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: **MC008**

DATE VERIFIED: **November 20, 2012**

QUALITY ASSURANCE TECHNICIAN: **Leah Hardenbergh**

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA

Stormwater Division

MEMORANDUM

Date: March 28, 2012

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

From: Leah Hardenbergh

PO: 110426

Re: Files Approved for Scanning

General File ID or BMP ID:	**MC008**
PIN:	**4711500001B**
Owner Name (if known):	**VILLAGE SQUARE**
Legal Property Description:	**CONSERVATION AREA P-1 VILLAGE SQUARE**
Site Address:	**ADJACENT TO 4588 VILLAGE PARK DRIVE EAST**

(For internal use only):

Box # 2

Agreements (in file as of scan date): Y Book or Doc #:

MC-008

Contents for Stormwater Management Facilities As-built Files

Each file is to contain:

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

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF RUNOFF CONTROL FACILITY

THIS DECLARATION, made this 24th day of March, 1994, between IRONBOUND MARKETPLACE PARTNERS, L.L.C., a Virginia limited liability company ("Marketplace Partners"), JAMESTOWN, INC., a Virginia corporation ("Jamestown, Inc."), and IRONBOUND COMPANY, L.C., a Virginia limited liability company ("Company"), and all successors in interest, hereinafter referred to as the "COVENANTOR(S)," (index as "grantors" and "grantees") and JAMES CITY COUNTY, VIRGINIA, hereinafter referred to as the "COUNTY" (index as a "grantee").

WITNESSETH:

RECITALS:

A. Marketplace Partners owns or is to acquire that parcel of real property ("Phase I") designated as "PHASE I GOVERNOR'S GREEN 5.9442," as shown on that subdivision plat (the "Plat") entitled "PLAT OF GOVERNOR'S GREEN BEING A SUBDIVISION OF PROPERTY OF IRONBOUND COMPANY, L.C. JAMES CITY COUNTY, VIRGINIA," dated February 18, 1994, prepared by Langley and McDonald, P.C., which plat is or will be recorded in the James City County, Virginia Circuit Court Clerk's Office in Map Book ____, at page ____.

B. Company is the owner of three parcels of real property designated as "PHASE IIIA 0.8937 ACRES" ("Phase IIIA") and "PHASE IIIB 0.8399 ACRES" ("Phase IIIB") and "PHASE II 2.7888 ACRES" ("Phase II"), on the Plat.

C. Jamestown, Inc. owns certain real property (the "Residential Property") more particularly described on EXHIBIT A attached hereto and by this reference made a part hereof (Phase I, Phase II, Phase IIA, Phase IIIB and the Residential Property are hereinafter collectively referred to as the "Benefitted Property").

D. The parties hereto have agreed that a runoff control facility is to be constructed and operated on the Residential Property, subject to the terms and conditions set forth herein.

DECLARATION AND AGREEMENT

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

1. The COVENANTOR(S) shall provide maintenance for the runoff control facility, hereinafter referred to as the "FACILITY", located on and serving the Benefitted Property to ensure that the FACILITY is and remains in proper working condition in accordance with approved design standards, and with the law and applicable executive regulations. The cost of such maintenance shall be prorated among the COVENANTORS in accordance with their "Percentage of Responsibility" shown following the respective parcels of the Benefitted Property:

Phase I	50%
Phase II	20%
Phase IIIA	5%
Phase IIIB	5%
Residential Property	20%

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

3. The COVENANTOR(S) shall provide and maintain perpetual access from public right-of-ways to the FACILITY for the COUNTY and Marketplace Partners, and their respective agents and contractors.

4. The COVENANTOR(S) shall grant the COUNTY and Marketplace Partners, and their respective agents and contractors, a right of entry to the FACILITY for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining or repairing the FACILITY.

5. If, after reasonable notice by the COUNTY or any of the owners of the Benefitted Property, the owners of the Benefitted Property shall fail to maintain the FACILITY in accordance with the approved design standards and with the law and applicable executive regulations, the COUNTY or Marketplace Partners may, but shall not be obligated to, perform all necessary repair or maintenance work, and whichever of the COUNTY or Marketplace Partners performing such work may assess the owners of all the Benefitted Property served by the FACILITY, in accordance with the respective Percentages of Responsibility, for the cost of the work and any applicable penalties.

6. The COVENANTOR(S), for themselves and their successors (including, without limitation, successors in title) and assigns, agree to, in accordance with their respective Percentages of Responsibility, indemnify and save the COUNTY harmless from any and all claims for damages to persons or property arising from the installation, construction, maintenance, repair, operation or use of the FACILITY, unless such damages are determined to be the result of the willful or negligent acts or omissions of one or more of the COVENANTOR(S) or such successors or assigns in which event such COVENANTOR(S) or successors or assigns shall be solely responsible for such indemnity and hold harmless obligation arising therefrom and all other COVENANTOR(S) shall not be subject to such obligation relating to such damages.

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

8. The covenants contained herein shall run with the land and shall bind the COVENANTOR(S) and the COVENANT(S)' heirs, executors, administrators, successors and assignees, and shall bind all present and subsequent owners of the Benefitted Property served by the FACILITY in accordance with their applicable Percentage of Responsibility. Upon the legal transfer of the property owned by COVENANTOR being served by the FACILITY, by acceptance of such transfer, the transferee assumes all of the obligations of such COVENANTOR as set forth herein, the COVENANTOR legally transferring such property to the transferee, shall thereupon be relieved of any further liability or responsibility hereunder with respect to such property transferred.

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

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of this 24th day of March, 19 94.

COVENANTOR(S)

JAMESTOWN, INC.

President

ATTEST:

_____

COVENANTOR(S)

IRONBOUND MARKETPLACE PARTNERS L.L.C.

~~ATTEST:~~

COVENANTOR(S)

IRONBOUND COMPANY, L.C.

Managing Member

ATTEST:

Managing Member

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF NEWPORT NEWS

I, the undersigned Notary Public, in and for the jurisdiction aforesaid, do certify that Jeffrey L. Weeks, President of Jamestown, Inc., whose name is signed as such to the foregoing writing bearing date 24th day of March, 1994, this day sworn the same before me in my jurisdiction aforesaid.

GIVEN under my hand this 24th day of March, 1994.

Carolyn W. Whitley
Notary Public

My commission expires: July 31, 1995

Approved as to form:

_____

COMMONWEALTH OF VIRGINIA
CITY/~~COUNTY~~ OF NORFOLK

I, the undersigned Notary Public, in and for the jurisdiction aforesaid, do certify that John L. Gibson, III as manager of Jamestown Marketplace Partners LLC whose name is signed as such to the foregoing writing bearing date 24th day of March, 1994, this day sworn the same before me in my jurisdiction aforesaid.

GIVEN under my hand this 24th day of March, 1994.

Donna M. Booth
Notary Public

My commission expires: September 30, 1997

Approved as to form:

_____

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF NEWPORT NEWS

I, the undersigned Notary Public, in and for the jurisdiction aforesaid, do certify that Joseph H. Latchum, Jr. and Jeffrey L. Weeks*, whose name is signed as such to the foregoing writing bearing date _____ day of _____, 19__, this day sworn the same before me in my jurisdiction aforesaid.

GIVEN under my hand this 24th day of March, 19 94.

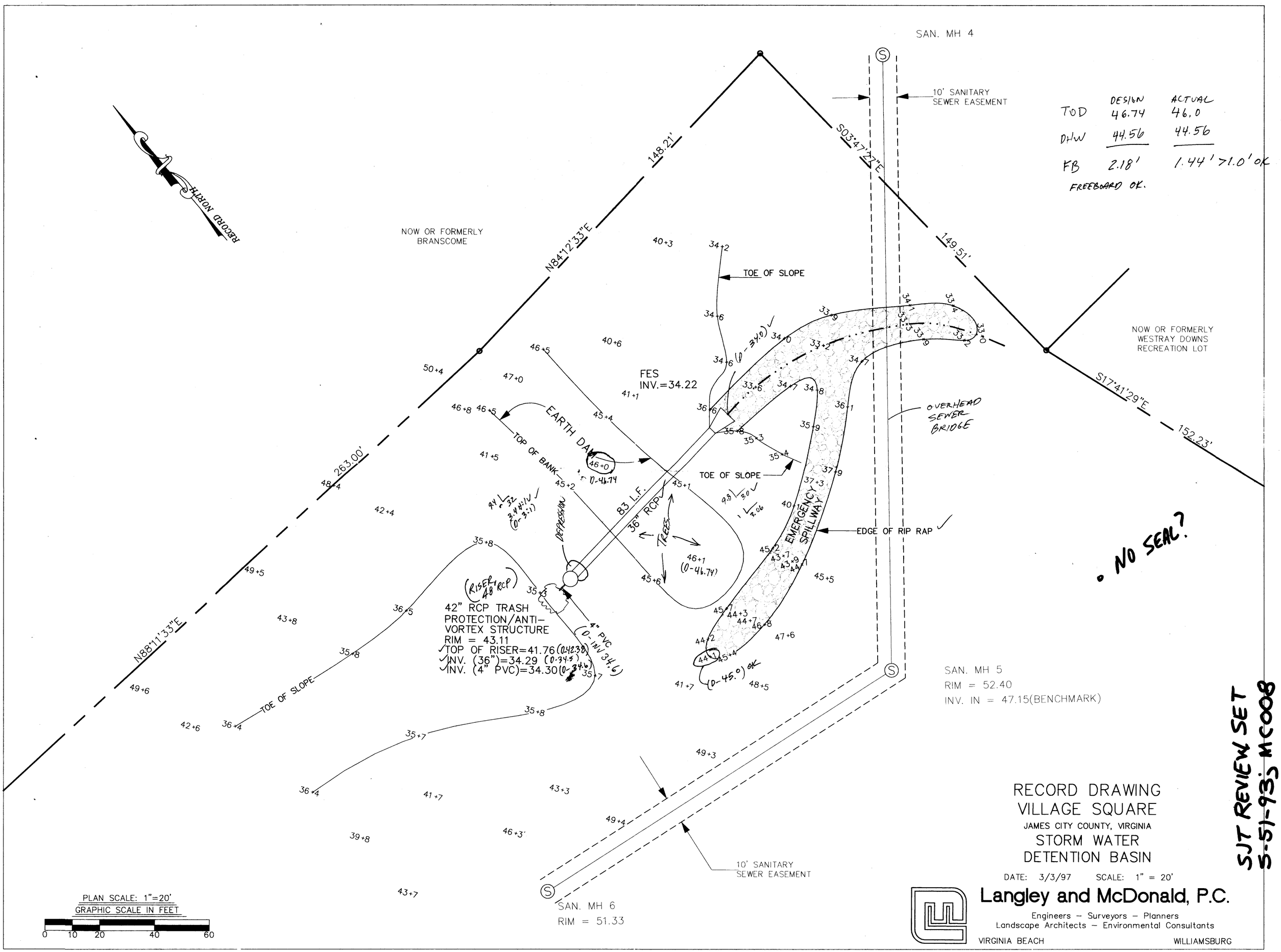
*Managing Members of Ironbound Company, L.C.

Carol J. Whitley
Notary Public

My commission expires: July 31, 1995

Approved as to form:

_____



	DESIGN	ACTUAL
TOD	46.74	46.0
DHW	44.56	44.56
FB	2.18'	1.44' >1.0' OK

FREEBOARD OK.

• NO SEAL?

SJT REVIEW SET
S-51-93; MC008

RECORD DRAWING
VILLAGE SQUARE
JAMES CITY COUNTY, VIRGINIA
STORM WATER
DETENTION BASIN

DATE: 3/3/97 SCALE: 1" = 20'

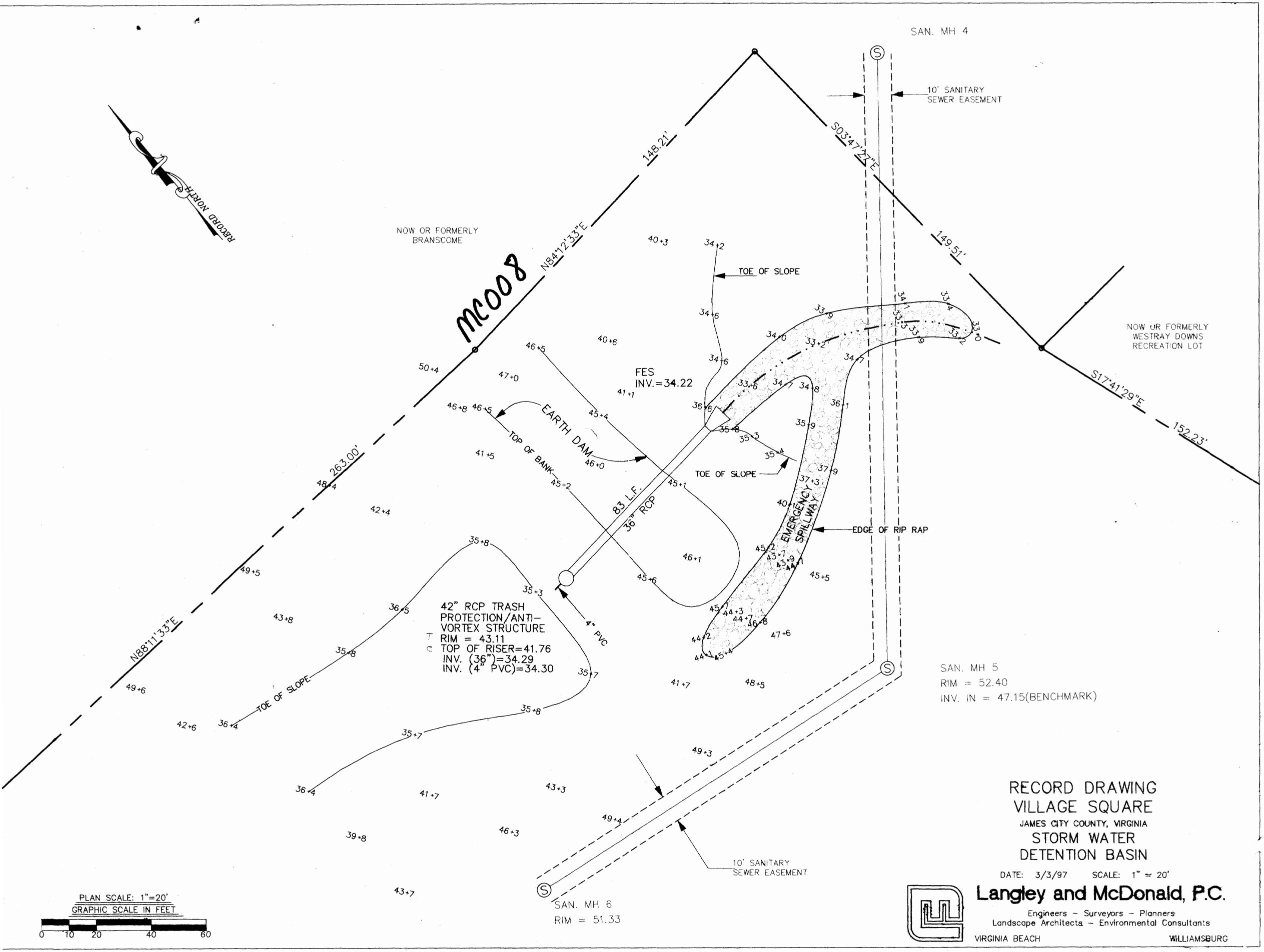
Langley and McDonald, P.C.

Engineers – Surveyors – Planners
Landscape Architects – Environmental Consultants

VIRGINIA BEACH WILLIAMSBURG

MC008_VILLAGE_SQ_FIVE_FORKS - 010

6388W



RECORD DRAWING
VILLAGE SQUARE
JAMES CITY COUNTY, VIRGINIA
STORM WATER DETENTION BASIN

DATE: 3/3/97 SCALE: 1" = 20'

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

MC008_VILLAGE_SQ_FIVE_FORKS - 011

6388W

INLET COMPUTATIONS

PROJECT 93054-5
HEC12 Version: V2.91 Run Date: 06-13-1993

INLET NUMBER 2-DI-3B LENGTH STATION 6+65

DRAINAGE AREA = 0.670 ACRES C VALUE = .430 CA = 0.288
SUM CA= 0.288 INT= 3.50 CFS= 1.008 CO= 0.000 GUTTER FLOW= 1.008

GUTTER SLOPE = 0.0400 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
2.91	2.0	0.69	0.0833	4.0	0.99	3.5	0.146	0.165

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 8.4 EFFICIENCY= 0.90
CFS INTERCEPTED= 0.90 CFS CARRYOVER= 0.11

INLET NUMBER 3-DI-3C LENGTH 6.0 STATION RADIUS POINT

DRAINAGE AREA = 0.180 ACRES C VALUE = .750 CA = 0.135
DRAINAGE AREA = 0.460 ACRES C VALUE = .700 CA = 0.322

FOR THE FIRST SIDE
SUM CA= 0.135 INT= 3.50 CFS= 0.473 CO= 0.110 GUTTER FLOW= 0.583
FOR THE OTHER SIDE
SUM CA= 0.322 INT= 3.50 CFS= 1.127 CO= 0.000 GUTTER FLOW= 1.127
AT THE INLET

SUM CA= 0.457 INT= 3.50 CFS= 1.600 CO= 0.110 GUTTER FLOW= 1.710

GUTTER SLOPE = 0.0050 FT/FT PAVEMENT CROSS SLOPE = 0.0323 FT/FT

SPREAD AT A SLOPE OF .005 (ft./ft.) AND 1.13 (cfs) IS 5.31 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 9.60 H (ft) = 0.375
DEPTH OF WATER (ft) = 0.18 SPREAD (ft) = 5.62

INLET NUMBER 6-DI-3B LENGTH 8.0 STATION 14+00 Lt.

DRAINAGE AREA = 0.900 ACRES C VALUE = .400 CA = 0.360
SUM CA= 0.360 INT= 3.50 CFS= 1.260 CO= 0.000 GUTTER FLOW= 1.260

GUTTER SLOPE = 0.0350 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
3.83	2.0	0.52	0.0833	4.0	0.96	3.5	0.146	0.160

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 9.0 EFFICIENCY= 0.98
CFS INTERCEPTED= 1.24 CFS CARRYOVER= 0.02

INLET NUMBER 6-A DI-3 LENGTH 8.0 STATION 14+00 Rt. Rd.

DRAINAGE AREA = 0.380 ACRES C VALUE = .850 CA = 0.323
SUM CA= 0.323 INT= 3.50 CFS= 1.131 CO= 0.000 GUTTER FLOW= 1.131

GUTTER SLOPE = 0.0350 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
3.48	2.0	0.57	0.0833	4.0	0.97	3.5	0.146	0.163

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 8.5 EFFICIENCY= 0.99
CFS INTERCEPTED= 1.12 CFS CARRYOVER= 0.01

INLET NUMBER 7-DI-3B LENGTH 8.0 STATION 15+[illegible] Lt.

