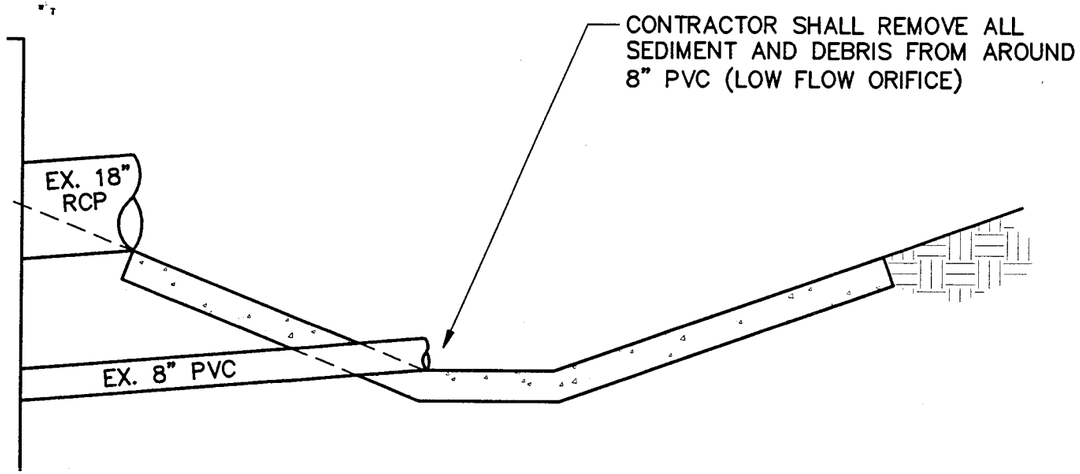
* 10'-0" C-C maximum typical spacing between Anchor Lugs. Anchor Lug is to be a maximum of 2' from end of channel.

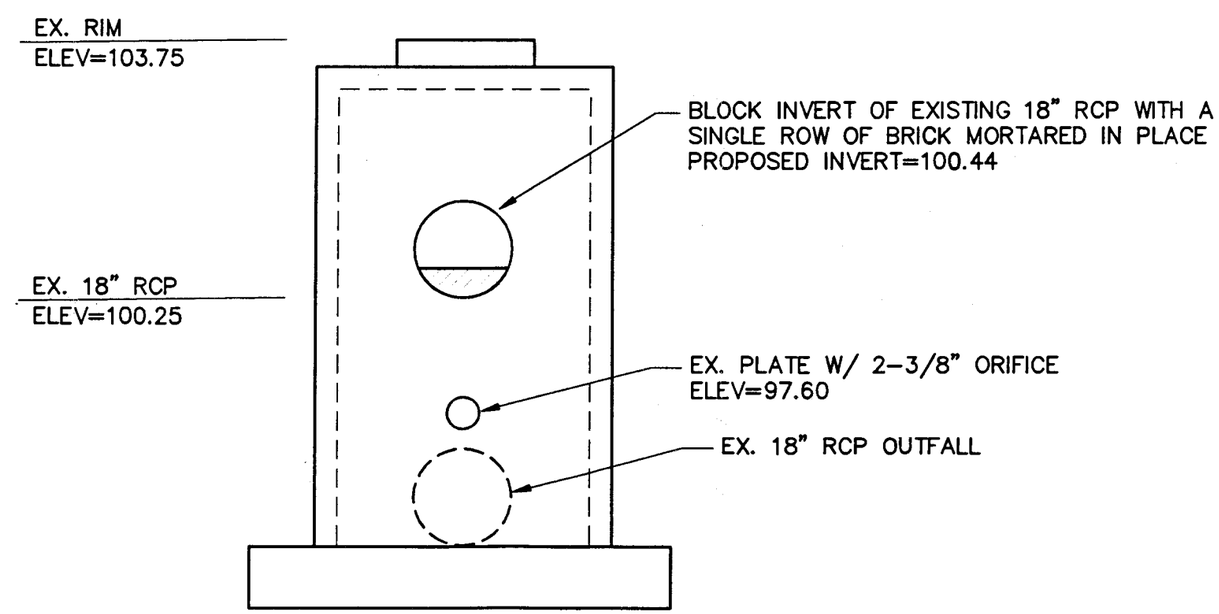
0.425 Sq. Yds. surface area per linear foot of flume.

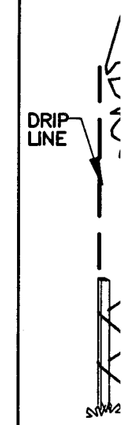
NOTE:
Dowels to be located at all required j

STANDARD PAVED FLUME

FOR 12"-24" PIPE CULVERTS
N.T.S.

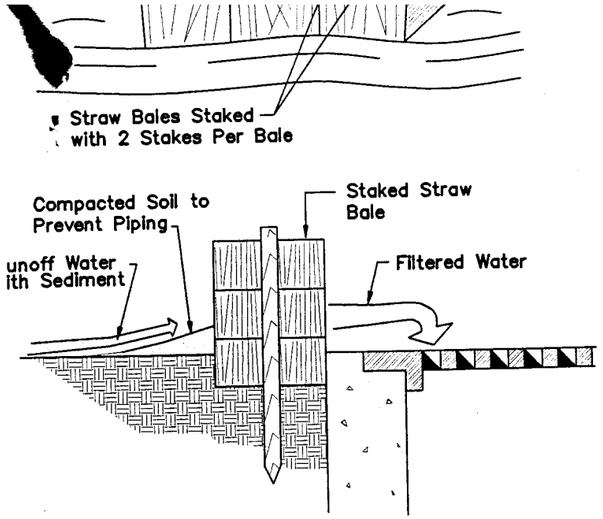






MODIFICATIONS AND REPAIRS TO EXISTING BMP STRUCTURE

NOT TO SCALE



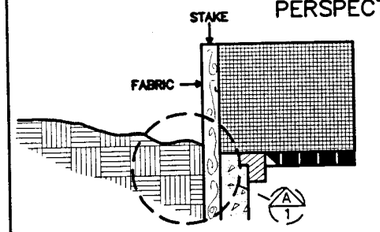
STRAW BALE DROP INLET SEDIMENT FILTER

(IP) INLET PROTECTION

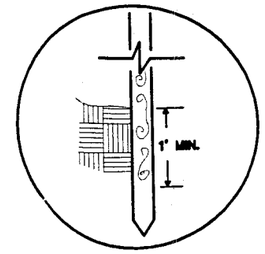
NOT TO SCALE

ES\D-IP

PERSPECTIVE VIEWS



ELEVATION OF STAKE AND FABRIC ORIENTATION



DETAIL A

SPECIFIC APPLICATION

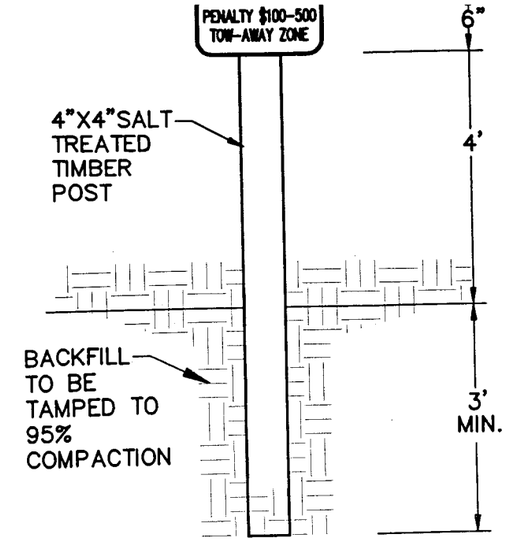
THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE THE INLET DRAINS A RELATIVELY FLAT AREA (SLOPE NO GREATER THAN 5%) WHERE THE INLET SHEET OR OVERLAND FLOWS (NOT EXCEEDING 1 C.F.S.) ARE TYPICAL. THE METHOD SHALL NOT APPLY TO INLETS RECEIVING CONCENTRATED FLOWS, SUCH AS IN STREET OR HIGHWAY MEDIANS.

(IP) SILT FENCE DROP INLET PROTECTION

SOURCE: N.C. EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL PLATE. 3.07-1

N.T.S.

D-IPSF.dwg



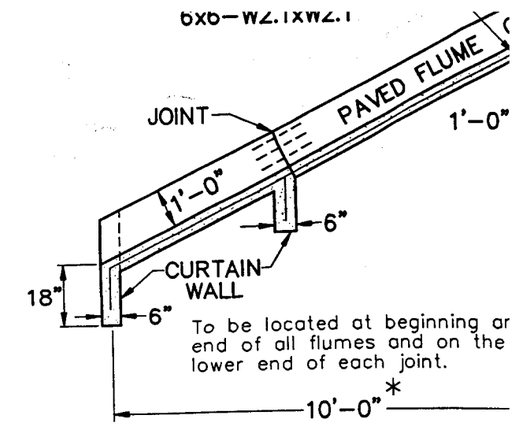
NOTE

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.

D-HCSIGN-2



To be located at beginning ar end of all flumes and on the lower end of each joint.

SECTION A-A

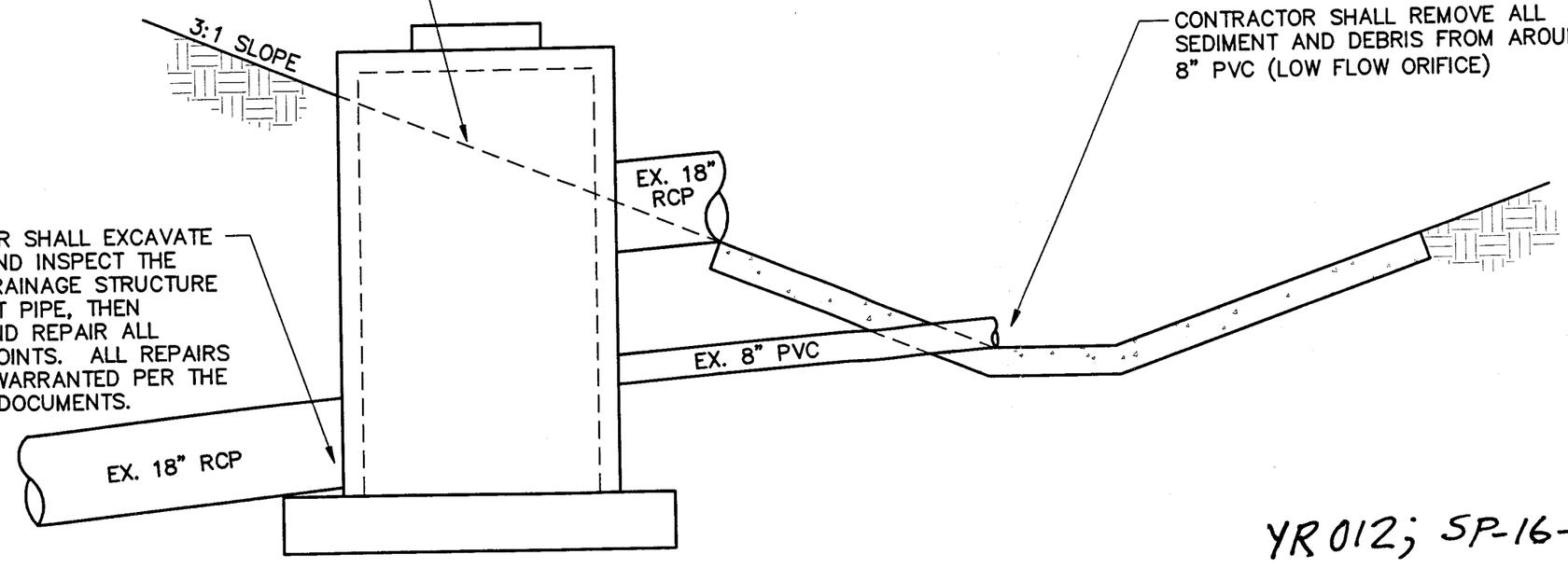
* 10'-0" C-C maximum typical spacir between Anchor Lugs. Anchor Lug to be a maximum of 2' from end channel.

