# 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:** **JR053**

**DATE VERIFIED:** **June 26, 2012**

**QUALITY ASSURANCE TECHNICIAN:** **Leah Hardenbergh**

Leah Hardenbergh

**LOCATION: WILLIAMSBURG, VIRGINIA**

# Stormwater Division

## MEMORANDUM

**DATE:** March 11, 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:** JR053

**PIN:** 3630100021

**Subdivision, Tract, Business or Owner Name** (if known): Williamsburg National

**Property Description:** Golf Course

**Site Address:** 3215 Monticello Ave

*(For Internal use only)* **Box** 14 **Drawer:** 7

**Agreements:** (in file as of scan date) **Y** **Book or Doc#:** 723 **Page:** 812

Comments

JR-053

**Contents for Stormwater Management Facilities As-built Files**

Each file is to contain:

1. As-built plan
2. Completed construction certification
3. Construction Plan
4. Design Calculations
5. Watershed Map
6. Maintenance Agreement
7. Correspondence with owners
8. Inspection Records
9. Enforcement Actions

Printed On 05/13/2008

[redacted]

Greenspring Legacy

[redacted]



001255

# DECLARATION OF COVENANTS

## INSPECTION/MAINTENANCE OF RUNOFF CONTROL FACILITY

THIS DECLARATION, made this 12th day of January, 19 95, between Legacy (Greensprings) Limited Partnership, and all successors in interest, hereinafter referred to as the "COVENANTOR(S)," owner(s) of the following property: (As Shown on on Tax Map #36-3, Parcel 1-21) located behind the maintenance building as referred to on the Tax Map.

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 right-of-ways 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 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 DECLARATION shall be recorded in the County Land Records.



JR053_GREENSPRINGS_WILLIAMSBURG - 004

Printed On 05/13/2008 By WOOLRIDGE



IN WITNESS WHEREOF. the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of this 12th day of January, 1995.

COVENANTOR(S)
LEGACY (GREENSPRINGS) LIMITED PARTNERSHI

By: [signature]
Michael Winston Sanders, President, Club Development Associates, Inc., it's Managing General Partner

ATTEST:

[signature]

COVENANTOR(S)

ATTEST:

STATE OF NORTH CAROLINA
~~COMMONWEALTH OF VIRGINIA~~
~~CITY~~/COUNTY OF Moore

I, the undersigned Notary Public, in and for the jurisdiction aforesaid, do certify that Michael Winston Sanders, whose name is signed as such to the foregoing writing bearing date 12th day of January, 1995, this day sworn the same before me in the jurisdiction aforesaid.

GIVEN under my hand this 12th day of January, of 1995.

[signature]
Notary Public

My Commission expires: November 6, 1999

Approved as to form:

[signature]

0261U.Wpf
Revised 9/92

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 25 day of Jan, 1995. This instrument was presented with certificate annexed and admitted to record at 1:05 o'clock
Teste: Helena S. Ward, Clerk
by [signature]
Deputy Clerk



JR053_GREENSPRINGS_WILLIAMSBURG - 005

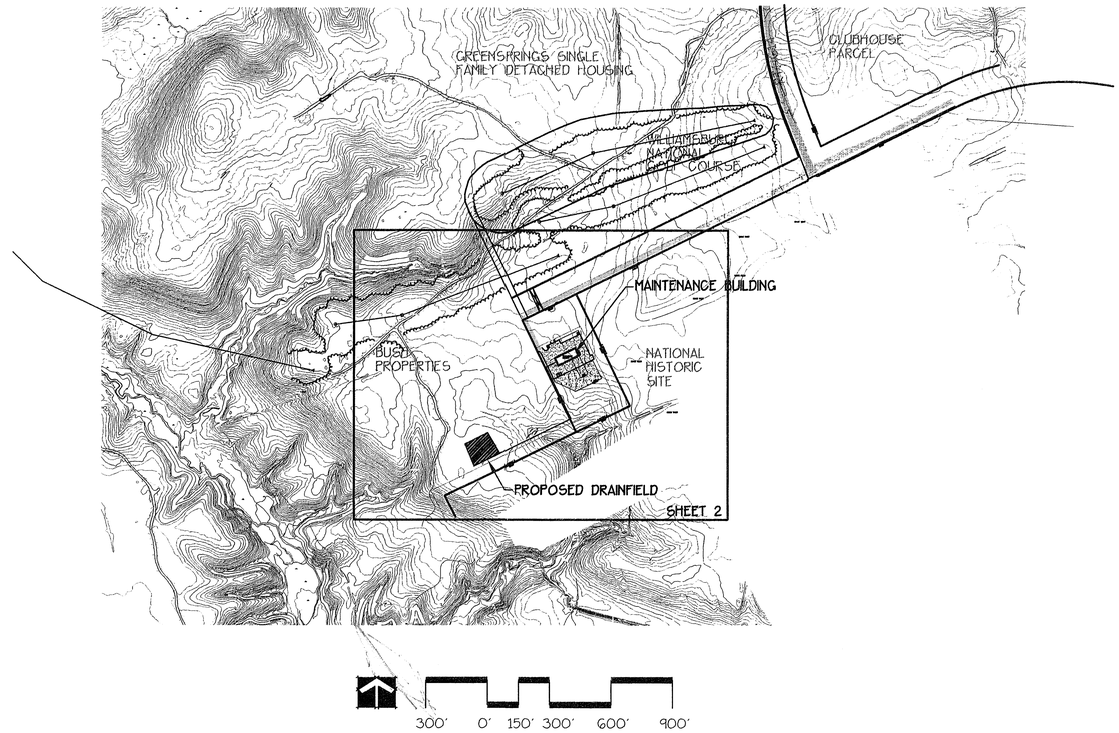
# WILLIAMSBURG NATIONAL GOLF COURSE

## SITE PLAN AMMENDMENT TO THE PROPOSED GOLF COURSE MAINTENANCE FACILITY (SP 132-94)

### JAMES CITY COUNTY, VIRGINIA

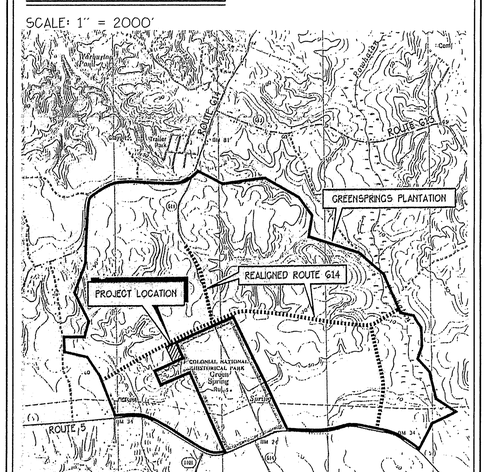
AMENDED ITEMS

1. ADDITION OF SEPTIC DRAINFIELD
2. ADDITION OF PROPANE TANK
3. DELETION OF UNDERGROUND SPILL CONTAINMENT TANK
4. DELETION OF CURBING
5. DELETION OF ASPHALT
6. ADJUSTMENT OF DITCH TO LEFT SIDE OF ENTRANCE ROAD




## VICINITY MAP:

SCALE: 1" = 2000'




SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC MAP
NORGE, VIRGINIA QUADRANGLE

DATE: 9/17/97

COMMONWEALTH OF VIRGINIA
ERIK L. ALLEN
No. 024783
PROFESSIONAL ENGINEER

REVISIONS
DATE

## OWNER AND DEVELOPER

MR. JASON FLOWERS
LEGACY GOLF MANAGEMENT, INC.
WILLIAMSBURG NATIONAL GOLF COURSE
3700 CENTERVILLE ROAD
WILLIAMSBURG, VA 23188

THE PROJECT CONSISTS OF A PORTION OF THE PROPERTY IDENTIFIED AS PARCEL (4G-1) ON TAX MAP (1-1), AND IS LISTED AS PARCEL (36-3)(1-21) IN THE JAMES CITY COUNTY REAL ESTATE ASSESSMENT OFFICE.

THE PROPERTY IS ZONED R4 WITH PROFFERS.

BASE TOPOGRAPHY AND LAND PLAN PROBIDED BY LANGLEY + MCDONALD ENGINEERS.

## STATISTICS

| | |
|---|---|
| MAINTENANCE FACILITY PARCEL 11 | 4.0 AC |
| 30' ACCESSES AND UTILITY EASEMENT | 1.0 AC |
| TOTAL DISTURBED AREA | 3.35 AC |
| DEDICATED OPEN SPACE | 1.65 AC |
| PHASE I PAVED AREA | .77 AC |
| PHASE II PAVED AREA | .43 AC |

## BUILDING STATISTICS

TOTAL FLOOR AREA

| | |
|---|---|
| PHASE I | 4400 SF |
| PHASE II | 4000 SF |
| TOTAL | 8400 SF |

| | |
|---|---|
| HEIGHT OF BUILDING | 19 FT |
| NUMBER OF FLOORS | 1 |
| USE GROUP | S1 |
| CONSTRUCTION TYPE | 5B |

## PARKING

ESTIMATED NUMBER OF EMPLOYEES
10 EMPLOYEES

PARKING TO BE PROVIDED
10 SPACES
1 HANDICAP SPACE

## PROJECT NOTES

1 NO IMPACTS TO JURISDICTIONAL WETLANDS WILL OCCUR AS A RESULT OF THIS PROJECT.

2. NO LAND DISTURBANCE ACTIVITY WILL OCCUR WITHIN THE LIMITS OF THE RESOURCE PROTECTION AREA (RPA).

3. NO SLOPES IN EXCESS OF 15% WILL BE DISTURBED.

4. THE PROPOSED DRAINFIELD SITE HAS BEEN APPROVED BY THE JAMES CITY COUNTY HEALTH DEPARTMENT.

5. PERMISSION HAS BEEN GRANTED BY BUSH PROPERTIES, INC. TO ALLOW USE OF THEIR PROPERTY FOR THE SEPTIC DRAINFIELD.

6. SEWER FORCEMAIN TO BE INSTALLED WITH A TRENCHER AND CLEARING WILL BE THE MINIMUM NECESSARY TO INSTAL THE PIPE AND CONSTRUCT THE FORCEMAIN.

7. NO ARCHEOLOGICAL SITES EXIST WITHIN THIS PARCEL AND A VISUAL IMPACT ANALYSIS OF THE PROPOSED IMPROVEMENTS TO ADJOINING PROPERTY PERFORMED IN 1993 INDICATE THAT NO VISUAL IMPACTS WILL BE INCURRED BY THE GREENSPRINGS PLANTATION NATIONAL HISTORIC STIE AS A RESULT OF THIS PROJECT.

8. PLANS CONFORM TO ALL STATE AND COUNTY ORDINANCES AND REGULATIONS.

9. WATER AND SEWER LINES, CONNECTIONS, AND VALVES SHALL BE INSTALLED IN ACCORDANCE WITH JAMES CITY SERVICE AUTHORITY STANDARDS.

10. A FIRE HYDRANT IS NOT REQURED BY JAMES CITY COUNTY FIRE DEPARTMENT.

11. WATER AND SEWER DEMANDS ARE ESTIMATED TO BE 300 GPD BASED ON OTHER MAINTENANCE FACILITIES.

12. THE STRUCTURE SHALL CONNECT TO PUBLIC UTILITIES WITHIN 30 DAYS OF THE DATE THAT SUCH FACILITIES ARE CONSTRUCTED WITHIN THE MINIMUM CONNECTION DISTANCE FOR PUBLIC UTILITIES AS DETERMINED BY THE JAMES CITY SERVICE AUTHORITY.

13. NO MORE THAN ONE STRUCTURE SERVED BY AN INDIVIDUAL SEPTIC SYSTEM SHALL BE PERMITTED AT ONE TIME WITHIN THE PLANNED COMMUNITY (ALL OF GREENSPRINGS).

14. OWNER SHALL PROVIDE PUBLIC SANITARY SEWER SERVICE TO THIS SITE WITHIN TIME LIMITS SPECIFIED IN SECTION 20-389 OF THE COUNTY CODE.

