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: **99124**

DATE VERIFIED: **September 10, 2012**

QUALITY ASSURANCE TECHNICIAN: **Leah Hardenbergh**

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA

Stormwater Division

MEMORANDUM

DATE: March 12, 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: 99124

PIN: 1330100009

Subdivision, Tract, Business or Owner Name (if known): Massie, Jack L

Property Description: General File

Site Address: 3920 Cokes Lane

(For internal use only) **Box** 20 **Drawer:** 8

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

Comments
Sand, Gravel, Cement Operation

Contents for Stormwater Management Facilities As-built Files

Each File is to contain:

- ☐ 1. Maintenance Agreement
- ☐ 2. Construction certification
- ☐ 3. As-Built plan
- ☐ 4. Design Calculations
- ☐ 6. Correspondence
- ☐ 7. Inspection records
- ☐ 8. Miscellaneous

4401

File – Massie Stor. Yd Exp.

BOOK 434 PAGE 347

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF RUNOFF CONTROL FACILITY

THIS DECLARATION, made this 4 day of MAY, 1989, between JACK L. MASSIE CONTRACTOR INC. hereinafter referred to as the "COVENANTOR(S)", owner(s) of the following property: (13-3) 09 3910 COLES LANE, and James City County, Virginia, hereinafter referred to as the "COUNTY".

WITNESSETH:

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

1. The COVENANTOR(S) shall provide maintenance for the runoff control facility, hereinafter referred to as the "FACILITY", located on and serving the above-described property to ensure that the FACILITY is and remains in proper working condition in accordance with approved design standards, and with the law and applicable executive regulations.

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

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

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

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

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

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

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

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

10. The COUNTY agrees to maintain a log of the inspections noting the condition of the FACILITY on the date the inspections are performed. The COUNTY shall make the log available to CONVENANTOR upon CONVENTORS request.

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of this 4th day of May, 19 89.

ATTEST: FOR THE COVENANTOR(S)

Gary M. Massie

Date: 5-4-89

STATE OF VIRGINIA

COUNTY OF

I hereby certify that on this 4th day of May, 19 89, before the subscribed, a Notary Public of the State of Virginia, and for the County of James City, aforesaid personally appeared Gary M. Massie and did acknowledge the aforegoing instrument to be their Act.

VIRGINIA: City of Williamsburg and County of James City, to Wit:
In the Clerk's office of the Circuit Court of the City of Williamsburg and County of James City the 16 day of May, 1989. This was presented with certificate annexed and admitted to record at 12:10 o'clock
Teste: Helene S. Ward, Clerk
by
Deputy Clerk

In Testimony whereof, I have affixed my official seal.

Marie Lou Smith

My Commission Expires: 2/8/93

NOTARY PUBLIC

Approved as to form:

/PW5

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF, THIS PLAT COMPLIES WITH THE APPLICABLE REQUIREMENTS OF THE BOARD OF SUPERVISORS AND ORDINANCES OF THE COUNTY OF JAMES CITY, VIRGINIA.

COMMONWEALTH OF VIRGINIA
8-9-96
STEPHEN A.ROMEO
No. 1448-B
LAND SURVEYOR

8-9-96 — DATE

Stephen Romeo — NAME

OWNER'S CERTIFICATE

THE CONSERVATION EASEMENT SHOWN ON THIS PLAT IS WITH THE FREE CONSENT AND IN ACCORDANCE WITH THE DESIRE OF THE UNDERSIGNED OWNERS, PROPORIETORS AND/OR TRUSTEES.

_____ DATE

_____ NAME

CERTIFICATE OF NOTARIZATION
STATE OF VIRGINIA
COUNTY OF JAMES CITY

I, (PRINT) _____, A NOTARY PUBLIC IN AND FOR THE COUNTY AND STATE AFORESAID, DO HEREBY CERTIFY THAT THE PERSONS WHOSE NAMES ARE SIGNED TO THE FOREGOING WRITING HAVE ACKNOWLEDGED THE SAME BEFORE ME IN THE COUNTY AND STATE AFORESAID. GIVEN UNDER MY NAME THIS _____ DAY OF_____, 1996.

MY COMMISSION EXPIRES_____

SIGNATURE _____

CERTIFICATE OF APPROVAL

THIS PLAT IS APPROVED BY THE UNDESIGEND IN ACCORDANCE WITH EXISTING REGULATIONS AND MAY BE ADMITTED TO RECORD.

_____ DATE

_____ VIRGINIA DEPARTMENT OF TRANSPORTATION

_____ DATE

_____ VIRGINIA DEPARTMENT OF HEALTH

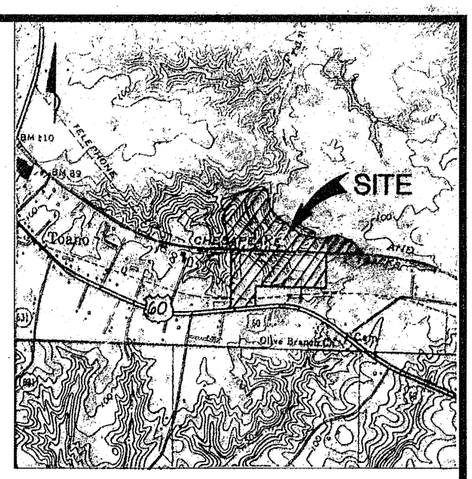
STATE OF VIRGINIA, COUNTY OF JAMES CITY

IN THE CLERK'S OFFICE OF THE CIRCUIT COURT THE PLAT SHOWN HEREON WAS PRESENTED AND ADMITTED TO RECORD THIS _____ DAY OF _____,1996,AS THE LAW DIRECTS.

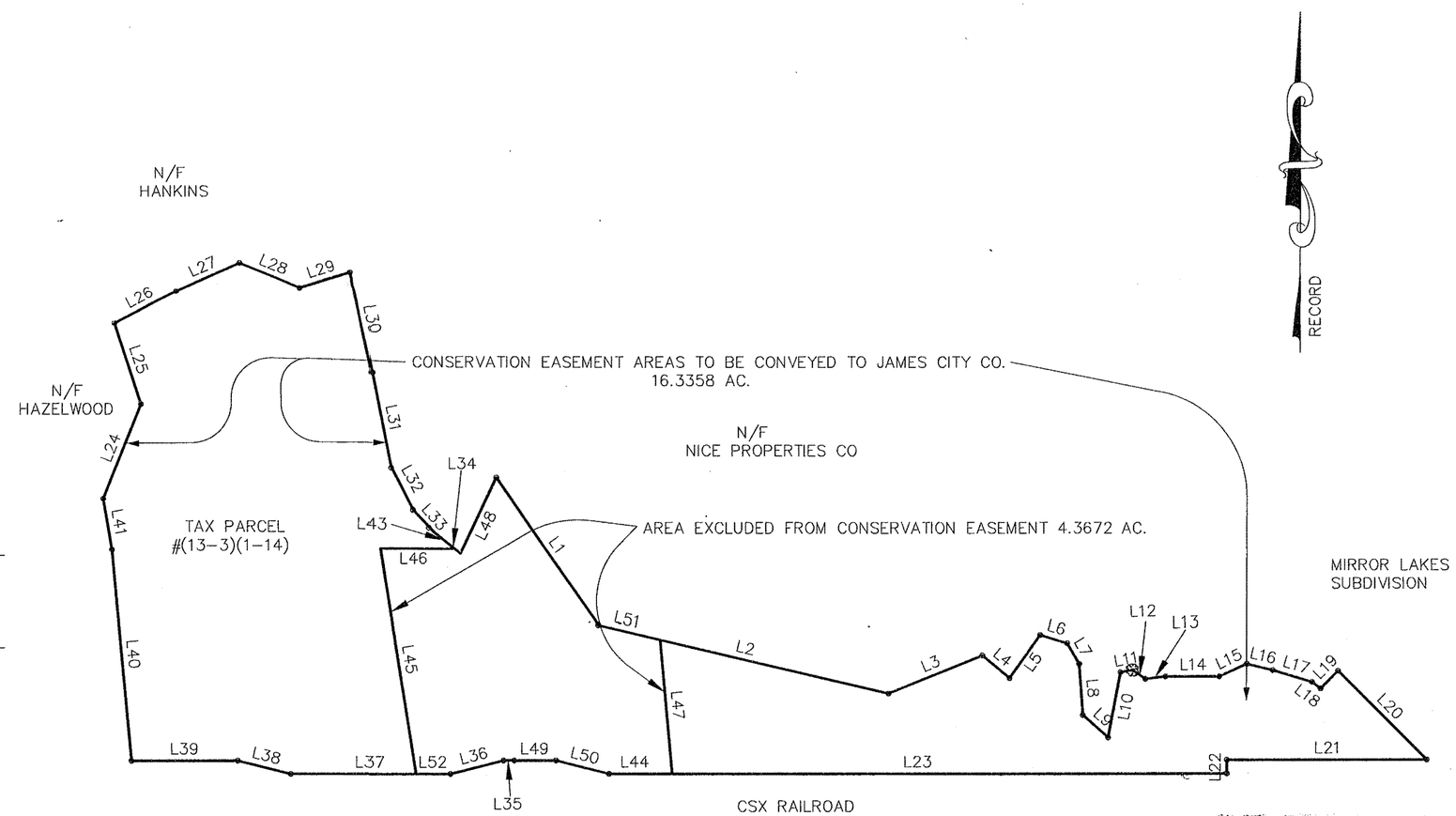
CLERK _____

PLAT BOOK _____ PAGE _____

LINE	DIRECTION	DISTANCE	L26	N61°42'47"E	131.70'
L1	S35°08'21"E	333.71'	L27	N65°48'58"E	131.55'
L2	S76°52'42"E	562.79'	L28	S67°07'14"E	122.67'
L3	N68°03'25"E	190.98'	L29	N72°53'37"E	99.70'
L4	S50°52'24"E	67.47'	L30	S12°11'22"E	194.54'
L5	N35°35'53"E	99.18'	L31	S11°09'10"E	179.03'
L6	S73°04'20"E	53.21'	L32	S27°27'43"E	91.22'
L7	S30°33'14"E	44.65'	L33	S43°57'33"E	56.05'
L8	S04°08'01"E	96.88'	L34	S52°06'45"E	63.49'
L9	S48°33'13"E	63.41'	L35	S89°55'00"W	20.00'
L10	N10°47'40"E	125.07'	L36	S75°52'50"W	103.08'
L11	N79°30'21"E	22.74'	L37	S89°55'00"W	300.00'
L12	S55°42'07"E	29.71'	L38	N76°02'50"W	103.08'
L13	N83°10'23"E	38.38'	L39	S89°55'00"W	200.19'
L14	S89°57'23"E	101.31'	L40	N05°20'18"W	395.59'
L15	N65°33'38"E	56.84'	L41	N09°56'34"W	95.50'
L16	S76°21'38"E	49.96'	L43	S52°06'45"E	50.00'
L17	S73°10'50"E	77.67'	L44	S89°59'36"E	100.00'
L18	S52°32'30"E	20.00'	L45	S09°00'50"E	426.19'
L19	N44°59'13"E	46.61'	L46	N89°43'48"W	140.00'
L20	S45°00'47"E	236.30'	L47	N05°07'36"W	252.07'
L21	N89°59'36"W	376.45'	L48	N25°47'10"E	155.16'
L22	S00°00'24"W	25.35'	L49	S89°48'30"W	78.81'
L23	N89°59'36"W	1167.00'	L50	N75°57'26"W	103.08'
L24	N21°55'47"E	190.36'	L51	S76°52'42"E	100.00'
L25	N18°12'06"W	159.35'	L52	S89°55'00"W	65.00'



VICINITY MAP SCALE: 1"=2000'



NOTE: THIS PLAT DOES NOT REPRESENT A NEW BOUNDARY SURVEY. EASEMENT LINES ARE DEVELOPED FROM PLATS OF RECORD PB 49 PG 72 AND PB 53 PG 43 JAMES CITY COUNTY,VA.

PLAT OF CONSERVATION EASEMENT AREAS FOR CONVEYANCE BY JACK L. MASSIE CONTRACTOR, INC. TO JAMES CITY COUNTY

GRAPHIC SCALE

0 0 0 0 0 0

(IN FEET)
1 inch = 200 ft.

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

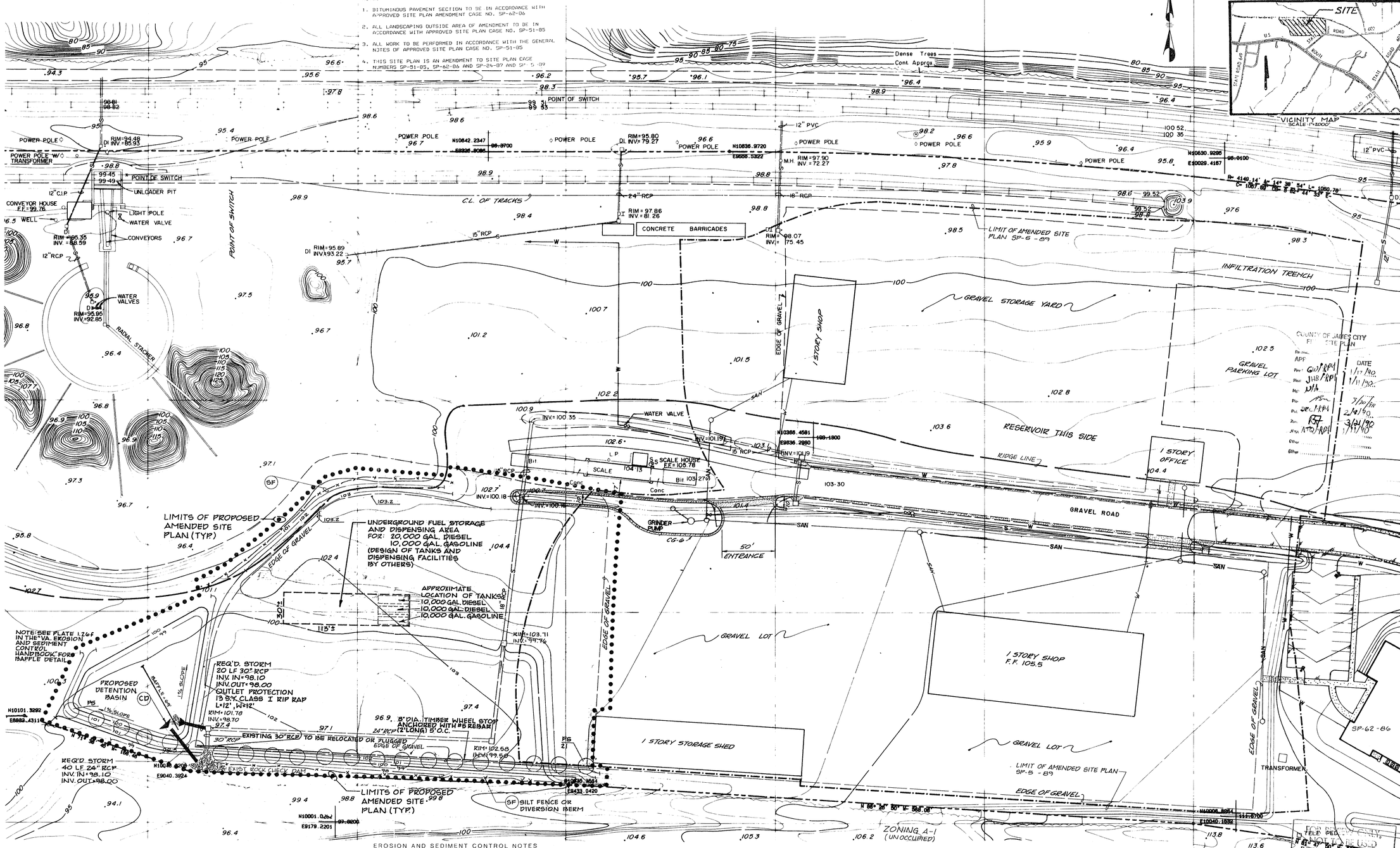
DATE: AUGUST 8,1996

6157W

99124_MASSIE_YARD_RICHMOND_ROAD - 005

NOTES

1. BITUMINOUS PAVEMENT SECTION TO BE IN ACCORDANCE WITH APPROVED SITE PLAN AMENDMENT CASE NO. SP-62-86
2. ALL LANDSCAPING OUTSIDE AREA OF AMENDMENT TO BE IN ACCORDANCE WITH APPROVED SITE PLAN CASE NO. SP-51-85
3. ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE GENERAL NOTES OF APPROVED SITE PLAN CASE NO. SP-51-85
4. THIS SITE PLAN IS AN AMENDMENT TO SITE PLAN CASE NUMBERS SP-51-85, SP-62-86 AND SP-24-87 AND SP-5-89



EROSION AND SEDIMENT CONTROL NOTES

THE PURPOSE OF THE EROSION CONTROL MEASURES SHOWN ON THESE PLANS SHALL BE TO PRECLUDE THE TRANSPORT OF ALL WATERBORNE SEDIMENTS RESULTING FROM CONSTRUCTION ACTIVITIES FROM ENTERING ONTO ADJACENT PROPERTIES OR STATE WATERS. IF FIELD INSPECTION REVEALS THE INADEQUACY OF THE PLAN TO CONFINE SEDIMENT TO THE PROJECT SITE, APPROPRIATE MODIFICATIONS WILL BE MADE TO CORRECT ANY PLAN 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 ALL APPLICABLE MEASURES CONTAINED THEREIN WHICH MAY BE PERTINENT TO THIS PROJECT.
2. ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS SHALL BE PROTECTED BY A TEMPORARY CONSTRUCTION ENTRANCE TO PREVENT TRACKING OF MUD ONTO PUBLIC RIGHT-OF-WAYS. AN ENTRANCE PERMIT FROM VDOT IS REQUIRED PRIOR TO ANY CONSTRUCTION ACTIVITIES WITHIN STATE RIGHT-OF-WAYS.
3. SEDIMENT CONTROL DEVICES, SUCH AS SEDIMENT BASINS AND TRAPS, PERIMETER DIKES, CHECK DAMS OR OTHER MEASURES NOT LOCATED IN PROPOSED FILL OR EXCAVATION AREAS, SHALL BE CONSTRUCTED PRIOR TO ALL OTHER LAND DISTURBANCE. AN ON-SITE PRE-CONSTRUCTION MEETING WILL BE HELD BETWEEN THE DEPARTMENT OF CODE COMPLIANCE AND THE CONTRACTOR TO IDENTIFY THOSE 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 PUBLIC WORKS 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 LOWER WATER DOWNSLOPE WITHOUT CAUSING EROSION. A TEMPORARY FILL DIVERSION (STD. & SPEC. 1.16) 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. DEPARTMENT 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.
9. TEMPORARY VEGETATIVE COVER SHALL BE PROVIDED IN ALL AREAS WHICH ARE NOT DESIGNATED FOR PAVING, UNDERGROUND UTILITIES OR STRUCTURAL USES IN ACCORDANCE WITH SPECIFICATION 1.65, TEMPORARY SEEDING. SUCH AREAS SHALL NOT BE EXPOSED FOR PERIODS EXCEEDING 30 DAYS. TEMPORARY VEGETAL COVER MAY BE ELIMINATED IN FAVOR OF FINAL VEGETAL COVER IF CONSTRUCTION AND SEASONAL CONDITIONS PERMIT.
10. ALL AREAS DESIGNATED FOR PAVING, UNDERGROUND UTILITIES, AND STRUCTURAL USE SHALL BE STABILIZED AS SOON AS POSSIBLE, BUT NOT EXCEEDING 15 DAYS FOLLOWING INSTALLATION. NO MORE THAN 300' OF SANITARY SEWER, STORM SEWER, OR WATER LINES ARE TO BE OPEN AT ONE TIME.
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 1.75. 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 STABLE GRASS COVER FROM A PROPERLY PREPARED SEEDBED CONTAINING THE SPECIFIED AMOUNTS OF SEED, LIME, AND FERTILIZER IN ACCORDANCE WITH SPECIFICATION 1.66, 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 1.75, MULCHING AND MANUFACTURER'S INSTRUCTIONS.
14. INLET PROTECTION IN ACCORDANCE WITH SPECIFICATION 1.08 SHALL BE PROVIDED FOR ALL STORM DRAIN INLETS AS SOON AS PRACTICAL FOLLOWING CONSTRUCTION OF SAME.
15. BASE COURSE MATERIAL SHALL BE PLACED IN ALL STREET AREAS WITHIN 30 DAYS OF FINAL GRADING.
16. PAVED DITCHES SHALL BE REQUIRED WHEREVER EROSION IS EVIDENT. PARTICULAR ATTENTION SHALL BE PAID TO THOSE AREAS WHERE GRADES EXCEED 3%.
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 SHALL BE APPROVED BY JAMES CITY COUNTY PRIOR TO THE IMPORT OF ANY BORROW OR EXPORT OF ANY WASTE TO OR FROM THE PROJECT SITE.

ALL CONSTRUCTION OR LAND DEVELOPMENT ACTIVITIES SHALL BE SUBJECT TO THE REQUIREMENTS OF THE CHESAPEAKE BAY PRESERVATION AREA DESIGNATION AND MANAGEMENT REGULATIONS (VR-173-02-01) AND ANY LOCAL ORDINANCES ADOPTED PURSUANT THERETO. THESE REGULATIONS AND ORDINANCES MAY PLACE ADDITIONAL REQUIREMENTS ON LOTS RECORDED AFTER SEPTEMBER 30, 1989, AND MAY LIMIT DEVELOPMENT OF LOTS. OWNERS SHOULD FAMILIARIZE THEMSELVES WITH THE REGULATIONS AND ORDINANCES AND ARE ENCOURAGED TO CONTACT THE JAMES CITY COUNTY DIRECTOR OF CODE COMPLIANCE FOR MORE INFORMATION.

PLANT LIST

KEY	QUANTITY	SCIENTIFIC NAME	COMMON NAME	HEIGHT	ROOTS
PS	21	PINUS STROBUS	WHITE PINE	10'	B&B

STATISTICAL DATA

ZONING: A-1
TAX MAP: (13-3)
PARCEL: (1-9)
SITE AREA: 1,501,949 SQ.FT. = 34.48 AC OR 100%
BUILDING AREA:
EXISTING AND PROPOSED: 38,744 SQ.FT. OR 2.58%
PAVED AREA: 522,144 SQ.FT. OR 34.76%
OPEN AREA: 941,051 SQ.FT. = 21.60 AC OR 62.66%

PARKING CALCULATIONS

EXISTING OFFICE:
REQUIRED: 6200 S.F./250 = 25
PROVIDED: 24+1 HANDICAPPED
PROPOSED OFFICE:
REQUIRED: 2000 S.F./250 = 8
PROVIDED: 7+1 HANDICAPPED
PROPOSED SHOPS:
REQUIRED: 1 PER 2 EMPLOYEES (10 EMPLOYEES MAX) = 5
PROVIDED: 47 SPACES
TOTAL REQUIRED: 38 SPACES
TOTAL PROVIDED: 80 INCLUDING 2 HANDICAPPED

REVISED 3/12/90-FUEL STORAGE FACILITY BY CLIENTS REQUEST

COUNTY OF JAMES CITY
FINAL SITE PLAN

		DATE
Engr.	APF	
Plan	GWP/RPM	1/17/90
Hydr.	JHB/RPM	1/11/90
Hyd.	DJA	
Plan	RPM	3/30/90
Pub.	JPC/RPM	2/21/90
Zon.	RT	3/21/90
Attny.	ATO/RPM	3/27/90
Other		
Other		

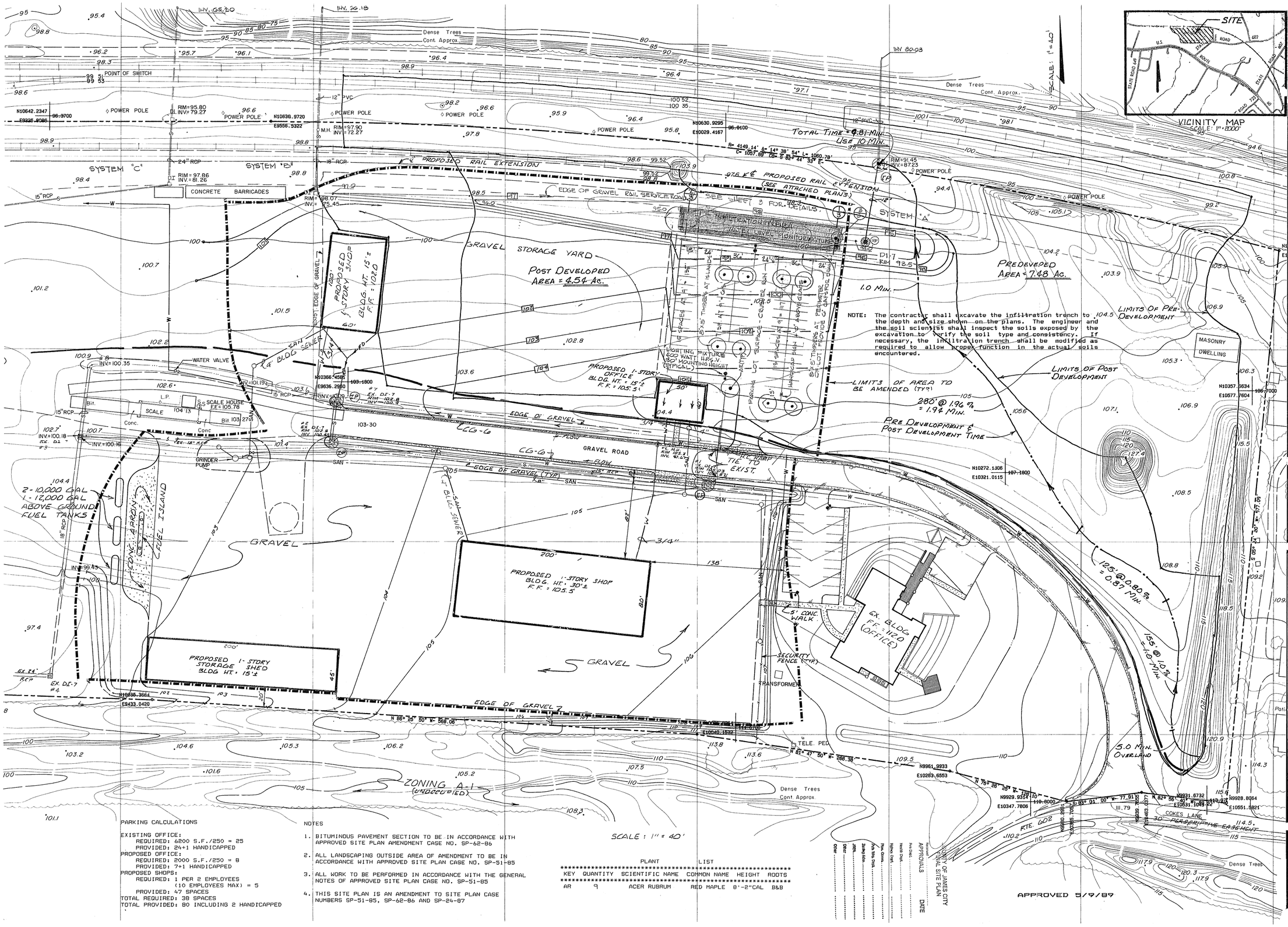
Langley and McDonald
A PROFESSIONAL CORPORATION
ENGINEERS • PLANNERS • SURVEYORS
VIRGINIA BEACH - WILLIAMSBURG, VIRGINIA

DES.	R.E.D.
DWN.	B.S.G.
CHK.	B.L.M.
DATE	1/18/90

SITE PLAN (AMENDING CASE NO. SP-51-85)
MASSIE EQUIPMENT & STORAGE YARD
3910 COKES LANE
PREPARED FOR
JACK L. MASSIE CONTRACTORS INC.

