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: **PC158**

DATE VERIFIED: **June 6, 2012**

QUALITY ASSURANCE TECHNICIAN: **Leah Hardenbergh**

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA

Stormwater Division

MEMORANDUM

DATE: February 24, 2010

TO: Michael J. Gillis, Virginia Correctional Enterprises Document Management Services

FROM: Jo Anna Ripley, Stormwater

PO: 270712

RE: Files Approved for Scanning

BMP ID or General File ID PC158

PIN: 3810100007

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

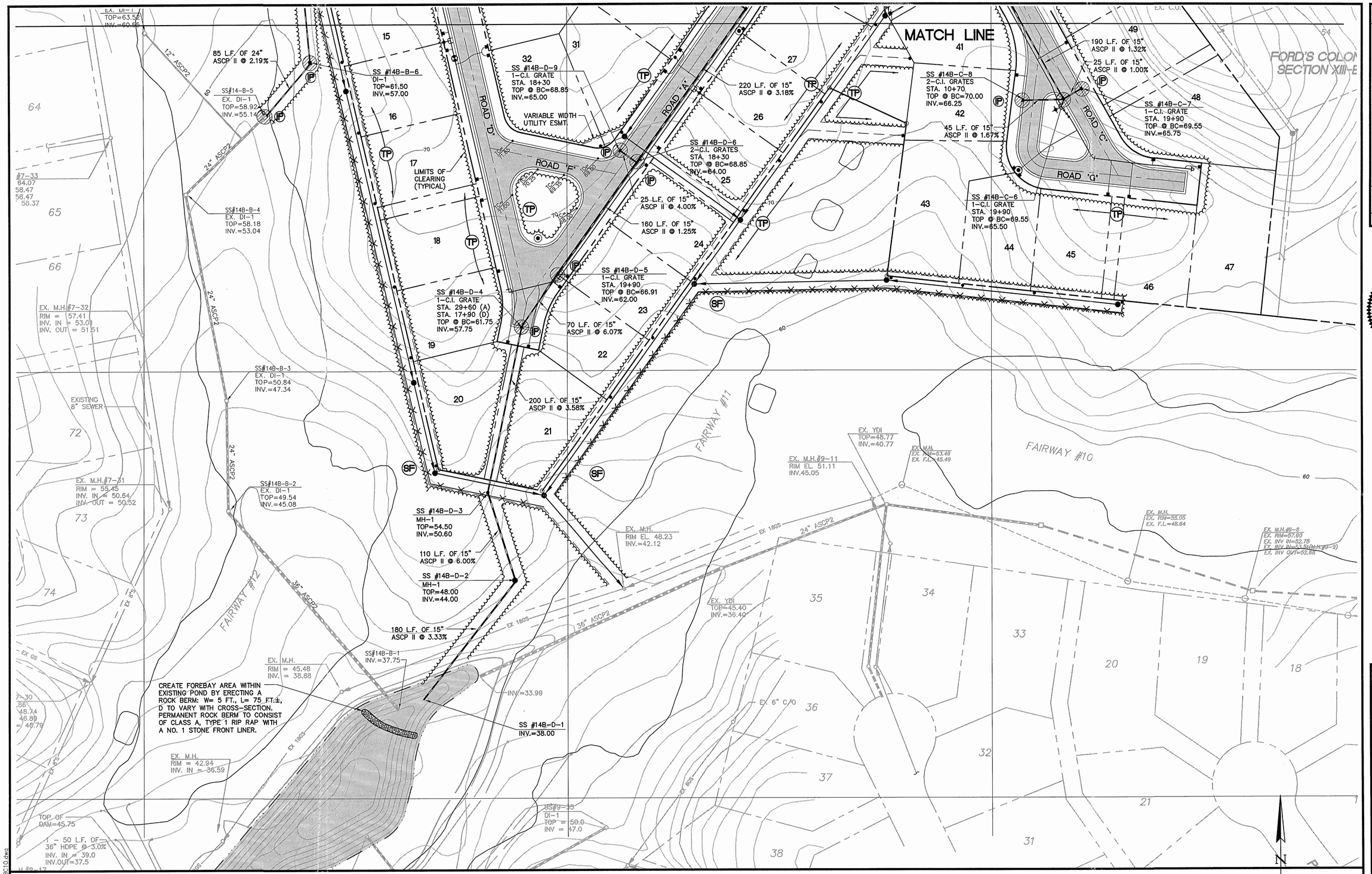
Property Description: Blue Heron Course Holes 5-13

Site Address:

(For internal use only) **Box:** FC001 **Drawer:** 1

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

Comments:



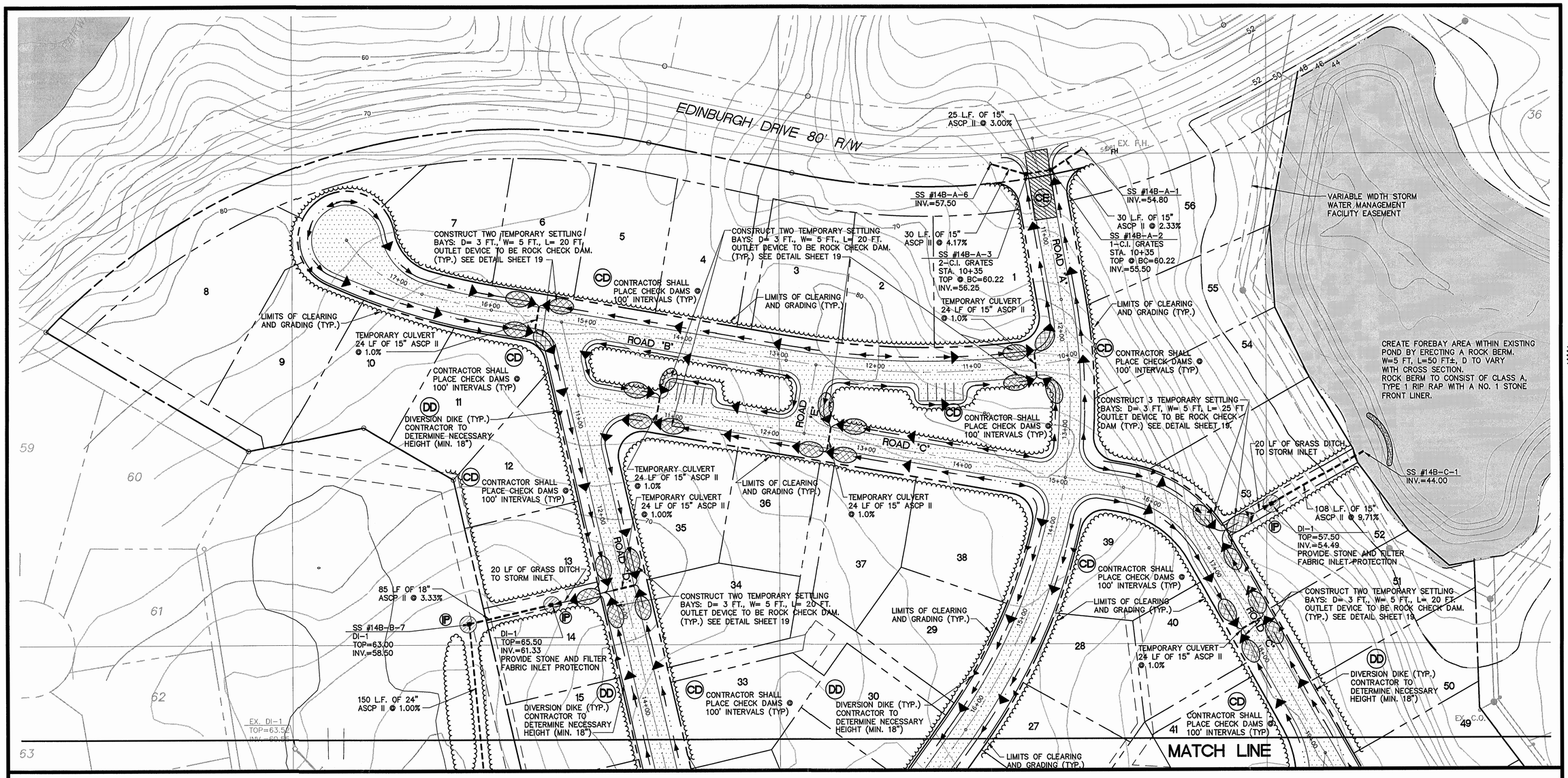
NOTE:
ALL STORM SEWER SYSTEM PIPE SHALL BE TYPE ASCP II OR APPROVED EQUAL N12 PLASTIC PIPE.

No.	DATE	REVISION / COMMENT / NOTE	BY
1	10/12/98	REVISED PER 10/98 JCC COMMENT LETTER	DPW

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

DRAINAGE AND EROSION AND SEDIMENT CONTROL PLAN
FORD'S COLONY AT WILLIAMSBURG
SECTION XIV-B, (LOTS 1 - 56)
OWNER / DEVELOPER : REALTEC INCORPORATED
BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
SOW/DPW	KEG
Scale	Date
1"=50'	8/25/98
Project No.	
5652-14B	
Drawing No.	
10	



NOTE:
ALL STORM SEWER SYSTEM PIPE SHALL BE TYPE ASCP II OR APPROVED EQUAL N12 PLASTIC PIPE.

NOTE:

TO ACHIEVE SALES ROAD STATUS CONTRACTOR TO:

1. ROUGH GRADE ROADWAYS TO DESIGN GRADES.
2. ON ALL ROADWAYS, ROUGH GRADE TEMPORARY ROADSIDE DITCHES AT APPROXIMATELY 15' OFFSET FROM CENTERLINE AND APPLY PERMANENT VEGETATION.
3. SURFACE ROADWAYS WITH APPROXIMATELY 2 INCHES OF CRUSHER RUN.
4. IMPLEMENT TEMPORARY DRAINAGE PLAN TO INCLUDE NECESSARY EROSION AND SEDIMENTATION CONTROL MEASURES.

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

No.	DATE	REVISION / COMMENT / NOTE	BY
1	10/12/98	REVISED PER 10/98 JCC COMMENT LETTER	DPW

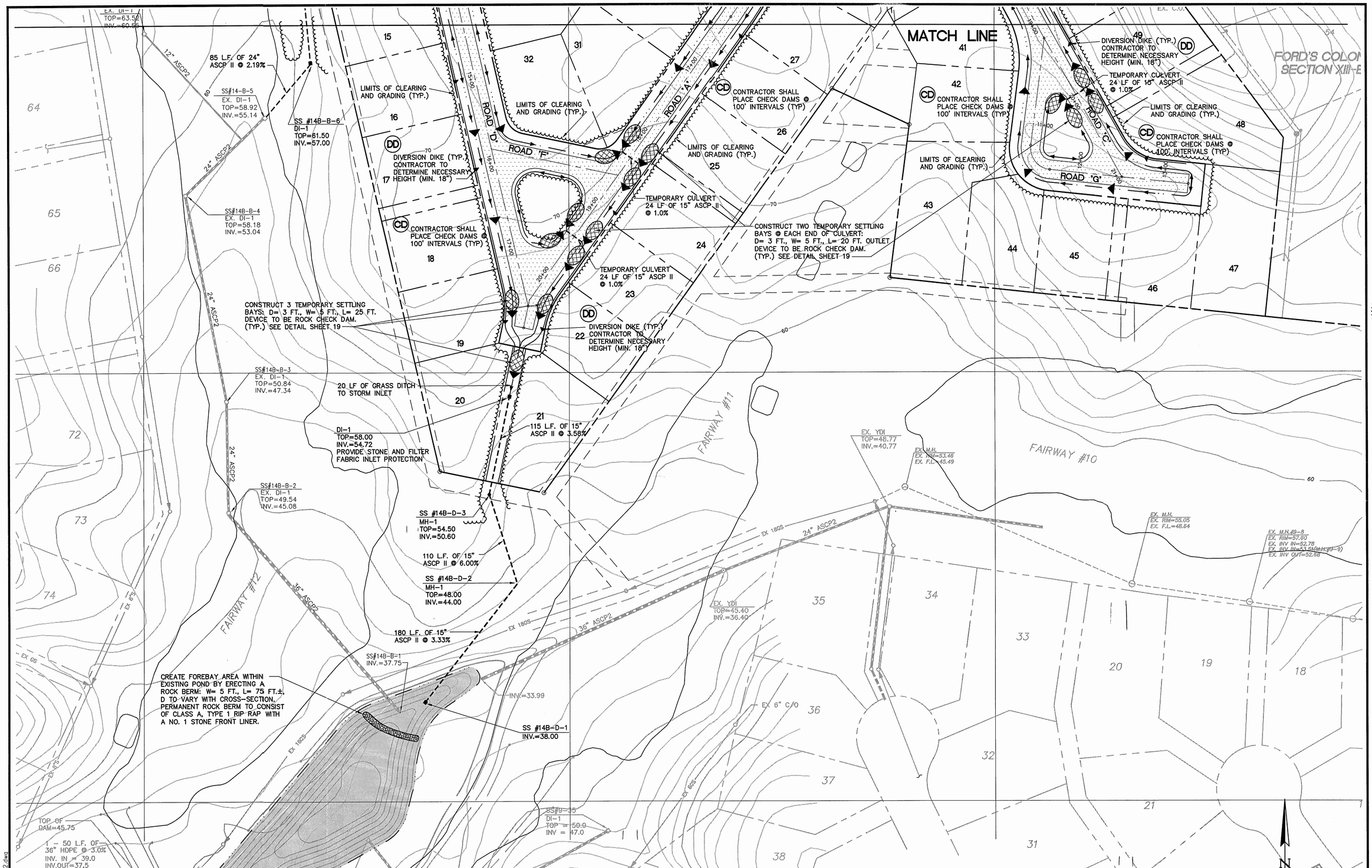
COMMONWEALTH OF VIRGINIA
STEVEN O. WIGLE
No. 019307
10/14/98
PROFESSIONAL ENGINEER

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

SALES ROAD AND TEMPORARY DRAINAGE PLAN
FORD'S COLONY AT WILLIAMSBURG
SECTION XIV-B, (LOTS 1 - 56)
OWNER / DEVELOPER : REALTEC INCORPORATED
BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
SOW/DPW	LBA
Scale	Date
1"=50'	8/26/98

Project No. 5652-14B
Drawing No. 11



NOTE:

TO ACHIEVE SALES ROAD STATUS CONTRACTOR TO:

1. ROUGH GRADE ROADWAYS TO DESIGN GRADES.
2. ON ALL ROADWAYS, ROUGH GRADE TEMPORARY ROADSIDE DITCHES AT APPROXIMATELY 15' OFFSET FROM CENTERLINE AND APPLY PERMANENT VEGETATION.
3. SURFACE ROADWAYS WITH APPROXIMATELY 2 INCHES OF CRUSHER RUN.
4. IMPLEMENT TEMPORARY DRAINAGE PLAN TO INCLUDE NECESSARY EROSION AND SEDIMENTATION CONTROL MEASURES.