DRAINAGE AREA = 1.050 ACRES C VALUE = .450 CA = 0.472
SUM CA= 0.472 INT= 3.50 CFS= 1.654 CO= 0.020 GUTTER FLOW= 1.674

GUTTER SLOPE = 0.0113 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Eo	a	S'W	SE
6.73	2.0	0.30	0.0833	4.0	0.76	3.5	0.146	0.132

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 8.1 EFFICIENCY= 1.00
CFS INTERCEPTED= 1.67 CFS CARRYOVER= 0.00

INLET NUMBER 8-DI-3C LENGTH 6.0 STATION 15+55.56 Rt.

DRAINAGE AREA = 0.080 ACRES C VALUE = .850 CA = 0.068
DRAINAGE AREA = 0.050 ACRES C VALUE = .850 CA = 0.043

FOR THE FIRST SIDE
SUM CA= 0.068 INT= 3.50 CFS= 0.238 CO= 0.010 GUTTER FLOW= 0.248
FOR THE OTHER SIDE
SUM CA= 0.043 INT= 3.50 CFS= 0.149 CO= 0.000 GUTTER FLOW= 0.149
AT THE INLET

SUM CA= 0.111 INT= 3.50 CFS= 0.387 CO= 0.010 GUTTER FLOW= 0.397

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

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.25 (cfs) IS 4.32 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 9.60 H (ft) = 0.375
DEPTH OF WATER (ft) = 0.07 SPREAD (ft) = 3.29

INLET NUMBER 13 LENGTH 6.0 STATION 10+47

DRAINAGE AREA = 0.120 ACRES C VALUE = .850 CA = 0.102
DRAINAGE AREA = 0.240 ACRES C VALUE = .750 CA = 0.180

FOR THE FIRST SIDE
SUM CA= 0.102 INT= 3.50 CFS= 0.357 CO= 0.000 GUTTER FLOW= 0.357
FOR THE OTHER SIDE
SUM CA= 0.180 INT= 3.50 CFS= 0.630 CO= 0.000 GUTTER FLOW= 0.630
AT THE INLET

SUM CA= 0.282 INT= 3.50 CFS= 0.987 CO= 0.000 GUTTER FLOW= 0.987

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

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.63 (cfs) IS 7.62 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 9.60 H (ft) = 0.375
DEPTH OF WATER (ft) = 0.13 SPREAD (ft) = 6.05

INLET NUMBER 14 LENGTH 6.0 STATION 10+47

DRAINAGE AREA = 0.250 ACRES C VALUE = .750 CA = 0.188
DRAINAGE AREA = 0.040 ACRES C VALUE = .900 CA = 0.036

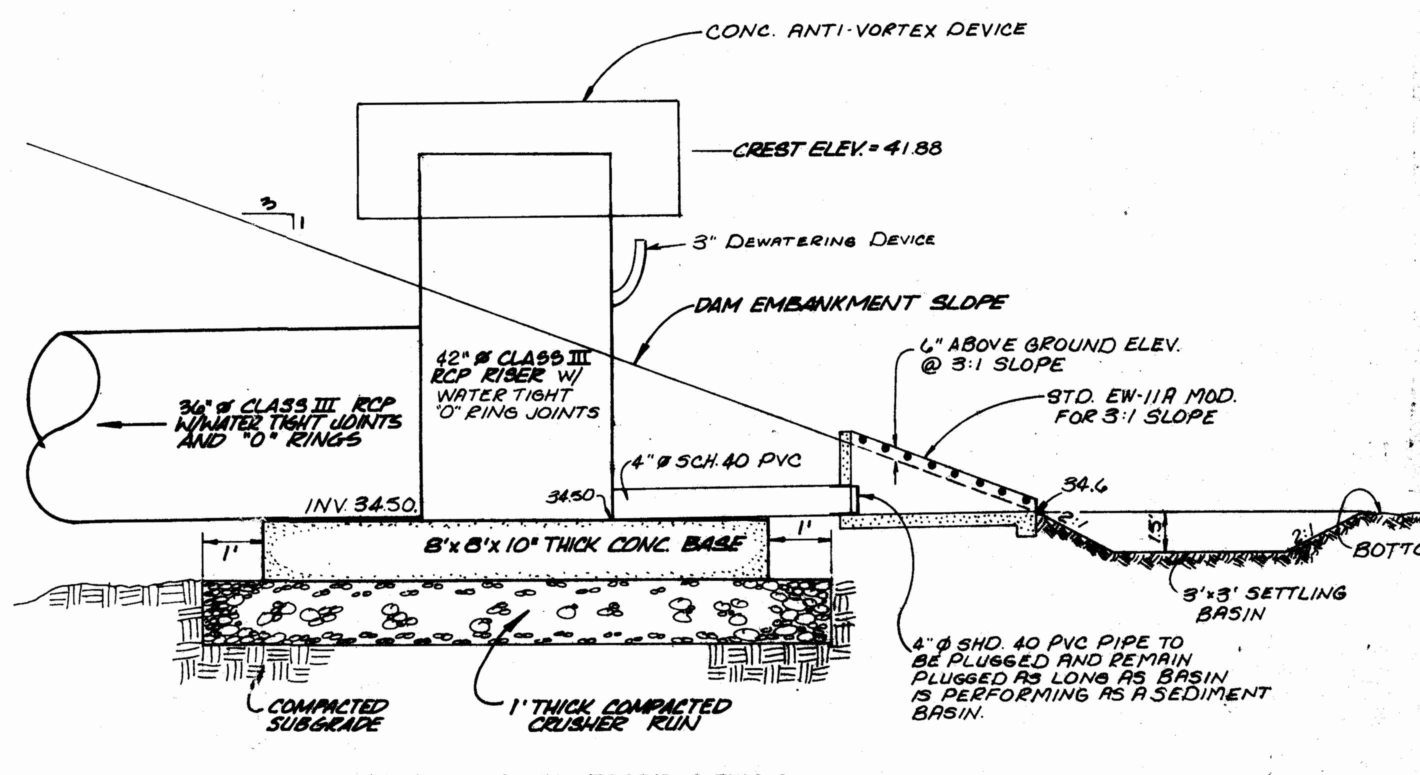
FOR THE FIRST SIDE
SUM CA= 0.188 INT= 3.50 CFS= 0.656 CO= 0.000 GUTTER FLOW= 0.656
FOR THE OTHER SIDE
SUM CA= 0.036 INT= 3.50 CFS= 0.126 CO= 0.000 GUTTER FLOW= 0.126
AT THE INLET

SUM CA= 0.223 INT= 3.50 CFS= 0.782 CO= 0.000 GUTTER FLOW= 0.782

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

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.66 (cfs) IS 7.78 (ft.)

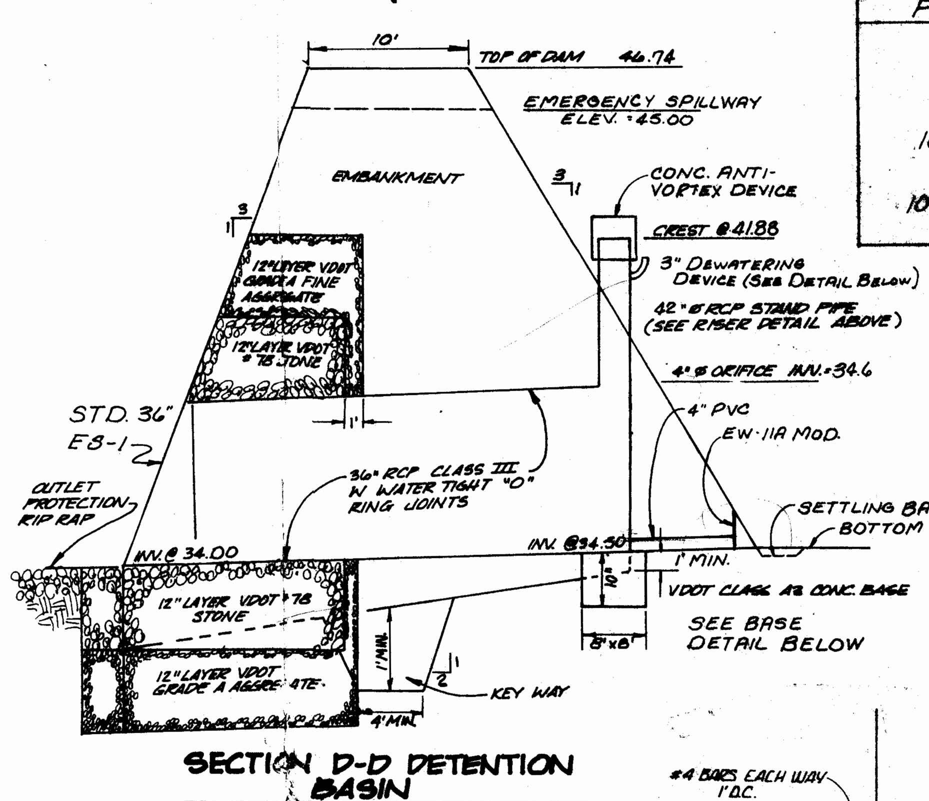
XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 9.60 H (ft) = 0.375
DEPTH OF WATER (ft) = 0.11 SPREAD (ft) = 5.18



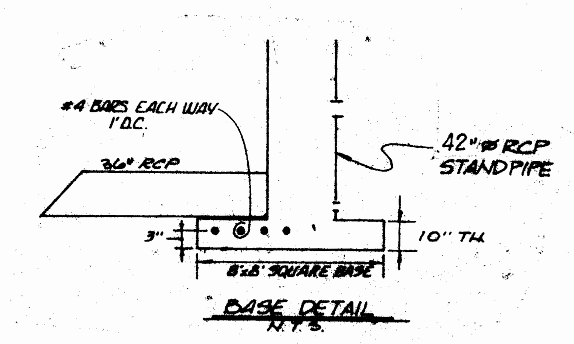
SECTION D-D RISER DETAIL
N.T.S.

MC008

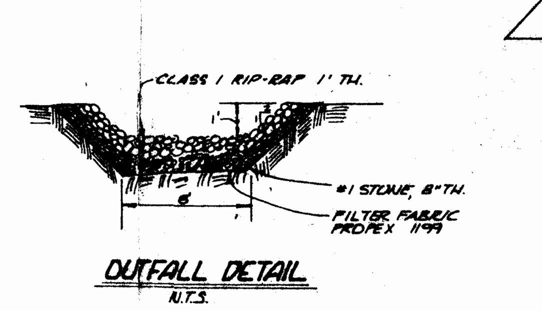
STORM FREQUENCY	PEAK ELEV.	PEAK OUTFLOW
2 YEAR	42.83	33.80 CFS
10 YEAR	43.24	51.56 CFS
100 YEAR	44.74	79.63 CFS



SECTION D-D DETENTION BASIN
N.T.S.



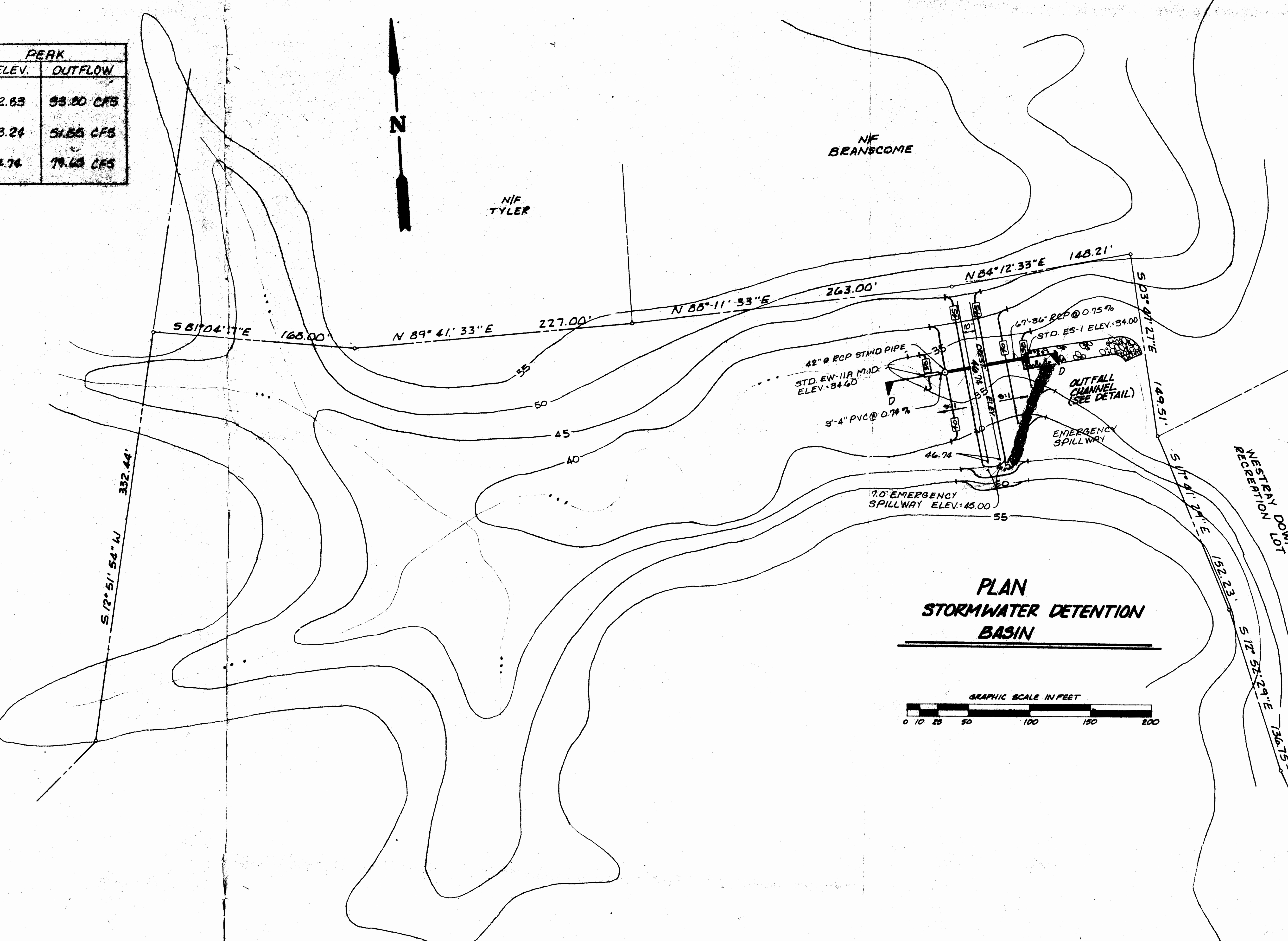
BASE DETAIL
N.T.S.



OUTFALL DETAIL
N.T.S.