SP-115-97

## SHEET INDEX:

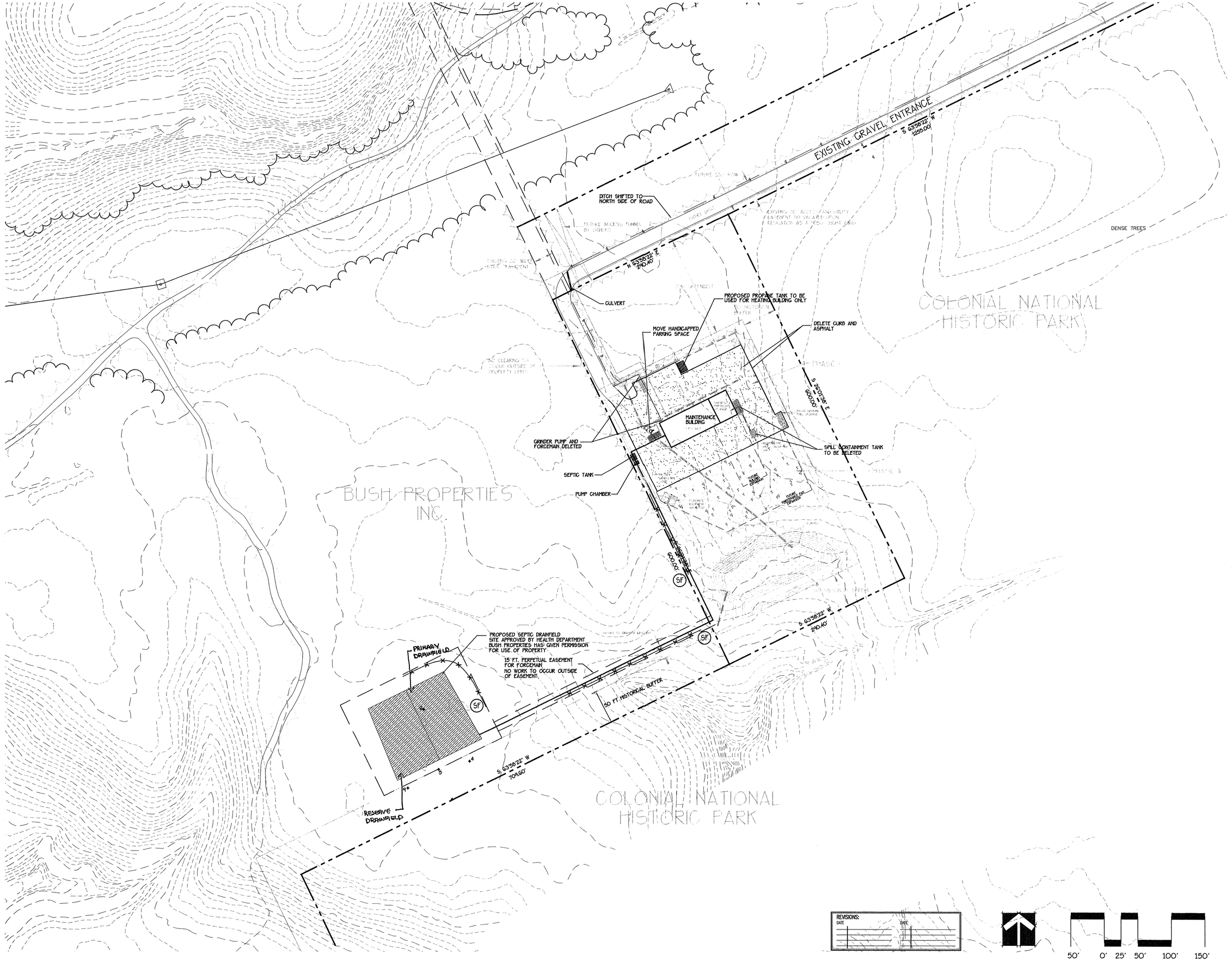
1. COVER SHEET
2. SITE PLAN

SEP 1997
RECEIVED
PLANNING DEPARTMENT


WILLIAMSBURG ENVIRONMENTAL GROUP, INC.
Environmental Consultants
516-B SOUTH HENRY STREET
WILLIAMSBURG, VIRGINIA, 23185
(757) 220 - 6869, FAX (757) 229 - 4507


COUNTY OF JAMES CITY
FINAL SITE PLAN

| APPROVALS | | DATES |
|---|---|---|
| Received | | |
| Fire Dept. | J.C.P. | 10/2/97 |
| Health Dept. | William Chisholm | 10/2/97 |
| Highway Dept. | | |
| Plan. Comm. | | |
| Pub. Wks. Dept. | D.E.C. | 10/16/97 |
| Zoning Adm. | | |
| JCSA | J.C.P. | 10/24/97 |
| Other | N/A | 10/31/97 |
| Other | | |





WILLIAMSBURG ENVIRONMENTAL GROUP, INC.
Environmental Consultants
516-B South Henry Street, Williamsburg, Virginia 23185 (757) 220-0669


# SITE PLAN AMENDMENT TO THE MAINTENANCE FACILITY SITE PLAN
# WILLIAMSBURG NATIONAL GOLF COURSE
## JAMES CITY COUNTY, VIRGINIA

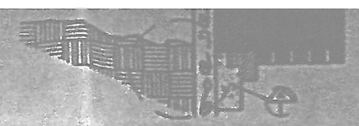
COMMONWEALTH OF VIRGINIA
ERIK T. ALLEN
No. 024783
PROFESSIONAL ENGINEER

| DESIGN BY: | DRAWN BY: |
|---|---|
| ELA/MSP | MSP/ACAD |
| DATE: 11/14/94 | CHECKED BY: EA |

SHEET: 2

JOB NUMBER: 158

JR053_GREENSPRINGS_WILLIAMSBURG - 008



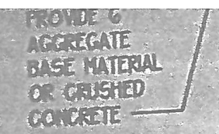
ELEVATION OF STAKE AND FABRIC ORIENTATION

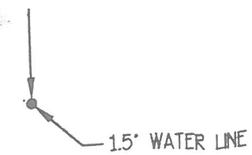
DETAIL A

SPECIFIC APPLICATION

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

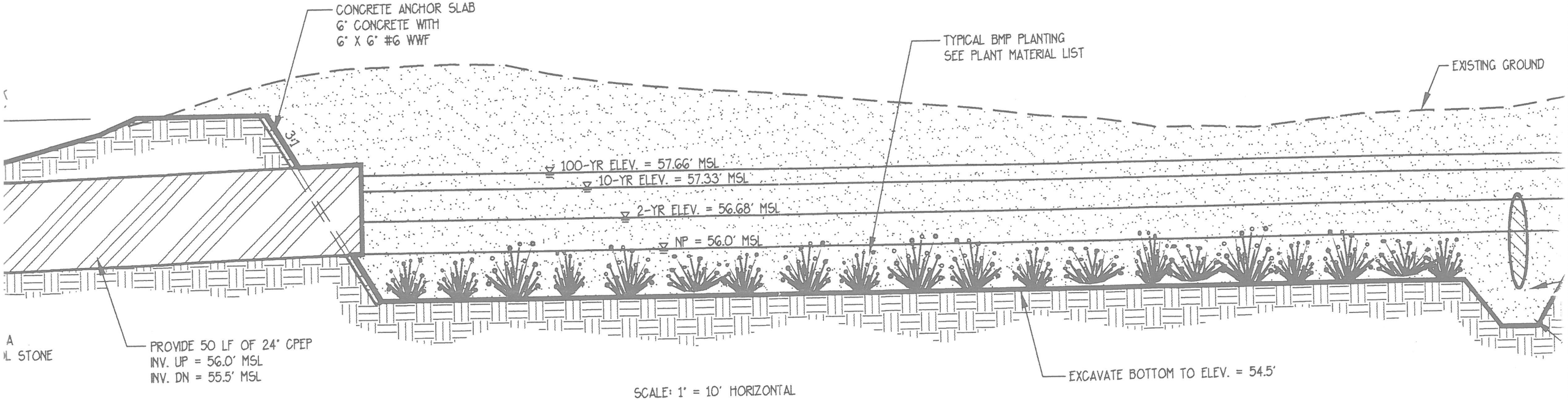
Source: N.C. Erosion and Sediment Control Planning and Design Manual, 1988



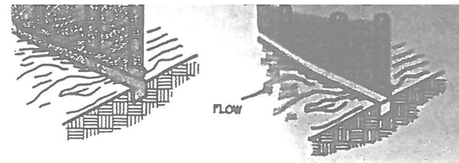




NOT TO SCALE

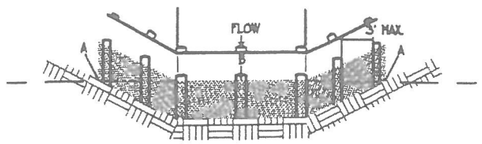
# BMP SECTION




SCALE: 1" = 10' HORIZONTAL

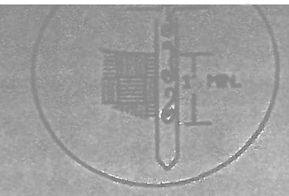



SHEET FLOW INSTALLATION
(PERSPECTIVE VIEW)




POINTS A SHOULD BE HIGHER THAN POINT B.
DRAINAGEWAY INSTALLATION
(FRONT ELEVATION)

ELEVATION OF STAKE AND
FABRIC ORIENTATION




DETAIL A

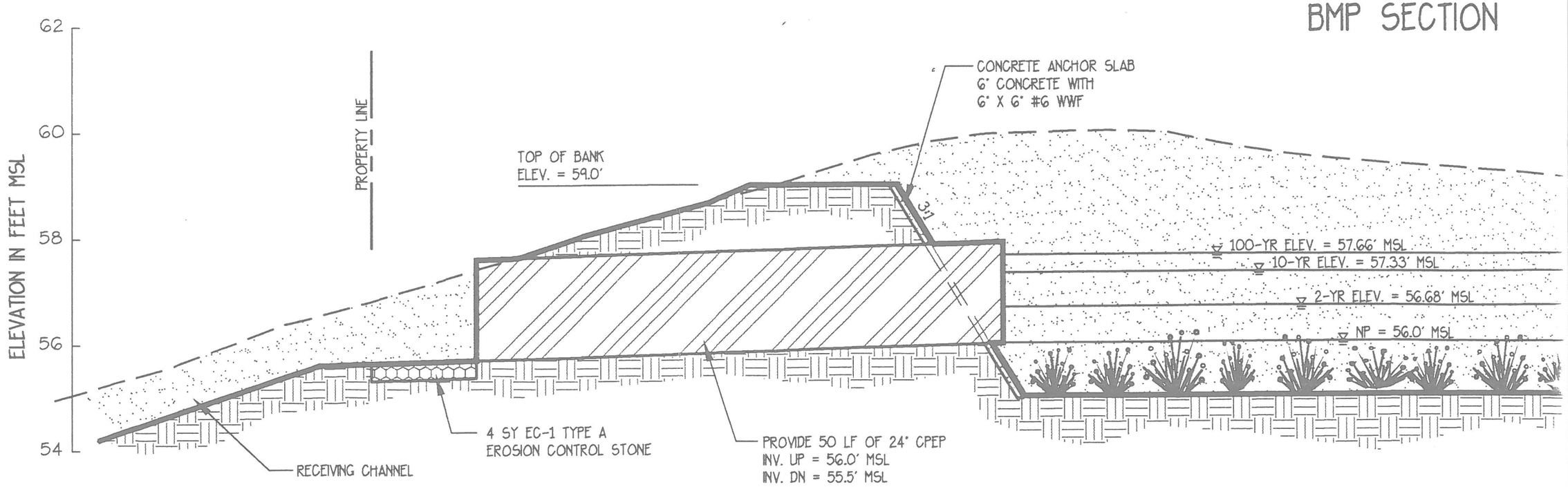
PROVIDE
AGGREG-
BASE M.
OR CRU-
CONCRE-

SPECIFIC APPLICATION

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

Source: N.C. Erosion and Sediment Control
Planning and Design Manual, 1988

# BMP SECTION




SCALE: 1" = 10' HORIZONTAL

# Worksheet For BMP Point System
## Williamsburg National Golf Maintenance Facility
## Total Site Area = 4 acres

A. STRUCTURAL BMP POINT ALLOCATION

| BMP | BMP Points | | Fraction of Site Served By BMP | | Weighted BMP Points |
|---|---|---|---|---|---|
| Marsh Enhanced Dry Pond | 9 | x | 77% | = | 6.93 |
| | | x | | = | |
| | | x | | = | |
| | | x | | = | |
| | | | TOTAL WEIGHTED BMP POINTS: | | 6.93 |

B. NATURAL OPEN SPACE CREDIT

| Fraction of Site | | Natural Open Space Credit | | Points for Natural Open Space |
|---|---|---|---|---|
| 33% | x | 0.10 | = | 3.30 |

C. TOTAL WEIGHTED POINTS

| | | | | |
|---|---|---|---|---|
| 6.93 | | 3.30 | = | 10.23 |
| Structural BMP Points | | Natural Open Space Points | | Total |

## BMP Sizing

I Compute Rv

| | | |
|---|---|---|
| Drainage Area = | 6.43 | acre |
| Impervious Area= | 1.22 | acre |
| Impervious %= | 18.97 | % |
| Open Space Impervious | 0 | % |
| Total Impervious | 18.97 | % |

Rv= (.05 + .009(Impervious %)
Rv= 0.22

II Compute Storage Volume

Design a wetlands enhanced extended detention basin to function as a 50% efficient BMP.
Removal efficiencies are taken from Local Assistance Manual. (CBLAD.1989)
Design based on A Framework For Evaluating Compliance With The 10% Rule
In the Chesapeake Bay Critical Area. (MWCOG.1987)

Vol=(Runoff from a 1" storm)
Vol=(Rv)(1")(Drainage Area)
Vol = 0.12 ac-ft
Vol= 5152.78 cu-ft