NOTE:
ALL STORM SEWER SYSTEM PIPE SHALL BE TYPE ASCP II OR APPROVED EQUAL N12 PLASTIC PIPE.

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

No.	DATE	REVISION / COMMENT / NOTE	BY
1	10/12/98	REVISED PER 10/98 JCC COMMENT LETTER	DPW

COMMONWEALTH OF VIRGINIA
STEVEN O. WICKS
No. 019307
10/14/98
PROFESSIONAL ENGINEER

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

SALES ROAD AND TEMPORARY DRAINAGE PLAN

FORD'S COLONY AT WILLIAMSBURG

SECTION XIV-B, (LOTS 1 - 56)

OWNER / DEVELOPER : REALTEC INCORPORATED

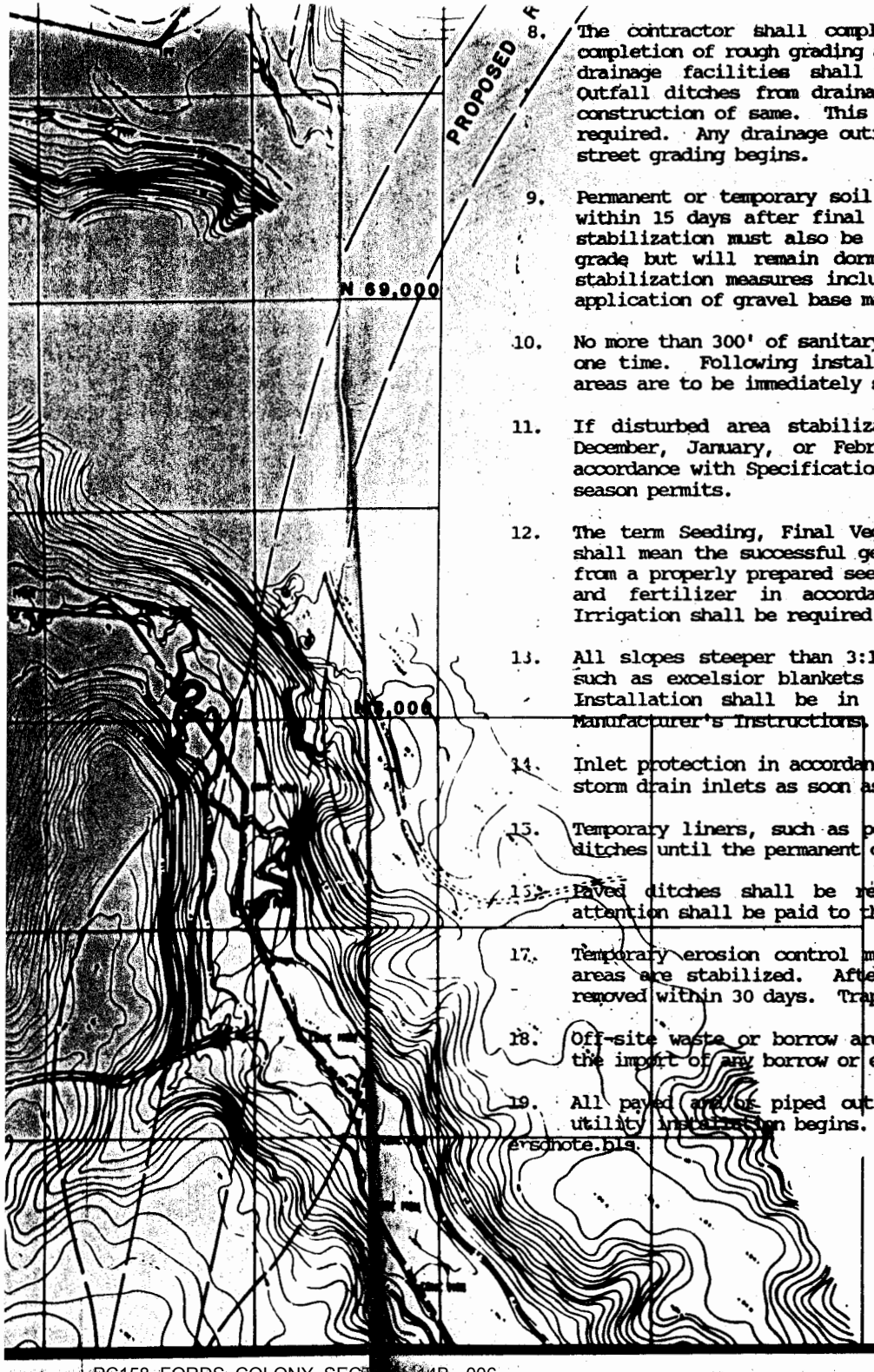
BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
SOW/DPW	LBA
Scale	Date
1"=50'	8/26/98

Project No. 5652-14B

Drawing No. 12

DPW 10.23.98-10:58 FC14BC12.dwg



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

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

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

11. If disturbed area stabilization is to be accomplished during the months of December, January, or February, stabilization shall consist of mulching in accordance with Specification 1.75. Seeding will then take place as soon as the season permits.

12. The term Seeding, Final Vegetative Cover or Stabilization, on this site plan shall mean the successful germination and establishment of a stable grass cover from a properly prepared seedbed containing the specified amounts of seed, lime, and fertilizer in accordance with Specification 1.66, Permanent Seeding. Irrigation shall be required as necessary to ensure establishment of grass cover.

13. All slopes steeper than 3:1 shall require the use of erosion control blankets such as excelsior blankets to aid in the establishment of a vegetative cover. Installation shall be in accordance with Specification 1.75, Mulching and Manufacturer's Instructions.

14. Inlet protection in accordance with Specification 1.08 shall be provided for all storm drain inlets as soon as practical following construction of same.

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

16. Paved ditches shall be required wherever erosion is evident. Particular attention shall be paid to those areas where grades exceed 3%.

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

18. Off-site waste or borrow areas shall be approved by James City County prior to the import of any borrow or export of any waste to or from the project site.

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

ersdnote.bls

PC 158; SP-69-88

SEDIMENT & EROSION CONTROL PLAN
WILLIAMSBURG WEST 9 HOLE GOLF COURSE
AND "THE LINKS" 9 HOLE GOLF COURSE

FORD'S COLONY @ WILLIAMSBURG

OWNER/DEVELOPER: FORD'S COLONY @ WILLIAMSBURG INC.

JAMES CITY COUNTY VIRGIN

SP-69-88

Designed	Drawn
LCA/AES	BB
Scale	Date
1"=400'	5/25/1988

Project No. 5652

Drawing No. 1 OF 2

HALFWAY HOUSE

S 51° 14'00"W, 782.00'

TEMPORARY DIVERSION

DV

N 45° 57'00"E, 820.32'

Y GOLF CART BRIDGE
(Separate site plan)

PC157

SF

S 10°31'00"E, 55.00'

100 YEAR FLOOD
PLAIN BOUNDARY

RR

PC156

N 04°31'00"W, 580.19'

RREL, H = 4.0' = 39 CFS PRINCIPAL
, D = 2.0' CONTROLLED BY BARREL,
SP = 3.33 (20 - .2) 1.5 = 66 CFS
REMAINDER OF FLOW @ DEPTH = 1.0'
CY SPILLWAY WITH JUTE MESH OR
ESTABLISH A GOOD INITIAL STAND

N 05°00'00"W, 504.00'

13

EMPORARY DIVERSION
UNOFF INTO
MENT BASIN

N 59°02'00"E
190.00'

S 25°07'00"W
717.00'

N 4°57'00"E, 600.00'

Δ = 24°13'00"
R = 972.26'
L = 411.12'
T = 191.42'

DISTURBED AREA (PREVIOUSLY
.70, TIME OF CONCENTRATION = 40
(122.74 AC) (8.30)(3.0) = 110.5

Δ = 29°03'00"
R = 553.26'
L = 282.92'

N83°15'00"E
280.00'

S59°02'00"W
190.00'

N 48°03'00"W
163.24'

Rp 380

Δ = 24°13'00"
R = 972.26'
L = 410.93'
T = 208.58'

S 83°15'00"W, 280.00'

264.00'

131.63'

N 61°12'00"E, 395.63'

395.63'

Δ = 22°03'00"
R = 473.26'
L = 182.13'
T = 92.21'

S 58°29'00"E,
90.00'

N 62°22'00"E, 120.00'

S 48°05'00"E, 87.07'

Δ = 13°42'18"
R = 473.26'
L = 113.20'
T = 56.87'

N 67°27'00"W
227.81'

N 28°34'00"W, 80.00'

ENTION BASIN INFORMATION
WITH VORTEX COLLAR (72" Ø,
WITH TOP INLET @ ELEVATION 26.0,
BARREL OUTLET WITH ES-2 END
= 23.0 INV OUT = 22.8 TOP OF DAM
28.0 PROVIDE PERFORATED RISER
R CLOTH AND BACKFILLED AROUND
R WITH # 1 STONE. PROVIDE
ARRON @ END SECTION.
SPILLWAY ALONG NORTH SIDE OF DAM
MERGENCY SPILLWAY TO BE 20' WIDE,

N 13°37'00"W, 786.00'

S 13°37'00"E, 941.12'

S 65°21'00"E
100.00

S 07°22'00"W
80.00'

N 11°55'00"W
655.00'

N 35°46'00"E
580.00'

DEVELOPMENT

S 78°10'00"E
125.00

DE SLOPE. CUT EMERGENCY SPILLWAY
OIL

N 85°

N INFORMATION
AC)(67 CY/AC)=649 CY.SEDIMENT VOLUME PROVIDED=1778 CY.
-VORTEX COLLAR (72" Ø, 12 GAUGE, 21" HIGH)
ATION 41.5 PROVIDE 60' OF 24" BARREL
CTION. INVERT @ RISER = 37.0, INV
.0, HIGH WATER = 43.3 PROVIDE PERFORATED
ER CLOTH AND BACKFILLED AROUND THE OUTSIDE
. PROVIDE 10' X 40' LONG RIPRAP APRON @
MERGENCY SPILLWAY ALONG SOUTHEAST SIDE OF
EMERGENCY SPILLWAY TO BE 20' WIDE, 1.5:
SLOPE. CUT EMERGENCY SPILLWAY INTO

N 81°42'00"W, 445.00'

S14°22'00"W, 125.00'

PC158

CD SF TEMPORAR
125' LONG
AND 3' DEE
ROCK CHE
(#1 STONE

FAMILY

, Q BARREL, H = 5.5' = 27 CFS,
CFS. EMERGENCY SPILLWAY MUST PASS

S 52°18'00"W, 555.00'

DEEP

65.9 CFS > 46.28 CFS THEREFORE

EMERGENCY SPILLWAY

N 41°31'00"
113.00'

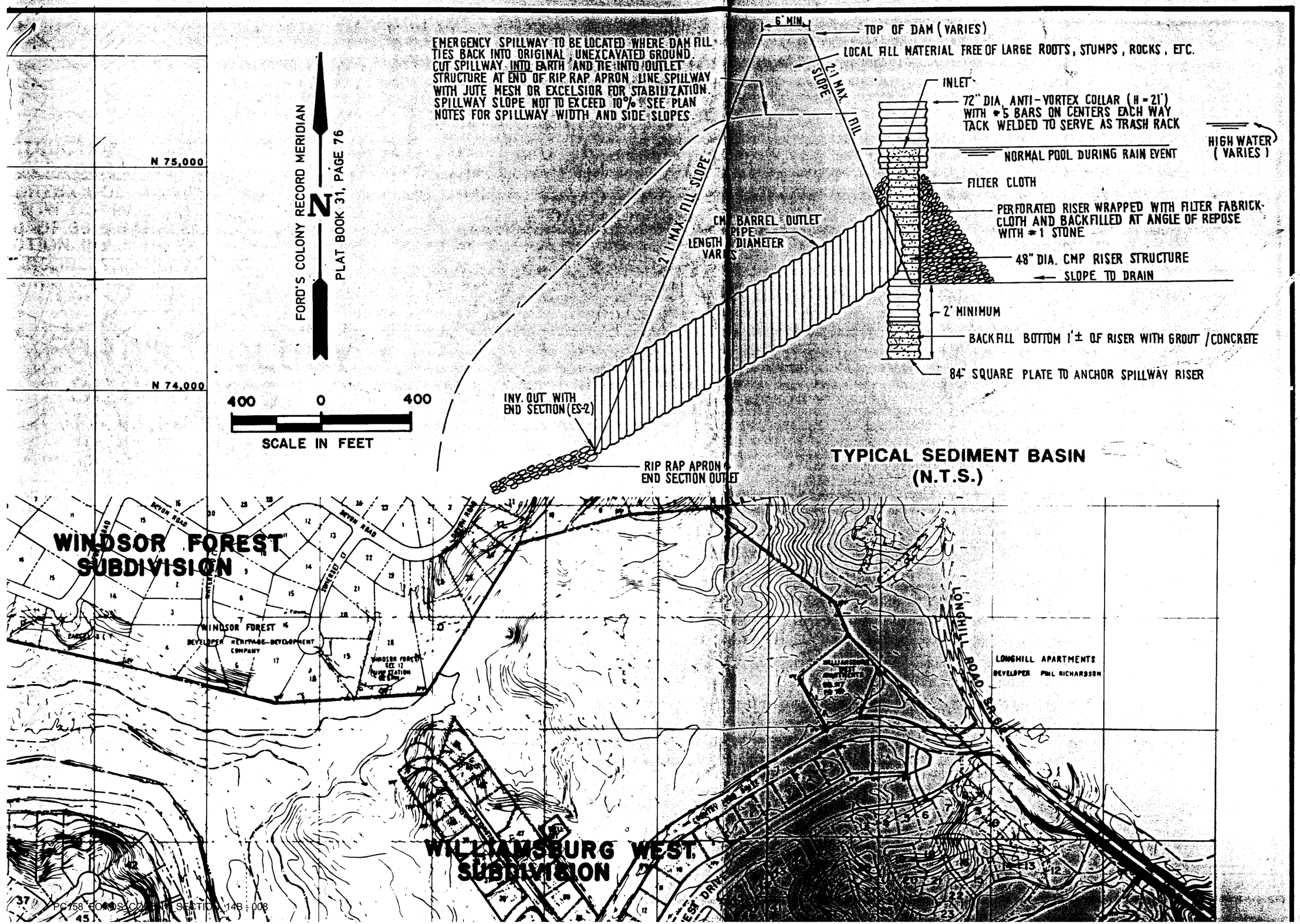
N 85°37'00"W, 125.00'