PROJ. NO.	84032
SCALE:	1"= 40'
SHEET	1A OF 6
DWG.	3131AW

99124_MASSIE_YARD_RICHMOND_ROAD - 006



PARKING CALCULATIONS

EXISTING OFFICE:
REQUIRED: 6200 S.F./250 = 25
PROVIDED: 24+1 HANDICAPPED
PROPOSED OFFICE:
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NOTES

1. BITUMINOUS PAVEMENT SECTION TO BE IN ACCORDANCE WITH APPROVED SITE PLAN AMENDMENT CASE NO. SP-62-86
2. ALL LANDSCAPING OUTSIDE AREA OF AMENDMENT TO BE IN ACCORDANCE WITH APPROVED SITE PLAN CASE NO. SP-51-85
3. ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE GENERAL NOTES OF APPROVED SITE PLAN CASE NO. SP-51-85
4. THIS SITE PLAN IS AN AMENDMENT TO SITE PLAN CASE NUMBERS SP-51-85, SP-62-86 AND SP-24-87

PLANT LIST

KEY	QUANTITY	SCIENTIFIC NAME	COMMON NAME	HEIGHT	ROOTS
AR	9	ACER RUBRUM	RED MAPLE	8'-2"CAL	B&B

APPROVALS

Director ..... DATE
Chief ..... DATE
Zoning Adm. .....
Zoning Adm. .....
Sys. Mgt. Chief. .....
Plan Comm. .....
Health Chief. .....
Fire Chief. .....

COUNTY OF JAMES CITY
FINAL SITE PLAN

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

DES. RED
DWN RED
CHK BLM
DATE 1-6-89

SEP 1993
RECEIVED
PLANNING DEPARTMENT

SITE PLAN (AMENDING CASE NO. SP-51-85)
MASSIE EQUIPMENT & STORAGE YARD
3910 COKES LANE
PREPARED FOR
JACK L. MASSIE CONTRACTORS INC.

PROJ. NO. 84-32-9
FLD. BK. NO.
SHEET 1 OF 6
DWG. 3131 W

SP-78-93

SITE CALCULATIONS

Site Area= 52.48 Acres
Offsite Area= 20.32 Acres
TOTAL AREA: 73.30± Acres

TOTAL GREEN SPACE: 45.50± Acres

TOTAL IMPERVIOUS SPACE: 27.80± Acres

TOTAL % RATIO =
GREEN SPACE: 62.1% ±
IMPERVIOUS SPACE: 37.9% ±

LEGEND

- GREEN AREA
- IMPERVIOUS AREA
- NATURAL OPEN SPACE WITHIN AN RPA BUFFER (0.10 POINTS / 1% SITE AREA)
- NATURAL OPEN SPACE EASEMENT (0.15 POINTS / 1% SITE AREA)

STORMWATER MANAGEMENT/ BMP FACILITY MAINTENANCE PLAN

PROPER MAINTENANCE OF THIS FACILITY IS ENCOURAGED TO PREVENT THE INTRODUCTION OF DEBRIS AND SEDIMENT IN TO THE FACTILITY, SPILLWAY(S) AND DOWNSTREAM WATERWAYS. FOLLOWING INSTALLATION OF THE FACILITY AND ESTABLISHMENT OF VEGETATION IN DISTURBED AREAS, INSPECTIONS FOR SEDIMENT BUILDUPS WILL BE PERFORMED AT LEAST QUARTERLY. IT IS ANTIOPATED THAT UNDER NORMAL CONDITIONS, SEDIMENT REMOVAL FROM THE FACILITY WILL BE REQUIRED ONCE EVERY 10 YEARS. IF OTHER CONSTRUCTION OR RELATED ACTIVITIES ARE PERFORMED ON UPSLOPE PARCELS, ADEQUATE PROTECTION SHOULD BE PROVIDED AND INSPECTIONS PERFORMED AT LEAST ONCE WEEKLY OF THESE NEWLY DISTURBED AREAS AS WELL AS INSPECTIONS FOR ACCUMULATED SEDIMENTS AT THE BMP FACILITY.

A DESIGNATED REPRESENTATIVE OF THE OWNER WILL INSPECT THE BMP STRUCTURE AFTER EACH SIGNIFICANT RAINFALL EVENT OR THE FOLLOWING WORKING DAY IF A WEEKEND OR HOLIDAY OCCURS. A SIGNIFICANT RAINFALL FOR THIS STRUCTURE IS DEFINED AS ONE (1) INCH OR MORE OF GAUGED RAINFALL WITHIN A 24 HOUR PERIOD. ONCE PER YEAR, A REPRESENTATIVE OF THE COUNTY MAY JOINTLY INSPECT THE STRUCTURE. APPROPRIATE ACTION, PERFORMED AT THE COST OF THE OWNER, WILL BE TAKEN TO ENSURE APPROPRIATE MAINTENANCE. KEYS TO LOCKED ACCESS POINTS SHALL BE MADE AVAILABLE TO COUNTY INSPECTION PERSONNEL UPON REQUEST.

INSPECTION AND MAINTENANCE OF THE FACILITY WILL CONSIST OF THE FOLLOWING ADDITIONAL MEASURES:

1. THE INSPECTION FOR SEDIMENT BUILDUP WILL BE PERFORMED BY VISUAL INSPECTION AND A PHYSICAL DETERMINATION OF SEDIMENT DEPTH WITHIN THE STORAGE AREA. SEDIMENT REMOVAL IS REQUIRED USING A RUBBER-WHEELED BACKHOE. AT THE SAME TIME, OR AT LEAST ONCE PER YEAR, THE RISER BOTTOM AND OUTLET PIPE SHALL BE CLEANED OF ACCUMULATED SEDIMENTS. DISPOSE OF SEDIMENTS REMOVED FROM THE FACILITY AT AN ACCEPTABLE DISPOSAL AREA. SEDIMENT SHALL NOT BE ALLOWED TO ACCUMULATE IN DEPTHS GREATER THAN 1-FOOT. NO SEDIMENT SHALL BE ALLOWED TO ACCUMULATE TO PREVENT THE PROPER FUNCTION OF ANY PIPE OR CULVERT.
2. PERFORM MAINTENANCE MOWING OF GRASSED AREAS AT LEAST TWICE EACH YEAR. GRASSES SUCH AS TALL FESCUE SHOULD BE MOWED IN EARLY SUMMER AFTER EMERGENCE OF THE HEADS ON COOL SEASON GRASSES AND IN LATE FALL TO PREVENT SEEDS OF ANNUAL WEEDS FROM MATURING. MOWING OF LEGUMES CAN BE LESS FREQUENT TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ON ANY PART OF THE GRADED EMBANKMENT.
3. PERFORM SOIL SAMPLING ON STABILIZED BMP SOIL AREAS ONCE EVERY FOUR (4) YEARS. SOIL SAMPLING AND TESTING SHOULD BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING LABORATORY. APPLY ADDITIONAL LIME AND FERTILIZER IN ACCORDANCE WITH TEST RECOMMENDATIONS.
4. IN STABILIZED BMP AREAS, IF VEGETATION COVERS LESS THAN 40% OF SOIL SURFACES, LIME, FERTILIZE AND SEED IN ACCORDANCE WITH RECOMMENDATIONS FOR NEW SEEDLINGS, AS LISTED IN DAM CONSTRUCTION NOTES. IF VEGETATION COVERS MORE THAN 40% BUT LESS THAN 70% OF SOIL SURFACES, LIME FERTILIZE AND OVERSEED IN ACCORDANCE WITH CURRENT SEEDING RECOMMENDATIONS.
5. PERFORM QUARTERLY INSPECTIONS OF THE RELEASE STRUCTURES, RISER SECTION AND CREST OF SPILLWAY FOR THE OBSERVANCE OF COLLECTED DEBRIS. IMMEDIATELY REMOVE ANY DEBRIS TO MAINTAIN THE INTEGRITY OF THE STRUCTURE AND PROVIDE AN ATTRACTIVE APPEARANCE. DURING QUARTERLY INSPECTIONS, THE POND DRAIN VALVE, USUALLY LEFT IN THE VALVE "CLOSED" POSITION, SHALL BE INSPECTED AND OPERATED THROUGH TWO COMPLETE FULL-OPEN TO FULL-CLOSE TO FULL-OPEN CYCLES.
6. PERFORM YEARLY STRUCTURAL INSPECTIONS OF THE FACILITY FOR DAMAGE. STRUCTURAL INSPECTION SHALL BE PERFORMED ON THE CONCRETE RISER, ANTI-VORTEX DEVICE, TRASH RACK, ORIFICE/ WEIR(S), OUTLET BARREL AND POND EMBANKMENT. IF DAMAGE IS EVIDENT, FURTHER INVESTIGATION BY A PROFESSIONAL ENGINEER MAY BE REQUIRED TO ASSESS THE CONTINUED INTEGRITY OF THE STRUCTURE.
7. PERFORM QUARTERLY INSPECTIONS OF THE GRADED SIDE SLOPES OF THE FACILITY FOR SIGNS OF ANIMAL/ RODENT BORROWS OR SLOPE EROSION. IMMEDIATELY PERFORM NECESSARY REPAIRS, REFILLING OR RESEEDING AS APPROPRIATE.
8. RECORD KEEPING. THE LANDOWNER OR DESIGNATED REPRESENTATIVE SHALL KEEP REASONABLE, ACCURATE WRITTEN RECORDS OF INSPECTIONS PERFORMED ON THE STRUCTURE. RECORDS SHALL DOCUMENT ROUTINE MAINTENANCE AND/ OR REPAIRS PERFORMED. COPIES SHALL BE PROVIDED TO THE COUNTY UPON REQUEST.
9. THE FACILITY SHALL NOT BE MODIFIED IN ANY WAY WITHOUT PRIOR CONSENT/ APPROVAL OF THE COUNTY.

Located at Massie Lane, James City County

TOTAL AREA = 52.48 ACRE(s)

A. STRUCTURAL BMP POINT ALLOCATION

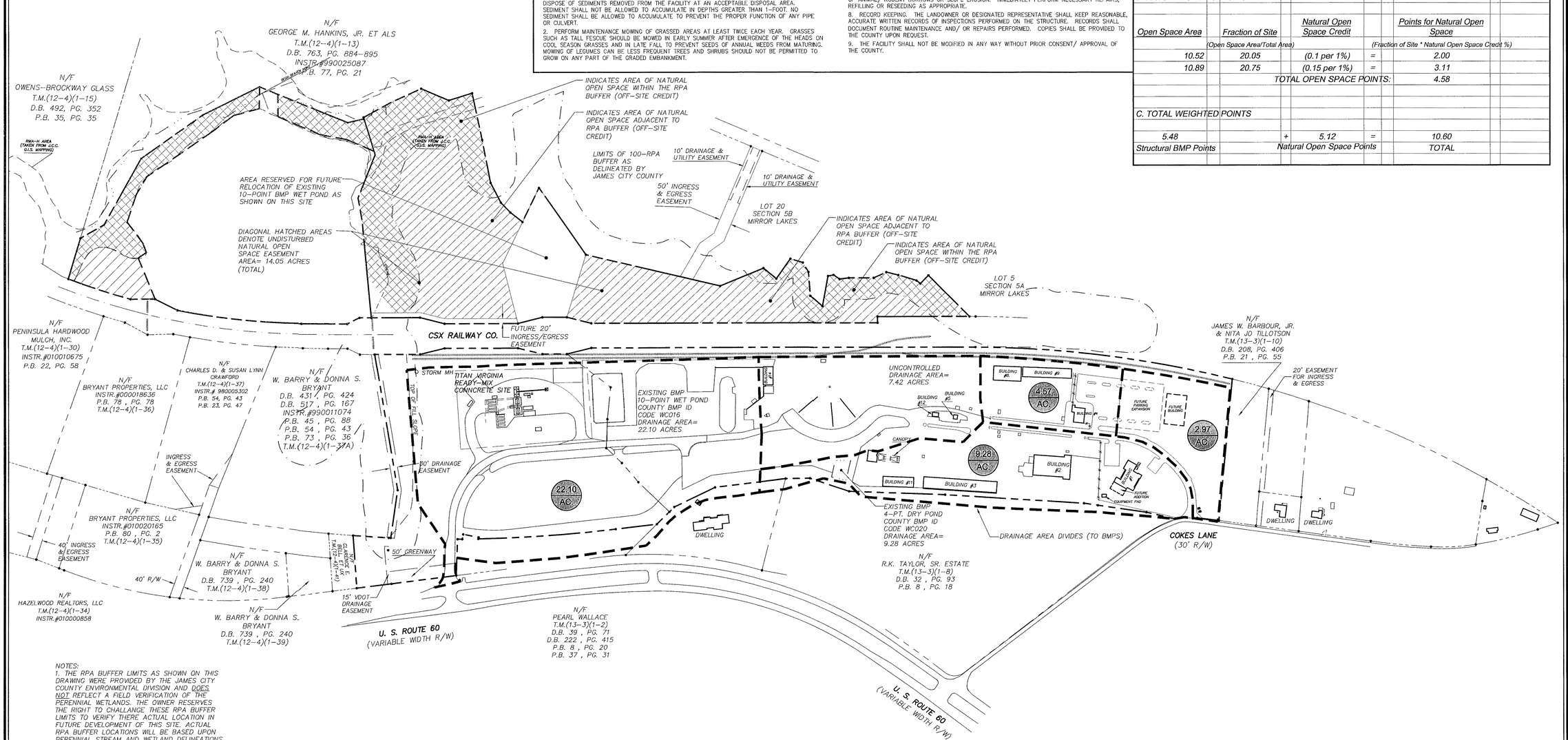
BMP	BMP Drainage Area	BMP Points		Fraction of Site Served by BMP (BMP Drainage Area/Total Area)		Weighted BMP Points
10-pt wet pond(WC016)	22.10	10	X	0.421	=	4.21
4-pt dry pond(WC020)	9.28	4	X	0.177	=	0.71
10 pt. Infiltration Basin	2.97	10	X	0.057	=	0.57
			X		=	
		TOTAL WEIGHTED STRUCTURAL BMP POINTS:				5.48

B. NATURAL OPEN SPACE CREDIT

Open Space Area	Fraction of Site (Open Space Area/Total Area)	Natural Open Space Credit		Points for Natural Open Space (Fraction of Site * Natural Open Space Credit %)	
10.52	20.05	(0.1 per 1%)	=	2.00	
10.89	20.75	(0.15 per 1%)	=	3.11	
		TOTAL OPEN SPACE POINTS:		4.58	

C. TOTAL WEIGHTED POINTS

Structural BMP Points		Natural Open Space Points		TOTAL
5.48	+	5.12	=	10.60



NOTES:
1. THE RPA BUFFER LIMITS AS SHOWN ON THIS DRAWING WERE PROVIDED BY THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION AND DOES NOT REFLECT A FIELD VERIFICATION OF THE PERENNIAL WETLANDS. THE OWNER RESERVES THE RIGHT TO CHALLANGE THESE RPA BUFFER LIMITS TO VERIFY THERE ACTUAL LOCATION IN FUTURE DEVELOPMENT OF THIS SITE. ACTUAL RPA BUFFER LOCATIONS WILL BE BASED UPON PERENNIAL STREAM AND WETLAND DELINEATIONS IN ACCORDANCE WITH SECTION 23-10 OF THE CHESAPEAKE BAY PRESERVATION ORDINANCE.

2. THIS SITE IS SITUATED IN THE WARE CREEK WATERSHED OF JAMES CITY COUNTY.

3. 4-POINT DRY POND (WC-020) MAY BE SUBJECT TO FURTHER ENHANCEMENTS, IMPROVEMENTS OR UPGRADES AS A DRY POND BMP AS DEVELOPMENT PLANS ARE PRESENTED WITHIN ITS RESPECTIVE DRAINAGE AREA.

4. THE SCOUR AREA LOCATED NORTH OF THE OUTFALL FOR BMP WC-016 IS TO BE REPAIRED WITH CLASS I RIP-RAP (d50=1.0') EMBEDDED OVER FILTER FABRIC (APPROX. 55 S.Y.)

1/m DB 434 P.347

APPROVED
James City County
Environmental Division
By: [signature]
Date: 07-10-07

No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY
	3/21/07	REVISIONS PER COUNTY COMMENTS	RGS	RDS
	1/8/07	REVISIONS PER COUNTY COMMENTS	RS/RS	RDS
	2/10/06	REVISIONS PER COUNTY COMMENTS	RS/RS	RDS
	12/9/05	REVISIONS PER COUNTY COMMENTS	RS/RS	RDS

5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
Fax (757) 220-8994
CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND

MASTER STORMWATER MANAGEMENT PLAN EXHIBIT
MASSIE CORPORATION PROPERTY

DEVELOPER: MASSIE CORPORATION

STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
AES	AES
Scale 1"=200'	Date 9/19/05
Project No. 8233-10	
Drawing No. 1 OF 1	

SWM-002-05

S:\Jobs\8233\10-ImperviousMPexhibit\dwg\Cad\8233-10 Stormwater Master Plan.dwg, 5/30/2007 1:25:47 PM, rick.smith

99124_MASSIE_YARD_RICHMOND_ROAD - 008

SITE CALCULATIONS

52.98?

Site Area= 52.98 Acres
Offsite Area= 20.32 Acres
TOTAL AREA: 73.30± Acres

TOTAL GREEN SPACE: 45.50± Acres

TOTAL IMPERVIOUS SPACE: 27.80± Acres

TOTAL % RATIO =
GREEN SPACE: 62.1% ±
IMPERVIOUS SPACE: 37.9% ± < 60%

LEGEND

- GREEN AREA (NOT CONSERV ESMT)
- IMPERVIOUS AREA
- NATURAL OPEN SPACE WITHIN AN RPA BUFFER — 0.10 pts
- NATURAL OPEN SPACE EASEMENT — 0.15 pts

Titan Concrete at Massie Property, AES PROJECT No. Located at Massie Lane, James City County
TOTAL AREA = 52.48 ACRE(s)

A. STRUCTURAL BMP POINT ALLOCATION

	BMP	BMP Drainage Area	BMP Points		Fraction of Site Served by BMP (BMP Drainage Area/Total Area)		Weighted BMP Points
WC016	10-pt wet pond	22.10	10	X	0.421	=	4.21
WC020	4-pt dry pond	9.28	4	X	0.177	=	0.71
				X		=	
				X		=	
			TOTAL WEIGHTED STRUCTURAL BMP POINTS:				4.92

B. NATURAL OPEN SPACE CREDIT

Open Space Area (Open Space Area/Total Area)	Fraction of Site	Natural Open Space Credit		Points for Natural Open Space (Fraction of Site * Natural Open Space Credit %)
6.95	13.24	(0.1 per 1%)	=	1.32
(14.45)	27.53	(0.15 per 1%)	=	~~4.13~~ 3.92
~~21.4~~		TOTAL OPEN SPACE POINTS:		~~5.45~~ 5.24

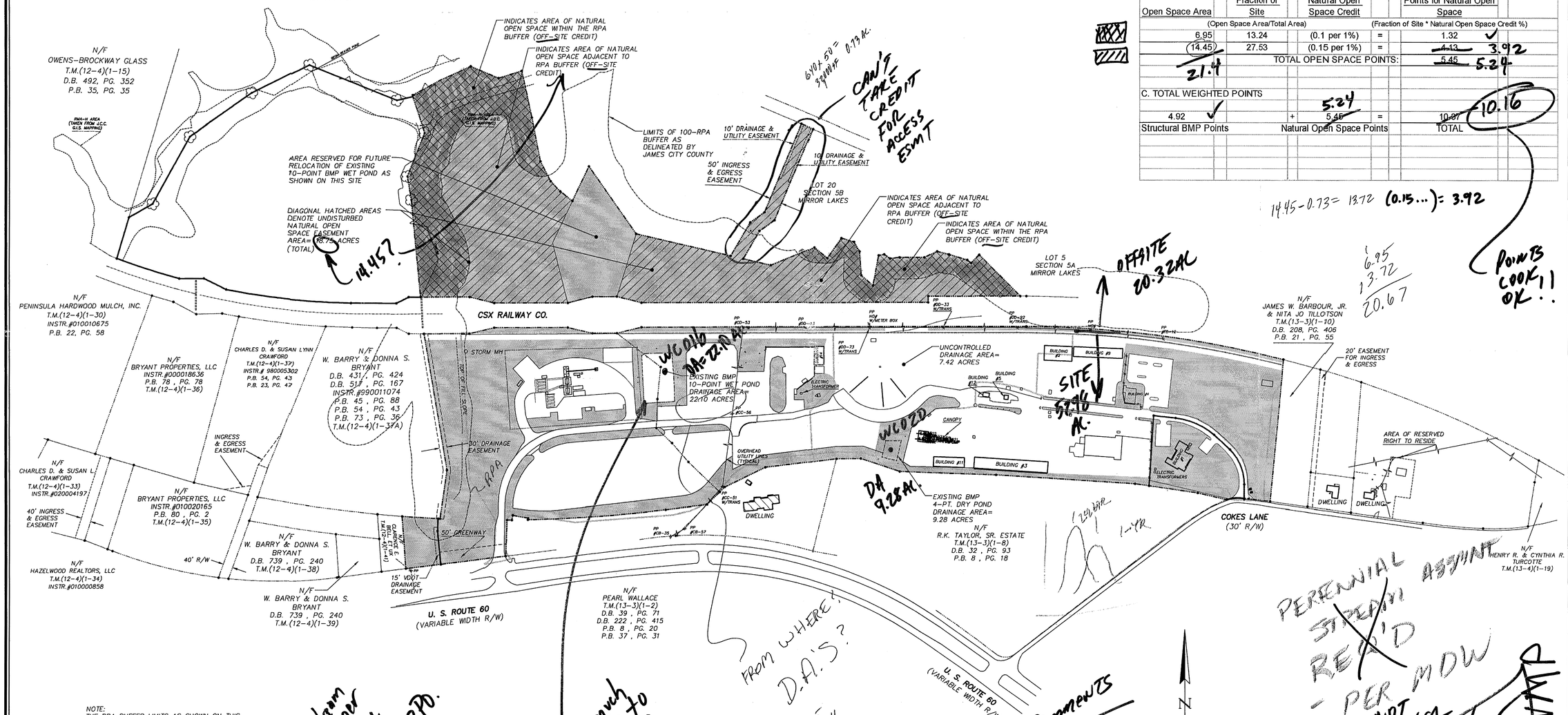
C. TOTAL WEIGHTED POINTS

4.92	+	~~5.45~~ 5.24	=	~~10.37~~ 10.16
Structural BMP Points		Natural Open Space Points		TOTAL

14.45 − 0.73 = 13.72 (0.15...) = 3.92

6.95
13.72
20.67

POINTS COOK OK!!



NOTE:
THE RPA BUFFER LIMITS AS SHOWN ON THIS DRAWING WERE PROVIDED BY THE JAMES CITY COUNTY ENVIRONMENTAL DIVISION AND DOES NOT REFLECT A FIELD VERIFICATION OF THE PERRENIAL WETLANDS. THE OWNER RESERVES THE RIGHT TO CHALLANGE THESE RPA BUFFER LIMITS TO VERIFY THERE ACTUAL LOCATION IN FUTURE DEVELOPMENT OF THIS SITE.

Perennial stream assessment per 23-10(2)(d) of the County's CBPO.

How much upgrade to get to 10. What was IT?

IT WAS 8pt. (1996) DA=16.6 2.5U? ~2 IN 1.25"

FROM WHERE? D.A.'S?

* MASTER SWMP COMMENTS
- DRAINAGE DIVIDES
- % IMPERV ONSITE?
- COLOR MAP?
- IS CONSERV ESMT RECORDED
- WARE CREEK WS
- CO. BMP#'S
- 10pt BMP upgrade SCDV? JVQ?

PERENNIAL STREAM ASSMNT REQ'D - PER MDW

NOT NOW SPT

SEE TITAN SP-122-05

MSWMP

THIS PLAN HAS NOT RECEIVED FINAL APPROVAL, AND IS NOT APPROVED FOR CONSTRUCTION.