STAN

CONTRACTOR SHALL REPAIR ERODED BANK AROUND MH-1 OUTLET STRUCTURE AND REESTABLISH A 3:1 SLOPE.

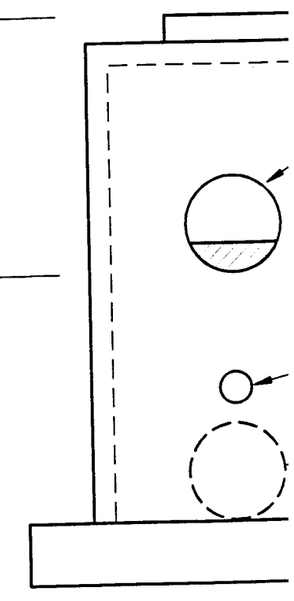
CONTRACTOR SHALL REMOVE ALL SEDIMENT AND DEBRIS FROM AROUND 8" PVC (LOW FLOW ORIFICE)

CONTRACTOR SHALL EXCAVATE ALL SOIL AND INSPECT THE EXISTING DRAINAGE STRUCTURE AND OUTLET PIPE, THEN IDENTIFY AND REPAIR ALL LEAKS IN JOINTS. ALL REPAIRS SHALL BE WARRANTED PER THE CONTRACT DOCUMENTS.



EX. RIM
ELEV=103.75

EX. 18" RCP
ELEV=100.25



YR 012; SP-16-00

MODIFICATIONS AND REPAIRS TO EXISTING BMP STRUCTURE

NOT TO SCALE

2 YEAR DESIGN

WALLER METHOD SMALL SITE DETENTION

JOB No. 94051-0151 MINIWHSE

AREA	13.66	Exist'g Tc	18.00	Req'd Storage
Exist'g C	0.25	ALLOW DISCH	12.19	34119.65
TIME CONC	7.00	RUNOFF COEF	0.69	

TD (MIN)	RAIN RATE (IN/HR)	VOLUME IN (CU. FT.)	VOLUME OUT (CU. FT.)	STORAGE (CU. FT.)
10	4.57	30380.05	7497.52	22882.53
11	4.42	31848.11	7863.25	23984.86
12	4.27	33219.90	8228.98	24990.92
13	4.14	34504.59	8594.71	25909.88
14	4.01	35710.23	8960.45	26749.79
15	3.89	36843.89	9326.18	27517.71
16	3.78	37911.83	9691.91	28219.92
17	3.67	38919.60	10057.64	28861.96
18	3.57	39872.15	10423.38	29448.78
19	3.47	40773.90	10789.11	29984.80
20	3.38	41628.81	11154.84	30473.97
21	3.30	42440.43	11520.57	30919.86
22	3.22	43211.97	11886.31	31325.66
23	3.14	43946.32	12252.04	31694.29
24	3.07	44646.12	12617.77	32028.35
25	3.00	45313.75	12983.50	32330.25
26	2.93	45951.37	13349.24	32602.13
27	2.86	46560.96	13714.97	32845.99
28	2.80	47144.33	14080.70	33063.63
29	2.74	47703.14	14446.43	33256.71
30	2.69	48238.91	14812.16	33426.74
31	2.63	48753.02	15177.90	33575.13
32	2.58	49246.78	15543.63	33703.15
33	2.53	49721.36	15909.36	33812.00
34	2.48	50177.87	16275.09	33902.77
35	2.44	50617.30	16640.83	33976.48
36	2.39	51040.62	17006.56	34034.06
37	2.35	51448.67	17372.29	34076.38
38	2.31	51842.29	17738.02	34104.26
39	2.27	52222.21	18103.76	34118.45
40	2.23	52589.14	18469.49	34119.65
41	2.19	52943.74	18835.22	34108.52
42	2.15	53286.62	19200.95	34085.66
43	2.12	53618.34	19566.69	34051.66
44	2.08	53939.45	19932.42	34007.03
45	2.05	54250.45	20298.15	33952.30
46	2.02	54551.80	20663.88	33887.92
47	1.99	54843.96	21029.62	33814.34
48	1.96	55127.32	21395.35	33731.97
49	1.93	55402.29	21761.08	33641.21
50	1.90	55669.23	22126.81	33542.42
51	1.87	55928.49	22492.55	33435.95
52	1.85	56180.40	22858.28	33322.12

2 YEAR DESIGN

VALLER METHOD SMALL SITE DETENTION

JOB No. 94051-0151 MINIWHSE

AREA	13.66	Exist'g Tc	18.00	Req'd Storage
Exist'g C	0.25	ALLOW DISCH	12.19	34119.65
TIME CONC	7.00	RUNOFF COEF	0.69	

TD (MIN)	RAIN RATE (IN/HR)	VOLUME IN (CU. FT.)	VOLUME OUT (CU. FT.)	STORAGE (CU. FT.)
53	1.82	56425.26	23224.01	33201.24
54	1.80	56663.36	23589.74	33073.62
55	1.77	56894.98	23955.48	32939.51
56	1.75	57120.39	24321.21	32799.18
57	1.73	57339.83	24686.94	32652.89
58	1.70	57553.53	25052.67	32500.85
59	1.68	57761.71	25418.41	32343.30
60	1.66	57964.59	25784.14	32180.45
61	1.64	58162.37	26149.87	32012.49
62	1.62	58355.23	26515.60	31839.62
63	1.60	58543.36	26881.34	31662.02
64	1.58	58726.93	27247.07	31479.86
65	1.56	58906.10	27612.80	31293.30
66	1.54	59081.03	27978.53	31102.49
67	1.52	59251.87	28344.27	30907.60
68	1.51	59418.76	28710.00	30708.76
69	1.49	59581.83	29075.73	30506.10
70	1.47	59741.22	29441.46	30299.76
71	1.46	59897.05	29807.20	30089.85
72	1.44	60049.43	30172.93	29876.50
73	1.42	60198.48	30538.66	29659.82
74	1.41	60344.31	30904.39	29439.92
75	1.39	60487.03	31270.13	29216.90
76	1.38	60626.72	31635.86	28990.86
77	1.36	60763.48	32001.59	28761.89
78	1.35	60897.41	32367.32	28530.09
79	1.34	61028.59	32733.06	28295.54
80	1.32	61157.11	33098.79	28058.33
81	1.31	61283.05	33464.52	27818.53
82	1.30	61406.48	33830.25	27576.23
83	1.28	61527.48	34195.99	27331.49
84	1.27	61646.12	34561.72	27084.40
85	1.26	61762.46	34927.45	26835.01
86	1.25	61876.58	35293.18	26583.40
87	1.24	61988.53	35658.92	26329.62
88	1.22	62098.39	36024.65	26073.74
89	1.21	62206.19	36390.38	25815.81
90	1.20	62312.01	36756.11	25555.90

10 YEAR DESIGN

WALLER METHOD SMALL SITE DETENTION

JOB No. 94051-0151 MINIWHSE

AREA	13.66	Exist'g Tc	18.00	Req'd Storage
Exist'g C	0.25	ALLOW DISCH	16.11	47719.60
TIME CONC	7.00	RUNOFF COEF	0.69	

TD (MIN)	RAIN RATE (IN/HR)	VOLUME IN (CU. FT.)	VOLUME OUT (CU. FT.)	STORAGE (CU. FT.)
54	2.49	78384.90	31178.01	47206.88
55	2.45	78756.00	31661.39	47094.61
56	2.42	79117.60	32144.77	46972.83
57	2.39	79470.06	32628.15	46841.91
58	2.36	79813.72	33111.53	46702.19
59	2.33	80148.91	33594.91	46553.99
60	2.30	80475.93	34078.29	46397.63
61	2.28	80795.07	34561.67	46233.40
62	2.25	81106.63	35045.05	46061.58
63	2.22	81410.87	35528.43	45882.43
64	2.20	81708.04	36011.81	45696.22
65	2.17	81998.38	36495.19	45503.19
66	2.15	82282.14	36978.57	45303.56
67	2.12	82559.52	37461.95	45097.57
68	2.10	82830.75	37945.33	44885.42
69	2.08	83096.02	38428.71	44667.31
70	2.05	83355.54	38912.09	44443.44
71	2.03	83609.47	39395.47	44214.00
72	2.01	83858.01	39878.85	43979.16
73	1.99	84101.33	40362.23	43739.09
74	1.97	84339.58	40845.61	43493.96
75	1.95	84572.92	41328.99	43243.93
76	1.93	84801.51	41812.37	42989.13
77	1.91	85025.48	42295.75	42729.72
78	1.89	85244.97	42779.13	42465.84
79	1.87	85460.13	43262.51	42197.62
80	1.85	85671.07	43745.89	41925.18
81	1.84	85877.92	44229.27	41648.64
82	1.82	86080.79	44712.65	41368.14
83	1.80	86279.81	45196.03	41083.77
84	1.78	86475.07	45679.41	40795.65
85	1.77	86666.69	46162.79	40503.89
86	1.75	86854.76	46646.17	40208.58
87	1.73	87039.38	47129.55	39909.82
88	1.72	87220.65	47612.93	39607.71
89	1.70	87398.65	48096.31	39302.34
90	1.69	87573.48	48579.70	38993.79

10 YEAR DESIGN

WALLER METHOD — SMALL SITE DETENTION

JOB No. 94051-0151 — MINIWHSE

AREA	13.66	Exist'g Tc	18.00	Req'd Storage
Exist'g C	0.25	ALLOW DISCH	16.11	47719.60
TIME CONC	7.00	RUNOFF COEF	0.69	

TD (MIN)	RAIN RATE (IN/HR)	VOLUME IN (CU. FT.)	VOLUME OUT (CU. FT.)	STORAGE (CU. FT.)
10	5.89	39165.62	9909.29	29256.33
11	5.72	41214.91	10392.67	30822.24
12	5.55	43144.01	10876.05	32267.96
13	5.39	44963.19	11359.43	33603.75
14	5.24	46681.58	11842.81	34838.77
15	5.10	48307.33	12326.19	35981.14
16	4.97	49847.75	12809.57	37038.18
17	4.84	51309.37	13292.95	38016.42
18	4.72	52698.09	13776.33	38921.76
19	4.60	54019.24	14259.71	39759.53
20	4.49	55277.62	14743.09	40534.53
21	4.39	56477.61	15226.47	41251.14
22	4.29	57623.18	15709.85	41913.33
23	4.20	58717.94	16193.23	42524.71
24	4.10	59765.21	16676.61	43088.60
25	4.02	60768.02	17159.99	43608.02
26	3.93	61729.12	17643.37	44085.75
27	3.85	62651.08	18126.75	44524.32
28	3.78	63536.23	18610.13	44926.09
29	3.70	64386.73	19093.51	45293.22
30	3.63	65204.59	19576.89	45627.70
31	3.56	65991.65	20060.27	45931.37
32	3.50	66749.60	20543.65	46205.95
33	3.43	67480.05	21027.03	46453.02
34	3.37	68184.45	21510.41	46674.04
35	3.31	68864.18	21993.79	46870.39
36	3.26	69520.52	22477.17	47043.35
37	3.20	70154.64	22960.55	47194.09
38	3.15	70767.66	23443.93	47323.73
39	3.10	71360.61	23927.31	47433.30
40	3.05	71934.47	24410.69	47523.78
41	3.00	72490.14	24894.07	47596.07
42	2.95	73028.47	25377.45	47651.02
43	2.91	73550.26	25860.83	47689.43
44	2.86	74056.27	26344.21	47712.05
45	2.82	74547.19	26827.59	47719.60
46	2.78	75023.69	27310.97	47712.72
47	2.74	75486.41	27794.35	47692.05
48	2.70	75935.92	28277.73	47658.18
49	2.66	76372.78	28761.11	47611.67
50	2.62	76797.53	29244.49	47553.04
51	2.59	77210.66	29727.87	47482.79
52	2.55	77612.64	30211.25	47401.38
53	2.52	78003.91	30694.63	47309.27
54	2.49	78384.90	31178.01	47206.88