N 40°28'00"W, 132.00'

S 66°21'00"W, 80.00'

S 89°27'00"W, 252.00'

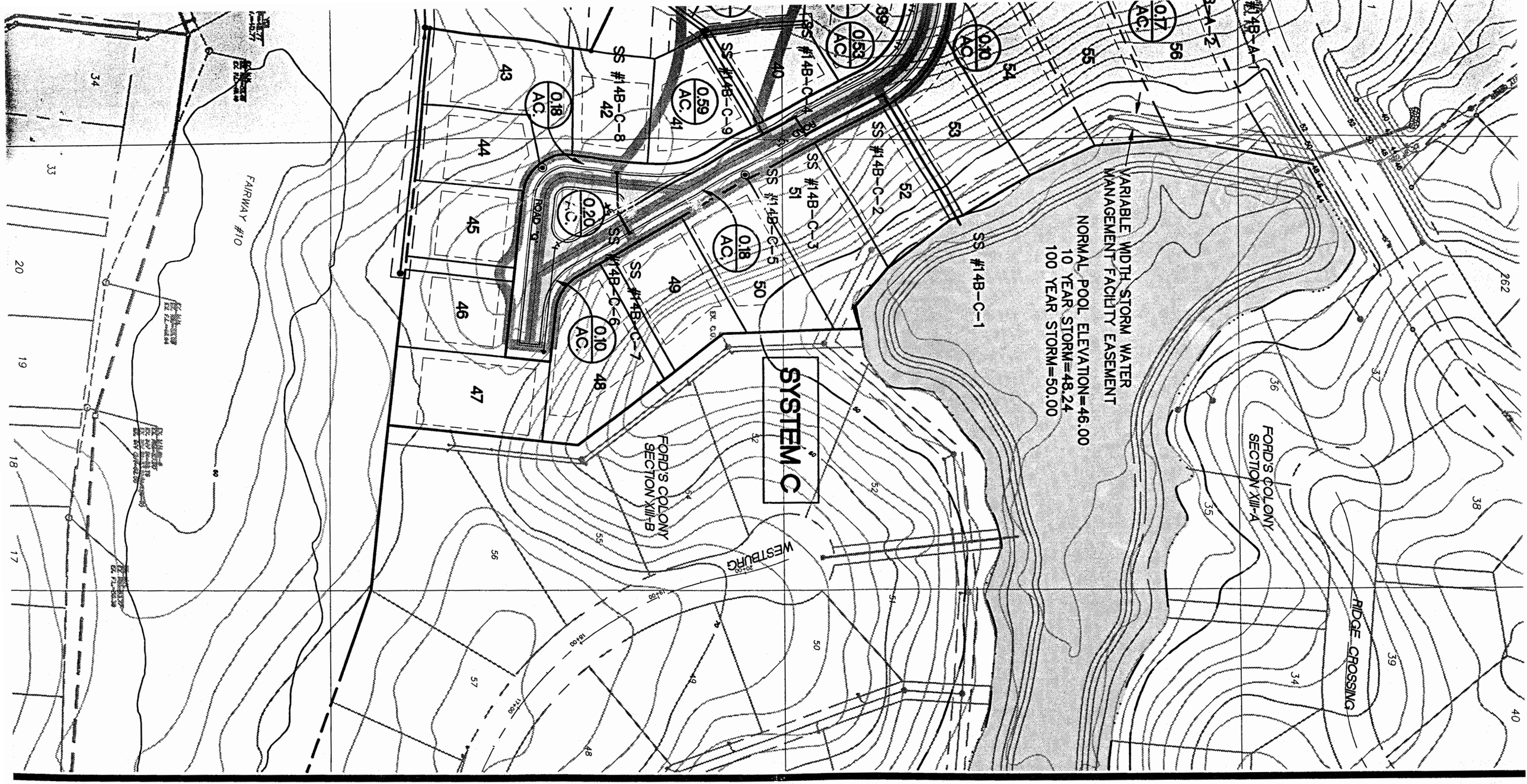
50,000 SF



No.	DATE	REVISION / COMMENT / NOTE	BY
1	6/27/88	REVISED PER JCC CODE COMPLIANCE REVIEW	JHB

COMMONWEALTH OF VIRGINIA
JAMES H. BENNETT
No. 018125
PROFESSIONAL ENGINEER

ssional corporation
estown Road
g, Virginia 23185
53-0040
Planning, Surveying



ERALL DRAINAGE PLAN

RD'S COLONY
WILLIAMSBURG

ION XIV-B, (LOTS 1 - 56)

LOPER: REALTEC INCORPORATED

JAMES CITY COUNTY VIRGINIA

CONSULTING ENGINEERS

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

COMMONWEALTH OF VIRGINIA
STEVEN O. WIGLEY
No. 019307
10/19/98
PROFESSIONAL ENGINEER

No.	DATE	REVISION
1	10/12/98	REVISED PER 10/9

SECTION VI
P.B.47,PG.59-64

FUTURE DEVELOPMENT

SYSTEM A

SYSTEM D

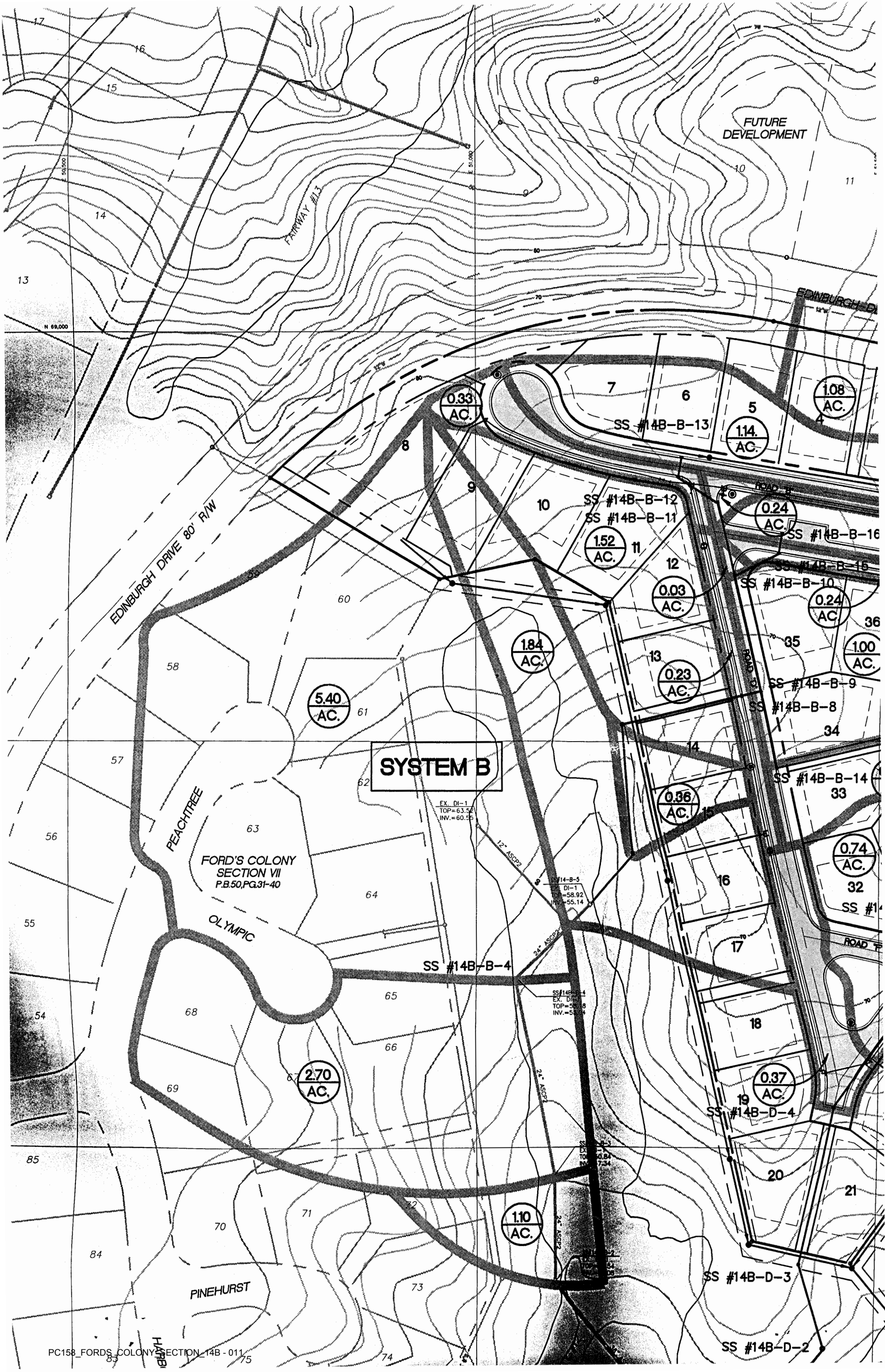
EDINBURGH DRIVE 80' R/W

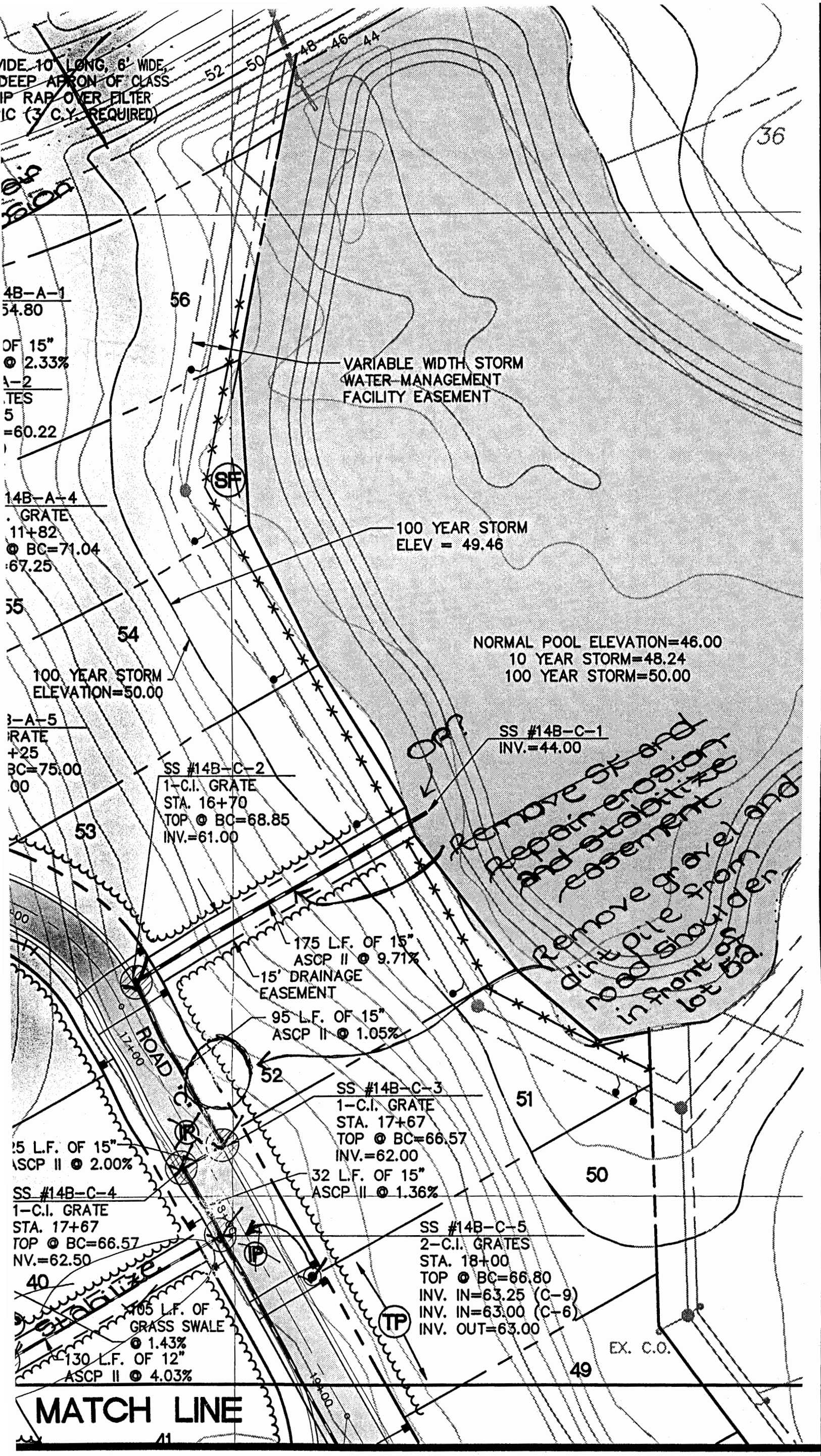
ROAD "A"
ROAD "B"
ROAD "C"
ROAD "D"
ROAD "E"
ROAD "F"

SS #14B-A-1
SS #14B-A-2
SS #14B-A-3
SS #14B-A-4
SS #14B-A-5
SS #14B-A-6
SS #14B-B-8
SS #14B-B-9
SS #14B-B-10
SS #14B-B-11
SS #14B-B-12
SS #14B-B-13
SS #14B-B-14
SS #14B-B-15
SS #14B-B-16
SS #14B-B-17
SS #14B-C-2
SS #14B-C-3
SS #14B-C-4
SS #14B-C-5
SS #14B-C-8
SS #14B-C-9
SS #14B-D-3
SS #14B-D-4
SS #14B-D-5
SS #14B-D-6
SS #14B-D-7
SS #14B-D-8
SS #14B-D-9

VARIABLE WIDTH S
MANAGEMENT FAC
NORMAL PO
10 YEA
100 YE

FAIRWAY #11
FAIRWAY #10


FUTURE DEVELOPMENT
FAIRWAY #13
EDINBURGH DRIVE 80' R/W
EDINBURGH DR
ROAD "B"
ROAD "D"
SS #14B-B-13
SS #14B-B-12
SS #14B-B-11
SS #14B-B-16
SS #14B-B-15
SS #14B-B-10
SS #14B-B-9
SS #14B-B-8
SS #14B-B-14
SS #14B-B-4
SS #14B-D-4
SS #14B-D-3
SS #14B-D-2
SYSTEM B
FORD'S COLONY SECTION VII P.B.50,PG.31-40
PEACHTREE
OLYMPIC
PINEHURST
0.33 AC.
1.08 AC.
1.14 AC.
0.24 AC.
1.52 AC.
0.03 AC.
0.24 AC.
1.84 AC.
1.00 AC.
0.23 AC.
5.40 AC.
0.36 AC.
0.74 AC.
2.70 AC.
0.37 AC.
1.10 AC.



