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: **PC124**

DATE VERIFIED: **June 6, 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: PC124

PIN: 3330100002

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

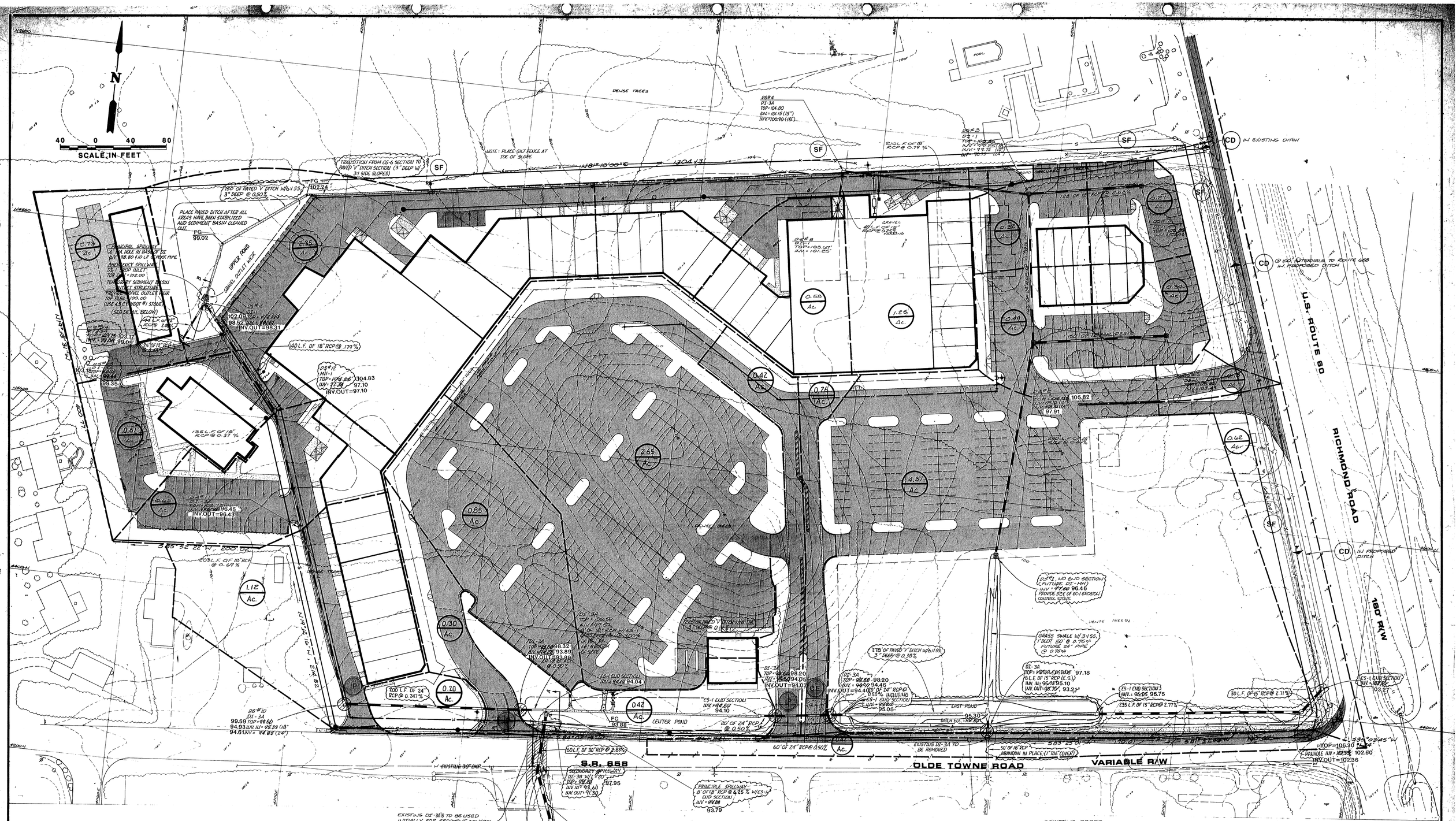
Property Description: Ewell Hall / Prime Outlet Expansion

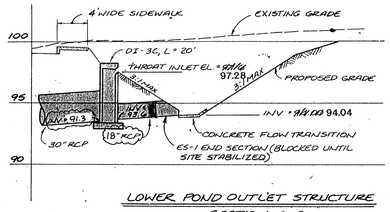
Site Address: 5601 Richmond Road

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

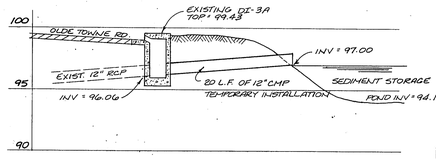
Agreements: (in file as of scan date) **N** **Book or Doc#:** **Page:**

Comments
lower pond

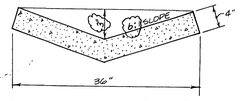




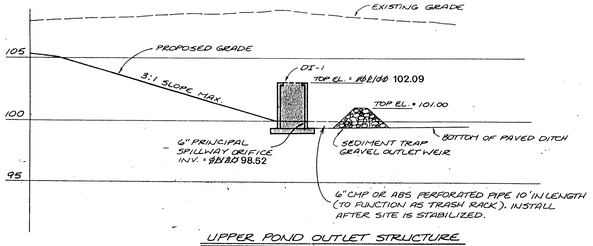
LOWER POND OUTLET STRUCTURE
SECTION A-A
N.T.S.



SEDIMENT TRAP DETAIL
SCALE: 1" = 10' HORIZ.
1" = 5' VERT.



DETENTION POND DITCH
SCALE: 1" = 1'-0"



UPPER POND OUTLET STRUCTURE
SECTION B-B
SCALE: 1" = 10' HORIZ.
1" = 5' VERT.

NO.	DATE	REVISION/COMMENT/NOTE	BY
7	9/13/00	RECORD DRAWING	HWP
6	12/6/99	SP REMEDIATION No. 1	RAC
5	6/1/99	LOT 3 REVISIONS & OLDE TOWNE RD UTILITIES	RAC
4	4/1/99	CURB / DRAINAGE REVISIONS	RAC
3	3/30/99	B/D SUBMITTAL SET	RAC
2	7/14/98	REVISED PER V.D.O.T.	RAC
1	2/2/99	REVISED PER OWNER	RAC

COMMONWEALTH OF VIRGINIA
RICHARD A. COSTELLO
CERTIFICATE NO. 013250
CERTIFIED PROFESSIONAL ENGINEER

AES, a professional corporation
1761 Jamestown Road
Williamsburg, Virginia 23185
804-253-0040
Engineering, Planning, Surveying

COMMONWEALTH OF VIRGINIA
RICHARD A. COSTELLO
CERTIFICATE NO. 013250
01/13/00
CERTIFIED PROFESSIONAL ENGINEER

DRAINAGE, SEDIMENT & EROSION CONTROL
EWELL STATION
SHOPPING CENTER
5601 RICHMOND ROAD
OWNER/DEVELOPER: EWELL PROPERTIES INC.
JAMES CITY COUNTY

Designed	HWP/RAC
Drawn	HWP/RAC
Scale	1"=40'
Date	9/13/99
Project No.	6874
Sheet No.	6

RECORD DRAWING - 9/13/00

PC124_EWELL_STATION_DUAL - 003

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

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

LETTER OF TRANSMITTAL

DATE	JOB NO.
9/15/00	6874

ATTENTION: DARRYL COOK

RE: EWELL STATION POND AS-BUILT

TO: JAMES CITY COUNTY
ENVIRONMENTAL DIV.

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

☐ Shop drawings ☒ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
2		1 SH.	AS-BUILT/RECORD DRAWING

SEP 2000 RECEIVED ENVIRONMENTAL DIVISION

THESE ARE TRANSMITTED as checked below:

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

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

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

☐ For review and comment ☐ _____

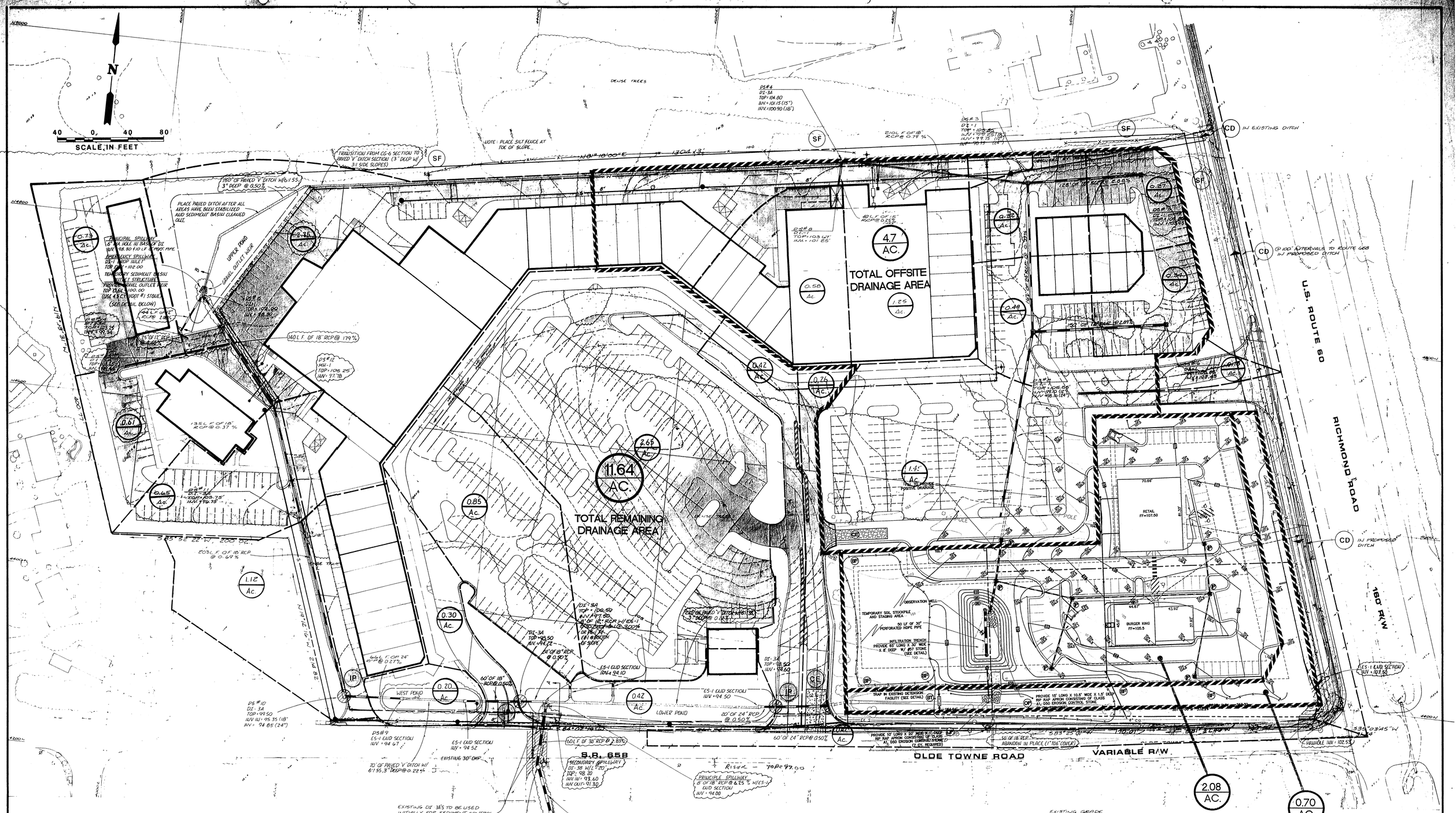
☐ FOR BIDS DUE _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS

COPY TO _____ SIGNED: _____

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

PC124_EWELL_STATION_DUAL - 004



NO.	DATE	REVISION/COMMENT/NOTE	BY
6	8/28/08	REVISED PER JAMES CITY COUNTY COMMENTS	RAC
5	6/11/08	LOT 3 REVISIONS & OLDE TOWNE RD UTILITIES	RAC
4	4/17/08	CURB/DRAINAGE REVISIONS	RAC
3	3/10/08	BID/SUBMITTAL SET	RAC
2	11/14/08	REVISED PER V.D.O.T.	RAC
1	6/12/08	REVISED PER OWNER	RAC

COMMONWEALTH OF VIRGINIA
RICHARD A. COSTELLO
CERTIFICATE NO. 013250
CERTIFIED PROFESSIONAL ENGINEER

AES, a professional corporation
1761 Jamestown Road
Williamsburg, Virginia 23185
804-253-0040
Engineering, Planning, Surveying

EXHIBIT "C"

DRAINAGE, SEDIMENT & EROSION CONTROL

EWELL STATION SHOPPING CENTER

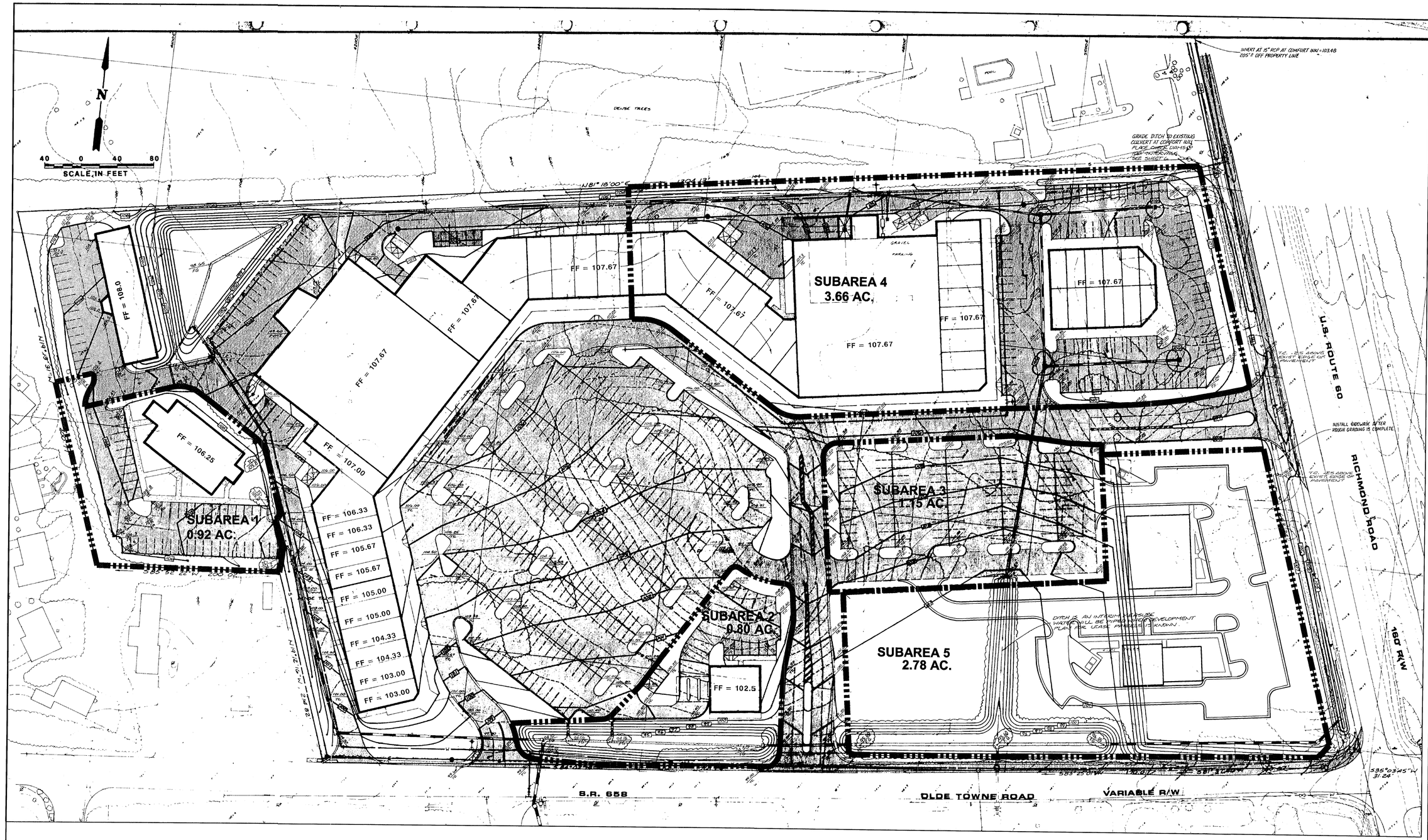
5601 RICHMOND ROAD

OWNER/DEVELOPER: EWELL PROPERTIES INC.

JAMES CITY COUNTY VIRGINIA

Designed	Drawn
HWP/RAC	RMB/DJU
Scale	Date
1"=40'	DEC., 1997
Project No.	
6874	
Drawing No.	
6	

PC124_EWELL_STATION_DUAL - 005



SUBAREA	AREA (AC.)	IMPERVIOUS COVER BLDG. (SF)	PVMT. (SF)	SIDEWALK (SF)	TOTAL IMPERVIOUS (SF.)
1	0.92	6,360	14,754	2,200	23,314
2	0.80	2,750	10,135	373	13,258
3	1.15	0	39,781	0	39,781
4	3.66	63,651	51,632	17,040	132,323
5	2.78	2.78 AC. @ 55% IMPERVIOUS FROM J.W. CROSSING SITE PLAN			66,647

TOTAL AREA 9.31 AC.

TOTAL IMPERVIOUS 275,323 SF. (6.32 AC.)

IMPERVIOUS PERCENTAGE = 6.32/9.31 = 68%

CHESAPEAKE BAY POLLUTANT REMOVAL REQUIREMENTS:

PRE-DEVELOPMENT LOAD -

L_{PRE} = 43 X 0.9 X [0.05 + (0.009X16)] X 0.26 X 9.31 X 2.72 / 12

= 4.12 LBS./YR.

POST-DEVELOPMENT LOAD -

L_{POST} = 43 X 0.9 X [0.05 + (0.009 X 68)] X 0.26 X 9.31 X 2.72 / 12

= 14 LBS./YR

POLLUTANT REMOVAL REQUIREMENT = 14 LBS./YR. - 4.12 LBS./YR. = 9.88 LBS./YR.