LANGLEY and McDONALD, P.C. DATE: 9 28 1994 PROJECT NO. 94051-0151

STORM SEWER DESIGN COMPUTATIONS

PROJECT NAME M. FINE MINIWHSE

189.2 =a 22.1 =b 10 YR STM	AREA DRAIN. "A"	RUN-OFF COEF.	CA	INLET TIME	RAIN FALL	RUNOFF "Q"	INVERT ELEVATIONS		PIPE LNGTH	SLOPE	DIA	CAPA-CITY	VEL.	FLOW TIME	REMARKS
FROM POINT	TO POINT	ACRES	C	INCRE-MENT	ACCUM-ULATED	MIN-UTES	IN.\HR	INCRE-MENT	ACCUM-ULATED	UPPER END	LOWER END	FT.	FT./FT.	IN.	C.F.S.	F.P.S.	MIN.	
1	2	0.60	0.90	0.54	0.54	5.00	6.98	3.77	3.77	101.50	101.32	44	0.0040	15	4.08	3.76	0.20	
2	3	0.28	0.90	0.25	0.79	5.20	6.93	1.75	5.49	101.32	101.17	52	0.0030	18	5.75	3.71	0.23	
3	4	0.37	0.90	0.33	1.12	5.43	6.87	2.27	7.71	101.17	100.66	94	0.0054	18	7.72	4.32	0.36	
5	6	0.14	0.90	0.13	0.13	5.00	6.98	0.88	0.88	103.20	103.00	32	0.0062	15	5.08	3.02	0.18	

Langley and McDonald
A PROFESSIONAL CORPORATION
ENGINEERS · PLANNERS · SURVEYORS
VIRGINIA BEACH · WILLIAMSBURG · VIRGINIA

Subject THE SAFE PLACE
MINI WHSE
Computed By WL Checked By —

Project No. 94051-01
Client J. BOWMAN
Date 11-10-94 Sheet No. 1

ALLOWABLE 10 YR DISCHARGE 10.11 CFS

STORAGE REQUIRED FOR 2 YR STM MET @ EL 102.42

USING 18" ORIFICE $h = 1.42$
℄ = EL 101.00

$q_o = 0.6 (A) \sqrt{(2)(G)(H)}$

$q_o = (0.6)(1.767) \sqrt{(2)(32.2)(1.42)}$

$q_o = 10.14$ CFS @ EL 102.42

USING 2 3/8" ORIFICE

$q_o = (0.6)(.0291) \sqrt{(2)(32.2)(2.07)}$

102.42
100.35
2.07 h

$q_o = 0.20$

Total 10.14 + 0.20 = 10.34 CFS ← THIS IS LESS THAN 2 YR ALLOWABLE

ALLOWABLE 2 YR. DISCHARGE 12.19 CFS
STORAGE REQUIRED FOR 10 YR STM. MET @ EL = 101.75
USING 18" ORIFICE $h = 0.75$ ℄ = 101.00

$q_o = (0.6)(1.767) \sqrt{(2)(32.2)(0.75)}$ .75h

$q_o = 7.37$ CFS

101.75
100.35
1.40

USING 2 3/8 ORIFICE

$q_o = (0.6)(0.0291) \sqrt{(2)(32.2)(1.40)}$

q_o 0.17 CFS

7.37 CFS + 0.17 CFS = 7.54 CFS

7.54 < 12.19

Langley and McDonald
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ENGINEERS · PLANNERS · SURVEYORS
VIRGINIA BEACH · WILLIAMSBURG, VIRGINIA

Subject THE SAFE PLACE
MINI WHSE
Computed By WL Checked By

Project No. 94051
Client
Date 11-10-94 Sheet No. 2

ADJUST RIM 103.75 /

103.75
101.00
2.75 = h

USING 18" ORFICE

$Q_o = (0.6)(1.767)\sqrt{(2)(32.2)(2.75)}$

$Q_o = 14.11$ CFS

USING 2 3/8" ORIFICE

$Q_o = (0.6)(.0291)\sqrt{(2)(32.2)(3.02)}$
$Q_o = 0.24$ CFS

14.11 CFS + 0.24 CFS = 14.35 < 16.11 CFS, 10YR. ALLOWABLE

Langley and McDonald
ENGINEERS · PLANNERS · SURVEYORS

Subject MINI WHSE

Computed By WL Checked By

Project No. 92051-01

Client M. FINE

Date 9-27-94 Sheet No. 1

MINI WHSE SITE
LOT 4A = 3.182 AC
AREA SERVED BY BMP 2.48 AC
COLONIAL GARDENS
LOT 4B = 1.277 AC
AREA SERVED BY BMP 1.23 AC
DIAMOND HEALTH CARE
LOT 3 = 2.565 AC
AREA SERVED BY BMP 2.30 AC

$$\frac{2.48}{3.182} = 0.779$$

$$\frac{3.53}{3.182} = 1.109$$

USE EXTENDED DRY DETENTION
(2) DESIGN 3 (24 HRS) 6 PTS

ON SITE
6 X .779 = 4.67

OFF SITE - LOTS 4B & 3B ONLY

6 X 1.109 = 6.65

TOTAL PTS 11.32

Langley and McDonald
ENGINEERS · PLANNERS · SURVEYORS

Subject M. FINE MINIWHSE

Computed By WC Checked By

Project No. 94051-0151
Client M FINE
Date 9-27-94 Sheet No. 2

$R_v = 0.05 + 0.009 (I)$

$= 0.05 + 0.009 (42)$

$R_v = 0.428$

IMP. AREA	1.89	Lot 4 A
"	0.51	Lot 4 B
"	0.57	Lot 3
	2.97	Ac

$V = \frac{(1.0)(.43)}{12} \; 7.02$

Lots 3, 4A & 4B = 7.02 Ac

2.97 / 7.02 = .423

SAY 42 %

V_{OL} = .2516 Ac Ft = 10,958 Cu Ft

VOLUME OF EXIST POND
WITHOUT CONNECTING DITCHES

EL	Sq Ft	AVE. DEPT	TOTAL CF	
98.5	0		0	
		5812 X 1.5		
100	11625		8718 CF	8718 CF
		15375 X 2.0		
102	19125		30750	39468 CF
		20875 X 1.0		
103	22625		20875	60342 CF

FOR CBPA 10,958 Cu Ft REQUIRED

At EL 100.25 STORAGE 11,741 Cu Ft. PROVIDED

Langley and McDonald
ENGINEERS • PLANNERS • SURVEYORS

Subject: MINI WHSE

Computed By: MC Checked By:

Project No. 94051-0151
Client: M FINE
Date: 9-27-94 Sheet No. 3

MODIFY EXISTING BMP STRUCTURE

CBPA

BMP 11,741 CU FT @ ELEV 100.25

RELEASE OVER:

24 HRS 86400 SEC

11742 / 86400 = 0.1359 CFS

$Q = (0.6)(A)\sqrt{2gh}$

100.25
98.38

$0.1359 = 0.6\ A\ \sqrt{(2)(32.2)\ .94}$

h = 1.87 MAX
AVERAGE h = .94

A = 0.0291 SQ FT

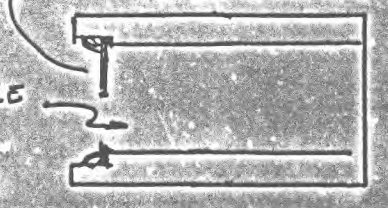
$d\ \sqrt{\frac{4}{\pi}\ a}$

$d\ \sqrt{(1.2732)(.0291)}$

d = .1925

d = 2 3/8" HOLE

1/8 STEEL PLATE
TO BE GROUTED INTO LIP OF 8" RCP



A = .0291

60 WEST BUSINESS PARK
J.O. A3572

DRAINAGE

DRAINAGE AREA Lot 2, 3, & 4 = 13.66 Ac

OVERLAND DIST NW Cor Lot 2 to Moorestown Rd to SE Cor Lot 4 = 1600'

DIFF IN ELEV. = 110.5 − 102.5 = 8'

∴ S = 8'/1600' = .005 F/F

∴ T_c = 18 min ∴ I_{10} = 4.7 in/HR I_2 = 3.5 in/HR

Predevelopment runoff @ I_2 = (13.66)(.3)(3.5) = 14.34 CFS

I_{10} = (13.66)(.3)(4.7) = 19.26 CFS

Post Development runoff @ I_2 = (13.66)(.85)(3.5) = 40.64 CFS

I_{10} = (13.66)(.85)(4.7) = 54.57 CFS

EXIST 18" CULV UNDER Moorestown Rd Q_{MAX}, A = 1.77 FT², P = 4.71 F ∴ R = 0.376

INV IN = 100.05
INV OUT = 99.93
Δ = 0.12 @ 48' long S = .0025

EXIST Q_{max} @ 0.90 = $\left(\frac{1.486}{.015}\right)(1.77)(.376 \times 1.19)^{2/3}(.0025)^{1/2}$

= (99.07)(1.77)(.585)(.05) = 5.53 CFS

∴ ΔQ_2 = 40.64 − 14.34 = 26.30 CFS = 183% increase

ΔQ_{10} = 54.57 − 19.26 = 35.31 CFS = 183% increase

∴ Post Development storage Req'd = $\frac{54.57 - 19.26}{54.57}$ = 65%

T_b = 18 min × 2.67 = 48.06 min

** ORIGINAL DRAINAGE INFORMATION FOR DETENTION POND PROVIDED BY WOODSON & ASSOCIATES.
USING WOODSONS BASIC DESIGN INFO WE RAN WALLER METHOD TO CHECK 5 & 10 YR STM. WE DID MODIFY THE PRE & POST COEF. & THE POST DEV. TIME

Langley and McDonald
A PROFESSIONAL CORPORATION
ENGINEERS · PLANNERS · SURVEYORS
VIRGINIA BEACH · WILLIAMSBURG, VIRGINIA

Subject: MINI WHSE

Computed By: WL Checked By:

Project No. 9L051-01
Client: M FINE
Date: 9-28-94 Sheet No. 5

13.66 AC DRAINING TO EXISTING DETENTION POND

SEE ATTACHED WOODSON & ASSOCIATES DRAINAGE INFO

MIN 30% TO REMAIN GREEN AREA = 4.10 AC

MAX 70% TO IMPERIOUS AREA = 9.56 AC

WEIGHT C

4.1 X .2 = 0.82

9.56 X .9 = 8.60

9.42

9.42 / 13.66 = 0.69 COEF

USE .69 FOR CAL'S

2 YEAR DESIGN

WALLER METHOD SMALL SITE DETENTION

JOB No. 94C51-0151 MINIWHSE

AREA	13.66	Exist'g Tc	18.00	Req'd Storage
Exist g C	0.25	ALLOW DISCH	12.19	34119.65
TIME CONC	7.00	RUNOFF COEF	0.69	

