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: **WC043**

DATE VERIFIED: **October 11, 2012**

QUALITY ASSURANCE TECHNICIAN: **Leah Hardenbergh**

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA

Stormwater Division

MEMORANDUM

DATE: March 13, 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: WC043

PIN: 0510700001A

Subdivision, Tract, Business or Owner Name (if known): Stonehouse

Property Description: Laurel Ridge Common Area Phase 2

Site Address:

(For internal use only) **Box** 23 **Drawer:** 9

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

Comments
Pond Located behind 3168 Ridge Drive/Lot 31 Phase 2 Laurel Ridge

James City County, Virginia
Environmental Division

Stormwater Management/BMP Facilities
Record Drawing/Construction Certification
Review Tracking Form

County Plan No.: S-98-97
Project Name: STONEHOUSE ORCHARD HILL PH 4D
Stormwater Management Facility: BLOCKWALL (END OF RIDGE DRIVE)
Phase: ☐ I ☒ II ☐ III

☒ Information Received. Date: 11-16-00
☐ Administrative Check.
- ☒ Record Drawing Date: 11-16-00
- ☒ Construction Certification Date: 11-15-00
- ☐ RD/CC Standard Forms NA (Required after Feb 1st 2001Only)
- ☐ Insp/Maint Agreement Info:
- ☐ BMP Maintenance Plan Location:
- ☐ Other:

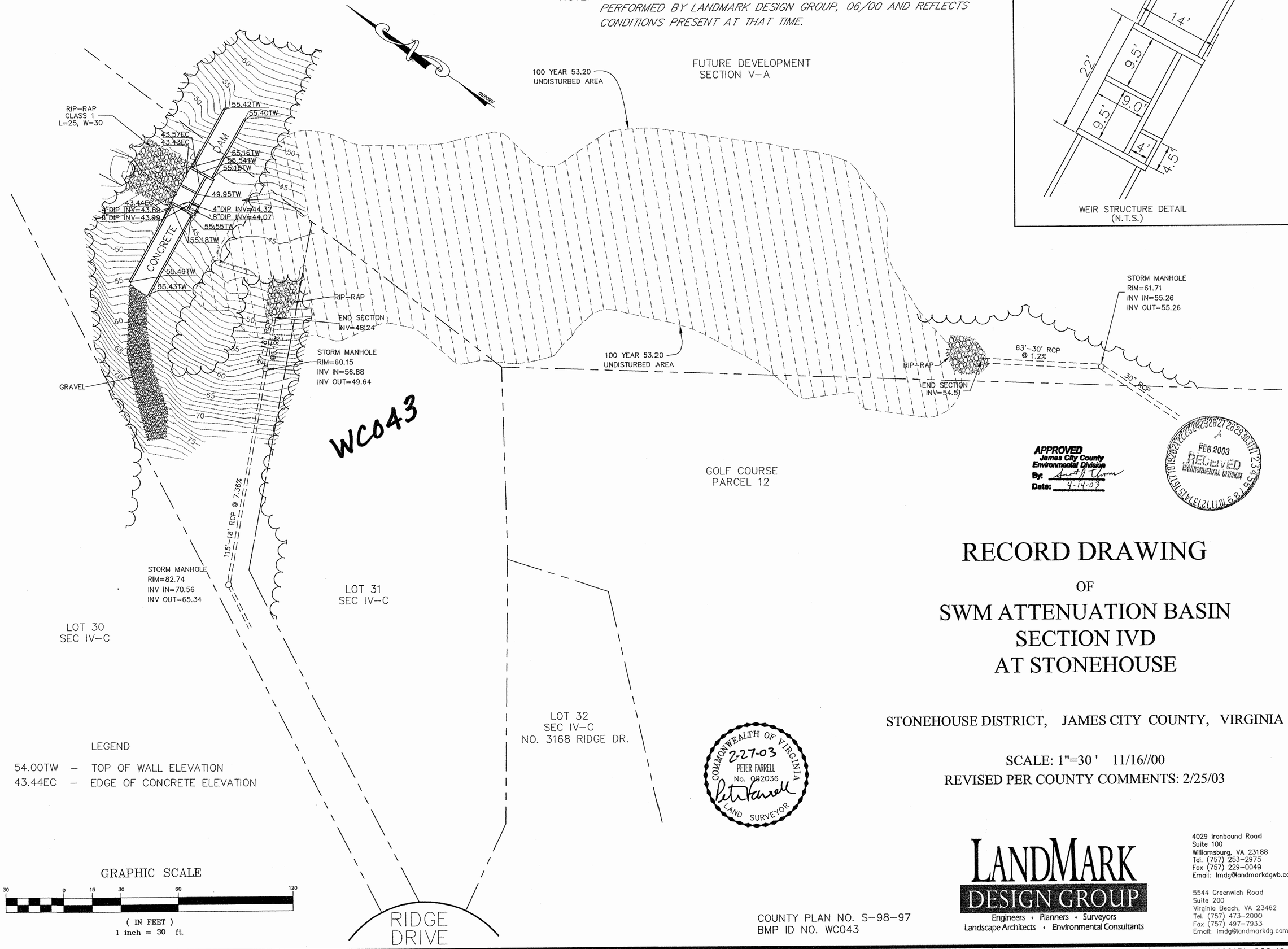
☒ Standard E&SC Note on Approved Plan Requiring RD/CC or County comment in plan review file.
☒ Yes ☐ No Location: Note #18 Sheet 20
☒ Assign County BMP ID Code Code: WC043
☒ Log into Division's "As-Built" Tracking Log
☒ Add Location to GIS Database Map. Obtain GIS site information (GPIN, Owner, Site Area, Address, etc.)
☒ Preliminary Log into BMP Database (BMP ID #, Site Plan #, GPIN, Project Name)
☒ Active Project File Review (correspondence, H&H, etc.).
☒ Initial As-Built File setup (label, copy hydraulics, BMP information, etc.).
☒ Inspector Check of RD/CC. GEL
☒ Pre-Inspection Drawing Review - Approved Plan (Quick look prior to field inspection).
☒ Final Inspection (FI) Performed Date: 8/29/01
☒ Record Drawing (RD) Review Date: 12-10-01
☒ Construction Certification (CC) Review Date: 12-10-01
☒ Actions:
- ☐ No comments.
- ☒ Comments. Letter Forwarded. Date: 12-11-01
  - ☒ Record Drawing (RD)
  - ☒ Construction Certification (CC)
  - ☒ Construction-Related (CR)
  - ☐ Site Issues (SI)
  - ☐ Other :

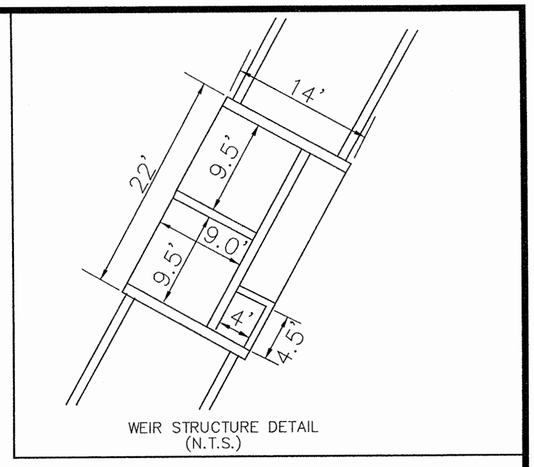
☐ Second Submission: 4/14/03 RD ok; Reinspect 4-14-03; Reinspect 7-7-03
☐ Third Submission:
☒ Acceptable for stormwater managment facility purposes (RD/CC/CR/Other). Proceed with bond release.
☒ Notify Darryl/Joan/Pat of acceptability using email (preferred), form or verbal.
☒ Check/Clean active file of any remaining material and finish "As-Built" file.
☒ Add to County BMP Inventory/Inspection schedule (Phase I, II or III).
☒ Copy Final Inspection Report into County BMP Inspection Program file.
☐ Digital Photographs obtained.
☒ Add to JCC Hydrology & Hydraulic database (optional).

BMP Certification Information Acceptable

Plan Reviewer: [signature] P.E. Date: 7/8/03

NOTE: THIS RECORD DRAWING IS BASED ON AN ACTUAL FIELD SURVEY PERFORMED BY LANDMARK DESIGN GROUP, 06/00 AND REFLECTS CONDITIONS PRESENT AT THAT TIME.





APPROVED
James City County
Environmental Division
By: [signature]
Date: 4-14-03

FEB 2003
RECEIVED
ENVIRONMENTAL DIVISION

RECORD DRAWING

OF

SWM ATTENUATION BASIN SECTION IVD AT STONEHOUSE

STONEHOUSE DISTRICT, JAMES CITY COUNTY, VIRGINIA

SCALE: 1"=30' 11/16//00

REVISED PER COUNTY COMMENTS: 2/25/03

COMMONWEALTH OF VIRGINIA
2-27-03
PETER FARRELL
No. 002036
LAND SURVEYOR

COUNTY PLAN NO. S-98-97
BMP ID NO. WC043

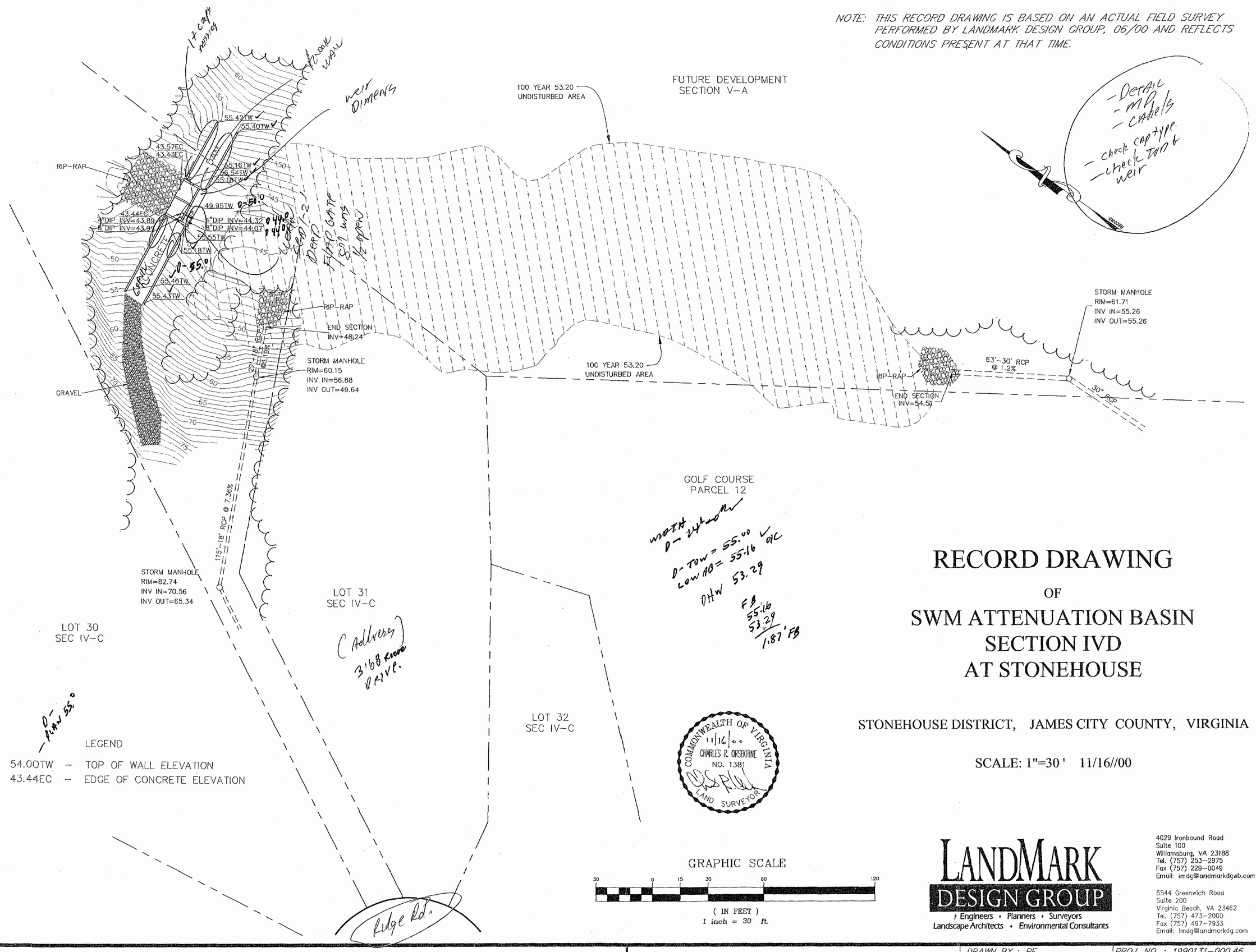
LANDMARK DESIGN GROUP
Engineers • Planners • Surveyors
Landscape Architects • Environmental Consultants

4029 Ironbound Road
Suite 100
Williamsburg, VA 23188
Tel. (757) 253-2975
Fax (757) 229-0049
Email: lmdg@landmarkdgwb.com

5544 Greenwich Road
Suite 200
Virginia Beach, VA 23462
Tel. (757) 473-2000
Fax (757) 497-7933
Email: lmdg@landmarkdg.com

DRAWN BY : PF	PROJ. NO. : 1990131-000.46
CHKD. BY : RSP	DWG. NO. : 11684 W WC043

NOTE: THIS RECORD DRAWING IS BASED ON AN ACTUAL FIELD SURVEY PERFORMED BY LANDMARK DESIGN GROUP, 06/00 AND REFLECTS CONDITIONS PRESENT AT THAT TIME.



RECORD DRAWING

OF

SWM ATTENUATION BASIN SECTION IVD AT STONEHOUSE

STONEHOUSE DISTRICT, JAMES CITY COUNTY, VIRGINIA

SCALE: 1"=30' 11/16//00

COMMONWEALTH OF VIRGINIA
11/16/00
CHARLES R. ORSBORNE
NO. 1381
LAND SURVEYOR

LANDMARK DESIGN GROUP
Engineers • Planners • Surveyors
Landscape Architects • Environmental Consultants

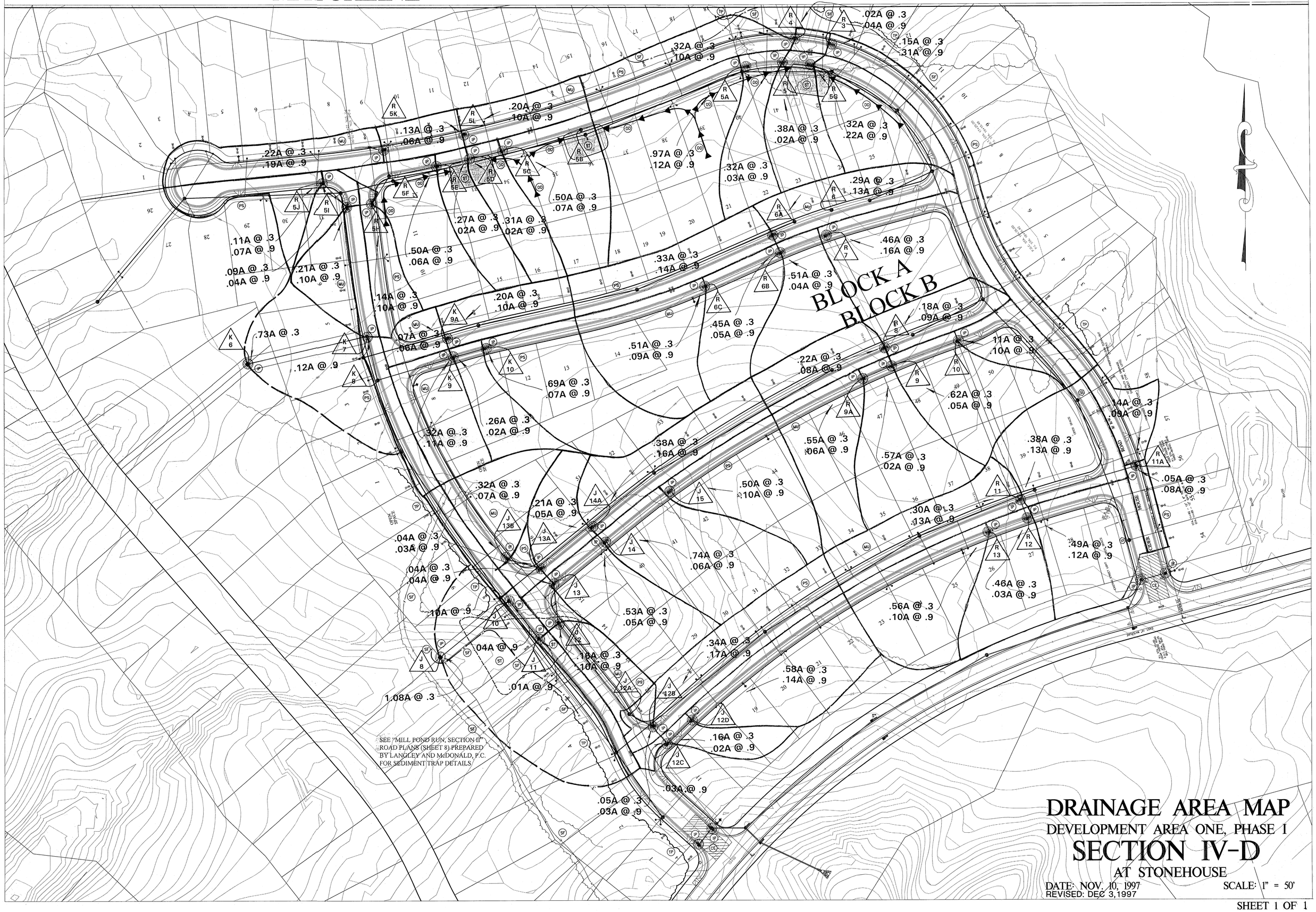
4029 Ironbound Road
Suite 100
Williamsburg, VA 23188
Tel. (757) 253-2975
Fax (757) 229-0049
Email: lmdg@landmarkdgwb.com

5544 Greenwich Road
Suite 200
Virginia Beach, VA 23462
Tel. (757) 473-2000
Fax (757) 497-7933
Email: lmdg@landmarkdg.com

DRAWN BY : PF	PROJ. NO. : 1990131-000.46
CHKD. BY : RSP	DWG. NO. : 11684 W

1990131-000.46 Stonehouse SWM EMP Record Drawings\IVD-1Bb\23.dwg

MATCHLINE SHEET 1



DRAINAGE AREA MAP

DEVELOPMENT AREA ONE, PHASE 1

SECTION IV-D

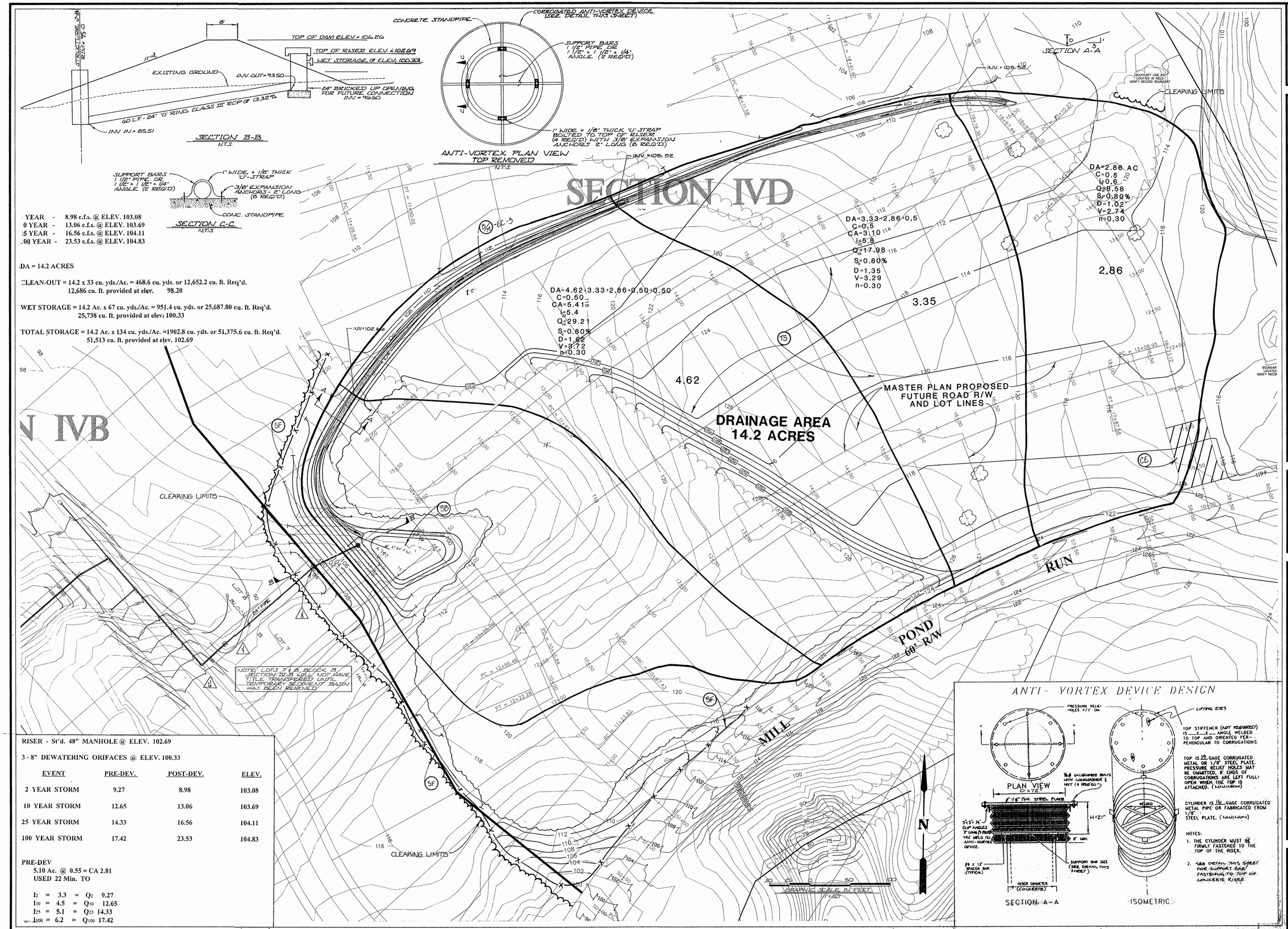
AT STONEHOUSE

DATE: NOV. 10, 1997
REVISED: DEC 3,1997

SCALE: 1" = 50'

SHEET 1 OF 1

WC043_STONEHOUSE_ORCHARD_HILL_SEC_4D - 006



RISER - St'd. 48" MANHOLE @ ELEV. 102.69

3 - 8" DEWATERING ORIFACES @ ELEV. 100.33

EVENT	PRE-DEV.	POST-DEV.	ELEV.
2 YEAR STORM	9.27	8.98	103.08
10 YEAR STORM	12.65	13.06	103.69
25 YEAR STORM	14.33	16.56	104.11
100 YEAR STORM	17.42	23.53	104.83

PRE-DEV
5.10 Ac. @ 0.55 = CA 2.81
USED 22 Min. TO

I_2 = 3.3 = Q_2 9.27
I_{10} = 4.5 = Q_{10} 12.65
I_{25} = 5.1 = Q_{25} 14.33
I_{100} = 6.2 = Q_{100} 17.42

COMMONWEALTH OF VIRGINIA
JOHN L. HUTCHERSON
No. 7753
CERTIFIED PROFESSIONAL ENGINEER

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

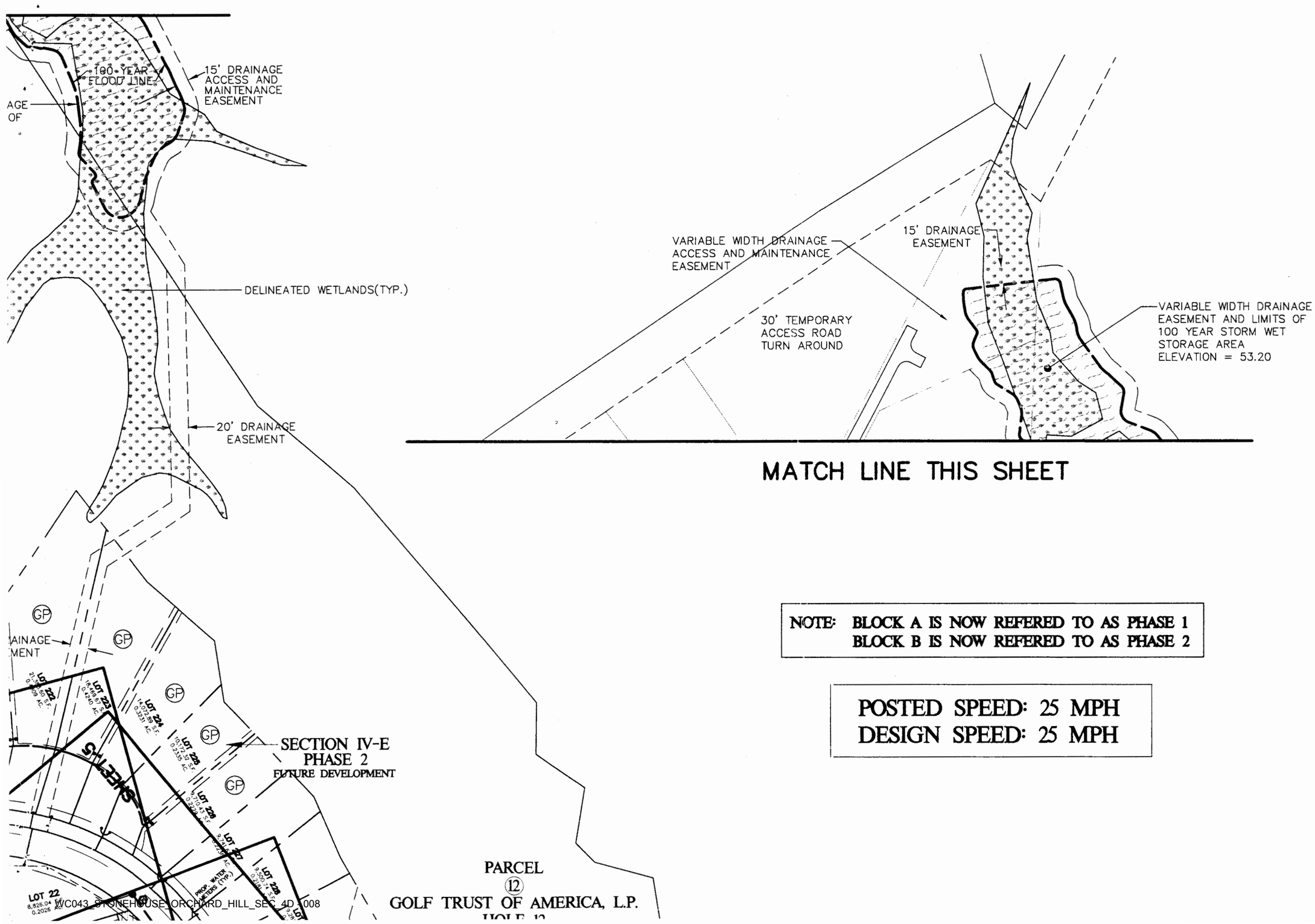
DES.	W.F.B.
DWN.	E.E.E.
CHK.	JLH/RSP.
DATE	APRIL 18, 1997

MILL POND RUN
SECTION II
AT STONEHOUSE
FOR
STONEHOUSE LLC.
TEMPORARY SEDIMENT BASIN FOR DISTURBED AREA IN SECTION IV-A
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

PROJ. NO.	96038-0355
SCALE:	1" = 50'
SHEET	8 OF 13
DWG.	96038-1260.002-JCC140

REVISED: 8/25/97 PER J.C.C. COMMENTS
REVISED: 10/3/97 PER J.C.C. COMMENTS

WC043_STONEHOUSE_ORCHARD_HILL_SEC_4D - 007

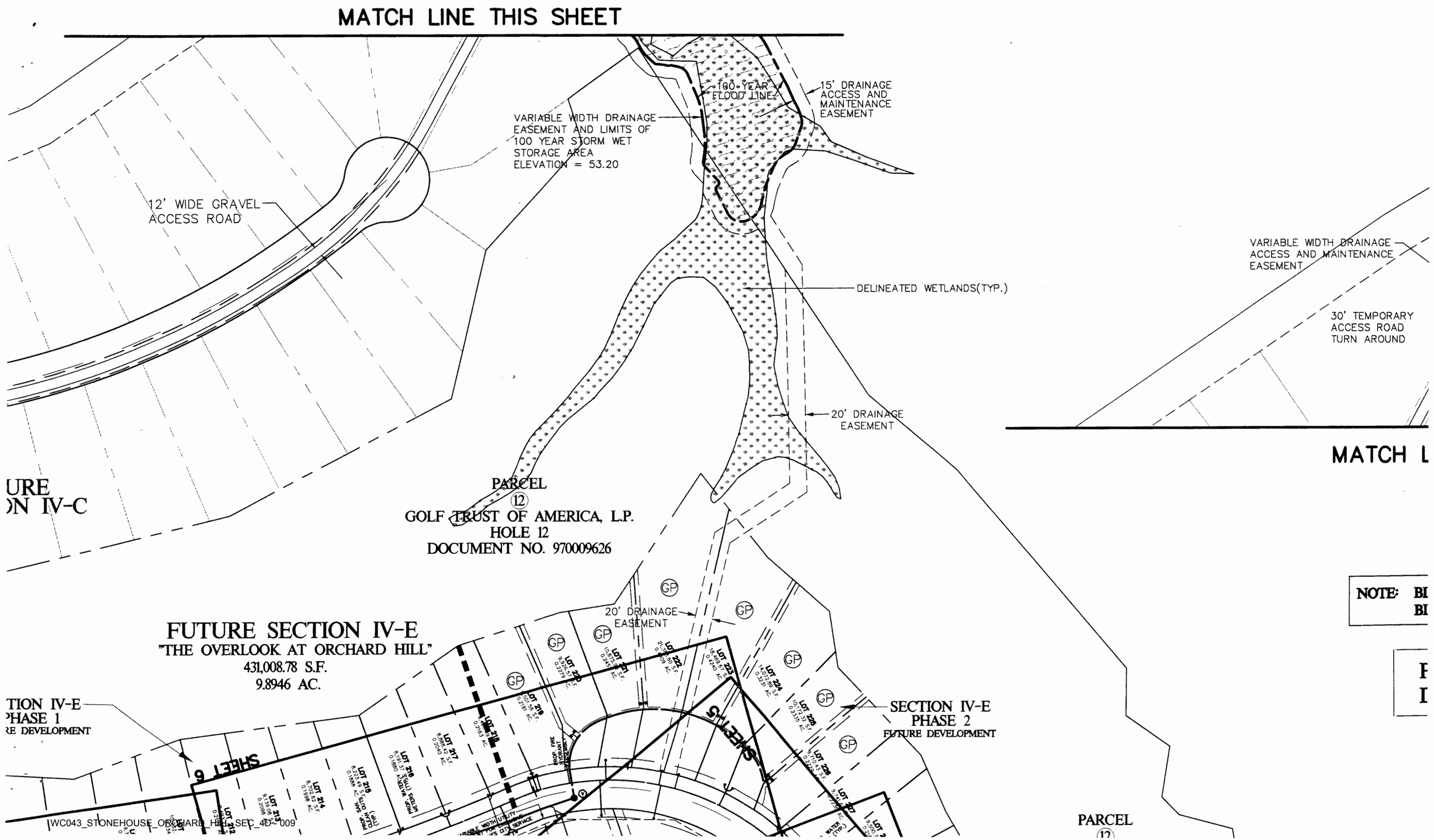


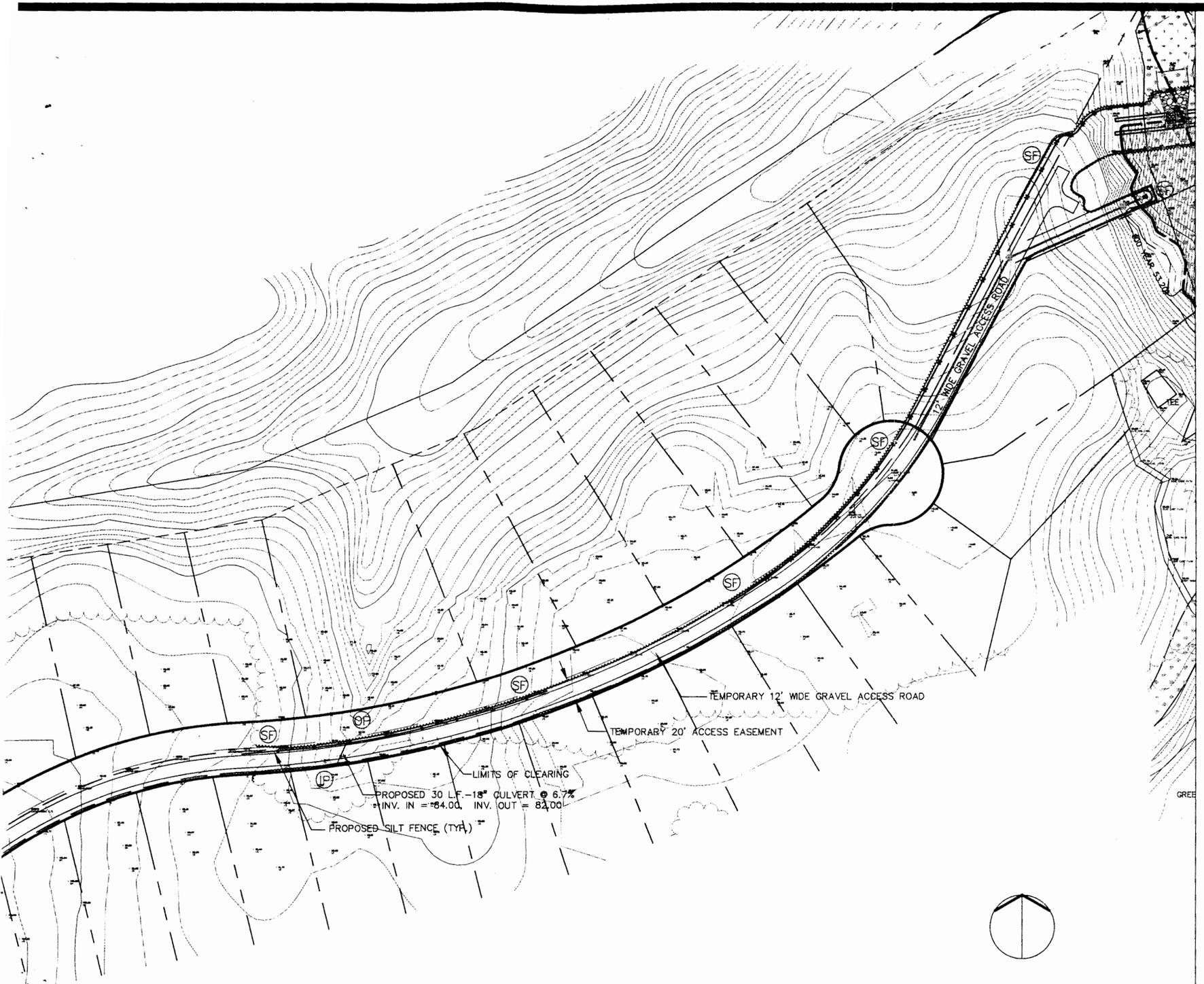
NOTE: BLOCK A IS NOW REFERED TO AS PHASE 1
BLOCK B IS NOW REFERED TO AS PHASE 2

POSTED SPEED: 25 MPH
DESIGN SPEED: 25 MPH

COMMONWEALTH OF VIRGINIA
RICHARD S. PHILLIPS
No. 023631
PROFESSIONAL ENGINEER

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

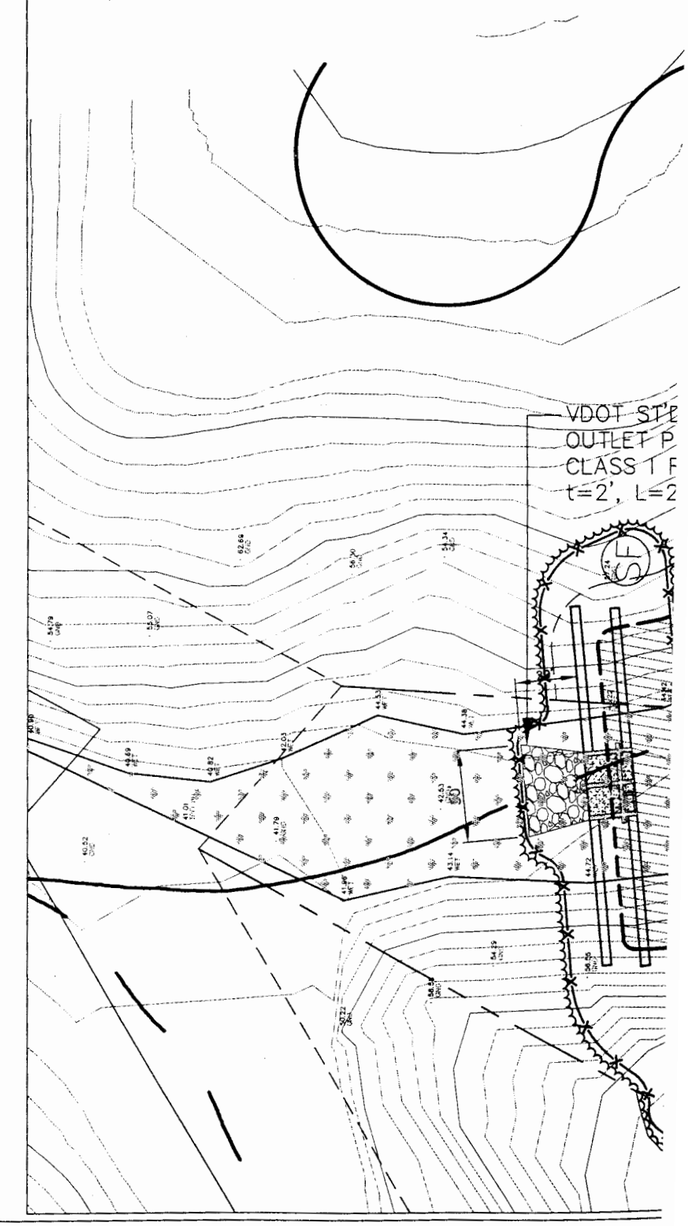

MATCH LINE THIS SHEET
100-YEAR FLOOD LINE
15' DRAINAGE ACCESS AND MAINTENANCE EASEMENT
VARIABLE WIDTH DRAINAGE EASEMENT AND LIMITS OF 100 YEAR STORM WET STORAGE AREA ELEVATION = 53.20
12' WIDE GRAVEL ACCESS ROAD
VARIABLE WIDTH DRAINAGE ACCESS AND MAINTENANCE EASEMENT
DELINEATED WETLANDS(TYP.)
30' TEMPORARY ACCESS ROAD TURN AROUND
20' DRAINAGE EASEMENT
MATCH L
URE
ON IV-C
PARCEL
12
GOLF TRUST OF AMERICA, L.P.
HOLE 12
DOCUMENT NO. 970009626
NOTE: BI
BI
20' DRAINAGE EASEMENT
FUTURE SECTION IV-E
"THE OVERLOOK AT ORCHARD HILL"
431,008.78 S.F.
9.8946 AC.
TION IV-E
PHASE 1
RE DEVELOPMENT
SHEET 6
SHEET 5
SECTION IV-E
PHASE 2
FUTURE DEVELOPMENT
PARCEL
12



TEMPORARY ACCESS ROAD

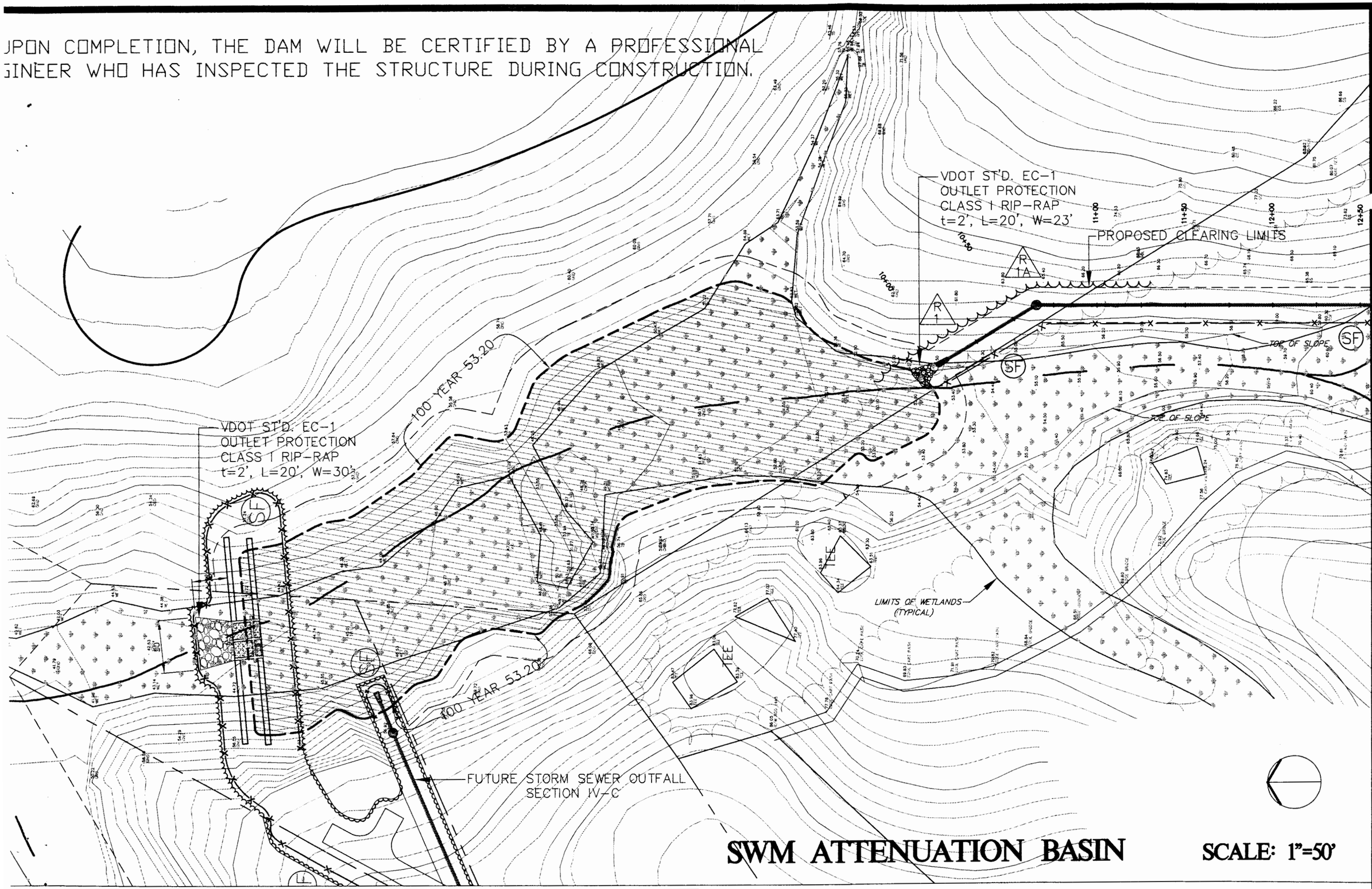
SCALE: 1"=100'

NOTE: UPON COMPLETION, THE DA
ENGINEER WHO HAS INSPECTE



NOTE: VDOT DOES NOT ASSUME RE
OF THE DETENTION/RETENT

UPON COMPLETION, THE DAM WILL BE CERTIFIED BY A PROFESSIONAL
GINEER WHO HAS INSPECTED THE STRUCTURE DURING CONSTRUCTION.