CARTER DESIGN
SITE DESIGN AND ENGINEERING
1032 PECK ROAD RICHMOND, VIRGINIA 23235
PHONE: 804.272.1146 FAX: 804.272.2276

EWELL STATION/JW CROSSING
OVERALL BMP SCHEMATIC
JAMES CITY COUNTY, VIRGINIA
POLLUTANT REMOVAL REQUIRMENT

NO.	DATE	REVISIONS	BY
1	XXX	XXX	XXX

SEAL

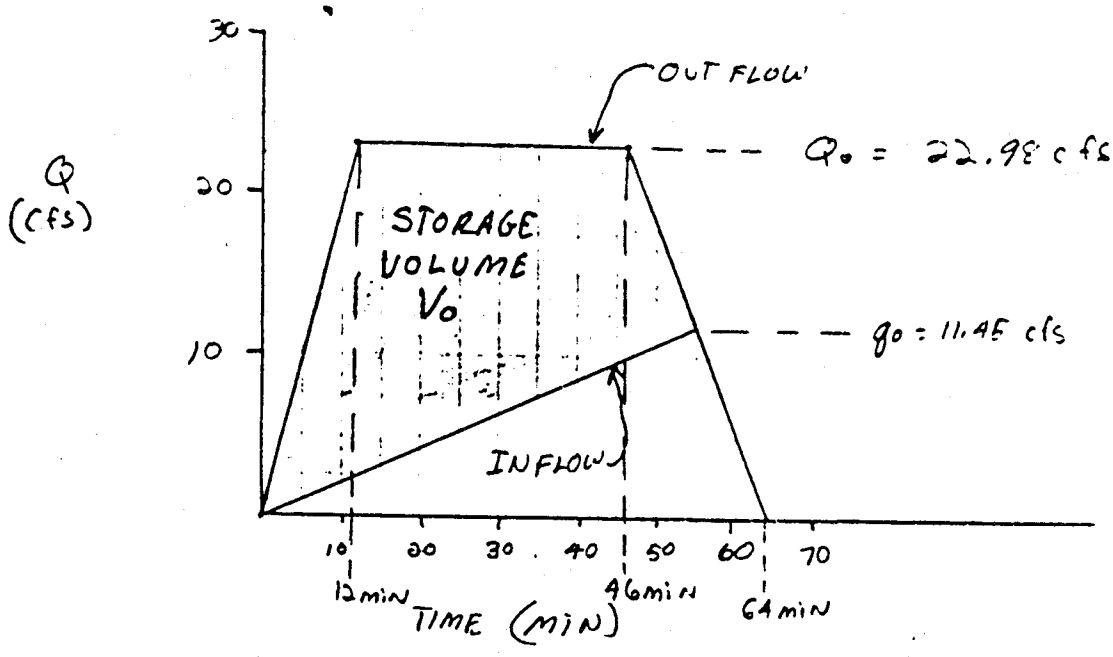
COMMONWEALTH OF VIRGINIA
A. MICHELE CARTER
No. 028821
PROFESSIONAL ENGINEER

SCALE	1"=50'
DESIGNED	AMC
DRAWN	AMC
CHECKED	AMC
DATE	10/20/00

SHEET DESIGNATION
C1
SHEET 1 OF 2
JOB NO

AM 12/9/87

COMPUTE STORAGE VOLUME
(GRAPHICAL METHOD)



$$V_o = \left[\frac{12(22.98)}{2} + 34(22.98) + \frac{18(22.98)}{2} - \frac{11.45(64)}{2}\right]60 =$$

$$[137.88 + 781.32 + 206.82 - 366.40]60 = 45{,}577 \text{ c.f.}$$

$$= 1688 \text{ c.y.}$$

VOLUME PROVIDED = 1700 c.y.

OLD TOWNE CROSSING

DETENTION POND DESIGN

SOIL CONSERVATION SERVICE HANDBOOK METHOD

AM 12/4/87

PRE-DEVELOPMENT FROM SITE DRAINING TO OLD TOWNE ROAD

- D.A = 15.32 AC
  SITE IS 75% WOODED C = 0.20
  21% CULTIVATED C = 0.50
  4% BUILDINGS OR GRAVEL AREA C = 0.7
- C_{comp} = 0.28
- Tc = 30 MIN

2 YR STORM CONSTANTS => a = 126.3, b = 17.3

$$I_2 = \frac{a}{b+Tc} = \frac{126.3}{17.3+30} = 2.67 \text{ IN/HR}$$

$$Q_2 = 0.28\,(2.67)\,15.32 = 11.45 \text{ cfs} = q_o = \text{ALLOWABLE PEAK DISCHARGE FROM DETENTION POND}$$

POST-DEVELOPMENT

D.A = 18.0 AC
SITE IS 70% BUILDINGS OR PAVEMENT C = 0.90
30% OPEN SPACE C = 0.25

C_{comp} = 0.70

Tc = 12 MIN

FOR 2YR STORM CONSTANTS a = 126.3, b = 17.3

$$I_2 = \frac{a}{b+Tc} = \frac{126.3}{17.3+12} = 4.31 \text{ IN/HR}$$

CRITICAL STORM DURATION = CT

$$C_T = \sqrt{\frac{2CAa\,(b - Tc/4)}{q_o}} - b = \sqrt{\frac{2(.70)(18)126.3\,(17.3 - 12/4)}{11.45}} - 17.3$$

$$C_T = 46 \text{ MIN} \Rightarrow I_{2_{CT}} = \frac{126.3}{17.3+46} = 2.00 \text{ IN/HR}$$

$$Q_o = 0.70\,(2.0)\,18 = 25.20 \text{ cfs}$$

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HYDRAULIC ANALYSIS

Return Period = 2 Yrs
Rainfall file: JAMES CITY COUNTY

LINE 1 / Q = 11.7 / HT = 24 / WID = 24 / N = .013 / L = 66 / JLC = [illegible]

DS#10 [illegible] / Outfall

	HGL	DEPTH	INVERT	VEL	EGL	T-WID	COVER	AREA
DNSTRM	96.09	16.99	94.67	4.92	96.46	2.32	N/A	[illegible]
UPSTRM	96.36	18.11	94.85	4.60	96.69	20.00	[illegible]	[illegible]

Drainage area (ac) = 1.12
Runoff coefficient = [illegible]
Time of conc (min) = 8
Inlet time (min) = 5
Intensity (in/hr) = 5.04
Cumulative C*A = 2.3
Flow contrib (cfs) = 3.3
Default Q (cfs) = 0
Line capac (cfs) = 11.8

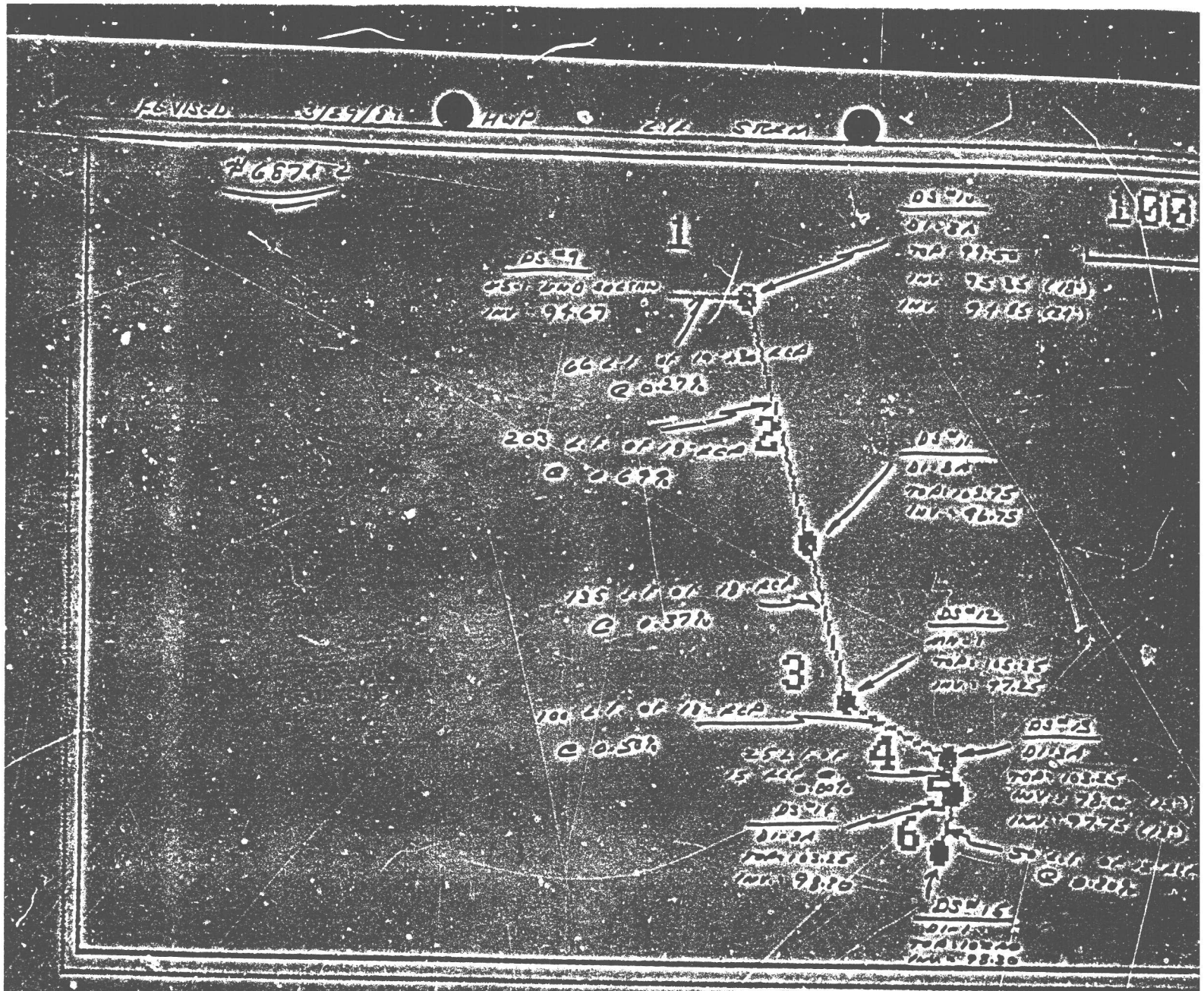
Slope of invert (%) = [illegible]
Slope energy grade line (%) = [illegible]
Critical depth (in) = [illegible]
Req'd length curb inlet (ft) = [illegible]
Req'd grate area (sf) = [illegible]
Depth at inlet opening (in) = [illegible]
Confluence angle (deg) = 0
Natural ground elev (ft) = [illegible]
Line storage (cuft) = [illegible]