TD (MIN)	RAIN RATE (IN/HR)	VOLUME IN (CU. FT.)	VOLUME OUT (CU. FT.)	STORAGE (CU. FT.)
10	4.57	30380.05	7497.52	22882.53
11	4.42	31848.11	7863.25	23984.86
12	4.27	33219.90	8228.98	24990.92
13	4.14	34504.59	8594.71	25909.88
14	4.01	35710.23	8960.45	26749.79
15	3.89	36843.89	9326.18	27517.71
16	3.78	37911.83	9691.91	28219.92
17	3.67	38919.60	10057.64	28861.96
18	3.57	39872.15	10423.38	29448.78
19	3.47	40773.90	10789.11	29984.80
20	3.38	41628.81	11154.84	30473.97
21	3.30	42440.43	11520.57	30919.86
22	3.22	43211.97	11886.31	31325.66
23	3.14	43946.32	12252.04	31694.29
24	3.07	44646.12	12617.77	32028.35
25	3.00	45313.75	12983.50	32330.25
26	2.93	45951.37	13349.24	32602.13
27	2.86	46560.96	13714.97	32845.99
28	2.80	47144.33	14080.70	33063.63
29	2.74	47703.14	14446.43	33256.71
30	2.69	48238.91	14812.16	33426.74
31	2.63	48753.02	15177.90	33575.13
32	2.58	49246.78	15543.63	33703.15
33	2.53	49721.36	15909.36	33812.00
34	2.48	50177.87	16275.09	33902.77
35	2.44	50617.30	16640.83	33976.48
36	2.39	51040.62	17006.56	34034.06
37	2.35	51448.67	17372.29	34076.38
38	2.31	51842.29	17738.02	34104.26
39	2.27	52222.21	18103.76	34118.45
40	2.23	52589.14	18469.49	34119.65
41	2.19	52943.74	18835.22	34108.52
42	2.15	53286.62	19200.95	34085.66
43	2.12	53618.34	19566.69	34051.66
44	2.08	53939.45	19932.42	34007.03
45	2.05	54250.45	20298.15	33952.30
46	2.02	54551.80	20663.88	33887.92
47	1.99	54843.96	21029.62	33814.34
48	1.96	55127.32	21395.35	33731.97
49	1.93	55402.29	21761.08	33641.21
50	1.90	55669.23	22126.81	33542.42
51	1.87	55928.49	22492.55	33435.95
52	1.85	56180.40	22858.28	33322.12

10 YEAR DESIGN

WALLER METHOD — SMALL SITE DETENTION

JOB No. 94051-0151 — MINIWHSE

AREA	13.66	Exist'g Tc	18.00	Req'd Storage	
Exist'g C	0.25	ALLOW DISCH	16.11		47719.60
TIME CONC	7.00	RUNOFF COEF	0.69		

TD (MIN)	RAIN RATE (IN/HR)	VOLUME IN (CU. FT.)	VOLUME OUT (CU. FT.)	STORAGE (CU. FT.)
54	2.49	78384.90	31178.01	47206.88
55	2.45	78756.00	31661.39	47094.61
56	2.42	79117.60	32144.77	46972.83
57	2.39	79470.06	32628.15	46841.91
58	2.36	79813.72	33111.53	46702.19
59	2.33	80148.91	33594.91	46553.99
60	2.30	80475.93	34078.29	46397.63
61	2.28	80795.07	34561.67	46233.40
62	2.25	81106.63	35045.05	46061.58
63	2.22	81410.87	35528.43	45882.43
64	2.20	81708.04	36011.81	45696.22
65	2.17	81998.38	36495.19	45503.19
66	2.15	82282.14	36978.57	45303.56
67	2.12	82559.52	37461.95	45097.57
68	2.10	82830.75	37945.33	44885.42
69	2.08	83096.02	38428.71	44667.31
70	2.05	83355.54	38912.09	44443.44
71	2.03	83609.47	39395.47	44214.00
72	2.01	83858.01	39878.85	43979.16
73	1.99	84101.33	40362.23	43739.09
74	1.97	84339.58	40845.61	43493.96
75	1.95	84572.92	41328.99	43243.93
76	1.93	84801.51	41812.37	42989.13
77	1.91	85025.48	42295.75	42729.72
78	1.89	85244.97	42779.13	42465.84
79	1.87	85460.13	43262.51	42197.62
80	1.85	85671.07	43745.89	41925.18
81	1.84	85877.92	44229.27	41648.64
82	1.82	86080.79	44712.65	41368.14
83	1.80	86279.81	45196.03	41083.77
84	1.78	86475.07	45679.41	40795.65
85	1.77	86666.63	46162.79	40503.89
86	1.75	86854.76	46646.17	40208.58
87	1.73	87039.38	47129.55	39909.82
88	1.72	87220.65	47612.93	39607.71
89	1.70	87398.65	48096.31	39302.34
90	1.69	87573.48	48579.70	38993.79

SAFE PLACE

TABLE 3

WORKSHEET FOR BMP POINT SYSTEM

A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP Points		Fraction of Site Served by BMP		Weighted BMP Points
DESIGN 3 (24 HRS) DRY POND	6	x	$\frac{2.48}{3.192} = 78\%$	=	4.7
		x		=	
DESIGN 3 (24 HRS) OFFSITE	6	x	$\frac{3.53}{3.192} = 1.10$	=	6.6
		x		=	

TOTAL WEIGHTED STRUCTURAL BMP POINTS: 11.3

B. NATURAL OPEN SPACE CREDIT

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

C. TOTAL WEIGHTED POINTS

11.3	+	0	=	11.3
Structural BMP Points		Natural Open Space Points		TOTAL

Langley and McDonald
ENGINEERS · PLANNERS · SURVEYORS

Subject: [illegible] SAFE PLACE
[illegible] WAGE
Computed By: [illegible] Checked By: —

Client: [illegible]
Date: [illegible]

SAFE PLACE

ALLOWABLE 10 [illegible] DISCHARGE 16.11 CFS

STORAGE REQUIRED FOR 2 YR STM MET @ EL 102.42

USING 18" ORIFICE $h = .42$
℄ = EL 101.00

$q_o = 0.6 (A) \sqrt{(2)(G)(H)}$

$q_o = (0.6)(1.767) \sqrt{(2)(32.2)(1.42)}$

$q_o = 10.14$ CFS @ EL 102.42

USING 2 3/8" ORIFICE

$q_o = (0.6)(.0291) \sqrt{(2)(32.2)(2.07)}$

$q_o = 0.20$

102.42
100.35
2.07 h

TOTAL 10.14 + 0.20 = 10.34 CFS ← THIS IS LESS THAN 2 YR ALLOWABLE

ALLOWABLE 2 YR. DISCHARGE 12.19 CFS
STORAGE REQUIRED FOR 10 YR STM. MET @ EL = 101.75
℄ = 101.00
.75h

USING 18" ORIFICE $h = 0.75$

$q_o = (0.6)(1.767) \sqrt{(2)(32.2)(0.75)}$

$q_o = 7.37$ CFS

101.75
100.35
1.40

USING 2 3/8 ORIFICE

$q_o = (0.6)(0.0291) \sqrt{(2)(32.2)(1.40)}$

q_o 0.17 CFS

7.37 CFS + 0.17 CFS = 7.54 CFS

7.54 < 12.19

Langley and McDonald
ENGINEERS · PLANNERS · SURVEYORS

Subject: THE SAFE PLACE
MINI WHSE
Computed By: WL Checked By:

Project No: [illegible]
Client:
Date: 11-10-94 Sheet No: 2

ADJUST RIM 103.75

103.75
101.00
2.75 = h

USING 18" ORFICE

$q_o = (0.6)(1.767)\sqrt{(2)(32.2)(2.75)}$

$q_o = 14.11$ CFS

USING 2 3/8" ORIFICE

$q_o = (0.6)(.0291)\sqrt{(2)(32.2)(3.02)}$
$q_o = 0.24$ CFS

14.11 CFS + 0.24 CFS = 14.35 < 16.11 CFS, 10YR. ALLOWABLE

Williamsburg Place Expansion

Drainage Calculations

FEB 2000
RECEIVED
PLANNING DEPARTMENT

Mooretown Road
James City County, Virginia

Prepared by

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

AES Project No. 8834

February 2, 2000

SP-16-00
YR 012

CONSULTING ENGINEERS

Stormwater Management

Existing Pond Conditions:

DA = 13.66 acres

Q_2 = 40.64 cfs

Q_{10} = 54.57 cfs

* Original drainage information provided by Langley & McDonald as submitted for "A Safer Place" site plan dated 9-27-94.

Proposed Pond Conditions:

DA = 13.66 acres

Assuming an impervious cover of 60% $\Rightarrow$ $C_{composite} = 0.66$

T_c = 18 min

Q_2 = 31.5 cfs

Q_{10} = 42.6 cfs

The original pond was over designed to allow for future development. After assuming all parcels in the contributing drainage area have the maximum allowable impervious cover of 60%, the proposed Q_2 and Q_{10} flows are well below the design flow as calculated by Langley and McDonald when the pond was last modified.

$\Rightarrow$ **No modifications are required to satisfy Stormwater Management Regulations**

BMP

Existing Pond Conditions:

Dry Detention (1"/Imp Acre released over 24 hours)

Impervious Area = 2.97 ac

Volume Required = 10,950 cu ft

Volume Provided = 11,741 cu ft @ elevation 100.25

Proposed Pond Conditions:

Additional impervious area = 0.44 ac

Additional volume required = 1"/acre x 0.44 ac = 1,615 cu ft

Total volume required = 10,950 cu ft + 1,615 cu ft = 12,565 cu ft

12,565 cu ft provided @ elevation 100.44

⇒ **Block invert of existing 18" RCP with a single row of brick mortared in place.**

TOTAL WQV

11,741 CF EXIST

1615 CF

12565 REQD

CONSULTING ENGINEERS

TABLE 3

WORKSHEET FOR BMP POINT SYSTEM

A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP Points		Fraction of Site Served by BMP		Weighted BMP Points
Dry pond (24 hr)[1]	4	x	2.3/5.75 = 0.40	=	1.6
Dry pond (24 hr)[2]	6	x	2.48/5.75 = 0.43	=	2.6
Dry pond (24 hr)[3]	6	x	6.73/5.75 = 1.17	=	7.0
		x		=	

TOTAL WEIGHTED STRUCTURAL BMP POINTS: 11.2

B. NATURAL OPEN SPACE CREDIT

Fraction of Site		Natural Open Space Credit		Points for Natural Open Space
N/A	X	N/A (0.1 per 1%)	=	N/A