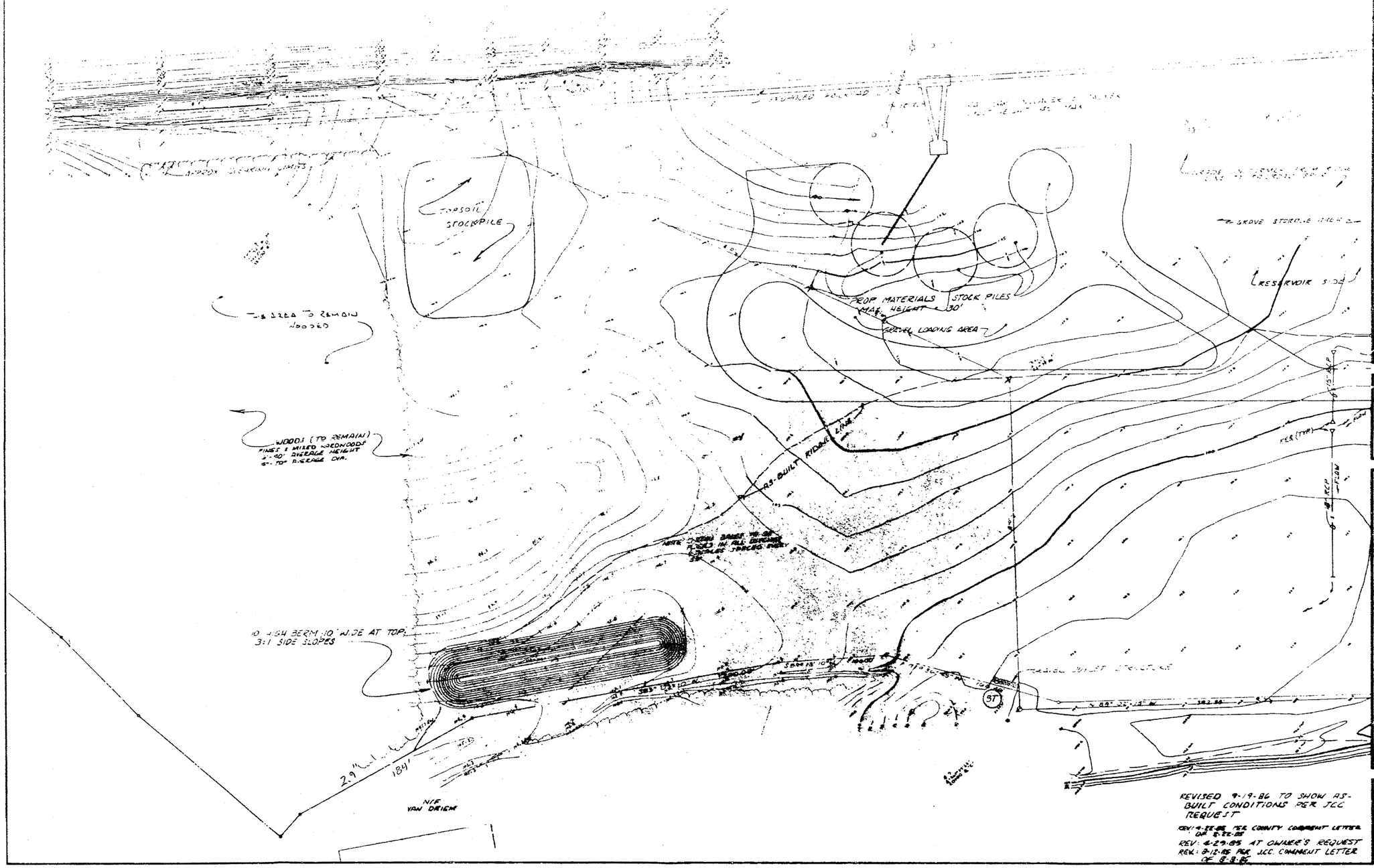
No.	DATE	REVISION / COMMENT / NOTE	REVISED BY	REVIEWED BY

COMMONWEALTH OF VIRGINIA
C. ARCHER MARSTON, III
No. 018232
9/19/05
PROFESSIONAL ENGINEER

5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(757) 253-0040
Fax (757) 220-8994
CONSULTING ENGINEERS
WILLIAMSBURG • RICHMOND

IMPERVIOUS COVER
SITE PLAN AMENDMENT
FOR INDUSTRIAL ACCESS ROAD
MASSIE CORPORATION PROPERTY
DEVELOPER: TITAN VIRGINIA READY-MIX, LLC
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
CMB	SEW
Scale	Date
1"=200'	9/19/05
Project No.	
9587-01	
Drawing No.	
8	



Langley and McDonald
ENGINEERS • PLANNERS • SURVEYORS

DES	RED
DWN	RED
CHK	JJM
DATE	1-15-85

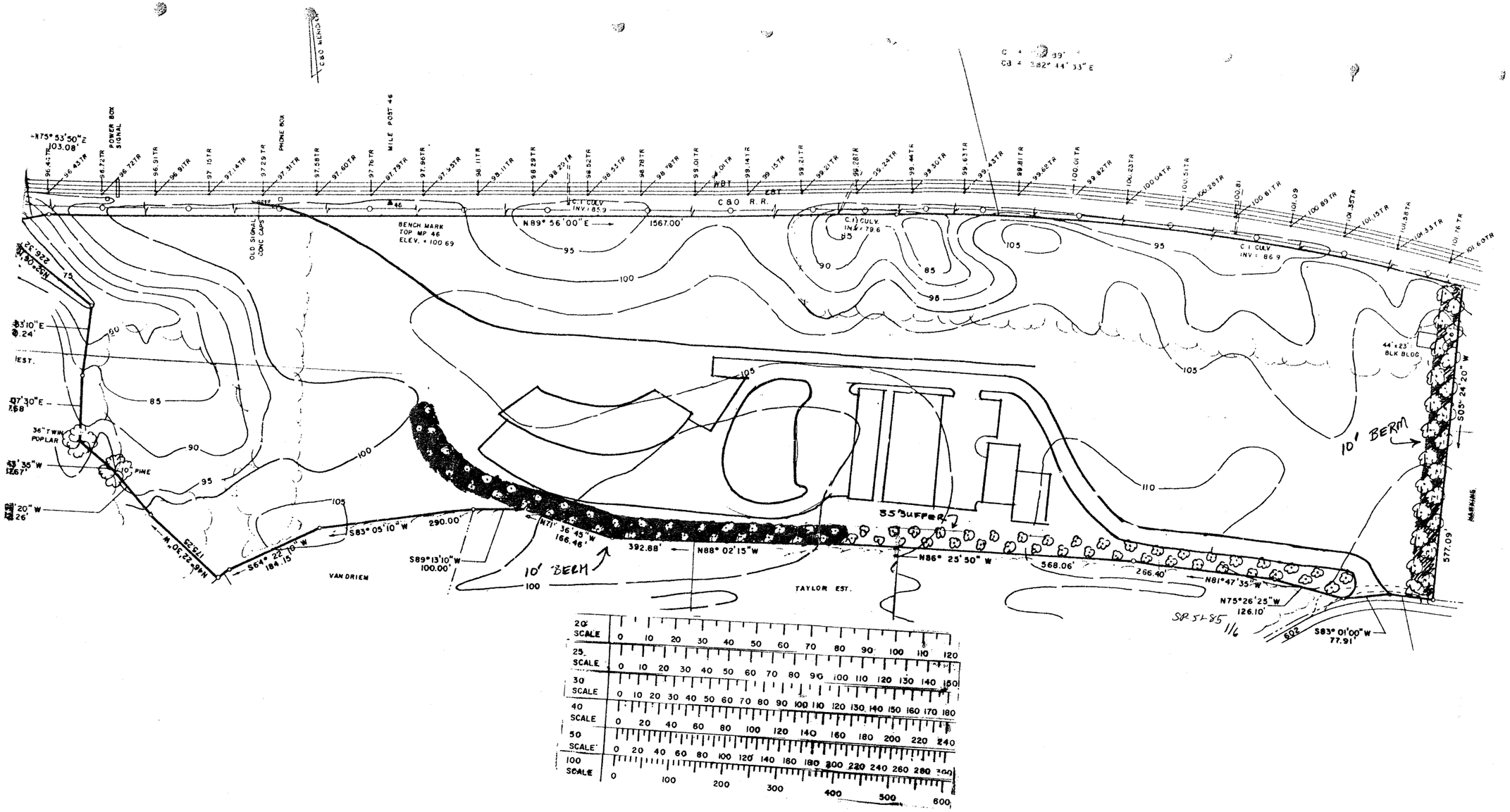
EQUIPMENT STORAGE AREA
AND RAILROAD TRACK
PREPARED FOR: JACK L MASSIE
SITE PLAN

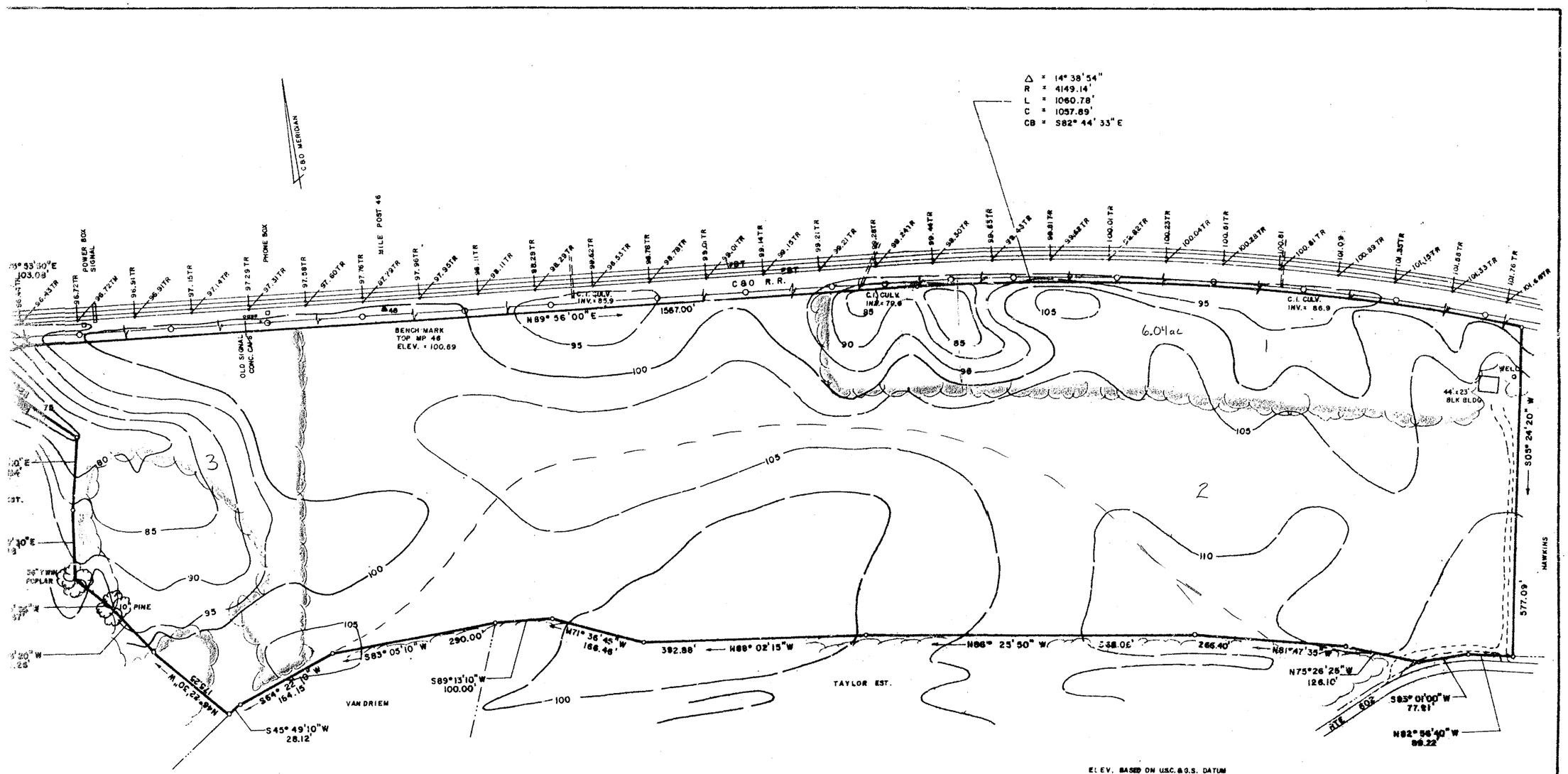
PROJ. NO	84-32-1
FLD. BK. NO.	
SHEET	3 OF 5
DWG.	1517W

20 SCALE 0 10 20 30 40 50 60 70 80 90 100 110 120
25 SCALE 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
30 SCALE 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
40 SCALE 0 20 40 60 80 100 120 140 160 180 200 220 240
50 SCALE 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
100 SCALE 0 100 200 300 400 500 600

63.4 '/,, x 3.5 x 4.5 = 1.45 ac.

99124_MASSIE_YARD_RICHMOND_ROAD - 010


C&O MERIDIAN
POWER BOX SIGNAL
PHONE BOX
MILE POST 46
OLD SIGNAL CONC CAPS
BENCH MARK TOP MP 46 ELEV. = 100.69
C.I. CULV. INV. = 85.9
C.I. CULV. INV. = 79.6
C.I. CULV. INV. = 86.9
WBT
EBT
C&O R.R.
N89° 56' 00" E
1567.00'
44' x 23' BLK BLDG.
10' BERM
35' BUFFER
36" TWIN POPLAR
10" PINE
VAN DRIEM
TAYLOR EST.
S83° 05' 10" W
290.00'
S89° 13' 10" W
100.00'
N71° 36' 45" W
166.46'
392.88'
N88° 02' 15" W
N86° 25' 50" W
568.06'
266.40'
N81° 47' 35" W
N75° 26' 25" W
126.10'
S83° 01' 00" W
77.91'
577.09'
S05° 24' 20" W
S64° 22' 10" W
184.15'
N46° 22' 30" W
175.23'
SR 54-85
1/6
20 SCALE
25 SCALE
30 SCALE
40 SCALE
50 SCALE
100 SCALE



TOPOGRAPHIC PLAT OF 34.48 ACRES FOR
JACK L. MASSIE CONTRACTOR, INC.

JAMES CITY COUNTY VIRGINIA
1" = 100' APRIL 1, 1980

SP-17-85
18-31-9 5/12

EVANS SURVEYING CO. P.C. WILLIAMSBURG, VA.

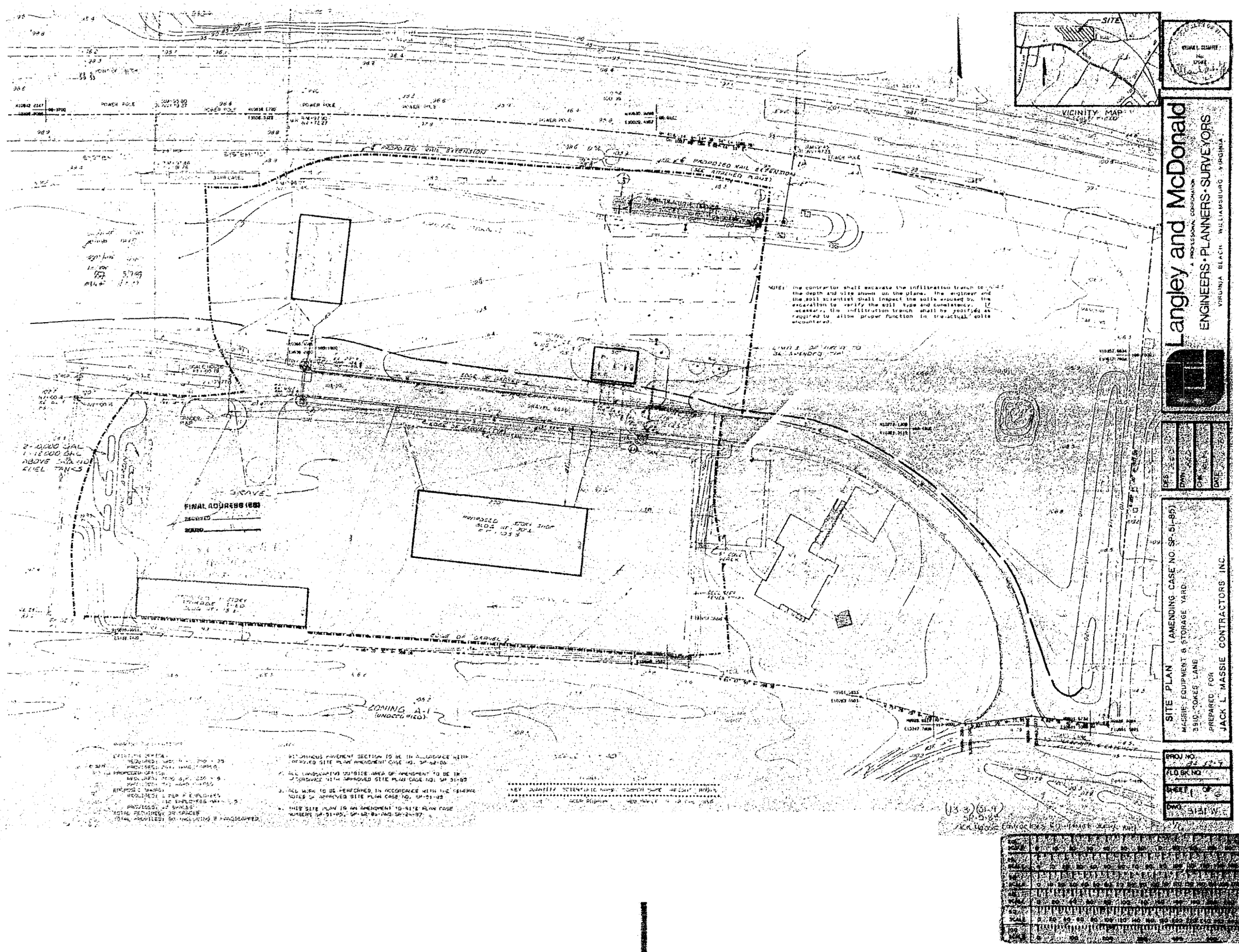
JAN RECEIVED PLANNING DEPARTMENT

SP-2-85
Code Compliance

West Field = 2.1 ac
Wooded in RPOD = 9.9 ac
∴ 9.9 - 6.04 = 3.86 ac

25.6 in overlay zone
-9.9 ac woods
15.7 ac cult. in overlay zone
-.5 ac diverted to Rt 602
15.2 ac

Area 1 8" x 1.4" x (153'/in)² = 6.04 ac
Area 2 3.8" x 13.8" x (153'/in)² = 28.3 ac - 6.04 = 22.26 ac
Area 3 2.6" x 4.3" x (153)² = 6.03
34.33 ac.



SP-5-89

99124_MASSIE_YARD_RICHMOND_ROAD - 013

;OLSS ROAD
R
MASSIE

NTY, VIRGINIA
5, 1994
; (REVISED)
(REVISED)

AUG 1996
RECEIVED
PLANNING DEPARTMENT

COUNTY OF JAMES CITY
FINAL SITE PLAN
Received .....
APPROVALS DATE
Fire Dept. HSO (TAW) 2/29/96
Health Dept. BM (TAW) 8/21/96
Planning Adm. 9/5/96
Parks & Rec. Dept. DEL 8/20/96
Zoning Adm. 9/6/96
JCSA JCA (TAW) 9/3/96
Other MSikura (TAW) 3/22/96
Other WB (TAW) 3/14/96

LIMITS OF M-1 ZONE W/SUP

LIMITS OF M-2 ZONE

LIMITS OF A-1 AND R-1 ZONES
WITH CONSERVATION EASEMENT

TY CO. ... 16.3 AC.

N/F
ROPERTIES CO

DED FROM CONSERVATION EASEMENT ... 4.375 ac.

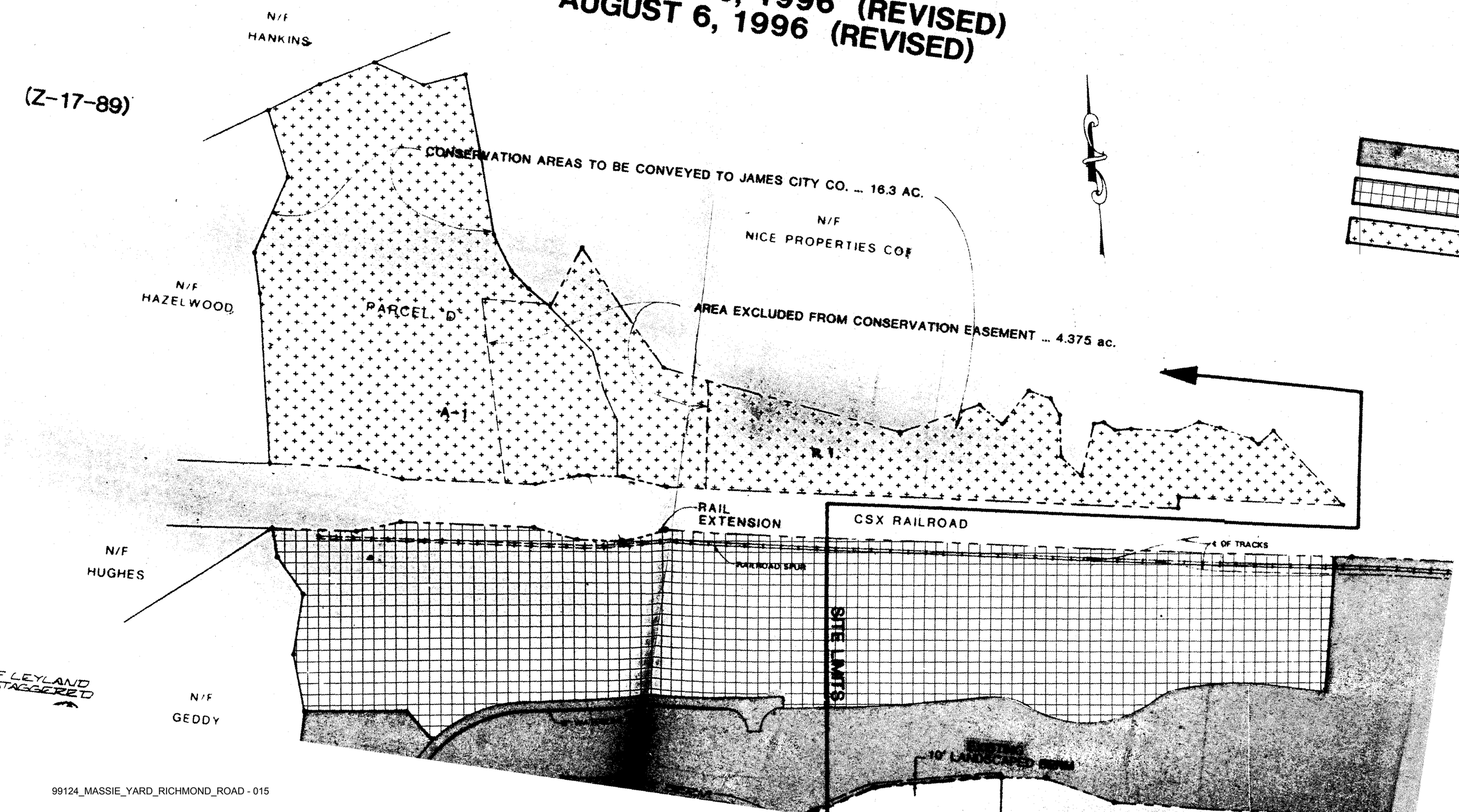
RAIL
EXTENSION

99124_MASSIE_YARD_RICHMOND_ROAD • 01

JAMES CITY COUNTY, VIRGINIA

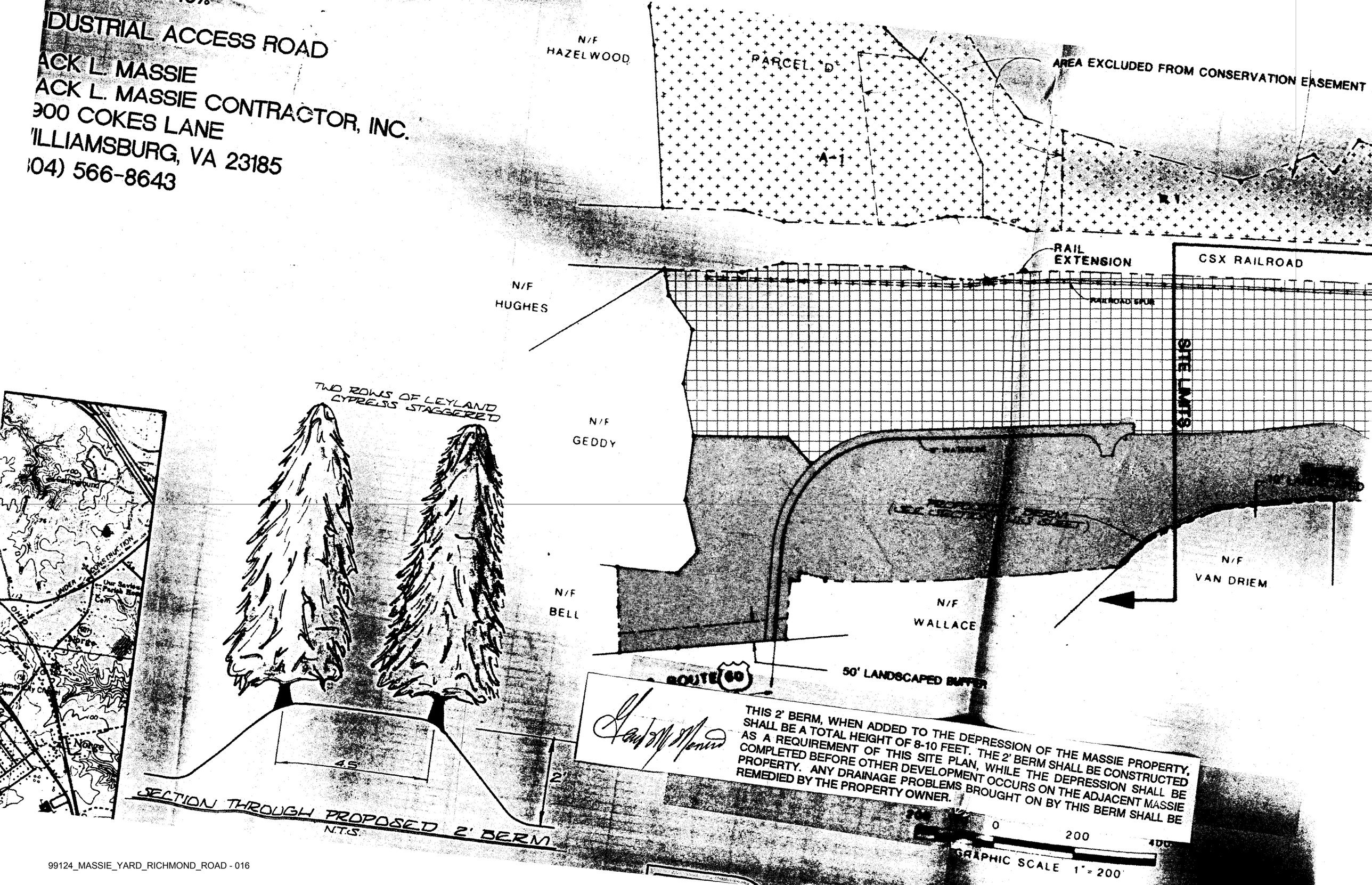
DECEMBER 5, 1994
JANUARY 26, 1996 (REVISED)
AUGUST 6, 1996 (REVISED)