LINE 2 / Q = 8.7 / HT = 18 / WID = 18 / N = .013 / L = 203 / JLC = [illegible]

DS#11 [illegible] / DNLN = 1

	HGL	DEPTH	INVERT	VEL	EGL	T-WID	COVER	AREA
DNSTRM	96.89	18.00	95.35	4.95	97.27	0.00	[illegible]	[illegible]
UPSTRM	98.23	[illegible]	96.75	[illegible]	98.6[illegible]	[illegible]	[illegible]	[illegible]

[illegible]



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LINE 5 / Q = 1.7 / HT = 12 / WID = 12 / N = .013 / L = 150 / JLC = 9

DS#6 / DNLN = 1

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	100.46	12.00	99.10	2.42	100.54	0.00		
UPSTRM	104.20	7.10	103.43	3.50	104.40	11.80	1.21	0.48

Drainage area (ac)	=	34	Slope of invert (%)	=	.38
Runoff coefficient	=	9	Slope energy grade line (%)	=	.578
Time of conc (min)	=	5	Critical depth (in)	=	7.97
Inlet time (min)	=	5	Req'd length curb inlet (ft)	=	
Intensity (in/hr)	=	5.69	Req'd grate area (sf)	=	
Cumulative C*A	=	0.3	Depth at inlet opening (in)	=	6
Flow contrib (cfs)	=	1.7	Confluence angle (deg)	=	78
Default Q (cfs)	=	0	Natural ground elev (ft)	=	105.85
Line capac. (cfs)	=	6.1	Line storage (cuft)	=	95

LINE 6 / Q = 1.4 / HT = 12 / WID = 12 / N = .013 / L = 128 / JLC = 9

DS#7 / DNLN = 2

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	101.26	12.00	99.75	1.76	101.31	0.00	5.09	0.76
UPSTRM	104.[illegible]	6.21	103.43	3.37	104.28	11.99	1.45	0.49

Drainage area (ac)	=	27	Slope of invert (%)	=	.574
Runoff coefficient	=	9	Slope energy grade line (%)	=	.20
Time of conc (min)	=	5	Critical depth (in)	=	6.[illegible]
Inlet time (min)	=	5	Req'd length curb inlet (ft)	=	[illegible]
Intensity (in/hr)	=	5.69	Req'd grate area (sf)	=	0.2
Cumulative C*A	=	0.2	Depth at inlet opening (in)	=	6
Flow contrib (cfs)	=	1.3	Confluence angle (deg)	=	38
Default Q (cfs)	=	0	Natural ground elev (ft)	=	101.81
Line capac. (cfs)	=	6.0	Line storage (cuft)	=	76

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LINE 3 // Q = 9.3 // HT = 18 // WID = 18 // N = .013 // L = 210 // SLO =

DS#4 // DNLN = 2

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	ARE
DNSTRM	101.26	[illegible]	[illegible]	[illegible]	[illegible]	0.00	5.00	
UPSTRM	102.89	15.00	100.90	5.24	103.32	0.00	2.4[illegible]	

Drainage area (ac) = 1.25
Runoff coefficient = .9
Time of conc (min) = 5
Inlet time (min) = 5
Intensity (in/hr) = 5.63
Cumulative CA = [illegible]
Flow contrib (cfs) = 6.3
Detention Q (cfs) = 0
Line capac (cfs) = [illegible]

Slope of invert (%) = [illegible]
Slope energy grade line (%) = [illegible]
Critical depth (in) = [illegible]
Req'd length curb inlet (ft) = [illegible]
Req'd grate area (sf) = [illegible]
Depth at inlet opening (in) = [illegible]
Confluence angle (deg) = [illegible]
Natural ground elev = 102
Line storage (cuft) = [illegible]

LINE 4 // Q = 3.0 // HT = 15 // WID = 15 // N = .013 // L = 40 // SLO = [illegible]

DS#5 // DNLN = 3

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	ARE
DNSTRM	103.28	15.00	101.15	2.42	103.37	0.00	[illegible]	
UPSTRM	103.44	15.00	101.21	[illegible]	103.53	0.00	[illegible]	

Drainage area (ac) = .38
Runoff coefficient = [illegible]
Time of conc (min) = [illegible]
Inlet time (min) = 5
Intensity (in/hr) = 5.63
Cumulative CA = [illegible]
Flow contrib (cfs) = [illegible]
Detention Q (cfs) = 0
Line capac (cfs) = [illegible]

Slope of invert (%) = [illegible]
Slope energy grade line (%) = [illegible]
Critical depth (in) = [illegible]
Req'd length curb inlet (ft) = [illegible]
Req'd grate area (sf) = [illegible]
Depth at inlet opening (in) = [illegible]
Confluence angle (deg) = [illegible]
Natural ground elev = [illegible]
Line storage (cuft) = [illegible]

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HYDRAULIC ANALYSIS

Return Period [illegible] Yrs
Rainfall File JAMES CITY COUNTY

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--- COPY ---

LINE 1 / Q = 14.9 / HT = 24 / WID = 24 / N = .013 / L = 240 / JLC = [illegible]

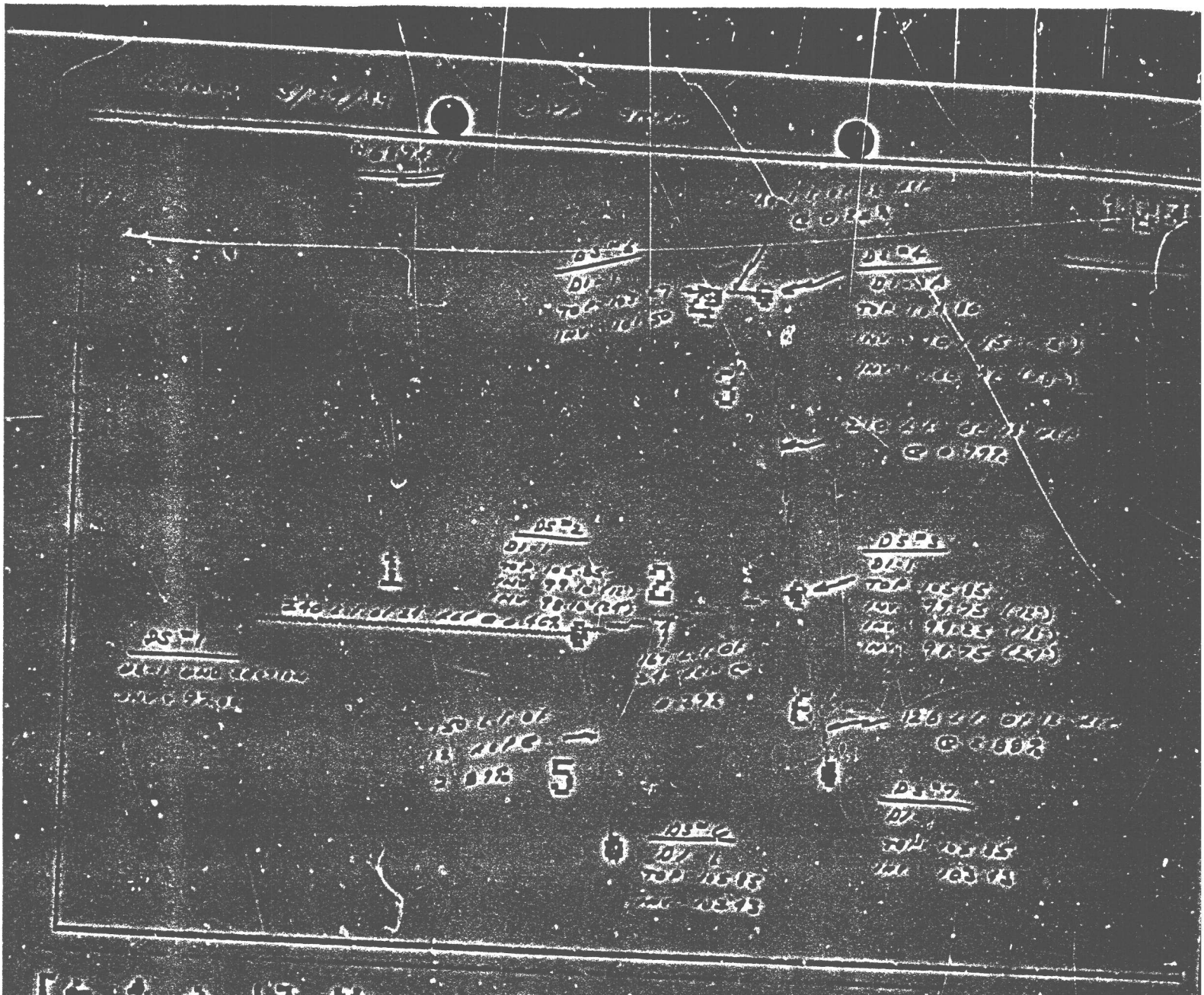
DS#2 [illegible] / Outfall

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	[illegible]	[illegible]	97.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UPSTRM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