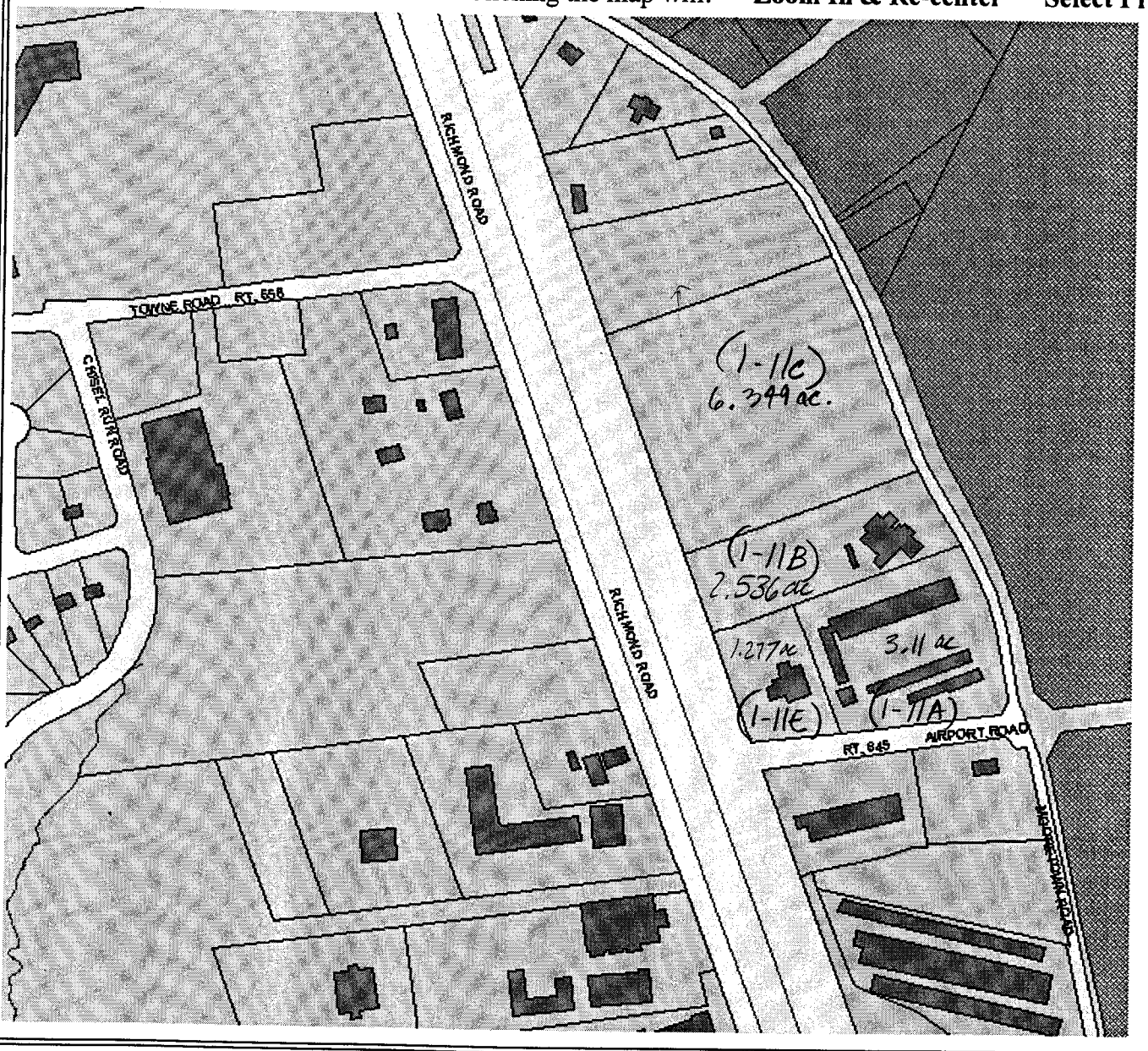
C. TOTAL WEIGHTED POINTS

11.2	+	0	=	11.2 > 10 (OK)
Structural BMP Points		Natural Open Space Points		TOTAL

	Tax Map #	BMP Points	Total Area	Area Served
[1] Williamsburg Place Expansion	(33-3)(1-11B)	4	2.565	2.30
[2] A Safer Place	(33-3)(1-11A)	**6	3.182	2.48
			5.75	4.78
OFFSITE AREAS				
[3] Colonial Gardens	(33-3)(1-11E)	**6	1.277	1.23
Undeveloped Site	(33-3)(1-11C)	**6	6.349	5.50
			7.63	6.73

*Colonial Gardens is listed as an offsite area because it was developed prior to Chesapeake Bay Regulations.
**Per Langley & McDonald approved plans.

Clicking the map will: ◉ **Zoom In & Re-center** ○ **Select Pr**



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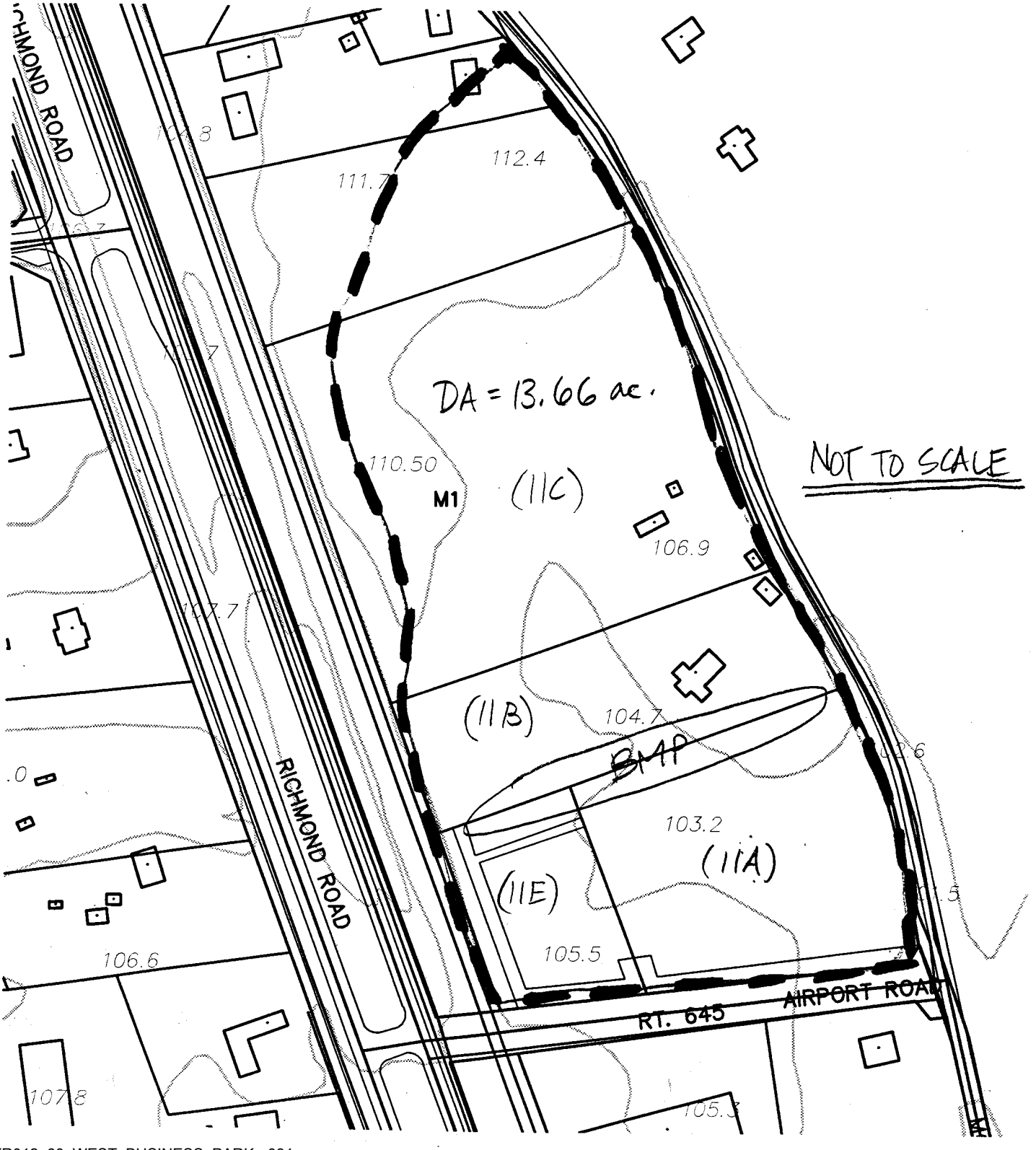
RICHMOND ROAD
RICHMOND ROAD
112.4
111.7
DA = 13.66 ac.
110.50
M1
(11C)
106.9
NOT TO SCALE
(11B)
104.7
BMP
103.2
(11A)
(11E)
105.5
106.6
AIRPORT ROAD
RT. 645

Manning Pipe Calculator

Given Input Data:

Shape	Circular
Solving for	Depth of Flow
Diameter	2.0000 ft
Flowrate	6.7200 cfs
Slope	0.0023 ft/ft
Manning's n	0.0150

Computed Results:

Depth	1.2503 ft
Area	3.1416 ft2
Wetted Area	2.0661 ft2
Wetted Perimeter	3.6475 ft
Perimeter	6.2832 ft
Velocity	3.2525 fps
Hydraulic Radius	0.5664 ft
Percent Full	62.5139 %
Full flow Flowrate	9.4027 cfs
Full flow velocity	2.9930 fps

Critical Information

Critical depth	0.9191 ft
Critical slope	0.0063 ft/ft
Critical velocity	4.7690 fps
Critical area	1.4091 ft2
Critical perimeter	2.9796 ft
Critical hydraulic radius	0.4729 ft
Critical top width	1.9934 ft
Specific energy	1.4110 ft
Minimum energy	1.3786 ft
Froude number	0.5655
Flow condition	Subcritical

Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Flowrate
Slope	0.0630 ft/ft
Manning's n	0.0130
Depth	0.3065 ft
Height	0.5000 ft
Bottom width	0.0000 ft
Left slope	0.3300 ft/ft (V/H)
Right slope	0.3300 ft/ft (V/H)

Computed Results:

Flowrate	2.2598 cfs
Velocity	7.9381 fps
Full Flowrate	8.3336 cfs
Flow area	0.2847 ft2
Flow perimeter	1.9561 ft
Hydraulic radius	0.1455 ft
Top width	1.8576 ft
Area	0.7576 ft2
Perimeter	3.1910 ft
Percent full	61.3000 %

10 yr storm event is contained within the channel

Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Depth of Flow
Flowrate	2.4600 cfs
Slope	0.2650 ft/ft
Manning's n	0.0130
Height	0.5000 ft
Bottom width	1.0000 ft
Left slope	0.3300 ft/ft (V/H)
Right slope	0.3300 ft/ft (V/H)

Computed Results:

Depth	0.1354 ft
Velocity	12.8826 fps
Full Flowrate	33.1671 cfs
Flow area	0.1910 ft2
Flow perimeter	1.8641 ft
Hydraulic radius	0.1024 ft
Top width	1.8206 ft
Area	1.2576 ft2
Perimeter	4.1910 ft
Percent full	27.0801 %

** 10 yr storm event is contained within the channel **

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	31.5	1	18	34,030	2	—	—	—	2 yr pre/post
2	Rational	42.6	1	18	45,976	10	—	—	—	10 yr pre/post
3	Rational	59.7	1	18	64,440	100	—	—	—	100 yr. pre/post
5	Reservoir	4.2	1	34	18,976	2	1	101.47	31,326	2 yr routed
6	Reservoir	7.3	1	33	30,908	10	2	102.09	40,407	10 yr routed
7	Reservoir	11.5	1	33	49,359	100	3	103.44	54,563	100 yr routed

Proj. file: New.GPW	IDF file: newjcc.IDF	Run date: 02-02-2000

Hydrograph Report

English

Hyd. No. 1

2 yr pre/post

Hydrograph type	= Rational	Peak discharge	= 31.51 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 13.7 ac	Runoff coeff.	= 0.66
Intensity	= 3.49 in	Time of conc. (Tc)	= 18 min
I-D-F Curve	= newjcc.IDF	Reced. limb factor	= 1

Total Volume = 34,030 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
0.03	3.50
0.20	21.01
0.37	24.51
0.53	7.00

...End

Hydrograph Report

English

Hyd. No. 2

10 yr pre/post

Hydrograph type	= Rational	Peak discharge	= 42.57 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Drainage area	= 13.7 ac	Runoff coeff.	= 0.66
Intensity	= 4.72 in	Time of conc. (Tc)	= 18 min
I-D-F Curve	= newjcc.IDF	Reced. limb factor	= 1

Total Volume = 45,976 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
0.03	4.73
0.20	28.38
0.37	33.11
0.53	9.46

...End

Hydrograph Report

English

Hyd. No. 3

100 yr. pre/post

Hydrograph type	= Rational	Peak discharge	= 59.67 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 13.7 ac	Runoff coeff.	= 0.66
Intensity	= 6.62 in	Time of conc. (Tc)	= 18 min
I-D-F Curve	= newjcc.IDF	Reced. limb factor	= 1

Total Volume = 64,440 cuft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
0.03	6.63
0.20	39.78
0.37	46.41
0.53	13.26

...End

Hydrograph Report

English

Hyd. No. 5

2 yr routed

Hydrograph type	= Reservoir	Peak discharge	= 4.21 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= Existing Pond
Max. Elevation	= 101.47 ft	Max. Storage	= 31,326 cuft

Storage Indication method used.