(Z-17-89)

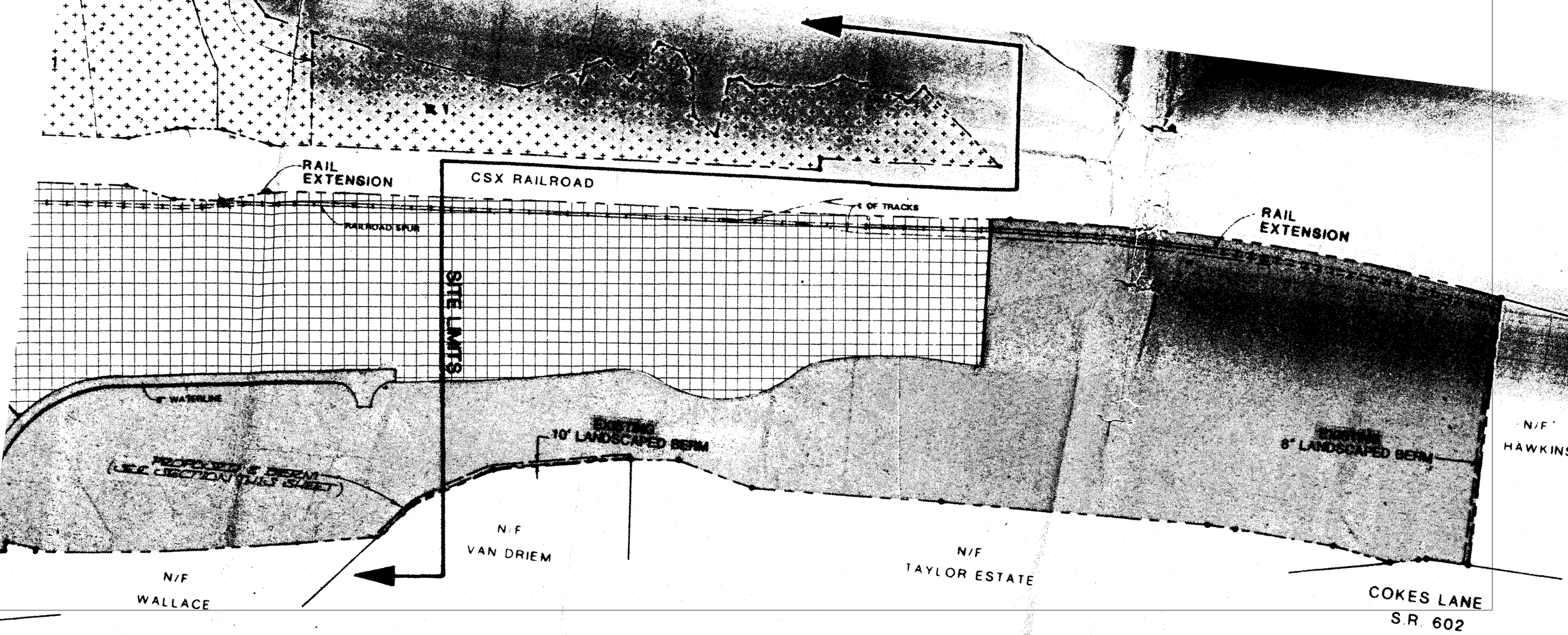


99124_MASSIE_YARD_RICHMOND_ROAD - 015

DUSTRIAL ACCESS ROAD
ACK L. MASSIE
ACK L. MASSIE CONTRACTOR, INC.
900 COKES LANE
'ILLIAMSBURG, VA 23185
04) 566-8643



99124_MASSIE_YARD_RICHMOND_ROAD - 016



50' LANDSCAPED BUFFER

ERM, WHEN ADDED TO THE DEPRESSION OF THE MASSIE PROPERTY, A TOTAL HEIGHT OF 8-10 FEET. THE 2' BERM SHALL BE CONSTRUCTED QUIREMENT OF THIS SITE PLAN, WHILE THE DEPRESSION SHALL BE ED BEFORE OTHER DEVELOPMENT OCCURS ON THE ADJACENT MASSIE Y. ANY DRAINAGE PROBLEMS BROUGHT ON BY THIS BERM SHALL BE BY THE PROPERTY OWNER.

200 100 0 200 400

GRAPHIC SCALE 1" = 200'

COMMONWEALTH OF VIRGINIA
8/6/96
JOHN L. HUTCHERSON
No. 7753
CERTIFIED PROFESSIONAL ENGINEER

SHEET INDEX

1. TITLE SHEET
2. ROAD PLAN/PROFILE
3. ROAD PLAN
4. PROFILE AND DETAILS
5. ROAD DETAILS AND NOTES
6. WATER AND

99124_MASSIE_YARD_RICHMOND_ROAD - 017

SP5-89

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

Subject: Pre & Post-development Runoff
Computed By: REP Checked By:

Project No. 84-32-9
Client: Massie
Date: 3-12-89 Sheet No. 1

Pre-development Runoff
Q = CIA 2 yr. storm

C = 0.6 cultivated row crop No conservation
A = 9.36 Ac.
Tc = 13 min.
I = 4.2 in/hr

Q = .6 × 4.2 × 9.36
Q = 23.6 cfs
11.8

Post-development

Composit C Value

1.94	Ac.	@	0.51 =	0.99
1.51	Ac.	@	0.53 =	0.80
0.51	Ac.	@	0.72 =	0.37
0.34	Ac.	@	0.60 =	0.20
0.61	Ac.	@	0.60 =	0.37
1.84	Ac	@	0.63 =	1.16
0.41	Ac	@	0.57 =	0.23
2.20	Ac	@	0.25 =	0.55
9.36				4.67

Composit C = 4.67 ÷ 9.36
C = 0.498 or 0.5

C = 0.5
A = 9.36
Tc = 15 min
I = 3.9

Q = .5 × 3.9 × 9.36
Q = 18.3 cfs

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

Subject

Computed By RED Checked By

Project No. 84-32-9
Client Massie
Date 3-12-89 Sheet No. 2

Pre-development Runoff = 23.6 cfs
Post-development Runoff = 18.3 cfs

The development of this property will result in a 23% reduction in runoff with attention being paid to on site erosion control measures to prevent silt laden runoff from leaving this site.

PROJECT Massie Equipment Yard
JOB NO. 84-32-9
DATE 3-12-89 SHEET 1 OF 1
DESIGN FORMULA Q=CIA FREQ 10 yr

COMPUTED BY RED CHECKED BY

Langley and McDonald
ENGINEERS·PLANNERS·SURVEYORS
WILLIAMSBURG, VIRGINIA

LOCATION		AREA (AC)	RUNOFF	"A" x "C"		INLET TIME (MIN)		RAIN INTEN. (IN.)		RUNOFF-Q-(CFS)		PIPE SIZE	CAPACITY	VELOCITY	LENGTH	SLOPE	FALL (FT.)	INVERT ELEVATION		PIPE TIME
STRUCTURE	STRUCTURE	"A"	"C"	INCRE.	ACCUM.	INCRE.	ACCUM.	INCRE.	ACCUM.	INCRE.	ACCUM.	(INCHES)	(CFS)	(FT./SEC.)	(FEET)	(FT./FT.)		UP	DOWN	(MIN)
1	2	1.94	0.51		0.99		10		6.0		5.94	15	5.0	3.9	395	.006				1.69
7	2	0.51	0.72	0.37		5		7.1		2.63		15	2.1	1.8	44	.010				
2	3	1.51	0.53	0.80	2.16	5	11	7.1	5.83	5.68	12.6	18	5.3	2.8	260	.0025				1.55 / 3.24
8	3	0.34	0.60	0.20		5		7.1		1.42		15	3.3	2.6	72	.0026				
3	4	0.61	0.60	0.37	2.73	5	13	7.1	5.5	2.63	15.0	18	7.5	4.1	250	.0052				1.02 / 4.26
4	5	0.41	0.57	0.23	2.96	5	14	7.1	5.3	1.63	15.7	24	16.1	5.0	225	.0052				0.75 / 5.01
5	6	4.04	0.25	1.01	3.97	5	15	7.1	5.1	3.91	20.2	30	22.4	4.4	12	.0030				

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

Subject

Computed By Checked By

Project No. 84022-9
Client JACK MASSIE CONTR.
Date 5-1-89 Sheet No.

INFILTRATION TRENCH DESIGN

FOR

JACK L. MASSIE CONTRACTORS, INC.

MAY 1, 1989

COMMONWEALTH OF VIRGINIA
WILLIAM L. MCDAFFEY
No. 17087
PROFESSIONAL ENGINEER

by:

LANGLEY AND McDONALD, P.C.
204 PACKETS COURT
WILLIAMSBURG, VIRGINIA 23185
(804) 253-2975

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

Subject INFILTRATION TRENCH DESIGN
Computed By BLM Checked By

Project No. 84032-9
Client JACK MASSIE CONTR.
Date 5-1-89 Sheet No. 1

1. INFILTRATION TEST RESULT. - TEST ON 4-27-89

TEST PIT NORTH OF PROPOSED PARKING LOT. (APPROX. LOCATION OF TRENCH)

	TIME	DROP	AVE. RATE OF INFILTRATION
	1:10 PM		
		1.5"	26.6 MIN / INCH.
	1:50 PM		
		1.5"	40.0 MIN / INCH.
	2:50 PM		
		5.0"	34.0 MIN / INCH.
	5:40 PM		
TOTAL	4 hrs. 30 MIN (270 MIN.)	8.0	33.75 MIN/INCH

USE 35 MIN / INCH FOR DESIGN

TEST PIT IN FILL MATERIAL. TRENCH TO BE EXCAVATED TO DESIGN DEPTH AND SIZE AND THEN SITE TO BE INSPECTED BY ENGINEER AND SOIL SCIENTIST TO VERIFY CONSISTENT SOILS AND CONDITION OVER ENTIRE TRENCH AREA.

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

Subject INFILTRATION TRENCH DESIGN
Computed By BLM Checked By

Project No. 84032-9
Client JACK MASSIE CONTR.
Date 5-1-89 Sheet No. 2

2. DESIGN CRITERIA: (DESIGN MANUAL FOR RUN-OFF ANALYSIS RESERVOIR PROTECTION OVERLAY DISTRICT. JAMES CITY COUNTY - JAMES CITY SERVICE AUTHORITY)

1. FILTERING DEVICES TO REMOVE GREASE, OIL, FLOATABLE ORGANIC MATERIAL, AND SETTLEABLE PARTICLES) SHALL BE EASILY MAINTAINED.

2. INFILTRATION TRENCH SIZED TO ACCOMMODATE 1ST 1-INCH OF RUNOFF FROM IMPERVIOUS AREAS OF DEVELOPMENT.

3. USE VDOT #57 STONE - VOID RATIO 0.40

4. DRAIN DOWN TIME - 5 DAYS - MAX.

5. OVERFLOW PROVIDED TO FROM TRENCH / BASIN TO PASS ADDITION RUNOFF - IN EXCESS OF 1ST 1-INCH.

6. SOIL ANALYSIS TO DETERMINE PERCOLATION RATE.

7. INFILTRATION TRENCH TO BE ABOVE HIGH GROUND WATER TABLE.

8. FACILITY MUST HAVE SIGHT TUBE TO MONITOR INFILTRATION FROM TRENCH.

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Subject: INFILTRATION TRENCH DESIGN
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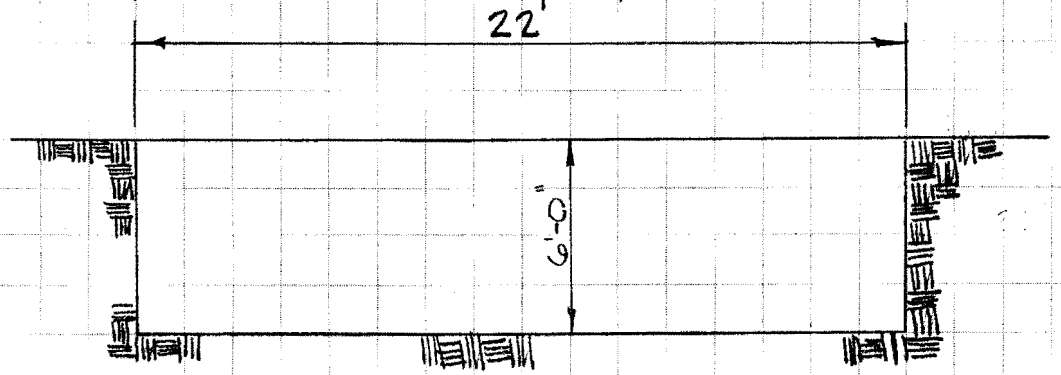
Client: JACK MASSIE
Date: 5-1-89 Sheet No. 3

3. INFILTRATION TRENCH DESIGN :

1. VOLUME OF 1ST INCH OF RUNOFF - VOL. REQ'D.

1"/12"/FT X 98,400 SF = 8,200 FT³

2. X- SECTION THRU INFILTRATION TRENCH



- GENERAL RULE SIDE AREA TO BOTTOM ≠ 4:1
- TRENCH FILLED WITH VDOT #57 STONE VOID RATIO = 40%

VOL. TRENCH = VOL STORAGE REQ'D / VOID RATIO

VOL. TRENCH = 8,200 FT³ / 0.40 = 20,500 C.F.

AREA OF TRENCH = 20,500 C.F. / 6 FT. = 3,420 S.F.

LENGTH = 3420 SF / 22' = 155 FT.

USE L = 160 FT

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4. DRAW DOWN TIME:

ACTUAL DEPTH OF TRENCH = 6' = 72"

WITH #57 STONE FILLED TRENCH AT 40% VOID RATIO.

EFFECTIVE WATER DEPTH = 0.40 x 72" = 28.8"

PERCOLATION RATE = 35 MIN / INCH

TIME TO DRAW DOWN = 35 MIN/INCH x 28.8" =

TIME = 1008 MIN = 16.8 HRS

DRAW DOWN TIME LESS THAN 5 DAYS. O.K.

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Subject

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DRAINAGE CALCULATIONS

FOR

JACK L. MASSIE CONTRACTORS, INC.

MAY 3, 1989

by:

LANGLEY & McDONALD, P.C.
204 PACKETS COURT
WILLIAMSBURG, VA. 23185
(804) 253-2975

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Subject DRAINAGE CALCULATIONS

Computed By BLM Checked By

Project No. 84032-9
Client JACK MASSIE
Date 5-3-89 Sheet No. 1

BASIN AT INFILTRATION TRENCH (SYSTEM "A")

AREA 5.19 AC.

COMPOSITE C: 50% AT 0.85 = .425
50% AT 0.25 = .125
0.55

CA = 5.19 AC. x 0.55 = 2.85

t_c = 10 MIN., i = 6.0 IN/HR. STORM FREQUENCY 10 YR.

Q_2 = 2.85 AC. x 6.0 IN/HR = 17.1 cfs

FIND HEAD REQ'D TO PASS 17.1 cfs

$h = (Q/0.6 \times A)^2/64.4 = 20.4$ FT DIA/2 = 0.5

HW = 20.4 + 0.5 = 20.9 FT

ROUTE STORM THROUGH BASIN TO FIND ACTUAL HEADWATER CONDITION.

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Subject: DRAINAGE CALCULATIONS

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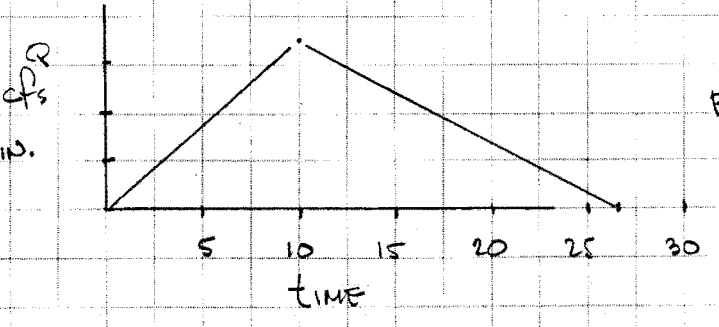
Project No. 84032-9
Client: JACK MASSIE
Date: 5-3-89 Sheet No. 2

	STAGE	C.F. STORAGE *	C.F.S. DISCHARGE **	h FEET
	88.0	0	0	0
3'	91.0	19	6.0	2.5
3'	94.0	38	8.9	5.5
1'	95.0	3,640	9.6	6.5
		7500 elev = 95.5		
1'	96.0	14,280	10.4	7.5
1'	97.0	32,500	11.0	8.5
1'	98.0	50,800	11.7	9.5
2'	100.0	106,700	12.8	11.5

* STORAGE DOES NOT INCLUDE VOL. OF INFILTRATION TRENCH.

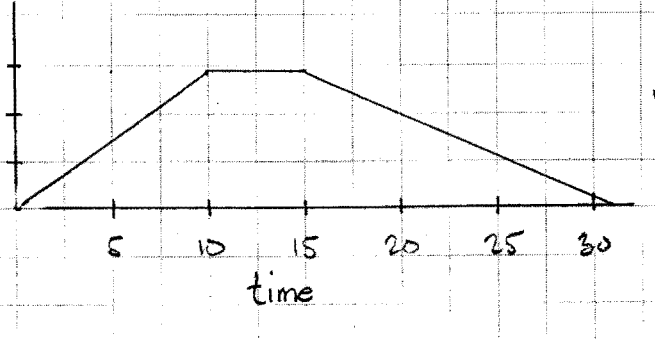
** $Q = 0.6 \times A \times \sqrt{2gh}$ $A = 0.7854\,\phi$

$t_c = 10$ MIN
$2.67 \times t_c = 26.7$ MIN.
$Q = 17.1$ cfs



TRIAL 1
PEAK $Q_o = 9.5$ cfs
VOL = 2,956 C.F.

$T_c = 15$, $i = 5.2$
$Q = 2.85 \times 5.2 = 14.8$ cfs
base 15 MIN + 1.67 × 10 MINS
31.7 MIN



TRIAL 2
PEAK $Q_o = 9.5$
VOL = 3,370 C.F.

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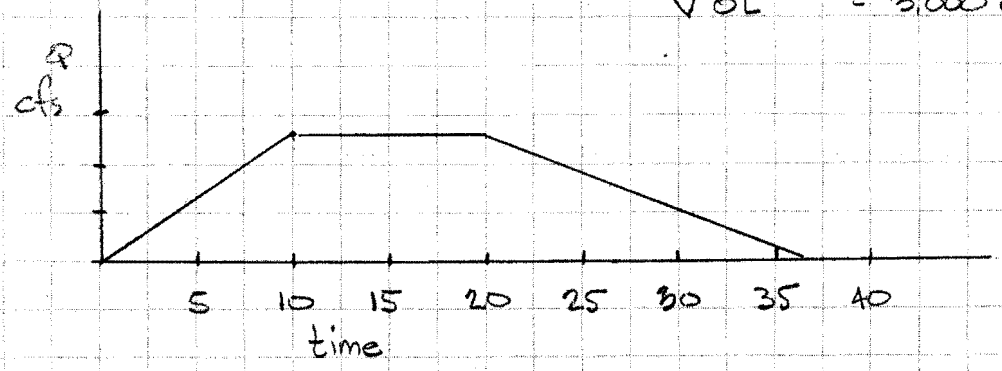
T_c = 20 MIN.
Q = 2.85 x 4.5 = 12.8 cfs
BASE = 20 + 1.67 x 10 MIN = 36.7 MIN.

TRIAL 3

PEAK Q_o = 9.5 cfs
VOL = 3,000 C.F.



CONCLUSION: CRITICAL STORM AT T_p = 15 MIN, Q_p = 14.8 cfs. VOLUME OF STORAGE IS 3,370 C.F. SEE ROUTING FOR TRIAL 2 HYDROGRAPH. STORAGE VOLUME INDICATED BY THIS ROUTING INDICATES THAT VOLUME OF STORAGE REQUIRED FOR THE 10 YEAR STORM IS LESS THAN THE VOLUME OF STORAGE PROVIDED BY THE INFILTRATION TRENCH (WHICH IS NOT INCLUDED IN THE STAGE-VOLUME CURVE USED IN THE STORM ROUTING CALCULATION). THEREFORE, THE 12" PIPE IS ADEQUATE TO PASS THE 10-YEAR STORM WITHOUT EXCESSIVE HEADWATER.

TRIAL #1

R E S E R V O I R R O U T I N G

INFLOW HYDROGRAPH		CAPACITY/OUTFLOW RATING		
IME-min	FLOW-cfs	STAGE-ft	VOLUME-cf	OUTFLOW-cfs
	0	88	0	0
0	17.1	91	19	6
6.7	0	94	38	8.9
		95	3640	9.6
		96	14280	10.4
		97	32500	11.0

TIME INCREMENT (min) = .5

TIME (MIN)	INFLOW (CFS)	STAGE (FT)	VOLUME (CF)	OUTFLOW (CFS)	
17.5		94.8	2,956	9.5	<<< MAXIMUM VALUES

Shift> <Prt Sc> print <P> hydrograph <Ret> repeat <Space> back to menu

TRIAL #1 Hydrograph

TIME (MIN)	INFLOW (CFS)	STAGE (FT)	VOLUME (CF)	OUTFLOW (CFS)
0.0	0.0	88.0	0	0.0
0.5	0.9	88.4	2	0.7
1.0	1.7	88.8	5	1.7
1.5	2.6	89.2	8	2.4
2.0	3.4	89.7	11	3.3
2.5	4.3	90.1	13	4.2
3.0	5.1	90.5	16	5.0
3.5	6.0	90.9	19	5.9
4.0	6.8	91.7	23	6.6
4.5	7.7	92.6	29	7.5
5.0	8.6	93.4	34	8.4
5.5	9.4	94.0	45	8.9
6.0	10.3	94.0	73	8.9
6.5	11.1	94.0	126	8.9
7.0	12.0	94.0	205	8.9
7.5	12.8	94.1	308	9.0
8.0	13.7	94.1	437	9.0
8.5	14.5	94.2	590	9.0
9.0	15.4	94.2	768	9.0
9.5	16.2	94.3	971	9.1
10.0	17.1	94.3	1,198	9.1
10.5	16.6	94.4	1,429	9.2
11.0	16.1	94.4	1,643	9.2
11.5	15.6	94.5	1,841	9.3
12.0	15.1	94.6	2,022	9.3
12.5	14.5	94.6	2,187	9.3
13.0	14.0	94.6	2,336	9.3
13.5	13.5	94.7	2,468	9.4
14.0	13.0	94.7	2,584	9.4
14.5	12.5	94.7	2,685	9.4
15.0	12.0	94.8	2,769	9.4
15.5	11.5	94.8	2,838	9.4
16.0	11.0	94.8	2,890	9.5
16.5	10.4	94.8	2,928	9.5
17.0	9.9	94.8	2,949	9.5
17.5	9.4	94.8	2,956	9.5
18.0	8.9	94.8	2,947	9.5
18.5	8.4	94.8	2,922	9.5
19.0	7.9	94.8	2,883	9.5
19.5	7.4	94.8	2,828	9.4
20.0	6.9	94.8	2,759	9.4
20.5	6.3	94.7	2,674	9.4
21.0	5.8	94.7	2,575	9.4
21.5	5.3	94.7	2,461	9.4
22.0	4.8	94.6	2,332	9.3
22.5	4.3	94.6	2,189	9.3
23.0	3.8	94.6	2,031	9.3
23.5	3.3	94.5	1,859	9.3
24.0	2.8	94.5	1,673	9.2
24.5	2.3	94.4	1,472	9.2
25.0	1.7	94.3	1,257	9.1

TRIAL #2

R E S E R V O I R R O U T I N G

INFLOW HYDROGRAPH		CAPACITY/OUTFLOW RATING		
IME-min	FLOW-cfs	STAGE-ft	VOLUME-cf	OUTFLOW-cfs
	0	88	0	0
0	14.8	91	19	6
5	14.8	94	38	8.9
1.7	0	95	3640	9.6
		96	14280	10.4

TIME INCREMENT (min) = .5

TIME (MIN)	INFLOW (CFS)	STAGE (FT)	VOLUME (CF)	OUTFLOW (CFS)	
21.0		94.9	3,370	9.5	<<< MAXIMUM VALUES

Shift> <Prt Sc> print <P> hydrograph <Ret> repeat <Space> back to menu

TRIAL #2 HYDROGRAPH

TIME (MIN)	INFLOW (CFS)	STAGE (FT)	VOLUME (CF)	OUTFLOW (CFS)
0.0	0.0	88.0	0	0.0
0.5	0.7	88.3	2	0.6
1.0	1.5	88.7	5	1.4
1.5	2.2	89.1	7	2.1
2.0	3.0	89.4	9	2.9
2.5	3.7	89.8	11	3.6
3.0	4.4	90.2	14	4.4
3.5	5.2	90.5	16	5.1
4.0	5.9	90.9	19	5.8
4.5	6.7	91.5	22	6.5
5.0	7.4	92.3	27	7.2
5.5	8.1	93.0	32	8.0
6.0	8.9	93.8	37	8.7
6.5	9.6	94.0	50	8.9
7.0	10.4	94.0	83	8.9
7.5	11.1	94.0	137	8.9
8.0	11.8	94.0	213	8.9
8.5	12.6	94.1	311	9.0
9.0	13.3	94.1	431	9.0
9.5	14.1	94.1	572	9.0
10.0	14.8	94.2	734	9.0
10.5	14.8	94.2	907	9.1
11.0	14.8	94.3	1,078	9.1
11.5	14.8	94.3	1,248	9.1
12.0	14.8	94.4	1,418	9.2
12.5	14.8	94.4	1,586	9.2
13.0	14.8	94.5	1,754	9.2
13.5	14.8	94.5	1,920	9.3
14.0	14.8	94.6	2,086	9.3
14.5	14.8	94.6	2,251	9.3
15.0	14.8	94.7	2,414	9.4
15.5	14.4	94.7	2,570	9.4
16.0	13.9	94.7	2,712	9.4
16.5	13.5	94.8	2,840	9.4
17.0	13.0	94.8	2,954	9.5
17.5	12.6	94.8	3,054	9.5
18.0	12.1	94.9	3,140	9.5
18.5	11.7	94.9	3,212	9.5
19.0	11.3	94.9	3,271	9.5
19.5	10.8	94.9	3,316	9.5
20.0	10.4	94.9	3,347	9.5
20.5	9.9	94.9	3,365	9.5
21.0	9.5	94.9	3,370	9.5
21.5	9.0	94.9	3,361	9.5
22.0	8.6	94.9	3,340	9.5
22.5	8.2	94.9	3,305	9.5
23.0	7.7	94.9	3,257	9.5
23.5	7.3	94.9	3,196	9.5
24.0	6.8	94.9	3,122	9.5
24.5	6.4	94.8	3,035	9.5
25.0	5.9	94.8	2,936	9.5