No.	DATE	REVISION / COMMENT / NOTE
1	10/12/98	REVISED PER 10/98 JCC COMMENT LETTER

COMMONWEALTH OF VIRGINIA
STEVEN O. WIGLEY
No. 019307
10/19/98
PROFESSIONAL ENGINEER

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

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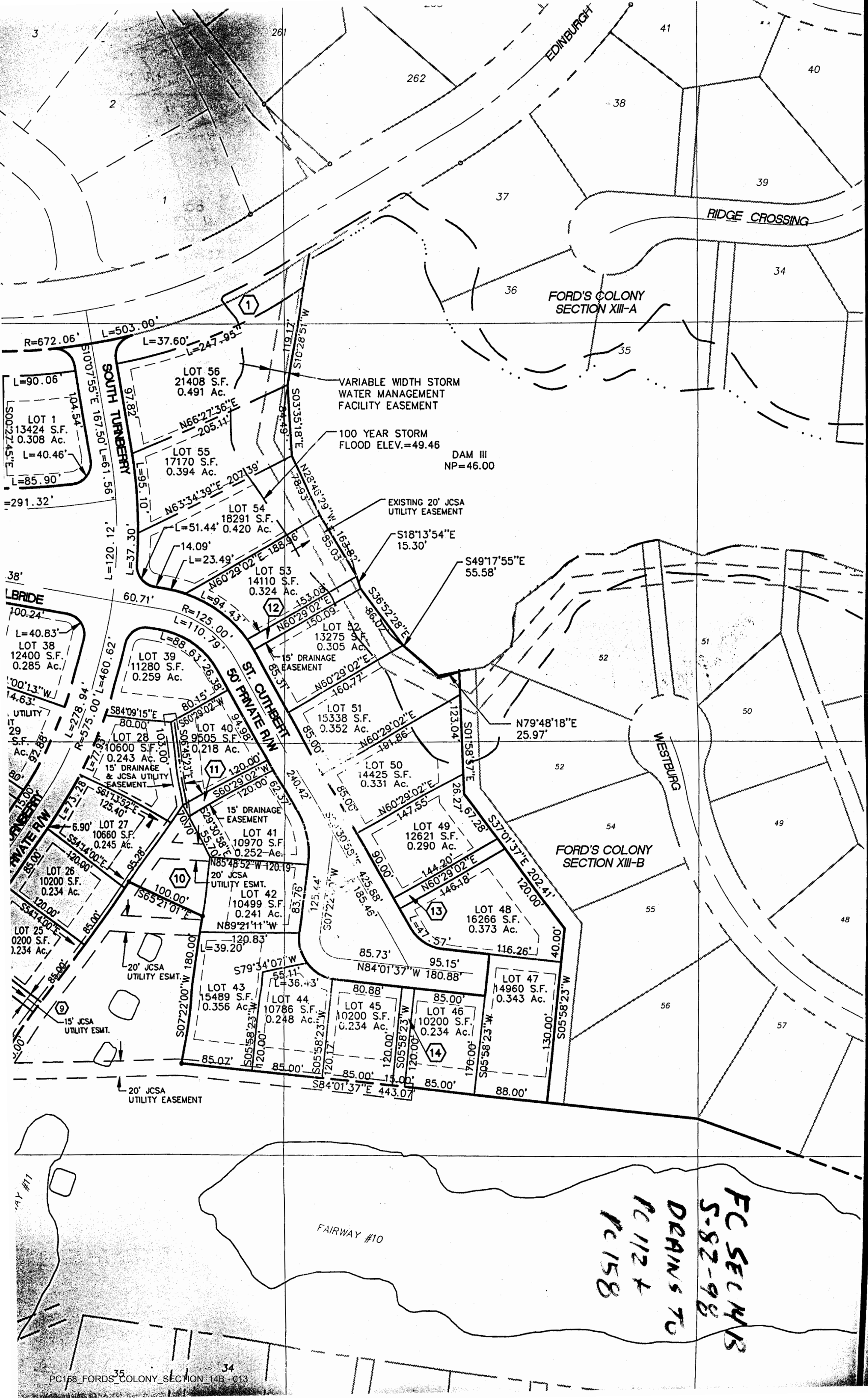
1 - 56)
INCORPORATED
VIRGINIA



EDINBURGH
RIDGE CROSSING
FORD'S COLONY SECTION XIII-A
FORD'S COLONY SECTION XIII-B
WESTBURG
SOUTH TURNBERRY
ST. CUTHBERT 50' PRIVATE R/W
VARIABLE WIDTH STORM WATER MANAGEMENT FACILITY EASEMENT
100 YEAR STORM FLOOD ELEV.=49.46
DAM III NP=46.00
EXISTING 20' JCSA UTILITY EASEMENT
15' DRAINAGE EASEMENT
15' DRAINAGE & JCSA UTILITY EASEMENT
20' JCSA UTILITY ESMT.
15' JCSA UTILITY ESMT.
20' JCSA UTILITY EASEMENT
LOT 1 13424 S.F. 0.308 Ac.
LOT 56 21408 S.F. 0.491 Ac.
LOT 55 17170 S.F. 0.394 Ac.
LOT 54 18291 S.F. 0.420 Ac.
LOT 53 14110 S.F. 0.324 Ac.
LOT 52 13275 S.F. 0.305 Ac.
LOT 51 15338 S.F. 0.352 Ac.
LOT 50 14425 S.F. 0.331 Ac.
LOT 49 12621 S.F. 0.290 Ac.
LOT 48 16266 S.F. 0.373 Ac.
LOT 47 14960 S.F. 0.343 Ac.
LOT 46 10200 S.F. 0.234 Ac.
LOT 45 10200 S.F. 0.234 Ac.
LOT 44 10786 S.F. 0.248 Ac.
LOT 43 15489 S.F. 0.356 Ac.
LOT 42 10499 S.F. 0.241 Ac.
LOT 41 10970 S.F. 0.252 Ac.
LOT 40 9505 S.F. 0.218 Ac.
LOT 39 11280 S.F. 0.259 Ac.
LOT 38 12400 S.F. 0.285 Ac.
LOT 28 10600 S.F. 0.243 Ac.
LOT 27 10660 S.F. 0.245 Ac.
LOT 26 10200 S.F. 0.234 Ac.
LOT 25 0200 S.F. 0.234 Ac.
S18°13'54"E 15.30'
S49°17'55"E 55.58'
N79°48'18"E 25.97'
S84°01'37"E 443.07'
N84°01'37"W 180.88'
FAIRWAY #10
FC SEC 14B S-82-98 DRAINS TO PC 112 + PC 158
NARY PLAT

FORDS COLONY

SECTION 14B

JOB NO. 5652-14B

SYSTEM A

prepared by:

AES CONSULTING ENGINEERS

5248 OLDE TOWNE RD,SUITE 1

WILLIAMSBURG, VA. 23188

DATE: 08/25/98

Return Period = 10 Yrs
Rainfall file: JCCN

Run Date: 08-25-1998
File: 565214BA.ST3

LINE 1 / Q = 5.83 / HT = 15 / WID = 15 / N = .011 / L = 30 / JLC = 1.2

SS#A-1 SS#A-2 / Outfall

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	55.43	7.53	54.80	9.44	56.81	15.00	-1.25	0.62
UPSTRM	56.13	7.53	55.50	9.44	57.51	15.00	3.47	0.62

Drainage area (ac) =	0.17	Slope of invert (%) =	2.3333
Runoff coefficient =	0.70	Slope energy grade line (%) =	2.3333
Time of conc (min) =	15.27	Critical depth (in) =	11.59
Inlet time (min) =	5.00	Natural ground elev. (ft) =	60.22
Intensity (in/hr) =	4.88	Upstream surcharge (ft) =	0.00
Cumulative C*A =	1.19	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	5.83	Line capacity (cfs) =	11.66
Q catchment (cfs) =	0.83	Inlet length (ft) =	0.00
Q carryover (cfs) =	6.17	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	7.00	Ponding width (ft) =	N/A

Note: Normal depth assumed

LINE 2 / Q = 5.26 / HT = 15 / WID = 15 / N = .011 / L = 25 / JLC = 1

SS#A-2 SS#A-3 / DNLN = 1

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	57.79	15.00	55.50	4.29	58.07	0.00	3.47	1.23
UPSTRM	57.91	15.00	56.25	4.29	58.19	0.00	2.72	1.23

Drainage area (ac) =	0.58	Slope of invert (%) =	3.0000
Runoff coefficient =	0.45	Slope energy grade line (%) =	0.4751
Time of conc (min) =	15.17	Critical depth (in) =	11.01
Inlet time (min) =	10.00	Natural ground elev. (ft) =	60.22
Intensity (in/hr) =	4.89	Upstream surcharge (ft) =	0.41
Cumulative C*A =	1.08	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	5.26	Line capacity (cfs) =	13.22
Q catchment (cfs) =	1.49	Inlet length (ft) =	0.00
Q carryover (cfs) =	4.68	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	6.17	Ponding width (ft) =	N/A

LINE 3 / Q = 2.25 / HT = 15 / WID = 15 / N = .011 / L = 145 / JLC = 1.1

SS#A-3 SS#A-4 / DNLN = 2

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	58.19	15.00	56.25	1.84	58.25	0.00	2.72	1.23
UPSTRM	67.85	7.21	67.25	3.87	68.08	14.99	2.54	0.58

Drainage area (ac) =	0.14	Slope of invert (%) =	7.5862
Runoff coefficient =	0.70	Slope energy grade line (%) =	6.7839
Time of conc (min) =	5.38	Critical depth (in) =	7.21
Inlet time (min) =	5.00	Natural ground elev. (ft) =	71.04
Intensity (in/hr) =	6.85	Upstream surcharge (ft) =	0.00
Cumulative C*A =	0.33	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	2.25	Line capacity (cfs) =	21.02
Q catchment (cfs) =	0.68	Inlet length (ft) =	0.00
Q carryover (cfs) =	1.61	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	2.29	Ponding width (ft) =	N/A

LINE 4 / Q = 1.61 / HT = 15 / WID = 15 / N = .011 / L = 60 / JLC = .9

SS#A-4 SS#A-5 / DNLN = 3

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	68.11	10.27	67.25	1.80	68.16	12.41	2.54	0.90
UPSTRM	71.67	6.09	71.00	3.44	71.86	14.73	2.75	0.47

Drainage area (ac) =	0.33	Slope of invert (%) =	6.2500
Runoff coefficient =	0.70	Slope energy grade line (%) =	6.1685
Time of conc (min) =	5.00	Critical depth (in) =	6.09
Inlet time (min) =	5.00	Natural ground elev. (ft) =	75.00
Intensity (in/hr) =	6.97	Upstream surcharge (ft) =	0.00
Cumulative C*A =	0.23	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	1.61	Line capacity (cfs) =	19.08
Q catchment (cfs) =	1.61	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.00	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	1.61	Ponding width (ft) =	N/A

LINE 5 / Q = 2.39 / HT = 15 / WID = 15 / N = .011 / L = 30 / JLC = .9

SS#A-3 SS#A-6 / DNLN = 2

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	58.19	15.00	56.25	1.95	58.25	0.00	2.72	1.23
UPSTRM	58.34	7.49	57.50	3.89	58.57	15.00	-1.25	0.61

Drainage area (ac)	= 1.08	Slope of invert (%)	= 4.1667
Runoff coefficient	= 0.45	Slope energy grade line (%)	= 0.3583
Time of conc (min)	= 15.00	Critical depth (in)	= 7.42
Inlet time (min)	= 15.00	Natural ground elev. (ft)	= 57.50
Intensity (in/hr)	= 4.91	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 0.49	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 2.39	Line capacity (cfs)	= 15.58
Q catchment (cfs)	= 2.39	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 0.00	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 2.39	Ponding width (ft)	= N/A

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

PROJECT [illegible]
PROJECT NO. [illegible]
SUBJECT SPREAD CALCULATIONS
SHEET NO. 1 OF 2
CALCULATED BY HWP DATE [illegible]

SYSTEM A

#A-2 STA 10+35 ROAD A (LT) GRADE

D.A = 0.17 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.42 CFS

$Q_T = \frac{0.56}{0.016}(48)(D)^{8/3}(.0736)^{1/2}$

D = 0.07' < 0.14' ok

$Q_i = KD^{5/3}$ K = 27

Q_i = 0.34 CFS < Q_T = 0.42 CFS

0.08 CFS BYPASS

#A-5 STA 10+25 ROAD B (LT) SUMP

D.A = 0.33 Ac C = 0.75 I = 3.5 in/hr

Q_T = 0.52 CFS

$Q_{in} = 3.3\,P(h)^{1.5}$ h = 0.14'