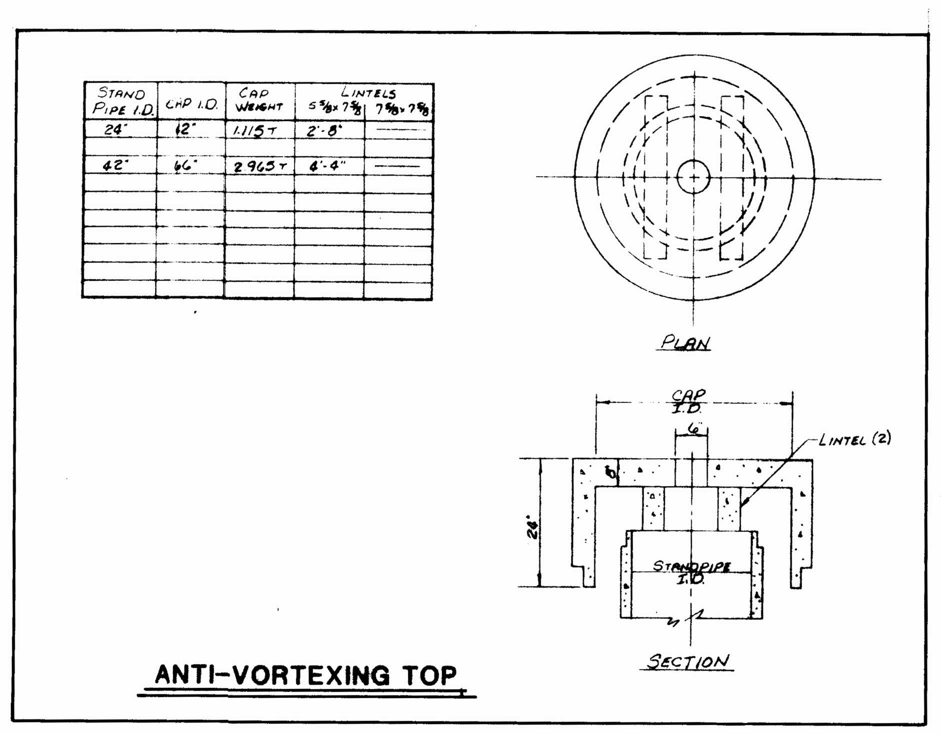
GENERAL NOTES - DAM CONSTRUCTION

1. EMBANKMENT SUBGRADES TO BE STRIPPED OF ALL TOPSOIL, ORGANIC MATTER, AND SOFT AND LOOSE SOILS PRIOR TO PLACEMENT OF FILL MATERIALS.
2. SUBGRADE TO BE PROOF ROLLED WITH A LOADED TANDEM DUMP TRUCK OR SIMILAR EQUIPMENT UNDER THE OBSERVATION OF THE ENGINEER.
3. AREAS THAT EXHIBIT EXCESSIVE PUMPING OR WEAVING WILL REQUIRE UNDERCUTTING.
4. COMPACTED EMBANKMENT FILL TO BE FREE OF ORGANIC MATTER AND CLASSIFY SM, SC, ML, MH OR CL IN ACCORDANCE WITH UNIFIED SOIL CLASSIFICATION SYSTEM, ASTM D-2487.
5. EMBANKMENT FILL TO BE PLACED IN LOOSE LIFTS NOT EXCEEDING 8 INCHES IN THICKNESS AND SHOULD BE COMPACTED TO AT LEAST 95% OF MAXIMUM DRY DENSITY ACCORDING TO ASTM D-698, STANDARD PROCTOR. FILL SHOULD COMPACTED AT MOISTURE CONTENTS WITHIN 3% ABOVE AND 1% BELOW THE OPTIMUM MOISTURE CONTENT FOR THE MATERIAL USED.
6. THE SURFACE OF EACH COMPLETED LIFT OF COMPACTED EMBANKMENT FILL SHOULD BE SCARIFIED TO A DEPTH OF 2 TO 3 INCHES PRIOR TO PLACING ADDITIONAL FILL TO LIMIT THE DEVELOPMENT OF HORIZONTAL SEEPAGE PLANS WITHIN THE EMBANKMENT.
7. COMPACTED EMBANKMENT FILL TO BE PLACED IN HORIZONTAL LIFTS.
8. SURFACES STEEPER THAN 4:1 TO BE BENCHED TO RECEIVE FILL. BENCH HEIGHTS NOT TO EXCEED 2 FEET.
9. BACKFILL ALONG THE PRINCIPAL SPILLWAY CONDUIT SHOULD BE PLACED EQUALLY ON BOTH SIDES OF THE PIPE DURING FILLING.
10. THE PRINCIPAL SPILLWAY PIPE TO BE SUPPORTED ON COMPACTED EMBANKMENT FILL AS SHOWN ON THE PLANS.
11. A DRAINAGE FILTER TO BE INSTALLED AROUND THE PRINCIPAL SPILLWAY PIPE FROM THE DOWNSTREAM TOE INTO THE EMBANKMENT AS SHOWN ON THE PLANS.
12. SUFFICIENT CLEARANCE SHOULD BE PROVIDED FOR STANDARD COMPACTION EQUIPMENT TO ACCESS DURING BACKFILLING ALONG THE PRINCIPAL SPILLWAY CONDUIT. THE BACKFILL SHOULD BE RAMMED UP AGAINST THE CONDUIT ON A MAXIMUM SLOPE OF 6:1. WHERE ACCESS IS LIMITED, THINNER LIFT THICKNESS, HAND COMPACTION AND TIGHT CONTROL ON MATERIAL QUALITY WILL BE NECESSARY.
13. WHERE TRENCH EXCAVATION FOR THE INSTALLATION OF THE PRINCIPAL SPILLWAY CONDUIT IS NECESSARY, SLOPE TO BE CUT NO STEEPER THAN 2:1.
14. SITE DRAINAGE TO BE PROVIDED TO MAINTAIN SUBGRADES FREE OF WATER AND TO AVOID SATURATION AND DISTURBANCE OF THE SUBGRADE SOILS PRIOR TO CONSTRUCTING FOUNDATIONS AND PLACING FILL. ANY SOILS THAT HAVE BEEN WEAKENED DUE TO SATURATION AND DISTURBANCE TO BE REMOVED AS RECOMMENDED BY THE ENGINEER.
15. DEWATERING OF THE DAM FOUNDATION AREAS (WELL POINTING OR PUMPING FROM SUMPS), AND THE DIVERSION OF SURFACE WATER AWAY FROM THE WORK AREA MAY BE NECESSARY TO ALLOW PROPER EXECUTION OF THE CONSTRUCTION WORK. DEWATERING SHOULD BEGIN PRIOR TO EARTHWORK SO THAT THE SPILLWAY CONDUIT CAN BE INSTALLED AND SURFACE WATER WOULD THEN BE DIVERTED THROUGH THE PRINCIPAL SPILLWAY.
16. THE EMBANKMENT FOUNDATION TO BE FREE OF PONDED WATER, EXCESSIVELY MUDDY CONDITIONS AND IN DRAINABLE CONDITION AS NEEDED FOR PROPER EXECUTION OF THE CONSTRUCTION WORK.
17. COMPACTION OF BACKFILL AROUND THE SPILLWAY STRUCTURE IS CRITICAL WITH REGARD TO SEEPAGE. DURING CONSTRUCTION OF THE DRAINAGE FILTER AROUND THE PRINCIPAL SPILLWAY CONDUIT, CARE SHOULD BE EXERCISED WITH RESPECT TO THE INSTALLATION OF THE FINE AND COARSE MATERIALS IN ORDER TO PREVENT CONTAMINATION BY FOREIGN MATTER.



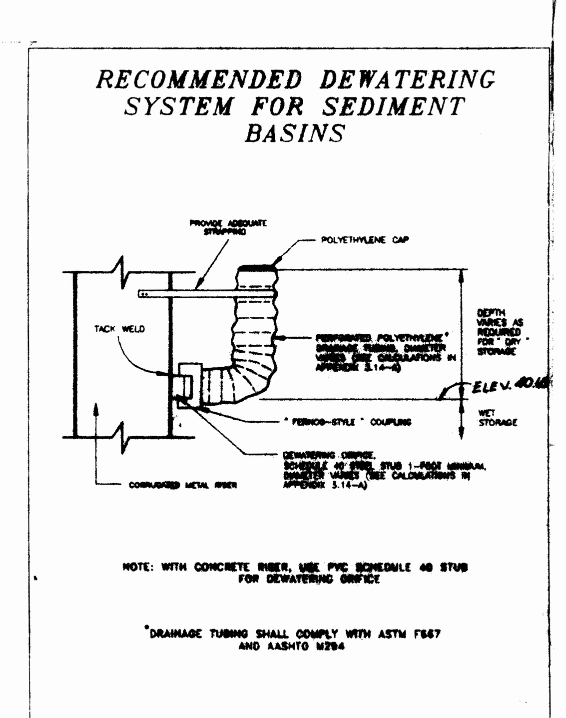
PLAN
STORMWATER DETENTION BASIN

NOTE: THE 42" ØSTANDPIPE SHALL BE FABRICATED TO ALLOW FOR INITIAL USE AS A TEMPORARY SEDIMENT BASIN STRUCTURE (CREST AT ELEVATION 42.55 AND 3" Ø DEWATERING ORIFICE AT ELEVATION 40.65), AND ULTIMATELY AS A WATER QUALITY BMP. THE SUPPLIER SHALL FURNISH THE CONTRACTOR WITH A LAYING SCHEDULE FOR THE STANDPIPE.



ANTI-VORTEXING TOP

RECOMMENDED DEWATERING SYSTEM FOR SEDIMENT BASINS



STORM SEWER COMPUTATIONS

FROM POINT (1)	TO POINT (2)	AREA DRAIN. "A" ACRES (3)	RUN-OFF COEF. C (4)	CA INCREMENT (5)	CA ACCUMULATED (6)	INLET TIME MINUTES (7)	RAIN FALL IN./HR. (8)	RUNOFF Q C.F.S. (9)	INVERT ELEVATIONS UPPER END (10)	INVERT ELEVATIONS LOWER END (11)	LENGTH FT. (12)	SLOPE FT./FT. (13)	DIA. IN. (14)	CAPACITY C.F.S. (15)	VEL. F.P.S. (16)	FLOW TIME SEC. (17)
1	2	0.98	0.35	–	0.34	10.0	6.0	2.04	63.98	58.18	146	0.0397	15	12.82	7.66	23.9
2	3	0.67	0.43	0.29	0.63	10.4	6.0	3.78	58.08	52.65	152	0.0357	15	12.21	8.77	15.2
3	4	0.64	0.70	0.45	1.08	10.7	5.9	6.37	48.90	46.26	110	0.024	15	10.01	8.64	11.6
5A	5	0.61	0.35	–	0.21	11.5	5.85	1.23	63.33	59.31	97	0.0414	15	13.2	6.71	14.5
5	6	–	–	–		11.76	5.85	1.23	59.21	57.58	40	0.0408	15	13.1	6.69	6.0
6A	6	0.38	0.86	–	0.32	6.0	6.9	2.21	57.58	57.24	26	0.013	15	7.37	5.25	7.1
6	7	0.48	0.54	0.26	0.79	12.0	5.8	4.58	57.14	55.16	108	0.0183	15	8.74	7.20	15.0
7	8	1.05	0.45	0.47	1.26	12.3	5.8	7.30	54.91	54.57	56	0.0058	18	8.00	4.68	12.4
8	9	0.13	0.85	0.11	1.37	12.5	5.8	7.95	54.47	53.55	110	0.0084	18	9.63	6.09	18.1
Future 10	Future 11	0.37	0.7	–	0.26	5	7.1	1.85	62.79	62.58	26	0.008	15	5.78	4.19	6.2
Future 11	Future 12	0.36	0.7	0.25	0.51	5.1	7.1	3.62	62.48	61.96	52	0.010	15	6.46	5.41	9.6
Future 12	13	–	–	–	0.51	5.3	7.1	3.62	60.96	54.51	200	0.0323	15	11.68	8.39	23.2
13	14	0.36	0.7	0.25	0.76	5.7	7.0	5.32	54.41	54.22	26	0.0072	15	5.48	5.09	5.1
14	9	0.38	0.7	0.27	1.03	5.8	7.0	7.21	53.97	53.55	60	0.0070	18	8.79	5.55	10.8
9	16A	–			2.40	12.7	5.7	13.68	53.30	52.80	133	0.0038	21	14.44	6.83	19.5
16A	16	–			2.40	13.0	5.7	13.68	52.10	50.14	93	0.0211	21	23.08	9.98	9.3
16	17A	0.49	0.40	0.20	2.60	13.2	5.6	14.56	50.04	48.87	96	0.0126	21	21.02	9.81	10.2
17A	17	0.39	0.40	0.16	2.76	13.4	5.5	15.18	48.12	47.93	37	0.0052	24	16.31	5.90	6.3
17B	17	0.53	0.75	–	0.40	7	6.4	2.56	49.26	49.07	32	0.006	15	6.40	4.34	6.0

STORM SEWER COMPUTATIONS CONT.

FROM POINT (1)	TO POINT (2)	AREA DRAIN. "A" ACRES (3)	RUN-OFF COEF. C (4)	CA INCREMENT (5)	CA ACCUMULATED (6)	INLET TIME MINUTES (7)	RAIN FALL IN./HR. (8)	RUNOFF Q C.F.S. (9)	INVERT ELEVATIONS UPPER END (10)	INVERT ELEVATIONS LOWER END (11)	LENGTH FT. (12)	SLOPE FT./FT. (13)	DIA. IN. (14)	CAPACITY C.F.S. (15)	VEL. F.P.S. (16)	FLOW TIME SEC. (17)
17	18	0.47	0.40	0.19	3.35	13.5	5.5	18.42	47.43	47.23	85	0.0024	30	20.09	4.64	18.4
18	19	1.12	0.40	0.45	3.80	13.7	5.4	20.52	47.13	46.17	266	0.0036	30	24.61	5.50	48.0
19	20	0.19	0.40	0.08	3.88	14.5	5.3	20.56	46.07	45.65	118	0.0036	30	24.61	5.61	21.4
20	21	0.45	0.45	0.20	4.08	14.8	5.3	21.62	45.55	45.10	125	0.0036	30	24.61	5.66	22.1
21	22	–						21.62	45.00	41.00	107	0.0374	30	79.32	13.76	7.8
22	23	–						21.62	37.31	37.23	15	0.0052	30	29.58	6.58	2.3

REVISED: 12-2-93 PER COUNTY COMMENTS
REVISED: 8/27/93 PER COUNTY COMMENTS

STEPHEN A. ROMEO No. 1403 LAND SURVEYOR

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

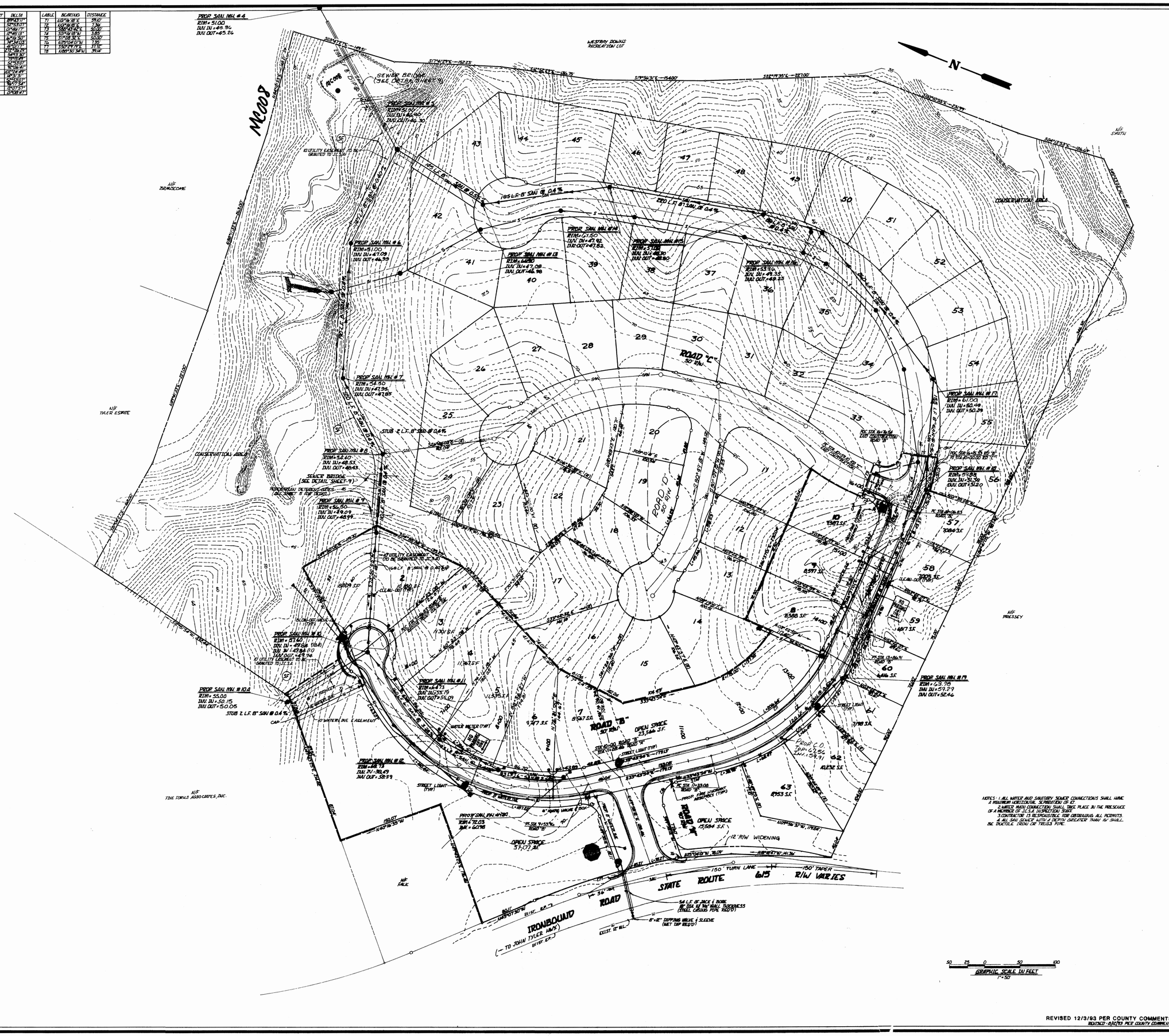
DES.
DWN. BSG
CHK. NHM
DATE 11-2-93

C. LEWIS WALTRIP, II
SUBDIVISION OF
FIVE FORKS SUBDIVISION PHASE I
JAMES CITY COUNTY, VIRGINIA
STORM WATER DETENTION BASIN PLAN AND DETAILS, INLET COMPUTATIONS, STORM SEWER COMPUTATIONS

SHEET 7 OF 9
DISK
PROJ. NO. 93054
DWG. 4946W

LABEL	RADIUS	ARC LENGTH	CHORD	CH BEARING	TANGENT	DELTA
C1	260.00	407.78	366.79	S17°07'42"W	259.13	89°53'17"
C2	275.00	293.83	278.92	S62°07'17"E	160.71	61°13'17"
C3	275.00	8.50	8.50	S81°30'16"E	4.25	01°46'17"
C4	225.00	61.01	60.79	N85°46'05"E	30.78	15°32'13"
C5	50.00	39.14	37.48	N109°24'55"E	20.61	44°51'05"
C6	250.00	390.11	351.79	N109°03'16"E	248.38	89°38'03"
C7	30.00	31.48	30.06	N123°29'32"E	17.12	60°07'11"
C8	50.00	237.96	60.76	S82°47'29"E		272°36'54"
C9	30.00	26.99	25.94	S29°39'20"W	15.36	54°43'32"
C10	250.00	308.50	289.38	S70°56'01"W	181.78	70°42'49"
C11	250.00	230.10	222.25	S30°10'17"E	124.33	52°43'01"
C12	75.00	40.17	39.70	N67°19'38"E	20.56	30°42'47"
C13	75.00	44.69	44.07	S49°56'07"E	23.07	34°08'49"
C14	50.00	19.06	19.00	N61°17'14"E	9.63	21°51'11"
C15	300.00	78.50	78.27	N80°07'17"E	39.51	15°00'00"
C16	50.00	29.30	28.87	N80°54'41"E	15.18	33°57'54"
C17	50.00	73.00	66.81	N60°03'31"E	46.20	83°37'37"
C18	250.00	4.70	4.70	S40°51'36"W	2.35	01°08'47"

LABEL	BEARINGS	DISTANCE
T1	N10°16'18"E	59.10
T2	N10°16'18"E	7.00
T3	S88°20'58"E	30.00
T4	S09°16'08"W	3.85
T5	S11°08'36"E	50.00
T6	N14°04'01"W	7.35
T7	S50°14'14"E	37.76
T8	N06°30'58"W	39.18



NOTES: 1. ALL WATER AND SANITARY SEWER CONNECTIONS SHALL HAVE A MINIMUM VERTICAL SEPARATION OF 18".
2. WATER MAIN CONNECTION SHALL TAKE PLACE IN THE PRESENCE OF A MEMBER OF J.C.S.A. INSPECTION STAFF.
3. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS.
4. ALL SAN SEWER WITH A DEPTH GREATER THAN 16' SHALL BE DUCTILE IRON OR "PRUSS" PIPE.