Vol. Produced 6420.00 cu-ft

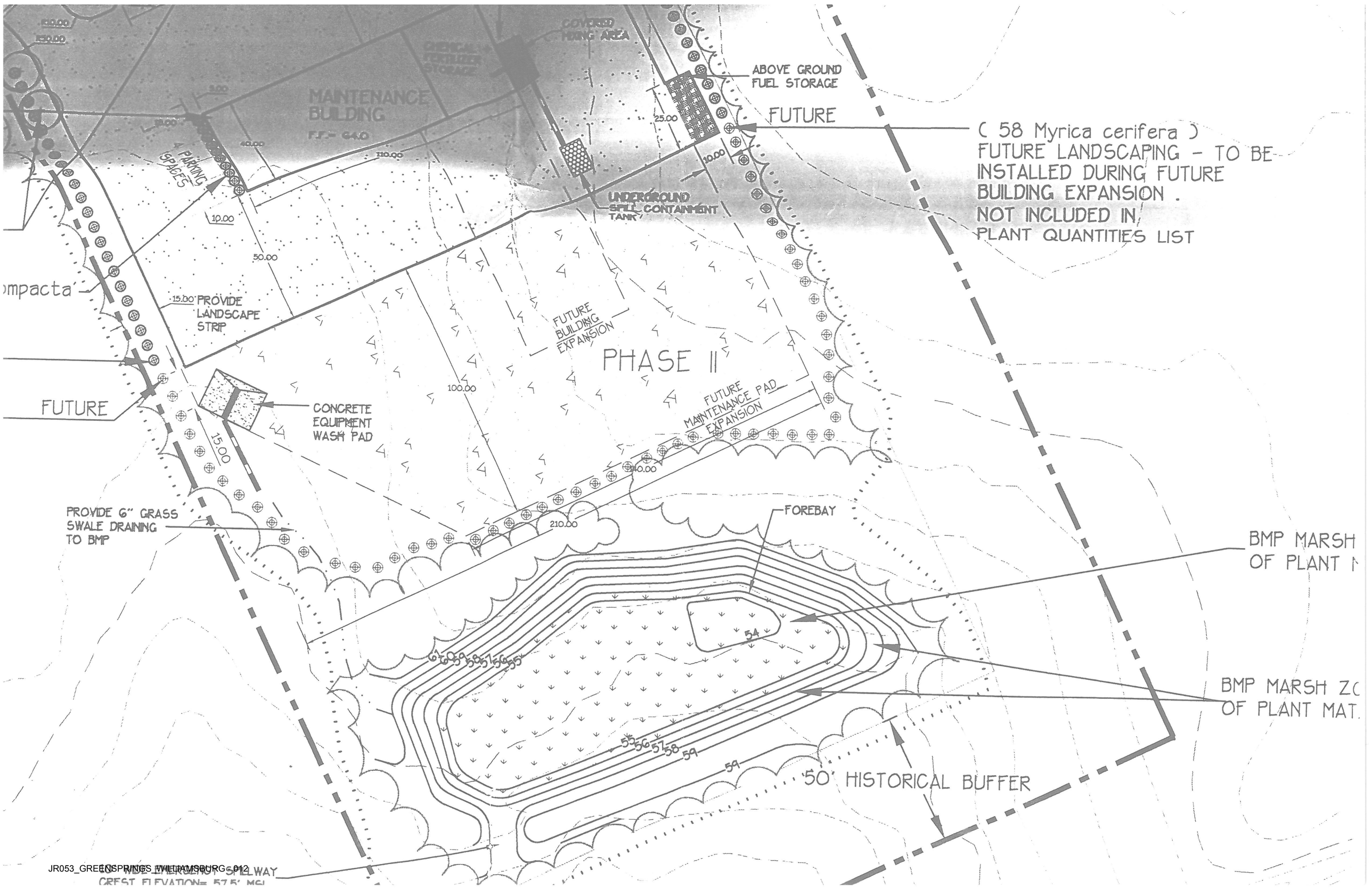
## BMP HYDROLOGY

| | DA acres | CN | Tc hours |
|---|---|---|---|
| Basin Characteristics | | | |
| Pre-development | | | |
| Forest | 6.43 | 72 | 1.2 |
| Post-development | | | |
| Woods | 5.21 | 72 | 1.2 |
| Impervious | 1.22 | 98 | 0.1 |

| | | |
|---|---|---|
| Top of Dam Elevation | 59.00 | ft (msl) |
| Normal Pool Elevation | 56.00 | ft (msl) |

| Hydrologic Summary | 2-yr cfs | 10-yr cfs | 100-yr cfs |
|---|---|---|---|
| Pre-development | 3 | 8 | 15 |
| Proposed Condition Unrouted | 6 | 12 | 16 |
| Proposed Condition Routed | 2 | 7 | 12 |

| Routed Elevations | | |
|---|---|---|
| 2-yr Elevation | 56.68 | ft (msl) |
| 10-yr Elevation | 57.33 | ft (msl) |
| 100-yr Elevation | 57.66 | ft (msl) |

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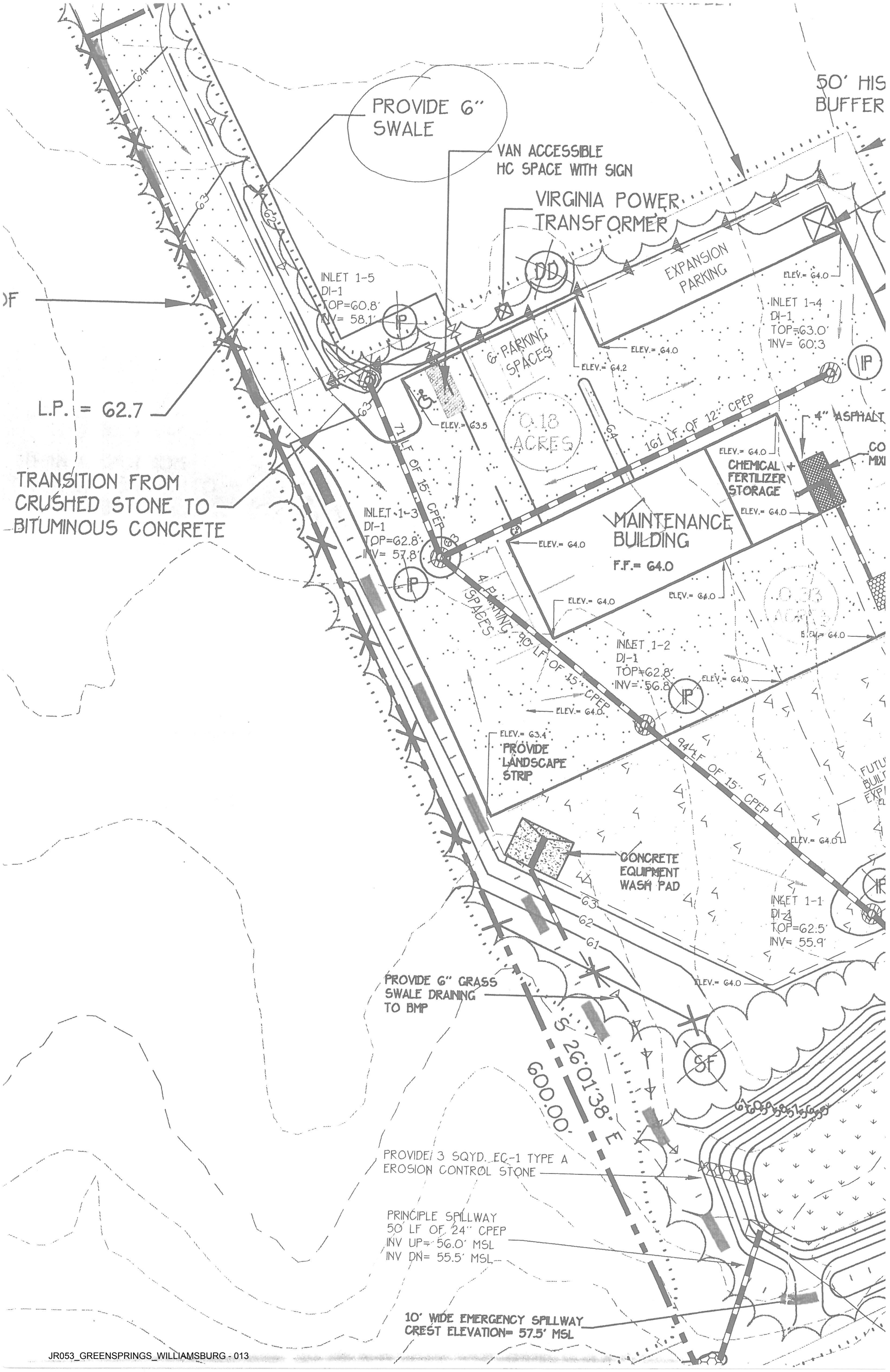
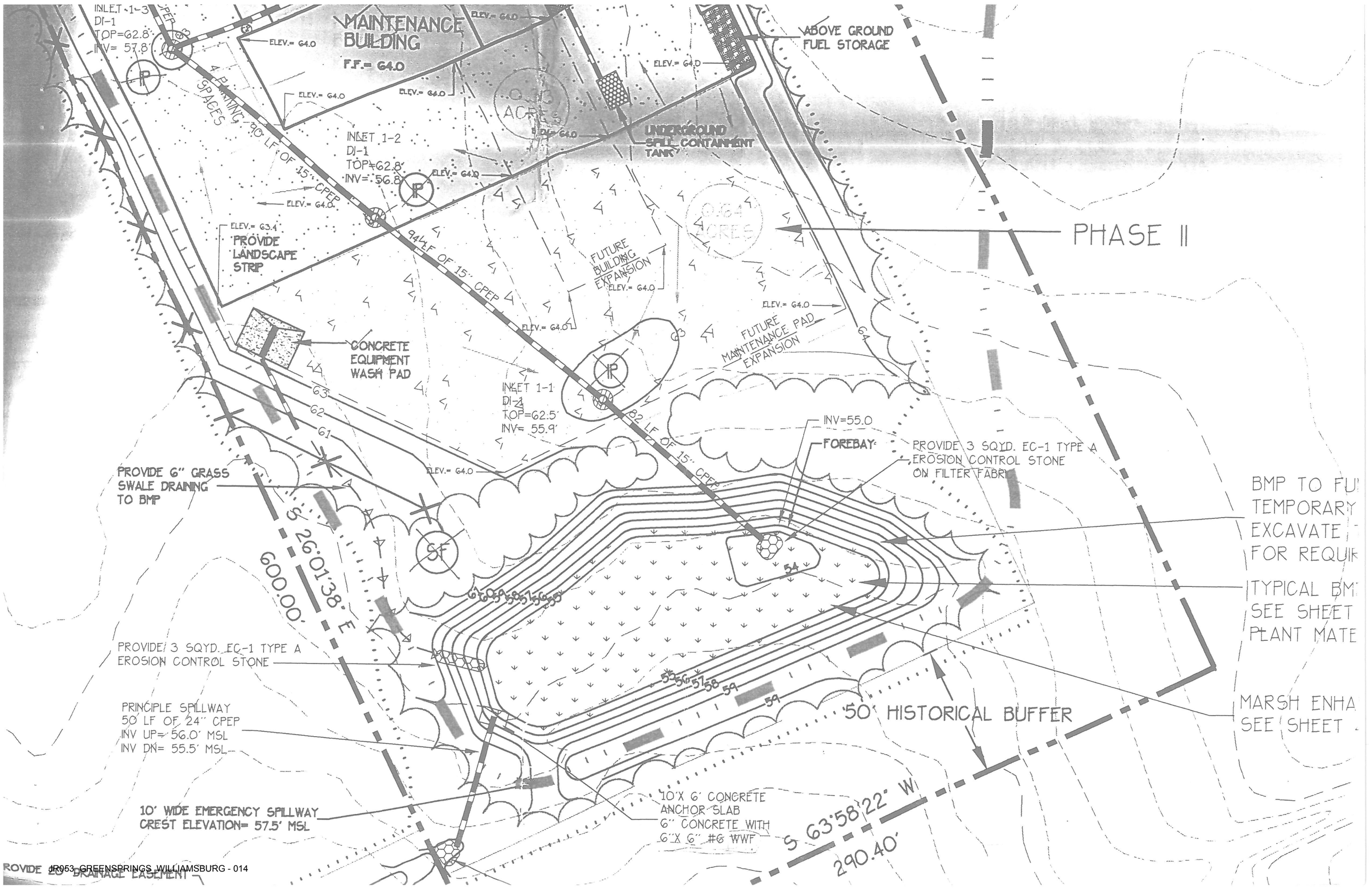
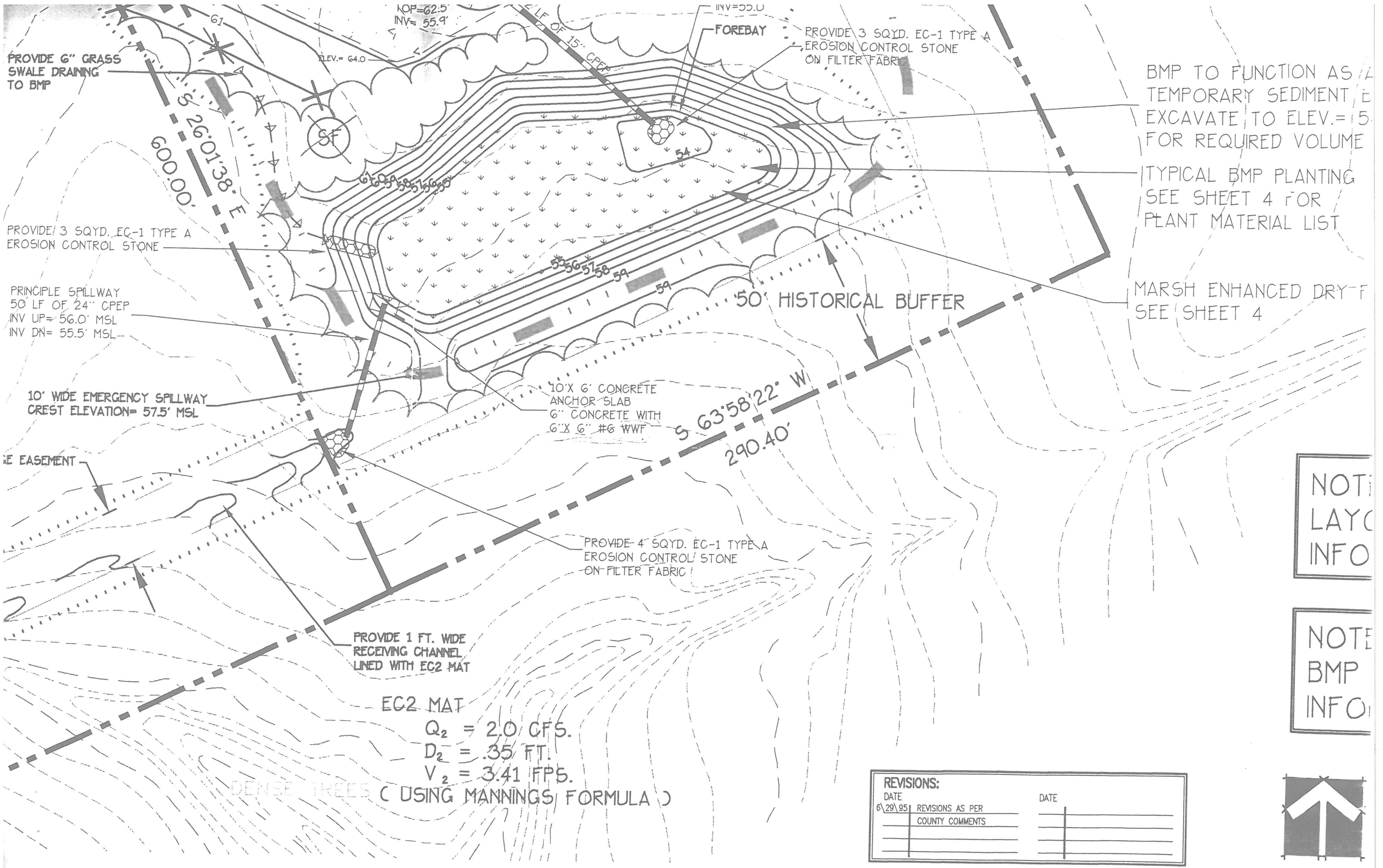