P = GRATE PERIMETER = 7.75'

Q_{in} = 1.34 CFS

Q_{in} = 1.34 CFS > Q_T = 0.52 CFS OK

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Williamsburg, Virginia 23188
(757) 253-0040
Fax: (757) 220-8994

PROJECT FORDS COLONY SEC. 14B
PROJECT NO. 5652-14B
SUBJECT SPREAD CALCULATIONS
SHEET NO. 2 OF 2
CALCULATED BY HWP DATE 8/22/98

SYSTEM A (CONT)

#A-4 STA 11+82 ROAD A (RT) GRADES

D.A.: 0.14 Ac C=0.70 I=3.5 in/hr

Q_T = 0.34 CFS

$Q_T = \frac{0.56}{.016}(48)(D)^{8/3}(.0736)^{1/2}$

D = 0.07' < 0.14' OK K=27

$Q_A = KD^{5/3}$ = 0.30 CFS < Q_T = 0.34 CFS

0.04 CFS BYPASS

#A-3 STA 10+35 ROAD A (RT) GRADES

D.A.: 0.58 Ac C=0.45 I=3.5 in/hr

Q_T = 0.91 CFS +0.04 CFS FROM A-4 = 0.95 CFS

$Q_T = \frac{0.56}{.016}(48)(D)^{8/3}(.0736)^{1/2}$

D = 0.16' < 0.14' OK K=27

$Q_A = KD^{5/3}$ = 0.55 CFS < Q_T = 0.91 CFS

USE 2 GRATES Q_A = 1.10 CFS > Q_T = 0.95 CFS OK

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Williamsburg, Virginia 23188
(757) 253-0040
Fax: (757) 220-8994

PROJECT [illegible]
PROJECT NO. [illegible]
SUBJECT SPREAD CALCULATIONS
SHEET NO. 1 OF 2
CALCULATED BY AWP DATE [illegible]/93

REVISED TO IDENTIFY SPREAD/DEPTH 10/98

SYSTEM A

#A-2 STA 10+35 ROAD A (LT) GRATE

D.A = 0.17 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.42 CFS

$Q_T = \frac{0.56}{0.016}(45)(D)^{8/3}(.0736)^{1/2}$

D = 0.07' < 0.14' OK

$Q_i = KD^{5/3}$ K = 27

Q_i = 0.34 CFS < Q_T = 0.42 CFS

0.08 CFS BYPASS

Spread:
D = 0.07' < 0.14'
OK

#A-5 STA 10+25 ROAD B (LT) SUMP

D.A. = 0.33 Ac C = 0.75 I = 3.5 in/hr

Q_T = 0.52 CFS

$Q_{IN} = 3.3P(h)^{1.5}$ h = 0.14'

P = GRATE PERIMETER = 7.75'

Q_{IN} = 1.34 CFS

Q_{IN} = 1.34 CFS > Q_T = 0.52 CFS OK

Spread:
$Q_T = 3.3P(h)^{1.5}$ h = D
$.53 = 3.3(7.75)(D)^{1.5}$
D = 0.08' < 0.14' OK

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

PROJECT FORDS COLONY, SEC. 14B
PROJECT NO. 5652-14B
SUBJECT SPREAD CALCULATIONS
SHEET NO. 2 OF 2
CALCULATED BY HWP DATE 8/22/98

SYSTEM A (CONT)

#A-4 STA 11+82 ROAD A (RT) GRADES

D.A.: 0.14 Ac C=0.70 I=3.5 in/hr

Q_T = 0.34 CFS

SPREAD: D=.07'<.14' OK

$Q_T = \frac{0.56}{.016}(48)(D)^{8/3}(.0736)^{1/2}$

D = 0.07' < 0.14' OK K=27

$Q_i = KD^{5/3}$ = 0.30 CFS < Q_T = 0.34 CFS

0.04 CFS BYPASS

#A-3 STA 10+35 ROAD A (RT) GRADES

D.A.: 0.58 Ac C=0.85 I=3.5 in/hr

Q_T = 0.91 CFS +0.04 CFS FROM A-4 = 0.95 CFS

$Q_T = \frac{0.56}{.016}(48)(D)^{8/3}(.0736)^{1/2}$

D = 0.10' < 0.14' OK K=27

$Q_i = KD^{5/3}$ = 0.55 CFS < Q_T = 0.91 CFS

USE 2 SLANTS Q_i = 1.10 CFS > Q_T = 0.95 CFS OK

SPREAD: D=.10' <.14' OK

FORDS COLONY

SECTION 14B

JOB NO. 5652-14B

SYSTEM B

prepared by:

AES CONSULTING ENGINEERS

5248 OLDE TOWNE RD,SUITE 1

WILLIAMSBURG, VA. 23188

DATE: 08/25/98

Return Period = 10 Yrs
Rainfall file: JCCN

Run Date: 08-25-1998
File: 565214BB.ST3

LINE 1 / Q = 34.02 / HT = 36 / WID = 36 / N = .011 / L = 305 / JLC = 1.1

SS#B-1 SS#B-2 / Outfall

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	43.00	36.00	37.75	4.81	43.36	0.00	-2.75	7.07
UPSTRM	46.94	22.30	45.08	7.40	47.79	34.96	1.45	4.60

Drainage area (ac)	= 1.10	Slope of invert (%)	= 2.4033
Runoff coefficient	= 0.30	Slope energy grade line (%)	= 1.4518
Time of conc (min)	= 15.99	Critical depth (in)	= 22.30
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 49.54
Intensity (in/hr)	= 4.78	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 7.11	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 34.02	Line capacity (cfs)	= 122.19
Q catchment (cfs)	= 1.89	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 37.07	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 38.96	Ponding width (ft)	= N/A

LINE 2 / Q = 32.62 / HT = 24 / WID = 24 / N = .011 / L = 130 / JLC = 1

SS#B-2 SS#B-3 / DNLN = 1

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	47.87	24.00	45.08	10.38	49.55	0.00	2.45	3.14
UPSTRM	49.81	24.00	47.34	10.38	51.48	0.00	1.5	3.14

Drainage area (ac)	= 2.70	Slope of invert (%)	= 1.7385
Runoff coefficient	= 0.40	Slope energy grade line (%)	= 1.4895
Time of conc (min)	= 15.78	Critical depth (in)	= 23.09
Inlet time (min)	= 15.00	Natural ground elev. (ft)	= 50.84
Intensity (in/hr)	= 4.81	Upstream surcharge (ft)	= 0.47
Cumulative C*A	= 6.78	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 32.62	Line capacity (cfs)	= 35.24
Q catchment (cfs)	= 5.30	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 31.77	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 37.07	Ponding width (ft)	= N/A

LINE 3 / Q = 27.76 / HT = 24 / WID = 24 / N = .011 / L = 245 / JLC = 1.1

SS#B-3 SS#B-4 / DNLN = 2

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	51.48	24.00	47.34	8.84	52.70	0.00	1.5	3.14
UPSTRM	54.90	22.28	53.04	9.13	56.19	12.37	3.13	3.04

Drainage area (ac)	= 5.40	Slope of invert (%)	= 2.3265
Runoff coefficient	= 0.30	Slope energy grade line (%)	= 1.4260
Time of conc (min)	= 15.33	Critical depth (in)	= 22.28
Inlet time (min)	= 15.00	Natural ground elev. (ft)	= 58.18
Intensity (in/hr)	= 4.87	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 5.70	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 27.76	Line capacity (cfs)	= 40.77
Q catchment (cfs)	= 7.96	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 23.81	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 31.77	Ponding width (ft)	= N/A

LINE 4 / Q = 20.06 / HT = 24 / WID = 24 / N = .011 / L = 130 / JLC = 1.1

SS#B-4 SSAA3B-5 / DNLN = 3

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	56.32	24.00	53.04	6.39	56.95	0.00	3.13	3.14
UPSTRM	56.93	21.52	55.14	6.75	57.64	14.62	1.77	2.97

Drainage area (ac)	= 1.84	Slope of invert (%)	= 1.6154
Runoff coefficient	= 0.35	Slope energy grade line (%)	= 0.5294
Time of conc (min)	= 15.00	Critical depth (in)	= 19.03
Inlet time (min)	= 15.00	Natural ground elev. (ft)	= 58.92
Intensity (in/hr)	= 4.91	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 4.08	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 20.06	Line capacity (cfs)	= 33.97
Q catchment (cfs)	= 3.16	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 20.65	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 23.81	Ponding width (ft)	= N/A

LINE 5 / Q = 18.55 / HT = 24 / WID = 24 / N = .011 / L = 85 / JLC = 1.1

SS#B-5 SS#B-6 / DNLN = 4

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	57.71	24.00	55.14	5.91	58.25	0.00	1.77	3.14
UPSTRM	58.52	18.30	57.00	7.22	59.33	20.43	2.5	2.57

Drainage area (ac)	= 0.36	Slope of invert (%)	= 2.1882
Runoff coefficient	= 0.35	Slope energy grade line (%)	= 1.2703
Time of conc (min)	= 11.82	Critical depth (in)	= 18.30
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 61.50
Intensity (in/hr)	= 5.39	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 3.44	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 18.55	Line capacity (cfs)	= 39.54
Q catchment (cfs)	= 0.72	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 19.93	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 20.65	Ponding width (ft)	= N/A

LINE 6 / Q = 18.09 / HT = 24 / WID = 24 / N = .011 / L = 150 / JLC = 1.1

SS#B-6 SS#B-7 / DNLN = 5

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	59.41	24.00	57.00	5.76	59.93	0.00	2.5	3.14
UPSTRM	60.01	18.07	58.50	7.13	60.80	20.70	2.5	2.54

Drainage area (ac)	= 1.52	Slope of invert (%)	= 1.0000
Runoff coefficient	= 0.45	Slope energy grade line (%)	= 0.5769
Time of conc (min)	= 11.44	Critical depth (in)	= 18.07
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 63.00
Intensity (in/hr)	= 5.46	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 3.31	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 18.09	Line capacity (cfs)	= 26.73
Q catchment (cfs)	= 3.92	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 16.01	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 19.93	Ponding width (ft)	= N/A

LINE 7 / Q = 14.50 / HT = 18 / WID = 18 / N = .011 / L = 150 / JLC = 1

SS#B-7 SS#B-8 / DNLN = 6

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	60.87	18.00	58.50	8.21	61.92	0.00	3	1.77
UPSTRM	64.91	16.93	63.50	8.41	66.01	8.50	3.95	1.72

Drainage area (ac)	= 0.23	Slope of invert (%)	= 3.3333
Runoff coefficient	= 0.70	Slope energy grade line (%)	= 2.7259
Time of conc (min)	= 11.14	Critical depth (in)	= 16.93
Inlet time (min)	= 5.00	Natural ground elev. (ft)	= 68.96
Intensity (in/hr)	= 5.51	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 2.63	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 14.50	Line capacity (cfs)	= 22.66
Q catchment (cfs)	= 1.12	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 14.89	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 16.01	Ponding width (ft)	= N/A

LINE 8 / Q = 13.63 / HT = 18 / WID = 18 / N = .011 / L = 25 / JLC = 1.2

SS#B-8 SS#B-9 / DNLN = 7

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	66.01	18.00	63.50	7.72	66.93	0.00	3.95	1.77
UPSTRM	66.31	18.00	64.25	7.72	67.24	0.00	3.2	1.77

Drainage area (ac)	= 1.00	Slope of invert (%)	= 3.0000
Runoff coefficient	= 0.45	Slope energy grade line (%)	= 1.2073
Time of conc (min)	= 11.08	Critical depth (in)	= 16.71
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 68.96
Intensity (in/hr)	= 5.52	Upstream surcharge (ft)	= 0.56
Cumulative C*A	= 2.47	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 13.63	Line capacity (cfs)	= 21.50
Q catchment (cfs)	= 2.58	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 12.31	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 14.89	Ponding width (ft)	= N/A

LINE 9 / Q = 7.74 / HT = 15 / WID = 15 / N = .011 / L = 145 / JLC = 1.2

SS#B-9 SS#B-10 / DNLN = 8

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	67.42	15.00	64.75	6.31	68.04	0.00	2.95	1.23
UPSTRM	69.63	13.51	68.50	6.65	70.31	8.98	4.06	1.16

Drainage area (ac)	= 0.03	Slope of invert (%)	= 2.5862
Runoff coefficient	= 0.70	Slope energy grade line (%)	= 1.5687
Time of conc (min)	= 10.71	Critical depth (in)	= 13.51
Inlet time (min)	= 5.00	Natural ground elev. (ft)	= 73.82
Intensity (in/hr)	= 5.59	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 1.38	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 7.74	Line capacity (cfs)	= 12.27
Q catchment (cfs)	= 0.15	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 8.53	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 8.68	Ponding width (ft)	= N/A

LINE 10 / Q = 5.24 / HT = 15 / WID = 15 / N = .011 / L = 91 / JLC = 1.1

SS#B-10 SS#B-11 / DNLN = 9

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	70.45	15.00	68.50	4.27	70.73	0.00	4.06	1.23
UPSTRM	70.88	15.00	69.50	4.27	71.16	0.00	4.52	1.23

Drainage area (ac)	= 0.24	Slope of invert (%)	= 1.0989
Runoff coefficient	= 0.70	Slope energy grade line (%)	= 0.4711
Time of conc (min)	= 10.35	Critical depth (in)	= 10.99
Inlet time (min)	= 5.00	Natural ground elev. (ft)	= 75.28
Intensity (in/hr)	= 5.66	Upstream surcharge (ft)	= 0.13
Cumulative C*A	= 0.93	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 5.24	Line capacity (cfs)	= 8.00
Q catchment (cfs)	= 1.17	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 4.64	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 5.82	Ponding width (ft)	= N/A

LINE 11 / Q = 4.32 / HT = 15 / WID = 15 / N = .011 / L = 50 / JLC = 1.1

SS#B-11 SS#B-12 / DNLN = 10

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	71.19	15.00	69.50	3.52	71.38	0.00	4.52	1.23
UPSTRM	71.30	12.60	70.25	3.93	71.54	11.01	3.16	1.10