REVISED 12/3/93 PER COUNTY COMMENTS
REVISED 8/12/93 PER COUNTY COMMENTS

SITE PLAN APPROVED No. 1113

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

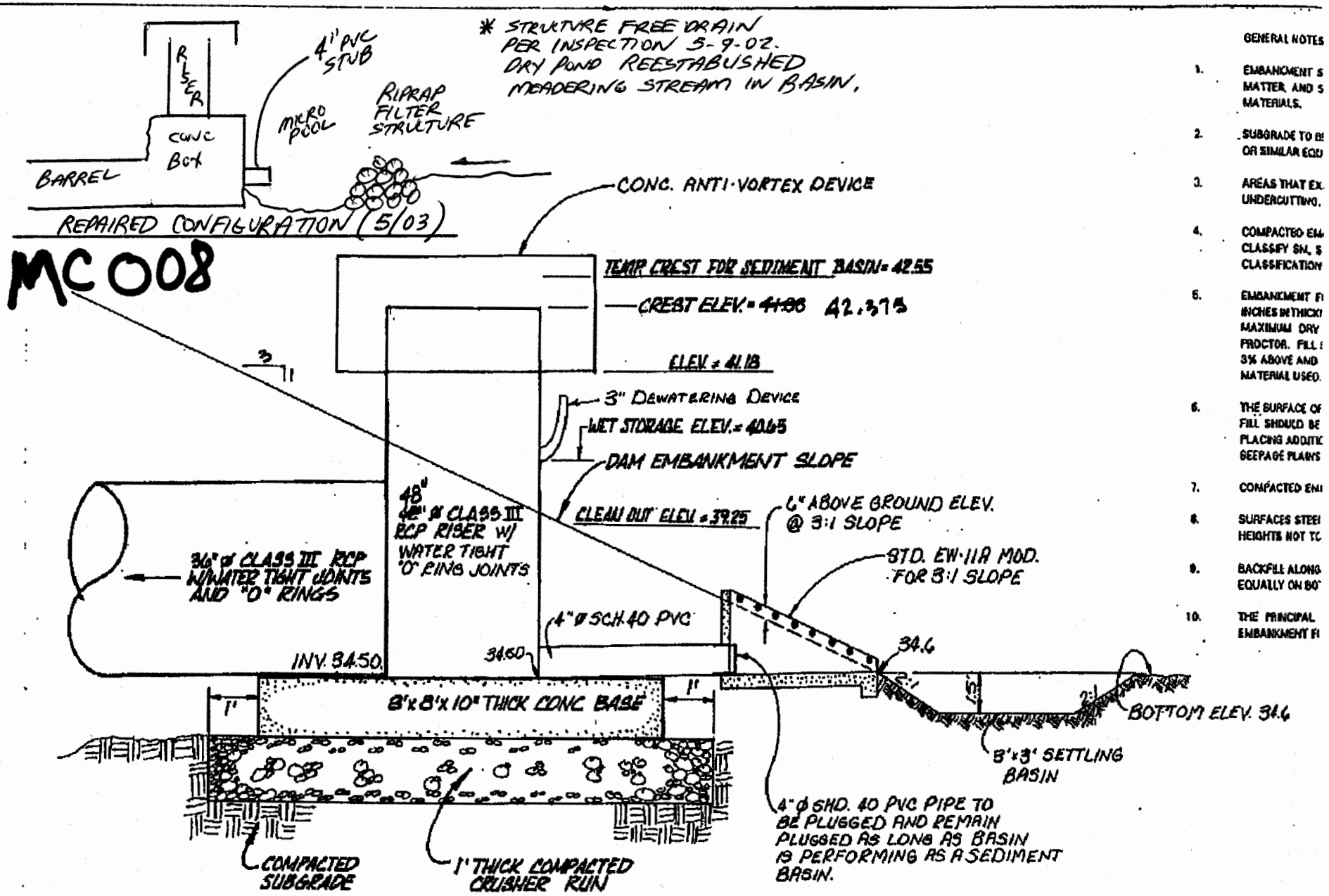
DES.	WLB
DWN.	GSW
CHK.	SAR
DATE	6-30-93

C. LEWIS WALTRIP, II
SUBDIVISION OF
FIVE FORKS SUBDIVISION PHASE I
JAMES CITY COUNTY, VIRGINIA
UTILITY PLAN SHEET

SHEET	2 OF 9
DISK	
PROJ. NO.	93054-5
DWG.	4961W

MC008_VILLAGE_SQ_FIVE_FORKS - 013

FEB-24-1994 12:12 FROM L & M TO JCC PLANNING P.03



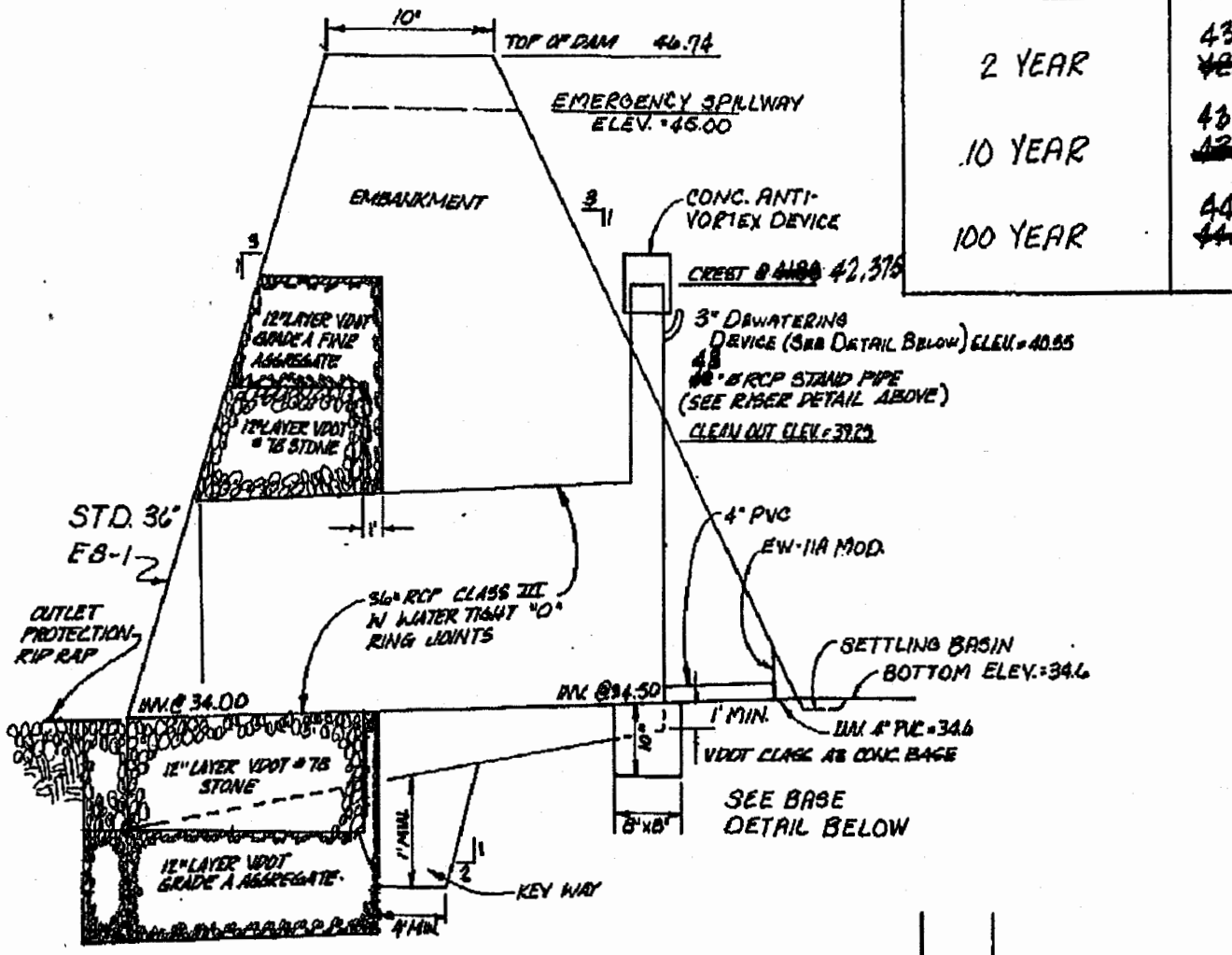
SECTION D-D RISER DETAIL

N.T.S.

GENERAL NOTES

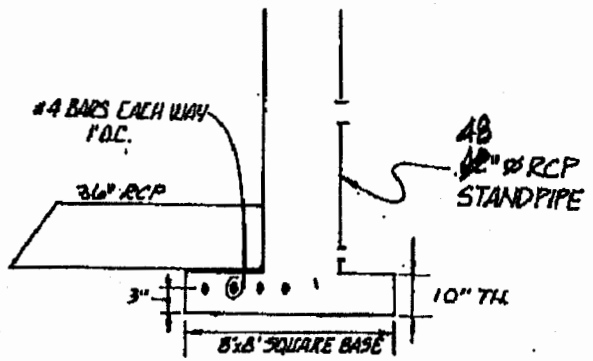
1. EMBANKMENT S MATTER, AND S MATERIALS.
2. SUBGRADE TO BE OR SIMILAR EQU
3. AREAS THAT EX. UNDERCUTTING.
4. COMPACTED EM CLASSIFY SM, S CLASSIFICATION
5. EMBANKMENT FI INCHES IN THICKI MAXIMUM DRY PROCTOR. FILL 3% ABOVE AND MATERIAL USED.
6. THE SURFACE OF FILL SHOULD BE PLACING ADDITIC SEEPAGE PLANS
7. COMPACTED EMI
8. SURFACES STEEI HEIGHTS NOT TC
9. BACKFILL ALONG EQUALLY ON BO
10. THE PRINCIPAL EMBANKMENT FI

STORM FREQUENCY	PEAK ELEV.	PEAK OUTFLOW
2 YEAR	43.14 ~~42.85~~	27.86 ~~33.00~~ CFS
10 YEAR	43.55 ~~43.04~~	51.26 ~~51.55~~ CFS
100 YEAR	44.56 ~~44.94~~	90.73 ~~94.65~~ CFS



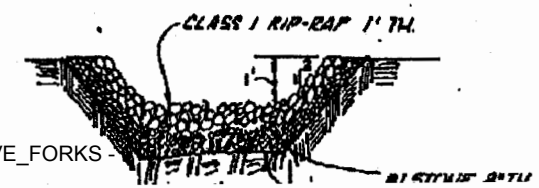
SECTION D-D DETENTION BASIN

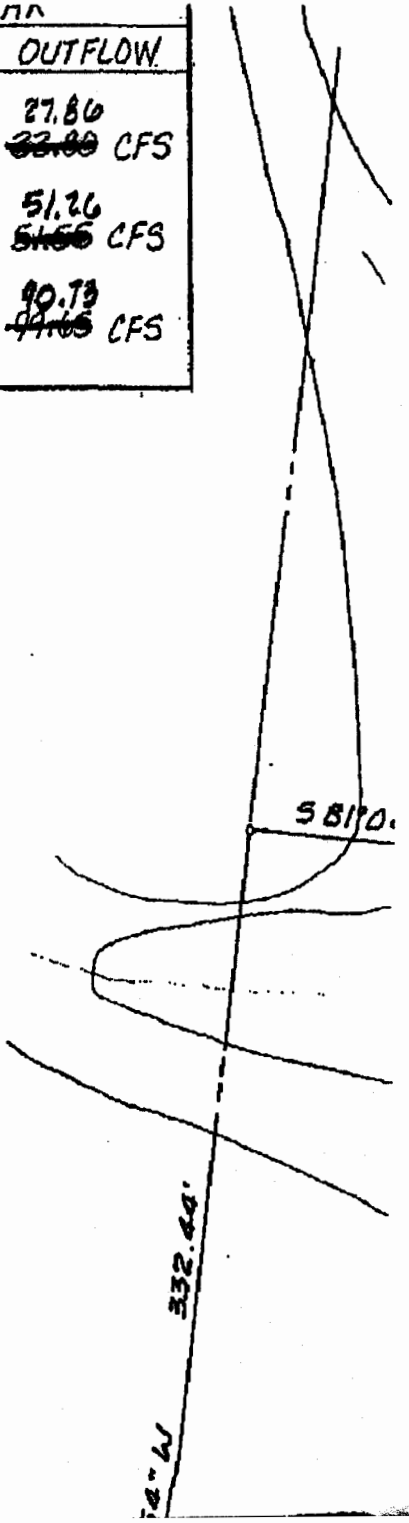
N.T.S.



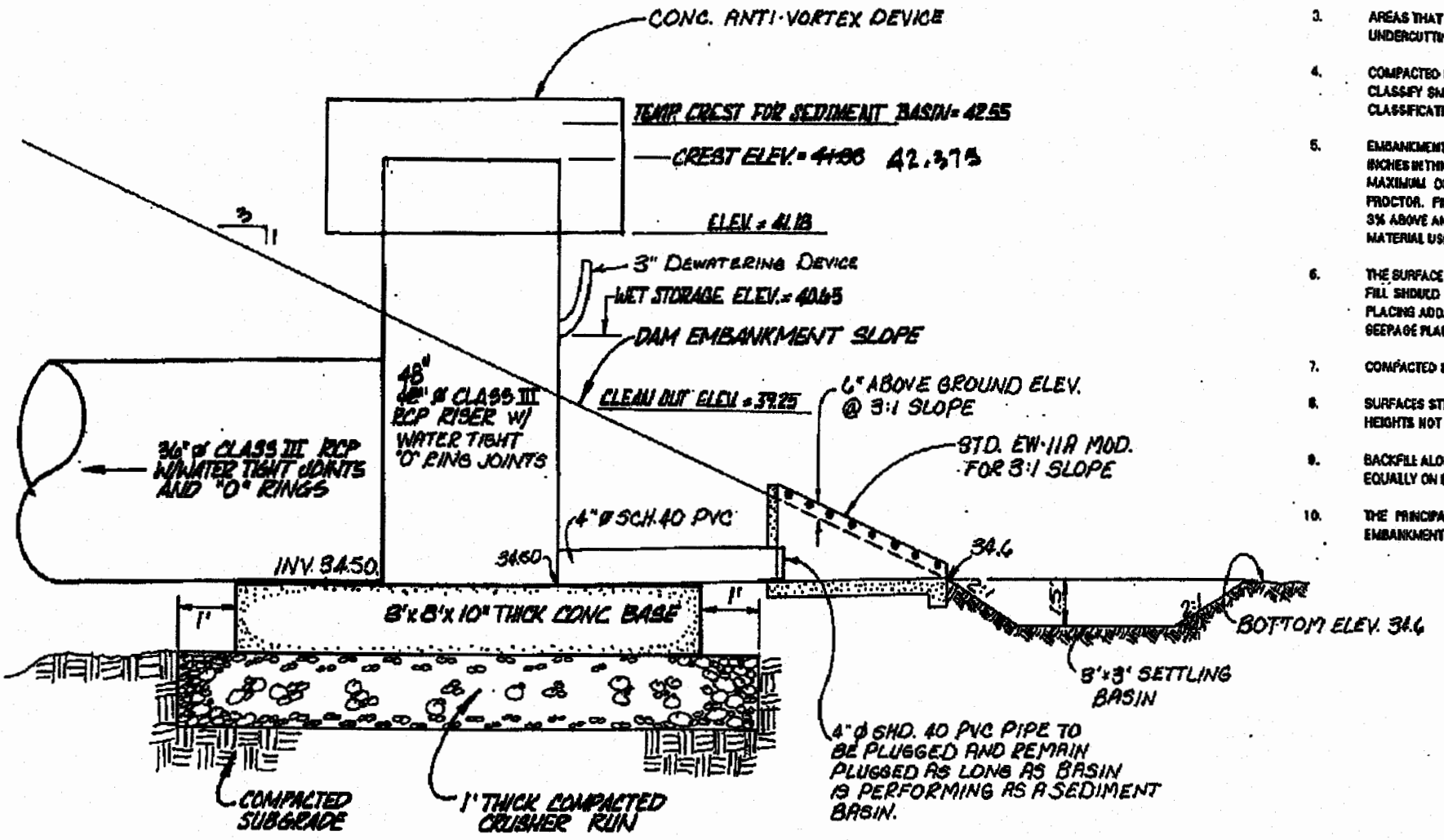
BASE DETAIL

N.T.S.





MC008_VILLAGE_SQ_FIVE_FORKS -



SECTION D-D RISER DETAIL

N.T.S.