TRIAL # 3

R E S E R V O I R R O U T I N G

INFLOW HYDROGRAPH		CAPACITY/OUTFLOW RATING		
IME-min	FLOW-cfs	STAGE-ft	VOLUME-cf	OUTFLOW-cfs
	0	88	0	0
0	12.8	91	19	6
0	12.8	94	38	8.9
6.7	0	95	3640	9.6
		96	14280	10.4

TIME INCREMENT (min) = .5

TIME (MIN)	INFLOW (CFS)	STAGE (FT)	VOLUME (CF)	OUTFLOW (CFS)	
24.5		94.8	3,000	9.5	<<< MAXIMUM VALUES

Shift> <Prt Sc> print <P> hydrograph <Ret> repeat <Space> back to menu

TRIAL # 3 HYDROGRAPH

TIME (MIN)	INFLOW (CFS)	STAGE (FT)	VOLUME (CF)	OUTFLOW (CFS)
0.0	0.0	88.0	0	0.0
0.5	0.6	88.3	2	0.5
1.0	1.3	88.6	4	1.2
1.5	1.9	88.9	6	1.8
2.0	2.6	89.3	8	2.5
2.5	3.2	89.6	10	3.1
3.0	3.8	89.9	12	3.8
3.5	4.5	90.2	14	4.4
4.0	5.1	90.5	16	5.1
4.5	5.8	90.8	18	5.7
5.0	6.4	91.3	21	6.3
5.5	7.0	91.9	25	6.9
6.0	7.7	92.6	29	7.5
6.5	8.3	93.3	33	8.2
7.0	9.0	93.9	37	8.8
7.5	9.6	94.0	50	8.9
8.0	10.2	94.0	80	8.9
8.5	10.9	94.0	130	8.9
9.0	11.5	94.0	198	8.9
9.5	12.2	94.1	285	8.9
10.0	12.8	94.1	391	9.0
10.5	12.8	94.1	505	9.0
11.0	12.8	94.2	619	9.0
11.5	12.8	94.2	733	9.0
12.0	12.8	94.2	845	9.1
12.5	12.8	94.3	957	9.1
13.0	12.8	94.3	1,069	9.1
13.5	12.8	94.3	1,179	9.1
14.0	12.8	94.3	1,289	9.1
14.5	12.8	94.4	1,399	9.2
15.0	12.8	94.4	1,507	9.2
15.5	12.8	94.4	1,616	9.2
16.0	12.8	94.5	1,723	9.2
16.5	12.8	94.5	1,830	9.2
17.0	12.8	94.5	1,936	9.3
17.5	12.8	94.6	2,042	9.3
18.0	12.8	94.6	2,147	9.3
18.5	12.8	94.6	2,251	9.3
19.0	12.8	94.6	2,355	9.4
19.5	12.8	94.7	2,458	9.4
20.0	12.8	94.7	2,561	9.4
20.5	12.4	94.7	2,657	9.4
21.0	12.0	94.8	2,741	9.4
21.5	11.7	94.8	2,814	9.4
22.0	11.3	94.8	2,874	9.5
22.5	10.9	94.8	2,922	9.5
23.0	10.5	94.8	2,959	9.5
23.5	10.1	94.8	2,985	9.5
24.0	9.7	94.8	2,998	9.5
24.5	9.4	94.8	3,000	9.5
25.0	9.0	94.8	2,991	9.5

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Date 5-3-89 Sheet No. 10

SYSTEM "B" — NEAR PROPOSED 1-STORY SHOP
(ST'D YD1 WITH 12" PVC OUTLET PIPE)

AREA = 80' x 10' = 800 S.F. = 0.02 Ac.

COMPOSIT C = 100% AT 0.85 = 0.85

CA = 0.02 Ac x 0.85 = 0.02

t_c = 5 MIN , i = 7.2 IN/HR STORM FREQUENCY, 10 YR.

Q_{10} = 0.02 x 7.2 = 0.14 cfs

HW/D REQ'D < 0.5 O.K.

SYSTEM "C" - EXISTING GRAVEL STORAGE YARD

C-1 (ST'D YD1 WITH 15" RCP OUTLET PIPE)

AREA = 320' x 225' = 72,000 S.F. = 1.65 Ac

C = 0.85

CA = 1.65 x 0.85 = 1.40

t_c = 5 MIN , i = 7.2 STORM FREQUENCY, 10 YR.

Q_{10} = 1.40 x 7.2 = 10.1 cfs , HW/D REQ'D 2.8 FT,
HW = 3.5 FT O.K.

C-2 (ST'D YD1 WITH 24" RCP OUTLET PIPE)

AREA = 180' x 225' = 40,500 S.F. = 0.93 Ac.

ΣCA_c = 2.33

t_c = 5 MIN. , i = 7.2 IN/HR STORM FREQUENCY, 10 YR

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SYSTEM "C" (CONTINUED)

$Q_{10} = 2.33 \times 7.2 = \underline{16.8 \text{ cfs}}$

HW/D REQ'D = 1.25', HW = 2.5 FT

HW DEPTH AVAILABLE IN INLET STRUCTURE 16.60 FT

HW REQ'D < HW AVAILABLE O.K.

SYSTEM "D" D-1 (ST'D YDI WITH 12" RCP OUTLET PIPE)

AREA = 0.30 Ac

C = 0.85

CA = 0.3 x 0.85 = 0.26

t_c = 5 MIN., i_{10} = 7.2 IN/HR.

$Q_{10} = 0.26 \times 7.2 = \underline{1.9 \text{ cfs}}$

HW/D REQ'D = 0.9, HW = 0.9 FT

D-2 (ST'D YDI WITH 12" CIP) STONE STORAGE YARD

AREA = 440 x 300 = 132,000 SF = 3.03 Ac

C = 0.60 3.33

CA = 0.60 x 3.03 Ac = 1.82

ΣCA = 0.26 + 1.82 = 2.08

t_c = 10 MIN., i_{10} = 6.0 IN/HR

$Q_{10} = 2.08 \times 6.0 = 12.4$ cfs

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Subject: DRAINAGE CALCULATIONS

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FIND HW TO PASS $Q_{10} = 12.4$ cfs

$h = (12.4/0.6 \times A)^2 / 64.4 =$ $A = 0.7854$

$h = 10.75$ DIA/2 = 0.5

$HW_{REQ'D} = 11.25$ FT HW AVAILABLE = 95.35 − 88.59 = 6.76 FT.

ROUTE STORM THROUGH BASIN TO FIND ACTUAL HEADWATER.

	STAGE	STORAGE FT³	* DISCHARGE CFS	h
	88.6	0		0.
1.40				
	90	13	3.6	0.9
5.35				
	95.35	60	9.5	6.25
0.65				
	96.0	580	9.9	6.90
0.7				
	96.7	12,900	10.4	7.60

* $Q = 0.6 \times A \times \sqrt{2gh}$

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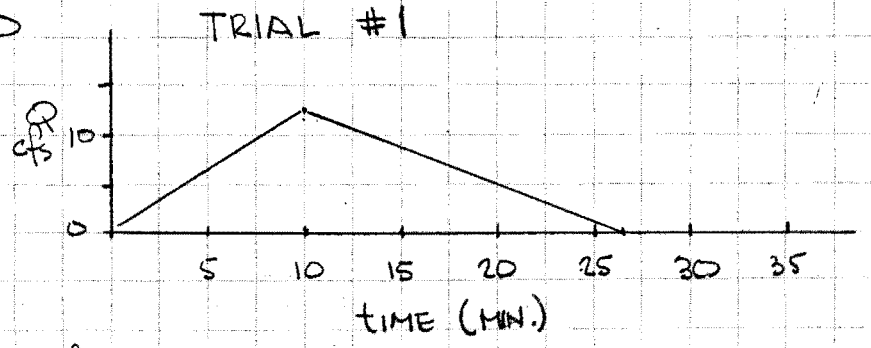
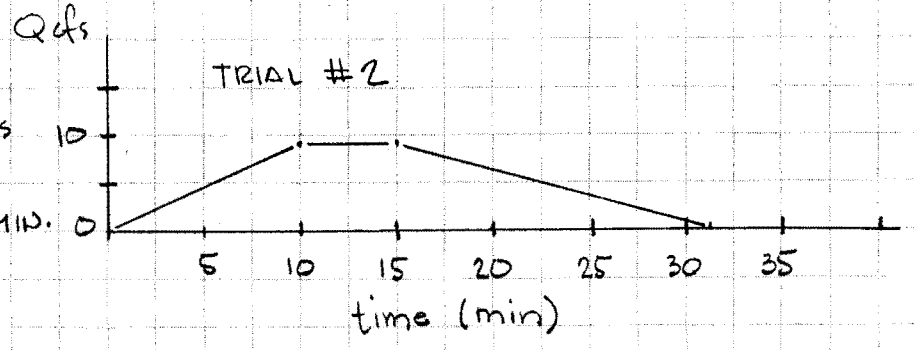
$t_c = 10$ MIN, $i_{10} = 6.0$
$Q_p = 12.4$ cfs
BASE STORM $2.67 \times 10 =$
26.7 MIN.

TRIAL #1



$T_c = 15$ MIN., $i_{10} = 4.5$
$Q_p = 4.5 \times 2.08 = 9.4$ cfs
BASE STORM
$15 + 1.67 \times 10 = 31.7$ MIN.

TRIAL #2



CONCLUSION: CRITICAL STORM DURATION IS A $T_p = 10$ MIN. AT HW ELEV. = 95.9 FT, 9.9 cfs IS DISCHARGED FROM PIPE SYSTEM. A VOLUME OF 532 C.F. OF WATER IS PONDED AT INLETS. TRIAL #2 INDICATES THAT THE CRITICAL STORM IS WITH THE TIME TO PEAK LESS THAN 15 MINUTES. THEREFORE, 12" PIPE IS ADEQUATE TO PASS 10 YEAR STORM WITHOUT EXCESSIVE HEADWATER.

TRIAL # 1

R E S E R V O I R R O U T I N G

INFLOW HYDROGRAPH IME-min	FLOW-cfs	CAPACITY/OUTFLOW RATING STAGE-ft	VOLUME-cf	OUTFLOW-cfs
	0	86.6	0	0
0	12.4	90	13	3.6
6.7	0	95.35	60	9.5
		96	580	9.9
		96.7	12900	10.4

TIME INCREMENT (min) = .5

TIME (MIN)	INFLOW (CFS)	STAGE (FT)	VOLUME (CF)	OUTFLOW (CFS)	
13.5		95.9	532	9.9	<<< MAXIMUM VALUES

Shift> <Prt Sc> print <F> hydrograph <Ret> repeat <Space> back to menu

HYDROGRAPH TRIAL #1

TIME (MIN)	INFLOW (CFS)	STAGE (FT)	VOLUME (CF)	OUTFLOW (CFS)
0.0	0.0	88.6	0	0.0
0.5	0.6	88.8	2	0.5
1.0	1.2	89.1	4	1.2
1.5	1.9	89.3	6	1.8
2.0	2.5	89.5	9	2.4
2.5	3.1	89.8	11	3.0
3.0	3.7	90.0	13	3.6
3.5	4.3	90.5	17	4.1
4.0	5.0	91.1	23	4.8
4.5	5.6	91.6	27	5.4
5.0	6.2	92.2	32	6.0
5.5	6.8	92.8	37	6.7
6.0	7.4	93.3	42	7.3
6.5	8.1	93.9	47	7.9
7.0	8.7	94.5	52	8.5
7.5	9.3	95.0	57	9.1
8.0	9.9	95.4	66	9.5
8.5	10.5	95.4	87	9.5
9.0	11.2	95.4	127	9.6
9.5	11.8	95.5	184	9.6
10.0	12.4	95.6	258	9.7
10.5	12.0	95.7	334	9.7
11.0	11.7	95.8	397	9.8
11.5	11.3	95.8	448	9.8
12.0	10.9	95.9	486	9.8
12.5	10.5	95.9	513	9.8
13.0	10.2	95.9	528	9.9
13.5	9.8	95.9	532	9.9
14.0	9.4	95.9	525	9.9
14.5	9.1	95.9	506	9.8
15.0	8.7	95.9	478	9.8
15.5	8.3	95.8	438	9.8
16.0	7.9	95.8	389	9.8
16.5	7.6	95.7	330	9.7
17.0	7.2	95.6	261	9.7
17.5	6.8	95.5	183	9.6
18.0	6.5	95.4	96	9.5
18.5	6.1	92.9	39	6.8
19.0	5.7	91.8	29	5.6
19.5	5.3	91.7	28	5.5
20.0	5.0	91.3	25	5.1
20.5	4.6	91.0	22	4.7
21.0	4.2	90.7	19	4.3
21.5	3.9	90.3	16	4.0
22.0	3.5	90.0	13	3.6
22.5	3.1	89.8	11	3.1
23.0	2.7	89.7	10	2.8
23.5	2.4	89.5	9	2.4
24.0	2.0	89.4	7	2.1
24.5	1.6	89.3	6	1.7
25.0	1.3	89.1	5	1.3

TRIAL #2

R E S E R V O I R R O U T I N G

INFLOW HYDROGRAPH IME-min	FLOW-cfs	CAPACITY/OUTFLOW RATING STAGE-ft	VOLUME-cf	OUTFLOW-cfs
	0	88.6	0	0
0	9.4	90	13	3.6
5	9.4	95.35	60	9.5
1.7	0	96.0	580	9.9
		96.7	12900	10.4

TIME INCREMENT (min) = .5

TIME (MIN)	INFLOW (CFS)	STAGE (FT)	VOLUME (CF)	OUTFLOW (CFS)	
10.5		95.3	60	9.4	<<< MAXIMUM VALUES

Shift> <Prt Sc> print <P> hydrograph <Ret> repeat <Space> back to menu

TRIAL #2 HYDROGRAPH

TIME (MIN)	INFLOW (CFS)	STAGE (FT)	VOLUME (CF)	OUTFLOW (CFS)
0.0	0.0	88.6	0	0.0
0.5	0.5	88.7	1	0.4
1.0	0.9	89.0	3	0.9
1.5	1.4	89.1	5	1.3
2.0	1.9	89.3	7	1.8
2.5	2.3	89.5	8	2.3
3.0	2.8	89.7	10	2.8
3.5	3.3	89.9	12	3.2
4.0	3.8	90.1	14	3.7
4.5	4.2	90.4	17	4.1
5.0	4.7	90.9	21	4.6
5.5	5.2	91.3	25	5.0
6.0	5.6	91.7	28	5.5
6.5	6.1	92.2	32	6.0
7.0	6.6	92.6	36	6.5
7.5	7.1	93.0	39	6.9
8.0	7.5	93.4	43	7.4
8.5	8.0	93.9	47	7.9
9.0	8.5	94.3	51	8.3
9.5	8.9	94.7	54	8.8
10.0	9.4	95.1	58	9.3
10.5	9.4	95.3	60	9.4
11.0	9.4	95.2	59	9.4
11.5	9.4	95.3	59	9.4
12.0	9.4	95.3	59	9.4
12.5	9.4	95.3	59	9.4
13.0	9.4	95.3	59	9.4
13.5	9.4	95.3	59	9.4
14.0	9.4	95.3	59	9.4
14.5	9.4	95.3	59	9.4
15.0	9.4	95.3	59	9.4
15.5	9.1	95.1	58	9.2
16.0	8.8	94.8	55	8.9
16.5	8.6	94.6	53	8.6
17.0	8.3	94.3	51	8.3
17.5	8.0	94.1	49	8.1
18.0	7.7	93.8	46	7.8
18.5	7.4	93.5	44	7.5
19.0	7.1	93.3	42	7.2
19.5	6.9	93.0	40	6.9
20.0	6.6	92.8	37	6.7
20.5	6.3	92.5	35	6.4
21.0	6.0	92.3	33	6.1
21.5	5.7	92.0	31	5.8
22.0	5.5	91.8	28	5.5
22.5	5.2	91.5	26	5.3
23.0	4.9	91.2	24	5.0
23.5	4.6	91.0	22	4.7
24.0	4.3	90.7	19	4.4
24.5	4.1	90.5	17	4.1
25.0	3.8	90.2	15	3.8

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 9	10	x	1	=	10
		x		=	
		x		=	
		x		=	

TOTAL WEIGHTED STRUCTURAL BMP POINTS: 10

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

Structural BMP Points	+	Natural Open Space Points	=	TOTAL
				10

39146-10

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ENGINEERS · PLANNERS · SURVEYORS
VIRGINIA BEACH - WILLIAMSBURG, VIRGINIA

Subject: FUEL STORAGE FACILITY CBPA CALC
Computed By: SAR Checked By: _____

Project No. 89146-10
Client: JACK MASSIE CONTR.
Date: 1/17/91 Sheet No. 1

SOIL TYPE 31B "SUFFOLK" SCS SOIL SURVEY

SITE IS CLASSIFIED AS PRE-DEVELOPMENT AND THEREFORE IT IS NECESSARY TO REDUCE THE NSP LOADING TO 90% OF THE NSP LOADING OF THE EXISTING CONDITION

SITE AREA = 4672 SF OR 0.11 AC

EXISTING NSP LOADING @ 0.45 lb/ac/yr × 0.11 ac = 0.05 lb/ac/yr

REDEVELOPMENT NSP LOADING = $P \times P_j \times R_v \times C \times A \times 2.72/12$

$43 \times 0.9 \times 0.86 \times 1.01 \times 0.11 \times 2.72/12 = 0.04$ lb/ac/yr

90% OF EXISTING NSP LOAD = 0.045 lb/ac/yr

REQUIRED VOLUME OF INFILTRATION TRENCH = 4672 SF × 0.08' = 389
(40% VOID RATIO) × 2.5
= 973 ft³

USE 20' × 20' × 2.5' INFILTRATION TRENCH @ SOUTH WEST CORNER OF FUEL STORAGE AREA

From RPOD:

Preload = 1.5 lb/ac/yr × .11 = .165 lbs

Post = .9 × .165 = .15 lbs

Trench = $\frac{1''}{12''/ft} \times 4672 = \frac{389\ ft^3}{.4\ (voids)} = 973\ ft^3$

↳ achieves 65% red.

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VIRGINIA BEACH - WILLIAMSBURG, VIRGINIA

Subject

Computed By Checked By

Project No. 8402-9
Client JACK MASSIE CONTR.
Date 5-1-89 Sheet No.

INFILTRATION TRENCH DESIGN

FOR

JACK L. MASSIE CONTRACTORS, INC.

MAY 1, 1989

COMMONWEALTH OF VIRGINIA
WILLIAM L. MEHAFFEY
No. 17087
PROFESSIONAL ENGINEER

by:

LANGLEY AND McDONALD, P.C.
204 PACKETS COURT
WILLIAMSBURG, VIRGINIA 23185
(804) 253-2975

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VIRGINIA BEACH - WILLIAMSBURG, VIRGINIA

Subject INFILTRATION TRENCH DESIGN
Computed By BLM Checked By

Project No. 84032-9
Client JACK MASSIE CONTR.
Date 5-1-89 Sheet No. 1

1. INFILTRATION TEST RESULT. - TEST ON 4-27-89

TEST PIT NORTH OF PROPOSED PARKING LOT. (APPROX. LOCATION OF TRENCH)

	TIME	DROP	AVE. RATE OF INFILTRATION
	1:10 PM		
		1.5"	26.6 MIN / INCH.
	1:50 PM		
		1.5"	40.0 MIN / INCH.
	2:50 PM		
		5.0"	34.0 MIN / INCH.
	5:40 PM		
TOTAL	4 hrs. 30 MIN (270 MIN.)	8.0	33.75 MIN/INCH

USE 35 MIN / INCH FOR DESIGN

TEST PIT IN FILL MATERIAL. TRENCH TO BE EXCAVATED TO DESIGN DEPTH AND SIZE AND THEN SITE TO BE INSPECTED BY ENGINEER AND SOIL SCIENTIST TO VERIFY CONSISTENT SOILS AND CONDITION OVER ENTIRE TRENCH AREA.

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Subject INFILTRATION TRENCH DESIGN
Computed By BLM Checked By

Project No. 8A032-9
Client JACK MASSIE CONTR.
Date 5-1-89 Sheet No. 2

2. DESIGN CRITERIA: (DESIGN MANUAL FOR RUN-OFF ANALYSIS RESERVOIR PROTECTION OVERLAY DISTRICT. JAMES CITY COUNTY - JAMES CITY SERVICE AUTHORITY)

1. FILTERING DEVICES TO REMOVE GREASE, OIL, FLOATABLE ORGANIC MATERIAL, AND SETTLEABLE PARTICLES) SHALL BE EASILY MAINTAINED.

2. INFILTRATION TRENCH SIZED TO ACCOMMODATE 1ST 1-INCH OF RUNOFF FROM IMPERVIOUS AREAS OF DEVELOPMENT.

3. USE VDOT #57 STONE - VOID RATIO 0.40

4. DRAIN DOWN TIME - 5 DAYS - MAX.

5. OVERFLOW PROVIDED TO FROM TRENCH / BASIN TO PASS ADDITION RUNOFF - IN EXCESS OF 1ST 1-INCH.

6. SOIL ANALYSIS TO DETERMINE PERCOLATION RATE.

7. INFILTRATION TRENCH TO BE ABOVE HIGH GROUND WATER TABLE.

8. FACILITY MUST HAVE SIGHT TUBE TO MONITOR INFILTRATION FROM TRENCH.

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Subject INFILTRATION TRENCH DESIGN
Computed By BLM Checked By

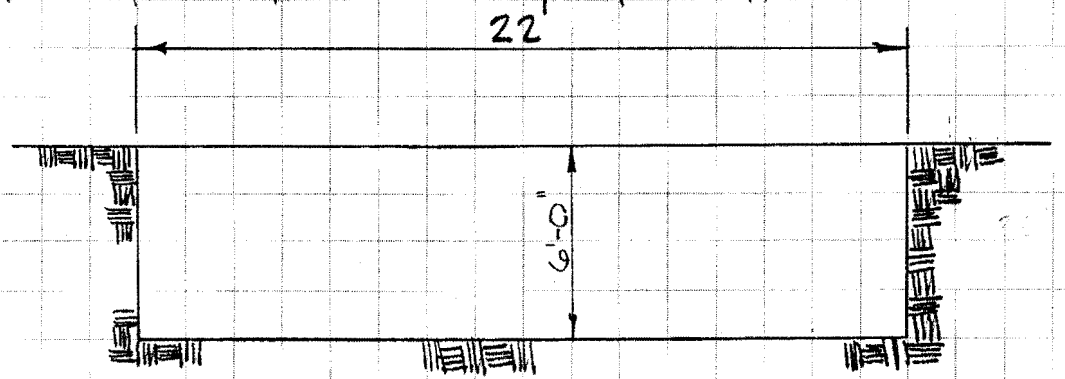
Project No. 84032-9
Client JACK MASSIE
Date 5-1-89 Sheet No. 3

3. INFILTRATION TRENCH DESIGN :

1. VOLUME OF 1ST INCH OF RUNOFF - VOL. REQ'D.

1"/12"/FT x 98,400 SF = 8,200 FT³

2. X- SECTION THRU INFILTRATION TRENCH



- GENERAL RULE SIDE AREA TO BOTTOM ≠ 4:1
- TRENCH FILLED WITH VDOT #57 STONE VOID RATIO = 40%

VOL. TRENCH = VOL STORAGE REQ'D / VOID RATIO

VOL. TRENCH = 8,200 FT³ / 0.40 = 20,500 C.F.

AREA OF TRENCH = 20,500 C.F. / 6 FT. = 3,420 S.F.

LENGTH = 3420 SF / 22' = 155 FT.

USE L = 160 FT

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Subject: INFILTRATION TRENCH DESIGN
Computed By: BLM Checked By:

Project No. 84032-9
Client: JACK MASSIE CONTRACTOR
Date: 5-1-89 Sheet No. 4

4. DRAW DOWN TIME:

ACTUAL DEPTH OF TRENCH = 6' = 72"

WITH #57 STONE FILLED TRENCH AT 40% VOID RATIO.

EFFECTIVE WATER DEPTH = 0.40 x 72" = 28.8"

PERCOLATION RATE = 35 MIN / INCH

TIME TO DRAW DOWN = 35 MIN/INCH x 28.8" =

TIME = 1008 MIN = 16.8 HRS

DRAW DOWN TIME LESS THAN 5 DAYS. O.K.

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VIRGINIA BEACH AND WILLIAMSBURG,
VIRGINIA

GEORGE E. LANGLEY
CONSULTANT

T.J. McDONALD
1906 - 1982

REPLY TO:
P.O. BOX 12047
NORFOLK, VA 23502

THIS IS TO CERTIFY THAT THE ACCOMPANYING RUN-OFF ANALYSIS HAS BEEN CONDUCTED IN ACCORDANCE WITH THE GUIDELINES SET FORTH IN THE "DESIGN MANUAL FOR RUN-OFF ANALYSIS RESERVOIR PROTECTION OVERLAY DISTRICT" PREPARED BY THE JAMES CITY SERVICE AUTHORITY.