Drainage area (ac)	= 0.35	Slope of invert (%)	= 1.5000
Runoff coefficient	= 0.70	Slope energy grade line (%)	= 0.3131
Time of conc (min)	= 10.13	Critical depth (in)	= 9.98
Inlet time (min)	= 5.00	Natural ground elev. (ft)	= 74.67
Intensity (in/hr)	= 5.70	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 0.76	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 4.32	Line capacity (cfs)	= 9.35
Q catchment (cfs)	= 1.71	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 2.94	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 4.64	Ponding width (ft)	= N/A

LINE 12 / Q = 2.94 / HT = 15 / WID = 15 / N = .011 / L = 25 / JLC = .9

SS#B-12 SS#B-13 / DNLN = 11

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	71.56	15.00	70.25	2.39	71.65	0.00	3.16	1.23
UPSTRM	71.69	8.60	70.75	4.04	71.95	14.84	2.66	0.73

Drainage area (ac)	= 1.14	Slope of invert (%)	= 2.0000
Runoff coefficient	= 0.45	Slope energy grade line (%)	= 1.1805
Time of conc (min)	= 10.00	Critical depth (in)	= 8.23
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 74.67
Intensity (in/hr)	= 5.72	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 0.51	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 2.94	Line capacity (cfs)	= 10.79
Q catchment (cfs)	= 2.94	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 0.00	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 2.94	Ponding width (ft)	= N/A

LINE 13 / Q = 3.56 / HT = 15 / WID = 15 / N = .011 / L = 97 / JLC = 1.1

SS#B-9 SS#B-14 / DNLN = 8

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	67.42	15.00	64.75	2.90	67.55	0.00	2.95	1.23
UPSTRM	67.75	9.06	67.00	4.59	68.08	14.67	2.84	0.77

Drainage area (ac)	= 0.39	Slope of invert (%)	= 2.3196
Runoff coefficient	= 0.45	Slope energy grade line (%)	= 0.5483
Time of conc (min)	= 10.61	Critical depth (in)	= 9.06
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 71.10
Intensity (in/hr)	= 5.61	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 0.63	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 3.56	Line capacity (cfs)	= 11.62
Q catchment (cfs)	= 1.00	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 2.63	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 3.63	Ponding width (ft)	= N/A

LINE 14 / Q = 2.63 / HT = 12 / WID = 12 / N = .011 / L = 145 / JLC = .9

SS#B-14 SS#B-17 / DNLN = 13

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	68.12	12.00	67.00	3.35	68.29	0.00	3.09	0.79
UPSTRM	70.98	8.25	70.00	4.57	71.30	11.13	1.5	0.58

Drainage area (ac)	= 1.02	Slope of invert (%)	= 2.0690
Runoff coefficient	= 0.45	Slope energy grade line (%)	= 2.0781
Time of conc (min)	= 10.00	Critical depth (in)	= 8.25
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 72.50
Intensity (in/hr)	= 5.72	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 0.46	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 2.63	Line capacity (cfs)	= 6.05
Q catchment (cfs)	= 2.63	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 0.00	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 2.63	Ponding width (ft)	= N/A

LINE 15 / Q = 2.49 / HT = 15 / WID = 15 / N = .011 / L = 60 / JLC = 1.1

SS#B-10 SS#B-15 / DNLN = 9

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	70.45	14.40	69.25	2.06	70.52	14.70	3.31	1.21
UPSTRM	70.88	7.58	70.25	4.01	71.13	15.00	3.18	0.62

Drainage area (ac)	= 0.24	Slope of invert (%)	= 1.6667
Runoff coefficient	= 0.70	Slope energy grade line (%)	= 1.0255
Time of conc (min)	= 10.17	Critical depth (in)	= 7.58
Inlet time (min)	= 5.00	Natural ground elev. (ft)	= 74.68
Intensity (in/hr)	= 5.69	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 0.44	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 2.49	Line capacity (cfs)	= 9.85
Q catchment (cfs)	= 1.17	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 1.55	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 2.72	Ponding width (ft)	= N/A

LINE 16 / Q = 1.55 / HT = 15 / WID = 15 / N = .011 / L = 25 / JLC = .9

SS#B-15 SS#B-16 / DNLN = 15

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	71.16	10.87	70.25	1.62	71.20	12.77	3.18	0.95
UPSTRM	71.41	5.97	70.75	3.40	71.59	14.68	2.68	0.46

Drainage area (ac)	= 0.45	Slope of invert (%)	= 2.0000
Runoff coefficient	= 0.60	Slope energy grade line (%)	= 0.9176
Time of conc (min)	= 10.00	Critical depth (in)	= 5.97
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 74.68
Intensity (in/hr)	= 5.72	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 0.27	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 1.55	Line capacity (cfs)	= 10.79
Q catchment (cfs)	= 1.55	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 0.00	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 1.55	Ponding width (ft)	= N/A

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

PROJECT FORDS COLONY, SEC. 14B
PROJECT NO. 5652-148
SUBJECT SPREAD CALCULATIONS
SHEET NO. 1 OF 3
CALCULATED BY AWP DATE 5/22/98

SYSTEM B

#B-13 STA 15+46 ROAD B (RT) SUMP

D.A = 1.14 Ac C = 0.45 I = 3.5 in/HR

Q_T = CIA = (0.45)(3.5)(1.14) = 1.80 CFS

P = GRATE PERIMETER = 7.75' A = FREE OPEN AREA = 1.23 ft^2

WEIR FLOW EQUATION $Q_{iw} = 3.3 P (h)^{1.5}$ h = 0.17 FT

Q_{iw} = 1.34 CFS

1.80 CFS > 1.34 CFS USE 2 GRATES

2.68 CFS > 1.80 CFS OK

#B-12 STA 15+46 ROAD B (LT) SUMP

D.A. = 0.35 Ac C = 0.70 I = 3.5 in/HR

Q_T = 0.85 CFS

Q_{iw} = 1.34 CFS > Q_T = 0.85 CFS OK

#B-11 STA 10+43 ROAD D (LT) SUMP

D.A. = 0.24 Ac C = 0.70 I = 3.5 in/HR

Q_T = 0.59 CFS

Q_{iw} = 1.34 CFS > Q_T = 0.59 CFS OK

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

PROJECT Fords Colony, Sec 14B
PROJECT NO. 5652-14B
SUBJECT SPREAD CALCULATIONS
SHEET NO. 2 OF 3
CALCULATED BY HWP DATE 8/22/98

SYSTEM B (CONT)

#B-16 STA 10+86 ROAD C (LT) SUMP

D.A. = 0.45 Ac C = 0.60 I = 3.5 in/hr

Q_T = 0.95 CFS

Q_{in} = 1.34 CFS > Q_T = 0.95 CFS OK

#B-15 STA 10+86 ROAD C (RT) SUMP

D.A. = 0.24 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.59 CFS

Q_{in} = 1.34 CFS > Q_T = 0.59 CFS OK

#B-10 STA 11+34 ROAD D (LT) GRADE

D.A. = 0.03 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.07 CFS

$$Q_T = \frac{0.56}{n} Z D^{8/3} S^{1/2}$$

n = 0.016
Z = 1/S = 1/.0208 = 48
D = DEPTH AT INLET
S = LONG. SLOPE

$$0.07 = \frac{0.56}{.016}(48)(D)^{8/3}(.0208)^{1/2}$$

D = 0.04' < 0.14' OK

$$Q_i = KD^{5/3} \qquad K = 26 \text{ (CHART)}$$

$$Q_i = 26(0.04)^{5/3} = 0.12 \text{ CFS} > Q_T = 0.07 \text{ CFS OK}$$

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

PROJECT FORDS COLONY, SEC 14B
PROJECT NO. 5652 - 14
SUBJECT SPREAD CALCULATIONS
SHEET NO. 3 OF 3
CALCULATED BY HWP DATE 8/22/96

SYSTEM B (CONT)

#B-9 STA 12+78 ROAD D (LT) SUMP

D.A. = 1.00 Ac C = 0.45 I = 3.5 in/Hr

Q_T = 1.58 CFS USE 2 GRATES

Q_{IN} = 2.68 CFS > Q_T = 1.58 CFS OK

#B-8 STA 12+78 ROAD D (RT) SUMP

D.A. = 0.23 Ac C = 0.70 I = 3.5 in/Hr

Q_T = 0.56 CFS

Q_{IN} = 1.34 CFS > Q_T = 0.56 CFS OK

#B-14 STA 13+75 ROAD D (LT) GRADE

D.A. = 0.39 Ac C = 0.45 I = 3.5 in/Hr

Q_T = 0.61 CFS

$$q_T = \frac{0.56}{0.016}(49)(D)^{8/3}(.03)^{1/2}$$

D = 0.10' < 0.17' OK

$Q_i = kD^{5/2}$ k = 22

Q_i = 0.47 CFS < Q_T = 0.61 CFS

USE 2 GRATES Q_i = 0.94 CFS > Q_T = 0.61 CFS OK

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

PROJECT FORDS COLONY SEC. 14B
PROJECT NO. 5652-148
SUBJECT SPREAD CALCULATIONS
SHEET NO. 1 OF 3
CALCULATED BY AWP DATE 8/22/98

REVISED 10/98 TO IDENTIFY SPREAD/DEPTH:

SYSTEM B

#B-13 STA 15+46 ROAD B (RT) SUMP

D.A. = 1.14 Ac C = 0.45 I = 3.5 in/hr

Q = CIA = (0.45)(3.5)(1.14) = 1.80 CFS

P = GRATE PERIMETER = 7.75' A = FREE OPEN AREA = 1.25

WEIR FLOW CONTROLS $Q_{iw} = 3.3 P (h)^{1.5}$ h = 0.14 FT

Q_{iw} = 1.34 CFS

1.80 CFS > 1.34 CFS USE 2 GRATES

2.68 CFS > 1.80 CFS OK

SPREAD:
ASSUME Q DIVIDED OVER 2 GRATES:
$\frac{1.8}{2} = 3.3(7.75)(D)^{1.5}$
D = 0.11' < 0.14' OK

#B-12 STA 15+46 ROAD B (LT) SUMP

D.A. = 0.25 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.86 CFS

SPREAD:
D = 0.10' < .14'
OK

Q_{iw} = 1.34 CFS > Q_T = 0.86 CFS OK

#B-11 STA 10+43 ROAD D (LT) SUMP

D.A. = 0.24 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.59 CFS

Q_{iw} = 1.34 CFS > Q_T = 0.59 CFS OK

SPREAD:
D = 0.08' < 0.14' OK

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

PROJECT FORDS COLONY, SEC 14B
PROJECT NO. 5652-14B
SUBJECT SPREAD CALCULATIONS
SHEET NO. 2 OF 3
CALCULATED BY HWP DATE 8/22/98

SYSTEM B (CONT)

SPREAD: D=0.11' < 0.14' OK

#B-16 STA 10+86 ROAD C (LT) SUMP

D.A.: 0.45 Ac C: 0.60 I: 3.5 in/hr

Q_T: 0.95 cfs

Q_{iw}: 1.34 cfs > Q_T: 0.95 cfs OK

#B-15 STA 10+86 ROAD C (RT) SUMP

D.A.: 0.24 Ac C: 0.70 I: 3.5 in/hr

SPREAD: D=0.08' < 0.14' OK

Q_T: 0.59 cfs

Q_{iw}: 1.34 cfs > Q_T: 0.59 cfs OK

#B-10 STA 11+34 ROAD D (LT) GRADE

D.A.: 0.03 Ac C: 0.70 I: 3.5 in/hr

Q_T: 0.07 cfs

$$Q_T = \frac{0.56}{n} Z D^{8/3} S^{1/2}$$

n: 0.016
Z: 1/S = 1/.0208 = 48
D: DEPTH AT INLET
S: LONG SLOPE

$$0.07 = \frac{0.56}{.016}(48)(D)^{8/3}(.0620)^{1/2}$$

D = 0.04' < 0.14' OK

SPREAD: D=0.04' < .14' OK

$Q_i = KD^{5/3}$ K: 26 (CHART)

$Q_i = 26(0.04)^{5/3} = 0.12$ cfs > Q_T = 0.07 cfs OK

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5248 Olde Towne Road, Suite 1
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PROJECT FORDS COLONY, SEC 14B
PROJECT NO. 5652 - 14
SUBJECT SPREAD CALCULATIONS
SHEET NO. 3 OF 3
CALCULATED BY HWP DATE 5/22/98

SYSTEM B (CONT)

SPREAD: D = 0.10' < 0.14' OK

#B-9 STA 12+78 ROAD D (LT) SUMP

D.A. = 1.00 Ac C = 0.45 I = 3.5 in/hr

Q_T = 1.58 CFS USE 2 GRATES

Q_{IN} = 2.68 CFS > Q_T = 1.58 CFS OK

#B-8 STA 12+78 ROAD D (RT) SUMP

SPREAD: D = 0.08' < 0.14' OK

D.A. = 0.23 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.56 CFS

Q_{IN} = 1.34 CFS > Q_T = 0.56 CFS OK

#B-14 STA 13+75 ROAD D (LT) GRADE

D.A. = 0.39 Ac C = 0.45 I = 3.5 in/hr

Q_T = 0.61 CFS

$$q_T = \frac{0.56}{0.016}(48)(D)^{8/3}(.032)^{1/2}$$

D = 0.10' < 0.14' OK

$Q_i = kD^{5/3}$ k = 22

Q_i = 0.47 CFS < Q_T = 0.61 CFS

USE 2 GRATES Q_i = 0.94 CFS > Q_T = 0.61 CFS OK

SPREAD: D = 0.10' < 0.14' OK

FORDS COLONY

SECTION 14B

JOB NO. 5652-14B

SYSTEM C

prepared by:

AES CONSULTING ENGINEERS

5248 OLDE TOWNE RD,SUITE 1

WILLIAMSBURG, VA. 23188

DATE: 08/25/98

Return Period = 10 Yrs
Rainfall file: JCCN

Run Date: 08-25-1998
File: 565214BC.ST3

LINE 1 / Q = 6.65 / HT = 15 / WID = 15 / N = .013 / L = 175 / JLC = 1.1

SS#C-1 SS#C-2 / Outfall

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	48.24	15.00	44.00	5.42	48.70	0.00	-1.25	1.23
UPSTRM	62.03	12.38	61.00	6.14	62.62	11.39	6.59	1.08