GENERAL NOTES

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2. SUBGRADE TO BE OR SIMILAR EQU
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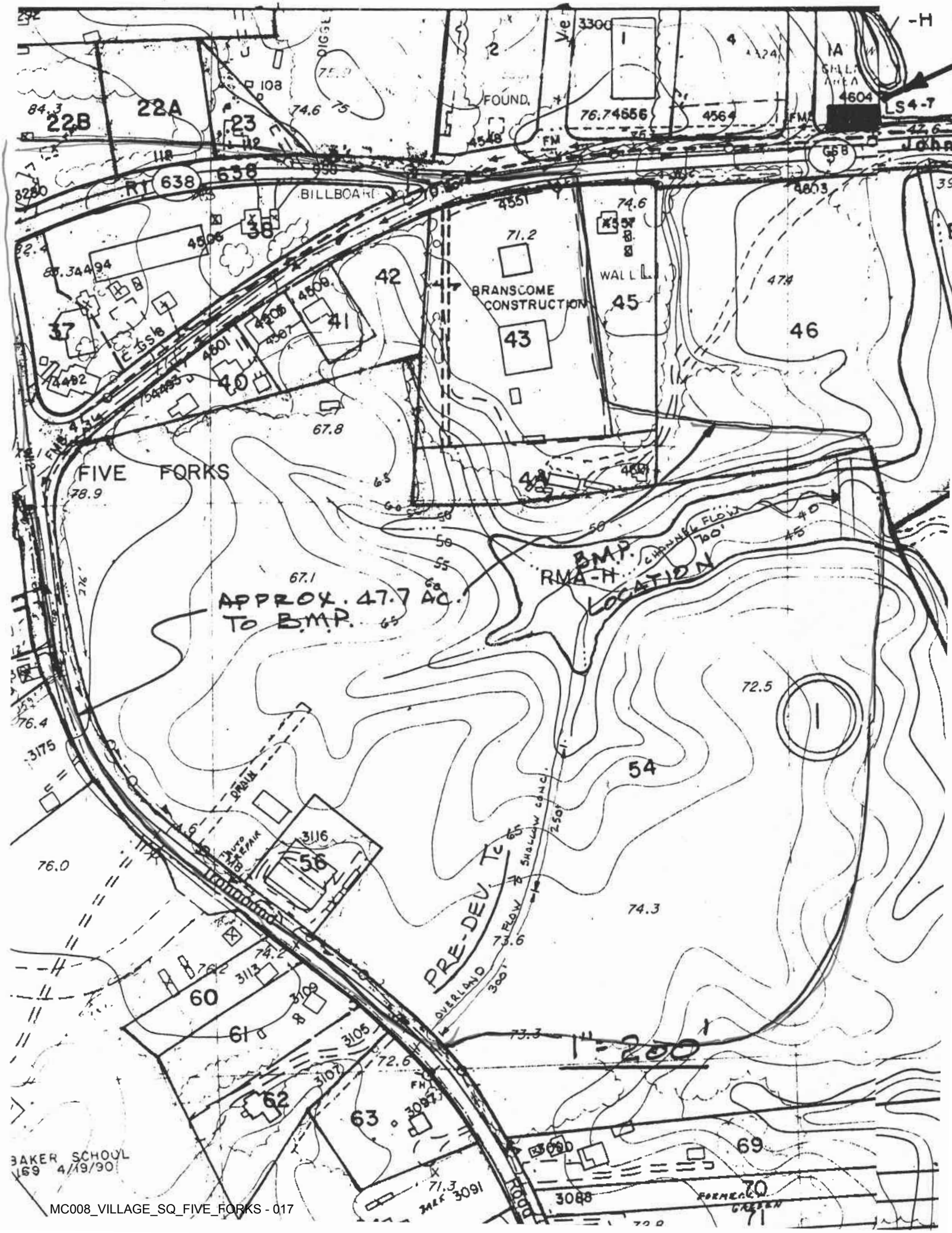
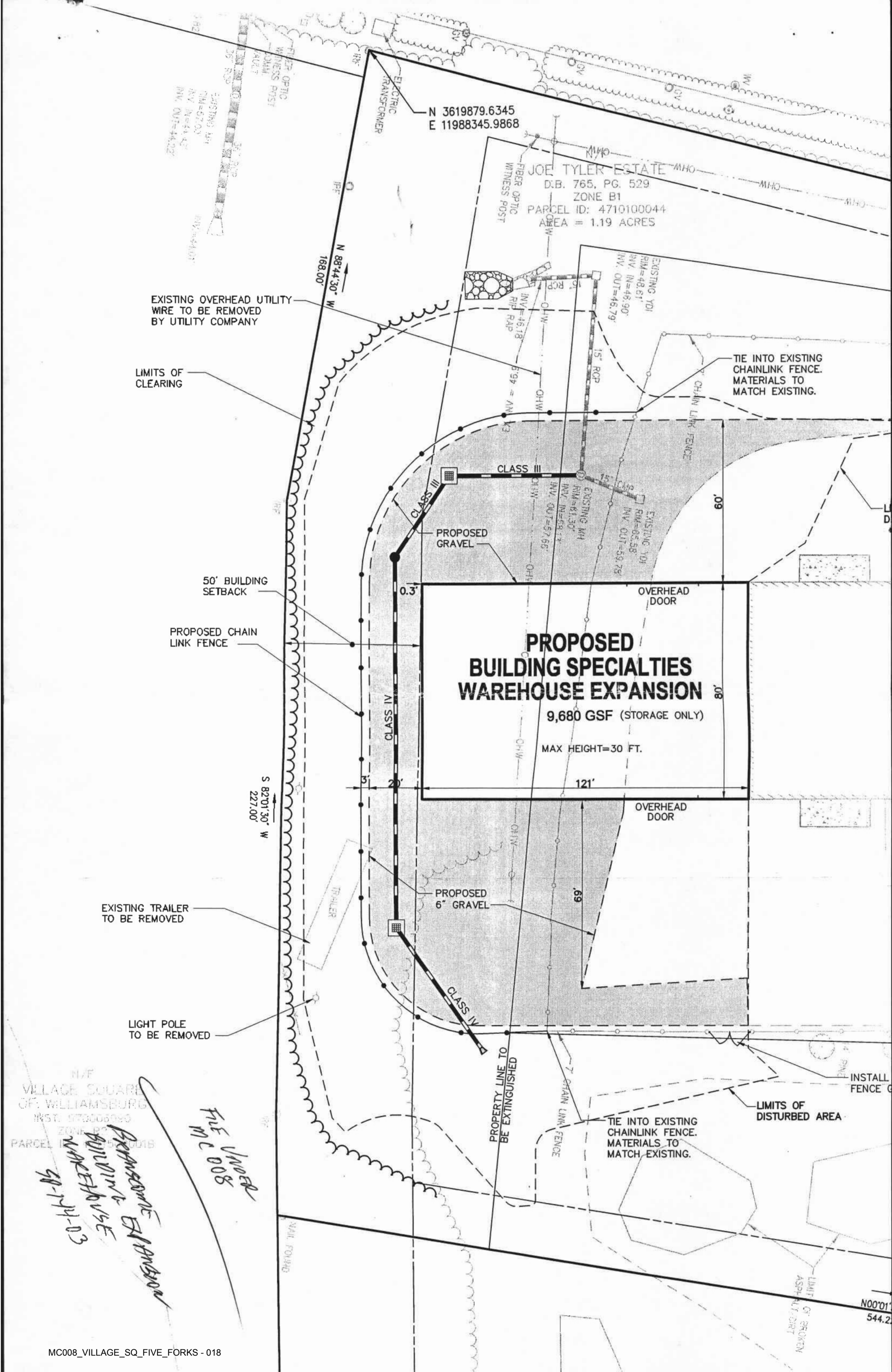
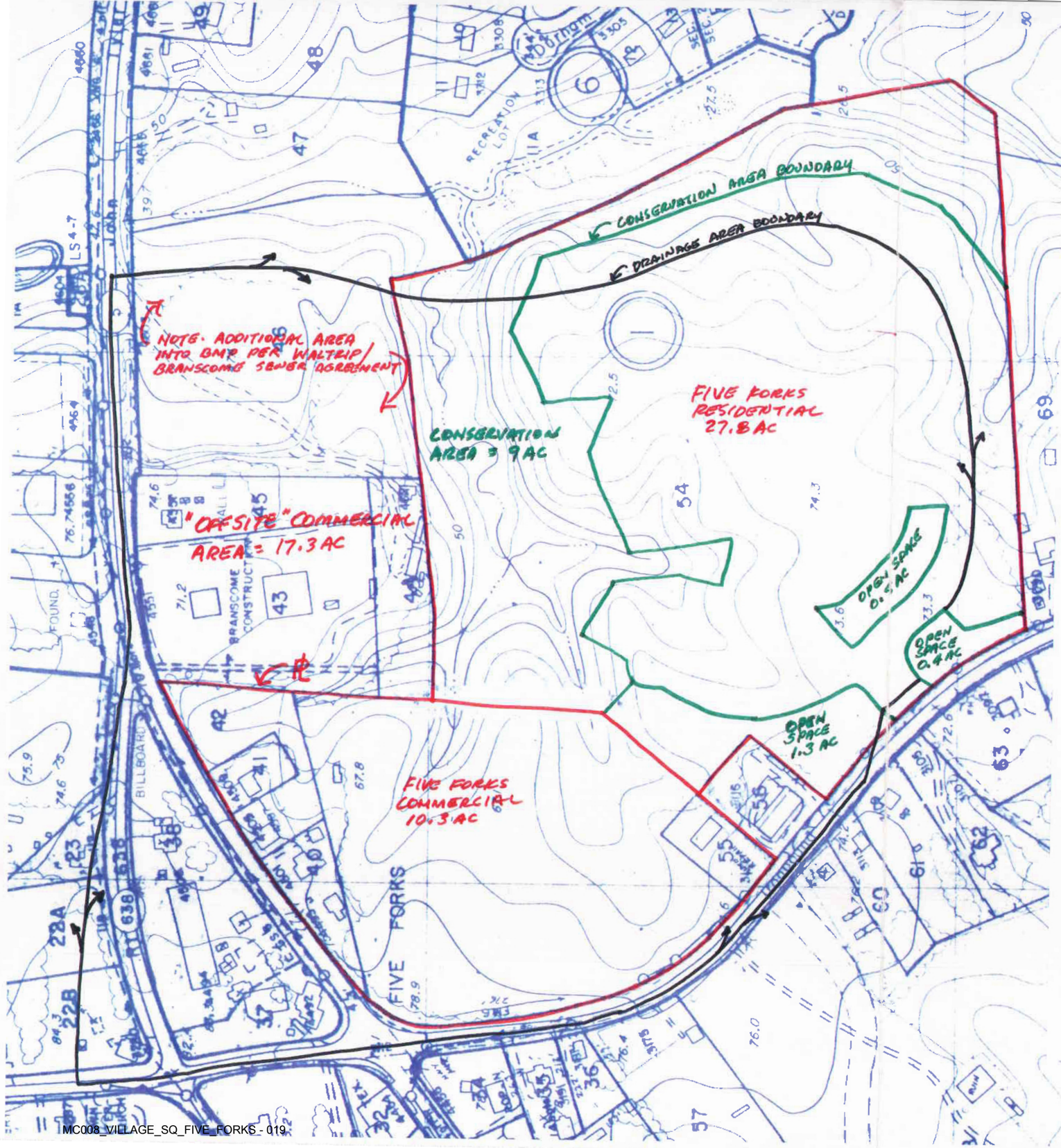

22B
22A
23
RT 638
638
BILLBOARD
38
37
42
41
40
43
45
46
BRANSCOME CONSTRUCTION
WALL
FOUND.
FIVE FORKS
APPROX. 47.7 AC. TO B.M.P.
BMP RMA-H LOCATION
CHANNEL FLOW 700'
54
58
60
61
62
63
69
70
71
PRE-DEV Tc
SHALLOW CONC.
OVERLAND FLOW 300'
1" = 200'
BAKER SCHOOL
169 4/19/90
FORMERLY GREEN


N 3619879.6345
E 11988345.9868
ELECTRIC TRANSFORMER
FIBER OPTIC WITNESS POST
JOE TYLER ESTATE
D.B. 765, PG. 529
ZONE B1
PARCEL ID: 4710100044
AREA = 1.19 ACRES
N 88°44'30" W
168.00'
EXISTING OVERHEAD UTILITY WIRE TO BE REMOVED BY UTILITY COMPANY
LIMITS OF CLEARING
TIE INTO EXISTING CHAINLINK FENCE. MATERIALS TO MATCH EXISTING.
CLASS III
CLASS III
PROPOSED GRAVEL
50' BUILDING SETBACK
PROPOSED CHAIN LINK FENCE
0.3'
OVERHEAD DOOR
PROPOSED
BUILDING SPECIALTIES
WAREHOUSE EXPANSION
9,680 GSF (STORAGE ONLY)
MAX HEIGHT=30 FT.
60'
80'
CLASS IV
3'
20'
121'
OVERHEAD DOOR
S 82°01'30" W
227.00'
PROPOSED 6" GRAVEL
69'
EXISTING TRAILER TO BE REMOVED
CLASS IV
LIGHT POLE TO BE REMOVED
PROPERTY LINE TO BE EXTINGUISHED
TIE INTO EXISTING CHAINLINK FENCE. MATERIALS TO MATCH EXISTING.
LIMITS OF DISTURBED AREA
INSTALL FENCE
N/F
VILLAGE SQUARE
OF WILLIAMSBURG
ZONE B2
PARCEL ID
File Under
MC 008
Brandscape Expansion
Building
Warehouse
SP-144-03



FIVE FORKS DEVELOPMENT

NOV 1993
RECEIVED
PLANNING DEPARTMENT

TABLE 3

WORKSHEET FOR BMP POINT SYSTEM

A. STRUCTURAL BMP POINT ALLOCATION

BMP	BMP Points		Fraction of Site Served by BMP		Weighted BMP Points	
EXT. DRY DETEN. #7	6	x	20.8/38.1 OR .55	=	3.3	RESIDENTIAL
" " "	6	x	10.3/38.1 OR .27	=	1.6	COMMERCIAL
" " "	6	x	17.3/38.1 OR .45	=	2.7	OFFSITE
		x		=		

TOTAL WEIGHTED STRUCTURAL BMP POINTS: 7.6

B. NATURAL OPEN SPACE CREDIT

Fraction of Site		Natural Open Space Credit		Points for Natural Open Space
11.2/38.1 OR 29%	x	0.1 (0.1 per 1%)	=	2.9

C. TOTAL WEIGHTED POINTS

7.6	+	2.9	=	10.5
Structural BMP Points		Natural Open Space Points		TOTAL

NOTE: PHASES I & II OF THE COMMERCIAL DEVELOPMENT PROVIDE 28% PERVIOUS SURFACE, HOWEVER, ADEQUATE SURPLUS IS AVAILABLE IN THE RESIDENTIAL AREA TO OFFSET THIS.

RES. OPEN SPACE REQ'D = (27.8 − 9) 0.4 = 7.5 AC
COM. OPEN SPACE REQ'D = 10.3 × 0.4 = 4.1 AC
11.6 AC

RES. OPEN SPACE PROVIDED = 11.2 AC
COM. OPEN SPACE PROPOSED = (8.6 × 0.28) + (1.7 × 0.4) = 3.1 AC
14.3 AC

2-9-93 / SUP-31-93

FIVE FORKS SUBDIVISION

CHESAPEAKE BAY COMPLIANCE

November 3, 1993

Langley and McDonald
ENGINEERS • PLANNERS • SURVEYORS
5544 Greenwich Road, Virginia Beach, VA 23462 (804) 473-2000
201 Packets Court, Williamsburg, VA 23185 (804) 253-2975

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

Subject: DET. BASIN PEAK FLOWS
PRE & POST DEVELOPMENT
Computed By _____ Checked By _____

Project No. 93 054-4
Client: L. WALTRIP
Date: 11/3/93 Sheet No. _____

AREAS INCLUDED	AREA	PRE-DEV RUNOFF	PRE-DEV. C.A	POST-DEV RUNOFF	POST-DEV C.A
AREA NORTH OF INGRAM ROAD	1.4 AC @	0.30	0.42	0.30	0.42
FIVE FORKS SHOPPING CENTER	4.2 AC @	0.70	2.94	0.70	2.94
BRANSCOME PARCELS 43 & 45 (INCLUDING PARCEL 44)	5.6 AC @	0.55	3.08	0.55	3.08
PARCELS 40, 41 & 42	2.5 AC @	0.40	1.00	0.70	1.75
FUTURE COMMERCIAL PARCEL	10.2 AC @	0.20	2.04	0.70	7.14
RESIDENTIAL AREA TO B.M.P.	23.1 AC. @	0.20	4.62	0.50	11.55
BRANSCOME PARCEL 46	5.2 AC @	0.20	1.04	0.70	3.66
TOTALS	52.2 AC.		15.14 PRE.		30.52 POST

PRE. DEV. wt. "C" = $\frac{15.14}{52.2}$ = 0.29

POST DEV. wt. "C" = $\frac{30.52}{52.2}$ = 0.58

PEAK FLOWS

RETURN FREQ	AREA AC	PRE. DEV. WT. C	POST DEV WT. C.	PRE DEV Tc.	POST DEV. Tc	PRE DEV. i	POST DEV. i	PRE DEV. Q	POST DEV. Q
2 YEAR	52.2	0.29	0.58	32.5	15	2.5	3.9	37.85	118.08
10 YEAR	52.2	0.29	0.58	32.5	15	3.4	5.1	51.47	154.41
25 YEAR	52.2	0.29	0.58	32.5	15	4.1	5.9	62.07	178.63
100 YEAR	52.2	0.29	0.58	32.5	15	4.9	7.2	74.18	217.99

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

Subject: Detention Basin Storage Requirement
Computed By _____ Checked By _____

Project No. 93054-4
Client: Walteip
Date 11/3/93 Sheet No. _____

CALCULATION OF EQUIVALENT "I" FOR BASIN IN DEVELOPED CONDITION

AREAS INCLUDED	AREAS	"I"	LBS/AC/YEAR	TOTAL LBS/YEAR COL. 2 × COL. 4
AREA NORTH OF INGRAM ROAD	1.4 AC	25	0.6	0.8
FIVE FORKS SHOPPING CENTER	4.2 AC	70	1.6	6.7
BRANSCOME PARCELS 43 & 45 (INCLUDING PARCEL 44)	5.6 AC	70	1.6	9.0
PARCELS 40, 41 & 42	2.5 AC	70	1.6	4.0
FUTURE COMMERCIAL PARCEL	10.2 AC	70	1.6	16.3
RESIDENTIAL AREA to BMP	23.1 AC.	32	0.8	18.5
BRANSCOME PARCEL 46	5.2 AC	70	1.6	8.3
TOTAL	52.2 AC			63.6 lbs/yr

$$\frac{63.6 \text{ LB/YR}}{52.2 \text{ AC}} = 1.2 \text{ lbs/AC/YR.}$$

$$[0.05 + (0.009 I)]\ 2.33 = 1.2$$

$$0.1165 + 0.021 I = 1.2$$

$$0.021 I = 1.1$$

$$\text{EQUIV. } I = 52\%$$

VOLUME REQUIRED

$$VOL = \frac{(R)(Rv)}{12} A$$

$$VOL = \frac{(1")(0.52)}{12} 52.2$$

$$VOL = 2.26 \text{ Ac.ft.}$$

$$VOL = 98,446 \text{ Cu ft.} \quad @ \text{ ELEV. } 40.92$$

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

Subject DETENTION BASIN Tc.
PRE & POST DEVELOPMENT
Computed By _____ Checked By _____

Project No. 93054-4
Client L. WALTRIP
Date 11/3/93 Sheet No. _____

PRE DEV. Tc =

OVERLAND FLOW 300'
HIGH EL = 73.0'
LOW EL = 70.0'
3.0' ÷ 300' = 1.0% TIME = 25 MIN.

SHALLOW FLOW 250'
HIGH EL = 70.0'
LOW EL = 49.0'
21' ÷ 250' = 8.4%, AVG. VEL = 5 ft/sec.
250' ÷ 5 ft/sec = 50 sec. TIME SAY 1 MIN

CHANNEL FLOW 700'
HIGH EL = 49'
LOW EL = 40'
9'
TIME = 6.5 MIN

TOTAL Tc PRE. DEV = 25 + 1 + 6.5 = 32.5 MIN

POST DEV T.C.

ASSUME THAT LONGEST PATH IS ACROSS OPEN SPACE TO SOUTH OF ENTRANCE OFF IRONBOUND ROAD. DRAINAGE THEN FLOWS INTO PIPE SYSTEM ON ROAD - APPROXIMATE DISTANCE IN PIPE TO B.M.P. IS 1700' ASSUME AVERAGE PIPE VELOCITIES TO BE 4 ft/sec.

OVERLAND FLOW = 100' @ 1.0% GRADE = TIME 18 MIN

PIPE FLOW = 1700' ÷ 4 ft/sec = 425 sec ÷ 60 = TIME 7 MIN

USE 15 min Tc FOR POST DEVELOPMENT.

LANGLEY & McDONALD, P.C.
WILLIAMSBURG, VIRGINIA
11/3/93

ORIFICE

ORIFICE = 4.00 INCHES

ELEV. (FT.)	FLOW (CFS)
36.00	0.00
36.25	.13
36.50	.24
36.75	.32
37.00	.38
37.25	.44
37.50	.49
37.75	.53
38.00	.57
38.25	.61
38.50	.64
38.75	.68
39.00	.71
39.25	.74
39.50	.77
39.75	.80
40.00	.82
40.25	.85
40.50	.87
40.75	.90

FORMULA USED Q = C * A * SQR 2gh HEAD > Dia

Q = 3 * D * HEAD^1.5 HEAD < Dia

98,459 cf (storage) ÷ 0.57 cfs (avrg. discharge) ÷ 3600 = 47.6 hrs. (total draw down time)

POND-2 Version: 5.17
S/N: 1295130250

FIVE FORKS DETENTION POND

CALCULATED 11-22-1993 14:38:48
DISK FILE: b:FF .VOL

Planimeter scale: 1 inch = 50 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	* Volume (cubic-ft)	Volume Sum (cubic-ft)
34.60	0.00	0	0	0	0
35.00	0.25	625	625	83	83
40.00	13.40	33,500	38,701	64,501	64,585
45.00	31.60	79,000	163,944	273,240	337,825
46.00	36.00	90,000	253,321	84,440	422,265
47.00	38.00	95,000	277,466	92,489	514,754
Elevations With Areas Interpolated From The Closest Two Planimeter Readings					
40.65	-----	38,328	107,661	23,327	87,911
40.88	-----	40,114	110,272	32,347	96,931
40.92	-----	40,429	110,731	33,957	98,542
42.55	-----	54,303	130,455	110,886	175,471

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

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

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

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

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

Outlet Structure File: FF .STR

POND-2 Version: 5.17 S/N: 1295130250
Date Executed: Time Executed:

****

FIVE FORKS DETENTION POND

****

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

Elevation (ft)	Q (cfs)	Contributing Structures
34.60	0.0	
35.10	0.2	1
35.60	0.4	1
36.10	0.5	1
36.60	0.6	1
37.10	0.6	1
37.60	0.7	1
38.10	0.8	1
38.60	0.8	1
39.10	0.9	1
39.60	0.9	1
40.10	1.0	1
40.60	1.0	1
41.10	1.1	1
41.60	1.1	1
42.10	4.8	2 +1
42.60	22.2	2 +1
43.10	47.4	2 +1
43.60	62.1	2 +1
44.10	70.4	2 +1
44.60	77.8	2 +1
45.10	84.5	2 +1
45.60	90.8	2 +1
46.10	96.6	2 +1
46.60	102.1	2 +1
46.90	105.3	2 +1

Outlet Structure File: FF .STR

POND-2 Version: 5.17 S/N: 1295130250
Date Executed: Time Executed:

****

FIVE FORKS DETENTION POND

****

Outlet Structure File: b:FF .STR
Planimeter Input File: b:FF .VOL
Rating Table Output File: b:FF .PND

Min. Elev.(ft) = 34.6 Max. Elev.(ft) = 46.9 Incr.(ft) = .5

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

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
STAND PIPE	2		->	2
ORIFICE-VC	1		->	1

Outflow rating table summary was stored in file:
b:FF .PND

Outlet Structure File: FF .STR

POND-2 Version: 5.17 S/N: 1295130250
Date Executed: Time Executed:

****

FIVE FORKS DETENTION POND

****

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

STAND PIPE
Stand Pipe with weir or orifice flow

E1 elev.(ft)?	41.875
E2 elev.(ft)?	46.901
Crest elev.(ft)?	41.875
Diameter (ft)?	3.5
Weir coefficient?	3.1
Orifice coefficient?	.6
Start transition elev.(ft) @ ?	
Transition height (ft)?	