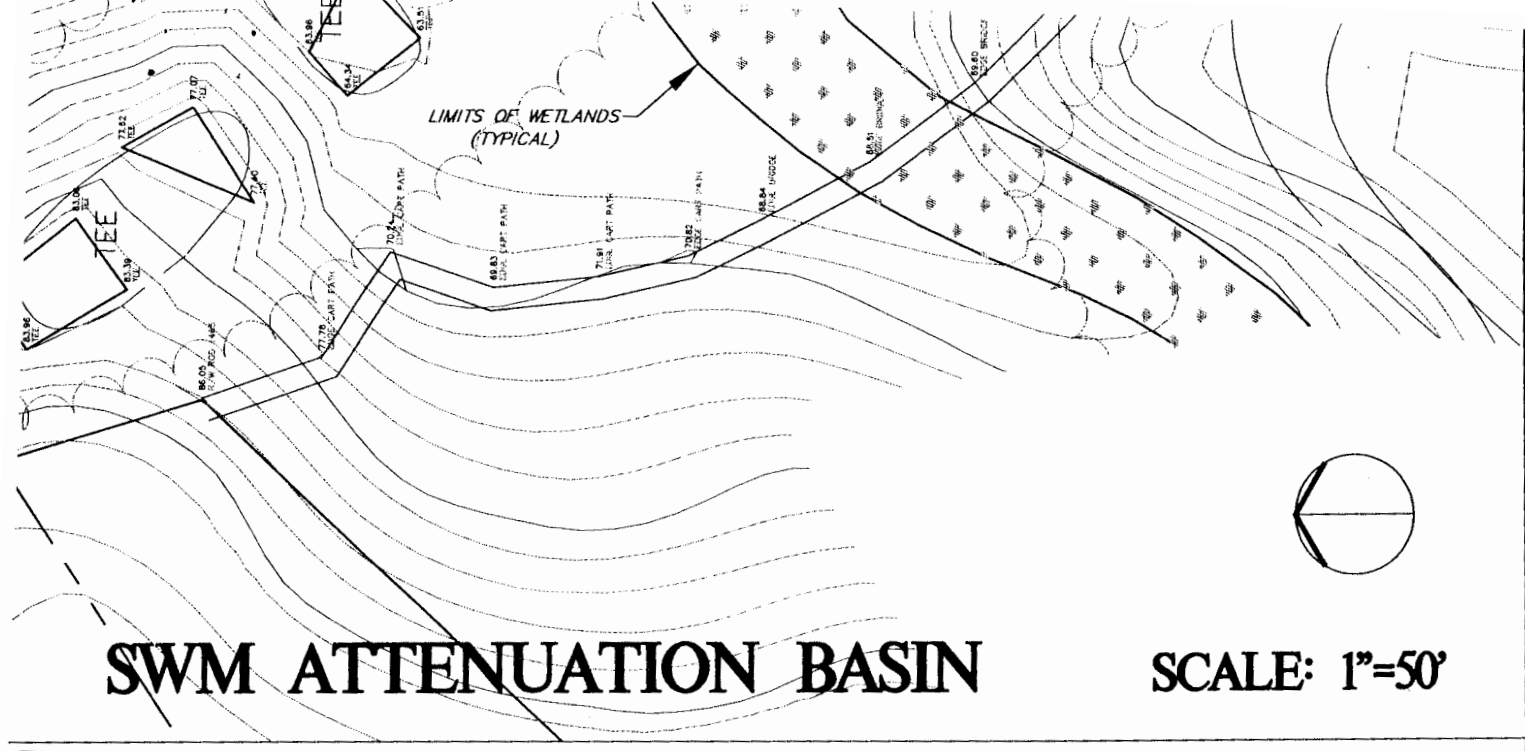
SWM ATTENUATION BASIN

SCALE: 1"=50'

COMMONWEALTH
RICHARD S.
No.
0236
PROFESSIONAL

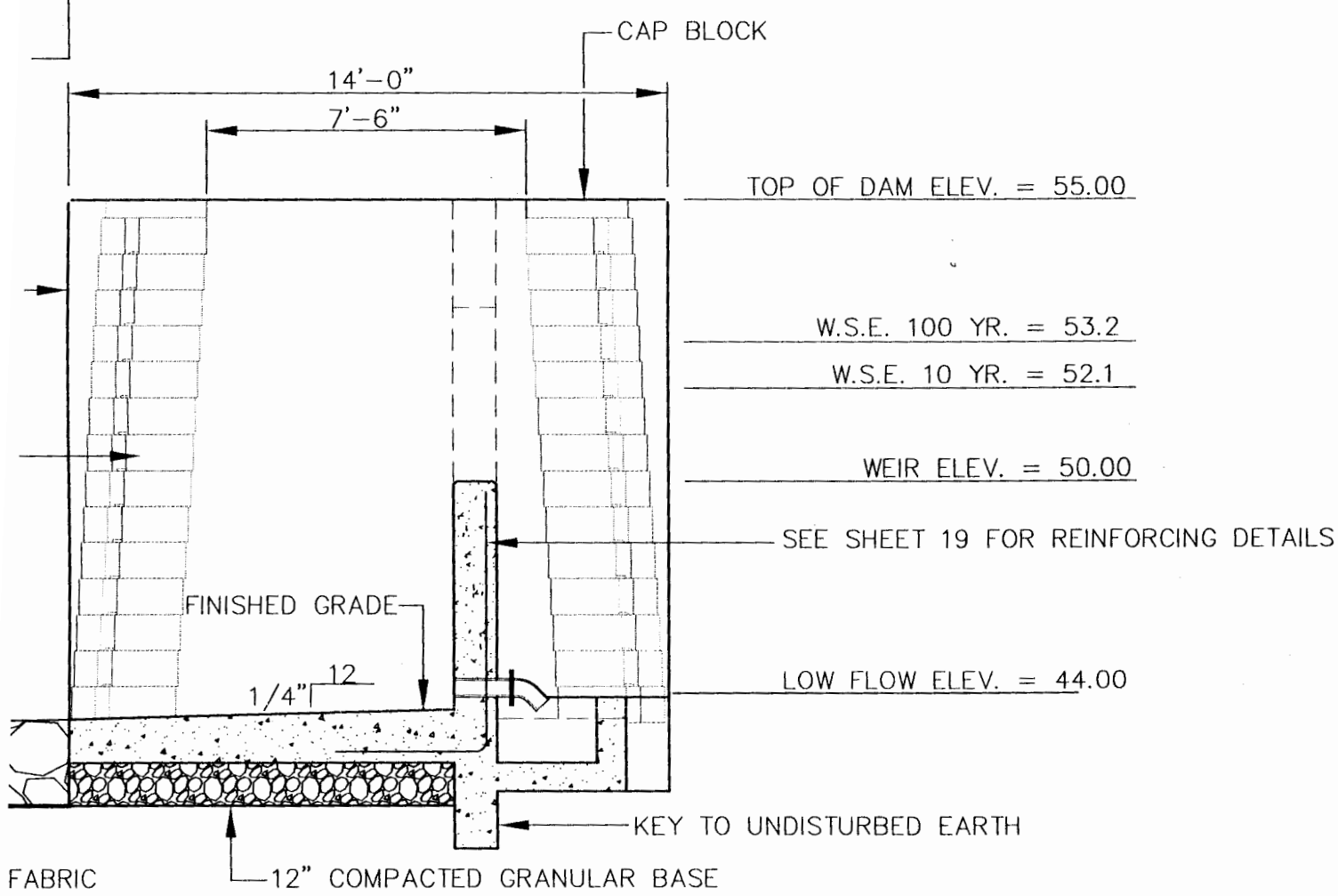
Langley and McDonald, P.C.
Engineers • Surveyors • Planners

DOES NOT ASSUME RESPONSIBILITY FOR MAINTENANCE
DETENTION/RETENTION POND OR IT'S STRUCTURES



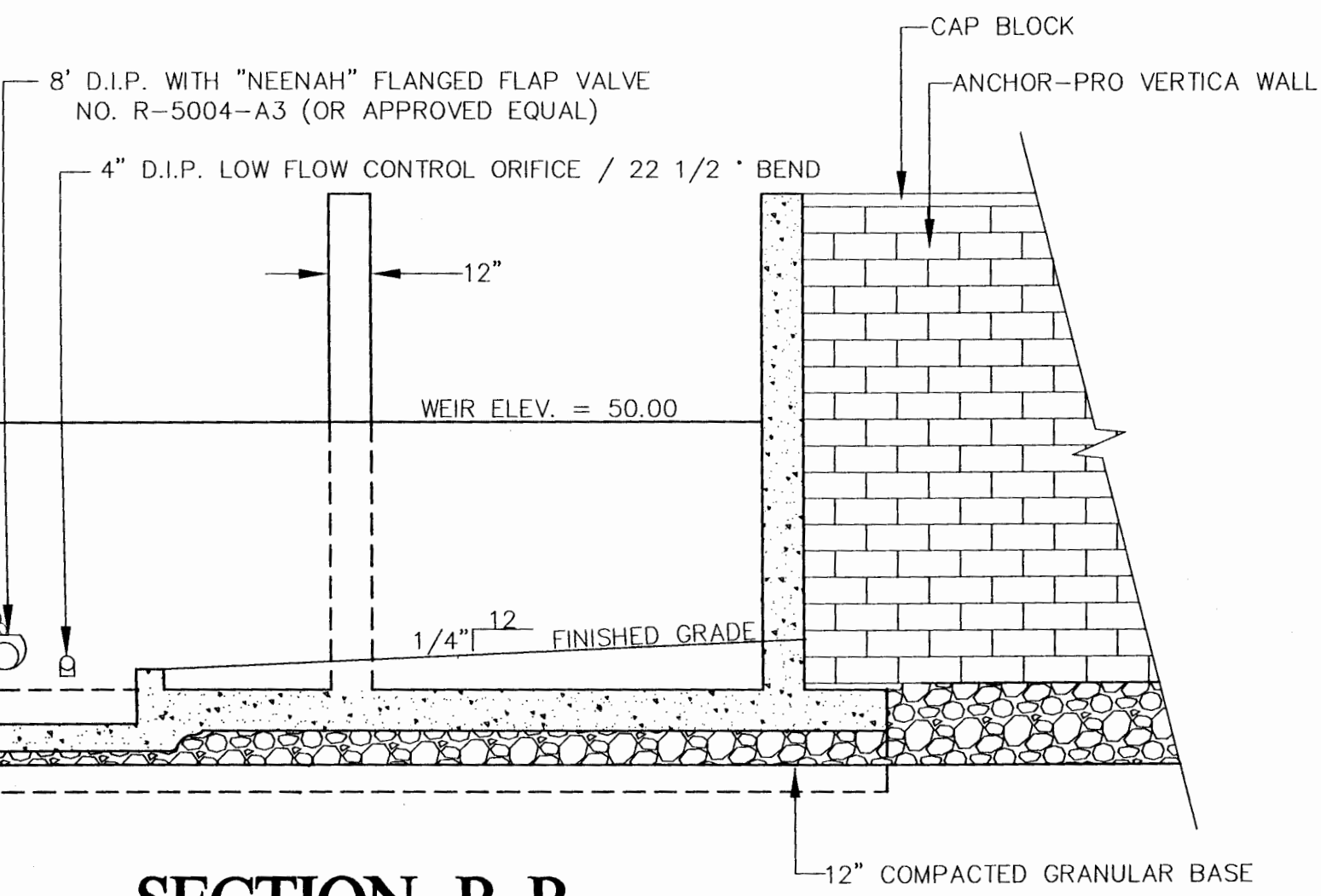
SWM ATTENUATION BASIN

SCALE: 1"=50'



SECTION A-A

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



SECTION B-B

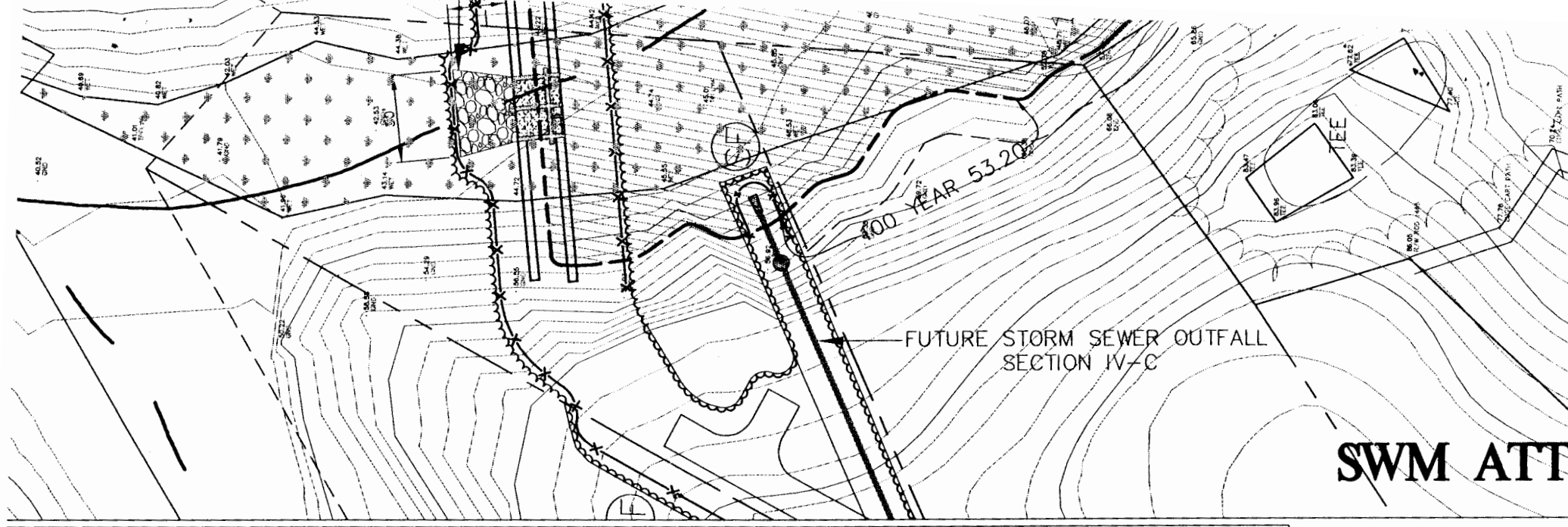
SCALE: 1/4" = 1'-0"

Langley and
Engineers · S
Landscape Architects
VIRGINIA BEACH

DES.	R.S.P.
DWN.	J.A.M.
CHK.	J.L.H.
DATE	OCT. 24, 1997

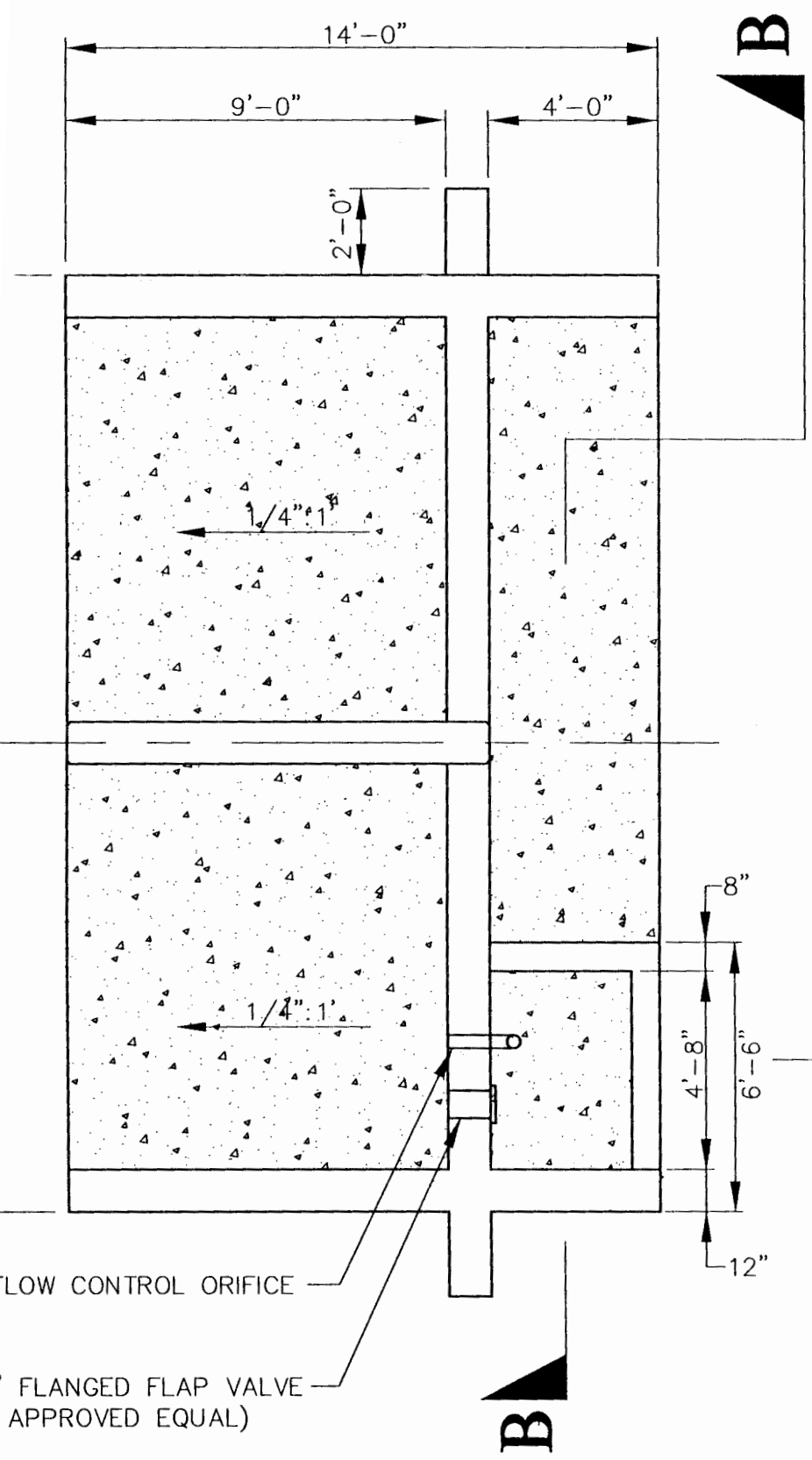
DEVELOPMENT AREA ONE, PHASE I
SECTION IVD
AT STONEHOUSE
FOR
STONEHOUSE L.L.C.
STORMWATER ATTENUATION BASIN SECTION AND DETAILS
STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

PROJ.NO.	96038-0452
SCALE:	AS SHOWN
SHEET	18 OF 23
DWG. NO.	



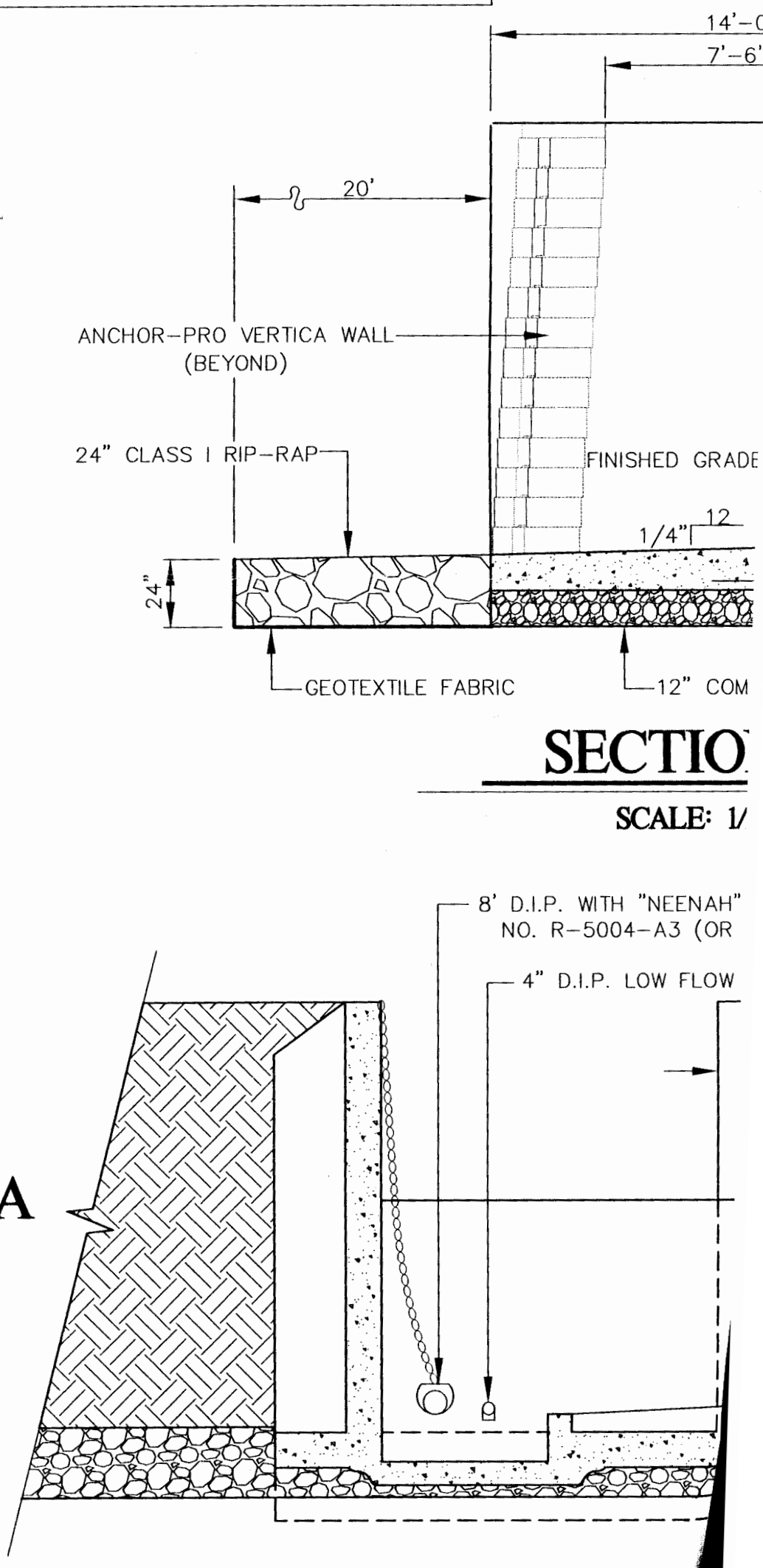
SWM ATT

VDOT DOES NOT ASSUME RESPONSIBILITY FOR MAINTENANCE OF THE DETENTION/RETENTION POND OR IT'S STRUCTURES AND SHALL BE SAVED HARMLESS FROM ANY DAMAGE



PLAN

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

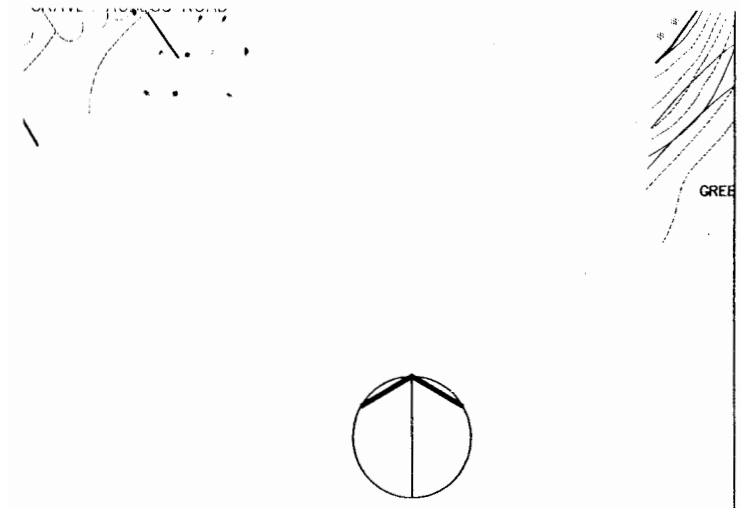


SECTIO

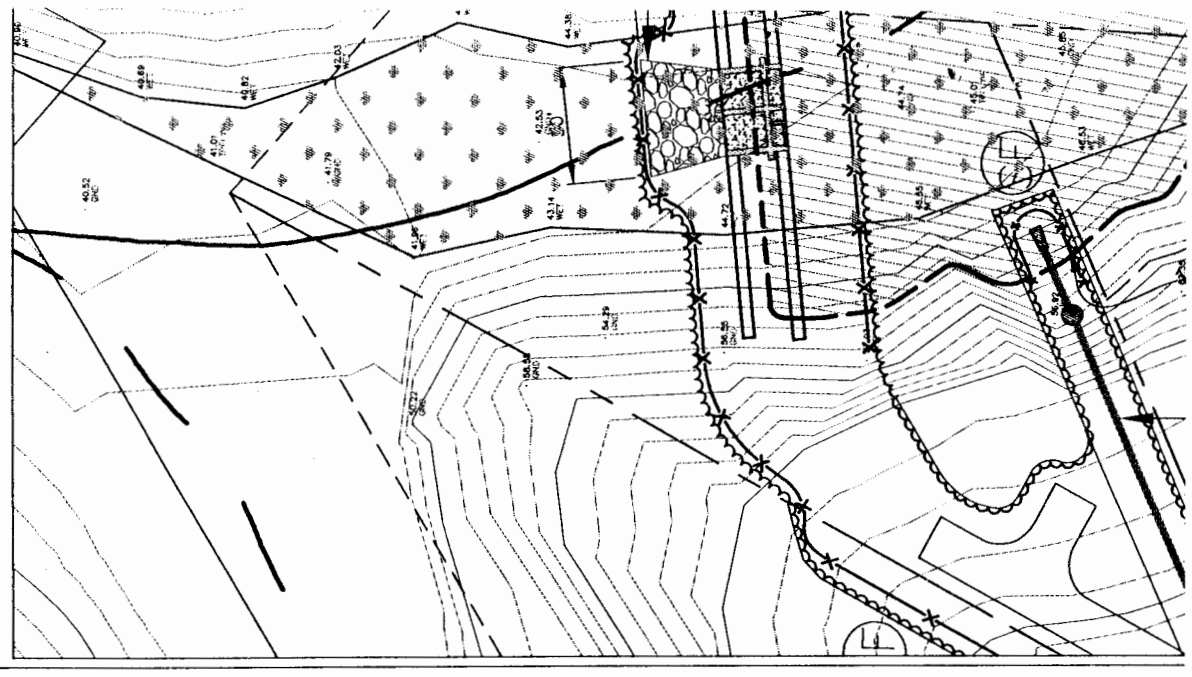
SCALE: 1/

SECTI

SCAL



SCALE: 1"=100'



NOTE: VDOT DOES NOT ASSUME RESPONSIBILITY
OF THE DETENTION/RETENTION POND OR
AND SHALL BE SAVED HARMLESS FROM A

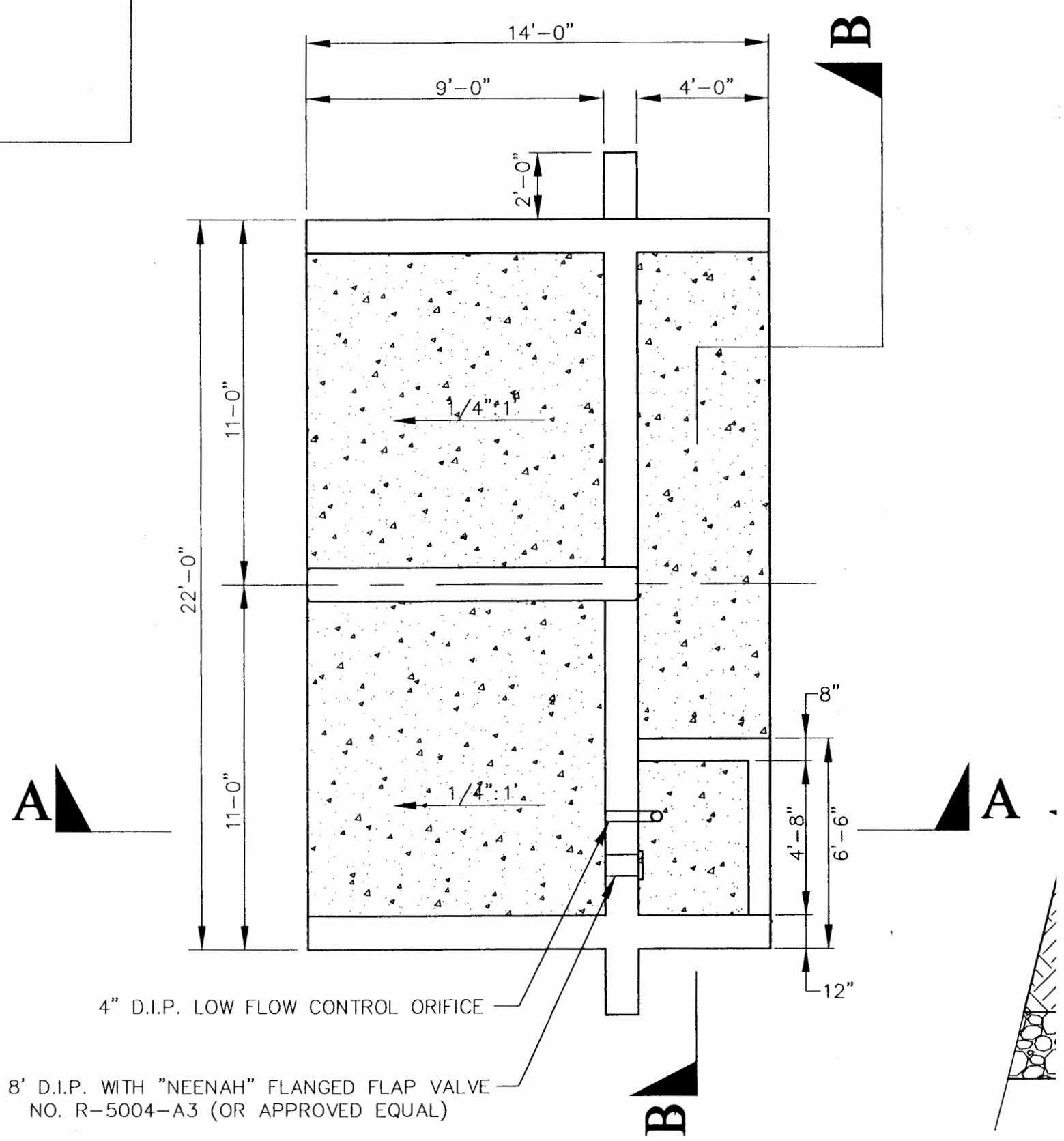
D

'H PROTECTION
ENT

S.

NS.
OVE WATER FROM BASE

] SCALE



PLAN

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

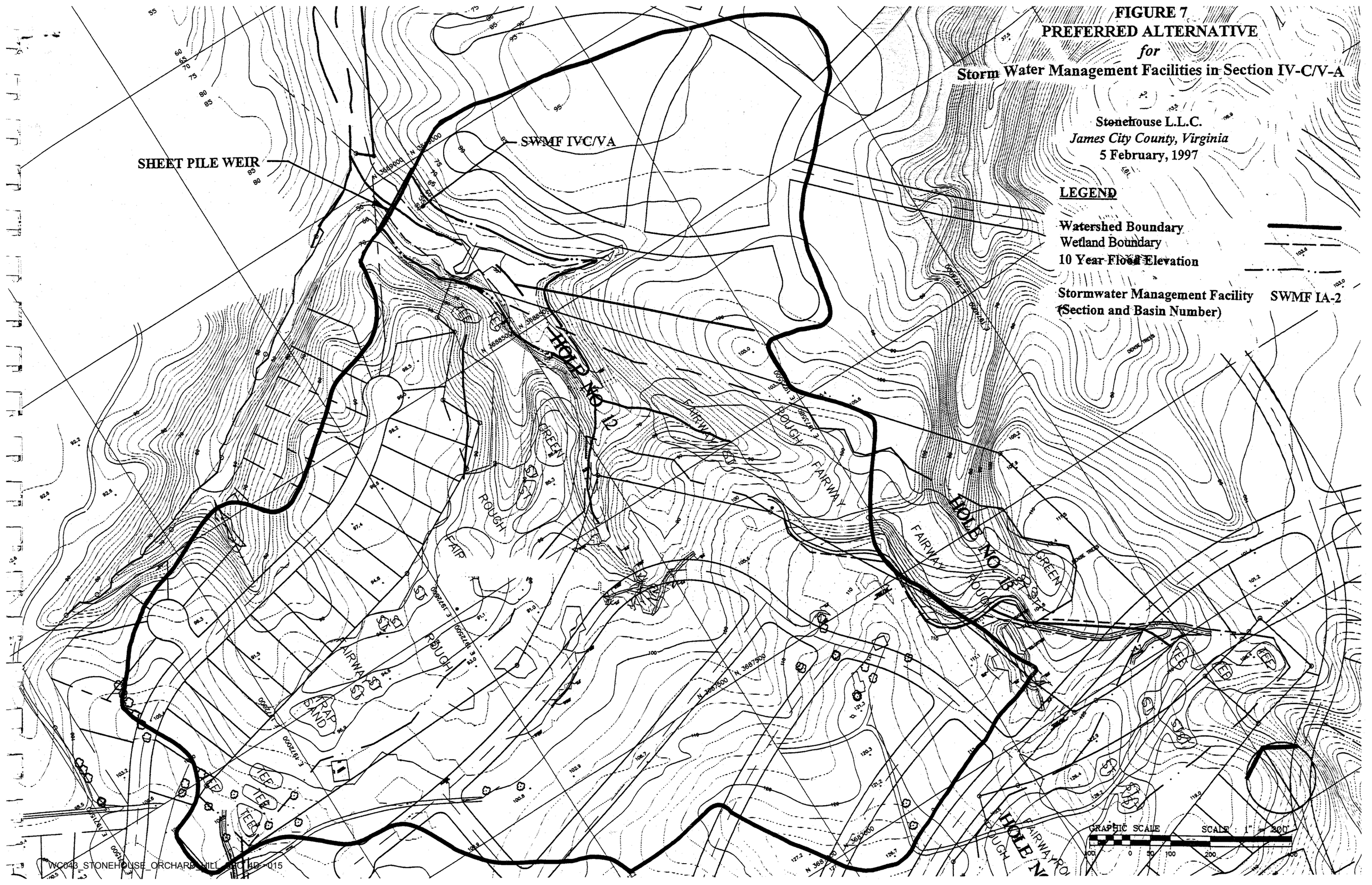
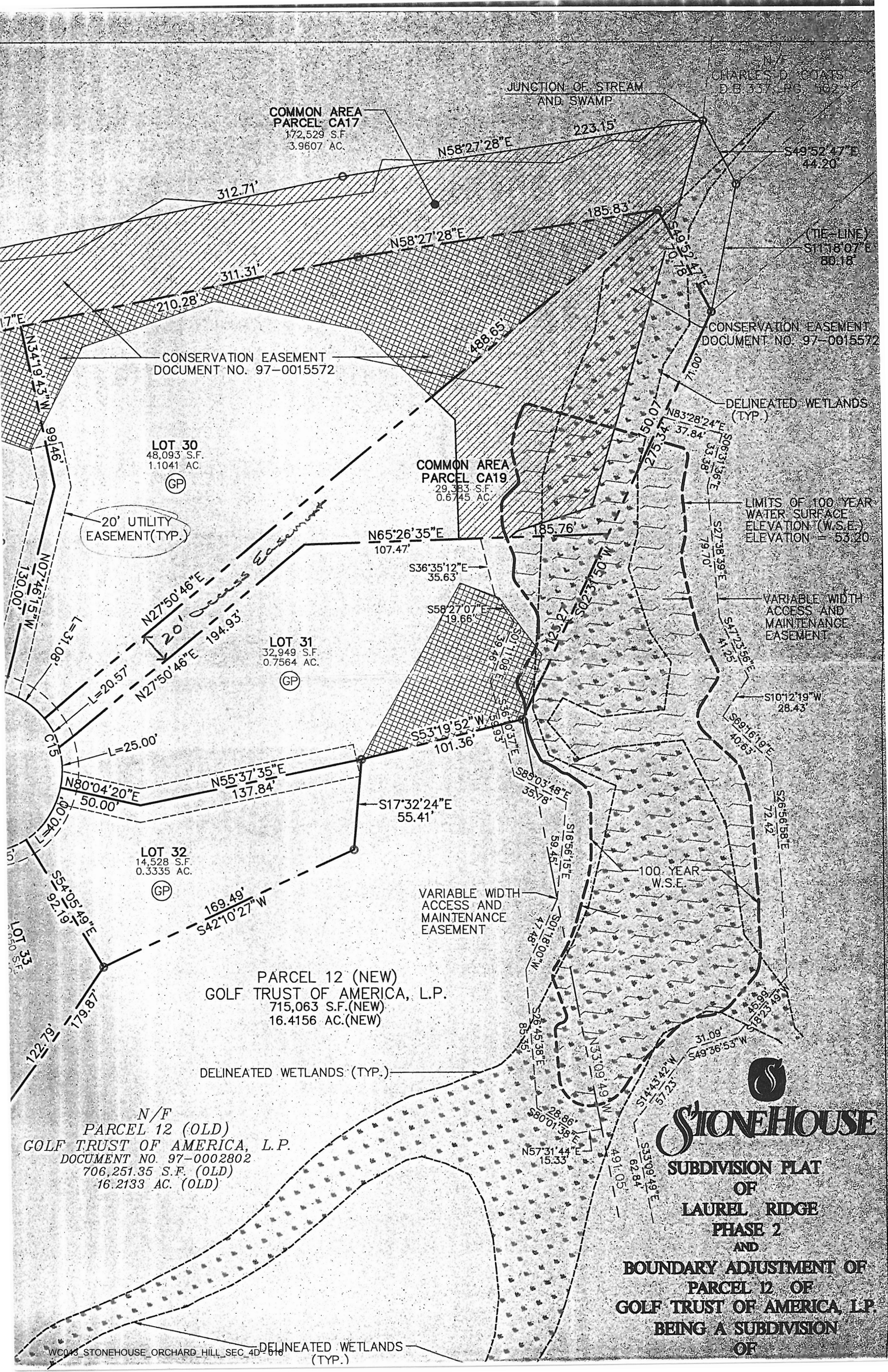


FIGURE 7
PREFERRED ALTERNATIVE
for
Storm Water Management Facilities in Section IV-C/V-A
Stonehouse L.L.C.
James City County, Virginia
5 February, 1997
LEGEND
Watershed Boundary
Wetland Boundary
10 Year Flood Elevation
Stormwater Management Facility (Section and Basin Number)
SWMF IA-2
SWMF IVC/VA
SHEET PILE WEIR
HOLE NO. 12
HOLE NO. 13
HOLE NO. 14
FAIRWAY
ROUGH
GREEN
TEE
TRAP
SAND
GRAPHIC SCALE
SCALE 1" = 200'
WC048_STONEHOUSE_ORCHARD_HILL_SHOT4B-015


COMMON AREA
PARCEL CA17
172,529 S.F.
3.9607 AC.
JUNCTION OF STREAM AND SWAMP
N/F
CHARLES D. COATS
D.B. 337, PG. 102
223.15'
N58°27'28"E
S49°52'47"E
44.20'
312.71'
185.83
N58°27'28"E
(TIE-LINE)
S11°18'07"E
80.18'
311.31'
210.28'
488.65'
CONSERVATION EASEMENT
DOCUMENT NO. 97-0015572
CONSERVATION EASEMENT
DOCUMENT NO. 97-0015572
N34°19'43"W
99.46'
71.00'
DELINEATED WETLANDS
(TYP.)
LOT 30
48,093 S.F.
1.1041 AC.
GP
COMMON AREA
PARCEL CA19
29,383 S.F.
0.6745 AC.
50.07'
N83°28'24"E
37.84'
275.34'
S06°31'36"E
33.38'
LIMITS OF 100 YEAR
WATER SURFACE
ELEVATION (W.S.E.)
ELEVATION = 53.20
20' UTILITY
EASEMENT(TYP.)
N65°26'35"E
107.47'
185.76'
S36°35'12"E
35.63'
S27°38'39"E
79.70'
N07°46'15"W
130.00'
N27°50'46"E
20' access Easement
194.93'
S58°27'07"E
19.66'
S02°37'50"W
125.27'
VARIABLE WIDTH
ACCESS AND
MAINTENANCE
EASEMENT
S47°23'56"E
41.25'
L=31.08'
L=20.57'
N27°50'46"E
LOT 31
32,949 S.F.
0.7564 AC.
GP
S10°12'19"W
28.43'
S69°16'19"E
40.63'
C15
L=25.00'
S53°19'52"W
101.36'
N55°37'35"E
137.84'
N80°04'20"E
50.00'
S17°32'24"E
55.41'
S85°03'48"E
35.78'
S26°56'58"E
72.42'
L=40.00'
LOT 32
14,528 S.F.
0.3335 AC.
GP
S16°56'15"E
59.45'
100 YEAR
W.S.E.
S54°05'49"E
92.19'
169.49'
S42°10'27"W
VARIABLE WIDTH
ACCESS AND
MAINTENANCE
EASEMENT
S01°18'00"W
47.48'
LOT 33
PARCEL 12 (NEW)
GOLF TRUST OF AMERICA, L.P.
715,063 S.F.(NEW)
16.4156 AC.(NEW)
179.87'
122.79'
S26°45'38"E
85.35'
N33°09'49"W
45.99'
S18°23'49"W
31.09'
S49°36'53"W
DELINEATED WETLANDS (TYP.)
S14°43'42"W
57.23'
28.86'
S80°01'38"E
N57°31'44"E
15.33'
491.05'
S33°09'49"E
62.84'
N/F
PARCEL 12 (OLD)
GOLF TRUST OF AMERICA, L.P.
DOCUMENT NO. 97-0002802
706,251.35 S.F. (OLD)
16.2133 AC. (OLD)
DELINEATED WETLANDS
(TYP.)
STONEHOUSE
SUBDIVISION PLAT
OF
LAUREL RIDGE
PHASE 2
AND
BOUNDARY ADJUSTMENT OF
PARCEL 12 OF
GOLF TRUST OF AMERICA, L.P.
BEING A SUBDIVISION
OF

BMP # WC 043 Analyses
for
Stonehouse Lisburn
County Plan No. S-27-02

NOV 1 5 2002

BMP #5-6

Storm Freq.	Pre-Dev. Runoff (in cfs)	Post-Dev. Runoff (in cfs)	Peak Release Rate (in cfs)	BMP Water Surface Elevation
1	0.67	5.69	0.68	44.96
2	1.97	8.94	0.76	47.11
10	9.16	21.22	9.86	50.37
100	18.05	33.94	12.38	52.28

BMP 4-5 (WC043)

A review of previous design documents for this facility identified this structure as a water quality facility only. The re-evaluation confirms this.

Although there is some (minor stormwater attenuation) which can and does occur with this facility, the reductions are somewhat insignificant. With this discovery, further analysis of the downstream facility, Coats Pond, was warranted.

EXISTING BMP #4-5 (CURRENT CONDITIONS)

Storm Freq.	Pre-Dev Runoff (in cfs)	Current-Dev. Runoff (in cfs)	Peak Release Rate (in cfs)	BMP Water Surface Elevation
1	8.30	28.27	5.47	50.16
2	18.10	49.36	32.08	50.60
10	63.32	135.16	126.80	51.53
100	116.43	226.92	217.07	52.19

DESIGN 53.29

EXISTING BMP #4-5 (POST CONDITIONS)

Storm Freq.	Pre-Dev Runoff (in cfs)	Post-Dev. Runoff (in cfs)	Peak Release Rate (in cfs)	BMP Water Surface Elevation
1	8.30	33.40	10.98	50.28
2	18.10	56.17	39.95	50.70
10	63.32	145.20	137.65	51.61
100	116.43	238.66	228.27	52.27

WC043

REVISED CALCULATION FOR SCS HYDROGRAPH GENERATION
FOR EXISTING BMP / SWM 4-5
STONEHOUSE, SECTION V-A, 'LISBURN'
AES Project No.: 9088-00
Revised October 3, 2002

I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN

A. Pre-Development Drainage Area to Point of Concern = 47.2 Acres

B. Pre-development Land Use, Soil Classification and Calculation of Composite Curve Number

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Wooded	7.9	73	575
2)	15-F Emporia Complex	C	Wooded	12.3	73	899
3)	19-B Kempsville-Emporia Fine Sandy Loam	B	Wooded	5.5	60	330
4)	29-A Slagle Fine Sandy Loam	C	Wooded	4.4	73	323
5)	31-B Suffolk	B	Wooded	13.4	60	803
6)	34-E Uchee Loamy Fine Sand	A	Wooded	3.7	36	132
	Totals =			47.2		3,062
	Composite CN =					65

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	mainly wooded	
Manning's roughness coefficient., n (table 5-7)	0.25	
Length of overland flow, L	300	Feet
2-year 24-hour rainfall, P2	3.5	inches
Average slope of overland flow , s	0.04	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.43	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved, wooded	
Length of shallow concentrated flow, L	300	Feet
Average slope of shallow concentrated flow, s	0.065	feet per foot
Average velocity, v	1.0	feet per second
Travel time, Tt = L/(3600*v)	0.08	hours

3) Channel or Pipe Flow

Length of channel flow, L	1375	Feet
Average velocity of channel flow, v	1.5	feet per second
Travel time, Tt = L/(3600*v)	0.25	hours
Total Time of Concentration =	0.77	hours
or	46	minutes

II. CURRENT-DEVELOPMENT CONDITIONS TO POINT OF CONCERN

A. Pre-Development Drainage Area to Point of Concern = 56.2 Acres

B. Pre-development Land Use, Soil Classification and Calculation of Composite Curve Number

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Wooded	4.0	73	292
1)	11-C Craven-Uchee	C	Residential - 1/2 acre lots	4.7	80	376
2)	14-B Emporia Fine Sandy Loam	C	Residential - 1/2 acre lots	1.2	80	93
2)	15-F Emporia Complex	C	Wooded	3.2	73	234
3)	15-F Emporia Complex	C	Residential - 1/2 acre lots	9.6	80	768
3)	19-B Kempsville-Emporia Fine Sandy Loam	B	Wooded	0.4	60	24
4)	19-B Kempsville-Emporia Fine Sandy Loam	B	Residential - 1/2 acre lots	3.4	70	238
4)	29-A Slagle Fine Sandy Loam	C	Wooded	1.1	73	80
5)	29-A Slagle Fine Sandy Loam	C	Residential - 1/2 acre lots	3.7	80	296
5)	31-B Suffolk	B	Wooded	2.5	60	150
7)	31-B Suffolk	B	Residential - 1/2 acre lots	18.4	70	1,288
6)	34-E Uchee Loamy Fine Sand	A	Wooded	0.0	36	0
8)	34-E Uchee Loamy Fine Sand	A	Residential - 1/2 acre lots	4.1	54	219
	Totals =			56.2		4,058
	Composite CN =					72

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	residential	
Manning's roughness coefficient., n (table 5-7)	0.25	
Length of overland flow, L	100	Feet
2-year 24-hour rainfall, P2	6.5	inches
Average slope of overland flow , s	0.04	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.13	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved	
Length of shallow concentrated flow, L	250	Feet
Average slope of shallow concentrated flow, s	0.02	feet per foot
Average velocity, v	1.0	feet per second
Travel time, Tt = L/(3600*v)	0.07	hours

3) Channel or Pipe Flow

Length of channel flow, L	2225	Feet
Average velocity of channel flow, v	2.25	feet per second
Travel time, Tt = L/(3600*v)	0.27	hours
Total Time of Concentration =	0.47	hours
or	28	minutes

III. POST-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for total site)

A. Post-Development Drainage Area to Point of Concern = 56.3 Acres

B. Post-development Land Use, Soil Classification and Calculation of Composite Curve Number

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Residential - 1/2 acre lots	8.9	80	709
2)	14-B Emporia Fine Sandy Loam	C	Residential - 1/2 acre lots	1.2	80	93
3)	15-F Emporia Complex	C	Residential - 1/2 acre lots	12.8	80	1,021
4)	19-B Kempsville-Emporia Fine Sandy Loam	B	Residential - 1/2 acre lots	3.8	70	267
5)	29-A Slagle Fine Sandy Loam	C	Residential - 1/2 acre lots	4.4	80	354
6)	29-B Slagle Fine Sandy Loam	C	Residential - 1/2 acre lots	0.4	80	29
7)	31-B Suffolk	B	Residential - 1/2 acre lots	20.9	70	1,462
8)	34-E Uchee Loamy Fine Sand	A	Residential - 1/2 acre lots	4.1	54	219
	Total Adjusted CN =			56.3		4,155
	Composite CN =					74

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	residential	
Manning's roughness coefficient., n (table 5-7)	0.25	
Length of overland flow, L	100	Feet
25-year 24-hour rainfall, P25	6.5	inches
Average slope of overland flow , s	0.04	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.13	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved	
Length of shallow concentrated flow, L	250	Feet
Average slope of shallow concentrated flow, s	0.02	feet per foot
Average velocity, v	1.0	feet per second
Travel time, Tt = L/(3600*v)	0.07	hours

3) Channel or Pipe Flow

Length of channel flow, L	2225	Feet
Average velocity of channel flow, v	2.25	feet per second
Travel time, Tt = L/(3600*v)	0.27	hours
Total Time of Concentration =	0.47	hours
or	28	minutes

IV. PROPOSED ESTIMATED POND(S) VOLUME ABOVE NORMAL POOL BY ELEVATION

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
44.0		920	0			
45.0	1.0	2590	1755	65	1755	65
46.0	1	5690	4140	153	5895	218
47.0	1	8636	7163	265	13058	484
48.0	1	13010	10823	401	23881	884
49.0	1	17093	15052	557	38933	1442
50.0	1	23303	20198	748	59131	2190
51.0	1	28615	25959	961	85090	3151
52.0	1	34956	31786	1177	116875	4329
53.0	1	41397	38177	1414	155052	5743
54.0	1	50118	45758	1695	200809	7437
55.0	1	57805	53962	1999	254771	9436

V. DETERMINING RELEASE RATE OF 1-YEAR, 24-HOUR DETAINED FOR 24 HOURS FOR STREAM CHANNEL PROTECTION

Volume of 1-Year, 24-Hour Storm (based upon Hydrograph) =	165,224 cubic feet	
Elevation of water surface associated with 1-Year, 24-Hour Storm Volume =	50.5	(Actual WSEL of routed 1-year strom is EL 48.57)
Elevation of Release Inlet for Channel Protection =	46.0	
Average Head, in feet, on Release Inlet +	2.3	

Average Release Rate Calculation

$$\frac{165{,}224 \text{ cubic feet}}{(24 \text{ hours} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/ minute})} = 1.9 \text{ cfs}$$

Calculation of Size of Release Inlet

Diameter of Release Inlet = 2 * (Q / ((64.32 * (h / 2)) ^ (1/2) * 0.6 * 3.14))) ^ (1/2)
where, Q equals Average Release Rate, in cfs
h equals Average Head, in feet

Diameter of Release Inlet = 0.70 feet, or 9 inches (4" use in Computer Routing)

REVISED CALCULATION FOR SCS HYDROGRAPH GENERATION AND CHANNEL PROTECTION
FOR COATS POND (EXISTING)
STONEHOUSE, SECTION V-A, 'LISBURN'
AES Project No.: 9088-00
August 6, 2002

I. PRE-DEVELOPMENT CONDITIONS TO POINT OF CONCERN

A. Pre-Development Drainage Area to Point of Concern = 103.6 Acres

B. Pre-development Land Use, Soil Classification and Calculation of Composite Curve Number

	Soil Type	Soil Hydrologic Group	Pre-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Wooded	19.1	73	1,391
2)	15-F Emporia Complex	C	Wooded	37.1	73	2,710
3)	19-B Kempsville-Emporia Fine Sandy Loam	B	Wooded	10.0	60	602
4)	29-A Slagle Fine Sandy Loam	C	Wooded	5.5	60	330
5)	29-B Slagle Fine Sandy Loam	C	Wooded	1.3	73	95
6)	31-B Suffolk	B	Wooded	25.4	60	1,525
7)	34-E Uchee Loamy Fine Sand	A	Wooded	5.2	36	187
	Totals =			103.6		6,841
	Composite CN =					66

C. Pre-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	mainly wooded	
Manning's roughness coefficient., n (table 5-7)	0.25	
Length of overland flow, L	300	Feet
2-year 24-hour rainfall, P2	3.5	inches
Average slope of overland flow , s	0.04	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.43	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved, wooded	
Length of shallow concentrated flow, L	300	Feet
Average slope of shallow concentrated flow, s	0.065	feet per foot
Average velocity, v	1.0	feet per second
Travel time, Tt = L/(3600*v)	0.08	hours

3) Channel or Pipe Flow

Length of channel flow, L	2680	Feet
Average velocity of channel flow, v	1.5	feet per second
Travel time, Tt = L/(3600*v)	0.50	hours
Total Time of Concentration =	1.01	hours
or	61	minutes

II. CURRENT-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for total site)

A. Post-Development Drainage Area to Point of Concern = 50.2 Acres

B. Post-development Land Use, Soil Classification and Calculation of Composite Curve Number

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Wooded	10.5	73	767
2)	14-B Emporia Fine Sandy Loam	C	Mostly Wooded	0.0	73	0
3)	15-F Emporia Complex	C	Wooded / Portions of lots	24.9	76	1,892
4)	19-B Kempsville-Emporia Fine Sandy Loam	B	Mostly Wooded	4.5	63	286
5)	29-A Slagle Fine Sandy Loam	C	Mostly Wooded	1.0	73	75
6)	29-B Slagle Fine Sandy Loam	C	Mostly Wooded	0.9	73	67
7)	31-B Suffolk	B	Wooded / Portions of lots	6.8	63	428
8)	34-E Uchee Loamy Fine Sand	A	Mostly Wooded	1.5	39	60
	Total Adjusted CN =			50.2		3,574
	Composite CN =					71

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	residential	
Manning's roughness coefficient., n (table 5-7)	0.25	
Length of overland flow, L	250	Feet
25-year 24-hour rainfall, P25	6.5	inches
Average slope of overland flow , s	0.04	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.27	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved	
Length of shallow concentrated flow, L	225	Feet
Average slope of shallow concentrated flow, s	0.02	feet per foot
Average velocity, v	1.0	feet per second
Travel time, Tt = L/(3600*v)	0.06	hours

3) Channel or Pipe Flow

Length of channel flow, L	1200	Feet
Average velocity of channel flow, v	1.5	feet per second
Travel time, Tt = L/(3600*v)	0.22	hours
Total Time of Concentration =	0.56	hours
or	33	minutes