Drainage area (ac) =	0.10	Slope of invert (%) =	9.7143
Runoff coefficient =	0.70	Slope energy grade line (%) =	7.9546
Time of conc (min) =	11.50	Critical depth (in) =	12.38
Inlet time (min) =	5.00	Natural ground elev. (ft) =	68.85
Intensity (in/hr) =	5.45	Upstream surcharge (ft) =	0.00
Cumulative C*A =	1.22	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	6.65	Line capacity (cfs) =	20.13
Q catchment (cfs) =	0.49	Inlet length (ft) =	0.00
Q carryover (cfs) =	7.16	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	7.65	Ponding width (ft) =	N/A

LINE 2 / Q = 6.33 / HT = 15 / WID = 15 / N = .011 / L = 95 / JLC = 1.1

SS#C-2 SS#C-3 / DNLN = 1

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	62.68	15.00	61.00	5.16	63.09	0.00	6.59	1.23
UPSTRM	63.33	15.00	62.00	5.16	63.74	0.00	3.31	1.23

Drainage area (ac) =	0.18	Slope of invert (%) =	1.0526
Runoff coefficient =	0.70	Slope energy grade line (%) =	0.6881
Time of conc (min) =	11.19	Critical depth (in) =	12.08
Inlet time (min) =	5.00	Natural ground elev. (ft) =	66.57
Intensity (in/hr) =	5.50	Upstream surcharge (ft) =	0.08
Cumulative C*A =	1.15	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	6.33	Line capacity (cfs) =	7.83
Q catchment (cfs) =	0.88	Inlet length (ft) =	0.00
Q carryover (cfs) =	6.28	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	7.16	Ponding width (ft) =	N/A

LINE 3 / Q = 5.65 / HT = 15 / WID = 15 / N = .011 / L = 25 / JLC = 1.1

SS#C-3 SS#C-4 / DNLN = 2

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	63.78	15.00	62.00	4.61	64.11	0.00	3.31	1.23
UPSTRM	63.92	15.00	62.50	4.61	64.25	0.00	2.81	1.23

Drainage area (ac)	= 0.53	Slope of invert (%)	= 2.0000
Runoff coefficient	= 0.45	Slope energy grade line (%)	= 0.5488
Time of conc (min)	= 11.10	Critical depth (in)	= 11.42
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 66.57
Intensity (in/hr)	= 5.52	Upstream surcharge (ft)	= 0.17
Cumulative C*A	= 1.02	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 5.65	Line capacity (cfs)	= 10.79
Q catchment (cfs)	= 1.37	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 4.92	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 6.28	Ponding width (ft)	= N/A

LINE 4 / Q = 4.36 / HT = 15 / WID = 15 / N = .011 / L = 32 / JLC = 1.2

SS#C-4 SS#C-5 / DNLN = 3

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	64.28	15.00	62.50	3.55	64.48	0.00	2.81	1.23
UPSTRM	64.39	15.00	63.00	3.55	64.58	0.00	2.55	1.23

Drainage area (ac)	= 0.59	Slope of invert (%)	= 1.5625
Runoff coefficient	= 0.45	Slope energy grade line (%)	= 0.3262
Time of conc (min)	= 10.95	Critical depth (in)	= 10.02
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 66.80
Intensity (in/hr)	= 5.54	Upstream surcharge (ft)	= 0.14
Cumulative C*A	= 0.79	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 4.36	Line capacity (cfs)	= 9.54
Q catchment (cfs)	= 1.52	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 3.40	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 4.92	Ponding width (ft)	= N/A

LINE 5 / Q = 2.28 / HT = 15 / WID = 15 / N = .011 / L = 190 / JLC = 1.2

SS#C-5 SS#C-6 / DNLN = 4

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	64.62	15.00	63.00	1.86	64.68	0.00	2.55	1.23
UPSTRM	66.10	7.24	65.50	3.88	66.34	14.99	2.8	0.59

Drainage area (ac) =	0.20	Slope of invert (%) =	1.3158
Runoff coefficient =	0.70	Slope energy grade line (%) =	0.8744
Time of conc (min) =	5.63	Critical depth (in) =	7.24
Inlet time (min) =	5.00	Natural ground elev. (ft) =	69.55
Intensity (in/hr) =	6.78	Upstream surcharge (ft) =	0.00
Cumulative C*A =	0.34	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	2.28	Line capacity (cfs) =	8.75
Q catchment (cfs) =	0.98	Inlet length (ft) =	0.00
Q carryover (cfs) =	1.37	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	2.34	Ponding width (ft) =	N/A

LINE 6 / Q = 0.49 / HT = 15 / WID = 15 / N = .011 / L = 25 / JLC = .9

SS#C-6 SS#C-7 / DNLN = 5

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	66.38	10.61	65.50	0.53	66.39	12.62	2.8	0.93
UPSTRM	66.39	7.53	65.75	0.79	66.40	15.00	2.55	0.62

Drainage area (ac) =	0.10	Slope of invert (%) =	1.0000
Runoff coefficient =	0.70	Slope energy grade line (%) =	0.0308
Time of conc (min) =	5.00	Critical depth (in) =	3.35
Inlet time (min) =	5.00	Natural ground elev. (ft) =	69.55
Intensity (in/hr) =	6.97	Upstream surcharge (ft) =	0.00
Cumulative C*A =	0.07	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	0.49	Line capacity (cfs) =	7.63
Q catchment (cfs) =	0.49	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.00	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	0.49	Ponding width (ft) =	N/A

LINE 7 / Q = 0.88 / HT = 15 / WID = 15 / N = .011 / L = 45 / JLC = .9

SS#C-6 SS#C-8 / DNLN = 5

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	66.38	10.61	65.50	0.95	66.40	12.62	2.8	0.93
UPSTRM	66.74	4.50	66.25	2.84	66.86	13.75	2.5	0.31

Drainage area (ac) =	0.18	Slope of invert (%) =	1.6667
Runoff coefficient =	0.70	Slope energy grade line (%) =	1.0320
Time of conc (min) =	5.00	Critical depth (in) =	4.50
Inlet time (min) =	5.00	Natural ground elev. (ft) =	70.00
Intensity (in/hr) =	6.97	Upstream surcharge (ft) =	0.00
Cumulative C*A =	0.13	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	0.88	Line capacity (cfs) =	9.85
Q catchment (cfs) =	0.88	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.00	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	0.88	Ponding width (ft) =	N/A

LINE 8 / Q = 1.06 / HT = 12 / WID = 12 / N = .011 / L = 130 / JLC = .9

SS#C-5 SS#C-9 / DNLN = 4

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	64.62	12.00	63.25	1.35	64.65	0.00	2.55	0.79
UPSTRM	69.08	5.23	68.50	3.21	69.24	11.90	1.5	0.33

Drainage area (ac) =	0.41	Slope of invert (%) =	4.0385
Runoff coefficient =	0.45	Slope energy grade line (%) =	3.4196
Time of conc (min) =	10.00	Critical depth (in) =	5.23
Inlet time (min) =	10.00	Natural ground elev. (ft) =	71.00
Intensity (in/hr) =	5.72	Upstream surcharge (ft) =	0.00
Cumulative C*A =	0.18	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	1.06	Line capacity (cfs) =	8.46
Q catchment (cfs) =	1.06	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.00	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	1.06	Ponding width (ft) =	N/A

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

PROJECT FORDS COLONY, SECT. 14B
PROJECT NO. 5652-14B
SUBJECT SPREAD CALCULATIONS
SHEET NO. 1 OF 3
CALCULATED BY HWP DATE 8/24/98

SYSTEM C

#C-2 STA 16+70 ROAD C (LT) GRADE

D.A. = 0.10 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.25 CFS

$Q_T = \frac{0.56}{0.016}(.79)(D)^{8/3}(.075)^{1/2}$

D = 0.06' < 0.14' OK

$Q_i = KD^{5/3}$ K = 27

Q_i = 0.27 CFS > Q_T = 0.25 CFS 0.01 CFS BYPASS

#C-7 STA 19+90 ROAD C (LT) GRADE

D.A. = 0.10 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.25 CFS

$Q = \frac{0.56}{.016}(.79)(D)^{8/3}(.037)^{1/2}$

D = 0.07' < 0.14' OK K = 23

$Q_i = (23)(.07)^{5/3}$ = 0.25 CFS > Q_T = 0.25 CFS OK

#C-3 STA 17+67 ROAD C (LT) SUMP

D.A. = 0.13 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.34 CFS − 0.01 CFS FROM #C-2 = 0.45 CFS

Q_{in} = 1.37 CFS > Q_T = 0.45 CFS OK

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Williamsburg, Virginia 23188
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SUBJECT SPREAD CALCULATIONS
SHEET NO. 2 OF 3
CALCULATED BY HWA DATE 8/24/92

SYSTEM C (CONT)

#C-6 STA 19+90 ROAD C (RT) SUMP

D.A.: 0.20 AC. C: 0.70 I: 3.5 IN/HR

Q_T: 0.49 CFS

Q_{cap}: 1.34 CFS > Q_T: 0.49 CFS OK

#C-8 STA 10+70 ROAD G (RT) GRADE

D.A.: 0.18 AC C: 0.70 I: 3.5 IN/HR

Q_T: 0.44 CFS

$Q_o = \frac{0.56}{.016}(.48)(D)^{8/3}(.0282)^{1/2}$

D: 0.09' < 0.14' OK Z: 21

$Q_{cap} = (21)(.09)^{5/3} = 0.37$ CFS < Q_T = 0.44 CFS

USE 2 GRATES Q_i = 0.74 CFS > Q_T: 0.44 CFS OK

#C-5 STA 18+00 ROAD C (RT) GRADE

D.A.: 0.59 AC. C: 0.45 I: 3.5 IN/HR

Q_T: 0.93 CFS

$Q_o = \frac{0.56}{.016}(.48)(D)^{8/3}(.01)^{1/2}$

D: 0.14' ≤ 0.14' OK S: 15

$Q_i = (15)(.14)^{5/3} = 0.56$ CFS < Q_T = 0.93 CFS

USE 2 GRATES Q_i: 1.12 CFS > Q_T: 0.93 CFS OK

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

PROJECT FORDS COLONY, SEC 14B
PROJECT NO. 5652-14B
SUBJECT SPREAD CALCULATIONS
SHEET NO. 3 OF 3
CALCULATED BY HWP DATE 8/24/98

SYSTEM C (cont)

C-4 STA 17+67 ROAD C (RT) SUMP

D.A. = 0.53 AC C = 0.45 I = 3.5 in/hr

Q_T = 0.83 CFS

Q_{in} = 0.39 CFS > Q_T = 0.83 CFS [illegible]

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(757) 253-0040
Fax: (757) 220-8994

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SUBJECT SPREAD CALCULATIONS
SHEET NO. 1 OF 3
CALCULATED BY HWP DATE 8/24/98

REVISED 10/98 TO IDENTIFY SPREAD/DEPTH

SYSTEM C

#C-2 STA 16+70 ROAD C (LT) GRADE

D.A. = 0.10 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.25 CFS

$Q_T = \frac{0.56}{0.016}(.48)(D)^{8/3}(.075)^{1/2}$

D = 0.06' < 0.14' ok

$Q_i = KD^{5/3}$ K = 27

Q_i = 0.24 CFS < Q_T = 0.25 CFS

0.01 CFS BYPASS

SPREAD: D = 0.06' < 0.14' OK

#C-7 STA 19+90 ROAD C (LT) GRADE

D.A. = 0.10 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.25 CFS

$Q_T = \frac{0.56}{.016}(.49)(D)^{8/3}(.037)^{1/2}$

D = 0.07' < 0.14' ok K = 23

$Q_i = (23)(.07)^{5/3}$ = 0.25 CFS > Q_T = 0.25 CFS ok

SPREAD: D = 0.07' < 0.14' OK

#C-3 STA 17+67 ROAD C (LT) SUMP

D.A. = 0.15 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.14 CFS + 0.01 CFS FROM #C-2 = 0.15 CFS

Q_{iw} = 1.34 CFS > Q_T = 0.15 CFS ok

SPREAD: D = 0.07' < 0.14' OK

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PROJECT FORDS COLONY, SEC. 14B
PROJECT NO. 5652-14B
SUBJECT SPREAD CALCULATIONS
SHEET NO. 2 OF 3
CALCULATED BY HWA DATE 8/24/98

SYSTEM C (CONT.)