Outlet Structure File: FF .STR

POND-2 Version: 5.17 S/N: 1295130250
Date Executed: Time Executed:

****

FIVE FORKS DETENTION POND

****

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

ORIFICE-VC
Orifice - Vertical Circular

E1 elev.(ft)?	34.7667
E2 elev.(ft)?	46.901
Orifice coeff.?	.60
Invert elev.(ft)?	34.6
Datum elev.(ft)?	34.7667
Diameter (ft)?	.3333

Outlet Structure File: FF .STR

POND-2 Version: 5.17 S/N: 1295130250
Date Executed: Time Executed:

****

FIVE FORKS DETENTION POND

****

Outflow Rating Table for Structure #2
STAND PIPE Stand Pipe with weir or orifice flow

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

Elevation (ft)	Q (cfs)	Computation Messages
34.60	0.0	E < Inv.El.= 41.875
35.10	0.0	E < E1=41.875
35.60	0.0	E < E1=41.875
36.10	0.0	E < E1=41.875
36.60	0.0	E < E1=41.875
37.10	0.0	E < E1=41.875
37.60	0.0	E < E1=41.875
38.10	0.0	E < E1=41.875
38.60	0.0	E < E1=41.875
39.10	0.0	E < E1=41.875
39.60	0.0	E < E1=41.875
40.10	0.0	E < E1=41.875
40.60	0.0	E < E1=41.875
41.10	0.0	E < E1=41.875
41.60	0.0	E < E1=41.875
42.10	3.6	Weir: H =.225
42.60	21.0	Weir: H =.725
43.10	46.2	Weir: H =1.225
43.60	60.8	Orifice: H =1.725
44.10	69.1	Orifice: H =2.225
44.60	76.5	Orifice: H =2.725
45.10	83.2	Orifice: H =3.225
45.60	89.4	Orifice: H =3.725
46.10	95.2	Orifice: H =4.225
46.60	100.7	Orifice: H =4.725
46.90	103.8	Orifice: H =5.025

Weir Cw = 3.1 Weir length = 10.99557 ft
Orifice Co = .6 Orifice area = 9.621128 sq.ft.
Q (cfs) = (Cw * L * H**1.5) or (Co * A * sqr(2*g*H))
No transition used, transition height = 0.0
Weir equation = Orifice equation @ elev.= 43.23407 ft

Outlet Structure File: FF .STR

POND-2 Version: 5.17 S/N: 1295130250
Date Executed: Time Executed:

****

FIVE FORKS DETENTION POND

****

Outflow Rating Table for Structure #1
ORIFICE-VC Orifice - Vertical Circular

Elevation (ft)	Q (cfs)	Computation Messages
34.60	0.0	E < E1=34.7667
35.10	0.2	H =.333
35.60	0.4	H =.833
36.10	0.5	H =1.333
36.60	0.6	H =1.833
37.10	0.6	H =2.333
37.60	0.7	H =2.833
38.10	0.8	H =3.333
38.60	0.8	H =3.833
39.10	0.9	H =4.333
39.60	0.9	H =4.833
40.10	1.0	H =5.333
40.60	1.0	H =5.833
41.10	1.1	H =6.333
41.60	1.1	H =6.833
42.10	1.1	H =7.333
42.60	1.2	H =7.833
43.10	1.2	H =8.333
43.60	1.2	H =8.833
44.10	1.3	H =9.333
44.60	1.3	H =9.833
45.10	1.4	H =10.333
45.60	1.4	H =10.833
46.10	1.4	H =11.333
46.60	1.4	H =11.833
46.90	1.5	H =12.133

C = .6 A = 8.724902E-02 sq.ft.
H (ft) = Table elev. - Datum elev. (34.7667 ft)
Q (cfs) = C * A * sqr(2g * H)

Quick TR-55 Ver.5.46 S/N:1315430271
Executed: 16:46:51 11-22-1993

```
*************************************************************************
*************************************************************************
*                                                                       *
*                                                                       *
*                        MODIFIED RATIONAL METHOD                       *
*           ---- Grand Summary For All Storm Frequencies ----           *
*                                                                       *
*                                                                       *
*************************************************************************
*************************************************************************
```

First peak outflow point assumed to occur at inflow recession leg.

FIVE FORKS

Area = 52.20 acres Tc = 15.00 minutes

Frequency (years)	Adjusted 'C'	Duration minutes	Intens. in/hr	Qpeak cfs	Allowable cfs	VOLUMES Inflow (cu.ft.)	VOLUMES Storage (cu.ft.)
2	0.580	84	1.540	46.63	37.85	234,990	122,576
10	0.580	86	2.082	63.02	51.47	325,207	169,253
25	0.638	51	3.205	106.74	62.07	326,618	203,720
100	0.725	93	2.767	104.74	74.18	584,427	344,084

Quick TR-55 Ver.5.46 S/N:1315430271
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MODIFIED RATIONAL METHOD
---- Graphical Summary for Maximum Required Storage ----

First peak outflow point assumed to occur at inflow recession leg.

FIVE FORKS

```
*********************************************************************
*  RETURN FREQUENCY:   2 yr      |  Allowable Outflow:    37.85 cfs    *
*  'C' Adjustment: 1.000         |  Required Storage:   122,576 cu.ft. *
*-------------------------------------------------------------------*
*  Peak Inflow:   46.63 cfs        Inflow .HYD stored: FF2M    .HYD   *
*********************************************************************
```

```
    |                Td =  84 minutes                    |  Return Freq:      2 yr
    /------- Approx. Duration for Max. Storage ------/  C adj.factor: 1.00
    |                                                    |
    |                                                    |
    |                 Tc=   15.00  minutes               |
    |                 I =   4.000  in/hr                 |  Area (ac):     52.20
    |               . Q =  121.10  cfs                   |  Weighted C:     0.58
    |              .|.                                   |  Adjusted C:     0.58
F   |             .   .                                  |
L   |            .  |  .              Required Storage   |
O   |           .       .         .--   122,576 cu.ft.   |  Td=       84 minutes
W   |          .    |    .        |                     |  I =    1.540 in/hr
    |         .     x x x x x x x|x x x x x x x x x x x  Q =    46.63 cfs
c   |        .                   |
f   |       .    x                                       x
s   |      .                                               o   Q=   37.85 cfs
    |     .   x                                o          |x  (Allow.Outflow)
    |    .  x                     .     o                 |
    |   .  x                o     .       NOT TO SCALE    |   x
    |  . x       o                .       ============    |
    | o                            .                      |       x
    `-------------------------------------------------------|------------
                                                      86.82 minutes
```

Quick TR-55 Ver.5.46 S/N:1315430271
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FIVE FORKS

**** Modified Rational Hydrograph *****

Weighted C = 0.580 Area= 52.200 acres Tc = 15.00 minutes

Adjusted C = 0.580 Td= 84.00 min. I= 1.54 in/hr Qp= 46.63 cfs

RETURN FREQUENCY: 2 year storm Adj.factor = 1.00
Output file: FF2M .HYD

HYDROGRAPH FOR MAXIMUM STORAGE
For the 2 Year Storm

Time increment = 1.00 Minutes
Time on left represents time for first Q in each row.

Time Minutes							
0.00	0.00	3.11	6.22	9.33	12.43	15.54	18.65
7.00	21.76	24.87	27.98	31.08	34.19	37.30	40.41
14.00	43.52	46.63	46.63	46.63	46.63	46.63	46.63
21.00	46.63	46.63	46.63	46.63	46.63	46.63	46.63
28.00	46.63	46.63	46.63	46.63	46.63	46.63	46.63
35.00	46.63	46.63	46.63	46.63	46.63	46.63	46.63
42.00	46.63	46.63	46.63	46.63	46.63	46.63	46.63
49.00	46.63	46.63	46.63	46.63	46.63	46.63	46.63
56.00	46.63	46.63	46.63	46.63	46.63	46.63	46.63
63.00	46.63	46.63	46.63	46.63	46.63	46.63	46.63
70.00	46.63	46.63	46.63	46.63	46.63	46.63	46.63
77.00	46.63	46.63	46.63	46.63	46.63	46.63	46.63
84.00	46.63	43.52	40.41	37.30	34.19	31.08	27.98
91.00	24.87	21.76	18.65	15.54	12.43	9.33	6.22
98.00	3.11	0.00					

Quick TR-55 Ver.5.46 S/N:1315430271
Executed: 16:46:51 11-22-1993

FIVE FORKS

* * * * * * SUMMARY OF RATIONAL METHOD PEAK DISCHARGES * * * * * *

Q = adj * C * I * A
Where: Q=cfs, C=Weighted Runoff Coefficient, I=in/hour, A=acres
adj = 'C' adjustment factor for each return frequency

RETURN FREQUENCY = 2 years
'C' adjustment, k = 1
Adj. 'C' = Wtd.'C' x 1

Subarea Descr.	Runoff 'C'	Area acres	Tc (min)	Wtd. 'C'	Adj. 'C'	I in/hr	Total acres	Peak Q (cfs)
FIVE FORKS	0.580	52.20						
			15.00	0.580	0.580	4.000	52.20	121.10

Quick TR-55 Ver.5.46 S/N:1315430271
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MODIFIED RATIONAL METHOD
---- Summary for Single Storm Frequency ----

First peak outflow point assumed to occur at inflow recession leg.

FIVE FORKS

RETURN FREQUENCY: 2 yr 'C' Adjustment = 1.000 Allowable Q = 37.85 cfs

Hydrograph file duration= 84.00 minutes
Hydrograph file: FF2M .HYD Tc = 15.00 minutes

Weighted 'C'	Adjusted 'C'	Duration minutes	Intens. in/hr	Areas acres	Qpeak cfs	VOLUMES Inflow (cu.ft.)	Storage (cu.ft.)
0.580	0.580	15	4.000	52.20	121.10	108,994	74,929
0.580	0.580	20	3.500	52.20	105.97	127,159	87,417
0.580	0.580	30	2.750	52.20	83.26	149,866	98,769
0.580	0.580	40	2.250	52.20	68.12	163,490	101,038
0.580	0.580	50	2.000	52.20	60.55	181,656	107,849
0.580	0.580	60	1.800	52.20	54.50	196,188	111,026
********** Storage Maximum							
0.580	0.580	84	1.540	52.20	46.63	234,990	122,576
**********							
0.580	0.580	120	1.150	52.20	34.82	Qpeak < Qallow	

POND-2 Version: 5.17 S/N: 1295130250

>>>>> HYDROGRAPH PRINTOUT <<<<<

11-22-1993 16:09:14

Hydrograph file: b:FF2MX .HYD

HYDROGRAPH ORDINATES (cfs)
Time increment = 5.00 Minutes
Time on left represents time for first Q in each row.

Time Minutes							
0.00	0.00	15.54	31.08	46.63	46.63	46.63	46.63
35.00	46.63	46.63	46.63	46.63	46.63	46.63	46.63
70.00	46.63	46.63	46.63	46.63	40.41	27.98	0.00
105.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
210.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
245.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
280.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
315.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
350.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
385.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
420.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
455.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
490.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
525.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
560.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
595.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
630.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
665.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	0.00	0.00	0.00		

```
*******************
*                 *
*   FIVE FORKS    *
*  DETENTION POND *
*                 *
*                 *
*                 *
*******************
```

Inflow Hydrograph: b:FF2MX .HYD
Rating Table file: b:FF .PND

----INITIAL CONDITIONS----
Elevation = 34.60 ft
Outflow = 0.00 cfs
Storage = 0 cu-ft

GIVEN POND DATA			INTERMEDIATE ROUTING COMPUTATIONS	
ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)	2S/t (cfs)	2S/t + O (cfs)
34.60	0.0	0	0.0	0.0
35.10	0.2	154	1.0	1.2
35.60	0.4	815	5.4	5.8
36.10	0.5	2,170	14.5	15.0
36.60	0.6	4,470	29.8	30.4
37.10	0.6	7,964	53.1	53.7
37.60	0.7	12,902	86.0	86.7
38.10	0.8	19,534	130.2	131.0
38.60	0.8	28,109	187.4	188.2
39.10	0.9	38,878	259.2	260.1
39.60	0.9	52,089	347.3	348.2
40.10	1.0	67,971	453.1	454.1
40.60	1.0	86,004	573.4	574.4
41.10	1.1	105,948	706.3	707.4
41.60	1.1	127,897	852.6	853.7
42.10	4.8	151,948	1013.0	1017.8
42.60	22.2	178,197	1188.0	1210.2
43.10	47.4	206,741	1378.3	1425.7
43.60	62.1	237,675	1584.5	1646.6
44.10	70.4	271,095	1807.3	1877.7
44.60	77.8	307,098	2047.3	2125.1
45.10	84.5	345,778	2305.2	2389.7
45.60	90.8	387,166	2581.1	2671.9
46.10	96.6	431,290	2875.3	2971.9
46.60	102.1	477,158	3181.1	3283.2
46.90	105.3	505,279	3368.5	3473.8

Time increment (t) = 5.0 min.

Pond File: b:FF .PND
Inflow Hydrograph: b:FF2MX .HYD
Outflow Hydrograph: b:FF2OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	0.00	-----	0.0	0.0	0.00	34.60
5.0	15.54	15.5	14.5	15.5	0.50	36.12
10.0	31.08	46.6	59.9	61.2	0.62	37.21
15.0	46.63	77.7	136.0	137.6	0.80	38.16
20.0	46.63	93.3	227.6	229.3	0.86	38.89
25.0	46.63	93.3	319.0	320.8	0.90	39.44
30.0	46.63	93.3	410.4	412.3	0.96	39.90
35.0	46.63	93.3	501.6	503.6	1.00	40.31
40.0	46.63	93.3	592.9	594.9	1.02	40.68
45.0	46.63	93.3	683.9	686.1	1.08	41.02
50.0	46.63	93.3	775.0	777.2	1.10	41.34
55.0	46.63	93.3	865.4	868.3	1.43	41.64
60.0	46.63	93.3	951.7	958.7	3.47	41.92
65.0	46.63	93.3	1030.5	1045.0	7.26	42.17
70.0	46.63	93.3	1095.0	1123.7	14.38	42.38
75.0	46.63	93.3	1147.8	1188.2	20.21	42.54
80.0	46.63	93.3	1189.4	1241.1	25.81	42.67
85.0	46.63	93.3	1221.3	1282.7	30.68	42.77
90.0	40.41	87.0	1241.0	1308.4	33.68	42.83
95.0	27.98	68.4	1241.8	1309.4	33.80	42.83
100.0	0.00	28.0	1211.4	1269.8	29.17	42.74
105.0	0.00	0.0	1166.7	1211.4	22.35	42.60
110.0	0.00	0.0	1130.2	1166.7	18.27	42.49
115.0	0.00	0.0	1100.3	1130.2	14.97	42.39
120.0	0.00	0.0	1075.7	1100.3	12.26	42.31
125.0	0.00	0.0	1055.7	1075.7	10.04	42.25
130.0	0.00	0.0	1039.2	1055.7	8.23	42.20
135.0	0.00	0.0	1025.7	1039.2	6.74	42.16
140.0	0.00	0.0	1014.7	1025.7	5.52	42.12
145.0	0.00	0.0	1005.2	1014.7	4.73	42.09
150.0	0.00	0.0	996.2	1005.2	4.52	42.06
155.0	0.00	0.0	987.6	996.2	4.31	42.03
160.0	0.00	0.0	979.3	987.6	4.12	42.01
165.0	0.00	0.0	971.5	979.3	3.93	41.98
170.0	0.00	0.0	964.0	971.5	3.76	41.96
175.0	0.00	0.0	956.8	964.0	3.59	41.94
180.0	0.00	0.0	949.9	956.8	3.42	41.91
185.0	0.00	0.0	943.4	949.9	3.27	41.89
190.0	0.00	0.0	937.2	943.4	3.12	41.87
195.0	0.00	0.0	931.2	937.2	2.98	41.85
200.0	0.00	0.0	925.5	931.2	2.85	41.84
205.0	0.00	0.0	920.1	925.5	2.72	41.82
210.0	0.00	0.0	914.9	920.1	2.60	41.80
215.0	0.00	0.0	909.9	914.9	2.48	41.79
220.0	0.00	0.0	905.2	909.9	2.37	41.77

Pond File: b:FF .PND
Inflow Hydrograph: b:FF2MX .HYD
Outflow Hydrograph: b:FF2OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
225.0	0.001	0.0	900.7	905.2	2.26	41.76
230.0	0.001	0.0	896.3	900.7	2.16	41.74
235.0	0.001	0.0	892.2	896.3	2.06	41.73
240.0	0.001	0.0	888.3	892.2	1.97	41.72
245.0	0.001	0.0	884.5	888.3	1.88	41.71
250.0	0.001	0.0	880.9	884.5	1.79	41.69
255.0	0.001	0.0	877.5	880.9	1.71	41.68
260.0	0.001	0.0	874.2	877.5	1.64	41.67
265.0	0.001	0.0	871.1	874.2	1.56	41.66
270.0	0.001	0.0	868.1	871.1	1.49	41.65
275.0	0.001	0.0	865.3	868.1	1.42	41.64
280.0	0.001	0.0	862.6	865.3	1.36	41.64
285.0	0.001	0.0	860.0	862.6	1.30	41.63
290.0	0.001	0.0	857.5	860.0	1.24	41.62
295.0	0.001	0.0	855.1	857.5	1.18	41.61
300.0	0.001	0.0	852.9	855.1	1.13	41.60
305.0	0.001	0.0	850.7	852.9	1.10	41.60
310.0	0.001	0.0	848.5	850.7	1.10	41.59
315.0	0.001	0.0	846.3	848.5	1.10	41.58
320.0	0.001	0.0	844.1	846.3	1.10	41.57
325.0	0.001	0.0	841.9	844.1	1.10	41.57
330.0	0.001	0.0	839.7	841.9	1.10	41.56
335.0	0.001	0.0	837.5	839.7	1.10	41.55
340.0	0.001	0.0	835.3	837.5	1.10	41.54
345.0	0.001	0.0	833.1	835.3	1.10	41.54
350.0	0.001	0.0	830.9	833.1	1.10	41.53
355.0	0.001	0.0	828.7	830.9	1.10	41.52
360.0	0.001	0.0	826.5	828.7	1.10	41.51
365.0	0.001	0.0	824.3	826.5	1.10	41.51
370.0	0.001	0.0	822.1	824.3	1.10	41.50
375.0	0.001	0.0	819.9	822.1	1.10	41.49
380.0	0.001	0.0	817.7	819.9	1.10	41.48
385.0	0.001	0.0	815.5	817.7	1.10	41.48
390.0	0.001	0.0	813.3	815.5	1.10	41.47
395.0	0.001	0.0	811.1	813.3	1.10	41.46
400.0	0.001	0.0	808.9	811.1	1.10	41.45
405.0	0.001	0.0	806.7	808.9	1.10	41.45
410.0	0.001	0.0	804.5	806.7	1.10	41.44
415.0	0.001	0.0	802.3	804.5	1.10	41.43
420.0	0.001	0.0	800.1	802.3	1.10	41.42
425.0	0.001	0.0	797.9	800.1	1.10	41.42
430.0	0.001	0.0	795.7	797.9	1.10	41.41
435.0	0.001	0.0	793.5	795.7	1.10	41.40
440.0	0.001	0.0	791.3	793.5	1.10	41.39
445.0	0.001	0.0	789.1	791.3	1.10	41.39
450.0	0.001	0.0	786.9	789.1	1.10	41.38