III. POST-DEVELOPMENT CONDITIONS TO POINT OF CONCERN (for total site)

A. Post-Development Drainage Area to Point of Concern = 50.5 Acres

B. Post-development Land Use, Soil Classification and Calculation of Composite Curve Number

	Soil Type	Soil Hydrologic Group	Post-Development Land Use	Area of Land Use (in Acres)	Curve Number for Land Use (CN)	Adjusted (CN)
1)	11-C Craven-Uchee	C	Wooded / Portions of lots	10.8	76	822
2)	14-B Emporia Fine Sandy Loam	C	Mostly Wooded	0.0	76	0
3)	15-F Emporia Complex	C	Wooded / Portions of lots	24.9	76	1,892
4)	19-B Kempsville-Emporia Fine Sandy Loam	B	Mostly Wooded	4.5	63	286
5)	29-A Slagle Fine Sandy Loam	C	Mostly Wooded	1.0	76	78
6)	29-B Slagle Fine Sandy Loam	C	Mostly Wooded	0.9	76	70
7)	31-B Suffolk	B	Wooded / Portions of lots	6.8	63	428
8)	34-E Uchee Loamy Fine Sand	A	Mostly Wooded	1.5	39	60
	Total Adjusted CN =			50.5		3,635
	Composite CN =					72

C. Post-Development Time of Concentration Calculations

1) Overland Flow (maximum 300 feet)

Surface description (table 5-7)	residential	
Manning's roughness coefficient., n (table 5-7)	0.25	
Length of overland flow, L	250	Feet
25-year 24-hour rainfall, P25	6.5	inches
Average slope of overland flow , s	0.04	feet per foot
Travel time, Tt = (0.007*(n*L)^0.8)/(P2^0.5*s^0.4)	0.27	hours

2) Shallow concentrated flow (maximum 300 feet)

Surface description, paved or unpaved	unpaved	
Length of shallow concentrated flow, L	225	Feet
Average slope of shallow concentrated flow, s	0.02	feet per foot
Average velocity, v	1.0	feet per second
Travel time, Tt = L/(3600*v)	0.06	hours

3) Channel or Pipe Flow

Length of channel flow, L	1200	Feet
Average velocity of channel flow, v	1.5	feet per second
Travel time, Tt = L/(3600*v)	0.22	hours
Total Time of Concentration =	0.56	hours
or	33	minutes

IV. PROPOSED ESTIMATED POND(S) VOLUME ABOVE NORMAL POOL BY ELEVATION

Elevation	Depth	Area (sq. ft.)	Incremental Volume (cu. ft.)	Inc. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
38.0		83423	0			
40.0	2.0	111050	194473	7203	194473	7203
42.0	2	141685	252735	9361	447208	16563
44.0	2	172428	314113	11634	761321	28197
46.0	2	211133	383561	14206	1144882	42403

V. DETERMINING RELEASE RATE OF 1-YEAR, 24-HOUR DETAINED FOR 24 HOURS FOR STREAM CHANNEL PROTECTION

Volume of 1-Year, 24-Hour Storm (based upon Hydrograph) = 332,735 cubic feet

Elevation of water surface associated with 1-Year, 24-Hour Storm Volume = 41.1 (Actual WSEL of routed 1-year strom is EL 40.08)

Elevation of Release Inlet for Channel Protection = 38.3

Average Head, in feet, on Release Inlet + 1.4

Average Release Rate Calculation

$$\frac{332{,}735 \text{ cubic feet}}{(24 \text{ hours} \times 60 \text{ minutes/hour} \times 60 \text{ seconds/ minute})} = 3.9 \text{ cfs}$$

Calculation of Size of Release Inlet

Diameter of Release Inlet = 2 * (Q / ((64.32 * (h / 2)) ^ (1/2) * 0.6 * 3.14))) ^ (1/2)
where, Q equals Average Release Rate, in cfs
h equals Average Head, in feet

Diameter of Release Inlet = 1.10 feet, or 14 inches (12"Existing)

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 1 - Existing Pond 4-5

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	44.00	920	0	0
1.00	45.00	2,590	1,755	1,755
2.00	46.00	5,690	4,140	5,895
3.00	47.00	8,636	7,163	13,058
4.00	48.00	13,010	10,823	23,881
5.00	49.00	17,093	15,052	38,933
6.00	50.00	23,303	20,198	59,131
7.00	51.00	28,615	25,959	85,090
8.00	52.00	34,956	31,786	116,875
9.00	53.00	41,397	38,177	155,052
10.00	54.00	50,118	45,758	200,809

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 4.0	0.0	0.0	0.0
Span in	= 4.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 44.00	0.00	0.00	0.00
Length ft	= 0.5	0.0	0.0	0.0
Slope %	= 1.00	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 20.00	180.00	110.00	0.00
Crest El. ft	= 50.00	55.50	64.25	0.00
Weir Coeff.	= 3.33	2.60	3.33	0.00
Weir Type	= Rect	Broad	Rect	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	44.00	0.00	---	---	---	0.00	0.00	0.00	---	---	0.00
1.00	1,755	45.00	0.38	---	---	---	0.00	0.00	0.00	---	---	0.38
2.00	5,895	46.00	0.57	---	---	---	0.00	0.00	0.00	---	---	0.57
3.00	13,058	47.00	0.71	---	---	---	0.00	0.00	0.00	---	---	0.71
4.00	23,881	48.00	0.82	---	---	---	0.00	0.00	0.00	---	---	0.82
5.00	38,933	49.00	0.92	---	---	---	0.00	0.00	0.00	---	---	0.92
6.00	59,131	50.00	1.01	---	---	---	0.00	0.00	0.00	---	---	1.01
7.00	85,090	51.00	1.10	---	---	---	66.60	0.00	0.00	---	---	67.70
8.00	116,875	52.00	1.18	---	---	---	188.37	0.00	0.00	---	---	189.55
9.00	155,052	53.00	1.25	---	---	---	346.06	0.00	0.00	---	---	347.31
10.00	200,809	54.00	1.32	---	---	---	532.80	0.00	0.00	---	---	534.12

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	8.30	5	745	71,570	—	-----	-----	Pond 4-5 [PRE]
3	SCS Runoff	28.27	5	735	145,544	—	-----	-----	Pond 4-5 [CURRENT]
4	Reservoir	5.47	5	790	145,544	3	50.16	63,302	Pond 4-5 Routed (Curre
6	SCS Runoff	33.40	5	735	165,224	—	-----	-----	Pond 4-5 [POST]
7	Reservoir	10.98	5	765	165,224	6	50.28	66,395	Pond 4-5 Routed (Post)
11	SCS Runoff	16.73	5	755	167,511	—	-----	-----	Coats Pond [PRE]
13	SCS Runoff	23.09	5	735	121,800	—	-----	-----	Coats Pond [Current]
14	Combine	23.93	5	735	267,343	4, 13	-----	-----	4-5 routed PLUS Coats Pond
15	Reservoir	2.75	5	1140	248,550	14	39.37	133,382	Coats Pond Routed (CURRENT)
17	SCS Runoff	25.41	5	735	130,783	—	-----	-----	Coats Pond [POST]
18	Combine	26.29	5	735	296,006	7, 17	-----	-----	4-5 routed PLUS Coats Pond
19	Reservoir	4.20	5	1065	314,369	18	40.08	204,014	Coats Pond Routed (POST)

NET 0.71' INCREASE

Proj. file: Existing Ponds.gpw | Return Period: 1 yr | Run date: 10-10-2002

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	18.10	5	745	128,843	---	-----	-----	Pond 4-5 [PRE]
3	SCS Runoff	49.36	5	730	235,820	---	-----	-----	Pond 4-5 [CURRENT]
4	Reservoir	32.08	5	750	235,819	3	50.60	74,727	Pond 4-5 Routed (Curre
6	SCS Runoff	56.17	5	730	261,319	---	-----	-----	Pond 4-5 [POST]
7	Reservoir	39.95	5	745	261,319	6	50.70	77,260	Pond 4-5 Routed (Post)
11	SCS Runoff	34.96	5	755	296,272	---	-----	-----	Coats Pond [PRE]
13	SCS Runoff	41.27	5	735	199,900	---	-----	-----	Coats Pond [Current]
14	Combine	59.79	5	750	435,719	4, 13	-----	-----	4-5 routed PLUS Coats Pond
15	Reservoir	4.58	5	1080	416,790	14	40.31	233,181	Coats Pond Routed (CURRENT)
17	SCS Runoff	44.35	5	730	211,902	---	-----	-----	Coats Pond [POST]
18	Combine	74.93	5	745	473,220	7, 17	-----	-----	4-5 routed PLUS Coats Pond
19	Reservoir	11.91	5	865	538,906	18	40.91	309,191	Coats Pond Routed (POST)

NET 0.60' INCREASE

Proj. file: Existing Ponds.gpw | Return Period: 2 yr | Run date: 10-10-2002

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	63.32	5	740	378,135	---	-----	-----	Pond 4-5 [PRE]
3	SCS Runoff	135.16	5	730	595,480	---	-----	-----	Pond 4-5 [CURRENT]
4	Reservoir	126.80	5	735	595,479	3	51.53	101,827	Pond 4-5 Routed (Curre
6	SCS Runoff	145.20	5	730	635,938	---	-----	-----	Pond 4-5 [POST]
7	Reservoir	137.65	5	735	635,937	6	51.61	104,586	Pond 4-5 Routed (Post)
11	SCS Runoff	117.67	5	755	848,876	---	-----	-----	Coats Pond [PRE]
13	SCS Runoff	116.38	5	730	514,613	---	-----	-----	Coats Pond [Current]
14	Combine	239.92	5	735	1,110,090	4, 13	-----	-----	4-5 routed PLUS Coats Pond
15	Reservoir	84.08	5	765	1,091,009	14	42.01	448,896	Coats Pond Routed (CURRENT)
17	SCS Runoff	121.45	5	730	535,084	---	-----	-----	Coats Pond [POST]
18	Combine	255.48	5	735	1,171,020	7, 17	-----	-----	4-5 routed PLUS Coats Pond
19	Reservoir	91.96	5	790	1,466,025	18	42.74	563,226	Coats Pond Routed (POST)

NET 0.73' INCREASE

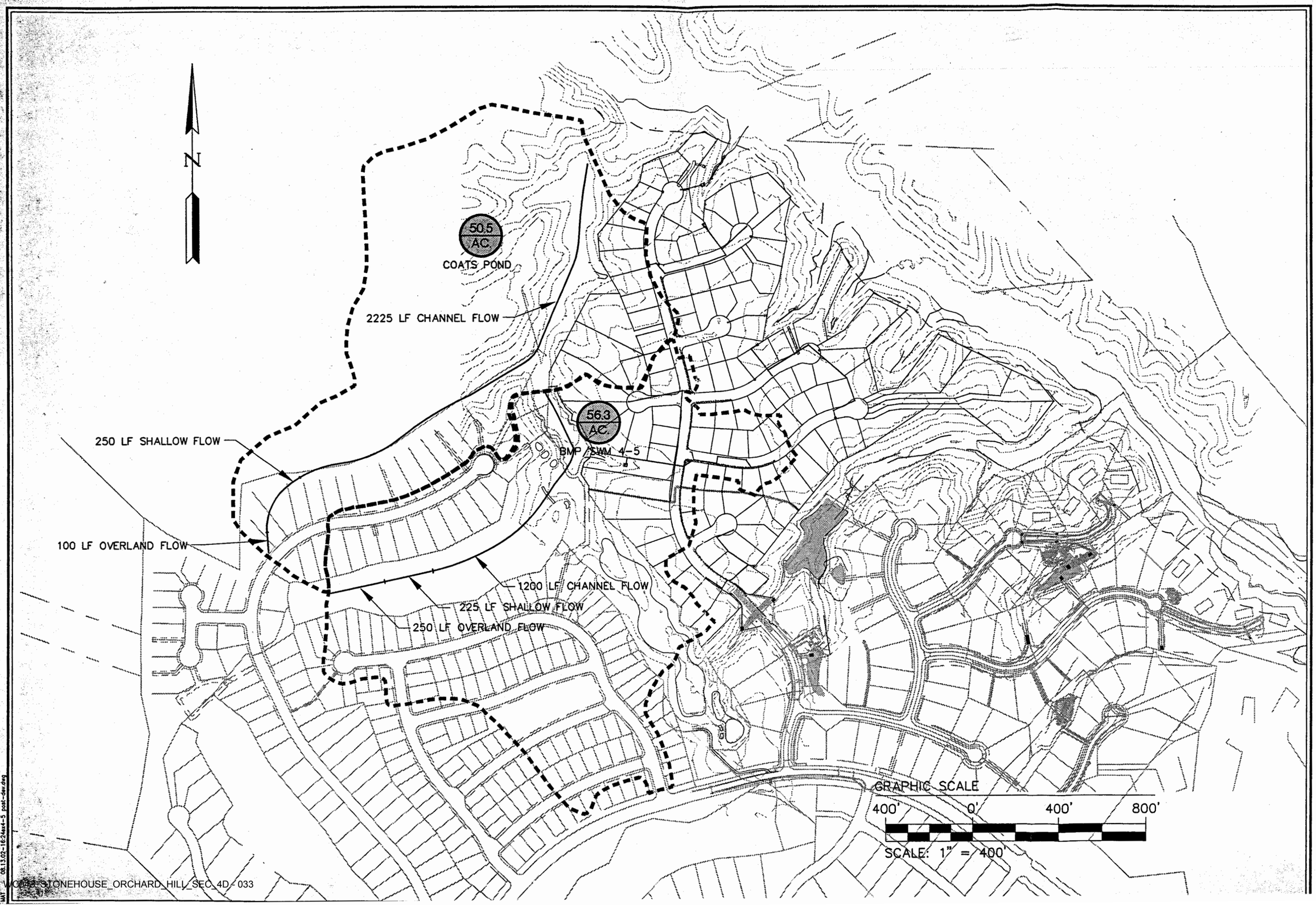
Proj. file: Existing Ponds.gpw | Return Period: 10 yr | Run date: 10-10-2002

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	116.43	5	740	667,222	---	-----	-----	Pond 4-5 [PRE]
3	SCS Runoff	226.92	5	730	987,623	---	-----	-----	Pond 4-5 [CURRENT]
4	Reservoir	217.07	5	735	987,621	3	52.19	124,134	Pond 4-5 Routed (Curre
6	SCS Runoff	238.66	5	730	1,038,113	---	-----	-----	Pond 4-5 [POST]
7	Reservoir	228.27	5	735	1,038,112	6	52.27	126,994	Pond 4-5 Routed (Post)
11	SCS Runoff	213.12	5	750	1,483,572	---	-----	-----	Coats Pond [PRE]
13	SCS Runoff	197.57	5	730	860,530	---	-----	-----	Coats Pond [Current]
14	Combine	407.04	5	735	1,848,150	4, 13	-----	-----	4-5 routed PLUS Coats Pond
15	Reservoir	140.48	5	760	1,829,046	14	44.07	774,315	Coats Pond Routed (CURRENT)
17	SCS Runoff	203.91	5	730	887,455	---	-----	-----	Coats Pond [POST]
18	Combine	424.07	5	735	1,925,565	7, 17	-----	-----	4-5 routed PLUS Coats Pond
19	Reservoir	200.79	5	775	2,502,877	18	44.73	901,342	Coats Pond Routed (POST)

NET 0.66' INCREASE

Proj. file: Existing Ponds.gpw | Return Period: 100 yr | Run date: 10-10-2002



No.	DATE	REVISION / COMMENT / NOTE	BY

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

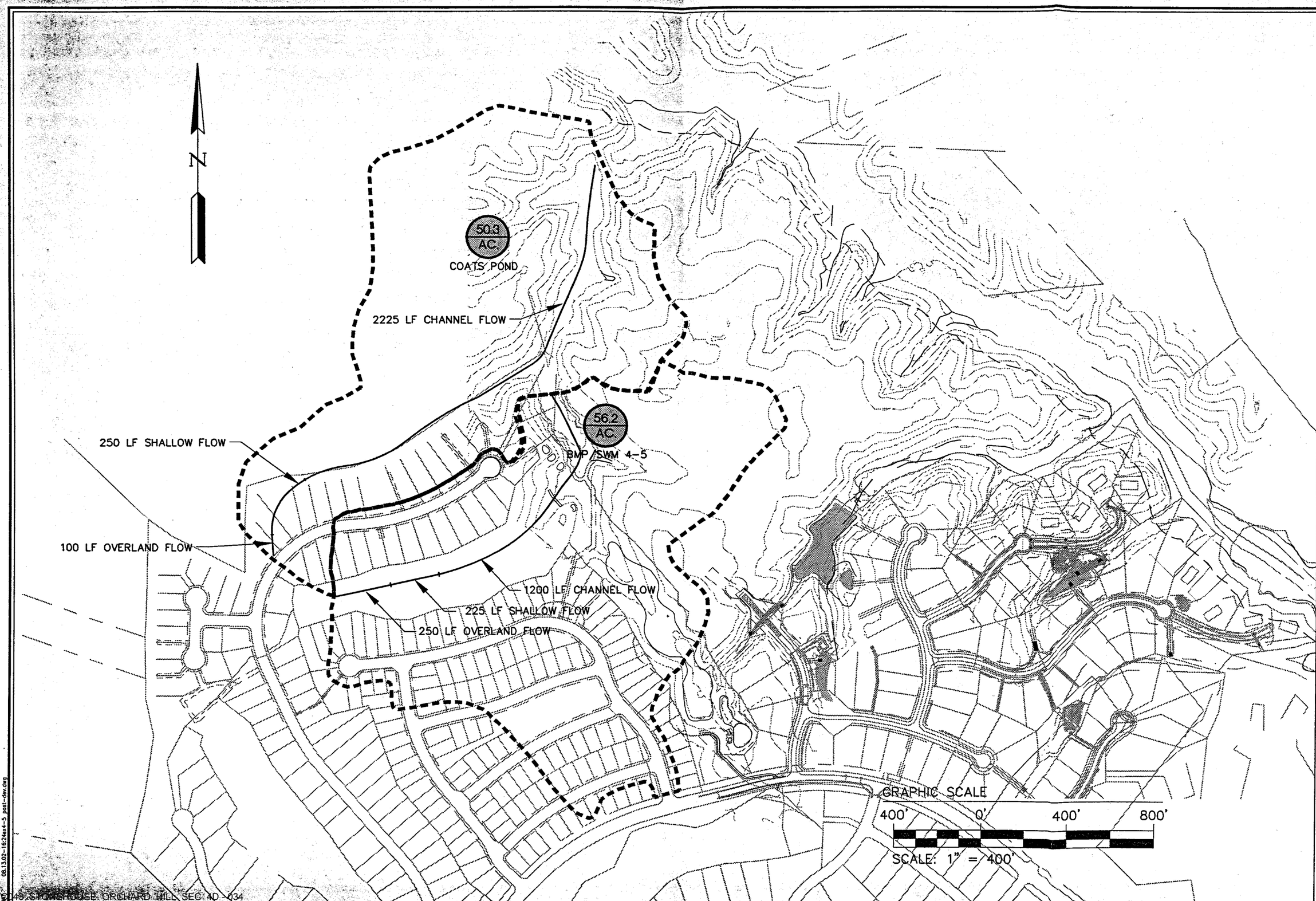
EXISTING POND
Post-Dev. Drainage Area
SECTION V-A "LISBURN" AT STONEHOUSE

STONEHOUSE DISTRICT — JAMES CITY COUNTY — VIRGINIA

Designed AES	Drawn AES
Scale 1"=400'	Date 8/07/02
Project No. 9088	
Drawing No. 1 OF 1	

V:\0044_STONEHOUSE_ORCHARD_HILL_SEC_4D - 033

MAT 08.13.02-16:24ex4-5 post-dev.dwg



No.	DATE	REVISION / COMMENT / NOTE	BY

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

EXISTING POND
Current-Dev. Drainage Area
SECTION V-A "LISBURN" AT STONEHOUSE

STONEHOUSE DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
AES	AES
Scale 1"=400'	Date 8/07/02
Project No. 9088	
Drawing No. 1 OF 1	

08.13.02-16:24:xv1-3 post-dev.dwg

WC 45 STONEHOUSE ORCHARD HILL SEC 4D - 034

DRAINAGE, STORMWATER MANAGEMENT,

EROSION CONTROL, PAVEMENT DESIGN CALCULATIONS

AND ENVIRONMENTAL INVENTORY

FOR

STONEHOUSE L.L.C.

DEVELOPMENT AREA ONE, PHASE I
SECTION IVD

"ORCHARD HILL"

NOVEMBER 18, 1997
REVISED PER COMMENTS, FEBRUARY 12, 1998
REVISED PER COMMENTS, MAY 4, 1998

WC 043
5-98-97
SWM F
BLOCK WALL

Langley and McDonald, P.C.

Engineers
Surveyors
Planners
Landscape Architects
Environmental Consultants

5544 Greenwich Road, Virginia Beach, VA 23462
(804) 473-2000 FAX: (804) 497-7933

201 Packets Court, Williamsburg, VA 23185
(804) 253-2975 FAX: (804) 229-0049

DRAINAGE, STORMWATER MANAGEMENT,

EROSION CONTROL, PAVEMENT DESIGN CALCULATIONS

AND ENVIRONMENTAL INVENTORY

FOR

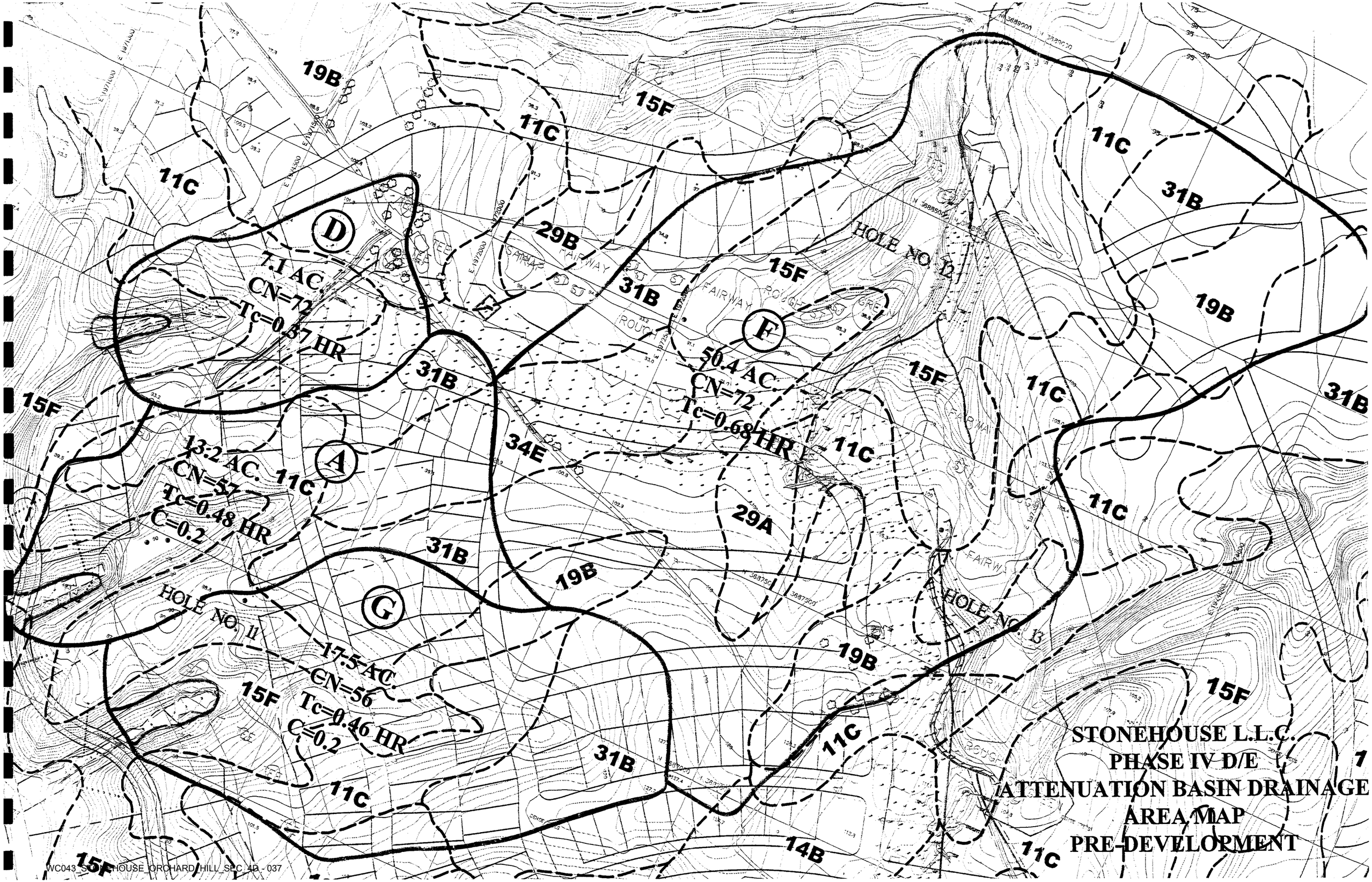
STONEHOUSE L.L.C.

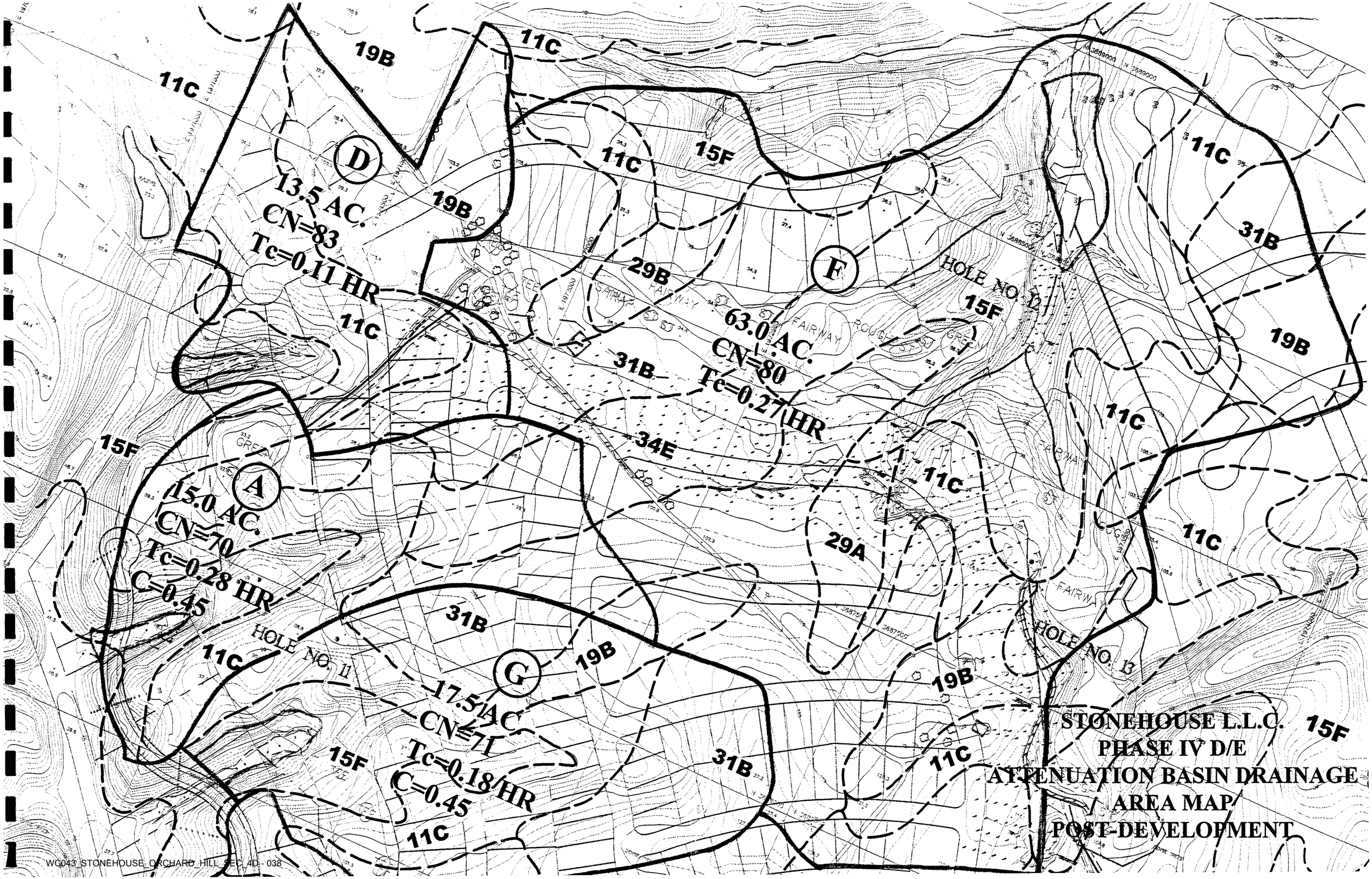
DEVELOPMENT AREA ONE, PHASE I
SECTION IVD

"ORCHARD HILL"

COMMONWEALTH OF VIRGINIA
RICHARD S. PHILLIPS
No. 023631
PROFESSIONAL ENGINEER

NOVEMBER 18, 1997
REVISED PER COMMENTS, FEBRUARY 12, 1998
REVISED PER COMMENTS, MAY 4, 1998


19B
15F
11C
11C
31B
29B
D
7.1 AC.
CN=72
Tc=0.37 HR
31B
15F
F
50.4 AC.
CN=72
Tc=0.68 HR
HOLE NO. 12
19B
15F
11C
31B
13.2 AC.
CN=57
Tc=0.48 HR
C=0.2
A
11C
34E
29A
11C
31B
19B
G
HOLE NO. 11
17.5 AC.
CN=56
Tc=0.46 HR
C=0.2
15F
31B
11C
HOLE NO. 13
19B
15F
11C
14B
11C
15F
STONEHOUSE L.L.C.
PHASE IV D/E
ATTENUATION BASIN DRAINAGE
AREA MAP
PRE-DEVELOPMENT


STONEHOUSE L.L.C.
PHASE IV D/E
ATTENUATION BASIN DRAINAGE
AREA MAP
POST-DEVELOPMENT
A
15.0 AC.
CN=70
Tc=0.28 HR
C=0.45
D
13.5 AC.
CN=83
Tc=0.11 HR
E
63.0 AC.
CN=80
Tc=0.27 HR
G
17.5 AC.
CN=71
Tc=0.18 HR
C=0.45
HOLE NO. 11
HOLE NO. 12
HOLE NO. 13
11C
15F
19B
29B
31B
34E
29A

DRAINAGE CALCULATIONS

PROJECT 96038.0452
HEC12 Version: V2.91 Run Date: 10-20-1997

INLET NUMBER J15 LENGTH 8.0 STATION 12+75B

DRAINAGE AREA = 0.500 ACRES C VALUE = .300 CA = 0.150
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
SUM CA= 0.240 INT= 3.50 CFS= 0.840 CO= 0.000 GUTTER FLOW= 0.840
GUTTER SLOPE = 0.0226 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
2.78	2.0	0.72	0.0833	4.0	0.99	3.5	0.146	0.166

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 7.1 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.84 CFS CARRYOVER= 0.00

INLET NUMBER J14 LENGTH 8.0 STATION 11+50B

DRAINAGE AREA = 0.740 ACRES C VALUE = .300 CA = 0.222
DRAINAGE AREA = 0.060 ACRES C VALUE = .900 CA = 0.054
SUM CA= 0.276 INT= 3.50 CFS= 0.966 CO= 0.000 GUTTER FLOW= 0.966
GUTTER SLOPE = 0.0226 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
3.22	2.0	0.62	0.0833	4.0	0.98	3.5	0.146	0.164

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 7.6 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.97 CFS CARRYOVER= 0.00

INLET NUMBER J14A LENGTH 8.0 STATION 11+50B

DRAINAGE AREA = 0.380 ACRES C VALUE = .300 CA = 0.114
DRAINAGE AREA = 0.160 ACRES C VALUE = .900 CA = 0.144
SUM CA= 0.258 INT= 3.50 CFS= 0.903 CO= 0.000 GUTTER FLOW= 0.903
GUTTER SLOPE = 0.0226 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
3.01	2.0	0.66	0.0833	4.0	0.99	3.5	0.146	0.165

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 7.4 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.90 CFS CARRYOVER= 0.00

INLET NUMBER J13 LENGTH 10.0 STATION 10+50B

DRAINAGE AREA = 0.040 ACRES C VALUE = .300 CA = 0.012
DRAINAGE AREA = 0.040 ACRES C VALUE = .900 CA = 0.036
DRAINAGE AREA = 0.530 ACRES C VALUE = .300 CA = 0.159
DRAINAGE AREA = 0.050 ACRES C VALUE = .900 CA = 0.045

FOR THE FIRST SIDE
SUM CA= 0.048 INT= 3.50 CFS= 0.168 CO= 0.000 GUTTER FLOW= 0.168
FOR THE OTHER SIDE
SUM CA= 0.204 INT= 3.50 CFS= 0.714 CO= 0.000 GUTTER FLOW= 0.714
AT THE INLET

SUM CA= 0.252 INT= 3.50 CFS= 0.882 CO= 0.000 GUTTER FLOW= 0.882
GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.71 (cfs) IS 7.55 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 13.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.09 SPREAD (ft) = 4.45

INLET NUMBER J13A LENGTH 10.0 STATION 10+50B

DRAINAGE AREA = 0.040 ACRES C VALUE = .300 CA = 0.012
DRAINAGE AREA = 0.030 ACRES C VALUE = .900 CA = 0.027
DRAINAGE AREA = 0.210 ACRES C VALUE = .300 CA = 0.063
DRAINAGE AREA = 0.050 ACRES C VALUE = .900 CA = 0.045

FOR THE FIRST SIDE
SUM CA= 0.039 INT= 3.50 CFS= 0.136 CO= 0.000 GUTTER FLOW= 0.136
FOR THE OTHER SIDE
SUM CA= 0.108 INT= 3.50 CFS= 0.378 CO= 0.000 GUTTER FLOW= 0.378
AT THE INLET

SUM CA= 0.147 INT= 3.50 CFS= 0.514 CO= 0.000 GUTTER FLOW= 0.514
GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.38 (cfs) IS 5.25 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 13.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.06 SPREAD (ft) = 3.11

INLET NUMBER J13B LENGTH 8.0 STATION 15+75D

DRAINAGE AREA = 0.320 ACRES C VALUE = .300 CA = 0.096
DRAINAGE AREA = 0.070 ACRES C VALUE = .900 CA = 0.063
SUM CA= 0.159 INT= 3.50 CFS= 0.557 CO= 0.000 GUTTER FLOW= 0.557
GUTTER SLOPE = 0.0300 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
1.79	2.0	1.12	0.0833	4.0	1.00	3.5	0.146	0.167

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 6.5 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.56 CFS CARRYOVER= 0.00

INLET NUMBER J12D LENGTH 8.0 STATION 11+00A

DRAINAGE AREA = 0.580 ACRES C VALUE = .300 CA = 0.174
DRAINAGE AREA = 0.140 ACRES C VALUE = .900 CA = 0.126
SUM CA= 0.300 INT= 3.50 CFS= 1.050 CO= 0.000 GUTTER FLOW= 1.050

GUTTER SLOPE = 0.0121 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
4.50	2.0	0.44	0.0833	4.0	0.92	3.5	0.146	0.155

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 6.8 EFFICIENCY= 1.00
CFS INTERCEPTED= 1.05 CFS CARRYOVER= 0.00

INLET NUMBER J12C LENGTH 8.0 STATION 10+50A

DRAINAGE AREA = 0.160 ACRES C VALUE = .300 CA = 0.048
DRAINAGE AREA = 0.020 ACRES C VALUE = .900 CA = 0.018
DRAINAGE AREA = 0.030 ACRES C VALUE = .900 CA = 0.027

FOR THE FIRST SIDE
SUM CA= 0.066 INT= 3.50 CFS= 0.231 CO= 0.000 GUTTER FLOW= 0.231
FOR THE OTHER SIDE
SUM CA= 0.027 INT= 3.50 CFS= 0.094 CO= 0.000 GUTTER FLOW= 0.094
AT THE INLET

SUM CA= 0.093 INT= 3.50 CFS= 0.325 CO= 0.000 GUTTER FLOW= 0.325

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.23 (cfs) IS 3.63 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.05 SPREAD (ft) = 2.54

INLET NUMBER J12B LENGTH 10.0 STATION 10+50A

DRAINAGE AREA = 0.340 ACRES C VALUE = .300 CA = 0.102
DRAINAGE AREA = 0.170 ACRES C VALUE = .900 CA = 0.153
DRAINAGE AREA = 0.050 ACRES C VALUE = .300 CA = 0.015
DRAINAGE AREA = 0.030 ACRES C VALUE = .900 CA = 0.027

FOR THE FIRST SIDE
SUM CA= 0.255 INT= 3.50 CFS= 0.892 CO= 0.000 GUTTER FLOW= 0.892
FOR THE OTHER SIDE
SUM CA= 0.042 INT= 3.50 CFS= 0.147 CO= 0.000 GUTTER FLOW= 0.147
AT THE INLET

SUM CA= 0.297 INT= 3.50 CFS= 1.039 CO= 0.000 GUTTER FLOW= 1.039

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.89 (cfs) IS 8.44 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 13.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.10 SPREAD (ft) = 4.96

INLET NUMBER J12 LENGTH 8.0 STATION 14+50D

DRAINAGE AREA = 0.160 ACRES C VALUE = .300 CA = 0.048
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
SUM CA= 0.138 INT= 3.50 CFS= 0.483 CO= 0.000 GUTTER FLOW= 0.483
GUTTER SLOPE = 0.0300 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
1.70	2.0	1.18	0.0833	4.0	1.00	3.5	0.146	0.167

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 6.1 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.48 CFS CARRYOVER= 0.00

INLET NUMBER J11 LENGTH 6.0 STATION 14+50D

DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
SUM CA= 0.090 INT= 3.50 CFS= 0.315 CO= 0.000 GUTTER FLOW= 0.315

GUTTER SLOPE = 0.0300 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
1.45	2.0	1.38	0.0833	4.0	1.00	3.5	0.146	0.167

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 5.1 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.31 CFS CARRYOVER= 0.00

INLET NUMBER J10 LENGTH 6.0 STATION 15+25D

DRAINAGE AREA = 0.040 ACRES C VALUE = .900 CA = 0.036
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090

FOR THE FIRST SIDE
SUM CA= 0.036 INT= 3.50 CFS= 0.126 CO= 0.000 GUTTER FLOW= 0.126
FOR THE OTHER SIDE
SUM CA= 0.090 INT= 3.50 CFS= 0.315 CO= 0.000 GUTTER FLOW= 0.315
AT THE INLET

SUM CA= 0.126 INT= 3.50 CFS= 0.441 CO= 0.000 GUTTER FLOW= 0.441

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.31 (cfs) IS 4.64 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 9.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.07 SPREAD (ft) = 3.53

PROJECT 96038.0452
HEC12 Version: V2.91 Run Date: 10-16-1997

INLET NUMBER K10 LENGTH 8.0 STATION 11+50C

DRAINAGE AREA = 0.690 ACRES C VALUE = .300 CA = 0.207
DRAINAGE AREA = 0.070 ACRES C VALUE = .900 CA = 0.063
SUM CA= 0.270 INT= 3.50 CFS= 0.945 CO= 0.000 GUTTER FLOW= 0.945

GUTTER SLOPE = 0.0200 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
3.35	2.0	0.60	0.0833	4.0	0.98	3.5	0.146	0.163

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 7.3 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.95 CFS CARRYOVER= 0.00

INLET NUMBER K9 LENGTH 8.0 STATION 11+00C

DRAINAGE AREA = 0.260 ACRES C VALUE = .300 CA = 0.078
DRAINAGE AREA = 0.020 ACRES C VALUE = .900 CA = 0.018
DRAINAGE AREA = 0.320 ACRES C VALUE = .300 CA = 0.096
DRAINAGE AREA = 0.110 ACRES C VALUE = .900 CA = 0.099

FOR THE FIRST SIDE
SUM CA= 0.096 INT= 3.50 CFS= 0.336 CO= 0.000 GUTTER FLOW= 0.336
FOR THE OTHER SIDE
SUM CA= 0.195 INT= 3.50 CFS= 0.683 CO= 0.000 GUTTER FLOW= 0.683
AT THE INLET

SUM CA= 0.291 INT= 3.50 CFS= 1.019 CO= 0.000 GUTTER FLOW= 1.019

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.68 (cfs) IS 7.38 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.11 SPREAD (ft) = 5.44

INLET NUMBER K9A LENGTH 8.0 STATION 11+00C

DRAINAGE AREA = 0.200 ACRES C VALUE = .300 CA = 0.060
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
DRAINAGE AREA = 0.070 ACRES C VALUE = .300 CA = 0.021
DRAINAGE AREA = 0.060 ACRES C VALUE = .900 CA = 0.054

FOR THE FIRST SIDE
SUM CA= 0.150 INT= 3.50 CFS= 0.525 CO= 0.000 GUTTER FLOW= 0.525
FOR THE OTHER SIDE
SUM CA= 0.075 INT= 3.50 CFS= 0.263 CO= 0.000 GUTTER FLOW= 0.263
AT THE INLET

SUM CA= 0.225 INT= 3.50 CFS= 0.788 CO= 0.000 GUTTER FLOW= 0.788

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.53 (cfs) IS 6.40 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.10 SPREAD (ft) = 4.59

INLET NUMBER K7 LENGTH 6.0 STATION 19+75D

DRAINAGE AREA = 0.060 ACRES C VALUE = .300 CA = 0.018
DRAINAGE AREA = 0.120 ACRES C VALUE = .900 CA = 0.108
SUM CA= 0.126 INT= 3.50 CFS= 0.441 CO= 0.000 GUTTER FLOW= 0.441

GUTTER SLOPE = 0.0292 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
1.65	2.0	1.21	0.0833	4.0	1.00	3.5	0.146	0.167

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 5.8 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.44 CFS CARRYOVER= 0.00

STORM SEWER DESIGN / RATIONAL METHOD 10 YEAR RETURN PERIOD

STONEHOUSE ORCHARD HILL SECTION IV D & E

Concrete Pipe,"n" = 0.013 Capacity @ 80% Full Depth

VDOT L&D 229		Area Drained	Run-off Coeff.	"C x A		Inlet Time	Time of Conc.	Rainfall intensity	RUNOFF	INVERT ELEVATIONS		LENGTH	SLOPE	DIAM	CAPACITY	VELOCITY	TRAVEL"t"	REMARKS
FROM PT.	TO PT.	"Acres"	"C"	INCR.	ACCUM	"t"	"tc"	"i"	"QRational"	UPPER END	LOWER END	ft.	ft/ft	inch	cfs	fps	min.	
(1)	(2)	(3)	(4)	(5)	(6)	*	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
STORM SYSTEM "J" (Extension of "J" IVB)																		
	J15	0.5	0.3	0.15														
		0.10	0.9	0.09	0.24	9.34	9.34	6.1	1.46									
J15	J14									105.50	103.00	125	0.0200	15	8.93	8.48	0.25	
	J14A	0.38	0.3	0.11														
		0.16	0.9	0.14	0.50	18.00	18.54	4.6	2.31									
J14A	J14									103.30	103.00	32	0.0094	15	6.11	5.81	0.09	
	J14	0.74	0.3	0.22														
		0.06	0.9	0.05	0.77	10.69	18.54	4.6	3.59									
J14	J13									102.10	100.10	100	0.0200	15	8.93	8.48	0.20	
	J13B	0.32	0.3	0.10														
		0.07	0.9	0.06	0.16	11.96	18.64	4.6	0.74									
J13B	J13A									101.80	100.80	50	0.0200	15	8.93	8.48	0.10	
	J13A	0.04	0.3	0.01														
		0.03	0.9	0.03														
		0.21	0.3	0.06														
		0.05	0.9	0.05	0.31	10.35	18.70	4.6	1.41									
J13A	J13									100.70	100.10	32	0.0187	15	8.65	8.22	0.06	
	J13	0.04	0.3	0.01														
		0.04	0.9	0.04														
		0.53	0.3	0.16														
		0.05	0.9	0.05	1.33	12.17	18.85	4.6	6.13									
J13	J12									99.75	99.15	60	0.0100	18	10.27	6.77	0.15	
	J12D	0.58	0.3	0.17														
		0.14	0.9	0.13	0.30	13.64	18.99	4.6	1.37									
J12D	J12C									108.50	108.00	50	0.0100	15	6.31	6.00	0.14	
	J12C	0.16	0.3	0.05														
		0.02	0.9	0.02														
		0.00	0.3	0.00														
		0.03	0.9	0.03	0.39	9.47	19.08	4.6	1.80									
J12C	J12B									107.80	107.50	32	0.0094	15	6.11	5.81	0.09	
	J12B	0.34	0.3	0.10														
		0.17	0.9	0.15														
		0.05	0.3	0.02														
		0.03	0.9	0.03	0.69	4.97	19.17	4.6	3.15									
J12B	J12A									107.40	106.80	40	0.0150	15	7.73	7.35	0.09	
J12A	J12									104.60	103.00	175	0.0091	15	6.04	5.74	0.51	
	J12	0.16	0.3	0.05														
		0.10	0.9	0.09	2.16	7.42	19.76	4.5	9.71									

STORM SEWER DESIGN / RATIONAL METHOD 10 YEAR RETURN PERIOD

STONEHOUSE ORCHARD HILL SECTION IV D & E

Concrete Pipe,"n" = 0.013 Capacity @ 80% Full Depth

VDOT L&D 229		Area Drained	Run-off Coeff.	"C x A		Inlet Time	Time of Conc.	Rainfall intensity	RUNOFF	INVERT ELEVATIONS		LENGTH	SLOPE	DIAM	CAPACITY	VELOCITY	TRAVEL"t"	REMARKS
FROM PT.	TO PT.	"Acres"	"C"	INCR.	ACCUM	"t"	"tc"	"i"	"QRational"	UPPER END	LOWER END	ft.	ft/ft	inch	cfs	fps	min.	
(1)	(2)	(3)	(4)	(5)	(6)	*	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
J12	J11									99.00	98.40	40	0.0150	18	12.58	8.30	0.08	
	J11	0.00	0.3	0.00														
		0.01	0.9	0.01	2.17	9.87	19.89	4.5	9.72									
J11	J10									97.80	96.30	75	0.0200	18	14.52	9.58	0.13	
	J10	0.00	0.3	0.00														
		0.04	0.9	0.04														
		0.00	0.3	0.00														
		0.10	0.9	0.09	2.30	9.87	19.97	4.5	10.26									
J10	J8									96.20	86.20	100	0.1000	18	32.47	21.42	0.08	
	J8	1.08	0.3	0.32	2.62	1.48	20.32	4.4	11.61									
J8	J7	6.33								85.41	84.36	146	0.0072	24	18.75	6.96	0.35	
STORM SYSTEM "K" (Extention IVB)																		
	K10	0.69	0.3	0.21														
		0.07	0.9	0.06	0.27	13.64	13.78	5.3	1.43									
K10	K9									99.00	98.50	50	0.0100	15	6.31	6.00	0.14	
	K9A	0.20	0.3	0.06														
		0.10	0.9	0.09														
		0.07	0.3	0.02														
		0.03	0.9	0.03	0.20	9.87	13.88	5.3	1.04									
K9A	K9									98.80	98.50	32	0.0094	15	6.11	5.81	0.09	
	K9	0.26	0.3	0.08														
		0.02	0.9	0.02														
		0.32	0.3	0.10														
		0.11	0.9	0.10	0.76	9.87	14.22	5.2	3.96									
K9	K8									98.40	97.25	120	0.0096	15	6.18	5.87	0.34	
K8	K7									97.15	96.50	68	0.0096	15	6.17	5.87	0.19	
	K7	0.00	0.3	0.00														
		0.12	0.9	0.11	0.87	12.17	15.28	5.1	4.39									
K7	K6									96.40	92.70	185	0.0200	15	8.93	8.48	0.36	
	K6	0.73	0.3	0.22	1.09	1.20	21.95	4.3	4.63									
K6	K5	2.72								92.60	84.43	300	0.0272	15	10.42	9.90	0.51	