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RUNOFF ANALYSIS
OFFICE, EQUIPMENT AND STORAGE FACILITY
FOR
JACK MASSIE CONTRACTORS INC.

1. GENERAL

A. RUNOFF ANALYSIS

1. THE OVERALL PROJECT WILL PROVIDE OFFICE FACILITIES, STORAGE FACILITIES AND AN EQUIPMENT SHOP FOR A GENERAL CONTRACTOR. THE ONLY FACILITIES WHICH WILL BE IN THE OVERLAY ZONE ARE A STONE STOCKPILE AREA WITH GRAVEL OPERATIONAL SURFACES, A RAIL SPUR LINE AND TWO BUILDINGS WHICH HAVE ROOF DRAINAGE SYSTEMS CONNECTED TO A CLOSED DRAINAGE SYSTEM WHICH DRAINS TO AN AREA OUTSIDE THE OVERLAY ZONE.

THE PROJECT IS LOCATED ON LAND LYING SOUTH OF CSX RAILROAD AND EAST OF COKES LANE (STATE ROUTE 602). THE PARCEL IS GENERALLY RECTANGULAR IN SHAPE AND IT EXTENDS IN A WESTERLY DIRECTION APPROXIMATELY 2,500 FEET FROM COKES LANE AND APPROXIMATELY 600 FEET SOUTH FROM THE CSX RIGHT-OF-WAY.

ALL ASPHALT SURFACES ARE LOCATED OUTSIDE THE OVERLAY ZONE. ALL BUILDINGS ARE LOCATED OUTSIDE OF, OR HAVE ROOF DRAINAGE AWAY FROM, THE OVERLAY ZONE. THE EXTENT OF IMPERVIOUS AREAS WITHIN THE OVERLAY ZONE IS QUESTIONABLE. ALL VEHICLE OPERATING SURFACES CONTIGUOUS TO THE STONE STOCKPILE AREAS WILL HAVE GRAVEL SURFACES. THE OTHER SIGNIFICANT USE WITHIN THE OVERLAY ZONE WILL BE THE STONE STOCKPILES. THESE ARE VERY POROUS AND WILL HAVE A HIGH VOID RATIO. THESE STOCKPILES WILL RETAIN WATER AND ALLOW A PORTION OF IT TO INFILTRATE INTO THE UNDERLYING SOIL. WE DO NOT CONSIDER THESE STOCKPILES TO BE "IMPERVIOUS" SURFACES.

AS NOTED BEFORE, THE VEHICULAR OPERATING SURFACES WILL BE GRAVEL. SECTION 20-171 OF THE ZONING ORDINANCE DEFINES AGGREGATE AND CRUSHER RUN AS IMPERVIOUS SURFACES. THIS APPEARS TO BE IN CONFLICT WITH SECTION II, C.1, PG. 6, OF THE "DESIGN MANUAL FOR RUNOFF ANALYSIS" WHICH NOTES THAT SITE IMPERVIOUS AREAS SHOULD BE MINIMIZED BY USE OF PERVIOUS SURFACES SUCH AS MODULAR PAVEMENT, POROUS PAVEMENT, AND GRAVEL STRIPS.

IF THE VEHICULAR OPERATING AREAS ARE CONSIDERED IMPERVIOUS, THERE
IMP. AREA WITHIN THE OVERLAY ZONE IS 145,264 S.F. OR 3.33 ACERS.

THE SITE IS GENTLY ROLLING WITH ITS HIGHEST ELEVATION AT ABOUT 105 FEET AND ITS LOWEST AT ABOUT 75 FEET. THE TOTAL SITE IS APPROXIMATELY 34.5 ACERS, OF WHICH 25.1 ACERS LIE WITHIN THE OVERLAY ZONE. OF THE AREA WITHIN THE OVERLAY ZONE,APPROXIMATELY 9.9 ACRES ARE WOODED, WITH THE REMAINDER UNDER CULTIVATION.

PAST TENSE

THERE ARE NO SIGNIFICANT HYDROLOGIC FEATURES ON THE SITE. DRAINAGE OF THE SITE WITHIN THE OVERLAY ZONE IS DIVIDED INTO THREE MAJOR AREAS WHICH DRAIN THROUGH CULVERTS UNDER THE CSX TRACKS ON THE NORTH SIDE OF THE PROPERTY. THE LOW AREAS ARE GENTLE WITH NO STEEP SIDED, ERODING RAVINES.

SOILS ON THE SITE ARE IN THE B AND C HYDROLOGIC SOILS GROUPS. THESE SOILS ARE GENERALLY DESCRIBED AS SANDY LOAM AND FINE SANDY LOAM, WITH UNDERLYING STRATA OF SANDY CLAY LOAM IN LIMITED AREAS 13 INCHES BELOW THE SURFACE. THESE SOILS GENERALLY HAVE AN INFILTRATION RATE OF 2 TO 6 INCHES PER HOUR AT THE SURFACE.

Single Component - Expand

AS NOTED PREVIOUSLY, APPROXIMATELY 9.9 ACRES OF THE SITE WITHIN THE OVERLAY ZONE ARE WOODED. THESE WOODS CONSIST OF MIXED HARD-WOODS AND CONIFERS OF WIDELY VARYING SIZES.

THE REMAINING AREA, 15.2 ACRES, IS BEING CULTIVATED, WITH THE PRESENT CROP BEING BARLEY.

2. THE NATURAL RUNOFF FROM THE PORTIONS OF THE SITE LYING WITHIN THE OVERLAY ZONE IS CALCULATED AS SHOWN ON ACCOMPANYING COMPUTATION SHEETS. THE TOTAL EXISTING RUNOFF IS 45 C.F.S. THE CALCULATED EXISTING PHOSPHOROUS CONCENTRATION AND SEDIMENT LOADS ARE 58 POUNDS PER YEAR AND 24.2 TONS PER YEAR RESPECTIVELY.

   THE MAJOR CONCERN WITH THE PRESENT LAND USE IS THE CHEMICAL RUNOFF FROM PESTICIDES AND HERBICIDES USED ON THE EXISTING CULTIVATED FIELDS. USE OF SUCH CHEMICALS WILL BE DISCONTINUED AFTER CONSTRUCTION OF THIS PROJECT.

3. THE RUNOFF FROM THE SITE AFTER DEVELOPMENT OF THE PROPOSED PROJECT IS SHOW ON THE ACCOMPANYING CALCULATIONS. THE REDUCTION OF THE THREE MAJOR COMPONENTS TO BE CONSIDERED ARE SHOWN IN THE FOLLOWING TABLE. THESE FIGURES ARE BASED ON THE TOTAL AREA OF LAND WITHIN THE OVERLAY ZONE.

PEAK RUNOFF FOR 2 YEAR STORM

	EXISTING	POST DEV.	
PEAK STORM WATER RUNOFF (CFS)	45 27.4	25.6	RATIONAL METHOD
PEAK STORM WATER RUNOFF (CFS)	37.4	21.6 23.6	TR-55 METHOD
TOTAL PHOSPHOROUS (LBS./YR.)	54.2	10.2	
TOTAL SEDIMENT (TONS/YR.)	22.4	2.0	

THE PRIMARY CAUSE OF THE SIGNIFICANT REDUCTIONS IN EACH OF THE CATEGORIES IS THE TERMINIATION OF AGRICULTURAL ACTIVITY. THE MOST SIGNIFICANT CATEGORIES AFFECTED BY TERMINIATION OF AGRICULTURAL ACTIVITIY IS THE ELIMINATION OF THE USE OF PESTICIDES AND HERBICIDES. ALSO OF SIGNIFICANCE IS THE REDUCED PHOSPHOROUS LEVELS AND THE REDUCED LOSS OF TOPSOIL.

THE MATERIALS PLACED WITHIN THE OVERLAY ZONE WILL CONSIST OF STONE SAND. THE STONE PRODUCTS WILL BE GRANITIC WITH THE GENERAL CHEMICAL COMPOSITION OF SiO_2 AND Al_2O_3
THE GRAVEL SURFACE OF THE VEHICLE OPERATING AREAS WILL CONSIST OF GRANITIC MATERIALS WITH THE SAME GENERAL CHEMICAL COMPOSITION.

4. DEVELOPMENT OF THIS SITE UNDER THE PROPOSED PLAN WILL RESULT IN A REDUCTION IN RUNOFF, PHOSPHOROUS LOAD AND SEDIMENT LOAD. THIS RESULTS IN A 42%, 81%, AND 91% REDUCTION RESPECTIVELY.

   ACCEPTED EROSIN CONTROL MEASURES WILL BE IMPLEMENTED DURING CONSTRUCTION TO PROHIBIT INCREASED SEDIMENT LOADING WHILE CONSTRUCTION IS IN PROGRESS.

5. AS THE PROPOSED PROJECT WILL RESULT IN SIGNIFICANT DECREASES IN RUNOFF, SEDIMENT LOAD AND PHOSPHOROUS CONTENT, THE PERFORMANCE CRITERIA OF THIS SECTION ARE NOT APPLICABLE.

EXISTING

1. RUNOFF FROM SITE
   COMPOSITE "C" CALCULATIONS
   AREA OF WOODS = 9.9 AC. X 0.25 "C" FACTOR = 2.47
   CULTIVATED FIELDS = 15.2 AC. X 0.60 "C" FACTOR = 9.12
   TOTAL 25.1 AC. 11.59
   7.03 .28 .3
   COMPOSITE "C" = 11.59/25.1 = 0.46

   TIME OF CONCENTRATION OF EXISTING BASIN = 15 MIN.

   PEAK RUNOFF FOR 2 YR. STORM
   Q = CIA .28 =
   Q = (0.46)(3.9)(25.1)
   Q = 45.0 CFS = 27.4

2. PHOSPHOROUS CONCENTRATION (TABLE 2-2)
   CROPLAND, CONVENTIONAL TILLAGE,LOAM SOILS
   WOODS: 9.9 AC. X 0.1 LBS./AC./YR. = 0.99 LBS./YR.
   CROPLAND: 15.2 AC. X 3.5 LBS./AC./YR. = 53.20 LBS./YR.
   LB soils TOTAL = 54.20 LBS./YR

3. SEDIMENT LOAD .055 LB soils
   WOODS: 9.9 AC. X 0.05 TONS/AC./YR. = 0.50 TONS/YR.
   CROPLAND: 15.2 AC. X 1.44 TONS/AC./YR. = 21.88 TONS/YR.
   1.62 TOTAL = 22.38 TONS/YR.

PROPOSED

1. PROPOSED RUNOFF FROM SITE
   CALCULATIONS FOR COMPOSITE "C"
   A. AREA OF WOODS CLEARED FOR RAIL SPUR
      1.96 AC. - "C" = 0.35
   B. AREA OF WOODS REMAINING
      7.94 AC. - "C" = 0.25
   C. AREA OF STOCKPILE AND GRAVEL VEHICLE AREA
      4.00 AC. - "C" = 0.50
   D. AREA OF IDLE LAND (LAWN)
      15.2 AC. - "C" = 0.25

   COMPOSITE "C"
   A. 1.96 AC. X 0.35 "C" = 0.686
   B. 7.94 AC. X 0.25 "C" = 1.985
   C. 4.00 AC. X 0.50 "C" = 2.000
   D. 14.1 AC. X 0.25 "C" = 2.800
   TOTAL = 7.471

   7.471/25.1 = 0.2976 USE "C" VALUE OF 0.3

   TIME OF CONCENTRATION = 20 MIN.

   PEAK RUNOFF RATE AFTER DEVELOPMENT - 2 YR. STORM
   Q = CIA
   Q = 0.3 X 3.4 X 25.1
   Q = 25.6 CFS

2. PHOSPHOROUS CONCENTRATION:

IDLE LAND	:	11.2 AC. X 0.20 LBS/AC./YR.	=	2.24 LBS/YR.
WOODS	:	7.94 AC. X 0.10 LBS/AC./YR/	=	0.79 LBS/YR.
INDUSTRIAL	:	5.96 AC. X 1.20 LBS/AC./YR.	=	7.15 LBS/YR.
		TOTAL	=	10.18 LBS/YR.

3. SEDIMENT LOAD:

IDLE LAND	:	11.2 AC. X 0.05 TONS/AC./YR.	=	0.56 TONS/YR.
WOODS	:	7.94 AC. X 0.05 TONS/AC./YR.	=	0.39 TONS/YR.
INDUSTRIAL	:	5.96 AC. X 0.18 TONS/AC./YR/	=	1.07 TONS/YR.
		TOTAL	=	2.02 TONS/YR.

Worksheet 2: Runoff curve number and runoff

Project Massie Equipment Yard By RED Date 3-14-89

Location Cokes Lane Checked _____ Date _____

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☐ mi² ☒ %	Product of CN x area
B&C	Woods - Good Cover	63			39.4	2482.2
B&C	Row Crops (SR)	85			60.6	5151.0
					Totals = 100	7633.2

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{7633.2}{100} = 76.33$; Use CN = 76.3

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	2		
Rainfall, P (24-hour) ..... in	3.5		
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	1.35		

99124_MASSIE_YARD_RICHMOND_ROAD - 056

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Massie Equipment Yard By RED Date 3-14-89

Location Cokes Lane Checked _____ Date _____

Circle one: (Present) Developed _____

Circle one: T_c T_t through subarea _____

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID				
1. Surface description (table 3-1)						
2. Manning's roughness coeff., n (table 3-1) ..		.06 0.05				
3. Flow length, L (total L ≤ 300 ft)	ft	300				
4. Two-yr 24-hr rainfall, P_2	in	3.5				
5. Land slope, s	ft/ft	.027				
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	.14	+		=	.14 .16

Shallow concentrated flow		Segment ID				
7. Surface description (paved or unpaved)		Unpaved				
8. Flow length, L	ft	800				
9. Watercourse slope, s	ft/ft	.027				
10. Average velocity, V (figure 3-1)	ft/s	2.5				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+		=	0.09

Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+		=	
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr					0.23 15 min

99124_MASSIE_YARD_RICHMOND_ROAD - 057

Worksheet 4: Graphical Peak Discharge method

Project Massie Equipment Yard By RED Date 3-14-89

Location Coker Lane Checked _____ Date _____

Circle one: (Present) Developed _____

1. Data:

Drainage area ..... A_m = 0.039 mi^2 (acres/640)

Runoff curve number .... CN = 76.3 (From worksheet 2)

Time of concentration .. T_c = 0.23 hr (From worksheet 3)

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = — percent of A_m (— acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	2		
3. Rainfall, P (24-hour)	in	3.5		
4. Initial abstraction, I_a ..... (Use CN with table 4-1.)	in	0.632		
5. Compute I_a/P		0.181		
6. Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-____)	csm/in	710		
7. Runoff, Q ..... (From worksheet 2).	in	1.35		
8. Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)		1.0		
9. Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs	37.4		

= 710 × .039 × 1.35 × 1.0 =

99124_MASSIE_YARD_RICHMOND_ROAD - 058

Worksheet 2: Runoff curve number and runoff

Project Massie Equipment Yard By RED Date 3-14-89

Location Cokes Lane Checked _____ Date _____

Circle one: Present (Developed)

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☐ acres ☐ mi² ☒ %	Product of CN x area
B & C	Rail Spur (Gravel Road)	87			7.8	678.6
B & C	Woods - Good Cover	63			31.6	1990.8
B & C	Indust. Area	89			15.9	1415.1
B & C	Open Space (75% Grass)	67			44.6	2988.2
				Totals =	100	7072.7

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{7072.7}{100} = 70.7$; Use CN = 70.7

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2		
Rainfall, P (24-hour)	in	3.5		
Runoff, Q ..... (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	in	~~1.01~~ 1.1		

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Massie Equipment Yard By RED Date 3-14-89

Location Cokes Lane Checked ____ Date ____

Circle one: Present Developed

Circle one: T_c T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID					
1. Surface description (table 3-1)						
2. Manning's roughness coeff., n (table 3-1) ..		0.125	.15			
3. Flow length, L (total L ≤ 300 ft)	ft	300	180			
4. Two-yr 24-hr rainfall, P_2	in	3.5	3.5			
5. Land slope, s	ft/ft	.027	.027			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		+ .22	=	.29	.22

Shallow concentrated flow	Segment ID					
7. Surface description (paved or unpaved)		Unpaved	Unpaved			
8. Flow length, L	ft	800	440			
9. Watercourse slope, s	ft/ft	.027	.007			
10. Average velocity, V (figure 3-1)	ft/s	2.5	1.3			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.09	+ .094	=	.09	

Channel flow	Segment ID	GRAVEL TO PIPE SYSTEM	PIPE SYSTEM			
12. Cross sectional flow area, a	ft^2	2.0				
13. Wetted perimeter, p_w	ft	.45				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft	4.47				
15. Channel slope, s	ft/ft	.02				
16. Manning's roughness coeff., n		.05				
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s	2.5	5	- from calcs		
18. Flow length, L	ft	300	225			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	.033	+ .018	=	.365	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr .38 .33

99124_MASSIE_YARD_RICHMOND_ROAD - 060

Worksheet 4: Graphical Peak Discharge method

Project Massie Equipment Yard By RED Date 3-14-89

Location Cokes Lane Checked _____ Date _____

Circle one: Present (Developed)

1. Data:

Drainage area ..... A_m = 0.039 mi^2 (acres/640)

Runoff curve number .... CN = 70.7 (From worksheet 2)

Time of concentration .. T_c = ~~0.66~~ hr (From worksheet 3) .365

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = — percent of A_m (— acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	2	2	
3. Rainfall, P (24-hour)	in	3.5	3.5	
4. Initial abstraction, I_a ..... (Use CN with table 4-1.)	in	0.817	.817	
5. Compute I_a/P		.233	.233	
6. Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-____)	csm/in	550	550	
7. Runoff, Q ..... (From worksheet 2).	in	1.01	1.1	
8. Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)		1.0		
9. Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs	21.6	23.6 cfs	

99124_MASSIE_YARD_RICHMOND_ROAD - 061

Table 5-3

RUNOFF CURVE NUMBERS (CN)

LAND USE DESCRIPTION	HYDROLOGIC SOIL GROUP			
	A	B	C	D
Cultivated land[1]: without conservation treatment	72	81	88	91
: with conservation treatment	62	71	78	81
Pasture or range land: poor condition	68	79	86	89
good condition	39	61	74	80
Meadow: good condition	30	58	71	78
Wood or Forest land: thin stand, poor cover, no mulch	45	66	77	83
good cover[2]	25	55	70	77
Open Spaces, lawns, parks, golf courses, cemeteries, etc.				
good condition: grass cover on 75% or more of the area	39	61	74	80
fair condition: grass cover on 50% to 75% of the area	49	69	79	84
Commercial and business areas (85% impervious)	89	92	94	95
Industrial districts (72% impervious).	81	88	91	93
Residential:[3]				
Average lot size — Average % Impervious				
1/8 acre or less — 65	77	85	90	92
1/4 acre — 38	61	75	83	87
1/3 acre — 30	57	72	81	86
1/2 acre — 25	54	70	80	85
1 acre — 20	51	68	79	84
Paved parking lots, roofs, driveways, etc.	98	98	98	98
Streets and roads:				
paved with curbs and storm sewers	98	98	98	98
gravel	76	85	89	91
dirt	72	82	87	89

1/ For a more detailed description of agricultural land use curve numbers refer to National Engineering Handbook, Section 4, Hydrology, Chapter 9, Aug. 1972.

2/ Good cover is protected from grazing and litter and brush cover soil.

3/ Curve numbers are computed assuming the runoff from the house and driveway is directed towards the street with a minimum of roof water directed to lawns where additional infiltration could occur.

Source: USDA-SCS

3. Time of Concentration (T_C) = 15 min. (given)

4. Determine Rainfall Intensity Factor (i)
   (i) = 4.9 in/hr - (from Plate 5-3)

5. Q = C(i)(A)
   Q = .43(4.9)(80) = 168.56 cfs

Table 5-2
VALUES OF RUNOFF COEFFICIENT (C) FOR RATIONAL FORMULA

Land use	C
Business:	
Downtown areas	0.70-0.95
Neighborhood areas	0.50-0.70
Residential:	
Single-family areas	0.30-0.50
Multi units, detached	0.40-0.60
Multi units, attached	0.60-0.75
Suburban	0.25-0.40
Industrial:	
Light areas	0.50-0.80
Heavy areas	0.60-0.90
Parks, cemeteries	0.10-0.25
Playgrounds	0.20-0.35
Railroad yard areas	0.20-0.40
Unimproved areas	0.10-0.30
Streets:	
Asphaltic	0.70-0.95
Concrete	0.80-0.95
Brick	0.70-0.85
Drives and walks	0.75-0.85
Roofs	0.75-0.95

Land use	C
Lawns:	
Sandy soil, flat, 2%	0.05-0.10
Sandy soil, average, 2-7%	0.10-0.15
Sandy soil, steep, 7%	0.15-0.20
Heavy soil, flat, 2%	0.13-0.17
Heavy soil, average, 2-7%	0.18-0.22
Heavy soil, steep, 7 %	0.25-0.35
Agricultural land:	
Bare packed soil	
Smooth	0.30-0.60
Rough	0.20-0.50
Cultivated rows	
Heavy soil no crop	0.30-0.60
Heavy soil with crop	0.20-0.50
Sandy soil no crop	0.20-0.40
Sandy soil with crop	0.10-0.25
Pasture	
Heavy soil	0.15-0.45
Sandy soil	0.05-0.25
Woodlands	0.05-0.25

Note: The designer must use judgement to select the appropriate C value within the range. Generally, larger areas with permeable soils, flat slopes and dense vegetation should have lowest (C) values. Smaller areas with dense soils, moderate to steep slopes, and sparce vegetation should be assigned highest (C) values.

Source: American Society of Civil Engineers

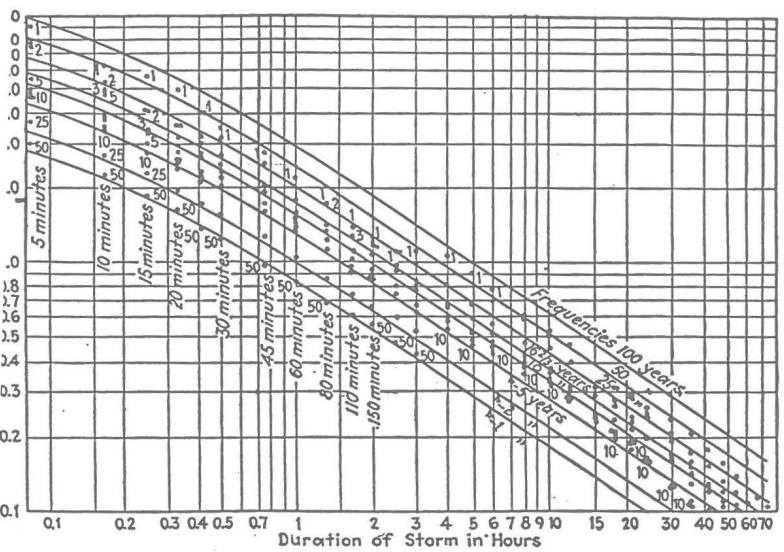
3. Average Intensity of Precipitation and Area Covered, Boston, Mass.[1]

Estimated frequency of occurrence, 10 years

ea, acres	Average intensity of precipitation, inches per hour, for durations of		
	30 min.	45 min.	60 min.
0	2.48	1.94	1.60
500	2.34	1.85	1.55
1000	2.26	1.80	1.52
1500	2.20	1.76	1.49
2000	2.15	1.74	1.47
3000	2.07	1.69	1.43
4000	1.98	1.65	1.40
5000	1.92	1.61	1.38

:ston, Frank A., *Trans. Am. Soc. Civil Engrs.*, vol. 87, p. 535, 1924.

ıge is located. The average intensity over any appreciable area will be less ıe maximum intensity found in the area. The way in which the average inten- ries with the size of area for rains of different duration is shown in Marston's



4. Intensity of precipitation at Boston, Mass., for various durations and frequencies. man, *Frequency and Intensity of Excessive Rainfalls at Boston, Mass., Trans. Am. Soc. Engrs., vol. 95, p. 956, 1931.*)

in Table 3. For an area of 5,000 acres served with a single rain gage, the in. intensity may be only 1.92/2.48 = 77.5 percent of the intensity taken from es similar to Fig. 4.

e *time of concentration* is the time required for the water from the farthest point e area to reach the point of concentration or that point of the system for which omputation of surface runoff is to be made. This time is computed by assuming

istribution of Intense Rainfall, *Trans. Am. Soc. Civil Engrs.*, vol. 87, p. 559, 1924.

99124_MASSIE_YARD_RICHMOND_ROAD - 064

an *inlet* time required for the runoff for the most distant part of the area to reach the nearest inlet and adding thereto the time of flow in the sewer from that inlet to the point of concentration. The rainfall intensity i used in the formula is that intenisty of rainfall which lasts for the time of concentration and is taken from the intensity-duration curve or computed by the appropriate formula. In the above formula, Q is a maximum when A is a maximum, since A varies more rapidly than, but inversely with, i. The intensity used, therefore, should be for that time at which the entire area becomes tributary at the point under consideration. In storm-sewer studies, it is unnecessary to construct a storm sewer that will accommodate the largest flood of record, but the 5-, 10-, or 15-year flood is ordinarily used, depending on the amount of damage that may result from overtaxing the storm sewer. The inlet time varies from 3 to 20 min.—ordinarily being about 5 min.—and experience is needed for its selection. Its determination is approximate and is more important for small areas than for large ones, since in such cases the inlet time is a greater proportion of the total time of concentration.