Total Volume = 18,976 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
0.33	28.01	100.77	0.00	0.56	-----	-----	-----	-----	-----	-----	0.56
0.50	10.50	101.42	0.00	3.91	-----	-----	-----	-----	-----	-----	3.91
0.67	0.00	101.39	0.00	3.69	-----	-----	-----	-----	-----	-----	3.69
0.83	0.00	101.26	0.00	2.92	-----	-----	-----	-----	-----	-----	2.92
1.00	0.00	101.16	0.00	2.34	-----	-----	-----	-----	-----	-----	2.34
1.17	0.00	101.08	0.00	1.91	-----	-----	-----	-----	-----	-----	1.91
1.33	0.00	101.01	0.00	1.55	-----	-----	-----	-----	-----	-----	1.55
1.50	0.00	100.95	0.00	1.30	-----	-----	-----	-----	-----	-----	1.30
1.67	0.00	100.91	0.00	1.10	-----	-----	-----	-----	-----	-----	1.10
1.83	0.00	100.87	0.00	0.93	-----	-----	-----	-----	-----	-----	0.93
2.00	0.00	100.83	0.00	0.79	-----	-----	-----	-----	-----	-----	0.79
2.17	0.00	100.81	0.00	0.67	-----	-----	-----	-----	-----	-----	0.67
2.33	0.00	100.78	0.00	0.59	-----	-----	-----	-----	-----	-----	0.59
2.50	0.00	100.76	0.00	0.53	-----	-----	-----	-----	-----	-----	0.54
2.67	0.00	100.74	0.00	0.48	-----	-----	-----	-----	-----	-----	0.48
2.83	0.00	100.72	0.00	0.44	-----	-----	-----	-----	-----	-----	0.44

...End

Reservoir Report

English

Reservoir No. 1 - Existing Pond

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	97.50	10	0	0
1.00	98.50	20	10	10
2.50	100.00	11,625	8,726	8,731
4.50	102.00	19,125	30,750	39,481
6.50	103.00	22,625	20,875	60,356

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.2	17.0	0.0	0.0
Span in	= 0.2	17.0	0.0	0.0
No. Barrels	= 1	1	0	0
Invert El. ft	= 97.60	100.45	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= -----	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.0	0.0	0.0	0.0
Crest El. ft	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Eqn. Exp.	= 0.00	0.00	0.00	0.00
Multi-Stage	= No	No	No	No

Tailwater Elevation = 0.00 ft

Stage / Storage / Discharge Table

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

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0	97.50	0.00	0.00	---	---	---	---	---	---	0.00
1.00	10	98.50	0.00	0.00	---	---	---	---	---	---	0.00
2.50	8,731	100.00	0.00	0.00	---	---	---	---	---	---	0.00
4.50	39,481	102.00	0.00	6.96	---	---	---	---	---	---	6.96
6.50	60,356	103.00	0.00	10.30	---	---	---	---	---	---	10.30

Hydrograph Report

English

Hyd. No. 6

10 yr routed

Hydrograph type	= Reservoir	Peak discharge	= 7.31 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 2	Reservoir name	= Existing Pond
Max. Elevation	= 102.09 ft	Max. Storage	= 40,407 cuft

Storage Indication method used.

Total Volume = 30,908 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
0.33	37.84	101.22	0.00	2.68	-----	-----	-----	-----	-----	-----	2.68
0.50	14.19	102.03	0.00	7.08	-----	-----	-----	-----	-----	-----	7.08
0.67	0.00	101.91	0.00	6.59	-----	-----	-----	-----	-----	-----	6.59
0.83	0.00	101.67	0.00	5.47	-----	-----	-----	-----	-----	-----	5.47
1.00	0.00	101.48	0.00	4.30	-----	-----	-----	-----	-----	-----	4.30
1.17	0.00	101.34	0.00	3.36	-----	-----	-----	-----	-----	-----	3.36
1.33	0.00	101.22	0.00	2.66	-----	-----	-----	-----	-----	-----	2.67
1.50	0.00	101.12	0.00	2.16	-----	-----	-----	-----	-----	-----	2.16
1.67	0.00	101.05	0.00	1.76	-----	-----	-----	-----	-----	-----	1.76
1.83	0.00	100.99	0.00	1.44	-----	-----	-----	-----	-----	-----	1.44
2.00	0.00	100.93	0.00	1.22	-----	-----	-----	-----	-----	-----	1.22
2.17	0.00	100.89	0.00	1.03	-----	-----	-----	-----	-----	-----	1.03
2.33	0.00	100.85	0.00	0.87	-----	-----	-----	-----	-----	-----	0.87
2.50	0.00	100.82	0.00	0.74	-----	-----	-----	-----	-----	-----	0.74

...End

Reservoir Report

English

Reservoir No. 1 - Existing Pond

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	97.50	10	0	0
1.00	98.50	20	10	10
2.50	100.00	11,625	8,726	8,731
4.50	102.00	19,125	30,750	39,481
6.50	103.00	22,625	20,875	60,356

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.2	17.0	0.0	0.0
Span in	= 0.2	17.0	0.0	0.0
No. Barrels	= 1	1	0	0
Invert El. ft	= 97.60	100.45	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= -----	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.0	0.0	0.0	0.0
Crest El. ft	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Eqn. Exp.	= 0.00	0.00	0.00	0.00
Multi-Stage	= No	No	No	No

Tailwater Elevation = 0.00 ft

Stage / Storage / Discharge Table

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

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0	97.50	0.00	0.00	---	---	---	---	---	---	0.00
1.00	10	98.50	0.00	0.00	---	---	---	---	---	---	0.00
2.50	8,731	100.00	0.00	0.00	---	---	---	---	---	---	0.00
4.50	39,481	102.00	0.00	6.96	---	---	---	---	---	---	6.96
6.50	60,356	103.00	0.00	10.30	---	---	---	---	---	---	10.30

Hydrograph Report

English

Hyd. No. 7

100 yr routed

Hydrograph type	= Reservoir	Peak discharge	= 11.48 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 3	Reservoir name	= Existing Pond
Max. Elevation	= 103.44 ft	Max. Storage	= 54,563 cuft

Storage Indication method used.

Total Volume = 49,359 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
0.33	53.04	101.89	0.00	6.51	-----	-----	-----	-----	-----	-----	6.51
0.50	19.89	103.38	0.00	11.32	-----	-----	-----	-----	-----	-----	11.32
0.67	0.00	103.08	0.00	10.53	-----	-----	-----	-----	-----	-----	10.53
0.83	0.00	102.53	0.00	8.71	-----	-----	-----	-----	-----	-----	8.71
1.00	0.00	102.07	0.00	7.23	-----	-----	-----	-----	-----	-----	7.23
1.17	0.00	101.79	0.00	6.07	-----	-----	-----	-----	-----	-----	6.08
1.33	0.00	101.57	0.00	4.91	-----	-----	-----	-----	-----	-----	4.91
1.50	0.00	101.41	0.00	3.78	-----	-----	-----	-----	-----	-----	3.79
1.67	0.00	101.27	0.00	3.00	-----	-----	-----	-----	-----	-----	3.00
1.83	0.00	101.17	0.00	2.40	-----	-----	-----	-----	-----	-----	2.40
2.00	0.00	101.09	0.00	1.95	-----	-----	-----	-----	-----	-----	1.95
2.17	0.00	101.02	0.00	1.59	-----	-----	-----	-----	-----	-----	1.59
2.33	0.00	100.96	0.00	1.33	-----	-----	-----	-----	-----	-----	1.33

...End

Reservoir Report

English

Reservoir No. 1 - Existing Pond

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	97.50	10	0	0
1.00	98.50	20	10	10
2.50	100.00	11,625	8,726	8,731
4.50	102.00	19,125	30,750	39,481
6.50	103.00	22,625	20,875	60,356

Culvert / Orifice Structures

		[A]	[B]	[C]	[D]
Rise in	=	0.2	17.0	0.0	0.0
Span in	=	0.2	17.0	0.0	0.0
No. Barrels	=	1	1	0	0
Invert El. ft	=	97.60	100.45	0.00	0.00
Length ft	=	0.0	0.0	0.0	0.0
Slope %	=	0.00	0.00	0.00	0.00
N-Value	=	.013	.013	.000	.000
Orif. Coeff.	=	0.60	0.60	0.00	0.00
Multi-Stage	=	-----	No	No	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len ft	=	0.0	0.0	0.0	0.0
Crest El. ft	=	0.00	0.00	0.00	0.00
Weir Coeff.	=	0.00	0.00	0.00	0.00
Eqn. Exp.	=	0.00	0.00	0.00	0.00
Multi-Stage	=	No	No	No	No

Tailwater Elevation = 0.00 ft

Stage / Storage / Discharge Table

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

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0	97.50	0.00	0.00	---	---	---	---	---	---	0.00
1.00	10	98.50	0.00	0.00	---	---	---	---	---	---	0.00
2.50	8,731	100.00	0.00	0.00	---	---	---	---	---	---	0.00
4.50	39,481	102.00	0.00	6.96	---	---	---	---	---	---	6.96
6.50	60,356	103.00	0.00	10.30	---	---	---	---	---	---	10.30

SERVICES

SP-16-00

(1)

TAX PARCEL (33-3)(1-11B)

GPIN 33301 00011B

DIAMOND Health Care of Williamsburg, Inc.
700 East Main St. #1011
Richmond Va. 23219
804-649-9340 C/O RICHARD WOODARD

ADDRESS: 5477 Moorefown ROAD 2.565AC
WMBG 23188

M1 ZONED
LOT 3 60W BUSINESS PARK

---

(2) SITUATED ON: (33-3)(01-11A)

GPIN 33301 00011A
5424 AIRPORT ROAD

LOUIS B FINE FAMILY PARTNERSHIP
6137 Millerstore RD
Norfolk VA 23502
3.11 AC
M-1 LOT 4 60W BUSINESS PARK

---

(3)