INLET STATION	Outlet Water Surface	FRICTION LOSS IN PIPE						JUNCTION LOSS												H Adjusted	Inlet Water Surface Elevation	Rim Elevation
		Do	Qo	Lo	no	Sfo	Hf	Vo	Ho	Qi	Vi	Qi x Vi	V²/ 2g	Hi	Δ	Hdelta	Ht	.3 x Ht	0.5 x Ht			
1	2	3	4	5	5A	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
STORM SYSTEM "J" (Extension of "J" IVB)																						
J8	86.98	24	11.61	146	0.013	0.0026	0.385	6.40	0.16	10.26	9.06	93	1.27	0.45	0	0.00	0.61	0.18	-0.30	0.87	87.85	99.00
	J7																					
J10	87.85	18	10.26	100	0.013	0.0095	0.954	9.06	0.32	9.72	8.00	78	0.99	0.35	0	0.00	0.67	0.20	-0.33	1.49	89.34	105.98
	J8																					
J11	89.34	18	9.72	75	0.013	0.0086	0.642	8.00	0.25	9.71	8.00	78	0.99	0.35	90	0.70	1.29	0.39	-0.65	1.68	91.01	107.26
	J10																					
J12	91.01	18	9.71	40	0.013	0.0085	0.342	8.00	0.25	6.13	6.17	38	0.59	0.21	90	0.41	0.87	0.26	-0.43	1.04	92.05	107.26
	J11								J12A	3.15	5.05	16										
J12A	92.05	15	3.15	175	0.013	0.0000	0.000	5.05	0.10	3.15	6.08	19	0.57	0.20	90	0.40	0.70	0.21	-0.35	0.56	92.61	113.22
	J12																					
J12B	92.61	15	3.15	40	0.013	0.0000	0.000	6.08	0.14	1.80	4.41	8	0.30	0.11	27	0.07	0.32	0.10	-0.16	0.26	92.87	112.40
	J12A																					
J12C	92.87	15	1.80	32	0.013	0.0000	0.000	4.41	0.08	1.37	4.18	6	0.27	0.09	26	0.06	0.23	0.07	-0.12	0.19	93.05	112.40
	J12B																					
J12D	93.05	15	1.37	50	0.013	0.0000	0.000	4.18	0.07											0.00	93.05	113.02
	J12C																					
J13	92.05	18	6.13	60	0.013	0.0000	0.000	6.17	0.15	3.59	7.00	25	0.76	0.27	36	0.26	0.67	0.20	-0.34	0.54	92.59	105.36
	J12								J13A	1.41	5.27	7										
J13A	92.59	15	1.41	32	0.013	0.0031	0.099	5.27	0.11	0.74	4.47	3	0.31	0.11	54	0.16	0.37	0.11	-0.19	0.40	92.98	105.36
	J13																					
J13B	92.98	15	0.74	50	0.013	0.0013	0.064	4.47	0.08	3.59	7.00											
	J13A																					
J14	92.59	15	3.59	100	0.013	0.0005	0.051	7.00	0.19	2.31	4.72	11	0.35	0.12	55	0.18	0.49	0.15	-0.24	0.44	93.03	107.35
	J13								J15	1.46	5.45	8										
J14A	93.03	15	2.31	32	0.013	0.0000	0.000	4.72	0.09													
	J14																					
J15	93.03	15	1.46	125	0.013	0.0000	0.000	5.45	0.12													
	J14																					
STORM SYSTEM "K" (Extention IVB)																						
K6	87.62	15	5.16	300	0.013	0.0064	1.910	8.60	0.29	5.01	7.62	38	0.90	0.32	27	0.22	0.82	0.25	-0.41	2.57	90.19	98.00
	K5																					
K7	90.19	15	5.01	185	0.013	0.0060	1.113	7.62	0.23	3.60	5.32	19	0.44	0.15	88	0.30	0.68	0.21	-0.34	1.66	91.85	103.14
	K6																					
MH K8	91.85	15	3.60	68	0.013	0.0031	0.211	5.32	0.11	3.60	5.32	19	0.44	0.15	90	0.31	0.57	0.17	-0.29	0.67	92.52	105.25
	K7																					
K9	92.52	15	3.60	120	0.013	0.0031	0.373	5.32	0.11	1.59	4.36	7	0.30	0.10	25	0.06	0.28	0.08	-0.14	0.60	93.11	103.26
	K8								K9A	0.49	3.04											
K9A	92.52	15	0.49	32	0.013	0.0001	0.002	3.04	0.04			0	0.00	0.00	90	0.00	0.04	0.01	-0.02	0.03	92.55	103.26
	K9																					
K10	92.52	15	1.59	50	0.013	0.0006	0.030	4.36	0.07			0	0.00	0.00	0	0.00	0.07	0.02	-0.04	0.09	92.61	104.48

PROJECT 96038.0452
HEC12 Version: V2.91 Run Date: 10-14-1997

INLET NUMBER R13 LENGTH 6.0 STATION 16+50A

DRAINAGE AREA = 0.560 ACRES C VALUE = .300 CA = 0.168
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
SUM CA= 0.258 INT= 3.50 CFS= 0.903 CO= 0.000 GUTTER FLOW= 0.903

GUTTER SLOPE = 0.0100 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
4.32	2.0	0.46	0.0833	4.0	0.93	3.5	0.146	0.156

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 6.0 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.90 CFS CARRYOVER= 0.00

INLET NUMBER R12 LENGTH 12.0 STATION 17+25A

DRAINAGE AREA = 0.460 ACRES C VALUE = .300 CA = 0.138
DRAINAGE AREA = 0.030 ACRES C VALUE = .900 CA = 0.027
DRAINAGE AREA = 0.490 ACRES C VALUE = .300 CA = 0.147
DRAINAGE AREA = 0.120 ACRES C VALUE = .900 CA = 0.108

FOR THE FIRST SIDE
SUM CA= 0.165 INT= 3.50 CFS= 0.578 CO= 0.000 GUTTER FLOW= 0.578
FOR THE OTHER SIDE
SUM CA= 0.255 INT= 3.50 CFS= 0.892 CO= 0.000 GUTTER FLOW= 0.892
AT THE INLET

SUM CA= 0.420 INT= 3.50 CFS= 1.470 CO= 0.000 GUTTER FLOW= 1.470

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.89 (cfs) IS 8.44 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 15.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.12 SPREAD (ft) = 5.71

INLET NUMBER R11A LENGTH 8.0 STATION 12+25E

DRAINAGE AREA = 0.500 ACRES C VALUE = .300 CA = 0.150
DRAINAGE AREA = 0.080 ACRES C VALUE = .900 CA = 0.072
DRAINAGE AREA = 0.140 ACRES C VALUE = .300 CA = 0.042
DRAINAGE AREA = 0.070 ACRES C VALUE = .900 CA = 0.063

FOR THE FIRST SIDE
SUM CA= 0.222 INT= 3.50 CFS= 0.777 CO= 0.000 GUTTER FLOW= 0.777
FOR THE OTHER SIDE
SUM CA= 0.105 INT= 3.50 CFS= 0.368 CO= 0.000 GUTTER FLOW= 0.368
AT THE INLET

SUM CA= 0.327 INT= 3.50 CFS= 1.145 CO= 0.000 GUTTER FLOW= 1.145

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.78 (cfs) IS 7.88 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.12 SPREAD (ft) = 5.89

INLET NUMBER R11 LENGTH 12.0 STATION 17+25A

DRAINAGE AREA = 0.300 ACRES C VALUE = .300 CA = 0.090
DRAINAGE AREA = 0.130 ACRES C VALUE = .900 CA = 0.117
DRAINAGE AREA = 0.380 ACRES C VALUE = .300 CA = 0.114
DRAINAGE AREA = 0.130 ACRES C VALUE = .900 CA = 0.117

FOR THE FIRST SIDE
SUM CA= 0.207 INT= 3.50 CFS= 0.724 CO= 0.000 GUTTER FLOW= 0.724
FOR THE OTHER SIDE
SUM CA= 0.231 INT= 3.50 CFS= 0.808 CO= 0.000 GUTTER FLOW= 0.808
AT THE INLET

SUM CA= 0.438 INT= 3.50 CFS= 1.533 CO= 0.000 GUTTER FLOW= 1.533

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.81 (cfs) IS 8.04 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 15.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.12 SPREAD (ft) = 5.87

INLET NUMBER R10 LENGTH 6.0 STATION 17+75A

DRAINAGE AREA = 0.110 ACRES C VALUE = .300 CA = 0.033
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
SUM CA= 0.123 INT= 3.50 CFS= 0.430 CO= 0.000 GUTTER FLOW= 0.430

GUTTER SLOPE = 0.0208 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
1.74	2.0	1.15	0.0833	4.0	1.00	3.5	0.146	0.167

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 5.2 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.43 CFS CARRYOVER= 0.00

INLET NUMBER R9 LENGTH 12.0 STATION 16+75B

DRAINAGE AREA = 0.620 ACRES C VALUE = .300 CA = 0.186
DRAINAGE AREA = 0.050 ACRES C VALUE = .900 CA = 0.045
DRAINAGE AREA = 0.570 ACRES C VALUE = .300 CA = 0.171
DRAINAGE AREA = 0.020 ACRES C VALUE = .900 CA = 0.018

FOR THE FIRST SIDE
SUM CA= 0.231 INT= 3.50 CFS= 0.809 CO= 0.000 GUTTER FLOW= 0.809
FOR THE OTHER SIDE
SUM CA= 0.189 INT= 3.50 CFS= 0.662 CO= 0.000 GUTTER FLOW= 0.662
AT THE INLET

SUM CA= 0.420 INT= 3.50 CFS= 1.470 CO= 0.000 GUTTER FLOW= 1.470

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.81 (cfs) IS 8.04 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 15.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.12 SPREAD (ft) = 5.71

INLET NUMBER R9A LENGTH 6.0 STATION 16+25B

DRAINAGE AREA = 0.550 ACRES C VALUE = .300 CA = 0.165
DRAINAGE AREA = 0.060 ACRES C VALUE = .900 CA = 0.054
SUM CA= 0.219 INT= 3.50 CFS= 0.767 CO= 0.000 GUTTER FLOW= 0.767

GUTTER SLOPE = 0.0100 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
3.79	2.0	0.53	0.0833	4.0	0.96	3.5	0.146	0.161

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 5.5 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.77 CFS CARRYOVER= 0.00

INLET NUMBER R8 LENGTH 12.0 STATION 16+75B

DRAINAGE AREA = 0.220 ACRES C VALUE = .300 CA = 0.066
DRAINAGE AREA = 0.080 ACRES C VALUE = .900 CA = 0.072
DRAINAGE AREA = 0.180 ACRES C VALUE = .300 CA = 0.054
DRAINAGE AREA = 0.090 ACRES C VALUE = .900 CA = 0.081

FOR THE FIRST SIDE
SUM CA= 0.138 INT= 3.50 CFS= 0.483 CO= 0.000 GUTTER FLOW= 0.483
FOR THE OTHER SIDE
SUM CA= 0.135 INT= 3.50 CFS= 0.473 CO= 0.000 GUTTER FLOW= 0.473
AT THE INLET

SUM CA= 0.273 INT= 3.50 CFS= 0.956 CO= 0.000 GUTTER FLOW= 0.956

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT
SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.48 (cfs) IS 6.10 (ft.)
XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 15.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.09 SPREAD (ft) = 4.28

INLET NUMBER R7 LENGTH 8.0 STATION 17+00C

DRAINAGE AREA = 0.460 ACRES C VALUE = .300 CA = 0.138
DRAINAGE AREA = 0.160 ACRES C VALUE = .900 CA = 0.144
SUM CA= 0.282 INT= 3.50 CFS= 0.987 CO= 0.000 GUTTER FLOW= 0.987

GUTTER SLOPE = 0.0208 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
3.42	2.0	0.58	0.0833	4.0	0.97	3.5	0.146	0.163

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 7.5 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.99 CFS CARRYOVER= 0.00

INLET NUMBER R6A LENGTH 12.0 STATION 16+25C

DRAINAGE AREA = 0.330 ACRES C VALUE = .300 CA = 0.099
DRAINAGE AREA = 0.140 ACRES C VALUE = .900 CA = 0.126
DRAINAGE AREA = 0.290 ACRES C VALUE = .300 CA = 0.087
DRAINAGE AREA = 0.130 ACRES C VALUE = .900 CA = 0.117

FOR THE FIRST SIDE
SUM CA= 0.225 INT= 3.50 CFS= 0.788 CO= 0.000 GUTTER FLOW= 0.788
FOR THE OTHER SIDE
SUM CA= 0.204 INT= 3.50 CFS= 0.714 CO= 0.000 GUTTER FLOW= 0.714
AT THE INLET

SUM CA= 0.429 INT= 3.50 CFS= 1.502 CO= 0.000 GUTTER FLOW= 1.502

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT
SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.79 (cfs) IS 7.93 (ft.)
XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 15.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.12 SPREAD (ft) = 5.79

INLET NUMBER R6B LENGTH 10.0 STATION 16+25C

DRAINAGE AREA = 0.510 ACRES C VALUE = .300 CA = 0.153
DRAINAGE AREA = 0.040 ACRES C VALUE = .900 CA = 0.036
DRAINAGE AREA = 0.450 ACRES C VALUE = .300 CA = 0.135
DRAINAGE AREA = 0.050 ACRES C VALUE = .900 CA = 0.045

FOR THE FIRST SIDE
SUM CA= 0.189 INT= 3.50 CFS= 0.661 CO= 0.000 GUTTER FLOW= 0.661
FOR THE OTHER SIDE
SUM CA= 0.180 INT= 3.50 CFS= 0.630 CO= 0.000 GUTTER FLOW= 0.630
AT THE INLET

SUM CA= 0.369 INT= 3.50 CFS= 1.292 CO= 0.000 GUTTER FLOW= 1.292
GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT
SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.66 (cfs) IS 7.26 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 13.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.12 SPREAD (ft) = 5.74

INLET NUMBER R6C LENGTH 6.0 STATION 15+00C

DRAINAGE AREA = 0.510 ACRES C VALUE = .300 CA = 0.153
DRAINAGE AREA = 0.090 ACRES C VALUE = .900 CA = 0.081
SUM CA= 0.234 INT= 3.50 CFS= 0.819 CO= 0.000 GUTTER FLOW= 0.819

GUTTER SLOPE = 0.0110 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
3.85	2.0	0.52	0.0833	4.0	0.96	3.5	0.146	0.160

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 5.8 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.82 CFS CARRYOVER= 0.00

INLET NUMBER R5G LENGTH 10.0 STATION 20+50E

DRAINAGE AREA = 0.320 ACRES C VALUE = .300 CA = 0.096
DRAINAGE AREA = 0.220 ACRES C VALUE = .900 CA = 0.198
SUM CA= 0.294 INT= 3.50 CFS= 1.029 CO= 0.000 GUTTER FLOW= 1.029

GUTTER SLOPE = 0.0488 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
2.21	2.0	0.90	0.0833	4.0	1.00	3.5	0.146	0.167

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 9.7 EFFICIENCY= 1.00
CFS INTERCEPTED= 1.03 CFS CARRYOVER= 0.00

INLET NUMBER R5 LENGTH 8.0 STATION 20+90E

DRAINAGE AREA = 0.380 ACRES C VALUE = .300 CA = 0.114
DRAINAGE AREA = 0.020 ACRES C VALUE = .900 CA = 0.018
DRAINAGE AREA = 0.320 ACRES C VALUE = .300 CA = 0.096
DRAINAGE AREA = 0.030 ACRES C VALUE = .900 CA = 0.027

FOR THE FIRST SIDE
SUM CA= 0.132 INT= 3.50 CFS= 0.462 CO= 0.000 GUTTER FLOW= 0.462
FOR THE OTHER SIDE
SUM CA= 0.123 INT= 3.50 CFS= 0.430 CO= 0.000 GUTTER FLOW= 0.430
AT THE INLET

SUM CA= 0.255 INT= 3.50 CFS= 0.892 CO= 0.000 GUTTER FLOW= 0.892

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.46 (cfs) IS 5.95 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.10 SPREAD (ft) = 4.99

INLET NUMBER R5A LENGTH 8.0 STATION 21+50E

DRAINAGE AREA = 0.970 ACRES C VALUE = .300 CA = 0.291
DRAINAGE AREA = 0.120 ACRES C VALUE = .900 CA = 0.108
SUM CA= 0.399 INT= 3.50 CFS= 1.396 CO= 0.000 GUTTER FLOW= 1.396

GUTTER SLOPE = 0.0147 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
5.13	2.0	0.39	0.0833	4.0	0.88	3.5	0.146	0.149

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 8.3 EFFICIENCY= 1.00
CFS INTERCEPTED= 1.39 CFS CARRYOVER= 0.00

INLET NUMBER R5C LENGTH 6.0 STATION 25+50E

DRAINAGE AREA = 0.500 ACRES C VALUE = .300 CA = 0.150
DRAINAGE AREA = 0.070 ACRES C VALUE = .900 CA = 0.063
SUM CA= 0.213 INT= 3.50 CFS= 0.745 CO= 0.000 GUTTER FLOW= 0.745

GUTTER SLOPE = 0.0188 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
2.69	2.0	0.74	0.0833	4.0	1.00	3.5	0.146	0.166

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 6.4 EFFICIENCY= 0.99
CFS INTERCEPTED= 0.74 CFS CARRYOVER= 0.01

INLET NUMBER R5D LENGTH 8.0 STATION 26+00E

DRAINAGE AREA = 0.310 ACRES C VALUE = .300 CA = 0.093
DRAINAGE AREA = 0.020 ACRES C VALUE = .900 CA = 0.018
DRAINAGE AREA = 0.270 ACRES C VALUE = .300 CA = 0.081
DRAINAGE AREA = 0.020 ACRES C VALUE = .900 CA = 0.018

FOR THE FIRST SIDE
SUM CA= 0.111 INT= 3.50 CFS= 0.389 CO= 0.010 GUTTER FLOW= 0.398
FOR THE OTHER SIDE
SUM CA= 0.099 INT= 3.50 CFS= 0.347 CO= 0.000 GUTTER FLOW= 0.347
AT THE INLET

SUM CA= 0.210 INT= 3.50 CFS= 0.735 CO= 0.010 GUTTER FLOW= 0.745

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT
SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.40 (cfs) IS 5.43 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.09 SPREAD (ft) = 4.42

INLET NUMBER R5E LENGTH 6.0 STATION 26+50E

DRAINAGE AREA = 0.500 ACRES C VALUE = .300 CA = 0.150
DRAINAGE AREA = 0.060 ACRES C VALUE = .900 CA = 0.054
SUM CA= 0.204 INT= 3.50 CFS= 0.714 CO= 0.000 GUTTER FLOW= 0.714
GUTTER SLOPE = 0.0170 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
2.72	2.0	0.74	0.0833	4.0	0.99	3.5	0.146	0.166

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 6.1 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.71 CFS CARRYOVER= 0.00

INLET NUMBER R5H LENGTH 8.0 STATION 21+75D

DRAINAGE AREA = 0.140 ACRES C VALUE = .300 CA = 0.042
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
DRAINAGE AREA = 0.010 ACRES C VALUE = .900 CA = 0.009
FOR THE FIRST SIDE
SUM CA= 0.132 INT= 3.50 CFS= 0.462 CO= 0.000 GUTTER FLOW= 0.462
FOR THE OTHER SIDE
SUM CA= 0.009 INT= 3.50 CFS= 0.031 CO= 0.000 GUTTER FLOW= 0.031
AT THE INLET

SUM CA= 0.141 INT= 3.50 CFS= 0.493 CO= 0.000 GUTTER FLOW= 0.493

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.46 (cfs) IS 5.95 (ft.)
XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.07 SPREAD (ft) = 3.36

INLET NUMBER R5I LENGTH 8.0 STATION 21+75D

DRAINAGE AREA = 0.210 ACRES C VALUE = .300 CA = 0.063
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
DRAINAGE AREA = 0.090 ACRES C VALUE = .300 CA = 0.027
DRAINAGE AREA = 0.040 ACRES C VALUE = .900 CA = 0.036

FOR THE FIRST SIDE
SUM CA= 0.153 INT= 3.50 CFS= 0.535 CO= 0.000 GUTTER FLOW= 0.535
FOR THE OTHER SIDE
SUM CA= 0.063 INT= 3.50 CFS= 0.221 CO= 0.000 GUTTER FLOW= 0.221
AT THE INLET

SUM CA= 0.216 INT= 3.50 CFS= 0.756 CO= 0.000 GUTTER FLOW= 0.756

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.54 (cfs) IS 6.47 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.09 SPREAD (ft) = 4.46

INLET NUMBER R5J LENGTH 6.0 STATION 28+25E

DRAINAGE AREA = 0.110 ACRES C VALUE = .300 CA = 0.033
DRAINAGE AREA = 0.070 ACRES C VALUE = .900 CA = 0.063
SUM CA= 0.096 INT= 3.50 CFS= 0.336 CO= 0.000 GUTTER FLOW= 0.336

GUTTER SLOPE = 0.0170 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
1.65	2.0	1.21	0.0833	4.0	1.00	3.5	0.146	0.167

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 4.4 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.34 CFS CARRYOVER= 0.00

INLET NUMBER R5K LENGTH 6.0 STATION 27+25E

DRAINAGE AREA = 0.260 ACRES C VALUE = .300 CA = 0.078
DRAINAGE AREA = 0.120 ACRES C VALUE = .900 CA = 0.108
SUM CA= 0.186 INT= 3.50 CFS= 0.651 CO= 0.000 GUTTER FLOW= 0.651

GUTTER SLOPE = 0.0170 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
2.43	2.0	0.82	0.0833	4.0	1.00	3.5	0.146	0.166

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 5.9 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.65 CFS CARRYOVER= 0.00

INLET NUMBER R5L LENGTH 6.0 STATION 26+00E

DRAINAGE AREA = 0.130 ACRES C VALUE = .300 CA = 0.039
DRAINAGE AREA = 0.060 ACRES C VALUE = .900 CA = 0.054
DRAINAGE AREA = 0.200 ACRES C VALUE = .300 CA = 0.060
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090

FOR THE FIRST SIDE
SUM CA= 0.093 INT= 3.50 CFS= 0.325 CO= 0.000 GUTTER FLOW= 0.325
FOR THE OTHER SIDE
SUM CA= 0.150 INT= 3.50 CFS= 0.525 CO= 0.000 GUTTER FLOW= 0.525
AT THE INLET

SUM CA= 0.243 INT= 3.50 CFS= 0.850 CO= 0.000 GUTTER FLOW= 0.850

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT
SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.53 (cfs) IS 6.40 (ft.)
XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 9.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.11 SPREAD (ft) = 5.48

INLET NUMBER R4A LENGTH 10.0 STATION 20+25E

DRAINAGE AREA = 0.150 ACRES C VALUE = .300 CA = 0.045
DRAINAGE AREA = 0.310 ACRES C VALUE = .900 CA = 0.279
SUM CA= 0.324 INT= 3.50 CFS= 1.134 CO= 0.000 GUTTER FLOW= 1.134

GUTTER SLOPE = 0.0488 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
2.51	2.0	0.80	0.0833	4.0	1.00	3.5	0.146	0.166

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 10.2 EFFICIENCY= 1.00
CFS INTERCEPTED= 1.13 CFS CARRYOVER= 0.00

INLET NUMBER R4 LENGTH 10.0 STATION 20+75E

DRAINAGE AREA = 0.020 ACRES C VALUE = .300 CA = 0.006
DRAINAGE AREA = 0.040 ACRES C VALUE = .900 CA = 0.036
DRAINAGE AREA = 0.320 ACRES C VALUE = .300 CA = 0.096
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
FOR THE FIRST SIDE
SUM CA= 0.042 INT= 3.50 CFS= 0.147 CO= 0.000 GUTTER FLOW= 0.147
FOR THE OTHER SIDE
SUM CA= 0.186 INT= 3.50 CFS= 0.651 CO= 0.000 GUTTER FLOW= 0.651
AT THE INLET
SUM CA= 0.228 INT= 3.50 CFS= 0.798 CO= 0.000 GUTTER FLOW= 0.798
GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT
SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.65 (cfs) IS 7.20 (ft.)
XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 13.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.09 SPREAD (ft) = 4.16

STORM SEWER DESIGN / RATIONAL METHOD 10 YEAR RETURN PERIOD

STONEHOUSE ORCHARD HILL SECTION IV D & E

Concrete Pipe,"n" = 0.013 Capacity @ 80% Full Depth

VDOT L&D 229		Area Drained	Run-off Coeff.	"C x A		Inlet Time	Time of Conc.	Rainfall intensity	RUNOFF	INVERT ELEVATIONS		LENGTH	SLOPE	DIAM	CAPACITY	VELOCITY	TRAVEL"t"	REMARKS
FROM PT. (1)	TO PT. (2)	"Acres" (3)	"C" (4)	INCR. (5)	ACCUM (6)	"t" *	"tc" (7)	"i" (8)	"QRational" (9)	UPPER END (10)	LOWER END (11)	ft. (12)	ft/ft (13)	inch (14)	cfs (15)	fps (16)	min. (17)	
		*	*							*	*	*		*				
STORM SYSTEM "R"																		
	R13	0.56	0.3	0.17														
		0.10	0.9	0.09	0.26	13.6	13.64	5.3	1.37									
R13	R12									111.65	111.00	60	0.0108	15	6.57	6.24	0.16	
	R12	0.46	0.3	0.14														
		0.03	0.9	0.03														
		0.49	0.3	0.15														
		0.12	0.9	0.11	0.68	10.4	13.81	5.3	3.58									
R12	R11									110.90	110.60	32	0.0094	15	6.11	5.81	0.09	
	R11A	0.30	0.3	0.09														
		0.13	0.9	0.12														
		0.38	0.3	0.11														
		0.13	0.9	0.12	0.44	8.94	13.90	5.3	2.31									
R11A	R11									113.50	111.70	185	0.0097	15	6.23	5.92	0.52	
	R11	0.30	0.3	0.09														
		0.13	0.9	0.12														
		0.38	0.3	0.11														
		0.13	0.9	0.12	1.55	18.6	19.38	4.5	7.05									
R11	R10									110.35	106.60	260	0.0144	18	12.33	8.14	0.53	
	R10	0.11	0.3	0.03														
		0.10	0.9	0.09	1.68	7.1	19.91	4.5	7.51									
R10	R9									106.35	104.85	107	0.0140	18	12.16	8.02	0.22	
	R9A	0.55	0.3	0.17														
		0.06	0.9	0.05	0.22	22.7	24.19	4.1	0.89									
R9A	R9									106.50	105.00	48	0.0313	15	11.16	10.61	0.08	
	R9	0.62	0.3	0.19														
		0.06	0.9	0.05														
		0.57	0.3	0.17														
		0.02	0.9	0.02	2.33	14.55	24.27	4.0	9.41									
R9	R8									104.75	103.85	32	0.0281	18	17.22	11.36	0.05	
	R8	0.22	0.3	0.07														
		0.08	0.9	0.07														
		0.18	0.3	0.05														
		0.09	0.9	0.08	2.60	16.18	24.31	4.0	10.50									
R8	R7									103.75	96.93	193	0.0353	18	19.30	12.74	0.25	
	R7	0.09	0.9	0.08	2.68	13.68	24.57	4.0	10.77									
R7	R6									96.83	96.53	40	0.0075	24	19.15	7.11	0.09	
	R6C	0.51	0.3	0.15														
		0.09	0.9	0.08	0.23	13.9	24.66	4.0	0.94									

STORM SEWER DESIGN / RATIONAL METHOD 10 YEAR RETURN PERIOD

STONEHOUSE ORCHARD HILL SECTION IV D & E

Concrete Pipe,"n" = 0.013 Capacity @ 80% Full Depth

VDOT L&D 229		Area Drained	Run-off Coeff.	"C x A		Inlet Time	Time of Conc.	Rainfall intensity	RUNOFF	INVERT ELEVATIONS		LENGTH	SLOPE	DIAM	CAPACITY	VELOCITY	TRAVEL"t"	REMARKS
FROM PT.	TO PT.	"Acres"	"C"	INCR.	ACCUM	"t"	"tc"	"i"	"QRational"	UPPER END	LOWER END	ft.	ft/ft	inch	cfs	fps	min.	
(1)	(2)	(3)	(4)	(5)	(6)	*	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
R6C	R6B									100.50	99.25	125	0.0100	15	6.31	6.00	0.35	
	R6B	0.51	0.3	0.15														
		0.04	0.9	0.04														
		0.45	0.3	0.14														
		0.05	0.9	0.05	0.60	11.17	25.01	4.0	2.40									
R6B	R6A									99.15	98.85	32	0.0094	15	6.11	5.81	0.09	
	R6A	0.33	0.3	0.10														
		0.14	0.9	0.13														
		0.29	0.3	0.09														
		0.13	0.9	0.12	1.03	11.17	25.10	4.0	4.10									
R6A	R6									98.75	97.75	100	0.0100	15	6.31	6.00	0.28	
R6	R5				3.71	0.00	25.66	3.9	14.57	96.43	89.23	240	0.0300	24	38.30	14.22	0.28	
	R5J	0.28	0.3	0.08														
		0.13	0.9	0.12	0.20	2.9	5.00	7.2	1.45									
R5J	R5I									94.40	93.40	50	0.0200	15	8.93	8.48	0.10	
	R5I	0.21	0.3	0.06														
		0.10	0.9	0.09														
		0.09	0.3	0.03														
		0.04	0.9	0.04	0.42	11.70	11.80	5.6	2.34									
R5I	R5H									93.30	93.00	40	0.0075	15	5.47	5.20	0.13	
	R5H	0.14	0.3	0.04														
		0.10	0.9	0.09														
		0.00	0.3	0.00														
		0.01	0.9	0.01	0.56	10.43	11.92	5.6	3.12									
R5H	R5F									92.90	92.65	50	0.0050	15	4.46	4.24	0.20	
	R5K	0.22	0.3	0.07														
		0.19	0.9	0.17	0.24	3.9	5.00	7.2	1.71									
R5K	R5F									92.55	92.23	40	0.0080	15	5.65	5.37	0.12	
R5F	R5E				0.80	0.00	12.45	5.5	4.38	92.13	91.38	75	0.0100	15	6.31	6.00	0.21	
	R5E	0.5	0.3	0.15														
		0.06	0.9	0.05	1.00	11.3	12.45	5.5	5.50									
R5E	R5D									91.00	90.60	50	0.0080	18	9.18	6.06	0.14	
	R5D	0.31	0.3	0.09														
		0.02	0.9	0.02														
		0.27	0.3	0.08														
		0.02	0.9	0.02	1.21	10.79	12.59	5.5	6.63									
	R5L	0.13	0.3	0.04														
		0.06	0.9	0.05														
		0.20	0.3	0.06														

STORM SEWER DESIGN / RATIONAL METHOD 10 YEAR RETURN PERIOD

STONEHOUSE ORCHARD HILL SECTION IV D & E

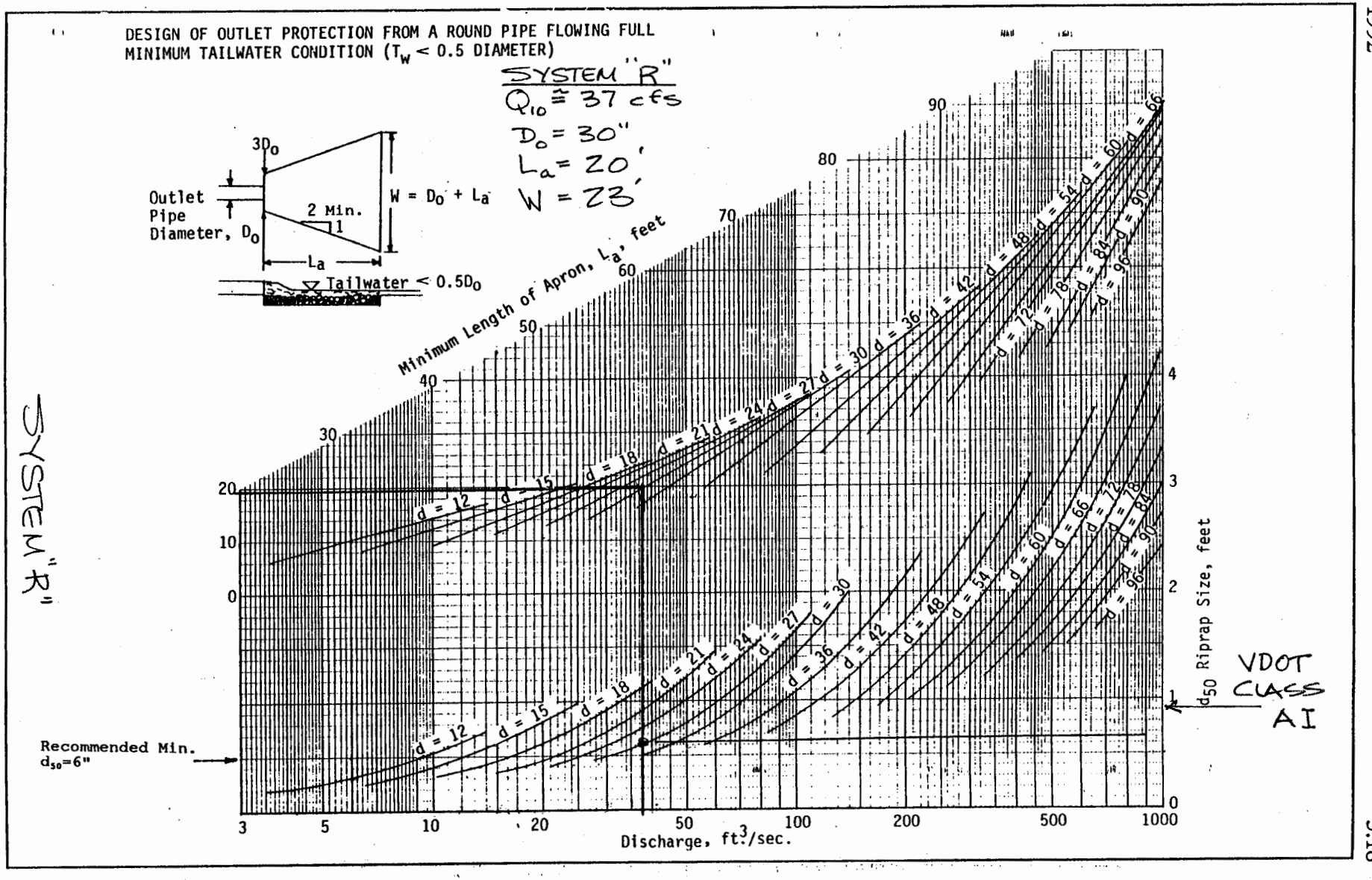
Concrete Pipe,"n" = 0.013 Capacity @ 80% Full Depth

VDOT L&D 229		Area Drained	Run-off Coeff.	"C x A		Inlet Time	Time of Conc.	Rainfall intensity	RUNOFF	INVERT ELEVATIONS		LENGTH	SLOPE	DIAM	CAPACITY	VELOCITY	TRAVEL"t"	REMARKS
FROM PT.	TO PT.	"Acres"	"C"	INCR.	ACCUM	"t"	"tc"	"i"	"QRational"	UPPER END	LOWER END	ft.	ft/ft	inch	cfs	fps	min.	
(1)	(2)	(3)	(4)	(5)	(6)	*	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
		0.10	0.9	0.09	0.24	15.56	15.56	5.0	1.22									
R5L	R5D			-						92.50	91.75	40	0.0188	15	8.65	8.22	0.08	
R5D	R5C				1.45	0.00	16.66	4.9	7.07	90.50	90.00	50	0.0100	18	10.27	6.77	0.12	
	R5C	0.5	0.3	0.15														
		0.07	0.9	0.06														
R5C	R5B				1.67	0.00	17.02	4.8	8.03	89.50	88.88	125	0.0050	24	15.64	5.80	0.36	
R5B	R5A									88.78	87.43	270	0.0050	24	15.61	5.79	0.78	
	R5A	0.97	0.3	0.29														
		0.12	0.9	0.11	2.06	17.1	19.34	4.5	9.37									
R5A	R5									87.33	87.00	55	0.0060	24	17.13	6.36	0.14	
	R5	0.38	0.3	0.11														
		0.02	0.9	0.02														
		0.32	0.3	0.10														
		0.03	0.9	0.03	2.32	11.68	19.49	4.5	10.49									
	R5G	0.32	0.3	0.10														
		0.22	0.9	0.20	0.29	11.2	19.49	4.5	1.33									
R5G	R5									90.00	89.00	40	0.0250	15	9.98	9.49	0.07	
R5	R4				6.32	0.00	28.16	3.7	23.57	86.90	85.64	42	0.0300	24	38.30	14.22	0.05	
	R4	0.38	0.3	0.11														
		0.02	0.9	0.02														
		0.32	0.3	0.10														
		0.03	0.9	0.03	6.58	7.10	28.16	3.7	24.52									
R4	R3				6.58	0.00	28.21	3.7	24.50	85.35	84.00	45	0.0300	24	38.30	14.22	0.05	
	R3	0.32	0.3	0.10														
		0.22	0.9	0.20	6.87	4.3	28.21	3.7	25.59									
R3	R2									83.90	79.25	155	0.0300	24	38.30	14.22	0.18	
R2	R1C				6.87	0.00	28.49	3.7	25.45	79.15	69.00	135	0.0752	24	60.63	22.50	0.10	
R1C	R1B				6.87	0.00	28.57	3.7	25.41	68.90	61.00	105	0.0752	24	60.65	22.51	0.08	
R1B	R1A				6.87	0.00	29.02	3.7	25.18	58.00	55.40	260	0.0100	30	40.09	9.52	0.46	
R1A	R1				6.87	0.00	29.13	3.7	25.13	55.30	54.70	60	0.0100	30	40.09	9.52	0.11	

INLET STATION	Outlet Water Surface	FRICTION LOSS IN PIPE						JUNCTION LOSS												H Adjusted	Inlet Water Surface Elevation	Rim Elevation
		Do	Qo	Lo	no	Sfo	Hf	Vo	Ho	Qi	Vi	Qi x Vi	V²/ 2g	Hi	Δ	Hdelta	Ht	.3 x Ht	0.5 x Ht			
1	2	3	4	5	5A	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
STORM SYSTEM "R"																						
MH R1A	55.95	30	36.42	60	**0.013**	0.0079	0.473	9.44	0.35	36.42	9.44	344	1.38	0.48		0.00	0.83	0.25	-0.42	1.14	57.09	62.00
	R1																					
MH R1B	57.09	30	36.53	260	**0.013**	0.0079	2.062	9.44	0.35	36.53	20.62	753	6.60	2.31	34	2.11	4.77	1.43	-2.38	5.88	62.96	66.00
	R1A																					
MH R1C	62.96	24	37.04	105	**0.013**	0.0268	2.815	20.62	1.65	37.04	20.63	764	6.61	2.31	58	3.53	7.49	2.25	-3.75	8.81	71.77	74.00
	R1B																					
MH R2	71.77	24	37.13	135	**0.013**	0.0269	3.637	20.63	1.65	37.13	14.02	521	3.05	1.07	42	1.21	3.94	1.18	-1.97	6.78	78.56	90.00
	R1C																					
DI R3	78.56	24	37.45	155	**0.013**	0.0274	4.248	14.02	0.76	37.45	14.14	530	3.11	1.09	0	0.00	1.85	0.56	-0.93	5.73	84.29	95.18
	R2																					
DI R4	84.29	24	35.85	45	**0.013**	0.0251	1.130	14.14	0.78	35.85	14.08	505	3.08	1.08	86	2.10	3.96	1.19	-1.98	4.30	88.58	95.01
	R3																					
DI R5	88.58	24	34.51	42	**0.013**	0.0233	0.977	14.08	0.77	21.95	12.83	282	2.55	0.89	72	1.58	3.25	0.97	-1.62	3.58	92.16	95.19
	R4								R5G	1.89	6.36	12										
									R5A	13.36	6.14	82										
R5G	92.16	15	1.89	40	**0.013**	0.0009	0.034	6.36	0.16											0.03	92.19	95.04
	R5																					
R5A	92.16	24	13.36	55	**0.013**	0.0035	0.192	6.14	0.15	10.98	5.49	60	0.47	0.16	60	0.26	0.57	0.17	-0.28	0.65	92.80	95.97
	R5																					
R5B	92.80	24	10.98	270	**0.013**	0.0024	0.636	5.49	0.12	11.48	5.54	64	0.48	0.17	15	0.05	0.33	0.10	-0.17	0.90	93.70	98.95
	R5A																					
R5C	93.70	24	11.48	125	**0.013**	0.0026	0.322	5.54	0.12	10.01	6.77	68	0.71	0.25	0	0.00	0.37	0.11	-0.18	0.62	94.32	97.23
	R5B																					
R5D	94.32	18	10.01	50	**0.013**	0.0091	0.454	6.77	0.18	7.19	5.86	42	0.53	0.19	0	0.00	0.36	0.11	-0.18	0.75	95.07	97.01
	R5C								R5L	1.75	5.62	10										
R5L	95.07	15	1.75	40	**0.013**	0.0007	0.029	5.62	0.12											0.03	95.10	97.86
	R5D																					
R5E	95.07	18	7.19	50	**0.013**	0.0047	0.235	5.86	0.13	5.73	4.67	27	0.34	0.12	0	0.00	0.25	0.08	-0.13	0.44	95.50	97.15
	R5D																					
R5F	95.50	15	5.73	75	**0.013**	0.0079	0.590	4.67	0.08	4.02	4.20	17	0.27	0.10	0	0.00	0.18	0.05	-0.09	0.73	96.24	97.88
	R5E								R5K	1.71	4.10	7										
R5K	96.24	15	1.71	40	**0.013**	0.0007	0.028	4.10	0.07											0.03	96.26	97.86
	R5F																					
R5H	96.24	15	4.02	50	**0.013**	0.0039	0.194	4.20	0.07	3.00	4.64	14	0.33	0.12	50	0.16	0.34	0.10	-0.17	0.47	96.70	93.00
	R5F																					
R5I	96.70	15	3.00	40	**0.013**	0.0022	0.086	4.64	0.08	1.45	5.45	8	0.46	0.16	50	0.22	0.46	0.14	-0.23	0.46	97.16	97.76
	R5H																					
R5J	97.16	15	1.45	50	**0.013**	0.0005	0.025	5.45	0.12											0.03	97.19	98.86
	R5I																					
R6	92.16	24	21.95	240	**0.013**	0.0094	2.259	12.83	0.64	16.46	6.99	115	0.76	0.27	45	0.32	1.23	0.37	-0.61	3.24	95.40	104.12
	R5								R6A	6.22	6.00	37										
R6A	95.40	15	6.22	100	**0.013**	0.0093	0.928	6.00	0.14	3.65	5.30	19	0.44	0.15	90	0.31	0.60	0.18	-0.30	1.41	96.80	103.64
	R6																					
R6B	96.80	15	3.65	32	**0.013**	0.0032	0.102	5.30	0.11	1.43	4.23	6	0.28	0.10	90	0.19	0.40	0.12	-0.20	0.42	97.23	103.64
	R6A																					
R6C	97.23	15	1.43	125	**0.013**	0.0005	0.061	4.23	0.07													
	R6B																					
R7	95.40	24	16.46	40	**0.013**	0.0053	0.212	6.99	0.19	16.10	12.45	200	2.41	0.84	38	0.87	1.90	0.57	-0.95	1.73	97.13	103.92
	R6																					

INLET STATION	Outlet Water Surface	FRICTION LOSS IN PIPE						JUNCTION LOSS												H Adjusted	Inlet Water Surface Elevation	Rim Elevation
		D_o	Q_o	L_o	n_o	S_{fo}	H_f	V_o	H_o	Q_i	V_i	$Q_i \times V_i$	$V^2/2g$	H_i	Δ	H_{delta}	H_t	.3 x H_t	0.5 x H_t			
1	2	3	4	5	5A	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
R8	97.13	18	16.10	193	**0.013**	0.0235	4.534	12.45	0.60	14.43	11.12	160	1.92	0.67	38	0.69	1.96	0.59	-0.98	6.11	103.24	110.53
	R7																					
R9	103.24	18	14.43	32	**0.013**	0.0189	0.604	11.12	0.48	11.04	7.95	88	0.98	0.34	0	0.00	0.82	0.25	-0.41	1.26	104.50	110.53
	R8								R9A	1.36	6.27	9										
R9A	104.50	15	1.36	48	**0.013**	0.0004	0.021	6.27	0.15											0.02	104.52	110.75
	R9																					
R10	104.50	18	11.04	107	**0.013**	0.0110	1.182	7.95	0.25	10.44	7.97	83	0.99	0.35	90	0.69	1.28	0.38	-0.64	2.21	106.71	112.50
	R9																					
R11	106.71	18	10.44	260	**0.013**	0.0099	2.569	7.97	0.25	4.88	5.64	28	0.49	0.17	90	0.35	0.77	0.23	-0.38	3.18	109.89	115.28
	R10								R11A	3.15	5.17	16										
R11A	109.89	15	3.15	185	**0.013**	0.0024	0.441	5.17	0.10													
	R11																					
R12	109.89	15	4.88	32	**0.013**	0.0057	0.183	5.64	0.12	1.86	4.68	9	0.34	0.12	0	0.00	0.24	0.07	-0.12	0.38	110.27	115.28
	R11														0							
R13	110.27	15	1.86	60	**0.013**	0.0008	0.050	4.68	0.08											0.05	110.31	115.87
	R12														90							

EROSION CONTROL



Source: USDA-SCS

Plate 3.18-3

Open Channel Analysis / Uniform Flow :
(USING MANNING'S EQUATION :)

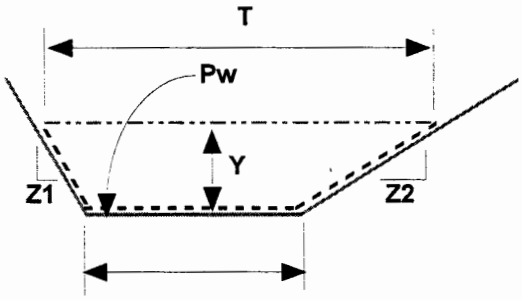
Project : Stonehouse
Location : James City County, VA

$$Q = \frac{1.486 \cdot A \cdot (R_h)^{\frac{2}{3}} \cdot \sqrt{S_o}}{n}$$

$$R_h := \frac{A}{P_w}$$

A = Area of Flow Section
P_w = Wetted Perimeter
R_h = Hydraulic Radius

$$T := B + y \cdot (Z_1 + Z_2)$$



TRAPEZOIDAL, RECTANGULAR or VEE CHANNEL CROSS SECTION

Cross Section Designation :
SECTION IVD SYSTEM "R" OUTFALL PROTECTION:

GIVEN :	**Design flow, Q_{DESIGN} =**	**208**	**cubic ft. / sec.**
	Bottom Width, B =	**20**	**feet**
	Channel Slope, S_o =	**0.001**	**feet / foot**
	Side Slopes, Z_1 =	**1.5**	**Run / Unit rise**
	Z_2 =	**1.5**	**Run / Unit rise**
	Manning's Coefficient, n =	**0.03**	**Stone lined**

CALCULATE : Depth and Velocity, (Normal and Critical Flow):

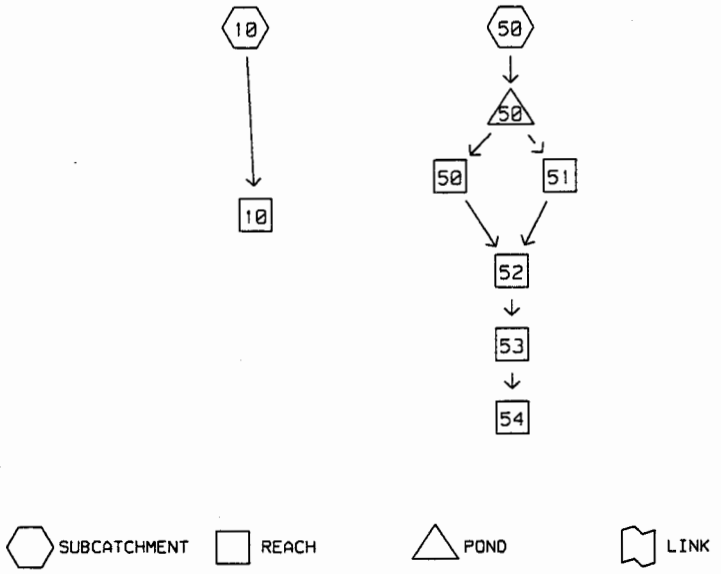
T_n =	29.06	feet	**Y_{Normal} =**	**3.02**	**feet**
R_{hn} =	2.40	feet	**V_{Normal} =**	**2.81**	**f.p.s.**
T_c =	24.33	feet	**$Y_{Critical}$ =**	**1.44**	**feet**
R_{hc} =	1.27	feet	**$V_{Critical}$ =**	**6.50**	**f.p.s.**
			$S_{Critical}$ =	**0.0125**	**ft. / ft.**
			F =	**0.31**	

Subcritical Flow / Mild Slope

Natural Channel below dam

Station	Elevation	Offset #1	Offset #2	d	W_{base}	A_{inc}	A_{accum}	P_W	R_h
25.00	43	39.5	39.5	0	0	0		0.00	
-0.02	44	22	57	1	35	18	18	35.06	0.50
	46	7	62	3	55	90	108	55.52	1.94
	48	0	67	5	67	122	230	67.67	3.39
50.00	42.5	44	44	0	0	0		0.00	
-0.02	44	22	65	1.5	43	32	32	43.10	0.75
	46	10	70	3.5	60	103	135	60.55	2.23
	48	0	75	5.5	75	135	238	75.58	3.15
75.00	42	59	59	0	0	0		0.00	
	44	22	72	2	50	50	50	50.21	1.00
	46	7	77	4	70	120	170	70.52	2.41
	48	0	82	6	82	152	322	82.67	3.90

WATERSHED ROUTING ==========



SUBCATCHMENT 10 **Predevelopment Area F**

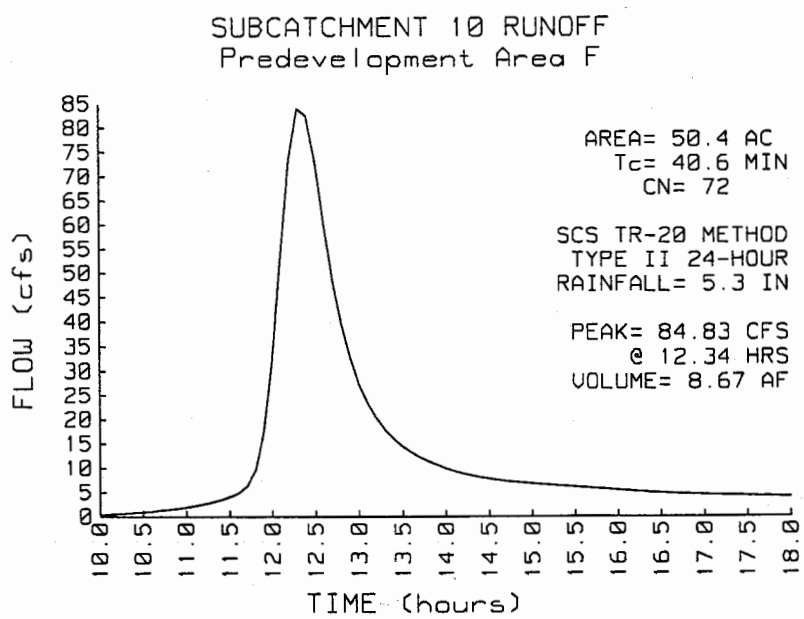
PEAK= 84.83 CFS @ 12.34 HRS, VOLUME= 8.67 AF