The value of the runoff coefficient to be used depends on the relative imperviousness of the tributary area and the length of time it has been raining on the various parts of that area. Table 4 gives the range of coefficients of runoff that are commonly used. When an area includes different classes of surface, their coefficients are combined in proportion to their relative areas. For example, let it be required to determine the coefficient of runoff for an area consisting of 1.5 acres of lawns and parkways with a coefficient of 0.10 and 0.5 acre of pavements and roof surfaces with a coefficient of 0.90. Then,

$$25\% \times 0.90 = 0.225$$
$$75\% \times 0.10 = 0.075$$
$$\text{Coefficient for total area} = 0.300$$

Table 4. Bryant and Kuichling's Estimates of Runoff from Different Classes of Surface as Percentages of Rainfall Intensity[1]

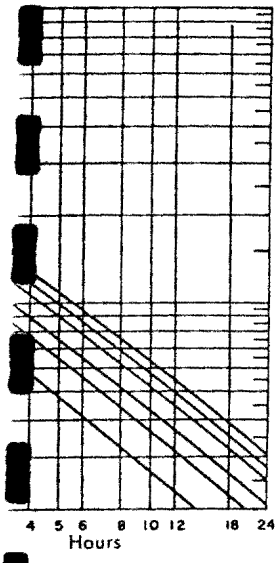
Watertight roof surfaces	0.70–0.95
Asphalt pavements in good order	0.85–0.90
Stone, brick, and wooden-block pavements with tightly cemented joints	0.75–0.85
Same with open or uncemented joints	0.50–0.70
Inferior block pavements with open joints	0.40–0.50
Macadamized roadways	0.25–0.60
Gravel roadways and walks	0.15–0.30
Unpaved surfaces, railroad yards, and vacant lots	0.10–0.30
Parks, gardens, lawns, and meadows, depending on surface slope and character of subsoil	0.05–0.25

[1] *Rept.* Back Bay Sewerage System, Boston, 1909.

Table 5 illustrates the current practice of some of the larger American cities and gives the general range of coefficients of run-off, inlet time, and storm frequency for which drainage is provided.

Table 5. Runoff Assumptions Used in Large American Cities

Item	Coefficient of run-off	Coefficient commonly used
Business areas	0.60 to 0.95	0.90
Downtown residential	0.30 to 0.60	0.40 to 0.50
Suburban	0.25 to 0.40	0.30
Inlet time, minutes	3 to 20	5 to 10
Frequency of storm provided for, years	1 to 15	10 to 15



eriods.

ons east of the Rocky
y of storms and their

d storm runoff or design

United States use the
ce 1889. This method,
n for roadside channels
n:

.....Equation (1)

e ratio of rate of runoff

er hour (for the selected
time of concentration)

e point under design

, gives numerically correct
per acre.

Table 4-4 Values of Relative Imperviousness[1]

Type of Surface	Factor *C*
For all watertight roof surfaces	.75 to .95
For asphalt runway pavements	.80 to .95
For concrete runway pavements	.70 to .90
For gravel or macadam pavements	.35 to .70
*For impervious soils (heavy)	.40 to .65
*For impervious soils, with turf	.30 to .55
*For slightly pervious soils	.15 to .40
*For slightly pervious soils, with turf	.10 to .30
*For moderately pervious soils	.05 to .20
*For moderately pervious soils, with turf	.00 to .10

*For slopes from 1% to 2%

WATERSHED CHARACTERISTICS

Some of the watershed characteristics that influence the amount and rate of runoff are:

1. Area and shape
2. Steepness and length of slopes
3. Kind and extent of vegetation or cultivation
4. Condition of surface—dry, saturated, frozen—pervious or impervious soil
5. Number, arrangement and condition of drainage channels on the watershed

The changes of land use during the lifetime of a drainage structure should be considered in evaluating runoff characteristics. Where the drainage area is composed of several types of ground cover, the runoff should be weighted according to the area of each type of cover present.

TIME OF CONCENTRATION

An important factor is the time required for runoff from the remotest part of a drainage area to reach the point under design. This is known as the time of concentration. It is used in the rational design method but must be clearly understood to avoid misapplication of the method and its proposed refinements.[1]

A minimum time of 5 minutes is recommended by the Federal Highway Administration. See Fig. 4-6.

DRAINAGE AREA

The drainage area can be measured on a topographic map or determined in the field by estimation, pacing, aerial photos, or a survey comparable in accuracy to a stadia-compass traverse.

Example

Find the discharge for a 10-year frequency rainfall at the outlet of a grassed roadside channel 400 ft from the crest of a hill with the contributing area 238 ft wide, consisting of 12 ft of concrete pavement, 26 ft of gravel shoul-

copy: Stormwater Division

Development Management
101-A Mounts Bay Road
P.O. Box 8784
Williamsburg, VA 23187-8784
P: 757-253-6671
F: 757-253-6822
devman@james-city.va.us

jccEgov.com

Code Compliance
757-253-6620
codecomp@james-city.va.us

Environmental Division
757-253-6670
environ@james-city.va.us

Planning and Zoning
757-253-6685
planning@james-city.va.us

September 20, 2010

Mr. V. Marc Bennett
AES Consulting Engineers
5248 Olde Towne Road, Suite 1
Williamsburg, Va. 23188

Re: Revised Master Stormwater Management Plan
Massie Corporation Property (3920 Cokes Lane)
Division Plan No. SWM-01-10 (formerly SWM-02-05)

Dear Mr. Bennett:

The Environmental Division has reviewed proposed revisions to the previously approved Master Stormwater Management Plan (MSWMP) for the above referenced project. The previously approved MSWMP was revised due to reallocation of water quality BMP points among Parcels A, B and C. The MSWMP includes a single 1" = 200 ft. scale overall plan, with revision date of September 13th 2010, showing the entire project site (73.18 acres) on both sides of the railroad as well as the location of the three parcels, two structural BMPs and dedicated natural open space (21.4 acres). Allocation of dedicated natural open space is as follows: Parcel A (2.53 acres); Parcel B (4.24 acres); and Parcel C (14.61 acres).

Based on our review of submittal information, the revised Master Stormwater Management Plan (MSWMP) is hereby **approved**. There are no further conditions attached to this approval beyond those listed on the MSWMP exhibit (plan) sheet, including notes.

Please note that approval of this revised MSWMP in no way implies final approval of any site or subdivision plan as required by the Chapter 24 Zoning or Chapter 19 Subdivisions of the County Code; nor, does it constitute final approval of an erosion and sediment control or stormwater management plan as required by the Chapter 8 Erosion and Sediment Control and Chapter 23 Chesapeake Bay Preservation ordinances of the County.

Thank you for your time and effort revise this master stormwater management plan. If you have any additional questions or comments, contact me at 757-253-6639.

Sincerely,

Scott J. Thomas, P.E.
Director
Environmental Division

SJT/sjt
cc: Planning Division (via email)
Stormwater Division (via email)

AES
CONSULTING ENGINEERS

Hampton Roads | Central Virginia | Middle Peninsula

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

aesva.com

Environmental Division
SEP 13 2010
RECEIVED

Letter of Transmittal

ATTN: **Scott Thomas; Mike Woolson**

CO.: James City County Planning

Address: 101-E Mounts Bay Road
Williamsburg, Virginia 23187

cc: Gary Massie

DATE	JOB NO.
September 13, 2010	W08233-15

FROM: Marc Bennett

RE
Massie Properties

WE ARE SENDING YOU THE FOLLOWING ITEMS: x Attached
☐ Under separate cover via

☐ Original(s) X Print(s) ☐ Plan(s) ☐ Specification(s) ☐ Change Order

☐ Copy of letter(s) ☐ Other:

COPIES	DATE	No. of Pages	DESCRIPTION
1	9/13/10	3	Plat of Boundary line Adjustment and Natural Open Space Allocation
2	9/13/10	1	Amended Stormwater Masterplan
1	9/13/10	1	Letter of explanation, copy to MDW

Sent to chris in Planning

THESE ARE TRANSMITTED as checked below:

☐ For your approval ☐ For your signature ☐ For review and comment

☐ For your use ☐ As you requested ☐ As requested by:

X Other: For Review for Compliance

REMARKS:
Please let me know of any questions.

Marc B

VIA: ☐Hand Deliver ☐UPS Ground ☐UPS Next Day Air ☐USPS Mail ☐ Other:

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

File name: S:\Jobs\8233\15-BLA mult-properties\Admin\Correspondence\Transmittals\W08233-15Transmittal Form 09-13-10 (2).doc
Form Rev. 7/02

AES
CONSULTING ENGINEERS

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

September 13, 2010

Scott J. Thomas, P.E.
Director
James City County Environmental Division
101-E Mounts Bay Road
Williamsburg, Virginia 23187

Environmental Division
SEP 13 2010
RECEIVED

RE: Massie Corporation Property
Master Stormwater Management Plan Amendment and
Natural Open Space Allocations
Division Plan No. SWM-01-10
AES Project Number W08233-15

Dear Messes. Thomas and Woolson:

For the administration of the Massie Corporation and AES Consulting Engineers, I sincerely appreciate the responsiveness and cooperation that has been shared to date on this particular item of interest as referenced above.

With regard to the Stormwater Master Plan for the Massie Properties, we are presenting an amended Stormwater Masterplan. The purpose of the amended plan is to allocate an natural open space easement area to developed parcels (identified as Parcels A, B and C) with a sufficient natural open space easement area to maintain Best Management Practice credits of 10 points or greater for each developed parcel.

This stormwater masterplan amendment and natural open space allocation is prepared for the knowledge that the developed parcels areas are being adjusted, and the adjusted parcels are being conveyed to various owners.

It should be noted that there is neither increase nor decrease in the natural open space easement area.

I thank you for the past and continued participation on this item. Please feel confident that I am available to you to discuss this item further.

Sincerely,
For AES Consulting Engineers

V. Marc Bennett, P.E.
Senior Project Manager

S:\Jobs\8233\15-BLA mult-properties\Admin\Correspondence\Letters\w08233-15 NOE easement letter 09-13-10.doc

Scott Thomas

From: Christopher Johnson
Sent: Tuesday, September 14, 2010 11:00 AM
To: Scott Thomas; Mike Woolson
Subject: RE: Massie Properties

I don't see anything related to this project on Case Track as of this morning. I'll let you know when it arrives.

From: Scott Thomas
Sent: Tuesday, September 14, 2010 10:34 AM
To: Mike Woolson; Christopher Johnson
Subject: RE: Massie Properties

I kept the SWMP here, instructed the front desk that the plat needed to go to Planning to get logged in. They should have sent it over yesterday.

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

Visit:
www. jccegov.com
www. protectedwithpride.org

From: Mike Woolson
Sent: Monday, September 13, 2010 3:11 PM
To: 'Bennett, Marc'; Christopher Johnson; Scott Thomas
Cc: Gary Massie
Subject: RE: Massie Properties

Marc,

Can I assume that you are working with Adam on the Deed? We will need that as well for recordation.

Mike

From: Bennett, Marc [mailto:marc.bennett@aesva.com]
Sent: Monday, September 13, 2010 2:11 PM
To: Christopher Johnson; Mike Woolson; Scott Thomas
Cc: Gary Massie
Subject: Massie Properties

Gentlemen,
I will be forwarding the following documents to your attention today:

To Chris Johnson:
Formal Subdivision Application
Application fee of $225.00
Twelve copies of the plat of boundary line adjustment and Natural Open Space Allocation

Scott Thomas

From: Christopher Johnson
Sent: Friday, September 10, 2010 11:03 AM
To: Steven Hicks; Robert Middaugh
Cc: Allen Murphy; Scott Thomas; Keith Taylor
Subject: RE: CONF. - Massie & Luck Needs Prior to 9/30/10 Sales Closing

I spoke to Marc Bennett this morning and expect the boundary line adjustment plat to be submitted by early next week. I don't anticipate any problems meeting the deadline for our portion of this project.

From: Steven Hicks
Sent: Friday, September 10, 2010 9:56 AM
To: Robert Middaugh
Cc: Allen Murphy; Christopher Johnson; Scott Thomas; Keith Taylor
Subject: RE: CONF. - Massie & Luck Needs Prior to 9/30/10 Sales Closing

No. I will ask staff to expedite this review/approval.

Chris/Scott - Please make this happen to meet the Sept 30th date. Please coordinate with Marc Bennett today to understand their schedule.

Thanks,
-Steven

From: Robert Middaugh
Sent: Thursday, September 09, 2010 5:56 PM
To: Steven Hicks
Subject: FW: CONF. - Massie & Luck Needs Prior to 9/30/10 Sales Closing
Importance: High

Any problems with this?

Robert C. Middaugh
County Administrator
101-C Mounts Bay Road, PO 8784
Williamsburg, Virginia 23187-8784
Phone (757) 253-6603
Fax (757) 253-6833
E-mail: rmiddaugh@james-city.va.us

From: Keith Taylor
Sent: Thursday, September 09, 2010 3:36 PM
To: Steven Hicks
Cc: Robert Middaugh; Doug Powell; Steven Yavorsky; Carla Brittle

Subject: CONF. - Massie & Luck Needs Prior to 9/30/10 Sales Closing
Importance: High

Steven –

The attached letter to me lists the three administrative things with which the Massie / Luck deal needs facilitated Staff assistance in order to close the transaction by September 30. Anything you and your folks can do to make this happen will be greatly appreciated.

Thanks in advance,
Keith

Scott Thomas

From: Scott Thomas
Sent: Friday, September 10, 2010 10:26 AM
To: 'Bennett, Marc'
Cc: Mike Woolson; Christopher Johnson
Subject: Massie Corp. Property, Master Stormwater Management Plan

As discussed this morning, I am reviewing the revised master stormwater management plan (MSWMP) for the site. The previously approved plan was under Division No. SWM-02-05 approved on July 10, 2007. The submittal received around September 2, 2010 is assigned a Division Plan No. SWM-01-10 and is for reallocation of 10-points among Parcels A, B and C.

We have two comments:

1. Add information to the revision block to reflect date and purpose of amended MSWMP.
2. Show the approximate RPA line between the Bryant Parcel and Parcel C. This was on the previously approved MSWP.

Please submit to revised drawing to me and I will issue a letter approving the revised MSWMP similar to that from July 10, 2007.

(Note: This is not for plat, boundary line adjustment or conservation easement review. It is a master stormwater management plan for 10-point water quality compliance.)

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

Visit:
www. jccegov.com
www. protectedwithpride.org

Scott Thomas

From: Robert Middaugh
Sent: Friday, September 10, 2010 3:29 PM
To: Steven Hicks
Cc: Allen Murphy; Christopher Johnson; Scott Thomas; Keith Taylor
Subject: RE: CONF. - Massie & Luck Needs Prior to 9/30/10 Sales Closing

Thank you Steven. I concur with and appreciate the effort.

Robert C. Middaugh
County Administrator
101-C Mounts Bay Road, PO 8784
Williamsburg, Virginia 23187-8784
Phone (757) 253-6603
Fax (757) 253-6833
E-mail: rmiddaugh@james-city.va.us

From: Steven Hicks
Sent: Friday, September 10, 2010 9:56 AM
To: Robert Middaugh
Cc: Allen Murphy; Christopher Johnson; Scott Thomas; Keith Taylor
Subject: RE: CONF. - Massie & Luck Needs Prior to 9/30/10 Sales Closing

No. I will ask staff to expedite this review/approval.

Chris/Scott - Please make this happen to meet the Sept 30th date. Please coordinate with Marc Bennett today to understand their schedule.

Thanks,
-Steven

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To: Steven Hicks
Subject: FW: CONF. - Massie & Luck Needs Prior to 9/30/10 Sales Closing
Importance: High

Any problems with this?

Robert C. Middaugh
County Administrator
101-C Mounts Bay Road, PO 8784
Williamsburg, Virginia 23187-8784
Phone (757) 253-6603
Fax (757) 253-6833
E-mail: rmiddaugh@james-city.va.us

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Sent: Thursday, September 09, 2010 3:36 PM
To: Steven Hicks
Cc: Robert Middaugh; Doug Powell; Steven Yavorsky; Carla Brittle
Subject: CONF. - Massie & Luck Needs Prior to 9/30/10 Sales Closing
Importance: High

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Thanks in advance,
Keith

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Sent: Friday, September 10, 2010 9:56 AM
To: Robert Middaugh
Cc: Allen Murphy; Christopher Johnson; Scott Thomas; Keith Taylor
Subject: RE: CONF. - Massie & Luck Needs Prior to 9/30/10 Sales Closing
Attachments: MassieLuckstone.pdf

No. I will ask staff to expedite this review/approval.

Chris/Scott - Please make this happen to meet the Sept 30th date. Please coordinate with Marc Bennett today to understand their schedule.

Thanks,
-Steven

From: Robert Middaugh
Sent: Thursday, September 09, 2010 5:56 PM
To: Steven Hicks
Subject: FW: CONF. - Massie & Luck Needs Prior to 9/30/10 Sales Closing
Importance: High

Any problems with this?

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Williamsburg, Virginia 23187-8784
Phone (757) 253-6603
Fax (757) 253-6833
E-mail: rmiddaugh@james-city.va.us

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Sent: Thursday, September 09, 2010 3:36 PM
To: Steven Hicks
Cc: Robert Middaugh; Doug Powell; Steven Yavorsky; Carla Brittle
Subject: CONF. - Massie & Luck Needs Prior to 9/30/10 Sales Closing
Importance: High

Steven –

The attached letter to me lists the three administrative things with which the Massie / Luck deal needs facilitated Staff assistance in order to close the transaction by September 30. Anything you and your folks can do to make this happen will be greatly appreciated.

JACK L. MASSIE
CONTRACTOR, INC.

Road & Site Construction
Since 1947
3900 Cokes Lane
Williamsburg, VA 23188-7010
(757) 566-8643
FAX (757) 566-8566

September 9, 2010

James City County Office of Economic Development
Keith Taylor, Director
5308 Discovery Park Boulevard, Suite 203 P.O. Box 8784
Williamsburg, VA 23187-8784
(757) 253-6607 * (757) 565-2208 (fax) Email: econdev@james-city.va.us

Reference: Jack L. Massie Contractor, Inc. Stone Distribution Center Sale to Luck Stone Corporation

Dear Keith:

We are happy to announce that effective September 30, 2010 Luck Stone Corporation will succeed Jack L. Massie Contractor, Inc as the operator of our stone facility at 3920 Cokes Lane. We are delighted that we could bring this value based, family owned aggregate producer to James City County. The Luck family and their business will improve service to our stone customers and make a contribution the community.

Jack L. Massie Contractor will retain the construction business on the property and continue to serve our existing construction customers with safe, high quality projects that deliver value to their owners. In addition, Jack L. Massie Contractor will continue to operate our Mineral Resource Facility at 5701 Centerville Road providing quality fill material, topsoil, and inert material disposal to our customers.

Attached for distribution is a copy of the media statement released today. Please share it with county staff and officials.

In order to complete the transaction by September 30 there are three items we are requesting expedited review by James City County:

1) Boundary Line Adjustment for Tax Map parcel (13-3) (1-4) this creates the 9 acre retained parcel that serves our construction business. Marc Bennett at AES has been talking with Chris Johnson in Planning.

2) Natural Open Space Easement revision, designating the existing easement to the various parcels. Marc Bennett with AES has been talking with Mike Woolson in environmental.

3) Close out of Land Disturbance Permit # 89-61 and the associated bond. Marc Bennett has been talking with Michael Majdeski in environmental and is preparing the necessary as-built and construction certifications to complete this task.

These three tasks are critical to the September 30 real estate closing and succession by Luck Stone Corporation as the aggregate distribution operator at our location. Marc Bennett is prepared to respond quickly and accurately to their needs for any additional information. We request your assistance in expediting these reviews.

Jack L. Massie Contractor, Inc. and Luck Stone have a relationship that extends over the past fifty years. The Luck family and Massie family share common values and want the best for our stone customers and the community. Luck has a strong heritage of involvement in the community. We are proud to bring the Luck family business values to the community and look forward to introducing their personnel to James City County staff, board, community leaders, and non-profit organizations within our community.

Please join the entire Massie family and staff in welcoming Luck Stone Corporation to James City County.

Jack L. Massie Contractor, Inc.
Sincerely,

Gary M. Massie
President
Cc. Marc Bennett via e-mail

VTCA

99124_MASSIE_YARD_RICHMOND_ROAD - 077

COPY TO AB FILE

COPY PREVIOUS REVIEWS & APPROVAL

DEVELOPMENT MANAGEMENT

101-E MOUNTS BAY ROAD, P.O. BOX 8784, WILLIAMSBURG, VIRGINIA 23187-8784
(757) 253-6671
E-MAIL: devtman@james-city.va.us
FAX: (757) 259-4032

ENVIRONMENTAL DIVISION
(757) 253-6670
ENVIRON@JAMES-CITY.VA.US

PLANNING
(757) 253-6685
PLANNING@JAMES-CITY.VA.US

COUNTY ENGINEER
(757) 253-6678

MOSQUITO CONTROL
(757) 259-4116

July 10, 2007

Mr. Richard Smith
AES Consulting Engineers
5248 Olde Towne Road, Suite 1
Williamsburg, Va. 23188

SEE APPROVED PLAT IN MASSIE MSWMP FILE. & DEED OF EASEMENT

Re: Master Stormwater Management Plan
Massie Corporation Property (3920 Cokes Lane)
Division Plan No. SWM-02-05

Dear Mr. Smith:

The Environmental Division has reviewed the latest Master Stormwater Management Plan (MSWMP) submittal as provided for the above referenced project. The MSWMP includes a single 1" = 200 ft. scale overall plan which shows the project site (73.30 acres) as well as the location of three structural BMPs and dedicated natural open space (21.41 acres). Total BMP points for the site based on the master stormwater management plan arrangement is 10.6 points.

Based on our review of this master stormwater management plan submittal, the Master Stormwater Management Plan (MSWMP) is hereby **approved**. There are no further conditions attached to this approval beyond those listed on the MSWMP exhibit (plan) sheet.

Please note that approval of this revised MSWMP in no way implies final approval of any site or subdivision plan as required by the Chapter 24 Zoning or Chapter 19 Subdivisions of the County Code; nor, does it constitute final approval of an erosion and sediment control or stormwater management plan as required by the Chapter 8 Erosion and Sediment Control and Chapter 23 Chesapeake Bay Preservation ordinances.

Thank you for your time and effort associated with preparing this master stormwater management plan. If you have any additional questions or comments, contact me at 757-253-6639 or Mike Woolson at 757-253-6823.

Sincerely,

Scott J. Thomas, P.E.
Director
Environmental Division

SJT/sjt
PlanReview\2005\SWM-002-05.approval

COPY TO AB FILE

DEVELOPMENT MANAGEMENT

101-E MOUNTS BAY ROAD, P.O. BOX 8784, WILLIAMSBURG, VIRGINIA 23187-8784
(757) 253-6671
E-MAIL: devtman@james-city.va.us
FAX: (757) 259-4032

ENVIRONMENTAL DIVISION (757) 253-6670 ENVIRON@JAMES-CITY.VA.US
PLANNING (757) 253-6685 PLANNING@JAMES-CITY.VA.US
COUNTY ENGINEER (757) 253-6678
MOSQUITO CONTROL (757) 259-4116

July 10, 2007

Mr. Richard Smith
AES Consulting Engineers
5248 Olde Towne Road, Suite 1
Williamsburg, Va. 23188

SEE APPROVED PLAT IN MASSIE MSWMP FILE. & DEED OF EASEMENT

Re: Master Stormwater Management Plan
Massie Corporation Property (3920 Cokes Lane)
Division Plan No. SWM-02-05

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Sincerely,

Scott J. Thomas

Scott J. Thomas, P.E.
Director
Environmental Division

SJT/sjt
PlanReview\2005\SWM-002-05.approval

Arch Marston, Howard Price, Chris Basic
AES Consulting Engineers

Attached are advance County Environmental Division comments for the *PLAN OF DEVELOPMENT* for Titan Concrete, County Plan No. SP-122-05. **This is a DRC case**. I have also attached related comments for the master stormwater management plan for the Massie Corporation property. Please call me at 757-253-6639 or Barry Moses at 757-253-6683 if you have any questions on the Environmental Division comments.

(Note: Comments are in MS Word format. Will also forward a hard copy fax.)

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

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

TRANSMITTAL

DATE: 3-20-89

TO: CODE COMPLIANCE, Darryl Cook

FROM: Mike Freda, Planner

SUBJECT: Case Number SP-5-89

Title Jack Massie Contractors Equipment Storage Yard

ITEMS ATTACHED:

Revised site plan
Runoff analysis

INSTRUCTIONS:

Please review and comment, or initial if approved.

Return required by 3-27-89

AGENCY'S COMMENTS:

1. The first inch of runoff from the gravel surfaces (new) must be either retained or infiltrated in accordance with Sec. 20-534 of the Zoning Ordinance. The Runoff Analysis must be revised to include these runoff control measures.
2. Submit drainage calculations to verify the adequacy of all existing and proposed storm drain systems. If drainage systems are not adequate, stormwater management will be required.

RECEIVED 5-12-89

TRANSMITTAL

DATE: 5-11-89

TO: CODE COMPLIANCE, Darryl Cook
VDOT
REAL ESTATE ASSESSMENTS*

FIRE
HEALTH
JCSA

FROM: Mike Freda, Planner

SUBJECT: Case Number SP-5-89

Title Jack Massie Contractors Equipment Storage Yard

ITEMS ATTACHED:

Approved site plan for your files
*Case file

INSTRUCTIONS:

*Forward case file to Records Management when through

Return required by 5-18-89

AGENCY'S COMMENTS:

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

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

LETTER OF TRANSMITTAL

DATE	JOB NO.
8-11-05	9573-01

ATTENTION: MR. SCOTT THOMAS

RE: MASSIE COMMERCIAL SITE - INFILTRATION TRENCH FILE

TO: JCC, ENV. DIV.