Pond File: b:FF .PND
Inflow Hydrograph: b:FF2MX .HYD
Outflow Hydrograph: b:FF2OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
455.0	0.001	0.0	784.7	786.9	1.10	41.37
460.0	0.001	0.0	782.5	784.7	1.10	41.36
465.0	0.001	0.0	780.3	782.5	1.10	41.36
470.0	0.001	0.0	778.1	780.3	1.10	41.35
475.0	0.001	0.0	775.9	778.1	1.10	41.34
480.0	0.001	0.0	773.7	775.9	1.10	41.33
485.0	0.001	0.0	771.5	773.7	1.10	41.33
490.0	0.001	0.0	769.3	771.5	1.10	41.32
495.0	0.001	0.0	767.1	769.3	1.10	41.31
500.0	0.001	0.0	764.9	767.1	1.10	41.30
505.0	0.001	0.0	762.7	764.9	1.10	41.30
510.0	0.001	0.0	760.5	762.7	1.10	41.29
515.0	0.001	0.0	758.3	760.5	1.10	41.28
520.0	0.001	0.0	756.1	758.3	1.10	41.27
525.0	0.001	0.0	753.9	756.1	1.10	41.27
530.0	0.001	0.0	751.7	753.9	1.10	41.26
535.0	0.001	0.0	749.5	751.7	1.10	41.25
540.0	0.001	0.0	747.3	749.5	1.10	41.24
545.0	0.001	0.0	745.1	747.3	1.10	41.24
550.0	0.001	0.0	742.9	745.1	1.10	41.23
555.0	0.001	0.0	740.7	742.9	1.10	41.22
560.0	0.001	0.0	738.5	740.7	1.10	41.21
565.0	0.001	0.0	736.3	738.5	1.10	41.21
570.0	0.001	0.0	734.1	736.3	1.10	41.20
575.0	0.001	0.0	731.9	734.1	1.10	41.19
580.0	0.001	0.0	729.7	731.9	1.10	41.18
585.0	0.001	0.0	727.5	729.7	1.10	41.18
590.0	0.001	0.0	725.3	727.5	1.10	41.17
595.0	0.001	0.0	723.1	725.3	1.10	41.16
600.0	0.001	0.0	720.9	723.1	1.10	41.15
605.0	0.001	0.0	718.7	720.9	1.10	41.15
610.0	0.001	0.0	716.5	718.7	1.10	41.14
615.0	0.001	0.0	714.3	716.5	1.10	41.13
620.0	0.001	0.0	712.1	714.3	1.10	41.12
625.0	0.001	0.0	709.9	712.1	1.10	41.12
630.0	0.001	0.0	707.7	709.9	1.10	41.11
635.0	0.001	0.0	705.5	707.7	1.10	41.10
640.0	0.001	0.0	703.3	705.5	1.10	41.09
645.0	0.001	0.0	701.1	703.3	1.10	41.08
650.0	0.001	0.0	698.9	701.1	1.10	41.08
655.0	0.001	0.0	696.7	698.9	1.09	41.07
660.0	0.001	0.0	694.5	696.7	1.09	41.06
665.0	0.001	0.0	692.3	694.5	1.09	41.05
670.0	0.001	0.0	690.1	692.3	1.09	41.04
675.0	0.001	0.0	688.0	690.1	1.09	41.04
680.0	0.001	0.0	685.8	688.0	1.09	41.03

Pond File: b:FF .PND
Inflow Hydrograph: b:FF2MX .HYD
Outflow Hydrograph: b:FF2OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
685.0	0.00	0.0	683.6	685.8	1.08	41.02
690.0	0.00	0.0	681.5	683.6	1.08	41.01
695.0	0.00	0.0	679.3	681.5	1.08	41.00
700.0	0.00	0.0	677.2	679.3	1.08	40.99
705.0	0.00	0.0	675.0	677.2	1.08	40.99
710.0	0.00	0.0	672.8	675.0	1.08	40.98
715.0	0.00	0.0	670.7	672.8	1.07	40.97
720.0	0.00	0.0	668.6	670.7	1.07	40.96

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

Pond File: b:FF .PND
Inflow Hydrograph: b:FF2MX .HYD
Outflow Hydrograph: b:FF2OUT .HYD

Starting Pond W.S. Elevation = 34.60 ft

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

Peak Inflow = 46.63 cfs
Peak Outflow = 33.80 cfs
Peak Elevation = 42.83 ft

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

Initial Storage = 0 cu-ft
Peak Storage From Storm = 191,340 cu-ft

Total Storage in Pond = 191,340 cu-ft

Quick TR-55 Ver.5.46 S/N:1315430271
Executed: 16:46:51 11-22-1993

MODIFIED RATIONAL METHOD
---- Graphical Summary for Maximum Required Storage ----

First peak outflow point assumed to occur at inflow recession leg.

FIVE FORKS

```
*********************************************************************
*  RETURN FREQUENCY:  10 yr      |  Allowable Outflow:    51.47 cfs    *
*  'C' Adjustment: 1.000         |  Required Storage:   169,253 cu.ft. *
*-------------------------------------------------------------------*
*  Peak Inflow:   63.02 cfs        Inflow .HYD stored: FF10M   .HYD   *
*********************************************************************
```

```
   |                Td =  86 minutes                  |  Return Freq:     10 yr
   /------- Approx. Duration for Max. Storage ------/  C adj.factor: 1.00
   |                                                  |
   |                                                  |
   |                Tc=   15.00  minutes              |
   |                I =   5.250  in/hr                |  Area (ac):     52.20
   |              . Q =  158.95  cfs                  |  Weighted C:     0.58
   |             .|.                                  |  Adjusted C:     0.58
F  |            .   .                                 |
L  |           .  |  .              Required Storage  |
O  |          .       .         .--   169,253 cu.ft. |  Td=       86 minutes
W  |         .    |    .        |                    |  I =    2.082 in/hr
   |        .     x x x x x x x|x x x x x x x x x x x |  Q =    63.02 cfs
c  |       .                   |
f  |      .    x                                      x
s  |     .                                              o   Q=   51.47 cfs
   |    .   x                                 o        |x  (Allow.Outflow)
   |   .  x                   .     o                  |
   |  .  x                o    .       NOT TO SCALE    |   x
   | . x       o                .      ============    |
   | o                           .                     |       x
   `-----------------------------------------------------|------------
                                                     88.75 minutes
```

Quick TR-55 Ver.5.46 S/N:1315430271
Executed: 16:46:51 11-22-1993

FIVE FORKS

**** Modified Rational Hydrograph *****

Weighted C = 0.580 Area= 52.200 acres Tc = 15.00 minutes

Adjusted C = 0.580 Td= 86.00 min. I= 2.08 in/hr Qp= 63.02 cfs

RETURN FREQUENCY: 10 year storm Adj.factor = 1.00
Output file: FF10M .HYD

HYDROGRAPH FOR MAXIMUM STORAGE
For the 10 Year Storm

Time increment = 1.00 Minutes
Time on left represents time for first Q in each row.

Time Minutes							
0.00	0.00	4.20	8.40	12.60	16.81	21.01	25.21
7.00	29.41	33.61	37.81	42.02	46.22	50.42	54.62
14.00	58.82	63.02	63.02	63.02	63.02	63.02	63.02
21.00	63.02	63.02	63.02	63.02	63.02	63.02	63.02
28.00	63.02	63.02	63.02	63.02	63.02	63.02	63.02
35.00	63.02	63.02	63.02	63.02	63.02	63.02	63.02
42.00	63.02	63.02	63.02	63.02	63.02	63.02	63.02
49.00	63.02	63.02	63.02	63.02	63.02	63.02	63.02
56.00	63.02	63.02	63.02	63.02	63.02	63.02	63.02
63.00	63.02	63.02	63.02	63.02	63.02	63.02	63.02
70.00	63.02	63.02	63.02	63.02	63.02	63.02	63.02
77.00	63.02	63.02	63.02	63.02	63.02	63.02	63.02
84.00	63.02	63.02	63.02	58.82	54.62	50.42	46.22
91.00	42.02	37.81	33.61	29.41	25.21	21.01	16.81
98.00	12.60	8.40	4.20	0.00			

Quick TR-55 Ver.5.46 S/N:1315430271
Executed: 16:46:51 11-22-1993

FIVE FORKS

* * * * * * SUMMARY OF RATIONAL METHOD PEAK DISCHARGES * * * * * *

Q = adj * C * I * A
Where: Q=cfs, C=Weighted Runoff Coefficient, I=in/hour, A=acres
adj = 'C' adjustment factor for each return frequency

RETURN FREQUENCY = 10 years
'C' adjustment, k = 1
Adj. 'C' = Wtd.'C' x 1

Subarea Descr.	Runoff 'C'	Area acres	Tc (min)	Wtd. 'C'	Adj. 'C'	I in/hr	Total acres	Peak Q (cfs)
FIVE FORKS	0.580	52.20						
			15.00	0.580	0.580	5.250	52.20	158.95

Quick TR-55 Ver.5.46 S/N:1315430271
Executed: 16:46:51 11-22-1993

MODIFIED RATIONAL METHOD
---- Summary for Single Storm Frequency ----

First peak outflow point assumed to occur at inflow recession leg.

FIVE FORKS

RETURN FREQUENCY: 10 yr 'C' Adjustment = 1.000 Allowable Q = 51.47 cfs

Hydrograph file duration= 86.00 minutes
Hydrograph file: FF10M .HYD Tc = 15.00 minutes

Weighted 'C'	Adjusted 'C'	Duration minutes	Intens. in/hr	Areas acres	Qpeak cfs	VOLUMES Inflow (cu.ft.)	Storage (cu.ft.)
0.580	0.580	15	5.250	52.20	158.95	143,054	96,731
0.580	0.580	20	4.700	52.20	142.30	170,757	116,713
0.580	0.580	30	3.750	52.20	113.53	204,363	134,878
0.580	0.580	40	3.150	52.20	95.37	228,887	143,961
0.580	0.580	50	2.750	52.20	83.26	249,777	149,410
0.580	0.580	60	2.450	52.20	74.18	267,034	151,227
********** Storage Maximum							
0.580	0.580	86	2.082	52.20	63.02	325,207	169,253
0.580	0.580	120	1.600	52.20	48.44	Qpeak < Qallow	

POND-2 Version: 5.17 S/N: 1295130250

>>>>> HYDROGRAPH PRINTOUT <<<<<

11-22-1993 16:17:16

Hydrograph file: b:FF10MX .HYD

HYDROGRAPH ORDINATES (cfs)
Time increment = 5.00 Minutes
Time on left represents time for first Q in each row.

Time Minutes							
0.00	0.00	21.01	42.02	63.02	63.02	63.02	63.02
35.00	63.02	63.02	63.02	63.02	63.02	63.02	63.02
70.00	63.02	63.02	63.02	63.02	46.22	25.21	0.00
105.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
210.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
245.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
280.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
315.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
350.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
385.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
420.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
455.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
490.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
525.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
560.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
595.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
630.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
665.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	0.00	0.00	0.00		

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*******************
*                 *
*   FIVE FORKS    *
*  DETENTION POND *
*                 *
*                 *
*                 *
*******************
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Inflow Hydrograph: b:FF10MX .HYD
Rating Table file: b:FF .PND

----INITIAL CONDITIONS----
Elevation = 34.60 ft
Outflow = 0.00 cfs
Storage = 0 cu-ft

GIVEN POND DATA			INTERMEDIATE ROUTING COMPUTATIONS	
ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)	2S/t (cfs)	2S/t + O (cfs)
34.60	0.0	0	0.0	0.0
35.10	0.2	154	1.0	1.2
35.60	0.4	815	5.4	5.8
36.10	0.5	2,170	14.5	15.0
36.60	0.6	4,470	29.8	30.4
37.10	0.6	7,964	53.1	53.7
37.60	0.7	12,902	86.0	86.7
38.10	0.8	19,534	130.2	131.0
38.60	0.8	28,109	187.4	188.2
39.10	0.9	38,878	259.2	260.1
39.60	0.9	52,089	347.3	348.2
40.10	1.0	67,971	453.1	454.1
40.60	1.0	86,004	573.4	574.4
41.10	1.1	105,948	706.3	707.4
41.60	1.1	127,897	852.6	853.7
42.10	4.8	151,948	1013.0	1017.8
42.60	22.2	178,197	1188.0	1210.2
43.10	47.4	206,741	1378.3	1425.7
43.60	62.1	237,675	1584.5	1646.6
44.10	70.4	271,095	1807.3	1877.7
44.60	77.8	307,098	2047.3	2125.1
45.10	84.5	345,778	2305.2	2389.7
45.60	90.8	387,166	2581.1	2671.9
46.10	96.6	431,290	2875.3	2971.9
46.60	102.1	477,158	3181.1	3283.2
46.90	105.3	505,279	3368.5	3473.8

Time increment (t) = 5.0 min.

Pond File: b:FF .PND
Inflow Hydrograph: b:FF10MX .HYD
Outflow Hydrograph: b:FF10OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	0.00	-----	0.0	0.0	0.00	34.60
5.0	21.01	21.0	19.9	21.0	0.54	36.30
10.0	42.02	63.0	81.6	83.0	0.69	37.54
15.0	63.02	105.0	185.0	186.6	0.80	38.59
20.0	63.02	126.0	309.3	311.1	0.90	39.39
25.0	63.02	126.0	433.3	435.3	0.98	40.01
30.0	63.02	126.0	557.4	559.4	1.00	40.54
35.0	63.02	126.0	681.3	683.4	1.08	41.01
40.0	63.02	126.0	805.1	807.3	1.10	41.44
45.0	63.02	126.0	925.4	931.1	2.85	41.84
50.0	63.02	126.0	1035.8	1051.5	7.85	42.19
55.0	63.02	126.0	1126.2	1161.8	17.83	42.47
60.0	63.02	126.0	1198.0	1252.2	27.12	42.70
65.0	63.02	126.0	1253.0	1324.0	35.51	42.86
70.0	63.02	126.0	1295.1	1379.0	41.95	42.99
75.0	63.02	126.0	1327.4	1421.2	46.88	43.09
80.0	63.02	126.0	1355.0	1453.5	49.25	43.16
85.0	63.02	126.0	1378.9	1481.0	51.08	43.23
90.0	46.22	109.2	1385.0	1488.1	51.55	43.24
95.0	25.21	71.4	1357.5	1456.4	49.45	43.17
100.0	0.00	25.2	1298.0	1382.7	42.38	43.00
105.0	0.00	0.0	1233.0	1298.0	32.47	42.80
110.0	0.00	0.0	1183.3	1233.0	24.87	42.65
115.0	0.00	0.0	1143.8	1183.3	19.77	42.53
120.0	0.00	0.0	1111.4	1143.8	16.19	42.43
125.0	0.00	0.0	1084.8	1111.4	13.26	42.34
130.0	0.00	0.0	1063.1	1084.8	10.86	42.27
135.0	0.00	0.0	1045.3	1063.1	8.90	42.22
140.0	0.00	0.0	1030.7	1045.3	7.29	42.17
145.0	0.00	0.0	1018.8	1030.7	5.97	42.13
150.0	0.00	0.0	1009.0	1018.8	4.89	42.10
155.0	0.00	0.0	999.8	1009.0	4.60	42.07
160.0	0.00	0.0	991.0	999.8	4.39	42.05
165.0	0.00	0.0	982.6	991.0	4.20	42.02
170.0	0.00	0.0	974.6	982.6	4.01	41.99
175.0	0.00	0.0	967.0	974.6	3.83	41.97
180.0	0.00	0.0	959.7	967.0	3.65	41.95
185.0	0.00	0.0	952.7	959.7	3.49	41.92
190.0	0.00	0.0	946.0	952.7	3.33	41.90
195.0	0.00	0.0	939.7	946.0	3.18	41.88
200.0	0.00	0.0	933.6	939.7	3.04	41.86
205.0	0.00	0.0	927.8	933.6	2.90	41.84
210.0	0.00	0.0	922.2	927.8	2.77	41.83
215.0	0.00	0.0	916.9	922.2	2.64	41.81
220.0	0.00	0.0	911.9	916.9	2.53	41.79

Pond File: b:FF .PND
Inflow Hydrograph: b:FF10MX .HYD
Outflow Hydrograph: b:FF10OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
225.0	0.001	0.0	907.1	911.9	2.41	41.78
230.0	0.001	0.0	902.5	907.1	2.30	41.76
235.0	0.001	0.0	898.1	902.5	2.20	41.75
240.0	0.001	0.0	893.9	898.1	2.10	41.74
245.0	0.001	0.0	889.9	893.9	2.00	41.72
250.0	0.001	0.0	886.0	889.9	1.91	41.71
255.0	0.001	0.0	882.4	886.0	1.83	41.70
260.0	0.001	0.0	878.9	882.4	1.75	41.69
265.0	0.001	0.0	875.5	878.9	1.67	41.68
270.0	0.001	0.0	872.4	875.5	1.59	41.67
275.0	0.001	0.0	869.3	872.4	1.52	41.66
280.0	0.001	0.0	866.4	869.3	1.45	41.65
285.0	0.001	0.0	863.7	866.4	1.39	41.64
290.0	0.001	0.0	861.0	863.7	1.32	41.63
295.0	0.001	0.0	858.5	861.0	1.26	41.62
300.0	0.001	0.0	856.1	858.5	1.21	41.61
305.0	0.001	0.0	853.8	856.1	1.15	41.61
310.0	0.001	0.0	851.6	853.8	1.10	41.60
315.0	0.001	0.0	849.4	851.6	1.10	41.59
320.0	0.001	0.0	847.2	849.4	1.10	41.59
325.0	0.001	0.0	845.0	847.2	1.10	41.58
330.0	0.001	0.0	842.8	845.0	1.10	41.57
335.0	0.001	0.0	840.6	842.8	1.10	41.56
340.0	0.001	0.0	838.4	840.6	1.10	41.55
345.0	0.001	0.0	836.2	838.4	1.10	41.55
350.0	0.001	0.0	834.0	836.2	1.10	41.54
355.0	0.001	0.0	831.8	834.0	1.10	41.53
360.0	0.001	0.0	829.6	831.8	1.10	41.52
365.0	0.001	0.0	827.4	829.6	1.10	41.52
370.0	0.001	0.0	825.2	827.4	1.10	41.51
375.0	0.001	0.0	823.0	825.2	1.10	41.50
380.0	0.001	0.0	820.8	823.0	1.10	41.49
385.0	0.001	0.0	818.6	820.8	1.10	41.49
390.0	0.001	0.0	816.4	818.6	1.10	41.48
395.0	0.001	0.0	814.2	816.4	1.10	41.47
400.0	0.001	0.0	812.0	814.2	1.10	41.46
405.0	0.001	0.0	809.8	812.0	1.10	41.46
410.0	0.001	0.0	807.6	809.8	1.10	41.45
415.0	0.001	0.0	805.4	807.6	1.10	41.44
420.0	0.001	0.0	803.2	805.4	1.10	41.43
425.0	0.001	0.0	801.0	803.2	1.10	41.43
430.0	0.001	0.0	798.8	801.0	1.10	41.42
435.0	0.001	0.0	796.6	798.8	1.10	41.41
440.0	0.001	0.0	794.4	796.6	1.10	41.40
445.0	0.001	0.0	792.2	794.4	1.10	41.40
450.0	0.001	0.0	790.0	792.2	1.10	41.39