ACRES	CN	
23.10	70	WOODS
27.30	74	OPEN / GOLF COURSE
50.40	72	

SCS TR-20 METHOD
TYPE II 24-HOUR
RAINFALL= 5.3 IN
SPAN= 10-18 HRS, dt=.1 HRS

Method	Comment	Tc (min)
TR-55 SHEET FLOW	**PREDEVELOPMENT Tc / TR55**	30.8
Woods: Light underbrush n=.4 L=200' P2=3.4 in s=.03 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	**SHALLOW CONCENTRATED**	9.8
Unpaved Kv=16.1345 L=1900' s=.04 '/' V=3.23 fps		

	Total Length= 2100 ft Total Tc=	40.6



SUBCATCHMENT 50 **Post Development Subcatchment**

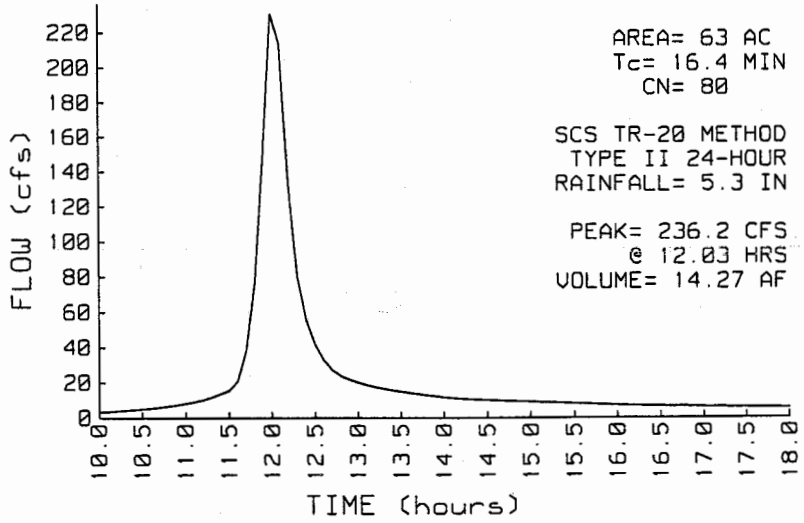
PEAK= 236.2 CFS @ 12.03 HRS, VOLUME= 14.27 AF

ACRES	CN	
5.60	70	WOODS
14.00	74	GOLF COURSE
9.40	81	SF RESIDENTIAL 1/3 Ac. LOTS
8.60	90	MULTI-FAMILY RESIDENTIAL
2.20	74	OPEN SPACE
10.30	80	SF RESIDENTIAL 0.4 Ac. LOTS
12.90	85	SF RESIDENTIAL 1/6 Ac. LOTS
63.00	80	

SCS TR-20 METHOD
TYPE II 24-HOUR
RAINFALL= 5.3 IN
SPAN= 10-18 HRS, dt=.1 HRS

Method	Comment	Tc (min)
TR-55 SHEET FLOW	**Segment ID:**	14.1
n=.15 L=200' P2=3.4 in s=.03 '/'		
CHANNEL FLOW	**Segment ID:**	2.3
a=3.1 sq-ft Pw=6.3' r=.492'		
s=.04 '/' n=.013 V=14.25 fps L=2000' Capacity=44.2 cfs		
	Total Length= 2200 ft Total Tc=	16.4

SUBCATCHMENT 50 RUNOFF
Post Development Subcatchment



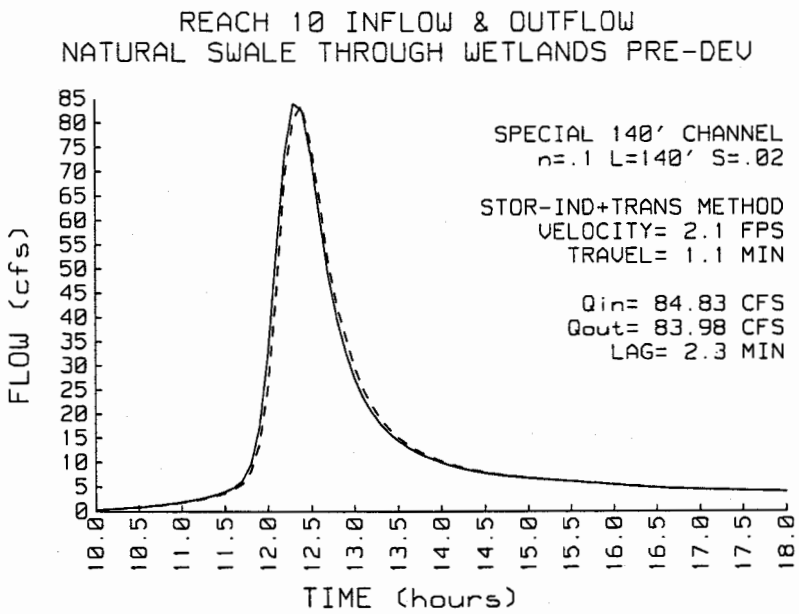
REACH 10 **NATURAL SWALE THROUGH WETLANDS PRE-DEV**

Qin = 84.83 CFS @ 12.34 HRS, VOLUME= 8.67 AF
Qout= 83.98 CFS @ 12.38 HRS, VOLUME= 8.66 AF, ATTEN= 1%, LAG= 2.3 MIN

DEPTH (FT)	END AREA (SQ-FT)	PERIM (FT)
0.0	0.0	0.00
1.5	30.0	55.00
4.5	227.0	82.00

SPECIAL 140' CHANNEL
n= .1
LENGTH= 140 FT
SLOPE= .02 FT/FT
CAPACITY= 940.5 CFS

STOR-IND+TRANS METHOD
PEAK DEPTH= 1.64 FT
PEAK VELOCITY= 2.1 FPS
TRAVEL TIME = 1.1 MIN
SPAN= 10-18 HRS, dt=.1 HRS



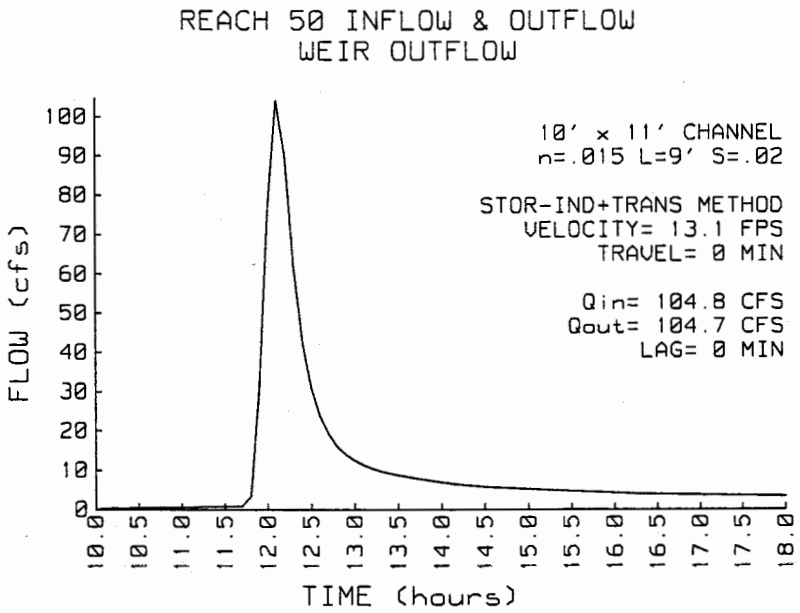
REACH 50 **WEIR OUTFLOW**

Qin = 104.8 CFS @ 12.12 HRS, VOLUME= 6.61 AF
Qout= 104.7 CFS @ 12.12 HRS, VOLUME= 6.61 AF, ATTEN= 0%, LAG= 0.0 MIN

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.00
1.1	11.0	143.83
2.2	22.0	408.86
3.3	33.0	730.96
4.7	47.3	1197.98
6.6	66.0	1856.48
8.8	88.0	2670.80
11.0	110.0	3510.19

10' x 11' CHANNEL
n= .015
LENGTH= 9 FT
SLOPE= .02 FT/FT

STOR-IND+TRANS METHOD
PEAK DEPTH= .80 FT
PEAK VELOCITY= 13.1 FPS
TRAVEL TIME = 0.0 MIN
SPAN= 10-18 HRS, dt=.1 HRS



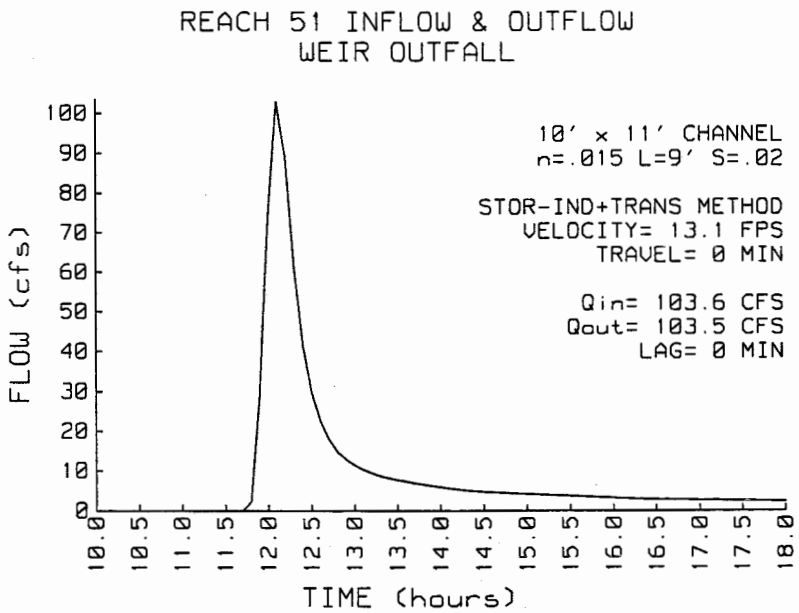
REACH 51 **WEIR OUTFALL**

Qin = 103.6 CFS @ 12.12 HRS, VOLUME= 5.98 AF
Qout= 103.5 CFS @ 12.12 HRS, VOLUME= 5.98 AF, ATTEN= 0%, LAG= 0.0 MIN

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.00
1.1	11.0	143.83
2.2	22.0	408.86
3.3	33.0	730.96
4.7	47.3	1197.98
6.6	66.0	1856.48
8.8	88.0	2670.80
11.0	110.0	3510.19

10' x 11' CHANNEL
n= .015
LENGTH= 9 FT
SLOPE= .02 FT/FT

STOR-IND+TRANS METHOD
PEAK DEPTH= .79 FT
PEAK VELOCITY= 13.1 FPS
TRAVEL TIME = 0.0 MIN
SPAN= 10-18 HRS, dt=.1 HRS



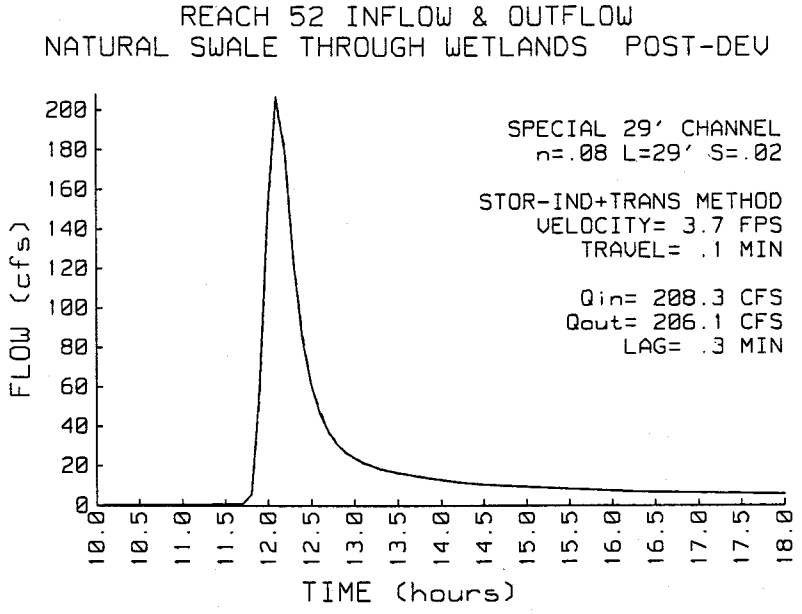
REACH 52 **NATURAL SWALE THROUGH WETLANDS POST-DEV**

Qin = 208.3 CFS @ 12.12 HRS, VOLUME= 12.59 AF
Qout= 206.1 CFS @ 12.12 HRS, VOLUME= 12.59 AF, ATTEN= 1%, LAG= .3 MIN

ELEV (FT)	END AREA (SQ-FT)	PERIM (FT)
43.0	0.0	0.00
44.0	18.0	35.00
46.0	108.0	55.50
48.0	230.0	67.70

SPECIAL 29' CHANNEL
n= .08
LENGTH= 29 FT
SLOPE= .02 FT/FT
CAPACITY= 1365.4 CFS

STOR-IND+TRANS METHOD
PEAK ELEV.= 44.85 FT
PEAK VELOCITY= 3.7 FPS
TRAVEL TIME = .1 MIN
SPAN= 10-18 HRS, dt=.1 HRS



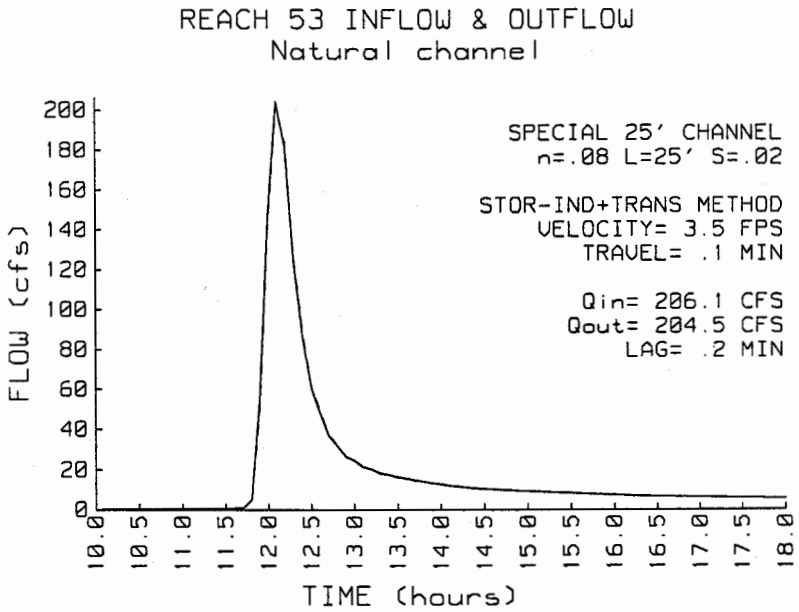
REACH 53 **Natural channel**

Qin = 206.1 CFS @ 12.12 HRS, VOLUME= 12.59 AF
Qout= 204.5 CFS @ 12.13 HRS, VOLUME= 12.59 AF, ATTEN= 1%, LAG= .2 MIN

ELEV (FT)	END AREA (SQ-FT)	PERIM (FT)
42.5	0.0	0.00
44.0	32.0	43.10
46.0	135.0	60.60
48.0	238.0	75.58

SPECIAL 25' CHANNEL
n= .08
LENGTH= 25 FT
SLOPE= .02 FT/FT
CAPACITY= 1343.2 CFS

STOR-IND+TRANS METHOD
PEAK ELEV.= 44.50 FT
PEAK VELOCITY= 3.5 FPS
TRAVEL TIME = .1 MIN
SPAN= 10-18 HRS, dt=.1 HRS



REACH 54

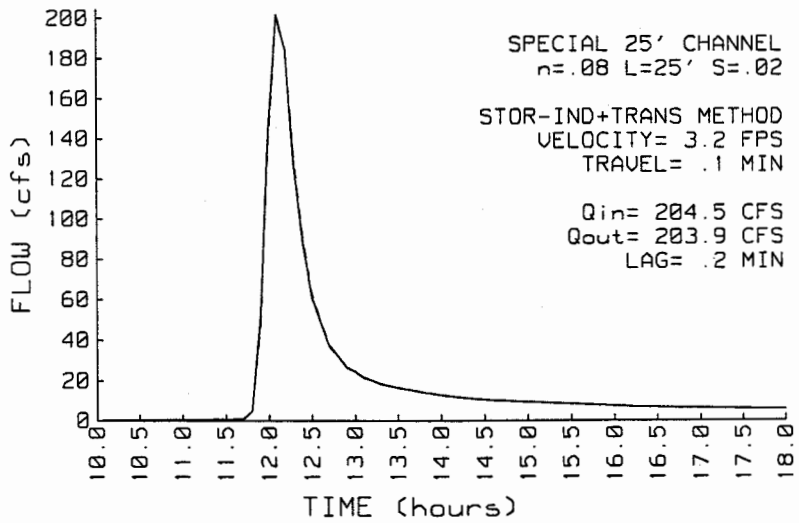
Qin = 204.5 CFS @ 12.13 HRS, VOLUME= 12.59 AF
Qout= 203.9 CFS @ 12.13 HRS, VOLUME= 12.59 AF, ATTEN= 0%, LAG= .2 MIN

ELEV (FT)	END AREA (SQ-FT)	PERIM (FT)
42.0	0.0	0.00
44.0	50.0	50.20
46.0	170.0	70.50
48.0	322.0	82.67

SPECIAL 25' CHANNEL
n= .08
LENGTH= 25 FT
SLOPE= .02 FT/FT
CAPACITY= 2094 CFS

STOR-IND+TRANS METHOD
PEAK ELEV.= 44.21 FT
PEAK VELOCITY= 3.2 FPS
TRAVEL TIME = .1 MIN
SPAN= 10-18 HRS, dt=.1 HRS
3 x FINER ROUTING

REACH 54 INFLOW & OUTFLOW



POND 50 **Area "F" Detention**

Qin = 236.2 CFS @ 12.03 HRS, VOLUME= 14.27 AF
Qout= 208.4 CFS @ 12.12 HRS, VOLUME= 12.59 AF, ATTEN= 12%, LAG= 5.0 MIN
Qpri= 104.8 CFS @ 12.12 HRS, VOLUME= 6.61 AF
Qsec= 103.6 CFS @ 12.12 HRS, VOLUME= 5.98 AF

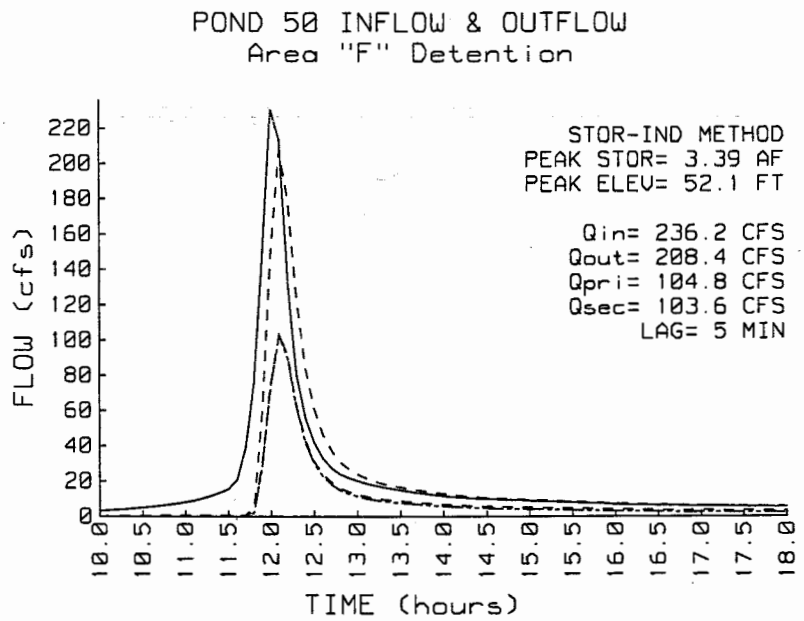
ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)
44.0	0.00	0.00	0.00
45.0	.14	.07	.07
50.0	.45	1.48	1.55
55.0	1.27	4.30	5.85
60.0	1.98	8.13	13.97

STOR-IND METHOD
PEAK STORAGE = 3.39 AF
PEAK ELEVATION= 52.1 FT
FLOOD ELEVATION= 60.0 FT
START ELEVATION= 44.0 FT
SPAN= 10-18 HRS, dt=.1 HRS
Tdet= 45.5 MIN (12.44 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	44.0'	**4" ORIFICE/GRATE**
			Q=.6 PI r^2 SQR(2g) SQR(H-r)
2	P	50.0'	**10' SHARP-CRESTED RECTANGULAR WEIR**
			Q=C L H^1.5 C=3.27+.4 H/6 L=Length-2(.1 H)
3	S	50.0'	**10' SHARP-CRESTED RECTANGULAR WEIR**
			Q=C L H^1.5 C=3.27+.4 H/6 L=Length-2(.1 H)

Primary Discharge
├──1=Orifice/Grate
└──2=Sharp-Crested Rectangular Weir

Secondary Discharge
└──3=Sharp-Crested Rectangular Weir



Langley and McDonald, P.C.
ENGINEERS • SURVEYORS • PLANNERS
LANDSCAPE ARCHITECTS • ENVIRONMENTAL CONSULTANTS
VIRGINIA BEACH • WILLIAMSBURG, VIRGINIA

Subject Stonehouse HVD

Computed By _____ Checked By _____

Project No. _____
Client _____
Date _____ Sheet No. _____

TEMPORARY SEDIMENT TRAP DESIGN:

THREE AREAS:

		REQUIRED WetVol/DryVol
DAR5G	≅ 2.67 Ac.	179
DAR5B	≅ 2.40 Ac.	161
DAR5D	≅ 2.31 Ac.	155

USE ONE STANDARDIZED ST. FOR ALL 3.

SET AREA AS DA = 2.75 Ac FOR TYPICAL.

FOR DA = 2.75

WET STORAGE VOLUME:

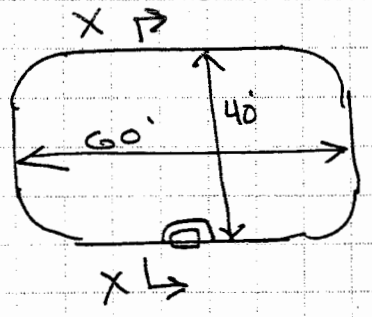
$V_{ws} = 2.75 \times 67 = 184$ c.y. ≅ 4975 c.f.

Use depth d = 3 ft.
with $V_{ws} = .85 \times A_1 \times D_1$

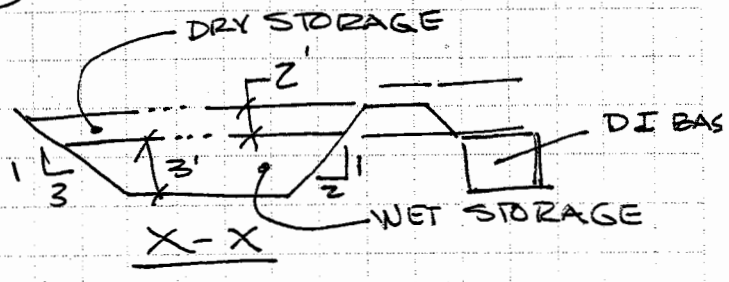
*VESC p III-72

$\text{Reqd. } A_1 = \frac{4975}{.85 \times 3} = 1951$ s.f.

USE 40' × 60' with 10' fillets



A = 2400 − 86 = 2314 s.f.

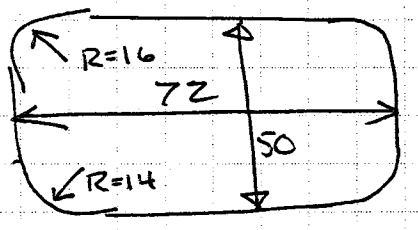


DRY STORAGE VOLUME: $z_1 = 3 \quad z_2 = 2$

try: $h = 2'$

$$\left[60 + (3 \times 2) \times 2\right] + \left[40 + 3 \times 2 + 2 \times 2\right] - \left(1 - \frac{\pi}{4}\right)$$

MINIMUM SURFACE AREA DRY STORAGE:



$$A = 50 \times 72 - \frac{.2146 \times 32^2}{2} - \frac{.2146 \times 28^2}{2}$$

$$= 3600 - 110 - 84$$

$$= 3406 \text{ s.f.}$$

VOL DRY

$$V_{DS} = \frac{2314 + 3406}{2} \times 2 = 5720 \text{ s.f.} \cong 212 \text{ c.y.}$$

EXISTING CONDITION

RUNOFF CURVE NUMBERS

TC COMPUTATIONS

AND INFLOW HYDROGRAPH

Quick TR-55 Ver.5.46 S/N:
Executed: 15:34:32 09-17-1997

STONEHOUSE
SUB-REGIONAL STORMWATER MGMT FACILITIES
SWMF 'F', IVC/VA
SERVING SECTION IVE
Existing

RUNOFF CURVE NUMBER SUMMARY

::

Subarea Description	Area (acres)	CN (weighted)
	50.40	72

Quick TR-55 Ver.5.46 S/N:
Executed: 15:34:46 09-17-1997

STONEHOUSE
SUB-REGIONAL STORMWATER MGMT FACILITIES
SWMF 'F', IVC/VA, SERVING IVE
FUTURE DEVELOPMENT

RUNOFF CURVE NUMBER SUMMARY

::

Subarea Description	Area (acres)	CN (weighted)
	63.00	80

```
Quick TR-55 Ver.5.46   S/N:
Executed: 15:35:05   09-17-1997    C:\96038\BMPS\F-EXIST.TCT

                           STONEHOUSE
        SUB-REGIONAL STORMWATER MANAGEMENT FACILITIES  (F, IVC/VA)
                    SERVING IVE, EXISTING CONDITIONS


                    Tc COMPUTATIONS FOR: F

 SHEET FLOW (Applicable to Tc only)
     Segment ID
     Surface description                        GRASS
     Manning's roughness coeff., n                    0.4000
     Flow length, L (total < or = 300)    ft     200.0
     Two-yr 24-hr rainfall, P2             in     3.400
     Land slope, s                       ft/ft   0.0300
                         0.8
          .007 * (n*L)
     T = --------------                 hrs       0.51              =  0.51
              0.5     0.4
            P2    *   s

 SHALLOW CONCENTRATED FLOW
     Segment ID
     Surface (paved or unpaved)?                     Unpaved
     Flow length, L                        ft    1900.0
     Watercourse slope, s                ft/ft   0.0400


                           0.5
     Avg.V =   Csf *   (s)              ft/s    3.2269
     where:    Unpaved Csf = 16.1345
               Paved   Csf = 20.3282

     T = L / (3600*V)                   hrs       0.16              =  0.16


 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)         0.68
```

Quick TR-55 Ver.5.46 S/N:
Executed: 15:35:05 09-17-1997 C:\96038\BMPS\F-EXIST.TCT

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

STONEHOUSE
SUB-REGIONAL STORMWATER MANAGEMENT FACILITIES (F, IVC/VA)
SERVING IVE, EXISTING CONDITIONS

Subarea descr.	Tc or Tt	Time (hrs)
F	Tc	0.68

Return Frequency: 2 years

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

Executed: 09-17-1997 15:35:48
Watershed file: --> C:\96038\BMPS\F-EXIST .MOP
Hydrograph file: --> C:\96038\BMPS\E2EX.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
EXISTING CONDITIONS

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

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	50.40	72.0	0.75	0.00	3.40	1.06	I.23 .23

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

Total area = 50.40 acres or 0.07875 sq.mi
Peak discharge = 31 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
	0.68	0.00	0.75	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: 09-17-1997 15:35:48
Watershed file: --> C:\96038\BMPS\F-EXIST .MOP
Hydrograph file: --> C:\96038\BMPS\E2EX.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
EXISTING CONDITIONS

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

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
	31	12.7
Composite Watershed	31	12.7

Return Frequency: 2 years

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

Executed: 09-17-1997 15:35:48
Watershed file: --> C:\96038\BMPS\F-EXIST .MOP
Hydrograph file: --> C:\96038\BMPS\E2EX.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
EXISTING CONDITIONS

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
	0	1	1	1	1	2	5	10	18
Total (cfs)	0	1	1	1	1	2	5	10	18

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
	26	30	31	29	21	15	11	9	7
Total (cfs)	26	30	31	29	21	15	11	9	7

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
	6	5	4	4	3	3	3	2	2
Total (cfs)	6	5	4	4	3	3	3	2	2

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
	2	2	2	1	0
Total (cfs)	2	2	2	1	0

Return Frequency: 10 years

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

Executed: 09-17-1997 15:35:48
Watershed file: --> C:\96038\BMPS\F-EXIST .MOP
Hydrograph file: --> C:\96038\BMPS\F10EX.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
EXISTING CONDITIONS

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

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
	50.40	72.0	0.75	0.00	5.28	2.42	I.15	.15

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

Total area = 50.40 acres or 0.07875 sq.mi
Peak discharge = 76 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
	0.68	0.00	0.75	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: 09-17-1997 15:35:48
Watershed file: --> C:\96038\BMPS\F-EXIST .MOP
Hydrograph file: --> C:\96038\BMPS\F10EX.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
EXISTING CONDITIONS

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

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
	76	12.6
Composite Watershed	76	12.6

Return Frequency: 10 years

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

Executed: 09-17-1997 15:35:48
Watershed file: --> C:\96038\BMPS\F-EXIST .MOP
Hydrograph file: --> C:\96038\BMPS\F10EX.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
EXISTING CONDITIONS

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
	2	3	3	5	7	10	18	32	50
Total (cfs)	2	3	3	5	7	10	18	32	50

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
	67	76	75	68	48	33	24	19	15
Total (cfs)	67	76	75	68	48	33	24	19	15

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
	12	10	9	7	7	6	5	5	4
Total (cfs)	12	10	9	7	7	6	5	5	4

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
	4	4	3	3	0
Total (cfs)	4	4	3	3	0

Return Frequency: 100 years

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

Executed: 09-17-1997 15:35:48
Watershed file: --> C:\96038\BMPS\F-EXIST .MOP
Hydrograph file: --> C:\96038\BMPS\F100EX.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
EXISTING CONDITIONS

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

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	50.40	72.0	0.75	0.00	8.00	4.69	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 = 50.40 acres or 0.07875 sq.mi
Peak discharge = 157 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
	0.68	0.00	0.75	0.00	No	Computed Ia/p < .1

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

Return Frequency: 100 years

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

Executed: 09-17-1997 15:35:48
Watershed file: --> C:\96038\BMPS\F-EXIST .MOP
Hydrograph file: --> C:\96038\BMPS\F100EX.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
EXISTING CONDITIONS

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

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
	157	12.6
Composite Watershed	157	12.6

Return Frequency: 100 years

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

Executed: 09-17-1997 15:35:48
Watershed file: --> C:\96038\BMPS\F-EXIST .MOP
Hydrograph file: --> C:\96038\BMPS\F100EX.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
EXISTING CONDITIONS

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
	5	7	9	13	17	25	42	72	109
Total (cfs)	5	7	9	13	17	25	42	72	109

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
	140	157	151	136	93	64	45	34	27
Total (cfs)	140	157	151	136	93	64	45	34	27

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
	23	18	15	13	11	10	9	8	7
Total (cfs)	23	18	15	13	11	10	9	8	7

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
	7	6	6	4	0
Total (cfs)	7	6	6	4	0

FUTURE CONDITION

RUNOFF CURVE NUMBERS

TC COMPUTATIONS

AND

INFLOW HYDROGRAPH

Quick TR-55 Ver.5.46 S/N:
Executed: 15:34:32 09-17-1997

STONEHOUSE
SUB-REGIONAL STORMWATER MGMT FACILITIES
SWMF 'F', IVC/VA
SERVING SECTION IVE

RUNOFF CURVE NUMBER DATA

::

Composite Area:

SURFACE DESCRIPTION	AREA (acres)	CN	
WOODS	23.10	70	
OPEN/GOLF COURSE	27.30	74	
COMPOSITE AREA --->	50.40	72.2	(72)

::

Quick TR-55 Ver.5.46 S/N:
Executed: 15:34:46 09-17-1997

STONEHOUSE
SUB-REGIONAL STORMWATER MGMT FACILITIES
SWMF 'F', IVC/VA, SERVING IVE
FUTURE DEVELOPMENT

RUNOFF CURVE NUMBER DATA

::

Composite Area:

SURFACE DESCRIPTION	AREA (acres)	CN	
WOODS	5.60	70	
GOLF COURSE	14.00	74	
SF RES. 1/3 AC. LOTS	9.40	81	
MULTI-FAMILY RES.	8.60	90	
OPEN SPACE	2.20	74	
SF RES. 0.4 AC. LOTS	10.30	80	
SF RES. 1/6 AC. LOTS	12.90	85	
COMPOSITE AREA --->	63.00	80.1	(80)

::

```
Quick TR-55 Ver.5.46   S/N:
Executed: 15:35:25   09-17-1997    C:\96038\BMPS\F-FUT.TCT

                           STONEHOUSE
       SUB-REGIONAL STORMWATER MANAGEMENT FACILITIES  (F, IVC/VA)
                    SERVING IVE, FUTURE DEVELOPMENT


                    Tc COMPUTATIONS FOR: F

 SHEET FLOW (Applicable to Tc only)
     Segment ID
     Surface description
     Manning's roughness coeff., n                     0.1500
     Flow length, L (total < or = 300)     ft         200.0
     Two-yr 24-hr rainfall, P2             in          3.400
     Land slope, s                         ft/ft      0.0300
                          0.8
          .007 * (n*L)
     T =  --------------                   hrs          0.23              =   0.23
             0.5     0.4
           P2    *   s

 SHALLOW CONCENTRATED FLOW
     Segment ID
     Surface (paved or unpaved)?
     Flow length, L                        ft            0.0
     Watercourse slope, s                  ft/ft      0.0000

                            0.5
     Avg.V =   Csf *   (s)                 ft/s       0.0000
     where:    Unpaved Csf = 16.1345
               Paved   Csf = 20.3282

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


 CHANNEL FLOW
     Segment ID
     Cross Sectional Flow Area, a          sq.ft        3.14
     Wetted perimeter, Pw                  ft           6.28
     Hydraulic radius, r = a/Pw            ft          0.500
     Channel slope, s                      ft/ft      0.0400
     Manning's roughness coeff., n                    0.0130

                        2/3     1/2
          1.49   *   r    *   s
     V =  --------------------             ft/s       %14.4406
                     n

     Flow length, L                        ft           2000

     T = L / (3600*V)                      hrs          0.04              =   0.04

    :::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                                 TOTAL TIME (hrs)             0.27
```

Quick TR-55 Ver.5.46 S/N:
Executed: 15:35:25 09-17-1997 C:\96038\BMPS\F-FUT.TCT

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

STONEHOUSE
SUB-REGIONAL STORMWATER MANAGEMENT FACILITIES (F, IVC/VA)
SERVING IVE, FUTURE DEVELOPMENT

Subarea descr.	Tc or Tt	Time (hrs)
F	Tc	0.27

Return Frequency: 2 years

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

Executed: 09-17-1997 15:36:05
Watershed file: --> C:\96038\BMPS\F-FUT .MOP
Hydrograph file: --> C:\96038\BMPS\F-2FUT.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
FUTURE CONDITIONS

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

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	63.00	80.0	0.30	0.00	3.40	1.56	I.15 .15

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

Total area = 63.00 acres or 0.09844 sq.mi
Peak discharge = 100 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
	0.27	0.00	0.30	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: 09-17-1997 15:36:05
Watershed file: --> C:\96038\BMPS\F-FUT .MOP
Hydrograph file: --> C:\96038\BMPS\F-2FUT.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
FUTURE CONDITIONS

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

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
	100	12.3
Composite Watershed	100	12.3

Return Frequency: 2 years

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

Executed: 09-17-1997 15:36:05
Watershed file: --> C:\96038\BMPS\F-FUT .MOP
Hydrograph file: --> C:\96038\BMPS\F-2FUT.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
FUTURE CONDITIONS

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
	2	3	5	14	30	61	98	100	70
Total (cfs)	2	3	5	14	30	61	98	100	70

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
	44	31	23	19	13	11	10	9	8
Total (cfs)	44	31	23	19	13	11	10	9	8

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
	7	6	6	5	5	4	4	3	3
Total (cfs)	7	6	6	5	5	4	4	3	3

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
	3	3	2	2	0
Total (cfs)	3	3	2	2	0

Return Frequency: 10 years

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

Executed: 09-17-1997 15:36:05
Watershed file: --> C:\96038\BMPS\F-FUT .MOP
Hydrograph file: --> C:\96038\BMPS\F-10FUT.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
FUTURE CONDITIONS

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

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	63.00	80.0	0.30	0.00	5.28	3.14	I.09 .10

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

Total area = 63.00 acres or 0.09844 sq.mi
Peak discharge = 209 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
	0.27	0.00	0.30	0.00	No	Computed Ia/p < .1

* 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: 09-17-1997 15:36:05
Watershed file: --> C:\96038\BMPS\F-FUT .MOP
Hydrograph file: --> C:\96038\BMPS\F-10FUT.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
FUTURE CONDITIONS

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

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
	209	12.2
Composite Watershed	209	12.2

Return Frequency: 10 years

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

Executed: 09-17-1997 15:36:05
Watershed file: --> C:\96038\BMPS\F-FUT .MOP
Hydrograph file: --> C:\96038\BMPS\F-10FUT.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
FUTURE CONDITIONS

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
	6	9	13	36	73	138	209	209	142
Total (cfs)	6	9	13	36	73	138	209	209	142

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
	87	61	45	35	25	20	18	16	14
Total (cfs)	87	61	45	35	25	20	18	16	14

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
	13	11	10	10	9	7	7	6	6
Total (cfs)	13	11	10	10	9	7	7	6	6

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
	6	5	4	4	0
Total (cfs)	6	5	4	4	0

Return Frequency: 100 years

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

Executed: 09-17-1997 15:36:05
Watershed file: --> C:\96038\BMPS\F-FUT .MOP
Hydrograph file: --> C:\96038\BMPS\F-100FUT.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
FUTURE CONDITIONS

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

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	63.00	80.0	0.30	0.00	8.00	5.63	I.06 .10

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

Total area = 63.00 acres or 0.09844 sq.mi
Peak discharge = 375 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
	0.27	0.00	0.30	0.00	No	Computed Ia/p < .1

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

Return Frequency: 100 years

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

Executed: 09-17-1997 15:36:05
Watershed file: --> C:\96038\BMPS\F-FUT .MOP
Hydrograph file: --> C:\96038\BMPS\F-100FUT.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
FUTURE CONDITIONS

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

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
	375	12.2
Composite Watershed	375	12.2

Return Frequency: 100 years

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

Executed: 09-17-1997 15:36:05
Watershed file: --> C:\96038\BMPS\F-FUT .MOP
Hydrograph file: --> C:\96038\BMPS\F-100FUT.HYD

STONEHOUSE SECTION IVE
SWMF IVC/VA, F
FUTURE CONDITIONS

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
	11	16	23	65	130	248	375	375	254
Total (cfs)	11	16	23	65	130	248	375	375	254

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
	157	109	81	63	44	37	32	28	25
Total (cfs)	157	109	81	63	44	37	32	28	25

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
	23	21	18	17	16	13	12	11	11
Total (cfs)	23	21	18	17	16	13	12	11	11

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
	10	9	7	7	0
Total (cfs)	10	9	7	7	0

VOLUME COMPUTATION

POND-2 Version: 5.20
S/N:

STONEHOUSE
SUB-REGIONAL STORMWATER MANAGEMENT FACILITIES (IVC/VA, F)
SWMF SERVING IVE
EXISTING CONTOURS - with survey data

CALCULATED 04-23-1998 10:41:04
DISK FILE: a:4E-EXIST.VOL

Planimeter scale: 1 inch = 1 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	* Volume (cubic-ft)	Volume Sum (cubic-ft)
44.00	120.00	120	0	0	0
45.00	5,993.00	5,993	6,961	2,320	2,320
49.00	*I*	16,277	32,146	42,862	45,182
50.00	19,634.00	19,634	36,474	60,791	63,111
55.00	55,491.00	55,491	108,133	180,221	243,332
60.00	85,664.00	85,664	210,101	350,169	593,501

I ---> Interpolated area from closest two planimeter readings.

$$IA = (sq.rt(Area1) + ((Ei-E1)/(E2-E1))*(sq.rt(Area2)-sq.rt(Area1)))^2$$

where: E1, E2 = Closest two elevations with planimeter data
Ei = Elevation at which to interpolate area
Area1,Area2 = Areas computed for E1, E2, respectively
IA = Interpolated area for Ei

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

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

Outlet Structure File: 4E-W .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
STONEHOUSE SECTION IVE
SWMF IVC/VA, "F"
WATER QUALITY BMP - NO ATTENUATION REQ'D

****

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

Elevation (ft)	Q (cfs)	Contributing Structures
44.00	0.0	1
44.50	0.2	2
45.00	0.4	2
45.50	0.5	2
46.00	0.6	2
46.50	0.6	2
47.00	0.7	2
47.50	0.8	2
48.00	0.8	2
48.50	0.9	2
49.00	0.9	2
49.50	1.0	2
50.00	1.0	2 +3
50.50	22.2	2 +3
51.00	61.1	2 +3
51.50	111.3	2 +3
52.00	170.9	2 +3
52.50	238.4	2 +3
53.00	313.0	2 +3
53.50	394.1	2 +3
54.00	481.3	2 +3
54.50	574.1	2 +3
55.00	672.2	2 +3
55.50	775.3	2 +3
56.00	883.2	2 +3
56.50	995.8	2 +3
57.00	1112.7	2 +3
57.50	1233.9	2 +3
58.00	1359.2	2 +3
58.50	1488.5	2 +3
59.00	1621.6	2 +3
59.50	1758.5	2 +3
60.00	1899.0	2 +3

Outlet Structure File: 4E-W .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

```
*****************************************
        STONEHOUSE SECTION IVE
           SWMF IVC/VA, "F"
WATER QUALITY BMP - NO ATTENUATION REQ'D

*****************************************
```

Outlet Structure File: a:4E-W .STR
Planimeter Input File: a:4E-EXIST.VOL
Rating Table Output File: a:4E-W .PND

Min. Elev.(ft) = 44 Max. Elev.(ft) = 60 Incr.(ft) = .5

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

```
*********************************************
              SYSTEM CONNECTIVITY
*********************************************
```

Structure	No.	Q Table		Q Table
TABLE	1		->	1
ORIFICE-VC	2		->	2
WEIR-VR	3		->	3

Outflow rating table summary was stored in file:
a:4E-W .PND

Outlet Structure File: 4E-W .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

```
****************************************
         STONEHOUSE SECTION IVE
            SWMF IVC/VA, "F"
WATER QUALITY BMP - NO ATTENUATION REQ'D

****************************************
```

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

TABLE
Input your own rating table.
E1 (ft) =44.0 E2 (ft) =44.33

Constant (ft) added to each elevation was:

Elev. (ft)	Q (cfs)
44	0
44.33	.1

Outlet Structure File: 4E-W .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

```
****************************************
        STONEHOUSE SECTION IVE
           SWMF IVC/VA, "F"
WATER QUALITY BMP - NO ATTENUATION REQ'D

****************************************
```

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

 ORIFICE-VC
 Orifice - Vertical Circular


 E1 elev.(ft)?            44.33
 E2 elev.(ft)?             60.001
 Orifice coeff.?          .6
 Invert elev.(ft)?        44.0
 Datum  elev.(ft)?        44.165
 Diameter (ft)?           .33
```

Outlet Structure File: 4E-W .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

```
****************************************
        STONEHOUSE SECTION IVE
           SWMF IVC/VA, "F"
WATER QUALITY BMP - NO ATTENUATION REQ'D

****************************************
```

```
>>>>>> Structure No. 3 <<<<<<
          (Input Data)

 WEIR-VR
 Weir - Vertical Rectangular


 E1 elev.(ft)?              50.0
 E2 elev.(ft)?               60.001
 Weir coefficient?          3.0
 Weir elev.(ft)?            50.0
 Length (ft)?               20
 Contracted/Suppressed (C/S)?  S
```

Outlet Structure File: 4E-W .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
STONEHOUSE SECTION IVE
SWMF IVC/VA, "F"
WATER QUALITY BMP - NO ATTENUATION REQ'D

****

Outflow Rating Table for Structure #1
TABLE Input your own rating table.

Elevation (ft)	Q (cfs)	Computation Messages
44.00	0.0	
44.50	0.0	E = or > E2=44.33
45.00	0.0	E = or > E2=44.33
45.50	0.0	E = or > E2=44.33
46.00	0.0	E = or > E2=44.33
46.50	0.0	E = or > E2=44.33
47.00	0.0	E = or > E2=44.33
47.50	0.0	E = or > E2=44.33
48.00	0.0	E = or > E2=44.33
48.50	0.0	E = or > E2=44.33
49.00	0.0	E = or > E2=44.33
49.50	0.0	E = or > E2=44.33
50.00	0.0	E = or > E2=44.33
50.50	0.0	E = or > E2=44.33
51.00	0.0	E = or > E2=44.33
51.50	0.0	E = or > E2=44.33
52.00	0.0	E = or > E2=44.33
52.50	0.0	E = or > E2=44.33
53.00	0.0	E = or > E2=44.33
53.50	0.0	E = or > E2=44.33
54.00	0.0	E = or > E2=44.33
54.50	0.0	E = or > E2=44.33
55.00	0.0	E = or > E2=44.33
55.50	0.0	E = or > E2=44.33
56.00	0.0	E = or > E2=44.33
56.50	0.0	E = or > E2=44.33
57.00	0.0	E = or > E2=44.33
57.50	0.0	E = or > E2=44.33
58.00	0.0	E = or > E2=44.33
58.50	0.0	E = or > E2=44.33
59.00	0.0	E = or > E2=44.33
59.50	0.0	E = or > E2=44.33
60.00	0.0	E = or > E2=44.33

Outlet Structure File: 4E-W .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
STONEHOUSE SECTION IVE
SWMF IVC/VA, "F"
WATER QUALITY BMP - NO ATTENUATION REQ'D

****

Outflow Rating Table for Structure #2
ORIFICE-VC Orifice - Vertical Circular

Elevation (ft)	Q (cfs)	Computation Messages
44.00	0.0	E < E1=44.33
44.50	0.2	H =.335
45.00	0.4	H =.835
45.50	0.5	H =1.335
46.00	0.6	H =1.835
46.50	0.6	H =2.335
47.00	0.7	H =2.835
47.50	0.8	H =3.335
48.00	0.8	H =3.835
48.50	0.9	H =4.335
49.00	0.9	H =4.835
49.50	1.0	H =5.335
50.00	1.0	H =5.835
50.50	1.0	H =6.335
51.00	1.1	H =6.835
51.50	1.1	H =7.335
52.00	1.2	H =7.835
52.50	1.2	H =8.335
53.00	1.2	H =8.835
53.50	1.3	H =9.335
54.00	1.3	H =9.835
54.50	1.3	H =10.335
55.00	1.4	H =10.835
55.50	1.4	H =11.335
56.00	1.4	H =11.835
56.50	1.4	H =12.335
57.00	1.5	H =12.835
57.50	1.5	H =13.335
58.00	1.5	H =13.835
58.50	1.6	H =14.335
59.00	1.6	H =14.835
59.50	1.6	H =15.335
60.00	1.6	H =15.835

C = .6 A = 8.552988E-02 sq.ft.
H (ft) = Table elev. - Datum elev. (44.165 ft)
Q (cfs) = C * A * sqr(2g * H)

Outlet Structure File: 4E-W .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
STONEHOUSE SECTION IVE
SWMF IVC/VA, "F"
WATER QUALITY BMP - NO ATTENUATION REQ'D

****

Outflow Rating Table for Structure #3
WEIR-VR Weir - Vertical Rectangular

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

Elevation (ft)	Q (cfs)	Computation Messages
44.00	0.0	E < Inv.El.= 50
44.50	0.0	E < Inv.El.= 50
45.00	0.0	E < Inv.El.= 50
45.50	0.0	E < Inv.El.= 50
46.00	0.0	E < Inv.El.= 50
46.50	0.0	E < Inv.El.= 50
47.00	0.0	E < Inv.El.= 50
47.50	0.0	E < Inv.El.= 50
48.00	0.0	E < Inv.El.= 50
48.50	0.0	E < Inv.El.= 50
49.00	0.0	E < Inv.El.= 50
49.50	0.0	E < Inv.El.= 50
50.00	0.0	H =0.0
50.50	21.2	H =.5
51.00	60.0	H =1.0
51.50	110.2	H =1.5
52.00	169.7	H =2.0
52.50	237.2	H =2.5
53.00	311.8	H =3.0
53.50	392.9	H =3.5
54.00	480.0	H =4.0
54.50	572.8	H =4.5
55.00	670.8	H =5.0
55.50	773.9	H =5.5
56.00	881.8	H =6.0
56.50	994.3	H =6.5
57.00	1111.2	H =7.0
57.50	1232.4	H =7.5
58.00	1357.6	H =8.0
58.50	1486.9	H =8.5
59.00	1620.0	H =9.0
59.50	1756.9	H =9.5
60.00	1897.4	H =10.0

C = 3 L (ft) = 20
H (ft) = Table elev. - Invert elev. (50 ft)
Q (cfs) = C * L * (H**1.5) -- Suppressed Weir

ROUTING