LINE 2 / Q = 11.6 / HT = 24 / WID = 24 / N = .013 / L = 167 / JLC = [illegible]

DS#3 [illegible] / DNLN = 1

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UPSTRM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]



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- TEMPORARY SEDIMENT BASIN DESIGN — UPPER POND

D.A = 2.92 AC => SEDIMENT VOLUME = 2.92 ACR 67CY/AC = 196 CY

PLACE GRAVEL WEIR STRUCTURE 1' IN HEIGHT AROUND PRINCIPAL SPILLWAY. IT YIELDS A SEDIMENT VOLUME OF 220 CY. => OK

POND WILL STORE 10 YR STORM THEREFORE THE SEDIMENT BASIN MEETS DESIGN CRITERIA

- TEMPORARY SEDIMENT BASIN DESIGN => LOWER POND

D.A = 14.10 AC
SEDIMENT VOLUME REQD = 14.10 AC X 67CY/AC = 945 CY

COVER 15" RCP PRINCIPAL SPILLWAY WITH WITH GEO CLOTH FILTER FABRIC AND FILL OVER WITH VDOT #1 STONE

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- - COPY - -

EMERGENCY SPILLWAY DESIGN

Q = Q10 FOR LOWER BASIN + RELEASE RATE FROM UPPER BASIN POND TO LOWER RATE

Q10 = 55.87 cfs Q FROM UPPER POND = 1.57 cfs

TOTAL Q = 55.87 + 1.57 − 10.0 = 46.84 cfs

USE DI-3C WITH 20' LONG TRIPOLT
CHECK DEPTH OF WATER AT INLET

$Q = .67\,h\,L\,(2g\,d_0)^{.5}$

$46.84 = .67(.5)(20)[64.4(d_0)]^{.5}$

$46.84 = 6.7\,[64.4\,d_0]^{.5}$

$6.99 = [64.4\,d_0]^{.5}$

$48.86 = 64.4\,d_0$

$d_0 = 48.86/64.4$

$d_0 = 0.76'$

INLET ELEV = 97.60

100yr STORM HIGH WATER ELEV = 97.60 + 0.76' = 98.36'

TOP OF BERM = 98.50 ⇒ OK

BARREL DESIGN

Q = Q10 EQUILIBRIUM BASIN + RELEASE RATE FROM UPPER BASIN

= 55.87 + 1.57 = 56.84 cfs

30" @ 2.05% CAPACITY 57.2 cfs

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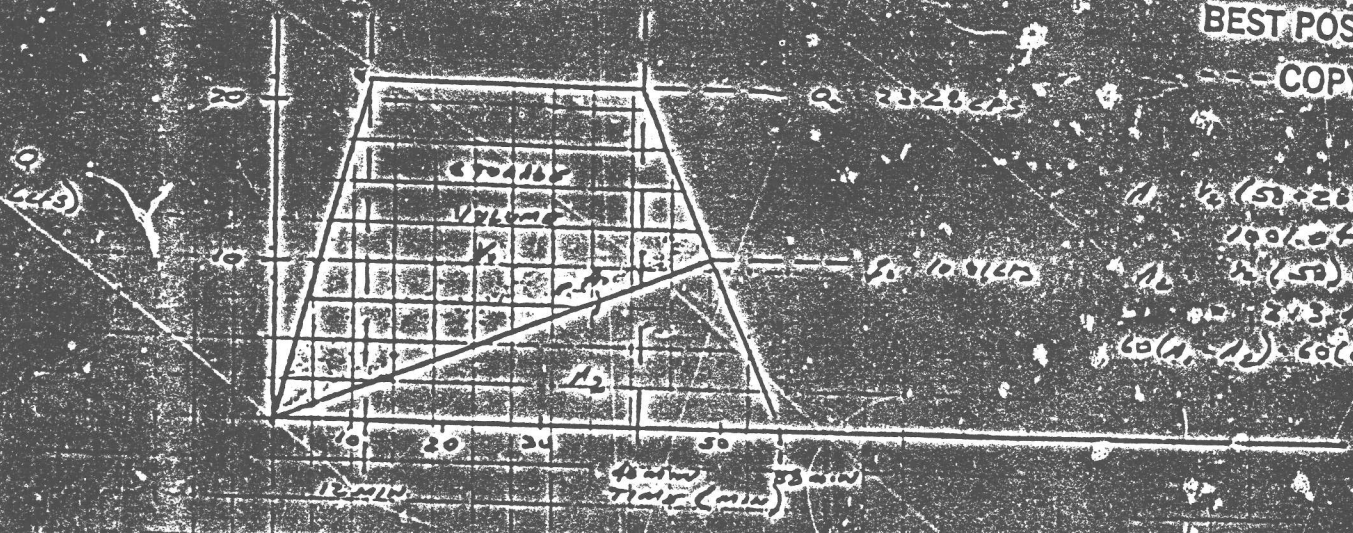
STORAGE VOLUME
(GRAPHICAL METHOD)



$$V_s = \left[Q_1 T_1 + \frac{Q_1 T_1}{2} - \frac{Q_2 T_2}{2} - \frac{3 Q_2 T_2}{4} \right] 60 =$$

$$\left[\frac{(23.26)(10)}{4} + \frac{(23.26)(12)}{2} - \frac{(10.81)(10)}{2} - \frac{3(10.81)(12)}{4} \right] 60$$

$$[931.20 - 69.84 - 216.20 - 97.29] 60 = \frac{41,253 \text{ cf}}{} = \frac{1.5 \text{ ac-ft}}{}$$

Volume Provided = 1840 cf. (Q Equal)

10 yr. Storm Runoff = 2010 - 823.9

$\frac{2010}{23.9 \times 12} = 5.60$ in/hr

$Q_{10} = (0.70)(5.60)(14.0) = 55.27$ cfs

PRINCIPAL SPILLWAY (CULVERT)

Assume

Inlet Control: TZ 12" RCP AW = 3.5 HW/D = 1.5 Top of Riser = 9.00 HW = 9.60

$Q_1 = 10.81$ cfs

Check $Q_2 = 7.10$ cfs

TZ 15" RCP HW = 3.5 HW/D = 3.5/1.5 = 2.8

Check $Q_2 = 10.0$ cfs

Use 15" RCP HW = 9.60

$\frac{\pi (1.25)^2 (2.0)}{4} 60 = 1500$ cf

[illegible] → POND

PRE-DEVELOPMENT

DA = 15.00 AC

SITE IS 80% WOODED, C = 0.20
16% CULTIVATED C = 0.35
4% BUILDINGS OR CRITICAL AREAS C = 0.90

C_{COMP} = 0.27

T_c = 30 MIN

24-HR RAINFALL CONSTANTS ⟹ 124.3 & 17.3

$I_2 = \frac{C}{T_c + b} = \frac{124.3}{17.3 + 30} = 2.67$ IN/HR

$Q_2 = (0.27)(2.67)(15.00) = 10.81$ CFS ← ALLOWABLE PEAK DISCHARGE FROM DETENTION POND

POST-DEVELOPMENT

DA = 14.10 AC

SITE IS 20% BUILDINGS OR PAVEMENT, C = 0.90
80% OPEN SPACE, C = 0.25

C_{COMP} = 0.70

T_c = 12 MIN

24-HR RAINFALL CONSTANTS ⟹ 124.3 & 17.3

$I_2 = \frac{124.3}{17.3 + 12} = 4.31$ IN/HR

CRITICAL STORM DURATION

$t_c = \sqrt{\frac{2CA(b - T_c)}{I_2}} - b = \sqrt{\frac{2(0.70)(14.10)(124.3)(17.3 - 12)}{0.61}} - 17.3$

t_c = 40 MIN ⟹ $I_{2c} = \frac{124.3}{17.3 + 40} = 2.20$ IN/HR

$Q_2 = (0.70)(2.20)(14.10) = 21.77$ CFS

[illegible] DETENTION [illegible]

BEST POSSIBLE COPY

COMPUTE STORAGE VOLUME
(GRAPHICAL METHOD)

$A_1 = \frac{1}{2}(40.5 - 28)(7.94)$
$= 27.95$

$A_2 = \frac{1}{2}(40.5 \times 3.57)$
$= 68.65$

$A_1 - A_2 = 203.3$
$60(203.3) = 12{,}198$

$$K\left[\frac{Q_1 t_1}{4} - \frac{Q_2 t_2}{2} - \frac{3 Q_3 t_3}{4}\right] 60 =$$

$$= \left[\frac{(7.94)(33)}{4} + \frac{(7.94)(5)}{2} - \frac{(8.39)(33)}{2} - \frac{3(3.29)(5)}{4}\right] 60 =$$

$= [262.02 + 9.95 - 85.94 - 12.71]\,60 = 12{,}198$ c.f. $= 452$ c.y.