PROVIDE 6" SWALE
VAN ACCESSIBLE HC SPACE WITH SIGN
VIRGINIA POWER TRANSFORMER
50' HIS BUFFER
EXPANSION PARKING
INLET 1-5
DI-1
TOP=60.8'
INV= 58.1'
INLET 1-4
DI-1
TOP=63.0'
INV= 60.3
6 PARKING SPACES
ELEV.= 64.0
ELEV.= 64.2
ELEV.= 63.5
L.P. = 62.7
TRANSITION FROM CRUSHED STONE TO BITUMINOUS CONCRETE
0.18 ACRES
161 LF OF 12" CPEP
4" ASPHALT
CHEMICAL + FERTILIZER STORAGE
71 LF OF 15" CPEP
INLET 1-3
DI-1
TOP=62.8'
INV= 57.8'
MAINTENANCE BUILDING
F.F.= 64.0
4 PARKING SPACES
90 LF OF 15" CPEP
INLET 1-2
DI-1
TOP=62.8'
INV= 56.8'
ELEV.= 63.4
PROVIDE LANDSCAPE STRIP
94 LF OF 15" CPEP
CONCRETE EQUIPMENT WASH PAD
INLET 1-1
DI-1
TOP=62.5'
INV= 55.9'
PROVIDE 6" GRASS SWALE DRAINING TO BMP
S 26°01'38" E
600.00'
PROVIDE 3 SQYD. EC-1 TYPE A EROSION CONTROL STONE
PRINCIPLE SPILLWAY
50 LF OF 24" CPEP
INV UP= 56.0' MSL
INV DN= 55.5' MSL
10' WIDE EMERGENCY SPILLWAY
CREST ELEVATION= 57.5' MSL


MAINTENANCE BUILDING
F.F.= 64.0
ABOVE GROUND FUEL STORAGE
UNDERGROUND SPILL CONTAINMENT TANK
INLET 1-3
DI-1
TOP=62.8'
INV= 57.8'
INLET 1-2
DI-1
TOP=62.8'
INV= 56.8'
INLET 1-1
DI-1
TOP=62.5'
INV= 55.9'
4 PARKING SPACES
90 LF OF 15" CPEP
94 LF OF 15" CPEP
82 LF OF 15" CPEP
ELEV.= 64.0
ELEV.= 63.4
PROVIDE LANDSCAPE STRIP
FUTURE BUILDING EXPANSION
FUTURE MAINTENANCE PAD EXPANSION
PHASE II
CONCRETE EQUIPMENT WASH PAD
PROVIDE 6" GRASS SWALE DRAINING TO BMP
S 26°01'38" E
600.00'
INV=55.0
FOREBAY
PROVIDE 3 SQYD. EC-1 TYPE A EROSION CONTROL STONE ON FILTER FABRIC
BMP TO FU
TEMPORARY
EXCAVATE
FOR REQUI
TYPICAL BM
SEE SHEET
PLANT MATE
PROVIDE 3 SQYD. EC-1 TYPE A EROSION CONTROL STONE
PRINCIPLE SPILLWAY
50' LF OF 24" CPEP
INV UP= 56.0' MSL
INV DN= 55.5' MSL
50' HISTORICAL BUFFER
MARSH ENHA
SEE SHEET
10' WIDE EMERGENCY SPILLWAY
CREST ELEVATION= 57.5' MSL
10'X 6' CONCRETE ANCHOR SLAB
6" CONCRETE WITH
6"X 6" #6 WWF
S 63°58'22" W
290.40'
ROVIDE 20' DRAINAGE EASEMENT




**REVISIONS:**

| DATE | | DATE |
|---|---|---|
| 6\29\95 | REVISIONS AS PER COUNTY COMMENTS | |

JR053_GREENSPRINGS_WILLIAMSBURG - 015

4. NO ARCHEOLOGICAL SITES EXIST WITHIN THIS PARCEL AND A VISUAL IMPACT ANALYSIS OF THE PROPOSED IMPROVEMENTS TO ADJOINING PROPERTY PERFORMED IN 1993 INDICATE THAT NO VISUAL IMPACTS WILL BE INCURRED BY THE GREENSPRINGS PLANTATION NATIONAL HISTORIC SITE AS A RESULT OF THIS PROJECT.

5. PLANS CONFORM TO ALL STATE AND COUNTY ORDINANCES AND REGULATIONS.

6. WATER AND SEWER LINES, CONNECTIONS AND VALVES SHALL BE INSTALLED IN ACCORDANCE WITH JAMES CITY SERVICE AUTHORITY STANDARDS.

7. A FIRE HYDRANT IS NOT REQUIRED BY JAMES CITY COUNTY FIRE DEPARTMENT.

8. WATER AND SEWER DEMANDS ARE ESTIMATED TO BE 300 GPD BASED ON OTHER MAINTENANCE FACILITIES.

Fax 221-5288
258-9642
JD Dill

## SHEET INDEX

1. COVER SHEET
2. MASTER PLAN
3. GRADING, DRAINAGE AND E+S PLAN
4. SITE PLAN
5. GENERAL NOTES AND DETAILS
6. UTILITY NOTES AND DETAILS

SP-132-94


WILLIAMSBURG ENVIRONMENTAL GROUP, INC.
Environmental Consultants
516-B SOUTH HENRY STREET
WILLIAMSBURG, VIRGINIA, 23185
(804) 220 - 6869, FAX (804) 229 - 4507


COUNTY OF JAMES CITY
SITE PLAN

| | DATE |
|---|---|
| HGO/MAF | 11/23/94 |
| VS/MAF | 11/28/94 |
| BEM/MAF | 7/10/95 |
| AS | 7/14/95 |
| DEC/MAF | 7/10/95 |
| RT | 7/17/95 |
| JCD/MAF | 7/12/95 |

THE PROJECT CONSISTS OF A PORTION OF THE PROPERTY IDENTIFIED AS PARCEL (46-1) ON TAX MAP (1-1) AND IS LISTED AS PARCEL (36-3) (1-21) IN THE JAMES CITY COUNTY REAL ESTATE ASSESSMENT OFFICE.

THE PROPERTY IS ZONED R4 WITH PROFFERS.

DEVELOPMENT WILL OCCUR IN TWO STAGES WITH FUTURE DEVELOPMENT MARKED AS PHASE II ON THE PLANS.

BASE TOPOGRAPHY AND LAND PLAN PROVIDED BY LANGLEY + MCDONALD ENGINEERS.

# STATISTICS

| | |
|---|---|
| MAINTENANCE FACILITY PARCEL H | 4.0 AC |
| 30' ACCESSES AND UTILITY EASEMENT | 1.0 AC |
| TOTAL DISTURBED AREA | 3.35 AC |
| DEDICATED OPEN SPACE | 1.65 AC |
| PHASE I PAVED AREA | .77 AC |
| PHASE II PAVED AREA | .43 AC |

# BUILDING STATISTICS:

TOTAL FLOOR AREA

| | |
|---|---|
| PHASE I | 4400 SF |
| PHASE II | 4000 SF |
| TOTAL | 8400 SF |

| | |
|---|---|
| HEIGHT OF BUILDING | 19 FT |
| NUMBER OF FLOORS | 1 |
| USE GROUP | S1 |
| CONSTRUCTION TYPE | 5B |

# PARKING

ESTIMATED NUMBER OF EMPLOYEES
10 EMPLOYEES

PARKING TO BE PROVIDED
10 SPACES
1 HANDICAP SPACE

# PROJECT NOTES

1. NO IMPACTS TO JURISDICTIONAL WETLANDS WILL OCCUR AS A RESULT OF THIS PROJECT.

2. NO LAND DISTURBANCE ACTIVITY WILL OCCUR WITHIN THE LIMITS OF THE RESOURCE PROTECTION AREA (RPA).

3. NO SLOPES IN EXCESS OF 15% WILL BE DISTURBED.

4. NO ARCHEOLOGICAL SITES EXIST WITHIN THIS PARCEL AND A VISUAL IMPACT ANALYSIS OF THE PROPOSED IMPROVEMENTS TO ADJOINING PROPERTY PERFORMED IN 1993 INDICATE THAT NO VISUAL IMPACTS WILL BE INCURRED BY THE GREENSPRINGS PLANTATION NATIONAL HISTORIC SITE AS A RESULT OF THIS PROJECT.

5. PLANS CONFORM TO ALL STATE AND COUNTY ORDINANCES AND REGULATIONS.

6. WATER AND SEWER LINES, CONNECTIONS AND VALVES SHALL BE INSTALLED IN ACCORDANCE WITH JAMES CITY SERVICE AUTHORITY STANDARDS.

7. A FIRE HYDRANT IS NOT REQUIRED BY JAMES CITY COUNTY FIRE DEPARTMENT.

8. WATER AND SEWER DEMANDS ARE ESTIMATED TO BE 300 GPD BASED ON OTHER MAINTENANCE FACILITIES.

# SHEET INDEX


1. COVER SHEET
2. MASTER PLAN


JR053_GREENSPRINGS_WILLIAMSBURG - 017

WILLIAMSBURG
ENVIRONMENTAL
GROUP, INC.

*Environmental Consultants*

# Williamsburg National Golf Course Maintenance Facility Storm Sewer and BMP Hydrologic/Hydraulic Computations

JR053
SP-132-94

*516-B South Henry Street Williamsburg, Virginia 23185 (804) 220-6869 FAX (804) 229-4507*

# Storm Sewer Routings

11/09/94 STORM SEWER CUSTOM REPORT

Data File : GSMAINT.STM
Rainfall file: GSMAINT.RND

Return Period: 10 Yrs
I = 134.700/ ( Tc + 17.360) ^ 0.940

**LINE 1**

Line description = 1-1
Downstream line number = 0

**FLOW INFO:**

Incremental area = 0.64 ac
Runoff coefficient = 0.900
Inlet time = 5.00 min
Inlet intensity = 7.26 in/h
Incremental CIA = 4.18 cfs
Input flow = 0.00 cfs
Total area = 0.64 ac
Weighted coefficient = 0.413
Time of concentration = 22.96 min
Total intensity = 4.17 in/h
Total CIA = 9.24 cfs
Total flow = 9.24 cfs

**PIPE INFO:**

Pipe length = 80.02 ft
Pipe diameter = 15.00 in
Pipe n-value = 0.011
Capacity at invert slope = 11.62 cfs
Invert elevation upstream = 55.90 ft
Invert elevation downstream = 54.00 ft
Invert slope = 2.317 %
Crown elevation upstream = 57.15 ft

**HYDRAULIC INFO:**

Hydraulic grade elev. upstrm = 56.74 ft
Hydraulic grade elev. dwnstrm = 54.84 ft
Velocity upstream = 10.50 ft/s

**LINE 2**

Line description = 1-2
Downstream line number = 1

**FLOW INFO:**

Incremental area = 0.33 ac
Runoff coefficient = 0.900
Inlet time = 5.00 min
Inlet intensity = 7.26 in/h
Incremental CIA = 2.16 cfs
Input flow = 0.00 cfs
Total area = 0.33 ac
Weighted coefficient = 0.347
Time of concentration = 22.69 min
Total intensity = 4.20 in/h
Total CIA = 6.88 cfs
Total flow = 6.88 cfs

**PIPE INFO:**

Pipe length = 90.00 ft
Pipe diameter = 15.00 in
Pipe n-value = 0.011
Capacity at invert slope = 7.47 cfs
Invert elevation upstream = 56.80 ft
Invert elevation downstream = 55.90 ft
Invert slope = 0.957 %
Crown elevation upstream = 58.05 ft

**HYDRAULIC INFO:**

Hydraulic grade elev. upstrm = 59.19 ft
Hydraulic grade elev. dwnstrm = 58.45 ft
Velocity upstream = 5.61 ft/s

**LINE 3**

Line description = 1-3
Downstream line number = 2

**FLOW INFO:**

Incremental area = 0.18 ac
Runoff coefficient = 0.900
Inlet time = 5.00 min
Inlet intensity = 7.26 in/h
Incremental CIA = 1.18 cfs
Input flow = 0.00 cfs
Total area = 0.18 ac
Weighted coefficient = 0.305
Time of concentration = 22.38 min
Total intensity = 4.23 in/h
Total CIA = 5.68 cfs
Total flow = 5.68 cfs