```
*************************
*                       *
*      STONEHOUSE       *
*     SWMF IVC/VA       *
* SERVING SECTION IVE   *
*                       *
*                       *
*************************
```

Inflow Hydrograph: a:4E2FUT .HYD
Rating Table file: a:4E-W .PND

----INITIAL CONDITIONS----
Elevation = 44.00 ft
Outflow = 0.00 cfs
Storage = 0 cu-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
44.00	0.0	0
44.50	0.2	426
45.00	0.4	2,320
45.50	0.5	5,566
46.00	0.6	9,337
46.50	0.6	13,671
47.00	0.7	18,609
47.50	0.8	24,190
48.00	0.8	30,453
48.50	0.9	37,437
49.00	0.9	45,182
49.50	1.0	53,727
50.00	1.0	63,111
50.50	22.2	73,612
51.00	61.1	85,541
51.50	111.3	98,990
52.00	170.9	114,050
52.50	238.4	130,811
53.00	313.0	149,365
53.50	394.1	169,803
54.00	481.3	192,216
54.50	574.1	216,696
55.00	672.2	243,332
55.50	775.3	271,756
56.00	883.2	301,558
56.50	995.8	332,771
57.00	1112.7	365,427
57.50	1233.9	399,558
58.00	1359.2	435,199
58.50	1488.5	472,381
59.00	1621.6	511,137

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + 0 (cfs)
0.0	0.0
2.4	2.6
12.9	13.3
30.9	31.4
51.9	52.5
76.0	76.6
103.4	104.1
134.4	135.2
169.2	170.0
208.0	208.9
251.0	251.9
298.5	299.5
350.6	351.6
409.0	431.2
475.2	536.3
549.9	661.2
633.6	804.5
726.7	965.1
829.8	1142.8
943.4	1337.5
1067.9	1549.2
1203.9	1778.0
1351.8	2024.0
1509.8	2285.1
1675.3	2558.5
1848.7	2844.5
2030.1	3142.8
2219.8	3453.7
2417.8	3777.0
2624.3	4112.8
2839.6	4461.2

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
59.50	1758.5	551,499
60.00	1899.0	593,501

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
3063.9	4822.4
3297.2	5196.2

Time increment (t) = 6.0 min.

EXECUTED: 04-23-1998 10:41:47 Return Freq: 2 years

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E2FUT .HYD
Outflow Hydrograph: a:4E2OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
660.0	2.00	-----	0.0	0.0	0.00	44.00
666.0	2.00	4.0	3.5	4.0	0.23	44.57
672.0	3.00	5.0	7.9	8.5	0.31	44.78
678.0	3.00	6.0	13.1	13.9	0.40	45.02
684.0	4.00	7.0	19.2	20.1	0.44	45.19
690.0	4.00	8.0	26.3	27.2	0.48	45.38
696.0	5.00	9.0	34.3	35.3	0.52	45.59
702.0	8.00	13.0	46.1	47.3	0.58	45.88
708.0	11.00	19.0	63.9	65.1	0.60	46.26
714.0	14.00	25.0	87.6	88.9	0.64	46.72
720.0	30.00	44.0	130.0	131.6	0.79	47.44
726.0	61.00	91.0	219.2	221.0	0.90	48.64
732.0	98.00	159.0	362.0	378.2	8.09	50.17
738.0	100.00	198.0	418.8	560.0	70.63	51.09
744.0	70.00	170.0	424.4	588.8	82.18	51.21
750.0	44.00	114.0	414.5	538.4	61.94	51.01
756.0	31.00	75.0	402.0	489.5	43.79	50.78
762.0	23.00	54.0	393.2	456.0	31.37	50.62
768.0	19.00	42.0	387.8	435.2	23.70	50.52
774.0	16.00	35.0	382.9	422.8	19.98	50.45
780.0	13.00	29.0	377.7	411.9	17.06	50.38
786.0	12.00	25.0	373.5	402.7	14.63	50.32
792.0	11.00	23.0	370.6	396.5	12.96	50.28
798.0	10.00	21.0	368.3	391.6	11.65	50.25
804.0	10.00	20.0	366.7	388.3	10.77	50.23
810.0	10.00	20.0	366.0	386.7	10.36	50.22
816.0	9.00	19.0	365.2	385.0	9.90	50.21
822.0	8.00	17.0	363.9	382.2	9.15	50.19
828.0	8.00	16.0	362.8	379.9	8.54	50.18
834.0	8.00	16.0	362.3	378.8	8.25	50.17
840.0	7.00	15.0	361.6	377.3	7.85	50.16
846.0	7.00	14.0	360.8	375.6	7.40	50.15
852.0	6.00	13.0	360.0	373.8	6.92	50.14
858.0	6.00	12.0	359.1	372.0	6.43	50.13
864.0	6.00	12.0	358.7	371.1	6.20	50.12
870.0	6.00	12.0	358.5	370.7	6.09	50.12
876.0	6.00	12.0	358.5	370.5	6.04	50.12
882.0	6.00	12.0	358.4	370.5	6.02	50.12
888.0	6.00	12.0	358.4	370.4	6.01	50.12
894.0	5.00	11.0	357.9	369.4	5.74	50.11
900.0	5.00	10.0	357.2	367.9	5.34	50.10
906.0	5.00	10.0	356.9	367.2	5.16	50.10
912.0	5.00	10.0	356.8	366.9	5.08	50.10
918.0	5.00	10.0	356.7	366.8	5.04	50.10
924.0	5.00	10.0	356.7	366.7	5.02	50.09

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E2FUT .HYD
Outflow Hydrograph: a:4E2OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
930.0	5.00	10.0	356.6	366.7	5.01	50.09
936.0	5.00	10.0	356.6	366.6	5.00	50.09
942.0	5.00	10.0	356.6	366.6	5.00	50.09
948.0	4.00	9.0	356.2	365.6	4.73	50.09
954.0	4.00	8.0	355.5	364.2	4.34	50.08
960.0	4.00	8.0	355.2	363.5	4.16	50.07
966.0	4.00	8.0	355.0	363.2	4.07	50.07
972.0	4.00	8.0	354.9	363.0	4.03	50.07
978.0	4.00	8.0	354.9	362.9	4.02	50.07
984.0	4.00	8.0	354.9	362.9	4.01	50.07
990.0	4.00	8.0	354.9	362.9	4.00	50.07
996.0	4.00	8.0	354.9	362.9	4.00	50.07
1002.0	4.00	8.0	354.9	362.9	4.00	50.07
1008.0	3.00	7.0	354.4	361.9	3.73	50.06
1014.0	3.00	6.0	353.7	360.4	3.34	50.06
1020.0	3.00	6.0	353.4	359.7	3.16	50.05
1026.0	3.00	6.0	353.3	359.4	3.07	50.05
1032.0	3.00	6.0	353.2	359.3	3.03	50.05
1038.0	3.00	6.0	353.1	359.2	3.02	50.05
1044.0	3.00	6.0	353.1	359.1	3.01	50.05
1050.0	3.00	6.0	353.1	359.1	3.00	50.05
1056.0	3.00	6.0	353.1	359.1	3.00	50.05
1062.0	3.00	6.0	353.1	359.1	3.00	50.05
1068.0	3.00	6.0	353.1	359.1	3.00	50.05
1074.0	3.00	6.0	353.1	359.1	3.00	50.05
1080.0	3.00	6.0	353.1	359.1	3.00	50.05
1086.0	3.00	6.0	353.1	359.1	3.00	50.05
1092.0	3.00	6.0	353.1	359.1	3.00	50.05
1098.0	3.00	6.0	353.1	359.1	3.00	50.05
1104.0	3.00	6.0	353.1	359.1	3.00	50.05
1110.0	3.00	6.0	353.1	359.1	3.00	50.05
1116.0	3.00	6.0	353.1	359.1	3.00	50.05
1122.0	3.00	6.0	353.1	359.1	3.00	50.05
1128.0	3.00	6.0	353.1	359.1	3.00	50.05
1134.0	3.00	6.0	353.1	359.1	3.00	50.05
1140.0	3.00	6.0	353.1	359.1	3.00	50.05
1146.0	3.00	6.0	353.1	359.1	3.00	50.05
1152.0	3.00	6.0	353.1	359.1	3.00	50.05
1158.0	3.00	6.0	353.1	359.1	3.00	50.05
1164.0	3.00	6.0	353.1	359.1	3.00	50.05
1170.0	2.00	5.0	352.7	358.1	2.73	50.04
1176.0	2.00	4.0	352.0	356.7	2.34	50.03
1182.0	2.00	4.0	351.6	356.0	2.16	50.03
1188.0	2.00	4.0	351.5	355.6	2.07	50.03
1194.0	2.00	4.0	351.4	355.5	2.03	50.02
1200.0	2.00	4.0	351.4	355.4	2.02	50.02

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E2FUT .HYD
Outflow Hydrograph: a:4E2OUT .HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
1206.0	2.00	4.0	351.4	355.4	2.01	50.02
1212.0	2.00	4.0	351.4	355.4	2.00	50.02
1218.0	2.00	4.0	351.4	355.4	2.00	50.02
1224.0	2.00	4.0	351.4	355.4	2.00	50.02
1230.0	2.00	4.0	351.4	355.4	2.00	50.02
1236.0	2.00	4.0	351.4	355.4	2.00	50.02
1242.0	2.00	4.0	351.4	355.4	2.00	50.02
1248.0	2.00	4.0	351.4	355.4	2.00	50.02
1254.0	2.00	4.0	351.4	355.4	2.00	50.02
1260.0	2.00	4.0	351.4	355.4	2.00	50.02
1266.0	2.00	4.0	351.4	355.4	2.00	50.02
1272.0	2.00	4.0	351.4	355.4	2.00	50.02
1278.0	2.00	4.0	351.4	355.4	2.00	50.02
1284.0	2.00	4.0	351.4	355.4	2.00	50.02
1290.0	2.00	4.0	351.4	355.4	2.00	50.02
1296.0	2.00	4.0	351.4	355.4	2.00	50.02
1302.0	2.00	4.0	351.4	355.4	2.00	50.02
1308.0	2.00	4.0	351.4	355.4	2.00	50.02
1314.0	2.00	4.0	351.4	355.4	2.00	50.02
1320.0	2.00	4.0	351.4	355.4	2.00	50.02
1326.0	2.00	4.0	351.4	355.4	2.00	50.02
1332.0	2.00	4.0	351.4	355.4	2.00	50.02
1338.0	2.00	4.0	351.4	355.4	2.00	50.02
1344.0	2.00	4.0	351.4	355.4	2.00	50.02
1350.0	2.00	4.0	351.4	355.4	2.00	50.02
1356.0	2.00	4.0	351.4	355.4	2.00	50.02
1362.0	2.00	4.0	351.4	355.4	2.00	50.02
1368.0	2.00	4.0	351.4	355.4	2.00	50.02
1374.0	2.00	4.0	351.4	355.4	2.00	50.02
1380.0	2.00	4.0	351.4	355.4	2.00	50.02
1386.0	1.00	3.0	350.9	354.4	1.73	50.02
1392.0	1.00	2.0	350.2	352.9	1.34	50.01
1398.0	1.00	2.0	349.9	352.2	1.16	50.00
1404.0	1.00	2.0	349.7	351.9	1.07	50.00
1410.0	1.00	2.0	349.7	351.7	1.03	50.00
1416.0	1.00	2.0	349.6	351.7	1.02	50.00
1422.0	1.00	2.0	349.6	351.6	1.01	50.00
1428.0	1.00	2.0	349.6	351.6	1.00	50.00
1434.0	1.00	2.0	349.6	351.6	1.00	50.00
1440.0	1.00	2.0	349.6	351.6	1.00	50.00
1446.0	1.00	2.0	349.6	351.6	1.00	50.00
1452.0	1.00	2.0	349.6	351.6	1.00	50.00
1458.0	1.00	2.0	349.6	351.6	1.00	50.00
1464.0	1.00	2.0	349.6	351.6	1.00	50.00
1470.0	1.00	2.0	349.6	351.6	1.00	50.00
1476.0	1.00	2.0	349.6	351.6	1.00	50.00

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E2FUT .HYD
Outflow Hydrograph: a:4E2OUT .HYD

INFLOW HYDROGRAPH

TIME (min)	INFLOW (cfs)
1482.0	1.00
1488.0	1.00
1494.0	1.00
1500.0	0.00
1506.0	0.00
1512.0	0.00
1518.0	0.00
1524.0	0.00
1530.0	0.00
1536.0	0.00
1542.0	0.00
1548.0	0.00
1554.0	0.00

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
2.0	349.6	351.6	1.00	50.00
2.0	349.6	351.6	1.00	50.00
2.0	349.6	351.6	1.00	50.00
1.0	348.6	350.6	1.00	49.99
0.0	346.6	348.6	1.00	49.97
0.0	344.6	346.6	1.00	49.95
0.0	342.6	344.6	1.00	49.93
0.0	340.6	342.6	1.00	49.91
0.0	338.6	340.6	1.00	49.89
0.0	336.6	338.6	1.00	49.88
0.0	334.6	336.6	1.00	49.86
0.0	332.6	334.6	1.00	49.84
0.0	330.6	332.6	1.00	49.82

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

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E2FUT .HYD
Outflow Hydrograph: a:4E2OUT .HYD

Starting Pond W.S. Elevation = 44.00 ft

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

Peak Inflow = 100.00 cfs
Peak Outflow = 82.18 cfs
Peak Elevation = 51.21 ft

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

Initial Storage = 0 cu-ft
Peak Storage From Storm = 91,189 cu-ft

Total Storage in Pond = 91,189 cu-ft

Warning: Inflow hydrograph truncated on left side.

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*                       *
*      STONEHOUSE       *
*     SWMF IVC/VA       *
* SERVING SECTION IVE   *
*                       *
*                       *
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Inflow Hydrograph: a:4E10FUT .HYD
Rating Table file: a:4E-W .PND

----INITIAL CONDITIONS----
Elevation = 44.00 ft
Outflow = 0.00 cfs
Storage = 0 cu-ft

GIVEN POND DATA			INTERMEDIATE ROUTING COMPUTATIONS	
ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)	2S/t (cfs)	2S/t + 0 (cfs)
44.00	0.0	0	0.0	0.0
44.50	0.2	426	2.4	2.6
45.00	0.4	2,320	12.9	13.3
45.50	0.5	5,566	30.9	31.4
46.00	0.6	9,337	51.9	52.5
46.50	0.6	13,671	76.0	76.6
47.00	0.7	18,609	103.4	104.1
47.50	0.8	24,190	134.4	135.2
48.00	0.8	30,453	169.2	170.0
48.50	0.9	37,437	208.0	208.9
49.00	0.9	45,182	251.0	251.9
49.50	1.0	53,727	298.5	299.5
50.00	1.0	63,111	350.6	351.6
50.50	22.2	73,612	409.0	431.2
51.00	61.1	85,541	475.2	536.3
51.50	111.3	98,990	549.9	661.2
52.00	170.9	114,050	633.6	804.5
52.50	238.4	130,811	726.7	965.1
53.00	313.0	149,365	829.8	1142.8
53.50	394.1	169,803	943.4	1337.5
54.00	481.3	192,216	1067.9	1549.2
54.50	574.1	216,696	1203.9	1778.0
55.00	672.2	243,332	1351.8	2024.0
55.50	775.3	271,756	1509.8	2285.1
56.00	883.2	301,558	1675.3	2558.5
56.50	995.8	332,771	1848.7	2844.5
57.00	1112.7	365,427	2030.1	3142.8
57.50	1233.9	399,558	2219.8	3453.7
58.00	1359.2	435,199	2417.8	3777.0
58.50	1488.5	472,381	2624.3	4112.8
59.00	1621.6	511,137	2839.6	4461.2

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
59.50	1758.5	551,499
60.00	1899.0	593,501

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + 0 (cfs)
3063.9	4822.4
3297.2	5196.2

Time increment (t) = 6.0 min.

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E10FUT .HYD
Outflow Hydrograph: a:4E10OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
660.0	6.00	-----	0.0	0.0	0.00	44.00
666.0	7.00	13.0	12.2	13.0	0.39	44.99
672.0	8.00	15.0	26.3	27.2	0.48	45.38
678.0	9.00	17.0	42.1	43.3	0.56	45.78
684.0	10.00	19.0	59.9	61.1	0.60	46.18
690.0	12.00	22.0	80.7	81.9	0.62	46.60
696.0	13.00	25.0	104.3	105.7	0.71	47.03
702.0	21.00	34.0	136.7	138.3	0.80	47.54
708.0	28.00	49.0	184.0	185.7	0.84	48.20
714.0	36.00	64.0	246.2	248.0	0.90	48.95
720.0	73.00	109.0	351.3	355.2	1.96	50.02
726.0	138.00	211.0	419.2	562.3	71.54	51.10
732.0	209.00	347.0	456.3	766.2	154.97	51.87
738.0	209.00	418.0	473.8	874.3	200.22	52.22
744.0	142.00	351.0	466.0	824.8	179.44	52.06
750.0	87.00	229.0	444.3	695.0	125.32	51.62
756.0	61.00	148.0	425.1	592.3	83.60	51.22
762.0	45.00	106.0	412.8	531.1	59.17	50.98
768.0	35.00	80.0	402.8	492.8	44.99	50.79
774.0	30.00	65.0	396.3	467.8	35.75	50.67
780.0	25.00	55.0	392.0	451.3	29.65	50.60
786.0	22.00	47.0	388.8	439.0	25.10	50.54
792.0	20.00	42.0	386.6	430.8	22.10	50.50
798.0	19.00	39.0	384.2	425.6	20.72	50.46
804.0	18.00	37.0	382.1	421.2	19.53	50.44
810.0	17.00	35.0	380.2	417.1	18.45	50.41
816.0	16.00	33.0	378.4	413.2	17.41	50.39
822.0	15.00	31.0	376.6	409.4	16.39	50.36
828.0	14.00	29.0	374.8	405.6	15.38	50.34
834.0	14.00	28.0	373.5	402.8	14.65	50.32
840.0	13.00	27.0	372.5	400.5	14.04	50.31
846.0	12.00	25.0	371.0	397.5	13.22	50.29
852.0	12.00	24.0	369.9	395.0	12.57	50.27
858.0	11.00	23.0	368.9	392.9	12.00	50.26
864.0	11.00	22.0	368.0	390.9	11.47	50.25
870.0	10.00	21.0	367.0	389.0	10.95	50.23
876.0	10.00	20.0	366.2	387.0	10.44	50.22
882.0	10.00	20.0	365.7	386.2	10.21	50.22
888.0	10.00	20.0	365.6	385.7	10.10	50.21
894.0	10.00	20.0	365.5	385.6	10.05	50.21
900.0	10.00	20.0	365.4	385.5	10.02	50.21
906.0	10.00	20.0	365.4	385.4	10.01	50.21
912.0	10.00	20.0	365.4	385.4	10.00	50.21
918.0	9.00	19.0	364.9	384.4	9.74	50.21
924.0	9.00	18.0	364.2	382.9	9.34	50.20

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E10FUT .HYD
Outflow Hydrograph: a:4E10OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
930.0	9.00	18.0	363.9	382.2	9.16	50.19
936.0	9.00	18.0	363.8	381.9	9.07	50.19
942.0	8.00	17.0	363.2	380.8	8.77	50.18
948.0	8.00	16.0	362.5	379.2	8.36	50.17
954.0	7.00	15.0	361.7	377.5	7.90	50.16
960.0	7.00	14.0	360.9	375.7	7.42	50.15
966.0	7.00	14.0	360.5	374.9	7.20	50.15
972.0	7.00	14.0	360.3	374.5	7.09	50.14
978.0	7.00	14.0	360.2	374.3	7.04	50.14
984.0	7.00	14.0	360.2	374.2	7.02	50.14
990.0	7.00	14.0	360.1	374.2	7.01	50.14
996.0	7.00	14.0	360.1	374.1	7.00	50.14
1002.0	7.00	14.0	360.1	374.1	7.00	50.14
1008.0	6.00	13.0	359.7	373.1	6.73	50.14
1014.0	6.00	12.0	359.0	371.7	6.34	50.13
1020.0	6.00	12.0	358.7	371.0	6.16	50.12
1026.0	6.00	12.0	358.5	370.7	6.07	50.12
1032.0	6.00	12.0	358.4	370.5	6.03	50.12
1038.0	6.00	12.0	358.4	370.4	6.02	50.12
1044.0	6.00	12.0	358.4	370.4	6.01	50.12
1050.0	6.00	12.0	358.4	370.4	6.00	50.12
1056.0	6.00	12.0	358.4	370.4	6.00	50.12
1062.0	6.00	12.0	358.4	370.4	6.00	50.12
1068.0	6.00	12.0	358.4	370.4	6.00	50.12
1074.0	6.00	12.0	358.4	370.4	6.00	50.12
1080.0	6.00	12.0	358.4	370.4	6.00	50.12
1086.0	6.00	12.0	358.4	370.4	6.00	50.12
1092.0	6.00	12.0	358.4	370.4	6.00	50.12
1098.0	6.00	12.0	358.4	370.4	6.00	50.12
1104.0	6.00	12.0	358.4	370.4	6.00	50.12
1110.0	6.00	12.0	358.4	370.4	6.00	50.12
1116.0	5.00	11.0	357.9	369.4	5.73	50.11
1122.0	5.00	10.0	357.2	367.9	5.34	50.10
1128.0	5.00	10.0	356.9	367.2	5.16	50.10
1134.0	5.00	10.0	356.8	366.9	5.07	50.10
1140.0	5.00	10.0	356.7	366.8	5.03	50.10
1146.0	5.00	10.0	356.7	366.7	5.02	50.09
1152.0	5.00	10.0	356.6	366.7	5.01	50.09
1158.0	5.00	10.0	356.6	366.6	5.00	50.09
1164.0	5.00	10.0	356.6	366.6	5.00	50.09
1170.0	4.00	9.0	356.2	365.6	4.73	50.09
1176.0	4.00	8.0	355.5	364.2	4.34	50.08
1182.0	4.00	8.0	355.2	363.5	4.16	50.07
1188.0	4.00	8.0	355.0	363.2	4.07	50.07
1194.0	4.00	8.0	354.9	363.0	4.03	50.07
1200.0	4.00	8.0	354.9	362.9	4.02	50.07

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E10FUT .HYD
Outflow Hydrograph: a:4E10OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
1206.0	4.00	8.0	354.9	362.9	4.01	50.07
1212.0	4.00	8.0	354.9	362.9	4.00	50.07
1218.0	4.00	8.0	354.9	362.9	4.00	50.07
1224.0	4.00	8.0	354.9	362.9	4.00	50.07
1230.0	4.00	8.0	354.9	362.9	4.00	50.07
1236.0	4.00	8.0	354.9	362.9	4.00	50.07
1242.0	4.00	8.0	354.9	362.9	4.00	50.07
1248.0	4.00	8.0	354.9	362.9	4.00	50.07
1254.0	4.00	8.0	354.9	362.9	4.00	50.07
1260.0	4.00	8.0	354.9	362.9	4.00	50.07
1266.0	4.00	8.0	354.9	362.9	4.00	50.07
1272.0	4.00	8.0	354.9	362.9	4.00	50.07
1278.0	4.00	8.0	354.9	362.9	4.00	50.07
1284.0	4.00	8.0	354.9	362.9	4.00	50.07
1290.0	4.00	8.0	354.9	362.9	4.00	50.07
1296.0	4.00	8.0	354.9	362.9	4.00	50.07
1302.0	4.00	8.0	354.9	362.9	4.00	50.07
1308.0	4.00	8.0	354.9	362.9	4.00	50.07
1314.0	4.00	8.0	354.9	362.9	4.00	50.07
1320.0	4.00	8.0	354.9	362.9	4.00	50.07
1326.0	4.00	8.0	354.9	362.9	4.00	50.07
1332.0	4.00	8.0	354.9	362.9	4.00	50.07
1338.0	4.00	8.0	354.9	362.9	4.00	50.07
1344.0	4.00	8.0	354.9	362.9	4.00	50.07
1350.0	4.00	8.0	354.9	362.9	4.00	50.07
1356.0	3.00	7.0	354.4	361.9	3.73	50.06
1362.0	3.00	6.0	353.7	360.4	3.34	50.06
1368.0	3.00	6.0	353.4	359.7	3.16	50.05
1374.0	3.00	6.0	353.3	359.4	3.07	50.05
1380.0	3.00	6.0	353.2	359.3	3.03	50.05
1386.0	3.00	6.0	353.1	359.2	3.02	50.05
1392.0	3.00	6.0	353.1	359.1	3.01	50.05
1398.0	3.00	6.0	353.1	359.1	3.00	50.05
1404.0	3.00	6.0	353.1	359.1	3.00	50.05
1410.0	2.00	5.0	352.7	358.1	2.73	50.04
1416.0	2.00	4.0	352.0	356.7	2.34	50.03
1422.0	2.00	4.0	351.6	356.0	2.16	50.03
1428.0	2.00	4.0	351.5	355.6	2.07	50.03
1434.0	2.00	4.0	351.4	355.5	2.03	50.02
1440.0	2.00	4.0	351.4	355.4	2.02	50.02
1446.0	2.00	4.0	351.4	355.4	2.01	50.02
1452.0	2.00	4.0	351.4	355.4	2.00	50.02
1458.0	2.00	4.0	351.4	355.4	2.00	50.02
1464.0	2.00	4.0	351.4	355.4	2.00	50.02
1470.0	2.00	4.0	351.4	355.4	2.00	50.02
1476.0	1.00	3.0	350.9	354.4	1.73	50.02

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E10FUT .HYD
Outflow Hydrograph: a:4E10OUT .HYD

INFLOW HYDROGRAPH

TIME (min)	INFLOW (cfs)
1482.0	1.00
1488.0	1.00
1494.0	1.00
1500.0	1.00
1506.0	1.00
1512.0	1.00
1518.0	1.00
1524.0	1.00
1530.0	0.00
1536.0	0.00
1542.0	0.00
1548.0	0.00
1554.0	0.00

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
2.0	350.2	352.9	1.34	50.01
2.0	349.9	352.2	1.16	50.00
2.0	349.7	351.9	1.07	50.00
2.0	349.7	351.7	1.03	50.00
2.0	349.6	351.7	1.02	50.00
2.0	349.6	351.6	1.01	50.00
2.0	349.6	351.6	1.00	50.00
2.0	349.6	351.6	1.00	50.00
1.0	348.6	350.6	1.00	49.99
0.0	346.6	348.6	1.00	49.97
0.0	344.6	346.6	1.00	49.95
0.0	342.6	344.6	1.00	49.93
0.0	340.6	342.6	1.00	49.91

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

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E10FUT .HYD
Outflow Hydrograph: a:4E10OUT .HYD

Starting Pond W.S. Elevation = 44.00 ft

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

Peak Inflow = 209.00 cfs
Peak Outflow = 200.22 cfs
Peak Elevation = 52.22 ft

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

Initial Storage = 0 cu-ft
Peak Storage From Storm = 121,330 cu-ft

Total Storage in Pond = 121,330 cu-ft

Warning: Inflow hydrograph truncated on left side.

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*************************
*                       *
*      STONEHOUSE       *
*     SWMF IVC/VA       *
* SERVING SECTION IVE   *
*                       *
*                       *
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Inflow Hydrograph: a:4E100FUT.HYD
Rating Table file: a:4E-W .PND

----INITIAL CONDITIONS----
Elevation = 44.00 ft
Outflow = 0.00 cfs
Storage = 0 cu-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
44.00	0.0	0
44.50	0.2	426
45.00	0.4	2,320
45.50	0.5	5,566
46.00	0.6	9,337
46.50	0.6	13,671
47.00	0.7	18,609
47.50	0.8	24,190
48.00	0.8	30,453
48.50	0.9	37,437
49.00	0.9	45,182
49.50	1.0	53,727
50.00	1.0	63,111
50.50	22.2	73,612
51.00	61.1	85,541
51.50	111.3	98,990
52.00	170.9	114,050
52.50	238.4	130,811
53.00	313.0	149,365
53.50	394.1	169,803
54.00	481.3	192,216
54.50	574.1	216,696
55.00	672.2	243,332
55.50	775.3	271,756
56.00	883.2	301,558
56.50	995.8	332,771
57.00	1112.7	365,427
57.50	1233.9	399,558
58.00	1359.2	435,199
58.50	1488.5	472,381
59.00	1621.6	511,137

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
2.4	2.6
12.9	13.3
30.9	31.4
51.9	52.5
76.0	76.6
103.4	104.1
134.4	135.2
169.2	170.0
208.0	208.9
251.0	251.9
298.5	299.5
350.6	351.6
409.0	431.2
475.2	536.3
549.9	661.2
633.6	804.5
726.7	965.1
829.8	1142.8
943.4	1337.5
1067.9	1549.2
1203.9	1778.0
1351.8	2024.0
1509.8	2285.1
1675.3	2558.5
1848.7	2844.5
2030.1	3142.8
2219.8	3453.7
2417.8	3777.0
2624.3	4112.8
2839.6	4461.2

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
59.50	1758.5	551,499
60.00	1899.0	593,501

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
3063.9	4822.4
3297.2	5196.2

Time increment (t) = 6.0 min.

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E100FUT.HYD
Outflow Hydrograph: a:4E100OUT.HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
660.0	11.00	-----	0.0	0.0	0.00	44.00
666.0	13.00	24.0	23.1	24.0	0.46	45.30
672.0	14.00	27.0	48.9	50.1	0.59	45.94
678.0	16.00	30.0	77.7	78.9	0.61	46.54
684.0	18.00	34.0	110.2	111.7	0.72	47.12
690.0	21.00	39.0	147.6	149.2	0.80	47.70
696.0	23.00	44.0	189.9	191.6	0.86	48.28
702.0	37.00	60.0	248.1	249.9	0.90	48.98
708.0	51.00	88.0	334.1	336.1	1.00	49.85
714.0	65.00	116.0	391.7	450.1	29.22	50.59
720.0	130.00	195.0	424.0	586.7	81.34	51.20
726.0	248.00	378.0	462.3	802.0	169.86	51.99
732.0	375.00	623.0	507.6	1085.3	288.85	52.84
738.0	375.00	750.0	535.9	1257.6	360.82	53.29
744.0	254.00	629.0	520.5	1164.9	322.22	53.06
750.0	157.00	411.0	483.0	931.5	224.27	52.40
756.0	109.00	266.0	453.4	749.0	147.79	51.81
762.0	81.00	190.0	435.1	643.4	104.12	51.43
768.0	63.00	144.0	422.5	579.1	78.30	51.17
774.0	53.00	116.0	414.6	538.5	61.98	51.01
780.0	44.00	97.0	407.7	511.6	51.94	50.88
786.0	40.00	84.0	402.5	491.7	44.59	50.79
792.0	37.00	77.0	399.3	479.5	40.08	50.73
798.0	34.00	71.0	397.0	470.3	36.69	50.69
804.0	32.00	66.0	395.0	463.0	33.96	50.65
810.0	30.00	62.0	393.5	457.0	31.77	50.62
816.0	28.00	58.0	392.0	451.5	29.72	50.60
822.0	26.00	54.0	390.6	446.0	27.71	50.57
828.0	25.00	51.0	389.5	441.6	26.07	50.55
834.0	24.00	49.0	388.7	438.5	24.91	50.53
840.0	23.00	47.0	387.9	435.7	23.87	50.52
846.0	22.00	45.0	387.2	432.9	22.86	50.51
852.0	22.00	44.0	386.8	431.2	22.22	50.50
858.0	21.00	43.0	386.1	429.8	21.83	50.49
864.0	20.00	41.0	384.9	427.1	21.12	50.47
870.0	19.00	39.0	383.4	423.9	20.26	50.45
876.0	18.00	37.0	381.7	420.4	19.32	50.43
882.0	18.00	36.0	380.5	417.7	18.62	50.42
888.0	18.00	36.0	379.9	416.5	18.29	50.41
894.0	17.00	35.0	379.2	414.9	17.87	50.40
900.0	17.00	34.0	378.4	413.2	17.41	50.39
906.0	17.00	34.0	378.0	412.4	17.19	50.38
912.0	17.00	34.0	377.8	412.0	17.09	50.38
918.0	16.00	33.0	377.3	410.8	16.77	50.37
924.0	16.00	32.0	376.5	409.3	16.36	50.36

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E100FUT.HYD
Outflow Hydrograph: a:4E100OUT.HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
930.0	16.00	32.0	376.2	408.5	16.17	50.36
936.0	15.00	31.0	375.6	407.2	15.81	50.35
942.0	15.00	30.0	374.8	405.6	15.38	50.34
948.0	14.00	29.0	374.0	403.8	14.91	50.33
954.0	14.00	28.0	373.1	402.0	14.43	50.32
960.0	13.00	27.0	372.3	400.1	13.93	50.30
966.0	13.00	26.0	371.4	398.3	13.44	50.29
972.0	13.00	26.0	371.0	397.4	13.20	50.29
978.0	12.00	25.0	370.3	396.0	12.83	50.28
984.0	12.00	24.0	369.6	394.3	12.39	50.27
990.0	12.00	24.0	369.2	393.6	12.18	50.26
996.0	12.00	24.0	369.0	393.2	12.08	50.26
1002.0	12.00	24.0	369.0	393.0	12.04	50.26
1008.0	11.00	23.0	368.5	392.0	11.75	50.25
1014.0	11.00	22.0	367.8	390.5	11.35	50.24
1020.0	11.00	22.0	367.4	389.8	11.16	50.24
1026.0	11.00	22.0	367.3	389.4	11.08	50.24
1032.0	11.00	22.0	367.2	389.3	11.04	50.24
1038.0	11.00	22.0	367.2	389.2	11.02	50.24
1044.0	11.00	22.0	367.1	389.2	11.01	50.24
1050.0	11.00	22.0	367.1	389.1	11.00	50.24
1056.0	11.00	22.0	367.1	389.1	11.00	50.24
1062.0	11.00	22.0	367.1	389.1	11.00	50.24
1068.0	10.00	21.0	366.7	388.1	10.73	50.23
1074.0	10.00	20.0	366.0	386.7	10.34	50.22
1080.0	10.00	20.0	365.7	386.0	10.16	50.22
1086.0	10.00	20.0	365.5	385.7	10.07	50.21
1092.0	10.00	20.0	365.4	385.5	10.03	50.21
1098.0	10.00	20.0	365.4	385.4	10.02	50.21
1104.0	10.00	20.0	365.4	385.4	10.01	50.21
1110.0	10.00	20.0	365.4	385.4	10.00	50.21
1116.0	9.00	19.0	364.9	384.4	9.74	50.21
1122.0	9.00	18.0	364.2	382.9	9.34	50.20
1128.0	9.00	18.0	363.9	382.2	9.16	50.19
1134.0	9.00	18.0	363.8	381.9	9.07	50.19
1140.0	9.00	18.0	363.7	381.8	9.03	50.19
1146.0	9.00	18.0	363.7	381.7	9.02	50.19
1152.0	9.00	18.0	363.6	381.7	9.01	50.19
1158.0	8.00	17.0	363.2	380.6	8.74	50.18
1164.0	8.00	16.0	362.5	379.2	8.34	50.17
1170.0	8.00	16.0	362.2	378.5	8.16	50.17
1176.0	8.00	16.0	362.0	378.2	8.08	50.17
1182.0	8.00	16.0	361.9	378.0	8.04	50.17
1188.0	7.00	15.0	361.4	376.9	7.75	50.16
1194.0	7.00	14.0	360.7	375.4	7.35	50.15
1200.0	7.00	14.0	360.4	374.7	7.16	50.15

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E100FUT.HYD
Outflow Hydrograph: a:4E100OUT.HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
1206.0	7.00	14.0	360.3	374.4	7.08	50.14
1212.0	7.00	14.0	360.2	374.3	7.04	50.14
1218.0	7.00	14.0	360.2	374.2	7.02	50.14
1224.0	7.00	14.0	360.1	374.2	7.01	50.14
1230.0	7.00	14.0	360.1	374.1	7.00	50.14
1236.0	7.00	14.0	360.1	374.1	7.00	50.14
1242.0	7.00	14.0	360.1	374.1	7.00	50.14
1248.0	7.00	14.0	360.1	374.1	7.00	50.14
1254.0	7.00	14.0	360.1	374.1	7.00	50.14
1260.0	7.00	14.0	360.1	374.1	7.00	50.14
1266.0	7.00	14.0	360.1	374.1	7.00	50.14
1272.0	7.00	14.0	360.1	374.1	7.00	50.14
1278.0	7.00	14.0	360.1	374.1	7.00	50.14
1284.0	7.00	14.0	360.1	374.1	7.00	50.14
1290.0	7.00	14.0	360.1	374.1	7.00	50.14
1296.0	7.00	14.0	360.1	374.1	7.00	50.14
1302.0	7.00	14.0	360.1	374.1	7.00	50.14
1308.0	7.00	14.0	360.1	374.1	7.00	50.14
1314.0	7.00	14.0	360.1	374.1	7.00	50.14
1320.0	7.00	14.0	360.1	374.1	7.00	50.14
1326.0	7.00	14.0	360.1	374.1	7.00	50.14
1332.0	7.00	14.0	360.1	374.1	7.00	50.14
1338.0	6.00	13.0	359.7	373.1	6.73	50.14
1344.0	6.00	12.0	359.0	371.7	6.34	50.13
1350.0	6.00	12.0	358.7	371.0	6.16	50.12
1356.0	6.00	12.0	358.5	370.7	6.07	50.12
1362.0	6.00	12.0	358.4	370.5	6.03	50.12
1368.0	6.00	12.0	358.4	370.4	6.02	50.12
1374.0	5.00	11.0	357.9	369.4	5.74	50.11
1380.0	5.00	10.0	357.2	367.9	5.35	50.10
1386.0	5.00	10.0	356.9	367.2	5.16	50.10
1392.0	5.00	10.0	356.8	366.9	5.08	50.10
1398.0	5.00	10.0	356.7	366.8	5.04	50.10
1404.0	5.00	10.0	356.7	366.7	5.02	50.09
1410.0	4.00	9.0	356.2	365.7	4.74	50.09
1416.0	4.00	8.0	355.5	364.2	4.35	50.08
1422.0	4.00	8.0	355.2	363.5	4.16	50.07
1428.0	4.00	8.0	355.0	363.2	4.08	50.07
1434.0	4.00	8.0	354.9	363.0	4.04	50.07
1440.0	4.00	8.0	354.9	362.9	4.02	50.07
1446.0	3.00	7.0	354.4	361.9	3.74	50.06
1452.0	3.00	6.0	353.7	360.4	3.35	50.06
1458.0	3.00	6.0	353.4	359.7	3.16	50.05
1464.0	3.00	6.0	353.3	359.4	3.08	50.05
1470.0	3.00	6.0	353.2	359.3	3.04	50.05
1476.0	2.00	5.0	352.7	358.2	2.75	50.04

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E100FUT.HYD
Outflow Hydrograph: a:4E100OUT.HYD

INFLOW HYDROGRAPH

TIME (min)	INFLOW (cfs)
1482.0	2.00
1488.0	2.00
1494.0	2.00
1500.0	2.00
1506.0	2.00
1512.0	1.00
1518.0	1.00
1524.0	1.00
1530.0	1.00
1536.0	1.00
1542.0	1.00
1548.0	0.00
1554.0	0.00

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
4.0	352.0	356.7	2.35	50.03
4.0	351.7	356.0	2.16	50.03
4.0	351.5	355.7	2.08	50.03
4.0	351.4	355.5	2.04	50.02
4.0	351.4	355.4	2.02	50.02
3.0	350.9	354.4	1.74	50.02
2.0	350.2	352.9	1.35	50.01
2.0	349.9	352.2	1.16	50.00
2.0	349.7	351.9	1.08	50.00
2.0	349.7	351.7	1.04	50.00
2.0	349.6	351.7	1.02	50.00
1.0	348.6	350.6	1.00	49.99
0.0	346.6	348.6	1.00	49.97

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

Pond File: a:4E-W .PND
Inflow Hydrograph: a:4E100FUT.HYD
Outflow Hydrograph: a:4E100OUT.HYD

Starting Pond W.S. Elevation = 44.00 ft

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

Peak Inflow = 375.00 cfs
Peak Outflow = 360.82 cfs
Peak Elevation = 53.29 ft

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

Initial Storage = 0 cu-ft
Peak Storage From Storm = 161,417 cu-ft

Total Storage in Pond = 161,417 cu-ft

Warning: Inflow hydrograph truncated on left side.

DRAWDOWN CALCULATIONS

Langley and McDonald, P.C.

ENGINEERS • SURVEYORS• PLANNERS
LANDSCAPE ARCHITECTS • ENVIRONMENTAL CONSULTANTS

VIRGINIA BEACH • WILLIAMSBURG, VIRGINIA

Subject DRAWDOWN

Computed By DLB Checked by _____

Project No. 96038-045

Client _____

Date 4/20/99 Sheet No. 1

RUNOFF FROM 1" RAIN:

43 AC SUBDIVISION, AVG LOT SIZE = 0.17 AC
USE I = 35%

20 AC GOLF COURSE AND PARKS
USE I = 2%

63

SUBDIVISION

$$\frac{1''}{12}\left[.05 + .009(35)\right] 43\ AC = 1.31\ AC\text{-}FT$$

GOLF COURSE

$$\frac{1''}{12}\left[.05 + .009(2)\right] 20\ AC = 0.11\ AC\text{-}FT$$

Total Req'd = 1.31 + 0.11 = 1.42 AC-FT

VOL PROVIDED (EL 50) = 1.45 AC-FT

Outlet Structure File: 4E-W .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
STONEHOUSE SECTION IVE
SWMF IVC/VA, "F"
WATER QUALITY BMP - NO ATTENUATION REQ'D
****

Outflow Rating Table for Structure #2
ORIFICE-VC Orifice - Vertical Circular

Elevation (ft)	Q (cfs)	Computation Messages
44.00	0.0	E < E1=44.33
44.50	0.2	H =.335
45.00	0.4	H =.835
45.50	0.5	H =1.335
46.00	0.6	H =1.835
46.50	0.6	H =2.335
47.00	0.7	H =2.835
47.50	0.8	H =3.335
48.00	0.8	H =3.835
48.50	0.9	H =4.335
49.00	0.9	H =4.835
49.50	1.0	H =5.335
50.00	1.0	H =5.835
50.50	1.0	H =6.335
51.00	1.1	H =6.835
51.50	1.1	H =7.335
52.00	1.2	H =7.835
52.50	1.2	H =8.335
53.00	1.2	H =8.835
53.50	1.3	H =9.335
54.00	1.3	H =9.835
54.50	1.3	H =10.335
55.00	1.4	H =10.835
55.50	1.4	H =11.335
56.00	1.4	H =11.835
56.50	1.4	H =12.335
57.00	1.5	H =12.835
57.50	1.5	H =13.335
58.00	1.5	H =13.835
58.50	1.6	H =14.335
59.00	1.6	H =14.835
59.50	1.6	H =15.335
60.00	1.6	H =15.835

$$\text{AVG } Q = \frac{8.4}{12} = 0.7 \text{ cfs}$$

$$\frac{VOL}{Q} = t$$

$$\frac{63{,}111 \text{ cf}}{0.7 \text{ cfs} \times 3600} = 25 \text{ HRS}$$

> 24 o.k.

C = .6 A = 8.552988E-02 sq.ft.
H (ft) = Table elev. - Datum elev. (44.165 ft)
Q (cfs) = C * A * sqr(2g * H)

PAVEMENT DESIGN

CALCULATIONS

FILE: SH IV D CHR 1
LANGLEY and McDONALD, P.C.
201 Packets Court
Williamsburg, Virginia 23185

PAVEMENT DESIGN
VHRC 73-R21

PROJECT: STONEHOUSE SEC TION IV D
LOCATION: James City Co., Virginia
STREET: CIDER HOUSE ROAD
FROM STA. 10+00 TO STA. 27+75
DATE: 28-Oct-97

TRAFFIC ANALYSIS

1. Vehicles Per Day = 910
2. % Heavy Traffic = 5 %
3. Equiv. Present ADT = 910
4. Design Period 20 Yrs.
5. % Growth = 0 %
6. Growth Factor = 1.00
7. V.P.D. Projection = 910 ADT

SUBGRADE ANALYSIS

1. CBR Values = 10.00 0
   0.00 0.00 0.00
2. Enter No. of Tests = 1
3. Average CBR = 10.00
4. Design CBR = 6.67
5. Soil Resiliency Factor = 3.00
6. Soil Support Value = 20.01

PAVEMENT DESIGN

1. Thickness Index Required = 13.5 inches
2. Design

ALT. 'A'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	1.67	0.0	0.0	#DIV/0!
Aggregate	1.00	0.0	0.0	
Sel. Material	0.60	0.0	0.0	
TOTAL		0.0	0.0	#DIV/0!

ALT. 'B'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	2.25	2.0	4.5	0.30
BM-2	2.25	3.0	6.8	0.45
Aggregate	0.60	6.0	3.6	
Sel. Material	0.40	0.0	0.0	
TOTAL		11.0	14.9	0.76

FILE: SH IV D CHR 2
LANGLEY and McDONALD, P.C.
201 Packets Court
Williamsburg, Virginia 23185

PAVEMENT DESIGN
VHRC 73-R21

PROJECT: STONEHOUSE SEC TION IV D
LOCATION: James City Co., Virginia
STREET: CIDER HOUSE ROAD
FROM STA. 27+75 TO STA. 30+16
DATE: 28-Oct-97

TRAFFIC ANALYSIS

1. Vehicles Per Day = 200
2. % Heavy Traffic = 5 %
3. Equiv. Present ADT = 200
4. Design Period 20 Yrs.
5. % Growth = 0 %
6. Growth Factor = 1.00
7. V.P.D. Projection = 200 ADT

SUBGRADE ANALYSIS

1. CBR Values = 10.00 0
   0.00 0.00 0.00
2. Enter No. of Tests = 1
3. Average CBR = 10.00
4. Design CBR = 6.67
5. Soil Resiliency Factor = 3.00
6. Soil Support Value = 20.01

PAVEMENT DESIGN

1. Thickness Index Required = 6.4 inches
2. Design

ALT. 'A'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	1.67	2.0	3.3	0.36
Aggregate	1.00	6.0	6.0	
Sel. Material	0.60	0.0	0.0	
TOTAL		8.0	9.3	0.36

ALT. 'B'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	2.25	0.0	0.0	#DIV/0!
BM-2	2.25	0.0	0.0	#DIV/0!
Aggregate	0.60	0.0	0.0	
Sel. Material	0.40	0.0	0.0	
TOTAL		0.0	0.0	#DIV/0!

FILE: SH IV D OGL
LANGLEY and McDONALD, P.C.
201 Packets Court
Williamsburg, Virginia 23185

PAVEMENT DESIGN
VHRC 73-R21

PROJECT: STONEHOUSE SEC TION IV D
LOCATION: James City Co., Virginia
STREET: OLD GROVE ROAD
FROM STA. 10+00 TO STA. 22+35
DATE: 28-Oct-97

TRAFFIC ANALYSIS

1. Vehicles Per Day = 910
2. % Heavy Traffic = 5 %
3. Equiv. Present ADT = 910
4. Design Period 20 Yrs.
5. % Growth = 0 %
6. Growth Factor = 1.00
7. V.P.D. Projection = 910 ADT

SUBGRADE ANALYSIS

1. CBR Values = 10.00 0
   0.00 0.00 0.00
2. Enter No. of Tests = 1
3. Average CBR = 10.00
4. Design CBR = 6.67
5. Soil Resiliency Factor = 3.00
6. Soil Support Value = 20.01

PAVEMENT DESIGN

1. Thickness Index Required = 13.5 inches
2. Design

ALT. 'A'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	1.67	0.0	0.0	#DIV/0!
Aggregate	1.00	0.0	0.0	
Sel. Material	0.60	0.0	0.0	
TOTAL		0.0	0.0	#DIV/0!

ALT. 'B'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	2.25	2.0	4.5	0.30
BM-2	2.25	3.0	6.8	0.45
Aggregate	0.60	6.0	3.6	
Sel. Material	0.40	0.0	0.0	
TOTAL		11.0	14.9	0.76

FILE: SH IV D TBD
LANGLEY and McDONALD, P.C.
201 Packets Court
Williamsburg, Virginia 23185

PAVEMENT DESIGN
VHRC 73-R21

PROJECT: STONEHOUSE SEC TION IV D
LOCATION: James City Co., Virginia
STREET: THREE BUSHEL DRIVE
FROM STA. 10+00 TO STA. 18+75
DATE: 28-Oct-97

TRAFFIC ANALYSIS

1. Vehicles Per Day = 230
2. % Heavy Traffic = 5 %
3. Equiv. Present ADT = 230
4. Design Period 20 Yrs.
5. % Growth = 0 %
6. Growth Factor = 1.00
7. V.P.D. Projection = 230 ADT

SUBGRADE ANALYSIS

1. CBR Values = 10.00 0
0.00 0.00 0.00
2. Enter No. of Tests = 1
3. Average CBR = 10.00
4. Design CBR = 6.67
5. Soil Resiliency Factor = 3.00
6. Soil Support Value = 20.01

PAVEMENT DESIGN

1. Thickness Index Required = 7.5 inches
2. Design

ALT. 'A'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	1.67	2.0	3.3	0.36
Aggregate	1.00	6.0	6.0	
Sel. Material	0.60	0.0	0.0	
TOTAL		8.0	9.3	0.36

ALT. 'B'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	2.25	0.0	0.0	#DIV/0!
BM-2	2.25	0.0	0.0	#DIV/0!
Aggregate	0.60	0.0	0.0	
Sel. Material	0.40	0.0	0.0	
TOTAL		0.0	0.0	#DIV/0!

FILE: SH IV D GAW
LANGLEY and McDONALD, P.C.
201 Packets Court
Williamsburg, Virginia 23185

PAVEMENT DESIGN
VHRC 73-R21

PROJECT: STONEHOUSE SEC TION IV D
LOCATION: James City Co., Virginia
STREET: GREEN APPLE WAY
FROM STA. 10+00 TO STA. 18+81
DATE: 28-Oct-97

TRAFFIC ANALYSIS

1. Vehicles Per Day = 230
2. % Heavy Traffic = 5 %
3. Equiv. Present ADT = 230
4. Design Period 20 Yrs.
5. % Growth = 0 %
6. Growth Factor = 1.00
7. V.P.D. Projection = 230 ADT

SUBGRADE ANALYSIS

1. CBR Values = 10.00 0
0.00 0.00 0.00
2. Enter No. of Tests = 1
3. Average CBR = 10.00
4. Design CBR = 6.67
5. Soil Resiliency Factor = 3.00
6. Soil Support Value = 20.01

PAVEMENT DESIGN

1. Thickness Index Required = 7.5 inches
2. Design

ALT. 'A'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	1.67	2.0	3.3	0.36
Aggregate	1.00	6.0	6.0	
Sel. Material	0.60	0.0	0.0	
TOTAL		8.0	9.3	0.36

ALT. 'B'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	2.25	0.0	0.0	#DIV/0!
BM-2	2.25	0.0	0.0	#DIV/0!
Aggregate	0.60	0.0	0.0	
Sel. Material	0.40	0.0	0.0	
TOTAL		0.0	0.0	#DIV/0!

FILE: SH IV D PC
LANGLEY and McDONALD, P.C.
201 Packets Court
Williamsburg, Virginia 23185

PAVEMENT DESIGN
VHRC 73-R21

PROJECT: STONEHOUSE SEC TION IV D
LOCATION: James City Co., Virginia
STREET: PLANTERS CROSSING
FROM STA. 10+00 TO STA. 19+15
DATE: 28-Oct-97

TRAFFIC ANALYSIS

1. Vehicles Per Day = 230
2. % Heavy Traffic = 5 %
3. Equiv. Present ADT = 230
4. Design Period 20 Yrs.
5. % Growth = 0 %
6. Growth Factor = 1.00
7. V.P.D. Projection = 230 ADT

SUBGRADE ANALYSIS

1. CBR Values = 10.00 0
   0.00 0.00 0.00
2. Enter No. of Tests = 1
3. Average CBR = 10.00
4. Design CBR = 6.67
5. Soil Resiliency Factor = 3.00
6. Soil Support Value = 20.01

PAVEMENT DESIGN

1. Thickness Index Required = 7.5 inches