VOLUME PROVIDED = 1100 c.y.

ASSUME NO DISCHARGE FROM BASIN

10 yr STORM VOLUME = .794 (28 + 40.5/2) 60 = 17,317 c.f.

VOLUME REQUIRED IS LESS THAN VOLUME PROVIDED = 604 c.y.

THEREFORE RETAIN 10 yr STORM IN BASIN WITHOUT DISCHARGE (STORAGE DETAIL)

ORIFICE FLOW

$Q = CA\sqrt{2gH}$ $\quad$ SAY $C = .60$, $A = \pi r^2 = \pi(.33)^2 = 0.1963$

SA NO. WITH = 3.75 $\quad$ USE 3" ORIFICE

$Q = (.6)(.1963)\sqrt{(2)(32.2)(3.75)}$

FOR TRADE
EMERGENCY SPILLWAY

$Q = 1.57$ cfs

BEST POSSIBLE

LINE 5 / Q = 6.4 / HT = 18 / WID = 18 / N = .013 / L = 135 / JLC = [illegible]

DS#12 [illegible] / DNLN = 2

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	98.57	18.00	96.75	[illegible]	98.78	0.00	5.5	[illegible]
UPSTRM	[illegible]	18.00	[illegible].25	[illegible]	[illegible]	0.00	6.5	[illegible]

Drainage area (ac) = [illegible]
Runoff coefficient = [illegible]
Time of conc (min) = [illegible]
Inlet time (min) = 0
Intensity (in/hr) = 5.50
Cumulative C*A = [illegible]
Flow contrib (cfs) = 0
Default Q (cfs) = 0
Line capac (cfs) = 6.4

Slope of invert (%) = [illegible]
Slope energy grade line (%) = [illegible]
Critical depth (in) = [illegible]
Req'd length curb inlet (ft) = 0.0
Req'd grate area (sf) = 0.0
Depth at inlet opening (in) = [illegible]
Confluence angle (deg) = 0.0
Natural ground elev (ft) = 105.25
Line storage (cuft) = [illegible]

LINE 4 / Q = 6.6 / HT = 18 / WID = 18 / N = .013 / L = 100 / JLC = 1.4

DS#13 [illegible] / DNLN = 3

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	99.28	18.00	97.25	5.75	99.49	0.00	6.5	[illegible]
UPSTRM	99.57	18.00	97.75	3.71	99.88	0.00	4.5	[illegible]

Drainage area (ac) = 56
Runoff coefficient = [illegible]
Time of conc (min) = 5
Inlet time (min) = 5
Intensity (in/hr) = 5.65
Cumulative C*A = [illegible]
Flow contrib (cfs) = 2.8
Default Q (cfs) = 0
Line capac (cfs) = 7.4

Slope of invert (%) = [illegible]
Slope energy grade line (%) = [illegible]
Critical depth (in) = [illegible]
Req'd length curb inlet (ft) = [illegible]
Req'd grate area (sf) = [illegible]
Depth at inlet opening (in) = [illegible]
Confluence angle (deg) = [illegible]
Natural ground elev (ft) = [illegible]
Line storage (cuft) = [illegible]

BEST POSSIBLE
COPY

LINE 5 / Q = 3.7 / HT = 15 / WID = 15 / N = .013 / L = 25 / JLC = [illegible]

DS#[illegible] / DNLN = 4

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UPSTRM	[illegible]	15.00	71.20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Drainage area (ac) = 7.0
Runoff coefficient = .9
Time of conc (min) = 5
Inlet time (min) = 5
Intensity (in/hr) = 5.69
Cumulative C*A = 0.7
Flow contrib (cfs) = 3.7
Default Q (cfs) = 0
Line capac (cfs) = 5.8

Slope of invert (ft/ft) = [illegible]
Slope energy grade line (ft/ft) = [illegible]
Critical depth (ft) = [illegible]
Req'd length curb inlet (ft) = [illegible]
Req'd grate area (sf) = [illegible]
Depth at inlet opening (ft) = [illegible]
Confluence angle (deg) = 90
Natural ground elev (ft) = [illegible]
Line storage (cuft) = 50

LINE 6 / Q = 1.6 / HT = 15 / WID = 15 / N = .013 / L = 50 / JLC = 5

DS#15 / DNLN = 5

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	100.21	15.00	98.20	1.28	100.23	0.00	3.8	[illegible]
UPSTRM	100.25	15.00	98.30	1.28	100.28	0.00	2.42	[illegible]

Drainage area (ac) = 0
Runoff coefficient = 0
Time of conc (min) = 0
Inlet time (min) = 0
Intensity (in/hr) = 0.00
Cumulative C*A = 0.0
Flow contrib (cfs) = 1.6
Default Q (cfs) = 1.57
Line capac (cfs) = 2.7

Slope of invert (ft/ft) = 0.200
Slope energy grade line (ft/ft) = 0.055
Critical depth (ft) = [illegible]
Req'd length curb inlet (ft) = 0.0
Req'd grate area (sf) = [illegible]
Depth at inlet opening (ft) = [illegible]
Confluence angle (deg) = 28
Natural ground elev (ft) = [illegible]
Line storage (cuft) = [illegible]

BEST POSSIBLE COPY

Reservoir Report

English

Reservoir No. 4 - FUTURE DRY BASIN

Pond Data

Pond storage is based on known contour areas

Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	91.00	00	0	0
2.90	93.90	01	1	1
3.00	94.00	02	0	1
4.00	95.00	3,875	1,939	1,940
5.00	96.00	9,720	6,798	8,738
6.00	97.00	16,033	12,877	21,615
7.00	98.00	21,037	18,535	40,150

Culvert / Orifice Structures

		[A]	[B]	[C]	[D]
Rise in	=	18.0	5.0	0.0	0.0
Span in	=	18.0	5.0	0.0	0.0
No. Barrels	=	1	1	0	0
Invert El. ft	=	94.00	94.00	0.00	0.00
Length ft	=	8.0	8.0	0.0	0.0
Slope %	=	5.00	6.25	0.00	0.00
N-Value	=	.013	.013	.000	.000
Orif. Coeff.	=	0.60	0.60	0.00	0.00
Multi-Stage	=	-----	Yes	No	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len ft	=	12.6	20.0	0.0	0.0
Crest El. ft	=	97.00	97.70	0.00	0.00
Weir Coeff.	=	3.00	3.00	0.00	0.00
Eqn. Exp.	=	1.50	1.50	0.00	0.00
Multi-Stage	=	No	Yes	No	No

what about 30" pipe under road

Tailwater Elevation = 0.00 ft 30" pipe @ 2.83% = 69cfs

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	Discharge cfs
0.00	0	91.00	0.00	0.00	---	---	0.00	0.00	---	---	0.00
2.90	1	93.90	0.00	0.00	---	---	0.00	0.00	---	---	0.00
3.00	1	94.00	0.00	0.00	---	---	0.00	0.00	---	---	0.00
4.00	1,940	95.00	4.31	0.55	---	---	0.00	0.00	---	---	0.55
5.00	8,738	96.00	9.51	0.83	---	---	0.00	0.00	---	---	0.83
6.00	21,615	97.00	12.76	1.05	---	---	0.00	0.00	---	---	1.05
7.00	40,150	98.00	15.34	1.07	---	---	37.71	9.86	---	---	48.64

REROUTE Performed for SP-20-00 JW CROSSING (BURGER KING)

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	9.1	1	15	8,156	2	----	------	------	2 YR PRE
2	Rational	12.1	1	15	10,888	10	----	------	------	10 YR PRE
3	Rational	20.0	1	10	12,020	2	----	------	------	2 YR POST
4	Rational	26.0	1	10	15,581	10	----	------	------	10 YR POST
5	Rational	35.5	1	10	21,285	100	----	------	------	100 YR POST
6	Reservoir	5.5	1	17	8,894	2	3	99.81	16,970	2 YR JW CROSSING R
7	Reservoir	10.0	1	16	12,456	10	4	100.14	18,368	10 YR JW CROSSING
8	Reservoir	19.8	1	14	18,160	100	5	100.56	20,317	100 YR JW CROSS RT
9	Rational	14.9	1	30	26,792	2	----	------	------	2 YR PRE EWELL STA
10	Rational	20.9	1	30	37,661	10	----	------	------	10 YR PRE EWELL ST
11	Rational	39.3	1	10	23,560	2	----	------	------	2 YR POST EWELL ST
12	Rational	50.9	1	10	30,540	10	----	------	------	10 YR POST EWELL S
13	Combine	39.7	1	10	32,454	2	6 + 11	------	------	2 YR POST COMBINED
14	Combine	51.4	1	10	42,996	10	7 + 12	------	------	10 YR POST COMBINE
15	Reservoir	11.6	1	18	32,454	2	13	96.59	16,400	2 YR POST ROUTED
16	Reservoir	13.2	1	19	42,996	10	14	97.17	24,692	10 YR ROUTED
17	Reservoir	11.3	1	17	23,560	2	11	96.51	15,337	2 YR EW STA (12.34
18	Reservoir	12.6	1	18	30,540	10	12	96.96	21,077	10 YR EW STA (12.3
19	Rational	69.5	1	10	41,721	100				100 YR POST EW STA
20	Reservoir	14.1	1	18	41,721	100	19	97.50	30,794	100 YR ROUTED (12.
21	Combine	73.9	1	10	59,880	100	8 + 19		------	100 YR COMBINED
22	Reservoir	20.2	1	19	59,880	100	21	97.89	38,165	100 YR ROUTED
23	Reservoir	3.0	1	21	32,453	2	13	97.13	24,088	2 YR THRU FUTURE
24	Reservoir	13.8	1	19	42,995	10	14	97.48	30,531	10 YR THRU FUTURE
25	Reservoir	37.0	1	17	59,879	100	21	97.88	37,910	100 YR THRU FUTURE

1-8 6.78 ac goes thru JW Xing BMP

original pre-devel

Ewell Sta - JW Xing

Total Post Devel Combined

Thru ex. Dry Basin unmodif.