**PIPE INFO:**

Pipe length = 86.01 ft
Pipe diameter = 15.00 in
Pipe n-value = 0.011
Capacity at invert slope = 8.04 cfs
Invert elevation upstream = 57.80 ft
Invert elevation downstream = 56.80 ft
Invert slope = 1.111 %
Crown elevation upstream = 59.05 ft

**HYDRAULIC INFO:**

Hydraulic grade elev. upstrm = 60.15 ft
Hydraulic grade elev. dwnstrm = 59.68 ft
Velocity upstream = 4.63 ft/s

**LINE 4**

Line description = 1-4
Downstream line number = 3

**FLOW INFO:**

Incremental area = 0.84 ac
Runoff coefficient = 0.400
Inlet time = 17.00 min
Inlet intensity = 4.85 in/h
Incremental CIA = 1.63 cfs
Input flow = 0.00 cfs
Total area = 0.84 ac
Weighted coefficient = 0.400
Time of concentration = 17.00 min
Total intensity = 4.85 in/h
Total CIA = 1.63 cfs
Total flow = 1.63 cfs

**PIPE INFO:**

Pipe length = 157.02 ft
Pipe diameter = 12.00 in
Pipe n-value = 0.011
Capacity at invert slope = 5.24 cfs
Invert elevation upstream = 60.30 ft
Invert elevation downstream = 57.80 ft
Invert slope = 1.553 %
Crown elevation upstream = 61.30 ft

**HYDRAULIC INFO:**

Hydraulic grade elev. upstrm = 61.06 ft
Hydraulic grade elev. dwnstrm = 60.48 ft
Velocity upstream = 3.75 ft/s

**LINE 5**

Line description = 1-5
Downstream line number = 3

**FLOW INFO:**

Incremental area = 3.38 ac
Runoff coefficient = 0.250
Inlet time = 22.00 min
Inlet intensity = 4.27 in/h
Incremental CIA = 3.60 cfs
Input flow = 0.00 cfs
Total area = 3.38 ac
Weighted coefficient = 0.250
Time of concentration = 22.00 min
Total intensity = 4.27 in/h
Total CIA = 3.60 cfs
Total flow = 3.60 cfs

**PIPE INFO:**

Pipe length = 67.00 ft
Pipe diameter = 15.00 in
Pipe n-value = 0.011
Capacity at invert slope = 4.96 cfs
Invert elevation upstream = 58.10 ft
Invert elevation downstream = 57.80 ft
Invert slope = 0.423 %
Crown elevation upstream = 59.35 ft

**HYDRAULIC INFO:**

Hydraulic grade elev. upstrm = 60.77 ft
Hydraulic grade elev. dwnstrm = 60.48 ft
Velocity upstream = 2.94 ft/s

# BMP Analysis

# Time of Concentration Computations

```
Quick TR-55 Ver.5.44   S/N:1315400034
Executed: 21:26:17   11-01-1994    c:\pondpack\GSMAINT.TCT

                                Greensprings
                            Maintenance Facility


                       Tc COMPUTATIONS FOR:

SHEET FLOW (Applicable to Tc only)
    Segment ID                                          1
    Surface description                            forest
    Manning's roughness coeff., n                      0.6000
    Flow length, L (total < or = 300)        ft       300.0
    Two-yr 24-hr rainfall, P2                in       3.700
    Land slope, s                          ft/ft     0.0200
                        0.8
         .007 * (n*L)
    T =  --------------                      hrs       1.11              =  1.11
            0.5    0.4
          P2    *   s

SHALLOW CONCENTRATED FLOW
    Segment ID                                          2
    Surface (paved or unpaved)?                    Unpaved
    Flow length, L                           ft       600.0
    Watercourse slope, s                   ft/ft     0.0125

                          0.5
    Avg.V =  Csf  *  (s)                    ft/s     1.8039
    where:   Unpaved Csf = 16.1345
             Paved   Csf = 20.3282

    T = L / (3600*V)                        hrs       0.09              =  0.09


CHANNEL FLOW
    Segment ID
    Cross Sectional Flow Area, a          sq.ft       0.00
    Wetted perimeter, Pw                     ft       0.00
    Hydraulic radius, r = a/Pw               ft      0.000
    Channel slope, s                       ft/ft     0.0000
    Manning's roughness coeff., n                    0.0000

                     2/3    1/2
         1.49  *  r    *  s
    V =  --------------------               ft/s     0.0000
                   n

    Flow length, L                           ft          0

    T = L / (3600*V)                        hrs       0.00              =  0.00

  :::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                              TOTAL TIME (hrs)         1.20
```

Quick TR-55 Ver.5.44 S/N:1315400034
Executed: 21:26:17 11-01-1994 c:\pondpack\GSMAINT.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

Greensprings
Maintenance Facility

| Subarea descr. | Tc or Tt | Time (hrs) |
|---|---|---|
| | Tc | 1.20 |

# Pre-development Hydrology Computations

Return Frequency: 2 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:09:31
Watershed file: --> C:\PONDPACK\GSMAINPR.MOP
Hydrograph file: --> C:\PONDPACK\GSMN2R.HYD

Greensprings Maintenance Facility
Pre-development Flows

>>>> Input Parameters Used to Compute Hydrograph <<<<

| Subarea Description | AREA (acres) | CN | Tc (hrs) | * Tt (hrs) | Precip. (in) | Runoff (in) | Ia/p input/used |
|---|---|---|---|---|---|---|---|
| Grass and Woods | 6.43 | 72.0 | 1.25 | 0.00 | 3.60 | 1.19 | I.22 .22 |

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 6.43 acres or 0.01005 sq.mi
Peak discharge = 3 cfs

>>>> Computer Modifications of Input Parameters <<<<<

| Subarea Description | Input Values Tc (hr) | Input Values * Tt (hr) | Rounded Values Tc (hr) | Rounded Values * Tt (hr) | Ia/p Interpolated (Yes/No) | Ia/p Messages |
|---|---|---|---|---|---|---|
| rass and Woods | 1.20 | 0.00 | 1.25 | 0.00 | Yes | -- |

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 2 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:09:31
Watershed file: --> C:\PONDPACK\GSMAINPR.MOP
Hydrograph file: --> C:\PONDPACK\GSMN2R.HYD

Greensprings Maintenance Facility
Pre-development Flows

>>>> Summary of Subarea Times to Peak <<<<

| Subarea | Peak Discharge at Composite Outfall (cfs) | Time to Peak at Composite Outfall (hrs) |
|---|---|---|
| Grass and Woods | 3 | 12.8 |
| Composite Watershed | 3 | 12.8 |

Return Frequency: 2 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:09:31
Watershed file: --> C:\PONDPACK\GSMAINPR.MOP
Hydrograph file: --> C:\PONDPACK\GSMN2R.HYD

Greensprings Maintenance Facility
Pre-development Flows

Composite Hydrograph Summary (cfs)

| Subarea Description | 11.0 hr | 11.3 hr | 11.6 hr | 11.9 hr | 12.0 hr | 12.1 hr | 12.2 hr | 12.3 hr | 12.4 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Total (cfs) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |

| Subarea Description | 12.5 hr | 12.6 hr | 12.7 hr | 12.8 hr | 13.0 hr | 13.2 hr | 13.4 hr | 13.6 hr | 13.8 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 |
| Total (cfs) | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 |

| Subarea Description | 14.0 hr | 14.3 hr | 14.6 hr | 15.0 hr | 15.5 hr | 16.0 hr | 16.5 hr | 17.0 hr | 17.5 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| Total (cfs) | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |

| Subarea Description | 18.0 hr | 19.0 hr | 20.0 hr | 22.0 hr | 26.0 hr |
|---|---|---|---|---|---|
| Grass and Woods | 0 | 0 | 0 | 0 | 0 |
| Total (cfs) | 0 | 0 | 0 | 0 | 0 |

Return Frequency: 10 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:09:31
Watershed file: --> C:\PONDPACK\GSMAINPR.MOP
Hydrograph file: --> C:\PONDPACK\GSMN10R.HYD

Greensprings Maintenance Facility
Pre-development Flows

>>>> Input Parameters Used to Compute Hydrograph <<<<

| Subarea Description | AREA (acres) | CN | Tc (hrs) | * Tt (hrs) | Precip. (in) | Runoff (in) | Ia/p input/used |
|---|---|---|---|---|---|---|---|
| Grass and Woods | 6.43 | 72.0 | 1.25 | 0.00 | 5.70 | 2.75 | I.14 .14 |

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 6.43 acres or 0.01005 sq.mi
Peak discharge = 8 cfs

>>>> Computer Modifications of Input Parameters <<<<<

| Subarea Description | Input Values Tc (hr) | Input Values * Tt (hr) | Rounded Values Tc (hr) | Rounded Values * Tt (hr) | Ia/p Interpolated (Yes/No) | Ia/p Messages |
|---|---|---|---|---|---|---|
| Grass and Woods | 1.20 | 0.00 | 1.25 | 0.00 | Yes | -- |

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 10 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:09:31
Watershed file: --> C:\PONDPACK\GSMAINPR.MOP
Hydrograph file: --> C:\PONDPACK\GSMN10R.HYD

Greensprings Maintenance Facility
Pre-development Flows

>>>> Summary of Subarea Times to Peak <<<<

| Subarea | Peak Discharge at Composite Outfall (cfs) | Time to Peak at Composite Outfall (hrs) |
|---|---|---|
| Grass and Woods | 8 | 13.0 |
| Composite Watershed | 8 | 13.0 |

Return Frequency: 10 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:09:31
Watershed file: --> C:\PONDPACK\GSMAINPR.MOP
Hydrograph file: --> C:\PONDPACK\GSMN10R.HYD

Greensprings Maintenance Facility
Pre-development Flows

Composite Hydrograph Summary (cfs)

| Subarea Description | 11.0 hr | 11.3 hr | 11.6 hr | 11.9 hr | 12.0 hr | 12.1 hr | 12.2 hr | 12.3 hr | 12.4 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 3 |
| Total (cfs) | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 3 |

| Subarea Description | 12.5 hr | 12.6 hr | 12.7 hr | 12.8 hr | 13.0 hr | 13.2 hr | 13.4 hr | 13.6 hr | 13.8 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 4 | 5 | 7 | 7 | 8 | 7 | 6 | 5 | 4 |
| Total (cfs) | 4 | 5 | 7 | 7 | 8 | 7 | 6 | 5 | 4 |

| Subarea Description | 14.0 hr | 14.3 hr | 14.6 hr | 15.0 hr | 15.5 hr | 16.0 hr | 16.5 hr | 17.0 hr | 17.5 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| Total (cfs) | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |

| Subarea Description | 18.0 hr | 19.0 hr | 20.0 hr | 22.0 hr | 26.0 hr |
|---|---|---|---|---|---|
| Grass and Woods | 1 | 1 | 0 | 0 | 0 |
| Total (cfs) | 1 | 1 | 0 | 0 | 0 |

Return Frequency: 50 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:09:31
Watershed file: --> C:\PONDPACK\GSMAINPR.MOP
Hydrograph file: --> C:\PONDPACK\GSMN50R.HYD

Greensprings Maintenance Facility
Pre-development Flows

>>>> Input Parameters Used to Compute Hydrograph <<<<

| Subarea Description | AREA (acres) | CN | Tc (hrs) | * Tt (hrs) | Precip. (in) | Runoff (in) | Ia/p input | Ia/p used |
|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 6.43 | 72.0 | 1.25 | 0.00 | 7.00 | 3.83 | I.11 | .11 |

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 6.43 acres or 0.01005 sq.mi
Peak discharge = 12 cfs

>>>> Computer Modifications of Input Parameters <<<<<

| Subarea Description | Input Values Tc (hr) | Input Values * Tt (hr) | Rounded Values Tc (hr) | Rounded Values * Tt (hr) | Ia/p Interpolated (Yes/No) | Ia/p Messages |
|---|---|---|---|---|---|---|
| Grass and Woods | 1.20 | 0.00 | 1.25 | 0.00 | Yes | -- |

* Travel time from subarea outfall to composite watershed outfall point.