#C-6 STA 19+90 ROAD C (RT) SUMP

D.A.: 0.20 Ac. C: 0.70 I: 3.5 in/hr

Q_T: 0.49 CFS

Q_{inl}: 1.34 CFS > Q_T: 0.49 CFS OK

SPREAD: D=.07' < 0.14' OK

#C-8 STA 10+70 ROAD G (RT) GRADES

D.A.: 0.18 Ac C: 0.70 I: 3.5 in/hr

Q_T: 0.44 CFS

$Q_T = \frac{0.56}{.016}(48)(D)^{8/3}(.0282)^{1/2}$

D: 0.09' < 0.14' OK Z: 21

$Q_{inl} = (21)(.09)^{5/3} = 0.37$ CFS < Q_T = 0.44 CFS

USE 2 GRATES Q_i = 0.74 CFS > Q_T: 0.44 CFS OK

SPREAD: D=0.09' < 0.14' OK

#C-5 STA 18+00 ROAD C (RT) GRADES

D.A.: 0.59 Ac. C: 0.45 I: 3.5 in/hr

Q_T: 0.93 CFS

$Q_T = \frac{0.56}{.016}(48)(D)^{8/3}(.01)^{1/2}$

D: 0.14' ≤ 0.14' OK Z: 15

$Q_i = (15)(.14)^{5/3} = 0.56$ CFS < Q_T = 0.93 CFS

USE 2 GRATES Q_i: 1.12 CFS > Q_T: 0.93 CFS OK

SPREAD: D=0.14' ≤ .14' OK

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5248 Olde Towne Road, Suite 1
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PROJECT FORDS COLONY, SEC 14B
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SUBJECT SPREAD CALCULATIONS
SHEET NO. 3 OF 3
CALCULATED BY HWP DATE 8/24/98

SYSTEM C (cont'd)

C-4 STA 17+67 ROAD C (RT) SUMP

D.A. = 0.53 Ac C = 0.45 I = 3.5 in/hr

Q_T = 0.83 CFS

Q_{in} = 1.54 CFS > Q_T = 0.83 CFS OK

SPREAD:
D = 0.10' < 0.14'
OK

FORDS COLONY

SECTION 14B

JOB NO. 5652-14B

SYSTEM D

prepared by:

AES CONSULTING ENGINEERS

5248 OLDE TOWNE RD,SUITE 1

WILLIAMSBURG, VA. 23188

DATE: 08/25/98

Return Period = 10 Yrs
Rainfall file: JCCN

Run Date: 08-25-1998
File: 565214BD.ST3

LINE 1 / Q = 5.84 / HT = 15 / WID = 15 / N = .011 / L = 180 / JLC = 0

SS#D-1 SS#D-2 / Outfall

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	43.00	15.00	38.00	4.76	43.35	0.00	-2.25	1.23
UPSTRM	44.97	11.61	44.00	5.74	45.48	12.55	2.75	1.02

Drainage area (ac)	= 0.00	Slope of invert (%)	= 3.3333
Runoff coefficient	= 0.00	Slope energy grade line (%)	= 1.1810
Time of conc (min)	= 12.05	Critical depth (in)	= 11.61
Inlet time (min)	= 0.00	Natural ground elev. (ft)	= 48.00
Intensity (in/hr)	= 5.35	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 1.09	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 5.84	Line capacity (cfs)	= 13.93
Q catchment (cfs)	= 0.00	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 6.96	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 6.96	Ponding width (ft)	= N/A

LINE 2 / Q = 5.87 / HT = 15 / WID = 15 / N = .011 / L = 110 / JLC = 1

SS#D-2 SS#D-3 / DNLN = 1

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	44.49	5.86	44.00	13.22	47.20	14.64	2.75	0.44
UPSTRM	51.09	5.86	50.60	13.22	53.80	14.64	2.65	0.44

Drainage area (ac)	= 0.00	Slope of invert (%)	= 6.0000
Runoff coefficient	= 0.00	Slope energy grade line (%)	= 6.0000
Time of conc (min)	= 11.91	Critical depth (in)	= 11.63
Inlet time (min)	= 0.00	Natural ground elev. (ft)	= 54.50
Intensity (in/hr)	= 5.38	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 1.09	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 5.87	Line capacity (cfs)	= 18.69
Q catchment (cfs)	= 0.00	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 6.96	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 6.96	Ponding width (ft)	= N/A

Note: Normal depth assumed

LINE 3 / Q = 5.99 / HT = 15 / WID = 15 / N = .011 / L = 200 / JLC = 1.1

SS#D-3 SS#D-4 / DNLN = 2

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	53.80	15.00	50.60	4.88	54.17	0.00	2.65	1.23
UPSTRM	58.73	11.75	57.75	5.81	59.25	12.36	2.75	1.03

Drainage area (ac)	= 0.37	Slope of invert (%)	= 3.5750
Runoff coefficient	= 0.70	Slope energy grade line (%)	= 2.5401
Time of conc (min)	= 11.29	Critical depth (in)	= 11.75
Inlet time (min)	= 5.00	Natural ground elev. (ft)	= 61.75
Intensity (in/hr)	= 5.48	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 1.09	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 5.99	Line capacity (cfs)	= 14.43
Q catchment (cfs)	= 1.81	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 5.16	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 6.96	Ponding width (ft)	= N/A

LINE 4 / Q = 4.60 / HT = 15 / WID = 15 / N = .011 / L = 70 / JLC = 1

SS#D-4 SS#D-5 / DNLN = 3

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	59.30	15.00	57.75	3.75	59.52	0.00	2.75	1.23
UPSTRM	62.86	10.30	62.00	5.12	63.27	13.91	3.66	0.90

Drainage area (ac)	= 0.74	Slope of invert (%)	= 6.0714
Runoff coefficient	= 0.45	Slope energy grade line (%)	= 5.3470
Time of conc (min)	= 11.03	Critical depth (in)	= 10.30
Inlet time (min)	= 10.00	Natural ground elev. (ft)	= 66.91
Intensity (in/hr)	= 5.53	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 0.83	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 4.60	Line capacity (cfs)	= 18.80
Q catchment (cfs)	= 1.91	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 3.25	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 5.16	Ponding width (ft)	= N/A

LINE 5 / Q = 2.84 / HT = 15 / WID = 15 / N = .011 / L = 160 / JLC = 1.2

SS#D-5 SS#D-6 / DNLN = 4

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	63.27	15.00	62.00	2.31	63.35	0.00	3.66	1.23
UPSTRM	64.67	8.09	64.00	4.21	64.95	14.95	3.59	0.67

Drainage area (ac) =	0.13	Slope of invert (%) =	1.2500
Runoff coefficient =	0.70	Slope energy grade line (%) =	0.9996
Time of conc (min) =	10.21	Critical depth (in) =	8.09
Inlet time (min) =	5.00	Natural ground elev. (ft) =	68.85
Intensity (in/hr) =	5.68	Upstream surcharge (ft) =	0.00
Cumulative C*A =	0.50	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	2.84	Line capacity (cfs) =	8.53
Q catchment (cfs) =	0.63	Inlet length (ft) =	0.00
Q carryover (cfs) =	2.62	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	3.25	Ponding width (ft) =	N/A

LINE 6 / Q = 1.55 / HT = 15 / WID = 15 / N = .011 / L = 220 / JLC = 1.2

SS#D-6 SS#D-7 / DNLN = 5

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	65.00	12.05	64.00	1.46	65.04	13.44	3.59	1.06
UPSTRM	71.50	5.97	71.00	3.40	71.68	14.69	3.01	0.46

Drainage area (ac) =	0.14	Slope of invert (%) =	3.1818
Runoff coefficient =	0.70	Slope energy grade line (%) =	3.0180
Time of conc (min) =	5.21	Critical depth (in) =	5.97
Inlet time (min) =	5.00	Natural ground elev. (ft) =	75.27
Intensity (in/hr) =	6.91	Upstream surcharge (ft) =	0.00
Cumulative C*A =	0.22	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	1.55	Line capacity (cfs) =	13.61
Q catchment (cfs) =	0.68	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.88	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	1.56	Ponding width (ft) =	N/A

LINE 7 / Q = 0.88 / HT = 15 / WID = 15 / N = .011 / L = 25 / JLC = .9

SS#D-7 SS#D-8 / DNLN = 6

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	71.71	8.55	71.00	1.22	71.74	11.33	3.01	0.72
UPSTRM	71.99	4.50	71.50	2.84	72.11	13.75	2.51	0.31

Drainage area (ac) =	0.18	Slope of invert (%) =	2.0000
Runoff coefficient =	0.70	Slope energy grade line (%) =	1.5076
Time of conc (min) =	5.00	Critical depth (in) =	4.50
Inlet time (min) =	5.00	Natural ground elev. (ft) =	75.27
Intensity (in/hr) =	6.97	Upstream surcharge (ft) =	0.00
Cumulative C*A =	0.13	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	0.88	Line capacity (cfs) =	10.79
Q catchment (cfs) =	0.88	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.00	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	0.88	Ponding width (ft) =	N/A

LINE 8 / Q = 1.06 / HT = 15 / WID = 15 / N = .011 / L = 25 / JLC = .9

SS#D-6 SS#D-9 / DNLN = 5

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	65.00	12.05	64.00	1.00	65.02	13.44	3.59	1.06
UPSTRM	65.54	4.93	65.00	3.00	65.68	14.09	2.59	0.35

Drainage area (ac) =	0.41	Slope of invert (%) =	4.0000
Runoff coefficient =	0.45	Slope energy grade line (%) =	2.1277
Time of conc (min) =	10.00	Critical depth (in) =	4.93
Inlet time (min) =	10.00	Natural ground elev. (ft) =	68.85
Intensity (in/hr) =	5.72	Upstream surcharge (ft) =	0.00
Cumulative C*A =	0.18	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	1.06	Line capacity (cfs) =	15.26
Q catchment (cfs) =	1.06	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.00	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	1.06	Ponding width (ft) =	N/A

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Williamsburg, Virginia 23188
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Fax: (757) 220-8994

PROJECT FORDS COLONY SEC 14B
PROJECT NO. 5652-14B
SUBJECT SPREAD CALCULATIONS
SHEET NO. 1 OF 2
CALCULATED BY HWP DATE 8/25/98

SYSTEM D

#D-8 STA 16+10 ROAD A (RT) GRADE

D.A. = 0.18 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.44 CFS

$Q_T = \frac{0.56}{0.016}(48)(D)^{8/3}(0.143)^{1/2}$

D = 0.10' < 0.14' ok

$Q_i = KD^{5/3}$ K = 17

Q_i = 0.37 CFS < Q_T = 0.44 CFS

0.07 CFS BYPASS

#D-9 STA 18+30 ROAD A (RT) SUMP

D.A. = 0.41 Ac C = 0.45 I = 3.5 in/hr

Q_T = 0.65 CFS + 0.07 CFS FROM D-8 = 0.72 CFS

$Q_{i\,in}$ = 1.34 CFS > Q_T = 0.72 CFS OK

#D-7 STA 16+10 ROAD A (LT) GRADE

D.A. = 0.14 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.34 CFS

$Q_T = \frac{0.56}{.016}(48)(D)^{8/3}(0.143)^{1/2}$

D = 0.09' < 0.14' ok

$Q_i = KD^{5/3}$ K = 17

Q_i = 0.31 CFS < Q_T = 0.34 CFS

0.03 CFS BYPASS

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PROJECT FORDS COLONY, SEC 14E
PROJECT NO. 5652-14B
SUBJECT SPREAD CALCULATIONS
SHEET NO. 2 OF 2
CALCULATED BY HWP DATE 8/25/98

SYSTEM C (CONT)

#D-6 STA 18+30 ROAD A (2+) GRADE

D.A. = 0.13 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.33 CFS + 0.01 CFS FROM #D-7 = 0.35 CFS

$Q_T = \frac{0.56}{1016}(48)(D)^{8/3}(.005)^{1/2}$

D = 0.11 < 0.14' OK

$Q_i = kD^{5/3}$ K = 14

Q_i = 0.34 CFS < Q_T = 0.35 CFS

0.01 CFS BYPASS

#D-5 STA 19+90 ROAD A (2+) GRADE

D.A. = 0.74 Ac C = 0.45 I = 3.5 in/hr

Q_T = 1.17 CFS + 0.01 CFS FROM #D-6 = 1.18 CFS

$Q_T = \frac{0.56}{1016}(48)(D)^{8/3}(.030)^{1/2}$

D = 0.13' < 0.14' OK K = 22

$Q_i = kD^{5/3}$ = 0.70 CFS < Q_T = 1.18 CFS

USE 2 GRATES Q_i = 1.40 CFS > Q_T = 1.18 CFS OK

#D-4 STA 20+60 ROAD A SUMP
STA 17+90 ROAD D

D.A. = 0.37 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.91 CFS

Q_{in} = 1.34 CFS > Q_T = 0.91 CFS OK

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5248 Olde Towne Road, Suite 1
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PROJECT FORDS COLONY SEC 14B
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REVISED 10/98 TO IDENTIFY SPREAD/DEPTH

SYSTEM D

#D-8 STA 16+10 ROAD A (RT) GRADE

D.A. = 0.18 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.44 CFS

$Q_T = \frac{0.56}{0.016}(48)(D)^{8/3}(.0143)^{1/2}$

D = 0.10' < 0.14' ok

$Q_i = KD^{5/3}$ K = 17

Q_i = 0.37 CFS < Q_T = 0.44 CFS

SPREAD: D = .10' < .14' OK

0.07 CFS BYPASS

#D-9 STA 18+30 ROAD A (RT) SUMP

D.A. = 0.41 Ac C = 0.45 I = 3.5 in/hr

Q_T = 0.65 CFS + 0.07 CFS FROM D-8 = 0.72 CFS

Q_{i_w} = 1.34 CFS > Q_T = 0.72 CFS OK

SPREAD: D = 0.09' < .14' OK

#D-7 STA 16+10 ROAD A (LT) GRADE

D.A. = 0.14 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.34 CFS

$Q_T = \frac{0.56}{.016}(48)(D)^{8/3}(.0143)^{1/2}$

D = 0.09' < 0.14' OK

$Q_i = KD^{5/3}$ K = 17

Q_i = 0.31 CFS < Q_T = 0.34 CFS

SPREAD: D = .09' < .14' OK

0.03 CFS BYPASS

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5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
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Fax: (757) 220-8994

PROJECT FORDS COLONY, SEC 14B
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SYSTEM C (CONT)

#D-6 STA 18+30 ROAD A (RT) GRADE

D.A. = 0.13 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.33 CFS + 0.01 CFS FROM #C-7 = 0.34 CFS

$Q_T = \frac{0.56}{.016}(.48)(D)^{8/3}(.030)^{1/2}$

D = 0.11 < 0.14' OK

$Q_i = kD^{5/3}$ K = 14

Q_i = 0.34 CFS < Q_T = 0.35 CFS

SPREAD: D=.11' L.14' OK

0.01 CFS BYPASS

#D-5 STA 19+90 ROAD A (RT) GRADE

D.A. = 0.74 Ac C = 0.45 I = 3.5 in/hr

Q_T = 1.17 CFS + 0.01 CFS FROM #D-6 = 1.18 CFS

$Q_T = \frac{0.56}{.016}(.48)(D)^{8/3}(.030)^{1/2}$

D = 0.13' < 0.14' OK k = 22

$Q_i = kD^{5/3}$ = 0.70 CFS < Q_T = 1.18 CFS

SPREAD: D=.13' L.14' OK

USE 2 INLETS Q_i = 1.40 CFS > Q_T = 1.18 CFS OK

#D-1 STA 20+60 ROAD A SUMP
STA 17+90 ROAD D

D.A. = 0.37 Ac C = 0.70 I = 3.5 in/hr

Q_T = 0.91 CFS

SPREAD: D=0.11' L0.14' OK

Q_{in} = 1.34 CFS > Q_T = 0.91 CFS OK