(33-3)(01-11E)
5406 AIRPORT ROAD
WMBG 23188

WILLIAM TOBIAS + Anne B Sherill
1.27AC.
L 4B 60 W BUSINESS PARK

Matches Agreement? YES

BMP # YR012

TABLE 3

WORKSHEET FOR BMP POINT SYSTEM

A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP Points		Fraction of Site Served by BMP		Weighted BMP Points
DESIGN 3 (24 HRS) DRY POND	6	x	$\frac{2.48}{3.182} = 78\%$	=	4.7
		x		=	
DESIGN 3 (24 HRS) OFFSITE	6	x	$\frac{3.53}{3.182} = 1.10$	=	6.6
		x		=	

TOTAL WEIGHTED STRUCTURAL BMP POINTS: 11.3

B. NATURAL OPEN SPACE CREDIT

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

C. TOTAL WEIGHTED POINTS

11.3	+	0	=	11.3
Structural BMP Points		Natural Open Space Points		TOTAL

3.01 Acres

Owner
Louis B Fine
2101 Parks Ave Suite 601
VA Beach

5242 Crisp Rd
Wmsbg VA

Langley and McDonald
A PROFESSIONAL CORPORATION
ENGINEERS • PLANNERS • SURVEYORS
VIRGINIA BEACH - WILLIAMSBURG, VIRGINIA

Subject MINI WHSE

Computed By WL Checked By

Project No. 94051-01

Client M. FINE

Date 9-27-94 Sheet No. 1

MINI WHSE SITE

LOT 4A = 3.182 AC

AREA SERVED BY BMP 2.48 AC

COLONIAL GARDENS

LOT 4B = 1.277 AC

AREA SERVED BY BMP 1.23 AC

DIAMOND HEALTH CARE

LOT 3 = 2.565 AC

AREA SERVED BY BMP 2.30 AC

$$\frac{2.48}{3.182} = 0.779$$

$$\frac{3.53}{3.182} = 1.109$$

USE EXTENDED DRY DETENTION

(2) DESIGN 3 (24 HRS) 6 PTS

ON SITE

6 X .779 = 4.67

OFF SITE - LOTS 4B & 3B ONLY

6 X 1.109 = 6.65

TOTAL PTS 11.32

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ENGINEERS • PLANNERS • SURVEYORS
VIRGINIA BEACH - WILLIAMSBURG, VIRGINIA

Subject M. FINE MINIWHSE

Computed By W.C. Checked By

Project No. 94051-0151
Client M FINE
Date 9-27-94 Sheet No. 2

$R_v = 0.05 + 0.009 (I)$

$= 0.05 + 0.009 (42)$

$R_v = 0.428$

IMP. AREA	1.89	Lot 4 A
"	0.51	Lot 4 B
"	0.57	Lot 3
	2.97	Ac

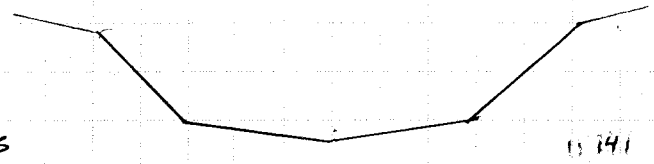
$V = \frac{(1.0)(.43)}{12} \; 7.02$

Lots 3, 4A & 4B = 7.02 Ac

2.97 / 7.02 = .423

SAY 42%

V_{OL} = .2516 Ac Ft = 10,958 Cu Ft



VOLUME OF EXIST POND
WITHOUT CONNECTING DITCHES

11,141

EL	Sq Ft	AVE. DEPT	Total CF	
98.5	0		0	
		5812 x 1.5		
100	11625		8718 CF	8718 CF
		15375 x 2.0		
102	19125		30750	39468 CF
		20875 x 1.0		
103	22625		20875	60342 CF

100.4

FOR CBPA 10,958 Cu Ft REQUIRED

At EL 100.25 STORAGE 11,741 Cu Ft. PROVIDED

Langley and McDonald
A PROFESSIONAL CORPORATION
ENGINEERS • PLANNERS • SURVEYORS
VIRGINIA BEACH – WILLIAMSBURG, VIRGINIA

Subject MINI WHSE

Computed By N/C Checked By

Project No. 94051-0151

Client M FINE

Date 9-27-94 Sheet No. 3

MODIFY EXISTING BMP STRUCTURE

CBPA

BMP 11,741 CU FT @ ELEV 100.25

RELEASE OVER:

24 HRS 86400 SEC

11742 / 86400 = 0.1359 CFS

$Q = (0.6)(A)\sqrt{2gh}$

100.25
98.38

$0.1359 = 0.6\ A\ \sqrt{(2)(32.2)\ .94}$

h = 1.87 MAX
AVERAGE h = .94

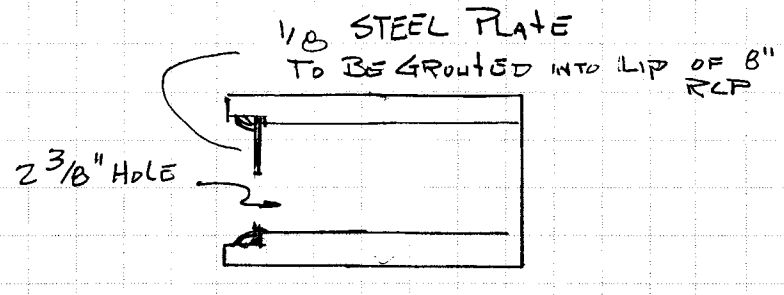
A = 0.0291 SQ FT

$d\ \sqrt{4/\pi\ a}$

$d\ \sqrt{(1.2732)(.0291)}$

d = .1925

d = 2 3/8" HOLE



A = .0291

60 WEST BUSINESS PARK
J.O. A3572

DRAINAGE

DRAINAGE AREA Lot 2, 3, & 4 = 13.66 Ac

OVERLAND DIST NW Cor Lot 2 to Moorestown Rd to SE Cor Lot 4 = 1600'

DIFF IN Elev. = 110.5 − 102.5 = 8'

∴ S = 8'/1600' = .005 F/F

∴ T_c = 18 min ∴ I_{10} = 4.7 in/HR I_2 = 3.5 in/HR

Predevelopment runoff @ I_2 = (13.66)(.3)(3.5) = 14.34 CFS

I_{10} = (13.66)(.3)(4.7) = 19.26 CFS

Post Development runoff @ I_2 = (13.66)(.85)(3.5) = 40.64 CFS

I_{10} = (13.66)(.85)(4.7) = 54.57 CFS

EXIST 18" CULV UNDER Moorestown Rd Q_{MAX}, A = 1.77 FT², P = 4.71 F ∴ R = 0.376

INV IN = 100.05
INV OUT = 99.93
Δ = 0.12 @ 48' long S = .0025

EXIST Q_{max} @ 0.90 $= \left(\frac{1.486}{.015}\right)(1.77)(.376 \times 1.19)^{2/3}(.0025)^{1/2}$

= (99.07)(1.77)(.585)(.05) = 5.53 CFS

∴ ΔQ_2 = 40.64 − 14.34 = 26.30 CFS = 183% increase

ΔQ_{10} = 54.57 − 19.26 = 35.31 CFS = 183% increase

∴ Post Development Storage Req'd = $\frac{54.57 - 19.26}{54.57}$ = 65%

T_b = 18 min × 2.67 = 48.06 min

* ORIGINAL DRAINAGE. INFORMATION FOR DETENTION POND PROVIDED BY WOODSON & ASSOCIATES.

USING WOODSONS BASIC DESIGN INFO WE RAN WALLER METHOD TO CHECK 2 & 10 YR STM. WE DID MODIFY THE PRE & POST COEF. & THE POST DEV. TIME

Langley and McDonald
A PROFESSIONAL CORPORATION
ENGINEERS • PLANNERS • SURVEYORS
VIRGINIA BEACH - WILLIAMSBURG, VIRGINIA

Subject: MINI WHSE

Computed By: WL Checked By:

Project No. 96051-01
Client: M FINE
Date: 9-28-94 Sheet No. 5

13.66 AC DRAINING TO EXISTING DETENTION POND

SEE ATTACHED WOODSON & ASSOCIATES DRAINAGE INFO

MIN 30% TO REMAIN GREEN AREA = 4.10 AC

MAX 70% TO IMPERIOUS AREA = 9.56 AC

	WEIGHT	C
4.1	x .2	= 0.82
9.56	x .9	= 8.60
		9.42

9.42 / 13.66 = 0.69 COEF

USE .69 FOR CAL'S

L. WOODSON & ASSOCIATES Inc.
Engineers, Surveyors & Planners
P.O. Box 613
Williamsburg, Va.
23187

July 12, 1988

Mr. Darryl Cook
James City County
101 Mounts Bay Road
Williamsburg, Virginia 23185

RE: 60 WEST BUSINESS PARK DRAINAGE

Dear Mr. Cook:

We have not been able to obtain an easement from The City of Williamsburg as shown on our original submission. We have therefore designed the project to store runoff (55 CFS) in excess of the present runoff (5 CFS). The stored runoff will be released at the present runoff rate of 5 CFS to the VDOT highway ditch on the north side of Route 645, Airport Road.

Attached are four (4) copies of the drawings which have been revised to reflect this change. Also attached is a copy of our drainage calculations.

I have discussed this arrangement with Mr. Speed Hollowell, VDOT Drainage Section, Suffolk. We have also met on site to discuss the problem.

I also discussed this arrangement with Ms. Connie Bennett, Chief Engineer, York County. I believe all parties agree this is the best solution to our problem.

Please review these drawings and let us have your comments/approval so that we can proceed with the installation of the drainage structures.

Thank you for your assistance in this matter.

Very Truly,

L. V. Woodson, P.E.

LVW/mw

cc: Mr. Speed Hollowell
Ms. Connie Bennett

JUL 1988
RECEIVED
PLANNING DEPARTMENT

804-565-2628 Residenc
804-229-2472 Office

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

FINAL CONSTRUCTION INSPECTION FOR BOND RELEASE

Database Inventory No. (if known): YR 012

Name of Facility: ~~60 WEST BUSINESS PARK~~ Williamsburg Place / SAFE PLACE BMP No.: 1 of 1 Date: 03/02/01

Location: 5477 Mooretown ROAD / 5424 Airport ROAD

Name of Owner: DIAMOND Health Care of Williamsburg LLC / LOUIS B. FINE FP

Inspector: SJ Thomas (Note: Inspection for WILLIAMSBURG PLACE. BMP SITUATED ON BOTH LOTS 11A & 11B.)

Type of Facility: Dry Detention POND

Weather Conditions: Sunny, High 50's

SP-16-00

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

O.K. - The item checked is in adequate condition and the maintenance program is currently satisfactory.
Routine - The item checked requires attention, but does not present an immediate threat to the function of the BMP.
Urgent - The item checked requires immediate attention to keep the BMP operational and prevent damage to the facility.