Return Frequency: 50 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:09:31
Watershed file: --> C:\PONDPACK\GSMAINPR.MOP
Hydrograph file: --> C:\PONDPACK\GSMN50R.HYD

Greensprings Maintenance Facility
Pre-development Flows

>>>> Summary of Subarea Times to Peak <<<<

| Subarea | Peak Discharge at Composite Outfall (cfs) | Time to Peak at Composite Outfall (hrs) |
|---|---|---|
| Grass and Woods | 12 | 13.0 |
| Composite Watershed | 12 | 13.0 |

Return Frequency: 50 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:09:31
Watershed file: --> C:\PONDPACK\GSMAINPR.MOP
Hydrograph file: --> C:\PONDPACK\GSMN50R.HYD

Greensprings Maintenance Facility
Pre-development Flows

Composite Hydrograph Summary (cfs)

| Subarea Description | 11.0 hr | 11.3 hr | 11.6 hr | 11.9 hr | 12.0 hr | 12.1 hr | 12.2 hr | 12.3 hr | 12.4 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 3 | 4 |
| Total (cfs) | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 3 | 4 |

| Subarea Description | 12.5 hr | 12.6 hr | 12.7 hr | 12.8 hr | 13.0 hr | 13.2 hr | 13.4 hr | 13.6 hr | 13.8 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 6 | 8 | 10 | 11 | 12 | 10 | 8 | 6 | 5 |
| Total (cfs) | 6 | 8 | 10 | 11 | 12 | 10 | 8 | 6 | 5 |

| Subarea Description | 14.0 hr | 14.3 hr | 14.6 hr | 15.0 hr | 15.5 hr | 16.0 hr | 16.5 hr | 17.0 hr | 17.5 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| Total (cfs) | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |

| Subarea Description | 18.0 hr | 19.0 hr | 20.0 hr | 22.0 hr | 26.0 hr |
|---|---|---|---|---|---|
| Grass and Woods | 1 | 1 | 1 | 0 | 0 |
| Total (cfs) | 1 | 1 | 1 | 0 | 0 |

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:09:31
Watershed file: --> C:\PONDPACK\GSMAINPR.MOP
Hydrograph file: --> C:\PONDPACK\GSMN100R.HYD

Greensprings Maintenance Facility
Pre-development Flows

>>>> Input Parameters Used to Compute Hydrograph <<<<

| Subarea Description | AREA (acres) | CN | Tc (hrs) | * Tt (hrs) | Precip. (in) | Runoff (in) | Ia/p input/used |
|---|---|---|---|---|---|---|---|
| Grass and Woods | 6.43 | 72.0 | 1.25 | 0.00 | 8.10 | 4.78 | I.1 .10 |

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 6.43 acres or 0.01005 sq.mi
Peak discharge = 15 cfs

>>>> Computer Modifications of Input Parameters <<<<<

| Subarea Description | Input Values Tc (hr) | Input Values * Tt (hr) | Rounded Values Tc (hr) | Rounded Values * Tt (hr) | Ia/p Interpolated (Yes/No) | Ia/p Messages |
|---|---|---|---|---|---|---|
| Grass and Woods | 1.20 | 0.00 | 1.25 | 0.00 | No | Computed Ia/p < .1 |

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:09:31
Watershed file: --> C:\PONDPACK\GSMAINPR.MOP
Hydrograph file: --> C:\PONDPACK\GSMN100R.HYD

Greensprings Maintenance Facility
Pre-development Flows

>>>> Summary of Subarea Times to Peak <<<<

| Subarea | Peak Discharge at Composite Outfall (cfs) | Time to Peak at Composite Outfall (hrs) |
|---|---|---|
| Grass and Woods | 15 | 13.0 |
| Composite Watershed | 15 | 13.0 |

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:09:31
Watershed file: --> C:\PONDPACK\GSMAINPR.MOP
Hydrograph file: --> C:\PONDPACK\GSMN100R.HYD

Greensprings Maintenance Facility
Pre-development Flows

Composite Hydrograph Summary (cfs)

| Subarea Description | 11.0 hr | 11.3 hr | 11.6 hr | 11.9 hr | 12.0 hr | 12.1 hr | 12.2 hr | 12.3 hr | 12.4 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 0 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 6 |
| Total (cfs) | 0 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 6 |

| Subarea Description | 12.5 hr | 12.6 hr | 12.7 hr | 12.8 hr | 13.0 hr | 13.2 hr | 13.4 hr | 13.6 hr | 13.8 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 8 | 10 | 12 | 14 | 15 | 13 | 10 | 8 | 6 |
| Total (cfs) | 8 | 10 | 12 | 14 | 15 | 13 | 10 | 8 | 6 |

| Subarea Description | 14.0 hr | 14.3 hr | 14.6 hr | 15.0 hr | 15.5 hr | 16.0 hr | 16.5 hr | 17.0 hr | 17.5 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 5 | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 1 |
| Total (cfs) | 5 | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 1 |

| Subarea Description | 18.0 hr | 19.0 hr | 20.0 hr | 22.0 hr | 26.0 hr |
|---|---|---|---|---|---|
| Grass and Woods | 1 | 1 | 1 | 1 | 0 |
| Total (cfs) | 1 | 1 | 1 | 1 | 0 |

# Post-development Hydrology Computations

Return Frequency: 2 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:03:05
Watershed file: --> C:\PONDPACK\GSMAINPS.MOP
Hydrograph file: --> C:\PONDPACK\GSMN2S.HYD

Greensprings Maintenance Facility
Postdevelopment Flows

>>>> Input Parameters Used to Compute Hydrograph <<<<

| Subarea Description | AREA (acres) | CN | Tc (hrs) | * Tt (hrs) | Precip. (in) | Runoff (in) | Ia/p input/used | |
|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 5.21 | 72.0 | 1.25 | 0.00 | 3.60 | 1.19 | I.22 | .22 |
| Pavement | 1.22 | 98.0 | 0.10 | 0.00 | 3.60 | 3.37 | I.01 | .10 |

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 6.43 acres or 0.01005 sq.mi
Peak discharge = 6 cfs

>>>> Computer Modifications of Input Parameters <<<<<

| Subarea Description | Input Values Tc (hr) | * Tt (hr) | Rounded Values Tc (hr) | * Tt (hr) | Ia/p Interpolated (Yes/No) | Ia/p Messages |
|---|---|---|---|---|---|---|
| rass and Woods | 1.20 | 0.00 | 1.25 | 0.00 | Yes | -- |
| Pavement | 0.10 | 0.00 | ** | ** | No | Computed Ia/p < .1 |

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

INC. FUTURE EXPANSION

Return Frequency: 2 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:03:05
Watershed file: --> C:\PONDPACK\GSMAINPS.MOP
Hydrograph file: --> C:\PONDPACK\GSMN2S.HYD

Greensprings Maintenance Facility
Postdevelopment Flows

>>>> Summary of Subarea Times to Peak <<<<

| Subarea | Peak Discharge at Composite Outfall (cfs) | Time to Peak at Composite Outfall (hrs) |
|---|---|---|
| Grass and Woods | 3 | 13.0 |
| Pavement | 6 | 12.1 |
| Composite Watershed | 6 | 12.1 |

Return Frequency: 2 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:03:05
Watershed file: --> C:\PONDPACK\GSMAINPS.MOP
Hydrograph file: --> C:\PONDPACK\GSMN2S.HYD

Greensprings Maintenance Facility
Postdevelopment Flows

Composite Hydrograph Summary (cfs)

| Subarea Description | 11.0 hr | 11.3 hr | 11.6 hr | 11.9 hr | 12.0 hr | 12.1 hr | 12.2 hr | 12.3 hr | 12.4 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Pavement | 0 | 0 | 0 | 2 | 4 | 6 | 4 | 1 | 1 |
| Total (cfs) | 0 | 0 | 0 | 2 | 4 | 6 | 4 | 1 | 2 |

| Subarea Description | 12.5 hr | 12.6 hr | 12.7 hr | 12.8 hr | 13.0 hr | 13.2 hr | 13.4 hr | 13.6 hr | 13.8 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 1 |
| Pavement | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total (cfs) | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 1 |

| Subarea Description | 14.0 hr | 14.3 hr | 14.6 hr | 15.0 hr | 15.5 hr | 16.0 hr | 16.5 hr | 17.0 hr | 17.5 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Pavement | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total (cfs) | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |

| Subarea Description | 18.0 hr | 19.0 hr | 20.0 hr | 22.0 hr | 26.0 hr |
|---|---|---|---|---|---|
| Grass and Woods | 0 | 0 | 0 | 0 | 0 |
| Pavement | 0 | 0 | 0 | 0 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| Total (cfs) | 0 | 0 | 0 | 0 | 0 |

Return Frequency: 10 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:03:05
Watershed file: --> C:\PONDPACK\GSMAINPS.MOP
Hydrograph file: --> C:\PONDPACK\GSMN10S.HYD

Greensprings Maintenance Facility
Postdevelopment Flows

>>>> Input Parameters Used to Compute Hydrograph <<<<

| Subarea Description | AREA (acres) | CN | Tc (hrs) | * Tt (hrs) | Precip. (in) | Runoff (in) | Ia/p input/used | |
|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 5.21 | 72.0 | 1.25 | 0.00 | 5.70 | 2.75 | I.14 | .14 |
| Pavement | 1.22 | 98.0 | 0.10 | 0.00 | 5.70 | 5.46 | I.01 | .10 |

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 6.43 acres or 0.01005 sq.mi
Peak discharge = 12 cfs

>>>> Computer Modifications of Input Parameters <<<<<

| Subarea Description | Input Values Tc (hr) | Input Values * Tt (hr) | Rounded Values Tc (hr) | Rounded Values * Tt (hr) | Ia/p Interpolated (Yes/No) | Ia/p Messages |
|---|---|---|---|---|---|---|
| rass and Woods | 1.20 | 0.00 | 1.25 | 0.00 | Yes | -- |
| Pavement | 0.10 | 0.00 | ** | ** | No | Computed Ia/p < .1 |

* Travel time from subarea outfall to composite watershed outfall point.
* Tc & Tt are available in the hydrograph tables.

Return Frequency: 10 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:03:05
Watershed file: --> C:\PONDPACK\GSMAINPS.MOP
Hydrograph file: --> C:\PONDPACK\GSMN10S.HYD

Greensprings Maintenance Facility
Postdevelopment Flows

>>>> Summary of Subarea Times to Peak <<<<

| Subarea | Peak Discharge at Composite Outfall (cfs) | Time to Peak at Composite Outfall (hrs) |
|---|---|---|
| Grass and Woods | 7 | 13.0 |
| Pavement | 11 | 12.1 |
| Composite Watershed | 12 | 12.1 |

Return Frequency: 10 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:03:05
Watershed file: --> C:\PONDPACK\GSMAINPS.MOP
Hydrograph file: --> C:\PONDPACK\GSMN10S.HYD

Greensprings Maintenance Facility
Postdevelopment Flows

Composite Hydrograph Summary (cfs)

| Subarea Description | 11.0 hr | 11.3 hr | 11.6 hr | 11.9 hr | 12.0 hr | 12.1 hr | 12.2 hr | 12.3 hr | 12.4 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 |
| Pavement | 0 | 0 | 1 | 3 | 7 | 11 | 7 | 2 | 2 |
| Total (cfs) | 0 | 0 | 1 | 3 | 8 | 12 | 8 | 4 | 4 |

| Subarea Description | 12.5 hr | 12.6 hr | 12.7 hr | 12.8 hr | 13.0 hr | 13.2 hr | 13.4 hr | 13.6 hr | 13.8 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 3 | 4 | 5 | 6 | 7 | 6 | 5 | 4 | 3 |
| Pavement | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| Total (cfs) | 4 | 5 | 6 | 7 | 8 | 7 | 6 | 4 | 3 |

| Subarea Description | 14.0 hr | 14.3 hr | 14.6 hr | 15.0 hr | 15.5 hr | 16.0 hr | 16.5 hr | 17.0 hr | 17.5 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Pavement | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total (cfs) | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| Subarea Description | 18.0 hr | 19.0 hr | 20.0 hr | 22.0 hr | 26.0 hr |
|---|---|---|---|---|---|
| Grass and Woods | 0 | 0 | 0 | 0 | 0 |
| Pavement | 0 | 0 | 0 | 0 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| Total (cfs) | 0 | 0 | 0 | 0 | 0 |

Return Frequency: 50 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:03:05
Watershed file: --> C:\PONDPACK\GSMAINPS.MOP
Hydrograph file: --> C:\PONDPACK\GSMN50S.HYD

Greensprings Maintenance Facility
Postdevelopment Flows

>>>> Input Parameters Used to Compute Hydrograph <<<<

| Subarea Description | AREA (acres) | CN | Tc (hrs) | * Tt (hrs) | Precip. (in) | Runoff (in) | Ia/p input/used | |
|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 5.21 | 72.0 | 1.25 | 0.00 | 7.00 | 3.83 | I.11 | .11 |
| Pavement | 1.22 | 98.0 | 0.10 | 0.00 | 7.00 | 6.76 | I.01 | .10 |

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 6.43 acres or 0.01005 sq.mi
Peak discharge = 14 cfs

>>>> Computer Modifications of Input Parameters <<<<<

| Subarea Description | Input Values Tc (hr) | * Tt (hr) | Rounded Values Tc (hr) | * Tt (hr) | Ia/p Interpolated (Yes/No) | Ia/p Messages |
|---|---|---|---|---|---|---|
| rass and Woods | 1.20 | 0.00 | 1.25 | 0.00 | Yes | -- |
| Pavement | 0.10 | 0.00 | ** | ** | No | Computed Ia/p < .1 |

* Travel time from subarea outfall to composite watershed outfall point.
* Tc & Tt are available in the hydrograph tables.