Ewell Sta to dry basin

Thru Dry Ba

Revised Dry Basin Design

Capacity of 30" pipe not considered - ?
Need to check 100 yr w/ this in place

Proj. file: 84590.gpw	IDF file: New JCC.IDF	Run date: 10-18-2000

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	9.1	1	15	8,156	2	----	------	------	2 YR PRE
2	Rational	12.1	1	15	10,888	10	----	------	------	10 YR PRE
3	Rational	20.0	1	10	12,020	2	----	------	------	2 YR POST
4	Rational	26.0	1	10	15,581	10	----	------	------	10 YR POST
5	Rational	35.5	1	10	21,285	100	----	------	------	100 YR POST
6	Reservoir	5.5	1	17	8,894	2	3	99.81	16,970	2 YR JW CROSSING R
7	Reservoir	10.0	1	16	12,456	10	4	100.14	18,368	10 YR JW CROSSING
8	Reservoir	19.8	1	14	18,160	100	5	100.56	20,317	100 YR JW CROSS RT
9	Rational	14.9	1	30	26,792	2	----	------	------	2 YR PRE EWELL STA
10	Rational	20.9	1	30	37,661	10	----	------	------	10 YR PRE EWELL ST
11	Rational	39.3	1	10	23,560	2	----	------	------	2 YR POST EWELL ST
12	Rational	50.9	1	10	30,540	10	----	------	------	10 YR POST EWELL S
13	Combine	39.7	1	10	32,454	2	6 + 11	------	------	2 YR POST COMBINED
14	Combine	51.4	1	10	42,996	10	7 + 12	------	------	10 YR POST COMBINE
15	Reservoir	11.6	1	18	32,454	2	13	96.59	16,400	2 YR POST ROUTED
16	Reservoir	13.2	1	19	42,996	10	14	97.17	24,692	10 YR ROUTED
17	Reservoir	11.3	1	17	23,560	2	11	96.51	15,337	2 YR EW STA (12.34
18	Reservoir	12.6	1	18	30,540	10	12	96.96	21,077	10 YR EW STA (12.3
19	Rational	69.5	1	10	41,721	100	----	------	------	100 YR POST EW STA
20	Reservoir	14.1	1	18	41,721	100	19	97.50	30,794	100 YR ROUTED (12.
21	Combine	73.9	1	10	59,880	100	8 + 19	------	------	100 YR COMBINED
22	Reservoir	20.2	1	19	59,880	100	21	97.89	38,165	100 YR ROUTED
23	Reservoir	3.0	1	21	32,454	2	13	97.14	24,127	2 YR THRU FUTURE
24	Reservoir	13.8	1	19	42,996	10	14	97.48	30,557	10 YR THRU FUTURE
25	Reservoir	37.0	1	17	59,880	100	21	97.88	37,928	100 YR THRU FUTURE
26	Reservoir	2.4	1	22	32,453	2	13	97.14	24,261	2 YR THRU FUTURE
27	Reservoir	10.4	1	20	42,995	10	14	97.54	31,547	10 YR THRU FUTURE
28	Reservoir	32.7	1	18	59,879	100	21	97.98	39,722	100 YR THRU FUTURE

SAME AS 23-25, BUT USED 30" RISER PIPE.

Proj. file: 84590.gpw	IDF file: New JCC.IDF	Run date: 10-04-2001

JW CROSSING / EWELL STATION

10/4/01 AWP

Hydrograph Plot

English

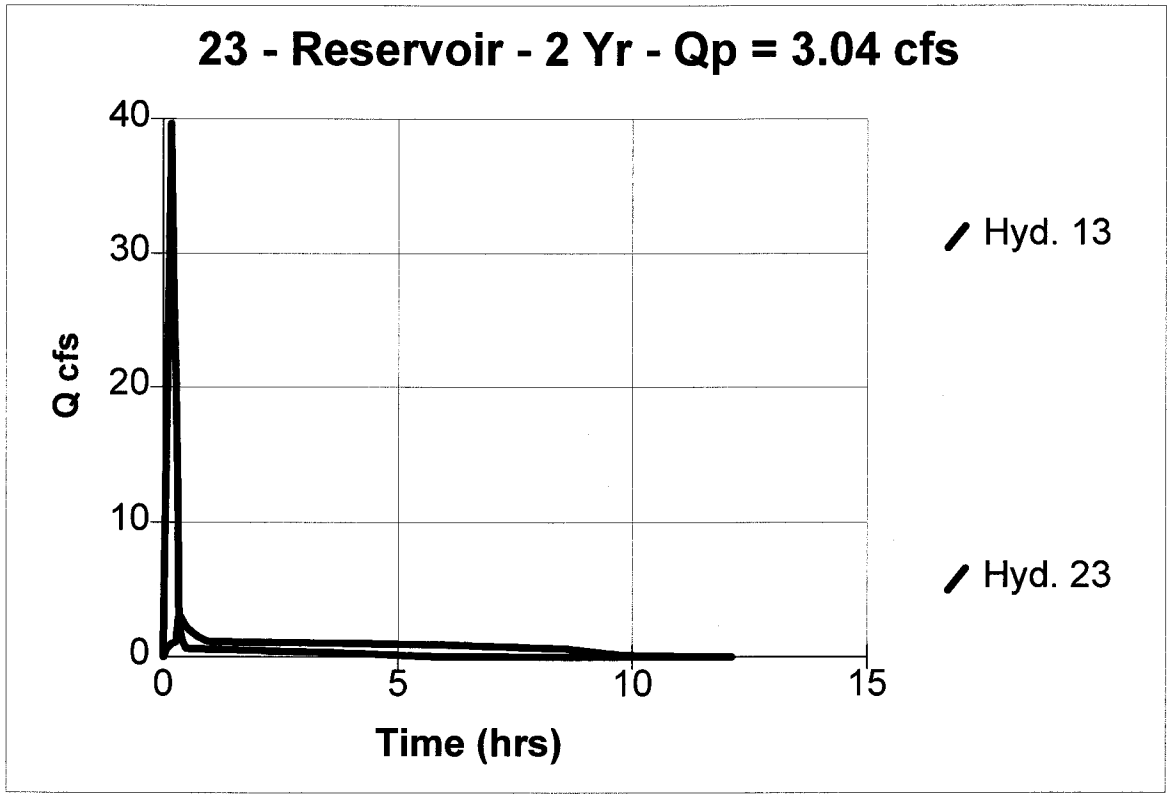
Hyd. No. 23

2 YR THRU FUTURE

Hydrograph type	= Reservoir	Peak discharge	= 3.04 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 13	Reservoir name	= FUTURE DRY BASI
Max. Elevation	= 97.13 ft	Max. Storage	= 24,088 cuft

Storage Indication method used.