RECEIVED
AUG 11 2005
ENVIRONMENTAL DIVISION

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☒ L & M DESIGN FILE

COPIES	DATE	NO.	DESCRIPTION

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval

☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution

☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints

☐ For review and comment ☒ RETURNED FILE FOR EX. INFILTRATION TRENCH

☐ FOR BIDS DUE _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS

COPY TO FILE SIGNED: [signature]

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

7/26/93

SP-5-89

- Imp Area covered by Infil Trench - 98,400 SF
  = 2.26 ac
- 160' x 22' x 6'

T R A N S M I T T A L

RECEIVED

DATE: 3-22-90

TO: CODE COMPLIANCE, Darryl Cook
REAL ESTATE ASSESSMENTS*
JCSA

FIRE
HEALTH

FROM: Pat Friel, Planner

SUBJECT: **Case Number** SP-2-90

Title Massie Equipment Storage Yard (amendment)

ITEMS ATTACHED:

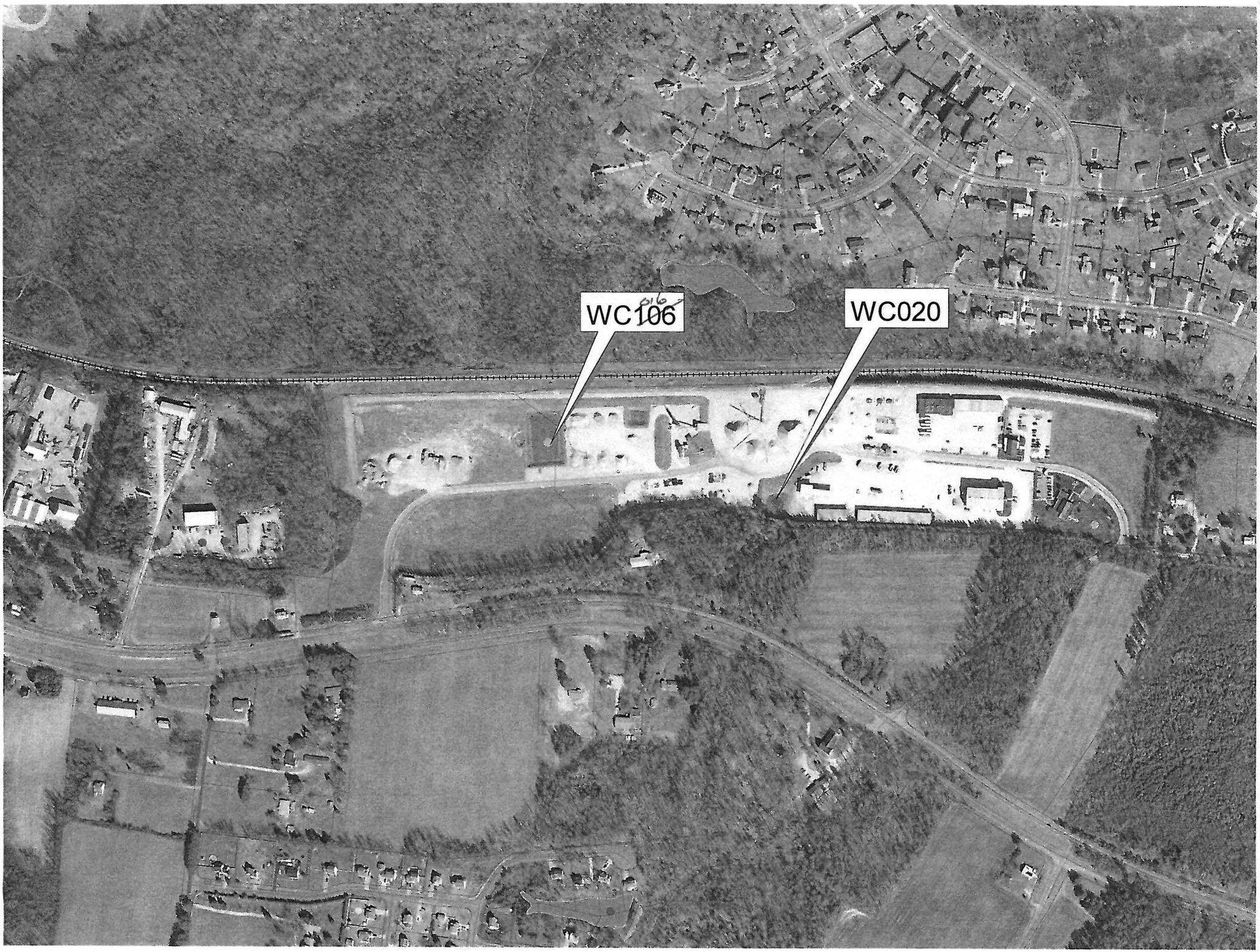
Site plan for your files
*Case file

INSTRUCTIONS:

*Forward case file to Records Management

Return required by *3-30-90

AGENCY'S COMMENTS:



99124_MASSIE_YARD_RICHMOND_ROAD - 086

BEM/SJT

ENVIRONMENTAL DIVISION REVIEW COMMENTS
MASTER STORMWATER MANAGEMENT PLAN EXHIBIT
MASSIE CORPORATION PROPERTY
SWM – 02 - 05
October 21, 2005

(These comments pertain to the 1 inch = 200 ft. scale master stormwater management plan dated September 19, 2005 and supporting information including a BMP worksheet. The master stormwater management plan covers an area of approximately 53 acres situated to the south of the CSX railroad and natural open space area approximately 20 acres in size situated to the north of the railroad adjacent to Mirror Lakes. For simplicity purposes, the master stormwater management plan will be referred to as the MSWMP.)

General Comments:

1. Instead of "Impervious Cover", label Sheet 8 as a master stormwater management plan exhibit.

2. Include this exhibit with all future plan of development submissions associated with these subject land tracts.

3. Provide a note that this site is situated in the Ware Creek watershed of the County.

4. Label the 10-point wet pond as County BMP ID Code WC 016 and the 4-point dry pond as County BMP ID Code WC020.

5. Show the approximate drainage divides (areas) to each primary BMP.

6. The site area in the BMP worksheet conflicts with the site area shown on the site calculations at the top of the sheet. One shows 52.48 acres, the other shows 52.98 acres.

7. In the legend, indicate that Natural Open Space within an RPA buffer is based on the 0.10 points per 1 percent site area method and that the other Natural Open Space Easement (hatched) area is per the 0.15 points per 1 percent site area method. The legend should be consistent with that shown in the natural open space credit portion of the BMP worksheet and the hatch pattern shown on the plan sheet.

8. The area shown near Lot 20 of Mirror Lakes, which is labeled as a 50 ft. ingress and egress easement and 10 ft. drainage and utility easement <u>cannot</u> receive natural open space credit. Based on hatch patterns shown in the legend, it appears that 0.15 points per 1 percent credit was taken for this area. Correct on the plan drawing and subtract this area out of the BMP worksheet. *(Note: By rough approximation, it still appears the site achieves the required 10 BMP points. Instead of 10.37 points it appears the site will achieve about 10.16 points.)*

9. The note in the bottom right hand corner of the plan sheet needs to indicate that actual RPA buffer locations will be based upon perennial stream and wetland delineations in accordance with Section 23-10 of the Chesapeake Bay Preservation ordinance.

10. Wet Pond. Based on available records, it appears the wet pond BMP (WC 016) was either originally designed or subsequently upgraded at some point to be an 8-point BMP per Design Type 6 criteria (2.5V). This would roughly equate to a treatment volume of 1.25 inches per impervious acre. The MSWMP as presented now is considering this BMP to be a 10-point facility, which would have a treatment volume of 2 inches per impervious acre. In order to qualify as a 10-point facility, which is a County type A-3 BMP, the basin must have several distinct features which provides it with better pollutant removal efficiency. These include, but are not limited to: a design which achieves the County's current stream channel protection requirements; a wet pool with a treatment volume of 1 inch per impervious acre, an extended detention pool with a treatment volume of 1 inch per impervious acre, pretreatment sediment forebays, aquatic and safety benches, a pond buffer/setback and an emergency spillway. Based on the location of the BMP as compared to the existing site use, some of these upgrades are not realistic, especially due to the adjacent industrial-type uses. However some are. In order to receive credit as a 10-point BMP rather than the 8-points that were previously assigned, the following needs to be considered for upgrade:

- Compliance with the County's current stream channel protection criteria.
- Water quality treatment for a total of 2 inches per impervious acre, split between the permanent pool and extended detention dry pool or any combination of the two (ie. meaning all 2-inches could be in the permanent pool)
- Forebays for each primary inflow (pipe or channel) into the basin, or at a minimum, permanent baffle walls to prevent short-circuiting.

11. Dry Pond. The dry pond 4-point BMP (WC 020) as listed in the master plan should be evaluated for the potential for adding a pretreatment sediment forebay at the primary inflow location and for modifying the low-flow orifice and basin volume to meet the County's current stream channel protection criteria. If there are realistic reasons (ie. space, conflict, etc.) for not doing so, then a sufficient reason should be given in response to this comment.

12. As new plans of developments are submitted for review on undeveloped portions of the Massie tract (52 acres +/-), those subject stormwater management and drainage plans will be subject to the provisions of Section 23-9(b)(8) of the Chesapeake Bay Preservation ordinance. It will need to be demonstrated at that time that the existing BMP (per this MSWMP) for which those project(s) are draining to are in good working order and performing at the design level of service. This is especially important as it pertains to the existing outfall pipe system from those BMP to the natural receiving natural channels. Even though the basin will be utilized for temporary sediment basin and final BMP purposes, the outfall system must be structurally sound and operational.

13. Maintenance Plans. Provide a maintenance plan for both the wet pond (WC 016) and the dry pond (WC 020) stormwater management/BMP facilities. Section 23-10(4)(b) of the Chesapeake Bay Preservation Ordinance requires stormwater management plans to include a long-term schedule for inspection and maintenance of stormwater management/BMP facilities.

14. If not already done so, provide a conservation easement plat for all Natural Open Space areas as claimed in the BMP worksheet.

15. Confirm if both the wet and dry pond BMP are covered under an existing Declaration of Covenants, Inspection and Maintenance Agreement. Our Division was able to find copy of one I/M agreement, referenced in Deed Book 434, page 347 dated May 4, 1989.

16. Provide our office with asbuilt drawings for both facilities if these items are available. Currently, our Division has very limited information on the final constructed and existing condition of the wet and dry pond BMP. This information will only be used for record and file purposes and will not be reviewed for consistency to previously approved plans.

17. If the BMP on the north side of the railroad tracks is incorporated at a future date, the MSWMP may need to be reviewed again for consistency purposes and construction of the basin may need to follow then current County criteria.

MEDIA STATEMENT

FOR RELEASE: September 9, 2010 Contact: Linda Tissiere, (804) 640-8975

Luck Stone Corporation & Jack L. Massie Contractor Sign Purchase Agreement – Sale Expected to Close on September 30, 2010

RICHMOND, Va. – September 9, 2010: Luck Stone Corporation, headquartered in Richmond, VA, has entered into an agreement to purchase the Jack L. Massie Aggregate Distribution Center located on Cokes Lane in Williamsburg, VA. The Massie family is retaining the Construction business on the property and will also retain the more than 100 employees that work on the non-aggregate side of the business. Luck Stone will interview the employees who work on the aggregate side to determine if they will work for Luck Stone or remain with Massie.

"This acquisition adds significant capacity to our market presence on the peninsula and is a great compliment to our two other distribution yards in the South Hampton Roads region," said John Pullen, Chief Growth Officer for Luck Stone Corporation and President of the construction aggregates division.

Massie wants to concentrate on their core business of construction while providing their aggregate customers with additional resources. "We recognize the value that Luck Stone can add to our aggregate customer base and are responding to our stone customers needs in the market," said Gary Massie, President of Jack L. Massie Contractor. He added, "With more than 85 years in the aggregate business, Luck Stone has the ability to provide a greater variety of products, expertise, and quality management."

Jack L. Massie Contractor was founded in 1947 and is a privately held, family-run corporation. In business for 63 years, the company is currently led by the founder's two sons, Steve Massie, CEO and Gary Massie, President. In addition to its construction business, Massie will also continue to operate its Mineral Resource Facility on Centerville Road and furnish their customers with topsoil, screened soil, and fill material.

Luck Stone Corporation is one of the largest private, family-owned and operated aggregates suppliers in the U.S. Headquartered in Richmond, Virginia, it operates 17 crushed stone, sand & gravel, and aggregate distribution yards in Virginia and North Carolina. Luck Stone also has three other business divisions in the mid-Atlantic, including the Charles Luck Stone Center which operates six stone centers in three states and provides distinctive stone products for style-minded customers; Luck Development Partners (LDP), the company's real estate development group that strives to create opportunities for people to connect with nature, history and each other, and Lee Tennis Court Products, maker of HAR-TRU, the world's most popular type of clay tennis court and a leading supplier of court accessories.

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ENVIRONMENTAL DIVISION REVIEW COMMENTS
MASTER STORMWATER MANAGEMENT PLAN EXHIBIT
MASSIE CORPORATION PROPERTY
SWM – 02 - 05
October 21, 2005

(These comments pertain to the 1 inch = 200 ft. scale master stormwater management plan dated September 19, 2005 and supporting information including a BMP worksheet. The master stormwater management plan covers an area of approximately 53 acres situated to the south of the CSX railroad and natural open space area approximately 20 acres in size situated to the north of the railroad adjacent to Mirror Lakes. For simplicity purposes, the master stormwater management plan will be referred to as the MSWMP.)

General Comments:

1. Instead of "Impervious Cover", label Sheet 8 as a master stormwater management plan exhibit.

2. Include this exhibit with all future plan of development submissions associated with these subject land tracts.

3. Provide a note that this site is situated in the Ware Creek watershed of the County.

4. Label the 10-point wet pond as County BMP ID Code WC 016 and the 4-point dry pond as County BMP ID Code WC020.

5. Show the approximate drainage divides (areas) to each primary BMP.

6. The site area in the BMP worksheet conflicts with the site area shown on the site calculations at the top of the sheet. One shows 52.48 acres, the other shows 52.98 acres.

7. In the legend, indicate that Natural Open Space within an RPA buffer is based on the 0.10 points per 1 percent site area method and that the other Natural Open Space Easement (hatched) area is per the 0.15 points per 1 percent site area method. The legend should be consistent with that shown in the natural open space credit portion of the BMP worksheet and the hatch pattern shown on the plan sheet.

8. The area shown near Lot 20 of Mirror Lakes, which is labeled as a 50 ft. ingress and egress easement and 10 ft. drainage and utility easement <u>cannot</u> receive natural open space credit. Based on hatch patterns shown in the legend, it appears that 0.15 points per 1 percent credit was taken for this area. Correct on the plan drawing and subtract this area out of the BMP worksheet. *(Note: By rough approximation, it still appears the site achieves the required 10 BMP points. Instead of 10.37 points it appears the site will achieve about 10.16 points.)*

9. The note in the bottom right hand corner of the plan sheet needs to indicate that actual RPA buffer locations will be based upon perennial stream and wetland delineations in accordance with Section 23-10 of the Chesapeake Bay Preservation ordinance.

10. Wet Pond. Based on available records, it appears the wet pond BMP (WC 016) was either originally designed or subsequently upgraded at some point to be an 8-point BMP per Design Type 6 criteria (2.5V). This would roughly equate to a treatment volume of 1.25 inches per impervious acre. The MSWMP as presented now is considering this BMP to be a 10-point facility, which would have a treatment volume of 2 inches per impervious acre. In order to qualify as a 10-point facility, which is a County type A-3 BMP, the basin must have several distinct features which provides it with better pollutant removal efficiency. These include, but are not limited to: a design which achieves the County's current stream channel protection requirements; a wet pool with a treatment volume of 1 inch per impervious acre, an extended detention pool with a treatment volume of 1 inch per impervious acre, pretreatment sediment forebays, aquatic and safety benches, a pond buffer/setback and an emergency spillway. Based on the location of the BMP as compared to the existing site use, some of these upgrades are not realistic, especially due to the adjacent industrial-type uses. However some are. In order to receive credit as a 10-point BMP rather than the 8-points that were previously assigned, the following needs to be considered for upgrade:

- Compliance with the County's current stream channel protection criteria.
- Water quality treatment for a total of 2 inches per impervious acre, split between the permanent pool and extended detention dry pool or any combination of the two (ie. meaning all 2-inches could be in the permanent pool)
- Forebays for each primary inflow (pipe or channel) into the basin, or at a minimum, permanent baffle walls to prevent short-circuiting.

11. Dry Pond. The dry pond 4-point BMP (WC 020) as listed in the master plan should be evaluated for the potential for adding a pretreatment sediment forebay at the primary inflow location and for modifying the low-flow orifice and basin volume to meet the County's current stream channel protection criteria. If there are realistic reasons (ie. space, conflict, etc.) for not doing so, then a sufficient reason should be given in response to this comment.

12. As new plans of developments are submitted for review on undeveloped portions of the Massie tract (52 acres +/-), those subject stormwater management and drainage plans will be subject to the provisions of Section 23-9(b)(8) of the Chesapeake Bay Preservation ordinance. It will need to be demonstrated at that time that the existing BMP (per this MSWMP) for which those project(s) are draining to are in good working order and performing at the design level of service. This is especially important as it pertains to the existing outfall pipe system from those BMP to the natural receiving natural channels. Even though the basin will be utilized for temporary sediment basin and final BMP purposes, the outfall system must be structurally sound and operational.

13. Maintenance Plans. Provide a maintenance plan for both the wet pond (WC 016) and the dry pond (WC 020) stormwater management/BMP facilities. Section 23-10(4)(b) of the Chesapeake Bay Preservation Ordinance requires stormwater management plans to include a long-term schedule for inspection and maintenance of stormwater management/BMP facilities.

14. If not already done so, provide a conservation easement plat for all Natural Open Space areas as claimed in the BMP worksheet.

15. Confirm if both the wet and dry pond BMP are covered under an existing Declaration of Covenants, Inspection and Maintenance Agreement. Our Division was able to find copy of one I/M agreement, referenced in Deed Book 434, page 347 dated May 4, 1989.

16. Provide our office with asbuilt drawings for both facilities if these items are available. Currently, our Division has very limited information on the final constructed and existing condition of the wet and dry pond BMP. This information will only be used for record and file purposes and will not be reviewed for consistency to previously approved plans.

17. If the BMP on the north side of the railroad tracks is incorporated at a future date, the MSWMP may need to be reviewed again for consistency purposes and construction of the basin may need to follow then current County criteria.

ENVIRONMENTAL DIVISION REVIEW COMMENTS
MASTER STORMWATER MANAGEMENT PLAN EXHIBIT
MASSIE CORPORATION PROPERTY
DIVISION PLAN NO. SWM – 02 - 05
April 12, 2006

General Comments:

1. Pursuant to our discussions during the review and approval of the Titan Concrete plan (SP-122-05) and the Massie Material Storage Yard plan (SP-135-05) and as acknowledged by the plan preparer in the first paragraph of the master stormwater management plan response letter dated February 8th 2006, an approval condition on the master stormwater management plan will be to repair the existing scour area at the outfall end of the existing wet pond WC 016 along the north side of the railroad tracks. The scour area will be repaired with outlet protection meeting the requirements of Minimum Standard & Spec. 3.18 and 3.19 of the VESCH using Class I riprap, minimum 18-inches deep and embedded over filter fabric. Once subsequent comments are addressed (below), an approval letter will be issued by our Division with the above related condition.

2. Remove reference to "Developer: Titan Virginia Ready Mix LLC" on the title block of the master stormwater management plan exhibit. This is an exhibit for the overall Massie Property and should not be referenced to any specific outparcel or leased area.

3. The limits of dry pond WC 020 should be better identified with line work on the plan sheet. Also sheet hatching patterns show this BMP as green space.

4. The drainage divides to each site BMP were not shown as requested in previous comment # 5.

5. On the exhibit drawing, move the BMP drainage area, BMP points, fraction of site served and BMP points values as shown in the BMP worksheet to the row for the 4-point dry pond (WC 020) BMP. Currently these values are shown with the 10-point BMP in the worksheet.

6. Response to previous comment # 11 is noted (ie. dry pond upgrade). Provide a general note in the bottom left hand corner of the exhibit drawing to indicate that the 4-point dry pond (WC 020) may be subject to further enhancements, improvements or upgrades as a dry pond BMP as development plans are presented within it's respective drainage area.

7. The response to previous comment # 12 is noted; however, there appears to be some confusion. As it pertains to the maintenance program, there are two necessary items. One, of course, is the inspection/maintenance agreement (Declaration of Covenants). If this is not in place to cover all BMPs on the site then a representative of Massie needs to complete these forms. Contact Joan Etchberger with our Division (757-253-6670) to work out this item. *(Note: Our records indicate a declaration of covenants dated May, 4 1989 as recorded by Deed Book 434, Page 347 for 3910 Cokes Lane. However, it is unclear if this covers all the BMPs on the parcel.).* The second is an actual working maintenance plan, specific to the wet and dry pond to give direction on frequency and routine/non-routine items to be performed by the owner at the BMPs. Specific to previous comment # 12, this is what was asked for. Provide a maintenance plan for the wet and dry pond BMP in narrative format. This can be added to the exhibit drawing or provided as a separate

attachment. *(Note: A base template narrative is available from our Division, in electronic format, to use as a start in developing the maintenance plans. The maintenance plan would show items such as when the facility needs to be inspected, when trash/debris is to be removed, when sediment needs to be cleaned out, etc.)*

8. Provide evidence that a conservation easement plat was dedicated; or provide a conservation easement plat for all Natural Open Space areas as claimed in the BMP worksheet (19.82 acres).

9. Provide any available asbuilt information for the dry pond BMP WC 020 for our record files. Although not part of the Titan site plan, it is part of the overall stormwater management master plan.

ENVIRONMENTAL DIVISION REVIEW COMMENTS
MASTER STORMWATER MANAGEMENT PLAN EXHIBIT
MASSIE CORPORATION PROPERTY
DIVISION PLAN NO. SWM – 02 - 05
March 19, 2007

General Comments:

1. Provide a leader from text to the map feature for Dry Pond WC020 on the Master Stormwater Management Plan Exhibit.

2. The first part of previous comment # 7 was not addressed. Although a maintenance plan for the BMPs was shown on the Master Stormwater Management Plan exhibit, our Division has no record of a Declaration of Covenants, Inspection/Maintenance Agreement being filed for all of the Massie Corporation Property.

3. Conservation Easement. The following comments pertain to natural open space, conservation easement and/or the natural open space easement plat (Sheet 1 of 1, revised 1/15/07) as provided with this submittal.

   3a. Provide a standard JCC Conservation Deed of Easement in conformance with the County template. A sample copy is attached or you can visit the following County website link: http://www.jccegov.com/pdf/planning/conservation/OPNSPACEDED6.pdf

   3b. In order to receive BMP point credit for the 21.41 acres of natural open space indicated in the BMP worksheet, the conservation easement plat must be recorded.

   3c. The four natural open space areas (# 1, # 2, # 3 and # 4) as indicated on the natural open space easement plat must be placed within an acceptable conservation easement dedicated to James City County or some other similar entity (Nature Conservancy) as an enforceable instrument that ensures perpetual protection. See page 56 of the County BMP manual.

   3d. The general note provided on the "Plat of Natural Open Space Easements Located on the Property Owned By: Jack L. Massie Contractor, Inc. and JSG Corporation", Revision No. 2 dated 1/15/07 must be revised. First, the note must reflect that County review and approval is necessary for any modification to the conservation easement plat. Second, remove language that states "in effect as of the date of recordation of this deed of easement for natural open space after considering the development served by the easement property on the date of recordation of this deed of easement for natural open space or such other lesser development so served as of the date of such movement, modification, reconfiguration or change." *(Note: If put in conservation easement to James City County, encroachments may require review and approval by the County Environmental Division, County Engineer and/or action by the Board of Supervisors.)*

4. Signs. At the time the northern part of the land tract is considered for development, a plan of development will be necessary. At that time, signs indicating conservation easement, natural open spaces and/or RPA buffer limits may be required.

EXEMPT FROM RECORDATION TAX UNDER VIRGINIA CODE SECTION 58.1-811(A) (3), AS AMENDED

DEED OF EASEMENT FOR NATURAL OPEN SPACE

THIS DEED OF EASEMENT, made this ___ day of _____, _____, by and between_____ and its/his/her/their heirs, successors and assigns ("Grantor") and the County of James City, Virginia ("Grantee").

WHEREAS, the Grantor is the owner of certain property known as _____, consisting of a tract of land containing _____ acres, more or less, more particularly described herein ("Property");

WHEREAS, Grantee has adopted the Chesapeake Bay Preservation Ordinance, Chapter 23 of the James City County Code, as required by Chapter 21 of Title 10.1 of the Code of Virginia to protect the Chesapeake Bay and its tributaries from nonpoint source pollution within the Chesapeake Bay drainage area; and

WHEREAS, the Grantor wishes to preserve land as natural open space as part of Grantor's efforts to improve the quality of stormwater runoff from the Property.

NOW, THEREFORE, in recognition of the foregoing and in consideration of the sum of Ten Dollars ($10.00) and other good and valuable consideration, the receipt of which is hereby acknowledged, the Grantor does hereby grant and convey to Grantee an easement in perpetuity in gross, with the right in perpetuity to restrict the use as described below, of the portion herein described of that certain tract, lot, piece or parcel of land ("Easement Property"), to wit:

> All that lot and parcel of land, consisting of 2.352 acres identified as "Conservation Easement' as depicted on that certain plat entitled "Subdivision Plat of Pocahontas Square, Phase I, James City County, Virginia", dated September 14, 2006, prepared by MSA, P.C., and Attached hereto and recorded simultaneously herewith in the Circuit Court Clerk's Office for the City of Williamsburg and County of James City.

The restrictions hereby imposed on the use of the Easement Property, the acts which the Grantor covenants to do or not to do, and the restrictions which the Grantee is hereby entitled to enforce, shall be as follows:

1. No building or structure shall be built or maintained on the Easement Property other than such building or structure approved by the County Engineer, in writing;

2. The Easement Property shall be kept free and clear of any junk, trash, rubbish, or other unsightly or offensive material;

3. No new signs, billboards, outdoor advertising, road or utility lines shall be placed on the property without the expressed written consent of the County Engineer;

4. The Easement Property shall remain in its natural condition with respect to natural leaf litter or other ground-covering vegetation, understory vegetation or shrub layer, and tree canopy. The activities of Grantor within the Easement Property shall be limited to those which do not remove or damage any vegetation or disturb any soil. Such activities include selective trimming and pruning which will not alter the natural character of the Easement Property with the expressed written consent of the County Engineer. Grantor may install walk trails or remove dead, diseased, poisonous or invasive vegetation with the expressed written consent of the County Engineer;

5. Grantee and its representatives may enter upon the Easement Property from time to time for inspection, to enforce the terms of this Easement, and to post a sign or marker identifying Grantee's interest in the Easement Property as natural open space;

6. In the event of a violation of the Easement, the Grantee shall have the right to seek all appropriate legal and equitable relief, including but not limited to: reasonable attorney's fees and costs; the right to restore the Easement Property to its natural condition; and assess the cost of such restoration as a lien against the Easement Property..