2. Design

ALT. 'A'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	1.67	2.0	3.3	0.36
Aggregate	1.00	6.0	6.0	
Sel. Material	0.60	0.0	0.0	
TOTAL		8.0	9.3	0.36

ALT. 'B'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	2.25	0.0	0.0	#DIV/0!
BM-2	2.25	0.0	0.0	#DIV/0!
Aggregate	0.60	0.0	0.0	
Sel. Material	0.40	0.0	0.0	
TOTAL		0.0	0.0	#DIV/0!

ENVIRONMENTAL INVENTORY

An Environmental Inventory was compiled for Sections IVA, IVB, IVD, IVE and Mill Pond Run Section II. The following is a description of the flora and fauna.

The overstory vegetation in Sections IVA and IVB is a mixture if hardwood and softwood species consisting of white oak, (*Quercus alba*), tulip poplar, (*Liriodendron tulipifera*), American beech (*Fagus gradnifolia*), loblloy pine (Pinus taeda) and red maple (*Acer rubrum*) with the understory comprised of flowering dogwood (*Cornus florida*), American holly (*Ilex opaca*), sweet gum (*Liquidambar styraciflua*), black oak (*Quercus velutina*), mockernut hickory (*Carya tomentosa*). The shrub layer contains very dense mountain laurel (*Kalmia latifolia*) and highbush blueberry (*Vaccinium corymbosum*). The herbaceous stratum consist of partridge berry (*Mitchella repens*), southern lady fern, (*Antherium asplenioides*), Christmas fern (*Polystichum acrostichoides*) sassafrass (*Sassafrass albidum*), strawberry bush (*Euonymus americanus*) and muscadine grape (*Vitus rotundifolia*).

Section IVD and IVE is a fallow farm field previously planted with corn. The area is currently dominated with weedy species including goldenrod species (*Solidago sp.*), field garlic (*Allium vineale*), wild onion (*Allium canadense*) and grasses including (*Panicum* sp.), (*Andropogon* sp.) and plantain (*Plantago lanceolata*).

The wildlife usage of the area would include species typical of mature woods including mammals such as white tailed deer, raccoons, gray squirrel, beaver, Virginia opossum, red fox and birds including robins, cardinals, sparrows, black birds, blue jays, doves, meadowlarks and turkey vultures. Reptiles and amphibians include usage would include toads, black snake, copperhead, and eastern garter snake.

The area also includes Legends golf hole 11 tees, fairways and green which lies between Section IVA and IVB.

DRAINAGE AND PAVEMENT DESIGN

CALCULATIONS

FOR

STONEHOUSE L.L.C.

DEVELOPMENT AREA ONE, PHASE I
SECTION IVD

"ORCHARD HILL"

NOVEMBER 18, 1997

REVISED PER COMMENTS, FEBRUARY 12, 1998

Langley and McDonald, P.C.

Engineers
Surveyors
Planners
Landscape Architects
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DRAINAGE AND PAVEMENT DESIGN

CALCULATIONS

FOR

STONEHOUSE L.L.C.

DEVELOPMENT AREA ONE, PHASE I
SECTION IVD

"ORCHARD HILL"

NOVEMBER 18, 1997

REVISED PER COMMENTS, FEBRUARY 12, 1998

DRAINAGE CALCULATIONS

PROJECT 96038.0452
HEC12 Version: V2.91 Run Date: 10-20-1997

INLET NUMBER J15 LENGTH 8.0 STATION 12+75B

DRAINAGE AREA = 0.500 ACRES C VALUE = .300 CA = 0.150
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
SUM CA= 0.240 INT= 3.50 CFS= 0.840 CO= 0.000 GUTTER FLOW= 0.840
GUTTER SLOPE = 0.0226 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
2.78	2.0	0.72	0.0833	4.0	0.99	3.5	0.146	0.166

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 7.1 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.84 CFS CARRYOVER= 0.00

INLET NUMBER J14 LENGTH 8.0 STATION 11+50B

DRAINAGE AREA = 0.740 ACRES C VALUE = .300 CA = 0.222
DRAINAGE AREA = 0.060 ACRES C VALUE = .900 CA = 0.054
SUM CA= 0.276 INT= 3.50 CFS= 0.966 CO= 0.000 GUTTER FLOW= 0.966
GUTTER SLOPE = 0.0226 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
3.22	2.0	0.62	0.0833	4.0	0.98	3.5	0.146	0.164

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 7.6 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.97 CFS CARRYOVER= 0.00

INLET NUMBER J14A LENGTH 8.0 STATION 11+50B

DRAINAGE AREA = 0.380 ACRES C VALUE = .300 CA = 0.114
DRAINAGE AREA = 0.160 ACRES C VALUE = .900 CA = 0.144
SUM CA= 0.258 INT= 3.50 CFS= 0.903 CO= 0.000 GUTTER FLOW= 0.903
GUTTER SLOPE = 0.0226 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
3.01	2.0	0.66	0.0833	4.0	0.99	3.5	0.146	0.165

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 7.4 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.90 CFS CARRYOVER= 0.00

INLET NUMBER J13 LENGTH 10.0 STATION 10+50B

DRAINAGE AREA = 0.040 ACRES C VALUE = .300 CA = 0.012
DRAINAGE AREA = 0.040 ACRES C VALUE = .900 CA = 0.036
DRAINAGE AREA = 0.530 ACRES C VALUE = .300 CA = 0.159
DRAINAGE AREA = 0.050 ACRES C VALUE = .900 CA = 0.045

FOR THE FIRST SIDE
SUM CA= 0.048 INT= 3.50 CFS= 0.168 CO= 0.000 GUTTER FLOW= 0.168
FOR THE OTHER SIDE
SUM CA= 0.204 INT= 3.50 CFS= 0.714 CO= 0.000 GUTTER FLOW= 0.714
AT THE INLET

SUM CA= 0.252 INT= 3.50 CFS= 0.882 CO= 0.000 GUTTER FLOW= 0.882
GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.71 (cfs) IS 7.55 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 13.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.09 SPREAD (ft) = 4.45

INLET NUMBER J13A LENGTH 10.0 STATION 10+50B

DRAINAGE AREA = 0.040 ACRES C VALUE = .300 CA = 0.012
DRAINAGE AREA = 0.030 ACRES C VALUE = .900 CA = 0.027
DRAINAGE AREA = 0.210 ACRES C VALUE = .300 CA = 0.063
DRAINAGE AREA = 0.050 ACRES C VALUE = .900 CA = 0.045

FOR THE FIRST SIDE
SUM CA= 0.039 INT= 3.50 CFS= 0.136 CO= 0.000 GUTTER FLOW= 0.136
FOR THE OTHER SIDE
SUM CA= 0.108 INT= 3.50 CFS= 0.378 CO= 0.000 GUTTER FLOW= 0.378
AT THE INLET

SUM CA= 0.147 INT= 3.50 CFS= 0.514 CO= 0.000 GUTTER FLOW= 0.514
GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.38 (cfs) IS 5.25 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 13.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.06 SPREAD (ft) = 3.11

INLET NUMBER J13B LENGTH 8.0 STATION 15+75D

DRAINAGE AREA = 0.320 ACRES C VALUE = .300 CA = 0.096
DRAINAGE AREA = 0.070 ACRES C VALUE = .900 CA = 0.063
SUM CA= 0.159 INT= 3.50 CFS= 0.557 CO= 0.000 GUTTER FLOW= 0.557
GUTTER SLOPE = 0.0300 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
1.79	2.0	1.12	0.0833	4.0	1.00	3.5	0.146	0.167

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 6.5 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.56 CFS CARRYOVER= 0.00

INLET NUMBER J12D LENGTH 8.0 STATION 11+00A

DRAINAGE AREA = 0.580 ACRES C VALUE = .300 CA = 0.174
DRAINAGE AREA = 0.140 ACRES C VALUE = .900 CA = 0.126
SUM CA= 0.300 INT= 3.50 CFS= 1.050 CO= 0.000 GUTTER FLOW= 1.050

GUTTER SLOPE = 0.0121 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
4.50	2.0	0.44	0.0833	4.0	0.92	3.5	0.146	0.155

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 6.8 EFFICIENCY= 1.00
CFS INTERCEPTED= 1.05 CFS CARRYOVER= 0.00

INLET NUMBER J12C LENGTH 8.0 STATION 10+50A

DRAINAGE AREA = 0.160 ACRES C VALUE = .300 CA = 0.048
DRAINAGE AREA = 0.020 ACRES C VALUE = .900 CA = 0.018
DRAINAGE AREA = 0.030 ACRES C VALUE = .900 CA = 0.027

FOR THE FIRST SIDE
SUM CA= 0.066 INT= 3.50 CFS= 0.231 CO= 0.000 GUTTER FLOW= 0.231
FOR THE OTHER SIDE
SUM CA= 0.027 INT= 3.50 CFS= 0.094 CO= 0.000 GUTTER FLOW= 0.094
AT THE INLET

SUM CA= 0.093 INT= 3.50 CFS= 0.325 CO= 0.000 GUTTER FLOW= 0.325

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.23 (cfs) IS 3.63 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.05 SPREAD (ft) = 2.54

INLET NUMBER J12B LENGTH 10.0 STATION 10+50A

DRAINAGE AREA = 0.340 ACRES C VALUE = .300 CA = 0.102
DRAINAGE AREA = 0.170 ACRES C VALUE = .900 CA = 0.153
DRAINAGE AREA = 0.050 ACRES C VALUE = .300 CA = 0.015
DRAINAGE AREA = 0.030 ACRES C VALUE = .900 CA = 0.027

FOR THE FIRST SIDE
SUM CA= 0.255 INT= 3.50 CFS= 0.892 CO= 0.000 GUTTER FLOW= 0.892
FOR THE OTHER SIDE
SUM CA= 0.042 INT= 3.50 CFS= 0.147 CO= 0.000 GUTTER FLOW= 0.147
AT THE INLET

SUM CA= 0.297 INT= 3.50 CFS= 1.039 CO= 0.000 GUTTER FLOW= 1.039

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.89 (cfs) IS 8.44 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 13.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.10 SPREAD (ft) = 4.96

INLET NUMBER J12 LENGTH 8.0 STATION 14+50D

DRAINAGE AREA = 0.160 ACRES C VALUE = .300 CA = 0.048
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
SUM CA= 0.138 INT= 3.50 CFS= 0.483 CO= 0.000 GUTTER FLOW= 0.483
GUTTER SLOPE = 0.0300 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
1.70	2.0	1.18	0.0833	4.0	1.00	3.5	0.146	0.167

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 6.1 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.48 CFS CARRYOVER= 0.00

INLET NUMBER J11 LENGTH 6.0 STATION 14+50D

DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
SUM CA= 0.090 INT= 3.50 CFS= 0.315 CO= 0.000 GUTTER FLOW= 0.315

GUTTER SLOPE = 0.0300 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
1.45	2.0	1.38	0.0833	4.0	1.00	3.5	0.146	0.167

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 5.1 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.31 CFS CARRYOVER= 0.00

INLET NUMBER J10 LENGTH 6.0 STATION 15+25D

DRAINAGE AREA = 0.040 ACRES C VALUE = .900 CA = 0.036
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090

FOR THE FIRST SIDE
SUM CA= 0.036 INT= 3.50 CFS= 0.126 CO= 0.000 GUTTER FLOW= 0.126
FOR THE OTHER SIDE
SUM CA= 0.090 INT= 3.50 CFS= 0.315 CO= 0.000 GUTTER FLOW= 0.315
AT THE INLET

SUM CA= 0.126 INT= 3.50 CFS= 0.441 CO= 0.000 GUTTER FLOW= 0.441

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.31 (cfs) IS 4.64 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 9.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.07 SPREAD (ft) = 3.53

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INLET NUMBER K10 LENGTH 8.0 STATION 11+50C

DRAINAGE AREA = 0.690 ACRES C VALUE = .300 CA = 0.207
DRAINAGE AREA = 0.070 ACRES C VALUE = .900 CA = 0.063
SUM CA= 0.270 INT= 3.50 CFS= 0.945 CO= 0.000 GUTTER FLOW= 0.945

GUTTER SLOPE = 0.0200 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
3.35	2.0	0.60	0.0833	4.0	0.98	3.5	0.146	0.163

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 7.3 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.95 CFS CARRYOVER= 0.00

INLET NUMBER K9 LENGTH 8.0 STATION 11+00C

DRAINAGE AREA = 0.260 ACRES C VALUE = .300 CA = 0.078
DRAINAGE AREA = 0.020 ACRES C VALUE = .900 CA = 0.018
DRAINAGE AREA = 0.320 ACRES C VALUE = .300 CA = 0.096
DRAINAGE AREA = 0.110 ACRES C VALUE = .900 CA = 0.099

FOR THE FIRST SIDE
SUM CA= 0.096 INT= 3.50 CFS= 0.336 CO= 0.000 GUTTER FLOW= 0.336
FOR THE OTHER SIDE
SUM CA= 0.195 INT= 3.50 CFS= 0.683 CO= 0.000 GUTTER FLOW= 0.683
AT THE INLET

SUM CA= 0.291 INT= 3.50 CFS= 1.019 CO= 0.000 GUTTER FLOW= 1.019

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.68 (cfs) IS 7.38 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.11 SPREAD (ft) = 5.44

INLET NUMBER K9A LENGTH 8.0 STATION 11+00C

DRAINAGE AREA = 0.200 ACRES C VALUE = .300 CA = 0.060
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
DRAINAGE AREA = 0.070 ACRES C VALUE = .300 CA = 0.021
DRAINAGE AREA = 0.060 ACRES C VALUE = .900 CA = 0.054

FOR THE FIRST SIDE
SUM CA= 0.150 INT= 3.50 CFS= 0.525 CO= 0.000 GUTTER FLOW= 0.525
FOR THE OTHER SIDE
SUM CA= 0.075 INT= 3.50 CFS= 0.263 CO= 0.000 GUTTER FLOW= 0.263
AT THE INLET

SUM CA= 0.225 INT= 3.50 CFS= 0.788 CO= 0.000 GUTTER FLOW= 0.788

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.53 (cfs) IS 6.40 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.10 SPREAD (ft) = 4.59

INLET NUMBER K7 LENGTH 6.0 STATION 19+75D

DRAINAGE AREA = 0.060 ACRES C VALUE = .300 CA = 0.018
DRAINAGE AREA = 0.120 ACRES C VALUE = .900 CA = 0.108
SUM CA= 0.126 INT= 3.50 CFS= 0.441 CO= 0.000 GUTTER FLOW= 0.441

GUTTER SLOPE = 0.0292 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
1.65	2.0	1.21	0.0833	4.0	1.00	3.5	0.146	0.167

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 5.8 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.44 CFS CARRYOVER= 0.00

STORM SEWER DESIGN / RATIONAL METHOD 10 YEAR RETURN PERIOD

STONEHOUSE ORCHARD HILL SECTION IV D & E

Concrete Pipe,"n" = 0.013 Capacity @ 80% Full Depth

VDOT L&D 229		Area Drained	Run-off Coeff.	"C x A		Inlet Time	Time of Conc.	Rainfall intensity	RUNOFF	INVERT ELEVATIONS		LENGTH	SLOPE	DIAM	CAPACITY	VELOCITY	TRAVEL"t"	REMARKS
FROM PT.	TO PT.	"Acres"	"C"	INCR.	ACCUM	"t"	"tc"	"i"	"QRational"	UPPER END	LOWER END	ft.	ft/ft	inch	cfs	fps	min.	
(1)	(2)	(3)	(4)	(5)	(6)	*	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
STORM SYSTEM "J" (Extension of "J" IVB)																		
	J15	0.5	0.3	0.15														
		0.10	0.9	0.09	0.24	9.34	9.34	6.1	1.46									
J15	J14									105.50	103.00	125	0.0200	15	8.93	8.48	0.25	
	J14A	0.38	0.3	0.11														
		0.16	0.9	0.14	0.50	18.00	18.54	4.6	2.31									
J14A	J14									103.30	103.00	32	0.0094	15	6.11	5.81	0.09	
	J14	0.74	0.3	0.22														
		0.06	0.9	0.05	0.77	10.69	18.54	4.6	3.59									
J14	J13									102.10	100.10	100	0.0200	15	8.93	8.48	0.20	
	J13B	0.32	0.3	0.10														
		0.07	0.9	0.06	0.16	11.96	18.64	4.6	0.74									
J13B	J13A									101.80	100.80	50	0.0200	15	8.93	8.48	0.10	
	J13A	0.04	0.3	0.01														
		0.03	0.9	0.03														
		0.21	0.3	0.06														
		0.05	0.9	0.05	0.31	10.35	18.70	4.6	1.41									
J13A	J13									100.70	100.10	32	0.0187	15	8.65	8.22	0.06	
	J13	0.04	0.3	0.01														
		0.04	0.9	0.04														
		0.53	0.3	0.16														
		0.05	0.9	0.05	1.33	12.17	18.85	4.6	6.13									
J13	J12									99.75	99.15	60	0.0100	18	10.27	6.77	0.15	
	J12D	0.58	0.3	0.17														
		0.14	0.9	0.13	0.30	13.64	18.99	4.6	1.37									
J12D	J12C									108.50	108.00	50	0.0100	15	6.31	6.00	0.14	
	J12C	0.16	0.3	0.05														
		0.02	0.9	0.02														
		0.00	0.3	0.00														
		0.03	0.9	0.03	0.39	9.47	19.08	4.6	1.80									
J12C	J12B									107.80	107.50	32	0.0094	15	6.11	5.81	0.09	
	J12B	0.34	0.3	0.10														
		0.17	0.9	0.15														
		0.05	0.3	0.02														
		0.03	0.9	0.03	0.69	4.97	19.17	4.6	3.15									
J12B	J12A									107.40	106.80	40	0.0150	15	7.73	7.35	0.09	
J12A	J12									104.60	103.00	175	0.0091	15	6.04	5.74	0.51	
	J12	0.16	0.3	0.05														
		0.10	0.9	0.09	2.16	7.42	19.76	4.5	9.71									

STORM SEWER DESIGN / RATIONAL METHOD 10 YEAR RETURN PERIOD

STONEHOUSE ORCHARD HILL SECTION IV D & E

Concrete Pipe,"n" = 0.013 Capacity @ 80% Full Depth

VDOT L&D 229		Area Drained	Run-off Coeff.	"C x A		Inlet Time	Time of Conc.	Rainfall intensity	RUNOFF	INVERT ELEVATIONS		LENGTH	SLOPE	DIAM	CAPACITY	VELOCITY	TRAVEL"t"	REMARKS
FROM PT.	TO PT.	"Acres"	"C"	INCR.	ACCUM	"t"	"tc"	"i"	"QRational"	UPPER END	LOWER END	ft.	ft/ft	inch	cfs	fps	min.	
(1)	(2)	(3)	(4)	(5)	(6)	*	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
J12	J11									99.00	98.40	40	0.0150	18	12.58	8.30	0.08	
	J11	0.00	0.3	0.00														
		0.01	0.9	0.01	2.17	9.87	19.89	4.5	9.72									
J11	J10									97.80	96.30	75	0.0200	18	14.52	9.58	0.13	
	J10	0.00	0.3	0.00														
		0.04	0.9	0.04														
		0.00	0.3	0.00														
		0.10	0.9	0.09	2.30	9.87	19.97	4.5	10.26									
J10	J8									96.20	86.20	100	0.1000	18	32.47	21.42	0.08	
	J8	1.08	0.3	0.32	2.62	1.48	20.32	4.4	11.61									
J8	J7	6.33								85.41	84.36	146	0.0072	24	18.75	6.96	0.35	
STORM SYSTEM "K" (Extention IVB)																		
	K10	0.69	0.3	0.21														
		0.07	0.9	0.06	0.27	13.64	13.78	5.3	1.43									
K10	K9									99.00	98.50	50	0.0100	15	6.31	6.00	0.14	
	K9A	0.20	0.3	0.06														
		0.10	0.9	0.09														
		0.07	0.3	0.02														
		0.03	0.9	0.03	0.20	9.87	13.88	5.3	1.04									
K9A	K9									98.80	98.50	32	0.0094	15	6.11	5.81	0.09	
	K9	0.26	0.3	0.08														
		0.02	0.9	0.02														
		0.32	0.3	0.10														
		0.11	0.9	0.10	0.76	9.87	14.22	5.2	3.96									
K9	K8									98.40	97.25	120	0.0096	15	6.18	5.87	0.34	
K8	K7									97.15	96.50	68	0.0096	15	6.17	5.87	0.19	
	K7	0.00	0.3	0.00														
		0.12	0.9	0.11	0.87	12.17	15.28	5.1	4.39									
K7	K6									96.40	92.70	185	0.0200	15	8.93	8.48	0.36	
	K6	0.73	0.3	0.22	1.09	1.20	21.95	4.3	4.63									
K6	K5	2.72								92.60	84.43	300	0.0272	15	10.42	9.90	0.51	

INLET STATION	Outlet Water Surface	FRICTION LOSS IN PIPE						JUNCTION LOSS												H Adjusted	Inlet Water Surface Elevation	Rim Elevation
		Do	Qo	Lo	no	Sfo	Hf	Vo	Ho	Qi	Vi	Qi x Vi	V²/ 2g	Hi	Δ	Hdelta	Ht	.3 x Ht	0.5 x Ht			
1	2	3	4	5	5A	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
STORM SYSTEM "J" (Extension of "J" IVB)																						
J8	86.98	24	11.61	146	**0.013**	0.0026	0.385	6.40	0.16	10.26	9.06	93	1.27	0.45	0	0.00	0.61	0.18	-0.30	0.87	87.85	99.00
	J7																					
J10	87.85	18	10.26	100	**0.013**	0.0095	0.954	9.06	0.32	9.72	8.00	78	0.99	0.35	0	0.00	0.67	0.20	-0.33	1.49	89.34	105.98
	J8																					
J11	89.34	18	9.72	75	**0.013**	0.0086	0.642	8.00	0.25	9.71	8.00	78	0.99	0.35	90	0.70	1.29	0.39	-0.65	1.68	91.01	107.26
	J10																					
J12	91.01	18	9.71	40	**0.013**	0.0085	0.342	8.00	0.25	6.13	6.17	38	0.59	0.21	90	0.41	0.87	0.26	-0.43	1.04	92.05	107.26
	J11								J12A	3.15	5.05	16										
J12A	92.05	15	3.15	175	**0.013**	0.0000	0.000	5.05	0.10	3.15	6.08	19	0.57	0.20	90	0.40	0.70	0.21	-0.35	0.56	92.61	113.22
	J12																					
J12B	92.61	15	3.15	40	**0.013**	0.0000	0.000	6.08	0.14	1.80	4.41	8	0.30	0.11	27	0.07	0.32	0.10	-0.16	0.26	92.87	112.40
	J12A																					
J12C	92.87	15	1.80	32	**0.013**	0.0000	0.000	4.41	0.08	1.37	4.18	6	0.27	0.09	26	0.06	0.23	0.07	-0.12	0.19	93.05	112.40
	J12B																					
J12D	93.05	15	1.37	50	**0.013**	0.0000	0.000	4.18	0.07											0.00	93.05	113.02
	J12C																					
J13	92.05	18	6.13	60	**0.013**	0.0000	0.000	6.17	0.15	3.59	7.00	25	0.76	0.27	36	0.26	0.67	0.20	-0.34	0.54	92.59	105.36
	J12								J13A	1.41	5.27	7										
J13A	92.59	15	1.41	32	**0.013**	0.0031	0.099	5.27	0.11	0.74	4.47	3	0.31	0.11	54	0.16	0.37	0.11	-0.19	0.40	92.98	105.36
	J13																					
J13B	92.98	15	0.74	50	**0.013**	0.0013	0.064	4.47	0.08	3.59	7.00											
	J13A																					
J14	92.59	15	3.59	100	**0.013**	0.0005	0.051	7.00	0.19	2.31	4.72	11	0.35	0.12	55	0.18	0.49	0.15	-0.24	0.44	93.03	107.35
	J13								J15	1.46	5.45	8										
J14A	93.03	15	2.31	32	**0.013**	0.0000	0.000	4.72	0.09													
	J14																					
J15	93.03	15	1.46	125	**0.013**	0.0000	0.000	5.45	0.12													
	J14																					
STORM SYSTEM "K" (Extention IVB)																						
K6	87.62	15	5.16	300	**0.013**	0.0064	1.910	8.60	0.29	5.01	7.62	38	0.90	0.32	27	0.22	0.82	0.25	-0.41	2.57	90.19	98.00
	K5																					
K7	90.19	15	5.01	185	**0.013**	0.0060	1.113	7.62	0.23	3.60	5.32	19	0.44	0.15	88	0.30	0.68	0.21	-0.34	1.66	91.85	103.14
	K6																					
MH K8	91.85	15	3.60	68	**0.013**	0.0031	0.211	5.32	0.11	3.60	5.32	19	0.44	0.15	90	0.31	0.57	0.17	-0.29	0.67	92.52	105.25
	K7																					
K9	92.52	15	3.60	120	**0.013**	0.0031	0.373	5.32	0.11	1.59	4.36	7	0.30	0.10	25	0.06	0.28	0.08	-0.14	0.60	93.11	103.26
	K8								K9A	0.49	3.04											
K9A	92.52	15	0.49	32	**0.013**	0.0001	0.002	3.04	0.04			0	0.00	0.00	90	0.00	0.04	0.01	-0.02	0.03	92.55	103.26
	K9																					
K10	92.52	15	1.59	50	**0.013**	0.0006	0.030	4.36	0.07			0	0.00	0.00	0	0.00	0.07	0.02	-0.04	0.09	92.61	104.48

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HEC12 Version: V2.91 Run Date: 10-14-1997

INLET NUMBER R13 LENGTH 6.0 STATION 16+50A

DRAINAGE AREA = 0.560 ACRES C VALUE = .300 CA = 0.168
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
SUM CA= 0.258 INT= 3.50 CFS= 0.903 CO= 0.000 GUTTER FLOW= 0.903

GUTTER SLOPE = 0.0100 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
4.32	2.0	0.46	0.0833	4.0	0.93	3.5	0.146	0.156

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 6.0 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.90 CFS CARRYOVER= 0.00

INLET NUMBER R12 LENGTH 12.0 STATION 17+25A

DRAINAGE AREA = 0.460 ACRES C VALUE = .300 CA = 0.138
DRAINAGE AREA = 0.030 ACRES C VALUE = .900 CA = 0.027
DRAINAGE AREA = 0.490 ACRES C VALUE = .300 CA = 0.147
DRAINAGE AREA = 0.120 ACRES C VALUE = .900 CA = 0.108

FOR THE FIRST SIDE
SUM CA= 0.165 INT= 3.50 CFS= 0.578 CO= 0.000 GUTTER FLOW= 0.578
FOR THE OTHER SIDE
SUM CA= 0.255 INT= 3.50 CFS= 0.892 CO= 0.000 GUTTER FLOW= 0.892
AT THE INLET

SUM CA= 0.420 INT= 3.50 CFS= 1.470 CO= 0.000 GUTTER FLOW= 1.470

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.89 (cfs) IS 8.44 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 15.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.12 SPREAD (ft) = 5.71

INLET NUMBER R11A LENGTH 8.0 STATION 12+25E

DRAINAGE AREA = 0.500 ACRES C VALUE = .300 CA = 0.150
DRAINAGE AREA = 0.080 ACRES C VALUE = .900 CA = 0.072
DRAINAGE AREA = 0.140 ACRES C VALUE = .300 CA = 0.042
DRAINAGE AREA = 0.070 ACRES C VALUE = .900 CA = 0.063

FOR THE FIRST SIDE
SUM CA= 0.222 INT= 3.50 CFS= 0.777 CO= 0.000 GUTTER FLOW= 0.777
FOR THE OTHER SIDE
SUM CA= 0.105 INT= 3.50 CFS= 0.368 CO= 0.000 GUTTER FLOW= 0.368
AT THE INLET

SUM CA= 0.327 INT= 3.50 CFS= 1.145 CO= 0.000 GUTTER FLOW= 1.145

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.78 (cfs) IS 7.88 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.12 SPREAD (ft) = 5.89

INLET NUMBER R11 LENGTH 12.0 STATION 17+25A

DRAINAGE AREA = 0.300 ACRES C VALUE = .300 CA = 0.090
DRAINAGE AREA = 0.130 ACRES C VALUE = .900 CA = 0.117
DRAINAGE AREA = 0.380 ACRES C VALUE = .300 CA = 0.114
DRAINAGE AREA = 0.130 ACRES C VALUE = .900 CA = 0.117

FOR THE FIRST SIDE
SUM CA= 0.207 INT= 3.50 CFS= 0.724 CO= 0.000 GUTTER FLOW= 0.724
FOR THE OTHER SIDE
SUM CA= 0.231 INT= 3.50 CFS= 0.808 CO= 0.000 GUTTER FLOW= 0.808
AT THE INLET

SUM CA= 0.438 INT= 3.50 CFS= 1.533 CO= 0.000 GUTTER FLOW= 1.533

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.81 (cfs) IS 8.04 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 15.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.12 SPREAD (ft) = 5.87

INLET NUMBER R10 LENGTH 6.0 STATION 17+75A

DRAINAGE AREA = 0.110 ACRES C VALUE = .300 CA = 0.033
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
SUM CA= 0.123 INT= 3.50 CFS= 0.430 CO= 0.000 GUTTER FLOW= 0.430

GUTTER SLOPE = 0.0208 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
1.74	2.0	1.15	0.0833	4.0	1.00	3.5	0.146	0.167

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 5.2 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.43 CFS CARRYOVER= 0.00

INLET NUMBER R9 LENGTH 12.0 STATION 16+75B

DRAINAGE AREA = 0.620 ACRES C VALUE = .300 CA = 0.186
DRAINAGE AREA = 0.050 ACRES C VALUE = .900 CA = 0.045
DRAINAGE AREA = 0.570 ACRES C VALUE = .300 CA = 0.171
DRAINAGE AREA = 0.020 ACRES C VALUE = .900 CA = 0.018

FOR THE FIRST SIDE
SUM CA= 0.231 INT= 3.50 CFS= 0.809 CO= 0.000 GUTTER FLOW= 0.809
FOR THE OTHER SIDE
SUM CA= 0.189 INT= 3.50 CFS= 0.662 CO= 0.000 GUTTER FLOW= 0.662
AT THE INLET

SUM CA= 0.420 INT= 3.50 CFS= 1.470 CO= 0.000 GUTTER FLOW= 1.470

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.81 (cfs) IS 8.04 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 15.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.12 SPREAD (ft) = 5.71

INLET NUMBER R9A LENGTH 6.0 STATION 16+25B

DRAINAGE AREA = 0.550 ACRES C VALUE = .300 CA = 0.165
DRAINAGE AREA = 0.060 ACRES C VALUE = .900 CA = 0.054
SUM CA= 0.219 INT= 3.50 CFS= 0.767 CO= 0.000 GUTTER FLOW= 0.767

GUTTER SLOPE = 0.0100 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
3.79	2.0	0.53	0.0833	4.0	0.96	3.5	0.146	0.161

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 5.5 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.77 CFS CARRYOVER= 0.00

INLET NUMBER R8 LENGTH 12.0 STATION 16+75B

DRAINAGE AREA = 0.220 ACRES C VALUE = .300 CA = 0.066
DRAINAGE AREA = 0.080 ACRES C VALUE = .900 CA = 0.072
DRAINAGE AREA = 0.180 ACRES C VALUE = .300 CA = 0.054
DRAINAGE AREA = 0.090 ACRES C VALUE = .900 CA = 0.081

FOR THE FIRST SIDE
SUM CA= 0.138 INT= 3.50 CFS= 0.483 CO= 0.000 GUTTER FLOW= 0.483
FOR THE OTHER SIDE
SUM CA= 0.135 INT= 3.50 CFS= 0.473 CO= 0.000 GUTTER FLOW= 0.473
AT THE INLET

SUM CA= 0.273 INT= 3.50 CFS= 0.956 CO= 0.000 GUTTER FLOW= 0.956

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT
SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.48 (cfs) IS 6.10 (ft.)
XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 15.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.09 SPREAD (ft) = 4.28

INLET NUMBER R7 LENGTH 8.0 STATION 17+00C

DRAINAGE AREA = 0.460 ACRES C VALUE = .300 CA = 0.138
DRAINAGE AREA = 0.160 ACRES C VALUE = .900 CA = 0.144
SUM CA= 0.282 INT= 3.50 CFS= 0.987 CO= 0.000 GUTTER FLOW= 0.987

GUTTER SLOPE = 0.0208 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
3.42	2.0	0.58	0.0833	4.0	0.97	3.5	0.146	0.163

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 7.5 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.99 CFS CARRYOVER= 0.00

INLET NUMBER R6A LENGTH 12.0 STATION 16+25C

DRAINAGE AREA = 0.330 ACRES C VALUE = .300 CA = 0.099
DRAINAGE AREA = 0.140 ACRES C VALUE = .900 CA = 0.126
DRAINAGE AREA = 0.290 ACRES C VALUE = .300 CA = 0.087
DRAINAGE AREA = 0.130 ACRES C VALUE = .900 CA = 0.117

FOR THE FIRST SIDE
SUM CA= 0.225 INT= 3.50 CFS= 0.788 CO= 0.000 GUTTER FLOW= 0.788
FOR THE OTHER SIDE
SUM CA= 0.204 INT= 3.50 CFS= 0.714 CO= 0.000 GUTTER FLOW= 0.714
AT THE INLET

SUM CA= 0.429 INT= 3.50 CFS= 1.502 CO= 0.000 GUTTER FLOW= 1.502

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT
SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.79 (cfs) IS 7.93 (ft.)
XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 15.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.12 SPREAD (ft) = 5.79

INLET NUMBER R6B LENGTH 10.0 STATION 16+25C

DRAINAGE AREA = 0.510 ACRES C VALUE = .300 CA = 0.153
DRAINAGE AREA = 0.040 ACRES C VALUE = .900 CA = 0.036
DRAINAGE AREA = 0.450 ACRES C VALUE = .300 CA = 0.135
DRAINAGE AREA = 0.050 ACRES C VALUE = .900 CA = 0.045

FOR THE FIRST SIDE
SUM CA= 0.189 INT= 3.50 CFS= 0.661 CO= 0.000 GUTTER FLOW= 0.661
FOR THE OTHER SIDE
SUM CA= 0.180 INT= 3.50 CFS= 0.630 CO= 0.000 GUTTER FLOW= 0.630
AT THE INLET

SUM CA= 0.369 INT= 3.50 CFS= 1.292 CO= 0.000 GUTTER FLOW= 1.292
GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT
SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.66 (cfs) IS 7.26 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 13.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.12 SPREAD (ft) = 5.74

INLET NUMBER R6C LENGTH 6.0 STATION 15+00C

DRAINAGE AREA = 0.510 ACRES C VALUE = .300 CA = 0.153
DRAINAGE AREA = 0.090 ACRES C VALUE = .900 CA = 0.081
SUM CA= 0.234 INT= 3.50 CFS= 0.819 CO= 0.000 GUTTER FLOW= 0.819

GUTTER SLOPE = 0.0110 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
3.85	2.0	0.52	0.0833	4.0	0.96	3.5	0.146	0.160

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 5.8 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.82 CFS CARRYOVER= 0.00

INLET NUMBER R5G LENGTH 10.0 STATION 20+50E

DRAINAGE AREA = 0.320 ACRES C VALUE = .300 CA = 0.096
DRAINAGE AREA = 0.220 ACRES C VALUE = .900 CA = 0.198
SUM CA= 0.294 INT= 3.50 CFS= 1.029 CO= 0.000 GUTTER FLOW= 1.029

GUTTER SLOPE = 0.0488 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
2.21	2.0	0.90	0.0833	4.0	1.00	3.5	0.146	0.167

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 9.7 EFFICIENCY= 1.00
CFS INTERCEPTED= 1.03 CFS CARRYOVER= 0.00

INLET NUMBER R5 LENGTH 8.0 STATION 20+90E

DRAINAGE AREA = 0.380 ACRES C VALUE = .300 CA = 0.114
DRAINAGE AREA = 0.020 ACRES C VALUE = .900 CA = 0.018
DRAINAGE AREA = 0.320 ACRES C VALUE = .300 CA = 0.096
DRAINAGE AREA = 0.030 ACRES C VALUE = .900 CA = 0.027

FOR THE FIRST SIDE
SUM CA= 0.132 INT= 3.50 CFS= 0.462 CO= 0.000 GUTTER FLOW= 0.462
FOR THE OTHER SIDE
SUM CA= 0.123 INT= 3.50 CFS= 0.430 CO= 0.000 GUTTER FLOW= 0.430
AT THE INLET

SUM CA= 0.255 INT= 3.50 CFS= 0.892 CO= 0.000 GUTTER FLOW= 0.892

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.46 (cfs) IS 5.95 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.10 SPREAD (ft) = 4.99

INLET NUMBER R5A LENGTH 8.0 STATION 21+50E

DRAINAGE AREA = 0.970 ACRES C VALUE = .300 CA = 0.291
DRAINAGE AREA = 0.120 ACRES C VALUE = .900 CA = 0.108
SUM CA= 0.399 INT= 3.50 CFS= 1.396 CO= 0.000 GUTTER FLOW= 1.396

GUTTER SLOPE = 0.0147 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
5.13	2.0	0.39	0.0833	4.0	0.88	3.5	0.146	0.149

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 8.3 EFFICIENCY= 1.00
CFS INTERCEPTED= 1.39 CFS CARRYOVER= 0.00

INLET NUMBER R5C LENGTH 6.0 STATION 25+50E

DRAINAGE AREA = 0.500 ACRES C VALUE = .300 CA = 0.150
DRAINAGE AREA = 0.070 ACRES C VALUE = .900 CA = 0.063
SUM CA= 0.213 INT= 3.50 CFS= 0.745 CO= 0.000 GUTTER FLOW= 0.745

GUTTER SLOPE = 0.0188 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
2.69	2.0	0.74	0.0833	4.0	1.00	3.5	0.146	0.166

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 6.4 EFFICIENCY= 0.99
CFS INTERCEPTED= 0.74 CFS CARRYOVER= 0.01

INLET NUMBER R5D LENGTH 8.0 STATION 26+00E

DRAINAGE AREA = 0.310 ACRES C VALUE = .300 CA = 0.093
DRAINAGE AREA = 0.020 ACRES C VALUE = .900 CA = 0.018
DRAINAGE AREA = 0.270 ACRES C VALUE = .300 CA = 0.081
DRAINAGE AREA = 0.020 ACRES C VALUE = .900 CA = 0.018

FOR THE FIRST SIDE
SUM CA= 0.111 INT= 3.50 CFS= 0.389 CO= 0.010 GUTTER FLOW= 0.398
FOR THE OTHER SIDE
SUM CA= 0.099 INT= 3.50 CFS= 0.347 CO= 0.000 GUTTER FLOW= 0.347
AT THE INLET

SUM CA= 0.210 INT= 3.50 CFS= 0.735 CO= 0.010 GUTTER FLOW= 0.745

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT
SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.40 (cfs) IS 5.43 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.09 SPREAD (ft) = 4.42

INLET NUMBER R5E LENGTH 6.0 STATION 26+50E

DRAINAGE AREA = 0.500 ACRES C VALUE = .300 CA = 0.150
DRAINAGE AREA = 0.060 ACRES C VALUE = .900 CA = 0.054
SUM CA= 0.204 INT= 3.50 CFS= 0.714 CO= 0.000 GUTTER FLOW= 0.714
GUTTER SLOPE = 0.0170 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
2.72	2.0	0.74	0.0833	4.0	0.99	3.5	0.146	0.166

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 6.1 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.71 CFS CARRYOVER= 0.00

INLET NUMBER R5H LENGTH 8.0 STATION 21+75D

DRAINAGE AREA = 0.140 ACRES C VALUE = .300 CA = 0.042
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
DRAINAGE AREA = 0.010 ACRES C VALUE = .900 CA = 0.009
FOR THE FIRST SIDE
SUM CA= 0.132 INT= 3.50 CFS= 0.462 CO= 0.000 GUTTER FLOW= 0.462
FOR THE OTHER SIDE
SUM CA= 0.009 INT= 3.50 CFS= 0.031 CO= 0.000 GUTTER FLOW= 0.031
AT THE INLET

SUM CA= 0.141 INT= 3.50 CFS= 0.493 CO= 0.000 GUTTER FLOW= 0.493

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.46 (cfs) IS 5.95 (ft.)
XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.07 SPREAD (ft) = 3.36

INLET NUMBER R5I LENGTH 8.0 STATION 21+75D

DRAINAGE AREA = 0.210 ACRES C VALUE = .300 CA = 0.063
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
DRAINAGE AREA = 0.090 ACRES C VALUE = .300 CA = 0.027
DRAINAGE AREA = 0.040 ACRES C VALUE = .900 CA = 0.036

FOR THE FIRST SIDE
SUM CA= 0.153 INT= 3.50 CFS= 0.535 CO= 0.000 GUTTER FLOW= 0.535
FOR THE OTHER SIDE
SUM CA= 0.063 INT= 3.50 CFS= 0.221 CO= 0.000 GUTTER FLOW= 0.221
AT THE INLET

SUM CA= 0.216 INT= 3.50 CFS= 0.756 CO= 0.000 GUTTER FLOW= 0.756

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.54 (cfs) IS 6.47 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 11.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.09 SPREAD (ft) = 4.46

INLET NUMBER R5J LENGTH 6.0 STATION 28+25E

DRAINAGE AREA = 0.110 ACRES C VALUE = .300 CA = 0.033
DRAINAGE AREA = 0.070 ACRES C VALUE = .900 CA = 0.063
SUM CA= 0.096 INT= 3.50 CFS= 0.336 CO= 0.000 GUTTER FLOW= 0.336

GUTTER SLOPE = 0.0170 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
1.65	2.0	1.21	0.0833	4.0	1.00	3.5	0.146	0.167

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 4.4 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.34 CFS CARRYOVER= 0.00

INLET NUMBER R5K LENGTH 6.0 STATION 27+25E

DRAINAGE AREA = 0.260 ACRES C VALUE = .300 CA = 0.078
DRAINAGE AREA = 0.120 ACRES C VALUE = .900 CA = 0.108
SUM CA= 0.186 INT= 3.50 CFS= 0.651 CO= 0.000 GUTTER FLOW= 0.651

GUTTER SLOPE = 0.0170 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
2.43	2.0	0.82	0.0833	4.0	1.00	3.5	0.146	0.166

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 5.9 EFFICIENCY= 1.00
CFS INTERCEPTED= 0.65 CFS CARRYOVER= 0.00

INLET NUMBER R5L LENGTH 6.0 STATION 26+00E

DRAINAGE AREA = 0.130 ACRES C VALUE = .300 CA = 0.039
DRAINAGE AREA = 0.060 ACRES C VALUE = .900 CA = 0.054
DRAINAGE AREA = 0.200 ACRES C VALUE = .300 CA = 0.060
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090

FOR THE FIRST SIDE
SUM CA= 0.093 INT= 3.50 CFS= 0.325 CO= 0.000 GUTTER FLOW= 0.325
FOR THE OTHER SIDE
SUM CA= 0.150 INT= 3.50 CFS= 0.525 CO= 0.000 GUTTER FLOW= 0.525
AT THE INLET

SUM CA= 0.243 INT= 3.50 CFS= 0.850 CO= 0.000 GUTTER FLOW= 0.850

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT
SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.53 (cfs) IS 6.40 (ft.)
XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 9.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.11 SPREAD (ft) = 5.48

INLET NUMBER R4A LENGTH 10.0 STATION 20+25E

DRAINAGE AREA = 0.150 ACRES C VALUE = .300 CA = 0.045
DRAINAGE AREA = 0.310 ACRES C VALUE = .900 CA = 0.279
SUM CA= 0.324 INT= 3.50 CFS= 1.134 CO= 0.000 GUTTER FLOW= 1.134

GUTTER SLOPE = 0.0488 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
2.51	2.0	0.80	0.0833	4.0	1.00	3.5	0.146	0.166

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 10.2 EFFICIENCY= 1.00
CFS INTERCEPTED= 1.13 CFS CARRYOVER= 0.00

INLET NUMBER R4 LENGTH 10.0 STATION 20+75E

DRAINAGE AREA = 0.020 ACRES C VALUE = .300 CA = 0.006
DRAINAGE AREA = 0.040 ACRES C VALUE = .900 CA = 0.036
DRAINAGE AREA = 0.320 ACRES C VALUE = .300 CA = 0.096
DRAINAGE AREA = 0.100 ACRES C VALUE = .900 CA = 0.090
FOR THE FIRST SIDE
SUM CA= 0.042 INT= 3.50 CFS= 0.147 CO= 0.000 GUTTER FLOW= 0.147
FOR THE OTHER SIDE
SUM CA= 0.186 INT= 3.50 CFS= 0.651 CO= 0.000 GUTTER FLOW= 0.651
AT THE INLET
SUM CA= 0.228 INT= 3.50 CFS= 0.798 CO= 0.000 GUTTER FLOW= 0.798
GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT
SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.65 (cfs) IS 7.20 (ft.)
XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 13.60 H (ft) = 0.385
DEPTH OF WATER (ft) = 0.09 SPREAD (ft) = 4.16

Open Channel Analysis / Uniform Flow :
(USING MANNING'S EQUATION :)

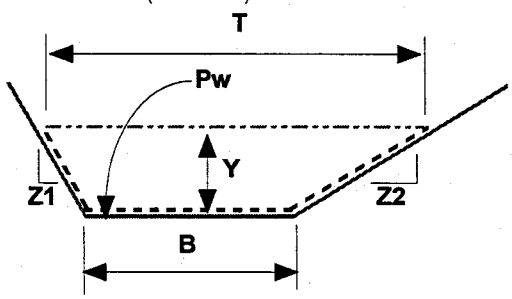
Project : Orchard Hill Subdivision
Location : Section IV D, StoneHouse
James City County, VA

$$Q = \frac{1.486 \cdot A \cdot (R_h)^{\frac{2}{3}} \cdot \sqrt{S_o}}{n}$$