Total Volume = 32,453 cuft



Hydrograph Plot

English

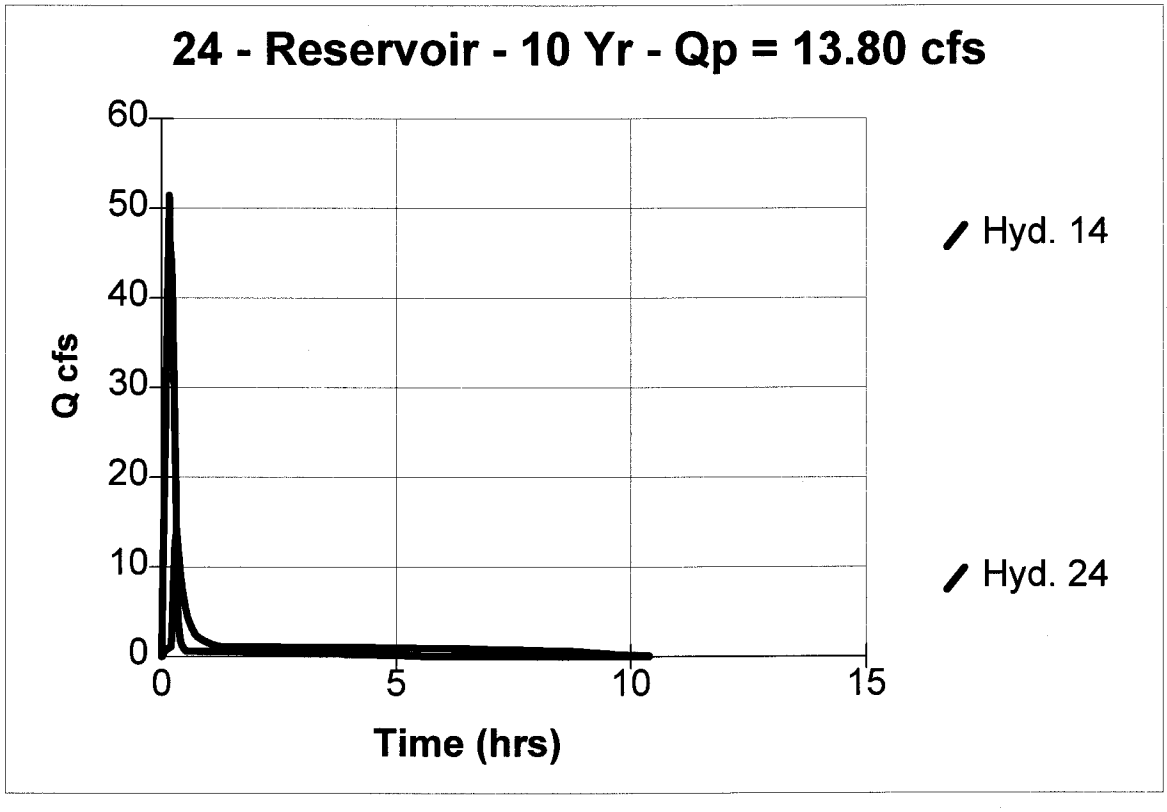
Hyd. No. 24

10 YR THRU FUTURE

Hydrograph type	= Reservoir	Peak discharge	= 13.80 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 14	Reservoir name	= FUTURE DRY BASI
Max. Elevation	= 97.48 ft	Max. Storage	= 30,531 cuft

Storage Indication method used.

Total Volume = 42,995 cuft



Hydrograph Plot

English

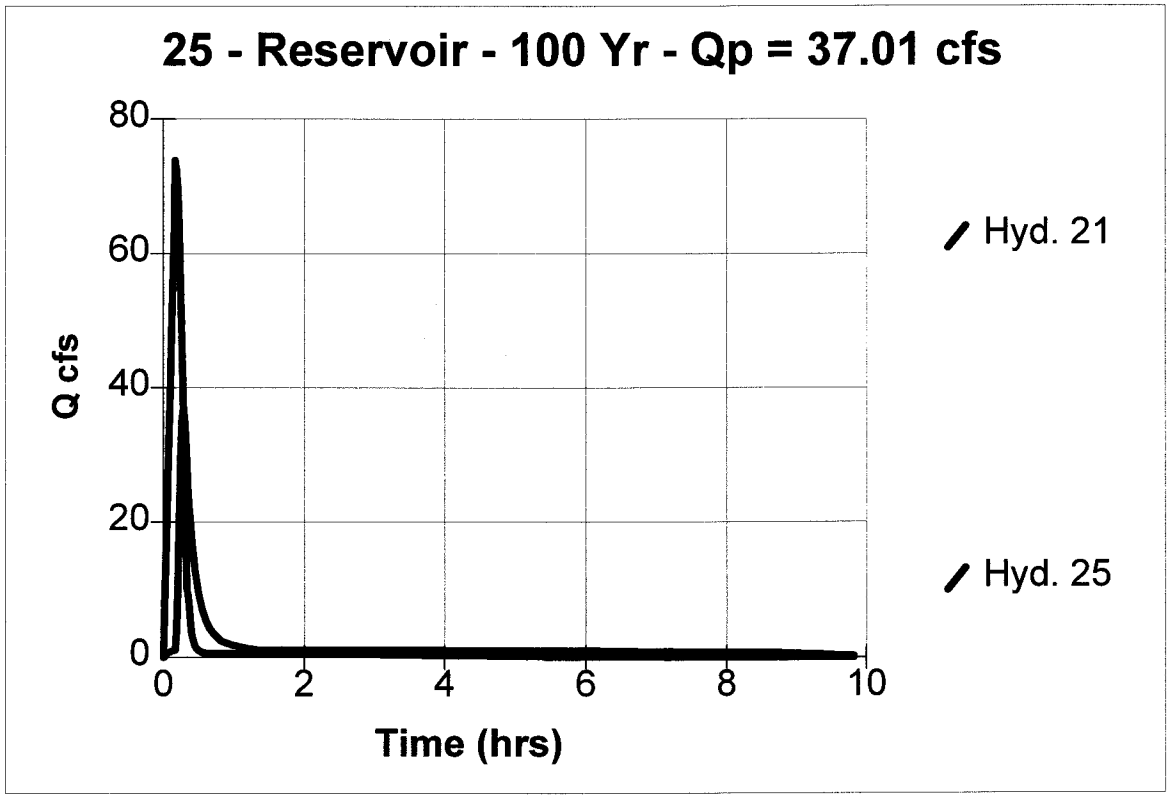
Hyd. No. 25

100 YR THRU FUTURE

Hydrograph type	= Reservoir	Peak discharge	= 37.01 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 21	Reservoir name	= FUTURE DRY BASI
Max. Elevation	= 97.88 ft	Max. Storage	= 37,910 cuft

Storage Indication method used.

Total Volume = 59,879 cuft



10/26/00

BMP VOLUMES REQUIRED FOR EWELL STATION/J. W. CROSSING:

UPPER POND

20% EXTENDED DETENTION DRY BASIN: - CBLAD Basin Design

Impervious Area to be treated by basin = 7.35 acres - where is this documented

Volume required = 7.35 ac x 1816 cf/ac. $\frac{0.5''}{12''/ft} \times 43{,}560 \frac{ft^2}{ac} = 1816\ ft^3/ac$

Volume required = 13,344 cf.

LOWER POND

50% INFILTRATION TRENCHES:

Impervious Area to be treated by trench = 5.97 acres - DA's 1+2 on Pollutant Removal Compliance Sht.

Volume required = 5.97 ac. X 1816 cf./ac.

Volume required = 10,836 cf.

Volume provided in trench approved on J.W. Crossing Plan = 6,240 cf.

Volume to be provided in additional trench along Olde Towne Road = 10,836 cf - 6,240 cf

= 4,596 cf

Volume provided by trench 170' long x 8' wide x 6' deep with 2 - 36" plastic pipes 170' long

Volume in pipes = 170' x 2 x 7.0685 cf./lf = 2,403.3 cf
Overall trench volume = 170' x 8' x 6' = 8,160 cf
(Overall volume - pipe volume) x 0.4 void ratio = void volume
(8,160 cf - 2,403.3 cf) x 0.40 = 2,302.7 cf.

Volume provided by additional trench = Volume in pipes + Volume in voids

= 2,403.3 cf. + 2,302.7 cf.

= 4,706 cf. > 4,596 cf. needed in trench

TOTAL SITE = 18.26 ac

7.35 + 5.97 = 13.32 => 72.9%

WATERSHED	PC	MAINTENANCE PLAN	No	CTRL STRUC DESC	DI-3C Inlet
BMP ID NO	124	SITE AREA acre	13.22	CTRL STRUC SIZE inches	Unk
PLAN NO	SP-59-89	LAND USE	Gen Business	OTLT BARRL DESC	RCP
TAX PARCEL	(33-03)(01-02)	old BMP TYP	Infiltration Trench	OTLT BARRL SIZE inch	30
PIN NO	3330100002	JCC BMP CODE			
CONSTRUCTION DATE	1/1/1988	POINT VALUE		EMERG SPILLWAY	No
PROJECT NAME	Ewell Station - Lower Pond			DESIGN HW ELEV	Unk
FACILITY LOCATION	5601 Richmond Road (along Olde Towne Rd)			PERM POOL ELEV	na
CITY-STATE	Williamsburg, Va. 23188	SVC DRAIN AREA acres	14.1	2-YR OUTFLOW cfs	0.00
CURRENT OWNER	Ewell Station, Inc.			10-YR OUTFLOW cfs	0.00
OWNER ADDRESS	P.O. Box 325			REC DRAWING	Yes
OWNER ADDRESS 2		SERVICE AREA DESCRI	Retail, Parking & Roadway		
CITY-STATE-ZIP CODE	Williamsburg, Va. 23187	IMPERV AREA acres	6	CONSTR CERTI	No
OWNER PHONE		RECV STREAM	UT of Powhatan Creek		
MAINT AGREEMENT	No	EXT DET-WQ-CTRL	Yes	LAST INSP DATE	
EMERG ACTION PLAN	No	WTR QUAL VOL acre-ft	0.2488	INTERNAL RATING	
		CHAN PROT CTRL	No	MISC/COMMENTS	
		CHAN PROT VOL acre-ft	0	Form SP-113-87 New Towne Crossing Shopping Center. Lower Pond. Also see PC036.	
		SW/FLOOD CONTROL	Yes		
		GEOTECH REPORT	No		

Get Last BMP No

Return to Menu

PC124_EWELL_STATION_DUAL - 031