Return Frequency: 50 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:03:05
Watershed file: --> C:\PONDPACK\GSMAINPS.MOP
Hydrograph file: --> C:\PONDPACK\GSMN50S.HYD

Greensprings Maintenance Facility
Postdevelopment Flows

>>>> Summary of Subarea Times to Peak <<<<

| Subarea | Peak Discharge at Composite Outfall (cfs) | Time to Peak at Composite Outfall (hrs) |
|---|---|---|
| Grass and Woods | 10 | 13.0 |
| Pavement | 13 | 12.1 |
| Composite Watershed | 14 | 12.1 |

Return Frequency: 50 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:03:05
Watershed file: --> C:\PONDPACK\GSMAINPS.MOP
Hydrograph file: --> C:\PONDPACK\GSMN50S.HYD

Greensprings Maintenance Facility
Postdevelopment Flows

Composite Hydrograph Summary (cfs)

| Subarea Description | 11.0 hr | 11.3 hr | 11.6 hr | 11.9 hr | 12.0 hr | 12.1 hr | 12.2 hr | 12.3 hr | 12.4 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 4 |
| Pavement | 0 | 0 | 1 | 4 | 8 | 13 | 8 | 3 | 2 |
| Total (cfs) | 0 | 0 | 2 | 5 | 9 | 14 | 10 | 5 | 6 |

| Subarea Description | 12.5 hr | 12.6 hr | 12.7 hr | 12.8 hr | 13.0 hr | 13.2 hr | 13.4 hr | 13.6 hr | 13.8 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 5 | 7 | 8 | 9 | 10 | 8 | 7 | 5 | 4 |
| Pavement | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Total (cfs) | 7 | 8 | 9 | 10 | 11 | 9 | 8 | 6 | 5 |

| Subarea Description | 14.0 hr | 14.3 hr | 14.6 hr | 15.0 hr | 15.5 hr | 16.0 hr | 16.5 hr | 17.0 hr | 17.5 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| Pavement | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total (cfs) | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |

| Subarea Description | 18.0 hr | 19.0 hr | 20.0 hr | 22.0 hr | 26.0 hr |
|---|---|---|---|---|---|
| Grass and Woods | 1 | 1 | 1 | 0 | 0 |
| Pavement | 0 | 0 | 0 | 0 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| Total (cfs) | 1 | 1 | 1 | 0 | 0 |

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:03:05
Watershed file: --> C:\PONDPACK\GSMAINPS.MOP
Hydrograph file: --> C:\PONDPACK\GSMN100S.HYD

Greensprings Maintenance Facility
Postdevelopment Flows

>>>> Input Parameters Used to Compute Hydrograph <<<<

| Subarea Description | AREA (acres) | CN | Tc (hrs) | * Tt (hrs) | Precip. (in) | Runoff (in) | Ia/p input/used | |
|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 5.21 | 72.0 | 1.25 | 0.00 | 8.10 | 4.78 | I.1 | .10 |
| Pavement | 1.22 | 98.0 | 0.10 | 0.00 | 8.10 | 7.86 | I.01 | .10 |

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 6.43 acres or 0.01005 sq.mi
Peak discharge = 16 cfs

>>>> Computer Modifications of Input Parameters <<<<<

| Subarea Description | Input Values Tc (hr) | * Tt (hr) | Rounded Values Tc (hr) | * Tt (hr) | Ia/p Interpolated (Yes/No) | Ia/p Messages |
|---|---|---|---|---|---|---|
| Grass and Woods | 1.20 | 0.00 | 1.25 | 0.00 | No | Computed Ia/p < .1 |
| Pavement | 0.10 | 0.00 | ** | ** | No | Computed Ia/p < .1 |

* Travel time from subarea outfall to composite watershed outfall point.
* Tc & Tt are available in the hydrograph tables.

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:03:05
Watershed file: --> C:\PONDPACK\GSMAINPS.MOP
Hydrograph file: --> C:\PONDPACK\GSMN100S.HYD

Greensprings Maintenance Facility
Postdevelopment Flows

>>>> Summary of Subarea Times to Peak <<<<

| Subarea | Peak Discharge at Composite Outfall (cfs) | Time to Peak at Composite Outfall (hrs) |
|---|---|---|
| Grass and Woods | 12 | 13.0 |
| Pavement | 15 | 12.1 |
| Composite Watershed | 16 | 12.1 |

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 11-01-1994 21:03:05
Watershed file: --> C:\PONDPACK\GSMAINPS.MOP
Hydrograph file: --> C:\PONDPACK\GSMN100S.HYD

Greensprings Maintenance Facility
Postdevelopment Flows

Composite Hydrograph Summary (cfs)

| Subarea Description | 11.0 hr | 11.3 hr | 11.6 hr | 11.9 hr | 12.0 hr | 12.1 hr | 12.2 hr | 12.3 hr | 12.4 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 5 |
| Pavement | 0 | 1 | 1 | 5 | 10 | 15 | 9 | 3 | 2 |
| Total (cfs) | 0 | 2 | 2 | 6 | 11 | 16 | 11 | 6 | 7 |

| Subarea Description | 12.5 hr | 12.6 hr | 12.7 hr | 12.8 hr | 13.0 hr | 13.2 hr | 13.4 hr | 13.6 hr | 13.8 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 6 | 8 | 10 | 11 | 12 | 10 | 8 | 6 | 5 |
| Pavement | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Total (cfs) | 8 | 10 | 11 | 12 | 13 | 11 | 9 | 7 | 6 |

| Subarea Description | 14.0 hr | 14.3 hr | 14.6 hr | 15.0 hr | 15.5 hr | 16.0 hr | 16.5 hr | 17.0 hr | 17.5 hr |
|---|---|---|---|---|---|---|---|---|---|
| Grass and Woods | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| Pavement | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total (cfs) | 5 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |

| Subarea Description | 18.0 hr | 19.0 hr | 20.0 hr | 22.0 hr | 26.0 hr |
|---|---|---|---|---|---|
| Grass and Woods | 1 | 1 | 1 | 0 | 0 |
| Pavement | 0 | 0 | 0 | 0 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| Total (cfs) | 1 | 1 | 1 | 0 | 0 |

# Post-development Outlet Structure Computations

POND-2 Version: 5.15
S/N: 1295100016

Greensprings Maintenance Facility

CALCULATED 11-01-1994 21:24:31
DISK FILE: c:\pondpack\GSMAINT .VOL

Planimeter scale: 1 inch = 1 ft.

| Elevation (ft) | Planimeter (sq.in.) | Area (acres) | A1+A2+sqr(A1*A2) (acres) | * Volume (acre-ft) | Volume Sum (acre-ft) |
|---|---|---|---|---|---|
| 55.00 | 5,851.00 | 0.13 | 0.00 | 0.00 | 0.00 |
| 56.00 | 6,980.00 | 0.16 | 0.44 | 0.15 | 0.15 |
| 57.00 | 8,143.00 | 0.19 | 0.52 | 0.17 | 0.32 |
| 58.00 | 9,429.00 | 0.22 | 0.60 | 0.20 | 0.52 |
| 59.00 | 11,003.00 | 0.25 | 0.70 | 0.23 | 0.76 |

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Outlet Structure File: GSMAINT .STR

POND-2 Version: 5.15 S/N: 1295100016
Date Executed: Time Executed:

***** COMPOSITE OUTFLOW SUMMARY ****

| Elevation (ft) | Q (cfs) | Contributing Structures |
|---|---|---|
| 56.00 | 0.0 | 1 |
| 56.20 | 0.3 | 1 |
| 56.40 | 1.0 | 1 |
| 56.60 | 1.9 | 1 |
| 56.80 | 3.1 | 1 |
| 57.00 | 4.6 | 1 |
| 57.20 | 6.1 | 1 |
| 57.40 | 7.8 | 1 |
| 57.60 | 10.6 | 1 +2 |
| 57.80 | 16.9 | 1 +2 |
| 58.00 | 24.9 | 1 +2 |
| 58.20 | 34.4 | 1 +2 |
| 58.40 | 45.0 | 1 +2 |
| 58.60 | 56.4 | 1 +2 |
| 58.80 | 68.7 | 1 +2 |
| 59.00 | 81.8 | 1 +2 |

Outlet Structure File: GSMAINT .STR

POND-2 Version: 5.15 S/N: 1295100016
Date Executed: Time Executed:

Outlet Structure File: c:\pondpack\GSMAINT .STR
Planimeter Input File: c:\pondpack\GSMAINT .VOL
Rating Table Output File: c:\pondpack\GSMAINT .PND

Min. Elev.(ft) = 56 Max. Elev.(ft) = 59 Incr.(ft) = .2

Additional elevations (ft) to be included in table:
* * * * * * * * * * * * * * * * * * * * * * * * * *

**********
SYSTEM CONNECTIVITY
**********

| Structure | No. | Q Table | | Q Table |
|---|---|---|---|---|
| CULVERT-CR | 1 | | -> | 1 |
| WEIR-VR | 2 | | -> | 2 |

Outflow rating table summary was stored in file:
c:\pondpack\GSMAINT .PND

Outlet Structure File: GSMAINT .STR

POND-2 Version: 5.15 S/N: 1295100016
Date Executed: Time Executed:

>>>>>> Structure No. 1 <<<<<<
(Input Data)

CULVERT-CR
Circular Culvert (With Inlet Control)

| | |
|---|---|
| E1 elev.(ft)? | 56 |
| E2 elev.(ft)? | 59.001 |
| Diam. (ft)? | 2 |
| Inv. el.(ft)? | 56 |
| Slope (ft/ft)? | .05 |
| T1 ratio? | |
| T2 ratio? | |
| K Coeff.? | .0098 |
| M Coeff.? | 2 |
| c Coeff.? | .0398 |
| Y Coeff.? | .67 |
| Form 1 or 2? | 1 |
| Slope factor? | -.5 |

Outlet Structure File: GSMAINT .STR

POND-2 Version: 5.15 S/N: 1295100016
Date Executed: Time Executed:

>>>>>> Structure No. 2 <<<<<<
(Input Data)

WEIR-VR
Weir - Vertical Rectangular

| | |
|---|---|
| E1 elev.(ft)? | 57.5 |
| E2 elev.(ft)? | 59.001 |
| Weir coefficient? | 3.33 |
| Weir elev.(ft)? | 57.5 |
| Length (ft)? | 10 |
| Contracted/Suppressed (C/S)? | S |

Outlet Structure File: GSMAINT .STR

POND-2 Version: 5.15 S/N: 1295100016
Date Executed: Time Executed:

Outflow Rating Table for Structure #1
CULVERT-CR Circular Culvert (With Inlet Control)

***** INLET CONTROL ASSUMED *****

| Elevation (ft) | Q (cfs) | Computation Messages | | |
|---|---|---|---|---|
| 56.00 | 0.0 | No headwater | | |
| 56.20 | 0.3 | Equ.1: HW =.2 | dc=.184 | Ac=.144 |
| 56.40 | 1.0 | Equ.1: HW =.4 | dc=.336 | Ac=.349 |
| 56.60 | 1.9 | Equ.1: HW =.6 | dc=.479 | Ac=.578 |
| 56.80 | 3.1 | Equ.1: HW =.8 | dc=.619 | Ac=.827 |
| 57.00 | 4.6 | Equ.1: HW =1.0 | dc=.753 | Ac=1.081 |
| 57.20 | 6.1 | Equ.1: HW =1.2 | dc=.873 | Ac=1.318 |
| 57.40 | 7.8 | Equ.1: HW =1.4 | dc=.995 | Ac=1.561 |
| 57.60 | 9.5 | Equ.1: HW =1.6 | dc=1.104 | Ac=1.778 |
| 57.80 | 11.4 | Equ.1: HW =1.8 | dc=1.214 | Ac=1.996 |
| 58.00 | 13.2 | Equ.1: HW =2.0 | dc=1.305 | Ac=2.171 |
| 58.20 | 14.9 | Equ.1: HW =2.2 | dc=1.39 | Ac=2.33 |
| 58.40 | 16.5 | Transition: HW =2.4 | | |
| 58.60 | 18.0 | Submerged: HW =2.6 | | |
| 58.80 | 19.4 | Submerged: HW =2.8 | | |
| 59.00 | 20.6 | Submerged: HW =3.0 | | |

Used Unsubmerged Equ. Form (1) for elev. less than 58.27 ft
Used Submerged Equation for elevations greater than 58.56 ft
HW=Headwater (ft) dc=Critical depth (ft) Ac=Area (sq.ft) at dc

Transition flows interpolated from the following values:
E1=58.27 ft; Q1=15.55 cfs; Dc=1.42 ft; E2=58.56 ft; Q2=17.77 cfs

Outlet Structure File: GSMAINT .STR

POND-2 Version: 5.15 S/N: 1295100016
Date Executed: Time Executed:

Outflow Rating Table for Structure #2
WEIR-VR Weir - Vertical Rectangular

***** INLET CONTROL ASSUMED *****

| Elevation (ft) | Q (cfs) | Computation Messages |
|---|---|---|
| 56.00 | 0.0 | E < Inv.El.= 57.5 |
| 56.20 | 0.0 | E < Inv.El.= 57.5 |
| 56.40 | 0.0 | E < Inv.El.= 57.5 |
| 56.60 | 0.0 | E < Inv.El.= 57.5 |
| 56.80 | 0.0 | E < Inv.El.= 57.5 |
| 57.00 | 0.0 | E < Inv.El.= 57.5 |
| 57.20 | 0.0 | E < Inv.El.= 57.5 |
| 57.40 | 0.0 | E < Inv.El.= 57.5 |
| 57.60 | 1.1 | H =.1 |
| 57.80 | 5.5 | H =.3 |
| 58.00 | 11.8 | H =.5 |
| 58.20 | 19.5 | H =.7 |
| 58.40 | 28.4 | H =.9 |
| 58.60 | 38.4 | H =1.1 |
| 58.80 | 49.4 | H =1.3 |
| 59.00 | 61.2 | H =1.5 |

C = 3.33 L (ft) = 10
H (ft) = Table elev. - Invert elev. ( 57.5 ft )
Q (cfs) = C * L * (H**1.5) -- Suppressed Weir

# Post-development Stormwater Routings

```
*************************************
*                                   *
*   Greensprings Maintenance Facility *
*                                   *
*                                   *
*                                   *
*                                   *
*************************************
```

Inflow Hydrograph: c:\pondpack\GSMN2S .HYD
Rating Table file: c:\pondpack\GSMAINT .PND

----INITIAL CONDITIONS----
Elevation = 56.00 ft
Outflow = 0.00 cfs
Storage = 0.15 ac-ft

GIVEN POND DATA

| ELEVATION (ft) | OUTFLOW (cfs) | STORAGE (ac-ft) |
|---|---|---|
| 56.00 | 0.0 | 0.147 |
| 56.20 | 0.3 | 0.180 |
| 56.40 | 1.0 | 0.213 |
| 56.60 | 1.9 | 0.248 |
| 56.80 | 3.1 | 0.284 |
| 57.00 | 4.6 | 0.321 |
| 57.20 | 6.1 | 0.358 |
| 57.40 | 7.8 | 0.398 |
| 57.60 | 10.6 | 0.438 |
| 57.80 | 16.9 | 0.479 |
| 58.00 | 24.9 | 0.522 |
| 58.20 | 34.4 | 0.566 |
| 58.40 | 45.0 | 0.611 |
| 58.60 | 56.4 | 0.658 |
| 58.80 | 68.7 | 0.707 |
| 59.00 | 81.8 | 0.756 |

INTERMEDIATE ROUTING COMPUTATIONS

| 2S/t (cfs) | 2S/t + O (cfs) |
|---|---|
| 35.6 | 35.6 |
| 43.5 | 43.8 |
| 51.6 | 52.6 |
| 60.0 | 61.9 |
| 68.6 | 71.7 |
| 77.6 | 82.2 |
| 86.7 | 92.8 |
| 96.2 | 104.0 |
| 106.0 | 116.6 |
| 116.0 | 132.9 |
| 126.3 | 151.2 |
| 137.0 | 171.4 |
| 148.0 | 193.0 |
| 159.3 | 215.7 |
| 171.0 | 239.7 |
| 183.0 | 264.8 |

Time increment (t) = 0.100 hrs.