$$R_h := \frac{A}{P_w}$$

A = Area of Flow Section
P_w = Wetted Perimeter
R_h = Hydraulic Radius

$$T := B + y \cdot (Z_1 + Z_2)$$



TRAPEZOIDAL, RECTANGULAR or VEE CHANNEL CROSS SECTION

Cross Section Designation :
ATTENUATION BASIN OUTFALL :

GIVEN :	**Design flow, Q_{DESIGN} =**	**24.6**	**cubic ft. / sec.**
	Bottom Width, B =	**0**	**feet**
	Channel Slope, S_o =	**0.019**	**feet / foot**
	Side Slopes, Z_1 =	**16**	**Run / Unit rise**
	Z_2 =	**22**	**Run / Unit rise**
	Manning's Coefficient, n =	**0.08**	

CALCULATE : Depth and Velocity, (Normal and Critical Flow):

T_n =	35.01	feet	Y_{Normal} =	**0.92**	**feet**
R_{hn} =	0.46	feet	V_{Normal} =	**1.53**	**f.p.s.**
T_c =	24.18	feet	$Y_{Critical}$ =	**0.64**	**feet**
R_{hc} =	0.32	feet	$V_{Critical}$ =	**3.20**	**f.p.s.**
			$S_{Critical}$ =	**0.1368**	**ft. / ft.**
			F =	**0.40**	

Subcritical Flow / Mild Slope

Cross Section Designation :
SECTION IVD SYSTEM "R" OUTFALL :

GIVEN :	**Design flow, Q_{DESIGN} =**	**27.5**	**cubic ft. / sec.**
	Bottom Width, B =	**0**	**feet**
	Channel Slope, S_o =	**0.02**	**feet / foot**
	Side Slopes, Z_1 =	**17.5**	**Run / Unit rise**
	Z_2 =	**22.5**	**Run / Unit rise**
	Manning's Coefficient, n =	**0.08**	

CALCULATE : Depth and Velocity, (Normal and Critical Flow):

T_n =	37.33	feet	Y_{Normal} =	**0.93**	**feet**
R_{hn} =	0.47	feet	V_{Normal} =	**1.58**	**f.p.s.**
T_c =	26.07	feet	$Y_{Critical}$ =	**0.65**	**feet**
R_{hc} =	0.33	feet	$V_{Critical}$ =	**3.24**	**f.p.s.**
			$S_{Critical}$ =	**0.1357**	**ft. / ft.**
			F =	**0.41**	

Subcritical Flow / Mild Slope

STORM SEWER DESIGN / RATIONAL METHOD 10 YEAR RETURN PERIOD

STONEHOUSE ORCHARD HILL SECTION IV D & E

Concrete Pipe,"n" = 0.013 Capacity @ 80% Full Depth

VDOT L&D 229		Area Drained	Run-off Coeff.	"C x A		Inlet Time	Time of Conc.	Rainfall intensity	RUNOFF	INVERT ELEVATIONS		LENGTH	SLOPE	DIAM	CAPACITY	VELOCITY	TRAVEL"t"	REMARKS
FROM PT. (1)	TO PT. (2)	"Acres" (3)	"C" (4)	INCR. (5)	ACCUM (6)	"t" *	"tc" (7)	"i" (8)	"QRational" (9)	UPPER END (10)	LOWER END (11)	ft. (12)	ft/ft (13)	inch (14)	cfs (15)	fps (16)	min. (17)	
		*	*							*	*	*		*				
STORM SYSTEM "R"																		
	R13	0.56	0.3	0.17														
		0.10	0.9	0.09	0.26	13.6	13.64	5.3	1.37									
R13	R12									111.65	111.00	60	0.0108	15	6.57	6.24	0.16	
	R12	0.46	0.3	0.14														
		0.03	0.9	0.03														
		0.49	0.3	0.15														
		0.12	0.9	0.11	0.68	10.4	13.81	5.3	3.58									
R12	R11									110.90	110.60	32	0.0094	15	6.11	5.81	0.09	
	R11A	0.30	0.3	0.09														
		0.13	0.9	0.12														
		0.38	0.3	0.11														
		0.13	0.9	0.12	0.44	8.94	13.90	5.3	2.31									
R11A	R11									113.50	111.70	185	0.0097	15	6.23	5.92	0.52	
	R11	0.30	0.3	0.09														
		0.13	0.9	0.12														
		0.38	0.3	0.11														
		0.13	0.9	0.12	1.55	18.6	19.38	4.5	7.05									
R11	R10									110.35	106.60	260	0.0144	18	12.33	8.14	0.53	
	R10	0.11	0.3	0.03														
		0.10	0.9	0.09	1.68	7.1	19.91	4.5	7.51									
R10	R9									106.35	104.85	107	0.0140	18	12.16	8.02	0.22	
	R9A	0.55	0.3	0.17														
		0.06	0.9	0.05	0.22	22.7	24.19	4.1	0.89									
R9A	R9									106.50	105.00	48	0.0313	15	11.16	10.61	0.08	
	R9	0.62	0.3	0.19														
		0.06	0.9	0.05														
		0.57	0.3	0.17														
		0.02	0.9	0.02	2.33	14.55	24.27	4.0	9.41									
R9	R8									104.75	103.85	32	0.0281	18	17.22	11.36	0.05	
	R8	0.22	0.3	0.07														
		0.08	0.9	0.07														
		0.18	0.3	0.05														
		0.09	0.9	0.08	2.60	16.18	24.31	4.0	10.50									
R8	R7									103.75	96.93	193	0.0353	18	19.30	12.74	0.25	
	R7	0.09	0.9	0.08	2.68	13.68	24.57	4.0	10.77									
R7	R6									96.83	96.53	40	0.0075	24	19.15	7.11	0.09	
	R6C	0.51	0.3	0.15														
		0.09	0.9	0.08	0.23	13.9	24.66	4.0	0.94									

STORM SEWER DESIGN / RATIONAL METHOD 10 YEAR RETURN PERIOD

STONEHOUSE ORCHARD HILL SECTION IV D & E

Concrete Pipe,"n" = 0.013 Capacity @ 80% Full Depth

VDOT L&D 229		Area Drained	Run-off Coeff.	"C x A		Inlet Time	Time of Conc.	Rainfall intensity	RUNOFF	INVERT ELEVATIONS		LENGTH	SLOPE	DIAM	CAPACITY	VELOCITY	TRAVEL"t"	REMARKS
FROM PT.	TO PT.	"Acres"	"C"	INCR.	ACCUM	"t"	"tc"	"i"	"QRational"	UPPER END	LOWER END	ft.	ft/ft	inch	cfs	fps	min.	
(1)	(2)	(3)	(4)	(5)	(6)	*	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
R6C	R6B									100.50	99.25	125	0.0100	15	6.31	6.00	0.35	
	R6B	0.51	0.3	0.15														
		0.04	0.9	0.04														
		0.45	0.3	0.14														
		0.05	0.9	0.05	0.60	11.17	25.01	4.0	2.40									
R6B	R6A									99.15	98.85	32	0.0094	15	6.11	5.81	0.09	
	R6A	0.33	0.3	0.10														
		0.14	0.9	0.13														
		0.29	0.3	0.09														
		0.13	0.9	0.12	1.03	11.17	25.10	4.0	4.10									
R6A	R6									98.75	97.75	100	0.0100	15	6.31	6.00	0.28	
R6	R5				3.71	0.00	25.66	3.9	14.57	96.43	89.23	240	0.0300	24	38.30	14.22	0.28	
	R5J	0.28	0.3	0.08														
		0.13	0.9	0.12	0.20	2.9	5.00	7.2	1.45									
R5J	R5I									94.40	93.40	50	0.0200	15	8.93	8.48	0.10	
	R5I	0.21	0.3	0.06														
		0.10	0.9	0.09														
		0.09	0.3	0.03														
		0.04	0.9	0.04	0.42	11.70	11.80	5.6	2.34									
R5I	R5H									93.30	93.00	40	0.0075	15	5.47	5.20	0.13	
	R5H	0.14	0.3	0.04														
		0.10	0.9	0.09														
		0.00	0.3	0.00														
		0.01	0.9	0.01	0.56	10.43	11.92	5.6	3.12									
R5H	R5F									92.90	92.65	50	0.0050	15	4.46	4.24	0.20	
	R5K	0.22	0.3	0.07														
		0.19	0.9	0.17	0.24	3.9	5.00	7.2	1.71									
R5K	R5F									92.55	92.23	40	0.0080	15	5.65	5.37	0.12	
R5F	R5E				0.80	0.00	12.45	5.5	4.38	92.13	91.38	75	0.0100	15	6.31	6.00	0.21	
	R5E	0.5	0.3	0.15														
		0.06	0.9	0.05	1.00	11.3	12.45	5.5	5.50									
R5E	R5D									91.00	90.60	50	0.0080	18	9.18	6.06	0.14	
	R5D	0.31	0.3	0.09														
		0.02	0.9	0.02														
		0.27	0.3	0.08														
		0.02	0.9	0.02	1.21	10.79	12.59	5.5	6.63									
	R5L	0.13	0.3	0.04														
		0.06	0.9	0.05														
		0.20	0.3	0.06														

STORM SEWER DESIGN / RATIONAL METHOD 10 YEAR RETURN PERIOD

STONEHOUSE ORCHARD HILL SECTION IV D & E

Concrete Pipe,"n" = 0.013 Capacity @ 80% Full Depth

VDOT L&D 229		Area Drained	Run-off Coeff.	"C x A		Inlet Time	Time of Conc.	Rainfall intensity	RUNOFF	INVERT ELEVATIONS		LENGTH	SLOPE	DIAM	CAPACITY	VELOCITY	TRAVEL"t"	REMARKS
FROM PT.	TO PT.	"Acres"	"C"	INCR.	ACCUM	"t"	"tc"	"i"	"QRational"	UPPER END	LOWER END	ft.	ft/ft	inch	cfs	fps	min.	
(1)	(2)	(3)	(4)	(5)	(6)	*	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
		0.10	0.9	0.09	0.24	15.56	15.56	5.0	1.22									
R5L	R5D									92.50	91.75	40	0.0188	15	8.65	8.22	0.08	
R5D	R5C				1.45	0.00	16.66	4.9	7.07	90.50	90.00	50	0.0100	18	10.27	6.77	0.12	
	R5C	0.5	0.3	0.15														
		0.07	0.9	0.06														
R5C	R5B				1.67	0.00	17.02	4.8	8.03	89.50	88.88	125	0.0050	24	15.64	5.80	0.36	
R5B	R5A									88.78	87.43	270	0.0050	24	15.61	5.79	0.78	
	R5A	0.97	0.3	0.29														
		0.12	0.9	0.11	2.06	17.1	19.34	4.5	9.37									
R5A	R5									87.33	87.00	55	0.0060	24	17.13	6.36	0.14	
	R5	0.38	0.3	0.11														
		0.02	0.9	0.02														
		0.32	0.3	0.10														
		0.03	0.9	0.03	2.32	11.68	19.49	4.5	10.49									
	R5G	0.32	0.3	0.10														
		0.22	0.9	0.20	0.29	11.2	19.49	4.5	1.33									
R5G	R5									90.00	89.00	40	0.0250	15	9.98	9.49	0.07	
R5	R4				6.32	0.00	28.16	3.7	23.57	86.90	85.64	42	0.0300	24	38.30	14.22	0.05	
	R4	0.38	0.3	0.11														
		0.02	0.9	0.02														
		0.32	0.3	0.10														
		0.03	0.9	0.03	6.58	7.10	28.16	3.7	24.52									
R4	R3				6.58	0.00	28.21	3.7	24.50	85.35	84.00	45	0.0300	24	38.30	14.22	0.05	
	R3	0.32	0.3	0.10														
		0.22	0.9	0.20	6.87	4.3	28.21	3.7	25.59									
R3	R2									83.90	79.25	155	0.0300	24	38.30	14.22	0.18	
R2	R1C				6.87	0.00	28.49	3.7	25.45	79.15	69.00	135	0.0752	24	60.63	22.50	0.10	
R1C	R1B				6.87	0.00	28.57	3.7	25.41	68.90	61.00	105	0.0752	24	60.65	22.51	0.08	
R1B	R1A				6.87	0.00	29.02	3.7	25.18	58.00	55.40	260	0.0100	30	40.09	9.52	0.46	
R1A	R1				6.87	0.00	29.13	3.7	25.13	55.30	54.70	60	0.0100	30	40.09	9.52	0.11	

INLET STATION	Outlet Water Surface	FRICTION LOSS IN PIPE						JUNCTION LOSS												H Adjusted	Inlet Water Surface Elevation	Rim Elevation
		D_o	Q_o	L_o	n_o	S_{fo}	H_f	V_o	H_o	Q_i	V_i	$Q_i \times V_i$	$V^2/2g$	H_i	Δ	H_{delta}	H_t	.3 x H_t	0.5 x H_t			
1	2	3	4	5	5A	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
STORM SYSTEM "R"																						
MH R1A	55.95	30	36.42	60	**0.013**	0.0079	0.473	9.44	0.35	36.42	9.44	344	1.38	0.48		0.00	0.83	0.25	-0.42	1.14	57.09	62.00
	R1																					
MH R1B	57.09	30	36.53	260	**0.013**	0.0079	2.062	9.44	0.35	36.53	20.62	753	6.60	2.31	34	2.11	4.77	1.43	-2.38	5.88	62.96	66.00
	R1A																					
MH R1C	62.96	24	37.04	105	**0.013**	0.0268	2.815	20.62	1.65	37.04	20.63	764	6.61	2.31	58	3.53	7.49	2.25	-3.75	8.81	71.77	74.00
	R1B																					
MH R2	71.77	24	37.13	135	**0.013**	0.0269	3.637	20.63	1.65	37.13	14.02	521	3.05	1.07	42	1.21	3.94	1.18	-1.97	6.78	78.56	90.00
	R1C																					
DI R3	78.56	24	37.45	155	**0.013**	0.0274	4.248	14.02	0.76	37.45	14.14	530	3.11	1.09	0	0.00	1.85	0.56	-0.93	5.73	84.29	95.18
	R2																					
DI R4	84.29	24	35.85	45	**0.013**	0.0251	1.130	14.14	0.78	35.85	14.08	505	3.08	1.08	86	2.10	3.96	1.19	-1.98	4.30	88.58	95.01
	R3																					
DI R5	88.58	24	34.51	42	**0.013**	0.0233	0.977	14.08	0.77	21.95	12.83	282	2.55	0.89	72	1.58	3.25	0.97	-1.62	3.58	92.16	95.19
	R4								R5G	1.89	6.36	12										
									R5A	13.36	6.14	82										
R5G	92.16	15	1.89	40	**0.013**	0.0009	0.034	6.36	0.16											0.03	92.19	95.04
	R5																					
R5A	92.16	24	13.36	55	**0.013**	0.0035	0.192	6.14	0.15	10.98	5.49	60	0.47	0.16	60	0.26	0.57	0.17	-0.28	0.65	92.80	95.97
	R5																					
R5B	92.80	24	10.98	270	**0.013**	0.0024	0.636	5.49	0.12	11.48	5.54	64	0.48	0.17	15	0.05	0.33	0.10	-0.17	0.90	93.70	98.95
	R5A																					
R5C	93.70	24	11.48	125	**0.013**	0.0026	0.322	5.54	0.12	10.01	6.77	68	0.71	0.25	0	0.00	0.37	0.11	-0.18	0.62	94.32	97.23
	R5B																					
R5D	94.32	18	10.01	50	**0.013**	0.0091	0.454	6.77	0.18	7.19	5.86	42	0.53	0.19	0	0.00	0.36	0.11	-0.18	0.75	95.07	97.01
	R5C								R5L	1.75	5.62	10										
R5L	95.07	15	1.75	40	**0.013**	0.0007	0.029	5.62	0.12											0.03	95.10	97.86
	R5D																					
R5E	95.07	18	7.19	50	**0.013**	0.0047	0.235	5.86	0.13	5.73	4.67	27	0.34	0.12	0	0.00	0.25	0.08	-0.13	0.44	95.50	97.15
	R5D																					
R5F	95.50	15	5.73	75	**0.013**	0.0079	0.590	4.67	0.08	4.02	4.20	17	0.27	0.10	0	0.00	0.18	0.05	-0.09	0.73	96.24	97.88
	R5E								R5K	1.71	4.10	7										
R5K	96.24	15	1.71	40	**0.013**	0.0007	0.028	4.10	0.07											0.03	96.26	97.86
	R5F																					
R5H	96.24	15	4.02	50	**0.013**	0.0039	0.194	4.20	0.07	3.00	4.64	14	0.33	0.12	50	0.16	0.34	0.10	-0.17	0.47	96.70	93.00
	R5F																					
R5I	96.70	15	3.00	40	**0.013**	0.0022	0.086	4.64	0.08	1.45	5.45	8	0.46	0.16	50	0.22	0.46	0.14	-0.23	0.46	97.16	97.76
	R5H																					
R5J	97.16	15	1.45	50	**0.013**	0.0005	0.025	5.45	0.12											0.03	97.19	98.86
	R5I																					
R6	92.16	24	21.95	240	**0.013**	0.0094	2.259	12.83	0.64	16.46	6.99	115	0.76	0.27	45	0.32	1.23	0.37	-0.61	3.24	95.40	104.12
	R5								R6A	6.22	6.00	37										
R6A	95.40	15	6.22	100	**0.013**	0.0093	0.928	6.00	0.14	3.65	5.30	19	0.44	0.15	90	0.31	0.60	0.18	-0.30	1.41	96.80	103.64
	R6																					
R6B	96.80	15	3.65	32	**0.013**	0.0032	0.102	5.30	0.11	1.43	4.23	6	0.28	0.10	90	0.19	0.40	0.12	-0.20	0.42	97.23	103.64
	R6A																					
R6C	97.23	15	1.43	125	**0.013**	0.0005	0.061	4.23	0.07													
	R6B																					
R7	95.40	24	16.46	40	**0.013**	0.0053	0.212	6.99	0.19	16.10	12.45	200	2.41	0.84	38	0.87	1.90	0.57	-0.95	1.73	97.13	103.92
	R6																					

INLET STATION	Outlet Water Surface	FRICTION LOSS IN PIPE						JUNCTION LOSS												H Adjusted	Inlet Water Surface Elevation	Rim Elevation
		D_o	Q_o	L_o	n_o	S_{fo}	H_f	V_o	H_o	Q_i	V_i	$Q_i \times V_i$	$V^2/2g$	H_i	Δ	H_{delta}	H_t	$.3 \times H_t$	$0.5 \times H_t$			
1	2	3	4	5	5A	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
R8	97.13	18	16.10	193	**0.013**	0.0235	4.534	12.45	0.60	14.43	11.12	160	1.92	0.67	38	0.69	1.96	0.59	-0.98	6.11	103.24	110.53
	R7																					
R9	103.24	18	14.43	32	**0.013**	0.0189	0.604	11.12	0.48	11.04	7.95	88	0.98	0.34	0	0.00	0.82	0.25	-0.41	1.26	104.50	110.53
	R8								R9A	1.36	6.27	9										
R9A	104.50	15	1.36	48	**0.013**	0.0004	0.021	6.27	0.15											0.02	104.52	110.75
	R9																					
R10	104.50	18	11.04	107	**0.013**	0.0110	1.182	7.95	0.25	10.44	7.97	83	0.99	0.35	90	0.69	1.28	0.38	-0.64	2.21	106.71	112.50
	R9																					
R11	106.71	18	10.44	260	**0.013**	0.0099	2.569	7.97	0.25	4.88	5.64	28	0.49	0.17	90	0.35	0.77	0.23	-0.38	3.18	109.89	115.28
	R10								R11A	3.15	5.17	16										
R11A	109.89	15	3.15	185	**0.013**	0.0024	0.441	5.17	0.10													
	R11																					
R12	109.89	15	4.88	32	**0.013**	0.0057	0.183	5.64	0.12	1.86	4.68	9	0.34	0.12	0	0.00	0.24	0.07	-0.12	0.38	110.27	115.28
	R11														0							
R13	110.27	15	1.86	60	**0.013**	0.0008	0.050	4.68	0.08											0.05	110.31	115.87
	R12														90							

PAVEMENT DESIGN

CALCULATIONS

FILE: SH IV D CHR 1
LANGLEY and McDONALD, P.C.
201 Packets Court
Williamsburg, Virginia 23185

PAVEMENT DESIGN
VHRC 73-R21

PROJECT: STONEHOUSE SEC TION IV D
LOCATION: James City Co., Virginia
STREET: CIDER HOUSE ROAD
FROM STA. 10+00 TO STA. 27+75
DATE: 28-Oct-97

TRAFFIC ANALYSIS

1. Vehicles Per Day = 910
2. % Heavy Traffic = 5 %
3. Equiv. Present ADT = 910
4. Design Period 20 Yrs.
5. % Growth = 0 %
6. Growth Factor = 1.00
7. V.P.D. Projection = 910 ADT

SUBGRADE ANALYSIS

1. CBR Values = 10.00 0
   0.00 0.00 0.00
2. Enter No. of Tests = 1
3. Average CBR = 10.00
4. Design CBR = 6.67
5. Soil Resiliency Factor = 3.00
6. Soil Support Value = 20.01

PAVEMENT DESIGN

1. Thickness Index Required = 13.5 inches
2. Design

ALT. 'A'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	1.67	0.0	0.0	#DIV/0!
Aggregate	1.00	0.0	0.0	
Sel. Material	0.60	0.0	0.0	
TOTAL		0.0	0.0	#DIV/0!

ALT. 'B'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	2.25	2.0	4.5	0.30
BM-2	2.25	3.0	6.8	0.45
Aggregate	0.60	6.0	3.6	
Sel. Material	0.40	0.0	0.0	
TOTAL		11.0	14.9	0.76

FILE: SH IV D CHR 2
LANGLEY and McDONALD, P.C.
201 Packets Court
Williamsburg, Virginia 23185

PAVEMENT DESIGN
VHRC 73-R21

PROJECT: STONEHOUSE SEC TION IV D
LOCATION: James City Co., Virginia
STREET: CIDER HOUSE ROAD
FROM STA. 27+75 TO STA. 30+16
DATE: 28-Oct-97

TRAFFIC ANALYSIS

1. Vehicles Per Day = 200
2. % Heavy Traffic = 5 %
3. Equiv. Present ADT = 200
4. Design Period 20 Yrs.
5. % Growth = 0 %
6. Growth Factor = 1.00
7. V.P.D. Projection = 200 ADT

SUBGRADE ANALYSIS

1. CBR Values = 10.00 0
   0.00 0.00 0.00
2. Enter No. of Tests = 1
3. Average CBR = 10.00
4. Design CBR = 6.67
5. Soil Resiliency Factor = 3.00
6. Soil Support Value = 20.01

PAVEMENT DESIGN

1. Thickness Index Required = 6.4 inches
2. Design

ALT. 'A'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	1.67	2.0	3.3	0.36
Aggregate	1.00	6.0	6.0	
Sel. Material	0.60	0.0	0.0	
TOTAL		8.0	9.3	0.36

ALT. 'B'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	2.25	0.0	0.0	#DIV/0!
BM-2	2.25	0.0	0.0	#DIV/0!
Aggregate	0.60	0.0	0.0	
Sel. Material	0.40	0.0	0.0	
TOTAL		0.0	0.0	#DIV/0!

FILE: SH IV D OGL
LANGLEY and McDONALD, P.C.
201 Packets Court
Williamsburg, Virginia 23185

PAVEMENT DESIGN
VHRC 73-R21

PROJECT: STONEHOUSE SEC TION IV D
LOCATION: James City Co., Virginia
STREET: OLD GROVE ROAD
FROM STA. 10+00 TO STA. 22+35
DATE: 28-Oct-97

TRAFFIC ANALYSIS

1. Vehicles Per Day = 910
2. % Heavy Traffic = 5 %
3. Equiv. Present ADT = 910
4. Design Period 20 Yrs.
5. % Growth = 0 %
6. Growth Factor = 1.00
7. V.P.D. Projection = 910 ADT

SUBGRADE ANALYSIS

1. CBR Values = 10.00 0
   0.00 0.00 0.00
2. Enter No. of Tests = 1
3. Average CBR = 10.00
4. Design CBR = 6.67
5. Soil Resiliency Factor = 3.00
6. Soil Support Value = 20.01

PAVEMENT DESIGN

1. Thickness Index Required = 13.5 inches
2. Design

ALT. 'A'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	1.67	0.0	0.0	#DIV/0!
Aggregate	1.00	0.0	0.0	
Sel. Material	0.60	0.0	0.0	
TOTAL		0.0	0.0	#DIV/0!

ALT. 'B'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	2.25	2.0	4.5	0.30
BM-2	2.25	3.0	6.8	0.45
Aggregate	0.60	6.0	3.6	
Sel. Material	0.40	0.0	0.0	
TOTAL		11.0	14.9	0.76

FILE: SH IV D TBD
LANGLEY and McDONALD, P.C.
201 Packets Court
Williamsburg, Virginia 23185

PAVEMENT DESIGN
VHRC 73-R21

PROJECT: STONEHOUSE SEC TION IV D
LOCATION: James City Co., Virginia
STREET: THREE BUSHEL DRIVE
FROM STA. 10+00 TO STA. 18+75
DATE: 28-Oct-97

TRAFFIC ANALYSIS

1. Vehicles Per Day = 230
2. % Heavy Traffic = 5 %
3. Equiv. Present ADT = 230
4. Design Period 20 Yrs.
5. % Growth = 0 %
6. Growth Factor = 1.00
7. V.P.D. Projection = 230 ADT

SUBGRADE ANALYSIS

1. CBR Values = 10.00 0
   0.00 0.00 0.00
2. Enter No. of Tests = 1
3. Average CBR = 10.00
4. Design CBR = 6.67
5. Soil Resiliency Factor = 3.00
6. Soil Support Value = 20.01

PAVEMENT DESIGN

1. Thickness Index Required = 7.5 inches
2. Design

ALT. 'A'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	1.67	2.0	3.3	0.36
Aggregate	1.00	6.0	6.0	
Sel. Material	0.60	0.0	0.0	
TOTAL		8.0	9.3	0.36

ALT. 'B'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	2.25	0.0	0.0	#DIV/0!
BM-2	2.25	0.0	0.0	#DIV/0!
Aggregate	0.60	0.0	0.0	
Sel. Material	0.40	0.0	0.0	
TOTAL		0.0	0.0	#DIV/0!

FILE: SH IV D GAW
LANGLEY and McDONALD, P.C.
201 Packets Court
Williamsburg, Virginia 23185

PAVEMENT DESIGN
VHRC 73-R21

PROJECT: STONEHOUSE SEC TION IV D
LOCATION: James City Co., Virginia
STREET: GREEN APPLE WAY
FROM STA. 10+00 TO STA. 18+81
DATE: 28-Oct-97

TRAFFIC ANALYSIS

1. Vehicles Per Day = 230
2. % Heavy Traffic = 5 %
3. Equiv. Present ADT = 230
4. Design Period 20 Yrs.
5. % Growth = 0 %
6. Growth Factor = 1.00
7. V.P.D. Projection = 230 ADT

SUBGRADE ANALYSIS

1. CBR Values = 10.00 0
   0.00 0.00 0.00
2. Enter No. of Tests = 1
3. Average CBR = 10.00
4. Design CBR = 6.67
5. Soil Resiliency Factor = 3.00
6. Soil Support Value = 20.01

PAVEMENT DESIGN

1. Thickness Index Required = 7.5 inches
2. Design

ALT. 'A'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	1.67	2.0	3.3	0.36
Aggregate	1.00	6.0	6.0	
Sel. Material	0.60	0.0	0.0	
TOTAL		8.0	9.3	0.36

ALT. 'B'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	2.25	0.0	0.0	#DIV/0!
BM-2	2.25	0.0	0.0	#DIV/0!
Aggregate	0.60	0.0	0.0	
Sel. Material	0.40	0.0	0.0	
TOTAL		0.0	0.0	#DIV/0!

FILE: SH IV D PC
LANGLEY and McDONALD, P.C.
201 Packets Court
Williamsburg, Virginia 23185

PAVEMENT DESIGN
VHRC 73-R21

PROJECT: STONEHOUSE SEC TION IV D
LOCATION: James City Co., Virginia
STREET: PLANTERS CROSSING
FROM STA. 10+00 TO STA. 19+15
DATE: 28-Oct-97

TRAFFIC ANALYSIS

1. Vehicles Per Day = 230
2. % Heavy Traffic = 5 %
3. Equiv. Present ADT = 230
4. Design Period 20 Yrs.
5. % Growth = 0 %
6. Growth Factor = 1.00
7. V.P.D. Projection = 230 ADT

SUBGRADE ANALYSIS

1. CBR Values = 10.00 0
   0.00 0.00 0.00
2. Enter No. of Tests = 1
3. Average CBR = 10.00
4. Design CBR = 6.67
5. Soil Resiliency Factor = 3.00
6. Soil Support Value = 20.01

PAVEMENT DESIGN

1. Thickness Index Required = 7.5 inches
2. Design

ALT. 'A'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	1.67	2.0	3.3	0.36
Aggregate	1.00	6.0	6.0	
Sel. Material	0.60	0.0	0.0	
TOTAL		8.0	9.3	0.36

ALT. 'B'

Material	Factor	Thickness	Index	% Asphalt
SM-2A	2.25	0.0	0.0	#DIV/0!
BM-2	2.25	0.0	0.0	#DIV/0!
Aggregate	0.60	0.0	0.0	
Sel. Material	0.40	0.0	0.0	
TOTAL		0.0	0.0	#DIV/0!

DEVELOPMENT MANAGEMENT

101-E MOUNTS BAY ROAD, P.O. BOX 8784, WILLIAMSBURG, VIRGINIA 23187-8784
(757) 253-6671 Fax: (757) 253-6850 E-MAIL: devtman@james-city.va.us

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codecomp@james-city.va.us

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(757) 253-6670
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PLANNING
(757) 253-6685
planning@james-city.va.us

COUNTY ENGINEER
(757) 253-6678

INTEGRATED PEST MANAGEMENT
(757) 253-2620

December 11, 2001

LandMark Design Group
4029 Ironbound Road
Williamsburg, Va. 23188
Attn: Mr. Peter Farrell

Re: Stonehouse Sec 4D Orchard Hill
Block Wall BMP at End of Ridge Drive
County BMP ID Code: WC 043

Dear Mr. Farrell:

The Environmental Division has reviewed a record drawing and construction certification as submitted to our office on November 16th 2000 for various stormwater management facilities located within Stonehouse. The record drawings and construction certifications provide as-built information for seven (7) extended detention stormwater management/BMP facilities located within the community. For simplicity, you will receive separate correspondence relative to each of the facilities.

Based on our review of information as submitted and a concurrent field observation as performed on August 29th 2001, the following items must be addressed for the basin at **Orchard Hill Sec 4D, End of Ridge Drive (WC 043)** prior to release of the developer's surety instrument for the stormwater management/BMP facility:

Construction Certification:

1. The construction certification dated November 15th 2000 is **satisfactory**.

Record Drawing:

2. Add details from Sheet 18 of the approved plan to the as-built (record) drawing for the facility. The inset plan and sections A-A and B-B show important information about the wall arrangement and weir wall and low orifice (outflow) configurations. Annotate the details as necessary with field-obtained construction information.

3. Label Ridge Drive at the cul-de-sac and add an address to Lot 31 for information purposes (3168 Ridge Drive).

4. Show the following additional information on the record drawing: dimensions and class of rock for the downstream outlet protection pad; and length of the concrete weir cells.

5. If possible, add the following County identifiers to the lower right hand corner of the record drawing: County Plan No. S-98-97 and BMP ID No. WC 043.

Construction-Related Items:

6. Remove silt fence present along the length of the downstream dam area.

7. Cap blocks were missing from the east and west portions of the dam along top of wall. Replace or repair missing concrete cap blocks as required along the full length of the block dam.

8. Remove cap blocks and any other debris present in the concrete spillway.

9. At the time of the inspection, the flap gate on the 8-inch pipe through the concrete weir wall was partially block half open. Fully open or fully close the flap gate in accordance with the provisions of the approved plan. *(Note: Based on a review of the plans/computations, the 8-inch orifice was not included in hydraulic routings for the basin. Therefore, it appears the 8-inch pipe/gate system is a backup appurtenance to be used for draining the BMP should it become necessary. Therefore, it appears the flap gate on the upstream side of the 8-inch pipe should normally be in a fully closed position.)*

10. Clean and remove accumulated sediment and vegetation from the upstream ends of the 4-inch low flow orifice and 8-inch backup drain. The 4-inch low flow orifice was about one-half blocked at the time of inspection. *(Note: Cleaning is only required in the immediate vicinity of the upstream ends of the pipes.)*

Once this work is satisfactorily completed, contact our office appropriately for reinspection. 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, Gerry Lewis, at 757-253-6672 if you have any further comments or questions.

Sincerely,

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

cc: James H. Bennett (via fax)

G:/SWMProg/Asbuilts/S9897.wc043

DEVELOPMENT MANAGEMENT

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INTEGRATED PEST MANAGEMENT
(757) 253-2620

December 11, 2001

Reinspect 4-14-03
Reinspect 7-7-03

LandMark Design Group
4029 Ironbound Road
Williamsburg, Va. 23188
Attn: Mr. Peter Farrell

Re: Stonehouse Sec 4D Orchard Hill
Block Wall BMP at End of Ridge Drive S-98-97
County BMP ID Code: WC 043

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Record Drawing:

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2-24-03 OK 3. Label Ridge Drive at the cul-de-sac and add an address to Lot 31 for information purposes (3168 Ridge Drive).

2-24-03 OK 4. Show the following additional information on the record drawing: dimensions and class of rock for the downstream outlet protection pad; and length of the concrete weir cells.

2-24-03 OK 5. If possible, add the following County identifiers to the lower right hand corner of the record drawing: County Plan No. S-98-97 and BMP ID No. WC 043.

Construction-Related Items:

6. ✓ NOT DONE Remove silt fence present along the length of the downstream dam area. OK 7-7-03

7. Cap blocks were missing from the east and west portions of the dam along top of wall. Replace or repair missing concrete cap blocks as required along the full length of the block dam. OK 7-7-03

8. Remove cap blocks and any other debris present in the concrete spillway. ✓ OK 7-7-03

9. ✓ 4-14-03 OK At the time of the inspection, the flap gate on the 8-inch pipe through the concrete weir wall was partially block half open. Fully open or fully close the flap gate in accordance with the provisions of the approved plan. *(Note: Based on a review of the plans/computations, the 8-inch orifice was not included in hydraulic routings for the basin. Therefore, it appears the 8-inch pipe/gate system is a backup appurtenance to be used for draining the BMP should it become necessary. Therefore, it appears the flap gate on the upstream side of the 8-inch pipe should normally be in a fully closed position.*)

10. Clean and remove accumulated sediment and vegetation from the upstream ends of the 4-inch low flow orifice and 8-inch backup drain. The 4-inch low flow orifice was about one-half blocked at the time of inspection. *(Note: Cleaning is only required in the immediate vicinity of the upstream ends of the pipes.)* ✓ OK 7-7-03 some minor debris

Once this work is satisfactorily completed, contact our office appropriately for reinspection. 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, Gerry Lewis, at 757-253-6672 if you have any further comments or questions.

Sincerely,

Scott J. Thomas

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

cc: James H. Bennett (via fax)

G:/SWMProg/Asbuilts/S9897.wc043

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December 11, 2001

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Attn: Mr. Peter Farrell

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Block Wall BMP at End of Ridge Drive
County BMP ID Code: WC 043

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4. Show the following additional information on the record drawing: dimensions and class of rock for the downstream outlet protection pad; and length of the concrete weir cells.

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Construction-Related Items:

6. Remove silt fence present along the length of the downstream dam area.

7. Cap blocks were missing from the east and west portions of the dam along top of wall. Replace or repair missing concrete cap blocks as required along the full length of the block dam.

8. Remove cap blocks and any other debris present in the concrete spillway.

9. At the time of the inspection, the flap gate on the 8-inch pipe through the concrete weir wall was partially block half open. Fully open or fully close the flap gate in accordance with the provisions of the approved plan. *(Note: Based on a review of the plans/computations, the 8-inch orifice was not included in hydraulic routings for the basin. Therefore, it appears the 8-inch pipe/gate system is a backup appurtenance to be used for draining the BMP should it become necessary. Therefore, it appears the flap gate on the upstream side of the 8-inch pipe should normally be in a fully closed position.)*

10. Clean and remove accumulated sediment and vegetation from the upstream ends of the 4-inch low flow orifice and 8-inch backup drain. The 4-inch low flow orifice was about one-half blocked at the time of inspection. *(Note: Cleaning is only required in the immediate vicinity of the upstream ends of the pipes.)*

Once this work is satisfactorily completed, contact our office appropriately for reinspection. 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, Gerry Lewis, at 757-253-6672 if you have any further comments or questions.

Sincerely,

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

cc: James H. Bennett (via fax)

G:/SWMProg/Asbuilts/S9897.wc043

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

Database Inventory No. (if known): WC 043

Name of Facility: Stonehouse SEC 4D Orchard Hill Common Lake Ridge Area BMP No.: 2 of 2 Date: 8/29/01

Location: Near (west) 3768 Ridge Drive (Remote at end of cul-de-sac)

Name of Owner: Stonehouse Limited Liability

Inspector: S.J. Thomas, J. Bachite

Type of Facility: Dry Ext Det – Block Wall Dam

Weather Conditions: Sunny, Hot, High 70's

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

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

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

Facility Item	O.K.	Routine	Urgent	Comments
Embankments and Side Slopes: Block wall w/ Geogrid; 12.5' wide; 8-10' High				
Grass Height	✓			None. Gravel Top w/ 1' cap Block
Vegetation Condition	✓			Good u/s and d/s
Tree Growth	✓			None along wall.
Erosion		✓		Remove SF D/S Dam Area. Minor erosion along west d/s for wall.
Trash & Debris	✓			None.
Seepage				
~~Fencing or Benches~~		✓	✓	(x) caps missing both wall sections. Wall bulgs no displaced sections
Interior Landscaping/Planted Areas: ☐ None ☐ Constructed Wetland/Shallow Marsh ☒ Naturally Established Vegetation				
Vegetated Conditions	✓			Trees about 50' from wall, weeds
Trash & Debris	✓			low grasses in pool area.
Floating Material	✓			
Erosion	✓			
Sediment	✓			1-2" deep @ low flow orif
Dead Plant	✓			
Aesthetics	✓			Natural
Other				
SF Lots & Roads				

Facility Item	O.K.	Routine	Urgent	Comments
Water Pools ☐ Permanent Pool (Retention Basin) ☑ Shallow Marsh (Detention Basin) ☐ None (Detention Basin)				
Shoreline Erosion	✓			Pool 6" deep.
Algae	✓			
Trash & Debris	✓			
Sediment		✓		1-2' deep at weir wall
Aesthetics	✓			
Other				
Inflow Stuctures (Describe Locations): 18" RCP 100' SW OF WEIR WALL. OP 20x10'				
Condition of Structure	✓			Good Slope.
Erosion	✓			
Trash and Debris	✓			
Sediment	✓			
Aesthetics	✓			
Other				
Principal Flow Control Structure - Intake, Riser, etc. (Describe Location): Conc. Weir WALL 18'W, 5½' BELOW TOD				
Condition of Structure	✓			Conc WALL O/L.
Corrosion	✓			
Trash and Debris		✓	✓	Remove SED 4" LOW FLOW. OPEN OR CLOSE FLAP GATE (½ OPEN)
Sediment		✓	✓	
Aesthetics	✓			
Other				4" DIP LOW FLOW ORIF, 8" DIP WITH FLAP
Principal Outlet Structure - Barrel, Conduit, etc. : None WEIR WALL TO 10x10 CONC SCRB.				
Condition of Structure	✓			
Settlement	✓			
Trash & Debris		✓		Remove TOP CAPS thrown into spillway
Sediment	✓			
Erosion	✓			
Other				
Emergency Spillway (Overflow): WEIR WALL 6' HIGH; 8" TH./TOD = 12' AT MIDDLE				
Vegetation	✓			None
Lining	✓			Conc.
Erosion	✓			None.
Trash & Debris	✓			None
Other				
WEIR WALL OK. WALL APPEARS STABLE + SOUND D/S AND U/S.				

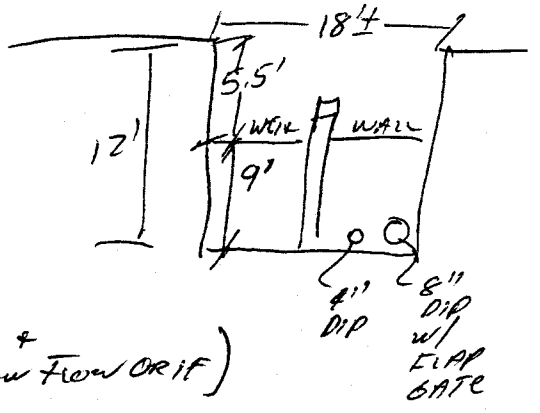
Facility Item	O.K.	Routine	Urgent	Comments
Nuisance Type Conditions:				
Mosquito Breeding	✓			None NOTICED.
Animal Burrows	✓			
Graffiti		✓		VANDALISM TOP DAM 1'x CAPS
Other				
Surrounding Perimeter Conditions: ALL SURROUNDING WOODS.				
Land Uses	✓			WOODS.
Vegetation	✓			
Trash & Debris	✓			
Aesthetics				NATURAL, REMOTE SETTING
Access /Maintenance Roads or Paths				10' GRAVEL FROM RIDGE RD TO WALL.
Other				

Remarks: ▷ Remove SF DS Area.

▷ Replace 1'x caps at full east end of top wall and east end of west wall. Caps were removed by vandals thrown into spillway & used to make steps at weir structure. Remove top caps thrown into spillway.

▷ Clean & Remove SED + THICK VEG AT 4" DIP Low Flow ORIF. ½ BLOCKED.

▷ Open or close 8" FLAP GATE PER PLAN WAS ½ open.



Overall Environmental Division Internal Rating: 3 (TOP CAPS + SED @ Low Flow ORIF)

(PHOTOS TAKEN)

Signature: Scott J Thomas P.E. **Date:** 08/29/01 11:50 Am

Title: Civil Eng Env DIV

SWMProg\BMP\CoInspProg\DetRet.wpd

WATERSHED	WC	MAINTENANCE PLAN	No	CTRL STRUC DESC	Conc Weir
BMP ID NO	043	SITE AREA acre	27.57	CTRL STRUC SIZE inches	264
PLAN NO	S-92-99	LAND USE	Res Planned Unit D	OTLT BARRL DESC	DIP
TAX PARCEL	(05-01)(07-1A)	old BMP TYP	Dry Pond	OTLT BARRL SIZE inch	4
PIN NO	0510700001A	JCC BMP CODE			
CONSTRUCTION DATE	11/16/2000	POINT VALUE	4	EMERG SPILLWAY	No
PROJECT NAME	Stonehouse Sec 4D Ph 1 Orchard Hill			DESIGN HW ELEV	53.29
FACILITY LOCATION	Behind (North of) 3168 Ridge Drive			PERM POOL ELE	na
CITY-STATE	Williamsburg, Va. 23011	SVC DRAIN AREA acres	63	2-YR OUTFLOW cfs	82.18
CURRENT OWNER	Stonehouse Limited Liability			10-YR OUTFLOW cfs	200.22
OWNER ADDRESS	P.O. Box 759			REC DRAWING	Yes
OWNER ADDRESS 2		SERVICE AREA DESCRI	SF Lots & Roads (4d & 5a)		
CITY-STATE-ZIP CODE	Toano, Va. 23168	IMPERV AREA acres	15.45	CONSTR CERTI	Yes
OWNER PHONE		RECV STREAM	UT of Ware Creek		
MAINT AGREEMENT	Yes	EXT DET-WQ-CTRL	Yes	LAST INSP DATE	8/29/2001
EMERG ACTION PLAN	No	WTR QUAL VOL acre-ft	1.45	INTERNAL RATING	3
		CHAN PROT CTRL	No	MISC/COMMENTS	
		CHAN PROT VOL acre-ft	0	Block Wall Dam in comm area end of Ridge Drive. SWM IV/VA "F". 24 det of 1" rf.	
		SW/FLOOD CONTROL	Yes		
		GEOTECH REPORT	No		

Get Last BMP No

Return to Menu

WATERSHED	WC	MAINTENANCE PLAN	No	CTRL STRUC DESC	Conc Weir
BMP ID NO	043	SITE AREA acre	27.57	CTRL STRUC SIZE inches	264
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CURRENT OWNER	Stonehouse Limited Liability			10-YR OUTFLOW cfs	200.22
OWNER ADDRESS	P.O. Box 759			REC DRAWING	Yes
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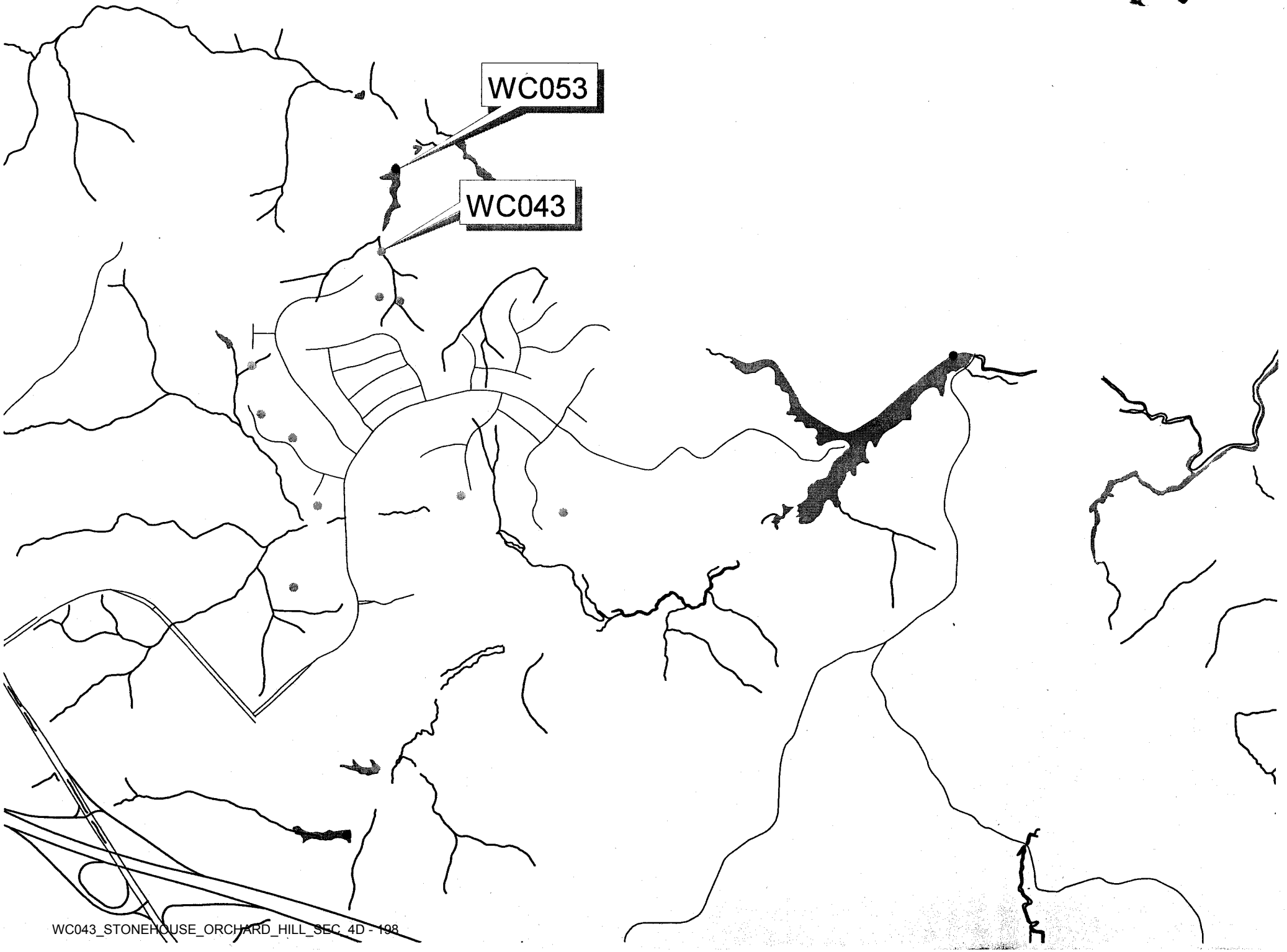
		CHAN PROT CTRL	No	MISC/COMMENTS	
		CHAN PROT VOL acre-ft	0	Block Wall Dam in comm area end of Ridge Drive. SWM IV/VA "F". 24 det of 1" rf.	
		SW/FLOOD CONTROL	Yes		
		GEOTECH REPORT	No		

Get Last BMP No

Return to Menu


WC053
WC043

SEC 4D PH 1

GPIN 0510700001A WC043

STONEHOUSE LIMITED LIAB
PO BOX 759
TIANO VA 23168
Common Area K-Z LAUREL RIDGE

LOCATION: NEAREST 3268 RIDGE DRIVE