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

Facility Item	O.K.	Routine	Urgent	Comments
Embankments and Side Slopes:	EXCAVATED FACILITY W 2H:1V SS; RECT SHAPED			
Grass Height	X			HI + LOW GRASS. GOOD COVER
Vegetation Condition	X			WELL VEGETATED.
Tree Growth	X			SMALL WILLOWS + PINE INTERIOR SS.
Erosion	X			
Trash & Debris	X			MINOR
Seepage	X			None Observed.
Fencing or Benches				N/A
Interior Landscaping/Planted Areas:	☐ None ☐ Constructed Wetland/Shallow Marsh ☒ Naturally Established Vegetation			
Vegetated Conditions	X			GOOD INTERIOR VEG. SMALL Ø TREES.
Trash & Debris	X			
Floating Material	X			
Erosion	X			
Sediment	X			
Dead Plant	X			
Aesthetics	X			NATURAL LOOK.
Other				
BMP MODIFICATIONS Due to Parking Lot Expansion. Serves Building + PARKING AREA				

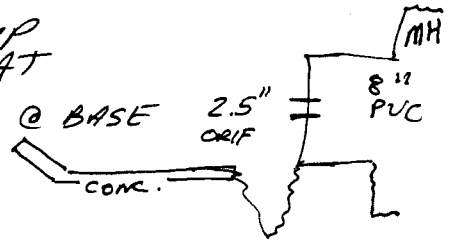
Facility Item	O.K.	Routine	Urgent	Comments
Water Pools ❒ Permanent Pool (Retention Basin) ❒ Shallow Marsh (Detention Basin) ☒ None (Detention Basin)				
Shoreline Erosion	X			
Algae	X			
Trash & Debris	X			
Sediment	X			
Aesthetics	X			
Other		X		WATER PONDING SLIGHTLY NEAR RISER.
Inflow Stuctures (Describe Locations): 24" RCP W/ ES-1 & PAVED FLUME NEAR MID BMP & AT RISER.				
Condition of Structure	X			PAVED FLUME NEW.
Erosion	X			
Trash and Debris	X	X		END OF PAVED FLUME NEEDS CLEANED OF LEAVES.
Sediment	X			
Aesthetics	X			
Other	X			
Principal Flow Control Structure - Intake, Riser, etc. (Describe Location): VDOT MH-1 w/ MOD. 18" ORIF; 2.5" LOW FLOW OR.				
Condition of Structure	X			
Corrosion	X			
Trash and Debris	X			
Sediment		X		SED. 1.5' DEEP @ LOW FLOW ORIF. @ CONC. APRON, 2" DEEP ELSEWHERE.
Aesthetics	X			
Other				MH-1 WAS clean inside.
Principal Outlet Structure - Barrel, Conduit, etc. : RCP from MH.				
Condition of Structure	X			
Settlement	X			
Trash & Debris	X			
Sediment	X			
Erosion	X			
Other				
Emergency Spillway (Overflow): None OBSERVED.				
Vegetation				
Lining				
Erosion				
Trash & Debris				
Other				

MODIFATION TO 18" RCP : 4" HIGH MORTAR IN 18" PIPE
NOTE: CLEANED 2.5" LF ORIF W/ RANGE POLE.

Facility Item	O.K.	Routine	Urgent	Comments
Nuisance Type Conditions:				
Mosquito Breeding	X			
Animal Burrows	X			
Graffiti	X			
Other	X			
Surrounding Perimeter Conditions:				
Land Uses	X			Building, Parking & Moorestown Rd.
Vegetation	X			
Trash & Debris		X		Some at Riser Vicinity.
Aesthetics	X			
Access /Maintenance Roads or Paths	X			Access Riser from Moorestown Rd. Back of Facility Thru Site.
Other				

Remarks:

▷ CLEAN SED. FROM 2.5"ϕ LOW FLOW BMP ORIFICE. CLEANED w/ RANGE POLE AT TIME OF INSPECTION. 1-1.5' DEEP IMMED. @ BASE OF ORIFICE. 2" ON CONC. APRON



Overall Environmental Division Internal Rating: 4

Signature: Scott Thomas P.E. **Date:** 03/02/01

Title: Civil Engineer, JCL Env Div.

SWMProg\BMP\CoInspProg\DetRet.wpd

Date Record Created:

Created By:

WS_BMPNO: YR012

Print Record

PRINTED ON
Wednesday, March 10, 201
1:18:00 PM

WATERSHED	YR
BMP ID NO	012
PLAN NO	SP-16-00
TAX PARCEL	(33-3)(1-11B)
PIN NO	3330100011B
CONSTRUCTION DATE	1/1/1995
PROJECT NAME	60 West Business Park (Lots 3,4,4B)
FACILITY LOCATION	5424 Airport Road
CITY-STATE	Williamsburg, Va. 23188
CURRENT OWNER	Louis B Fine Family Partnership
OWNER ADDRESS	6137 Miller Store Road
OWNER ADDRESS 2	
CITY-STATE-ZIP CODE	Norfolk, Va. 23502
OWNER PHONE	
MAINT AGREEMENT	Yes
EMERG ACTION PLAN	No

Get Last BMP No

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MAINTENANCE PLAN	No
SITE AREA acre	3.11
LAND USE	Limited Business
old BMP TYP	Dry Pond
JCC BMP CODE	F2 Dry ED with forebay
POINT VALUE	6
SVC DRAIN AREA acres	13.66
SERVICE AREA DESCRI	Parcels 11A(Safe Pl), B (Wmbg Pl), C & E
IMPERV AREA acres	8.00
RECV STREAM	
EXT DET-WQ-CTRL	Yes
WTR QUAL VOL acre-ft	0.2885
CHAN PROT CTRL	No
CHAN PROT VOL acre-ft	0
SW/FLOOD CONTROL	Yes
GEOTECH REPORT	No

CTRL STRUC DESC	Conc Manhol
CTRL STRUC SIZE inches	48
OTLT BARRL DESC	RCP
OTLT BARRL SIZE inch	18
EMERG SPILLWAY	No
DESIGN HW ELEV	103.4
PERM POOL ELEV	None
2-YR OUTFLOW cfs	4.20
10-YR OUTFLOW cfs	7.30
REC DRAWING	No
CONSTR CERTIF	No
LAST INSP DATE	11/9/2001
Inspected by:	
INTERNAL RATING	3
MISC/COMMENTS	Riser modified per SP-16-00.

Additional Comments:

WATERSHED	YR	MAINTENANCE PLAN	No	CTRL STRUC DESC	Conc Manhol
BMP ID NO	012	SITE AREA acre	3.11	CTRL STRUC SIZE inches	48
PLAN NO	SP-16-00	LAND USE	Limited Business	OTLT BARRL DESC	RCP
TAX PARCEL	(33-3)(01-11B)	old BMP TYP	Dry Pond	OTLT BARRL SIZE inch	18
PIN NO	3330100011B	JCC BMP CODE			
CONSTRUCTION DATE	1/1/1995	POINT VALUE	6	EMERG SPILLWAY	No
PROJECT NAME	60 West Business Park (Lots 3,4,4B)			DESIGN HW ELEV	103.4
FACILITY LOCATION	5424 Airport Road			PERM POOL ELEV	None
CITY-STATE	Williamsburg, Va. 23188	SVC DRAIN AREA acres	13.66	2-YR OUTFLOW cfs	4.20
CURRENT OWNER	Louis B Fine Family Partnership			10-YR OUTFLOW cfs	7.30
OWNER ADDRESS	6137 Miller Store Road			REC DRAWING	No
OWNER ADDRESS 2		SERVICE AREA DESCRI	Parcels 11A(Safe Pl), B (Wmbg Pl), C & E		
CITY-STATE-ZIP CODE	Norfolk, Va. 23502	IMPERV AREA acres	8	CONSTR CERTI	No
OWNER PHONE		RECV STREAM	UT to York River		
MAINT AGREEMENT	Yes	EXT DET-WQ-CTRL	Yes	LAST INSP DATE	3/2/2001
EMERG ACTION PLAN	No	WTR QUAL VOL acre-ft	0.2885	INTERNAL RATING	4
		CHAN PROT CTRL	No	MISC/COMMENTS	
		CHAN PROT VOL acre-ft	0	In PC drains across Mooretown Rd to YR via 18" RCP. Riser modified per SP-16-00.	
		SW/FLOOD CONTROL	Yes		
		GEOTECH REPORT	No		

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CSX RAILROAD
(PARCEL 11C)
WILLIAMSBURG PLACE CARE INC.
W/F DIAMOND HEALTH OF WILLIAMSBURG INC.
2.565 AC
ZONE M1
GPIN 3330100011B
(PARCEL 11B)
1.27 AC.
PARCEL 11E
THE SAFE PLACE FP
W/F LOUIS B. FINE
GPIN 3330100011A
(PARCEL 11A)
ZONE M1
3.11 AC.
645 AIRPORT ROAD
603 MOORETOWN RD.
YR012 (PC WATERSHED)
OUTFALL YR
SIXTY WEST BUSINESS PARK

ENVIRONMENTAL DIVISION REVIEW COMMENTS
WILLIAMSBURG PLACE EXPANSION
COUNTY PLAN NO. SUP – 32 - 04
January 3, 2004

General Comments:

1. Powhatan Creek. Based on subwatershed maps of the Powhatan Creek study and recent knowledge which has come about with regards to the existing roadside storm drainage piping system along Mooretown Road (under County case SP-16-04, AAAA Self-Storage), there is a good possibility that the expansion project area is situated within subwatershed 207 (Upper Chisel Run) of the Powhatan Creek watershed, specifically catchments 207-101-1 and/or 207-101-2). As the Board of Supervisors, by resolution dated February 26th 2002, adopted eight (8) goals and 21 of 24 priorities associated with the Powhatan Creek Watershed Management Plan. This project may be subject to the contents of that plan. The special use permit binder, community impact statement and conceptual plan drawing makes no mention of the area as being situated in the Powhatan Creek watershed nor how the goals, priorities and specific subwatershed or catchment recommendations are to be implemented. The owner, applicant, developer and plan preparer should be advised of and completely review the goals, priorities (tools) and entire contents of this study, including sub-watershed maps, as layout and design of the proposed project could be affected by and should remain consistent with these items. Refer to the watershed management plan and the associated sub-watershed maps for environmental sensitive areas, features and/or recommendations that may apply to the sub-watershed or catchment in which the project area is situated. Specific items that may apply include:

    - Stormwater retrofitting
    - Onsite stormwater management

2. Unless otherwise verified that drainage from the site is directed to the City or another watershed, provide a general note on the concept plan drawing stating that the SUP designated area is situated within sub-watershed 207 of the Powhatan Creek watershed.

3. Drainage Plan. Some guidance is being offered as it would pertain to the plan of development for the expansion site. Drainage along the east side of the CSX railroad is very poor and efforts should be made to keep uncontrolled drainage toward the railroad to a minimum (appropriate approvals from the railroad may be necessary). If directed toward the existing onsite dry pond BMP to the south of the existing buildings, it will need to be verified that this facility was master planned for drainage from the expansion site; otherwise additional onsite BMPs or upgrades to the existing BMP may be necessary. *(Note: Language in Section 4, Stormwater Management of the Community Impact Statement is not justified in stating that "no further stormwater improvements to this (BMP) facility nor any new facilities are anticipated to be needed for this project. This expansion project may result in the need for upgrade to the existing BMP in order to meet current County BMP manual requirements and recommendations from the Powhatan Creek Watershed Management Plan.)*

4. For information, our records show that the riser structure associated with the BMP situated to the south of the existing building was modified under County Plan No. SP-16-00, thus indicative of the need to upgrade the BMP proportional to the scale of the expansion activity and amount of drainage to be directed to the existing BMP. The extent of further analyses required for the existing BMP will be determined at the plan of development (site plan) stage based on final impervious cover, grading and drainage arrangements.

5. Use of low-impact development principles and techniques are fully encouraged for use in (expansion) 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, minimizing use of storm drain pipe, encouraging infiltration and use of bioretention cells with appropriate landscaping.)