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: c:\pondpack\GSMAINT .PND
Inflow Hydrograph: c:\pondpack\GSMN2S .HYD
Outflow Hydrograph: c:\pondpack\GSMN2O .HYD

Starting Pond W.S. Elevation = 56.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 6.00 cfs
Peak Outflow = 2.38 cfs
Peak Elevation = 56.68 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.15 ac-ft
Peak Storage From Storm = 0.12 ac-ft
---
Total Storage in Pond = 0.26 ac-ft

```
*************************************
*                                   *
*   Greensprings Maintenance Facility *
*                                   *
*                                   *
*                                   *
*                                   *
*************************************
```

Inflow Hydrograph: c:\pondpack\GSMN10S .HYD
Rating Table file: c:\pondpack\GSMAINT .PND

----INITIAL CONDITIONS----
Elevation = 56.00 ft
Outflow = 0.00 cfs
Storage = 0.15 ac-ft

GIVEN POND DATA

| ELEVATION (ft) | OUTFLOW (cfs) | STORAGE (ac-ft) |
|---|---|---|
| 56.00 | 0.0 | 0.147 |
| 56.20 | 0.3 | 0.180 |
| 56.40 | 1.0 | 0.213 |
| 56.60 | 1.9 | 0.248 |
| 56.80 | 3.1 | 0.284 |
| 57.00 | 4.6 | 0.321 |
| 57.20 | 6.1 | 0.358 |
| 57.40 | 7.8 | 0.398 |
| 57.60 | 10.6 | 0.438 |
| 57.80 | 16.9 | 0.479 |
| 58.00 | 24.9 | 0.522 |
| 58.20 | 34.4 | 0.566 |
| 58.40 | 45.0 | 0.611 |
| 58.60 | 56.4 | 0.658 |
| 58.80 | 68.7 | 0.707 |
| 59.00 | 81.8 | 0.756 |

INTERMEDIATE ROUTING COMPUTATIONS

| 2S/t (cfs) | 2S/t + O (cfs) |
|---|---|
| 35.6 | 35.6 |
| 43.5 | 43.8 |
| 51.6 | 52.6 |
| 60.0 | 61.9 |
| 68.6 | 71.7 |
| 77.6 | 82.2 |
| 86.7 | 92.8 |
| 96.2 | 104.0 |
| 106.0 | 116.6 |
| 116.0 | 132.9 |
| 126.3 | 151.2 |
| 137.0 | 171.4 |
| 148.0 | 193.0 |
| 159.3 | 215.7 |
| 171.0 | 239.7 |
| 183.0 | 264.8 |

Time increment (t) = 0.100 hrs.

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: c:\pondpack\GSMAINT .PND
Inflow Hydrograph: c:\pondpack\GSMN10S .HYD
Outflow Hydrograph: c:\pondpack\GSMN10O .HYD

Starting Pond W.S. Elevation = 56.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

| | | |
|---|---|---|
| Peak Inflow | = | 12.00 cfs |
| Peak Outflow | = | 7.16 cfs |
| Peak Elevation | = | 57.33 ft |

***** Summary of Approximate Peak Storage *****

| | | |
|---|---|---|
| Initial Storage | = | 0.15 ac-ft |
| Peak Storage From Storm | = | 0.24 ac-ft |
| | | --- |
| Total Storage in Pond | = | 0.38 ac-ft |

```
*************************************
*                                   *
*   Greensprings Maintenance Facility *
*                                   *
*                                   *
*                                   *
*                                   *
*************************************
```

Inflow Hydrograph: c:\pondpack\GSMN100S.HYD
Rating Table file: c:\pondpack\GSMAINT .PND

----INITIAL CONDITIONS----
Elevation = 56.00 ft
Outflow = 0.00 cfs
Storage = 0.15 ac-ft

GIVEN POND DATA

| ELEVATION (ft) | OUTFLOW (cfs) | STORAGE (ac-ft) |
|---|---|---|
| 56.00 | 0.0 | 0.147 |
| 56.20 | 0.3 | 0.180 |
| 56.40 | 1.0 | 0.213 |
| 56.60 | 1.9 | 0.248 |
| 56.80 | 3.1 | 0.284 |
| 57.00 | 4.6 | 0.321 |
| 57.20 | 6.1 | 0.358 |
| 57.40 | 7.8 | 0.398 |
| 57.60 | 10.6 | 0.438 |
| 57.80 | 16.9 | 0.479 |
| 58.00 | 24.9 | 0.522 |
| 58.20 | 34.4 | 0.566 |
| 58.40 | 45.0 | 0.611 |
| 58.60 | 56.4 | 0.658 |
| 58.80 | 68.7 | 0.707 |
| 59.00 | 81.8 | 0.756 |

INTERMEDIATE ROUTING COMPUTATIONS

| 2S/t (cfs) | 2S/t + O (cfs) |
|---|---|
| 35.6 | 35.6 |
| 43.5 | 43.8 |
| 51.6 | 52.6 |
| 60.0 | 61.9 |
| 68.6 | 71.7 |
| 77.6 | 82.2 |
| 86.7 | 92.8 |
| 96.2 | 104.0 |
| 106.0 | 116.6 |
| 116.0 | 132.9 |
| 126.3 | 151.2 |
| 137.0 | 171.4 |
| 148.0 | 193.0 |
| 159.3 | 215.7 |
| 171.0 | 239.7 |
| 183.0 | 264.8 |

Time increment (t) = 0.100 hrs.

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: c:\pondpack\GSMAINT .PND
Inflow Hydrograph: c:\pondpack\GSMN100S.HYD
Outflow Hydrograph: c:\pondpack\GSMN100O.HYD

Starting Pond W.S. Elevation = 56.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 16.00 cfs
Peak Outflow = 12.44 cfs
Peak Elevation = 57.66 ft DHW

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.15 ac-ft
Peak Storage From Storm = 0.30 ac-ft
---
Total Storage in Pond = 0.45 ac-ft

Active File


# DEVELOPMENT MANAGEMENT

101-E MOUNTS BAY ROAD, P.O. BOX 8784, WILLIAMSBURG, VIRGINIA 23187-8784
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(757) 253-6678

INTEGRATED PEST MANAGEMENT
(757) 253-2620


March 13, 2002

Robert M. Oliver, P.E.
Jamestown Management Company LLC
213 Ingram Road
Williamsburg, Va. 23188

Re: Greensprings-Williamsburg National Golf Maintenance Facility
County Plan SP-132-94, Amended SP-115-97
Stormwater Management Facility
County BMP ID Code: JR 053

Dear Mr. Oliver:

In response to our recent telephone conversation, I am forwarding information relative to certification of the above referenced stormwater management facility and closing out the project. The dry pond with shallow marsh facility is situated at the rear (south) end of the property. Based on the active project file, the land-disturbing permit for the project was assigned to the following:

Legacy (Greensprings) Limited Partnership
3700 Centerville Road
Williamsburg, Va. 23188

Based on our review of a record drawing as previously submitted by Williamsburg Environmental Group dated November 1999 and a field observation as performed on January 30th 2002, the following items must be addressed prior to release of the developer's surety instrument for the stormwater management/BMP facility:

***Record Drawing:***

1. Provide additional spot elevation data along the south side of the facility to show top of dam reached El. 59.0 per the approved plan. The approved plan showed a small fill area necessary to achieve top of dam elevation. Highest elevation on the as-built drawing is shown by contour El. 58.0. If the facility did not meet proposed top of dam elevations, additional hydraulic computations would be required to support the plan change or the facility must be constructed in accordance with the approved plan. *(Note: In order to achieve minimum freeboard requirements per the approved plan, the elevation of top of dam must be at least to El. 58.66 which is design high water plus 1 foot for freeboard.)*

2. A professional seal and signature is required on the record drawing.

3. Show the following additional information on the record drawing: label the concrete wash pad and grass swale located northwest of the pond; show the location and crest elevation for the emergency spillway in the southwest corner of the facility; show approximate location of the forebay/stilling basin at the outfall end of the 15-inch storm pipe which inflows into the pond.

4. If possible, add the following County identifiers to the lower right hand corner of the record drawing: County Plan Number SP-132-94 and BMP ID Code No. JR 053.

***Construction-Related Items:***

5. Construct top of dam to elevations as proposed per the approved plan; or alternatively, provide a check hydraulic routing from an engineer (based on as-built data) to confirm proper stormwater function and general conformance of the facility with original design parameters including allowable discharge, design high water, freeboard, etc.

6. Clear and remove the felled tree (12-inch diameter) within the basin in the west corner. This tree could affect outflow from the 24-inch principal flow control pipe and inflow to the basin from the open channel which conveys drainage to the basin from the washdown area and west portions of the site.

7. Clear and remove vegetation within 10 feet of the inlet (upstream) side of the 24-inch pipe through the dam. Principal flow control structures shall not be obstructed by vegetation.

8. Clear and remove pine trees from the southwest corner of the basin directly above and around the 24-inch outlet barrel pipe. Trees and roots could eventually damage the corrugated PE pipe.

9. Clear and remove vegetation and sediment within 10 feet of outfall end of the 15-inch corrugated polyethylene pipe which outfalls into the basin at the east end (forebay area). Inflow into the basin should not be obstructed by vegetation and sediment.

10. To promote growth of desirable grasses, mow the entire south perimeter of the facility to no less than 4-inch grass height. Vegetation along this part of the facility was excessive (2 to 5 feet in height) and prevented a thorough inspection of the pond.

Please revise the record drawing and contact our office, as appropriate, once construction-related work items are satisfactorily completed. We can then proceed with final release of the surety on the project. One reproducible and one blue/black line set of the record drawings will be required once the above items are adequately addressed. Please contact me at 757-253-6639 or the assigned Environmental Division inspector, Beth Davis, at 757-253-6702 if you have any further comments or questions.

Sincerely,

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

G:\SWMProg\AsBuilts\SP13294.jr053

| | | | | | |
|---|---|---|---|---|---|
| WATERSHED | JR | MAINTENANCE PLAN | No | CTRL STRUC DESC | CPP Barrel |
| BMP ID NO | 053 | SITE AREA acre | 4 | CTRL STRUC SIZE inches | 24 |
| PLAN NO | SP-132-94 | LAND USE | Res Planned Com | OTLT BARRL DESC | CPP Barrel |
| TAX PARCEL | (36-03)(01-21) | old BMP TYP | Dry Pond w/ SM | OTLT BARRL SIZE inch | 24 |
| PIN NO | 3630100021 | JCC BMP CODE | | | |
| CONSTRUCTION DATE | 10/1/1999 | POINT VALUE | 9 | EMERG SPILLWAY | Yes |
| PROJECT NAME | Greensprings-Wmbg Nat Golf Course | | | DESIGN HW ELEV | 57.66 |
| FACILITY LOCATION | Maintenance Facility-3215 Monticello Ave | | | PERM POOL ELE | 56.4 |
| CITY-STATE | Williamsburg, Va. 23188 | SVC DRAIN AREA acres | 6.43 | 2-YR OUTFLOW cfs | 2.00 |
| CURRENT OWNER | Legacy (Greensprings) Limited Partnership | | | 10-YR OUTFLOW cfs | 7.00 |
| OWNER ADDRESS | 3700 Centerville Road | | | REC DRAWING | Yes |
| OWNER ADDRESS 2 | | SERVICE AREA DESCRI | Building, Parking & Future Expansion | | |
| CITY-STATE-ZIP CODE | Williamsburg, Va. 23188 | IMPERV AREA acres | 1.22 | CONSTR CERTI | No |
| OWNER PHONE | | RECV STREAM | UT of Shellbank Creek | | |
| MAINT AGREEMENT | Yes | EXT DET-WQ-CTRL | Yes | LAST INSP DATE | 1/30/2002 |
| EMERG ACTION PLAN | No | WTR QUAL VOL acre-ft | 0.24 | INTERNAL RATING | 2 |
| | | CHAN PROT CTRL | No | MISC/COMMENTS | |
| | | CHAN PROT VOL acre-ft | 0 | Parcel H. South Alt 5. Single 24" corr PE pipe culv. Golf cart wash down. | |
| | | SW/FLOOD CONTROL | Yes | | |
| | | GEOTECH REPORT | No | | |

Get Last BMP No

Return to Menu