Pond File: b:FF .PND
Inflow Hydrograph: b:FF10MX .HYD
Outflow Hydrograph: b:FF10OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
455.0	0.001	0.0	787.8	790.01	1.10	41.38
460.0	0.001	0.0	785.6	787.81	1.10	41.37
465.0	0.001	0.0	783.4	785.61	1.10	41.37
470.0	0.001	0.0	781.2	783.41	1.10	41.36
475.0	0.001	0.0	779.0	781.21	1.10	41.35
480.0	0.001	0.0	776.8	779.01	1.10	41.34
485.0	0.001	0.0	774.6	776.81	1.10	41.34
490.0	0.001	0.0	772.4	774.61	1.10	41.33
495.0	0.001	0.0	770.2	772.41	1.10	41.32
500.0	0.001	0.0	768.0	770.21	1.10	41.31
505.0	0.001	0.0	765.8	768.01	1.10	41.31
510.0	0.001	0.0	763.6	765.81	1.10	41.30
515.0	0.001	0.0	761.4	763.61	1.10	41.29
520.0	0.001	0.0	759.2	761.41	1.10	41.28
525.0	0.001	0.0	757.0	759.21	1.10	41.28
530.0	0.001	0.0	754.8	757.01	1.10	41.27
535.0	0.001	0.0	752.6	754.81	1.10	41.26
540.0	0.001	0.0	750.4	752.61	1.10	41.25
545.0	0.001	0.0	748.2	750.41	1.10	41.25
550.0	0.001	0.0	746.0	748.21	1.10	41.24
555.0	0.001	0.0	743.8	746.01	1.10	41.23
560.0	0.001	0.0	741.6	743.81	1.10	41.22
565.0	0.001	0.0	739.4	741.61	1.10	41.22
570.0	0.001	0.0	737.2	739.41	1.10	41.21
575.0	0.001	0.0	735.0	737.21	1.10	41.20
580.0	0.001	0.0	732.8	735.01	1.10	41.19
585.0	0.001	0.0	730.6	732.81	1.10	41.19
590.0	0.001	0.0	728.4	730.61	1.10	41.18
595.0	0.001	0.0	726.2	728.41	1.10	41.17
600.0	0.001	0.0	724.0	726.21	1.10	41.16
605.0	0.001	0.0	721.8	724.01	1.10	41.16
610.0	0.001	0.0	719.6	721.81	1.10	41.15
615.0	0.001	0.0	717.4	719.61	1.10	41.14
620.0	0.001	0.0	715.2	717.41	1.10	41.13
625.0	0.001	0.0	713.0	715.21	1.10	41.13
630.0	0.001	0.0	710.8	713.01	1.10	41.12
635.0	0.001	0.0	708.6	710.81	1.10	41.11
640.0	0.001	0.0	706.4	708.61	1.10	41.10
645.0	0.001	0.0	704.2	706.41	1.10	41.10
650.0	0.001	0.0	702.0	704.21	1.10	41.09
655.0	0.001	0.0	699.8	702.01	1.10	41.08
660.0	0.001	0.0	697.6	699.81	1.09	41.07
665.0	0.001	0.0	695.4	697.61	1.09	41.06
670.0	0.001	0.0	693.2	695.41	1.09	41.05
675.0	0.001	0.0	691.0	693.21	1.09	41.05
680.0	0.001	0.0	688.9	691.01	1.09	41.04

Pond File: b:FF .PND
Inflow Hydrograph: b:FF10MX .HYD
Outflow Hydrograph: b:FF10OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
685.0	0.00	0.0	686.7	688.9	1.09	41.03
690.0	0.00	0.0	684.5	686.7	1.08	41.02
695.0	0.00	0.0	682.4	684.5	1.08	41.01
700.0	0.00	0.0	680.2	682.4	1.08	41.01
705.0	0.00	0.0	678.0	680.2	1.08	41.00
710.0	0.00	0.0	675.9	678.0	1.08	40.99
715.0	0.00	0.0	673.7	675.9	1.08	40.98
720.0	0.00	0.0	671.6	673.7	1.07	40.97

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

Pond File: b:FF .PND
Inflow Hydrograph: b:FF10MX .HYD
Outflow Hydrograph: b:FF10OUT .HYD

Starting Pond W.S. Elevation = 34.60 ft

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

Peak Inflow = 63.02 cfs
Peak Outflow = 51.55 cfs
Peak Elevation = 43.24 ft

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

Initial Storage = 0 cu-ft
Peak Storage From Storm = 215,481 cu-ft

Total Storage in Pond = 215,481 cu-ft

Quick TR-55 Ver.5.46 S/N:1315430271
Executed: 16:46:51 11-22-1993

MODIFIED RATIONAL METHOD
---- Graphical Summary for Maximum Required Storage ----

First peak outflow point assumed to occur at inflow recession leg.

FIVE FORKS

```
*********************************************************************
*  RETURN FREQUENCY: 100 yr     |  Allowable Outflow:     74.18 cfs    *
*  'C' Adjustment: 1.250        |  Required Storage:   344,084 cu.ft. *
*-------------------------------------------------------------------*
*  Peak Inflow:  104.74 cfs       Inflow .HYD stored: FF100M  .HYD    *
*********************************************************************
```

```
   |                Td =  93 minutes                  |  Return Freq:   100 yr
   /------- Approx. Duration for Max. Storage ------/  C adj.factor: 1.25
   |                                                  |
   |                                                  |
   |                Tc=   15.00  minutes              |
   |                I =   7.200  in/hr                |  Area (ac):     52.20
   |              . Q =  272.48  cfs                  |  Weighted C:     0.58
   |             .|.                                  |  Adjusted C:     0.72
F  |            .   .                                 |
L  |           .  |  .              Required Storage  |
O  |          .       .         .--   344,084 cu.ft. |  Td=       93 minutes
W  |         .    |    .        |                    |  I =    2.767 in/hr
   |        .     x x x x x x x|x x x x x x x x x x x |  Q =   104.74 cfs
c  |       .                   |
f  |      .    x                                      x
s  |     .                                              o   Q=   74.18 cfs
   |    .   x                                 o        |x  (Allow.Outflow)
   |   .  x                   .     o                  |
   |  .  x               o    .       NOT TO SCALE     |   x
   | . x       o               .      ============     |
   | o                          .                       |       x
   `-------------------------------------------------|------------
                                                   97.38 minutes
```

Quick TR-55 Ver.5.46 S/N:1315430271
Executed: 16:46:51 11-22-1993

FIVE FORKS

**** Modified Rational Hydrograph *****

Weighted C = 0.580 Area= 52.200 acres Tc = 15.00 minutes

Adjusted C = 0.725 Td= 93.00 min. I= 2.77 in/hr Qp= 104.74 cfs

RETURN FREQUENCY: 100 year storm Adj.factor = 1.25
Output file: FF100M .HYD

HYDROGRAPH FOR MAXIMUM STORAGE
For the 100 Year Storm

Time increment = 1.00 Minutes
Time on left represents time for first Q in each row.

Time Minutes							
0.00	0.00	6.98	13.96	20.95	27.93	34.91	41.89
7.00	48.88	55.86	62.84	69.82	76.81	83.79	90.77
14.00	97.75	104.74	104.74	104.74	104.74	104.74	104.74
21.00	104.74	104.74	104.74	104.74	104.74	104.74	104.74
28.00	104.74	104.74	104.74	104.74	104.74	104.74	104.74
35.00	104.74	104.74	104.74	104.74	104.74	104.74	104.74
42.00	104.74	104.74	104.74	104.74	104.74	104.74	104.74
49.00	104.74	104.74	104.74	104.74	104.74	104.74	104.74
56.00	104.74	104.74	104.74	104.74	104.74	104.74	104.74
63.00	104.74	104.74	104.74	104.74	104.74	104.74	104.74
70.00	104.74	104.74	104.74	104.74	104.74	104.74	104.74
77.00	104.74	104.74	104.74	104.74	104.74	104.74	104.74
84.00	104.74	104.74	104.74	104.74	104.74	104.74	104.74
91.00	104.74	104.74	104.74	97.75	90.77	83.79	76.81
98.00	69.82	62.84	55.86	48.88	41.89	34.91	27.93
105.00	20.95	13.96	6.98	0.00			

Quick TR-55 Ver.5.46 S/N:1315430271
Executed: 16:46:51 11-22-1993

FIVE FORKS

* * * * * * SUMMARY OF RATIONAL METHOD PEAK DISCHARGES * * * * * *

Q = adj * C * I * A
Where: Q=cfs, C=Weighted Runoff Coefficient, I=in/hour, A=acres
adj = 'C' adjustment factor for each return frequency

RETURN FREQUENCY = 100 years
'C' adjustment, k = 1.25
Adj. 'C' = Wtd.'C' x 1.25

Subarea Descr.	Runoff 'C'	Area acres	Tc (min)	Wtd. 'C'	Adj. 'C'	I in/hr	Total acres	Peak Q (cfs)
FIVE FORKS	0.580	52.20						
			15.00	0.580	0.725	7.200	52.20	272.48

Quick TR-55 Ver.5.46 S/N:1315430271
Executed: 16:46:51 11-22-1993

MODIFIED RATIONAL METHOD
---- Summary for Single Storm Frequency ----

First peak outflow point assumed to occur at inflow recession leg.

FIVE FORKS

RETURN FREQUENCY: 100 yr 'C' Adjustment = 1.250 Allowable Q = 74.18 cfs

Hydrograph file duration= 93.00 minutes
Hydrograph file: FF100M .HYD Tc = 15.00 minutes

Weighted 'C'	Adjusted 'C'	Duration minutes	Intens. in/hr	Areas acres	Qpeak cfs	VOLUMES Inflow (cu.ft.)	Storage (cu.ft.)
0.580	0.725	15	7.200	52.20	272.48	245,236	178,473
0.580	0.725	20	6.500	52.20	245.99	295,191	217,302
0.580	0.725	30	5.250	52.20	198.69	357,635	257,492
0.580	0.725	40	4.500	52.20	170.30	408,726	286,329
0.580	0.725	50	3.800	52.20	143.81	431,433	286,782
0.580	0.725	60	3.400	52.20	128.67	463,223	296,318
********** Storage Maximum							
0.580	0.725	93	2.767	52.20	104.74	584,427	344,084
0.580	0.725	120	2.250	52.20	85.15	613,089	312,660
0.580	0.725	180	1.700	52.20	64.34	Qpeak < Qallow	

POND-2 Version: 5.17 S/N: 1295130250

>>>>> HYDROGRAPH PRINTOUT <<<<<

11-22-1993 16:42:25

Hydrograph file: b:FF100MX .HYD

HYDROGRAPH ORDINATES (cfs)
Time increment = 5.00 Minutes
Time on left represents time for first Q in each row.

Time Minutes							
0.00	0.00	34.91	69.82	104.74	104.74	104.74	104.74
35.00	104.74	104.74	104.74	104.74	104.74	104.74	104.74
70.00	104.74	104.74	104.74	104.74	104.74	104.74	55.86
105.00	20.95	0.00	0.00	0.00	0.00	0.00	0.00
140.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
210.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
245.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
280.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
315.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
350.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
385.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
420.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
455.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
490.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
525.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
560.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
595.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
630.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
665.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	0.00	0.00	0.00		

```
*******************
*                 *
*   FIVE FORKS    *
*  DETENTION POND *
*                 *
*                 *
*                 *
*******************
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Inflow Hydrograph: b:FF100MX .HYD
Rating Table file: b:FF .PND

----INITIAL CONDITIONS----
Elevation = 34.60 ft
Outflow = 0.00 cfs
Storage = 0 cu-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
34.60	0.0	0
35.10	0.2	154
35.60	0.4	815
36.10	0.5	2,170
36.60	0.6	4,470
37.10	0.6	7,964
37.60	0.7	12,902
38.10	0.8	19,534
38.60	0.8	28,109
39.10	0.9	38,878
39.60	0.9	52,089
40.10	1.0	67,971
40.60	1.0	86,004
41.10	1.1	105,948
41.60	1.1	127,897
42.10	4.8	151,948
42.60	22.2	178,197
43.10	47.4	206,741
43.60	62.1	237,675
44.10	70.4	271,095
44.60	77.8	307,098
45.10	84.5	345,778
45.60	90.8	387,166
46.10	96.6	431,290
46.60	102.1	477,158
46.90	105.3	505,279

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
1.0	1.2
5.4	5.8
14.5	15.0
29.8	30.4
53.1	53.7
86.0	86.7
130.2	131.0
187.4	188.2
259.2	260.1
347.3	348.2
453.1	454.1
573.4	574.4
706.3	707.4
852.6	853.7
1013.0	1017.8
1188.0	1210.2
1378.3	1425.7
1584.5	1646.6
1807.3	1877.7
2047.3	2125.1
2305.2	2389.7
2581.1	2671.9
2875.3	2971.9
3181.1	3283.2
3368.5	3473.8

Time increment (t) = 5.0 min.

Pond File: b:FF .PND
Inflow Hydrograph: b:FF100MX .HYD
Outflow Hydrograph: b:FF100OUT.HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	0.00	-----	0.0	0.0	0.00	34.60
5.0	34.91	34.9	33.7	34.9	0.60	36.70
10.0	69.82	104.7	136.8	138.4	0.80	38.16
15.0	104.74	174.6	309.6	311.4	0.90	39.39
20.0	104.74	209.5	517.1	519.1	1.00	40.37
25.0	104.74	209.5	724.4	726.6	1.10	41.17
30.0	104.74	209.5	928.0	933.8	2.91	41.84
35.0	104.74	209.5	1106.3	1137.5	15.63	42.41
40.0	104.74	209.5	1246.6	1315.7	34.54	42.84
45.0	104.74	209.5	1357.3	1456.1	49.43	43.17
50.0	104.74	209.5	1453.2	1566.8	56.79	43.42
55.0	104.74	209.5	1537.3	1662.7	62.68	43.63
60.0	104.74	209.5	1615.4	1746.8	65.70	43.82
65.0	104.74	209.5	1687.9	1824.9	68.50	43.99
70.0	104.74	209.5	1755.4	1897.3	70.99	44.14
75.0	104.74	209.5	1818.8	1964.8	73.01	44.28
80.0	104.74	209.5	1878.5	2028.3	74.90	44.40
85.0	104.74	209.5	1934.6	2088.0	76.69	44.52
90.0	104.74	209.5	1987.5	2144.1	78.28	44.64
95.0	104.74	209.5	2037.8	2197.0	79.62	44.74
100.0	55.86	160.6	2039.1	2198.4	79.65	44.74
105.0	20.95	76.8	1960.8	2115.9	77.52	44.58
110.0	0.00	21.0	1834.7	1981.8	73.51	44.31
115.0	0.00	0.0	1697.0	1834.7	68.86	44.01
120.0	0.00	0.0	1569.2	1697.0	63.91	43.71
125.0	0.00	0.0	1455.3	1569.2	56.95	43.42
130.0	0.00	0.0	1356.6	1455.3	49.37	43.17
135.0	0.00	0.0	1277.9	1356.6	39.32	42.94
140.0	0.00	0.0	1217.7	1277.9	30.12	42.76
145.0	0.00	0.0	1171.5	1217.7	23.08	42.62
150.0	0.00	0.0	1134.1	1171.5	18.70	42.50
155.0	0.00	0.0	1103.5	1134.1	15.32	42.40
160.0	0.00	0.0	1078.4	1103.5	12.55	42.32
165.0	0.00	0.0	1057.8	1078.4	10.28	42.26
170.0	0.00	0.0	1041.0	1057.8	8.42	42.20
175.0	0.00	0.0	1027.2	1041.0	6.90	42.16
180.0	0.00	0.0	1015.9	1027.2	5.65	42.12
185.0	0.00	0.0	1006.4	1015.9	4.76	42.09
190.0	0.00	0.0	997.3	1006.4	4.54	42.07
195.0	0.00	0.0	988.6	997.3	4.34	42.04
200.0	0.00	0.0	980.3	988.6	4.14	42.01
205.0	0.00	0.0	972.4	980.3	3.96	41.99
210.0	0.00	0.0	964.9	972.4	3.78	41.96
215.0	0.00	0.0	957.7	964.9	3.61	41.94
220.0	0.00	0.0	950.8	957.7	3.44	41.92

Pond File: b:FF .PND
Inflow Hydrograph: b:FF100MX .HYD
Outflow Hydrograph: b:FF100OUT.HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
225.0	0.001	0.0	944.2	950.8	3.29	41.90
230.0	0.001	0.0	937.9	944.2	3.14	41.88
235.0	0.001	0.0	931.9	937.9	3.00	41.86
240.0	0.001	0.0	926.2	931.9	2.86	41.84
245.0	0.001	0.0	920.7	926.2	2.73	41.82
250.0	0.001	0.0	915.5	920.7	2.61	41.80
255.0	0.001	0.0	910.5	915.5	2.49	41.79
260.0	0.001	0.0	905.7	910.5	2.38	41.77
265.0	0.001	0.0	901.2	905.7	2.27	41.76
270.0	0.001	0.0	896.9	901.2	2.17	41.74
275.0	0.001	0.0	892.7	896.9	2.07	41.73
280.0	0.001	0.0	888.8	892.7	1.98	41.72
285.0	0.001	0.0	885.0	888.8	1.89	41.71
290.0	0.001	0.0	881.4	885.0	1.80	41.70
295.0	0.001	0.0	877.9	881.4	1.72	41.68
300.0	0.001	0.0	874.6	877.9	1.65	41.67
305.0	0.001	0.0	871.5	874.6	1.57	41.66
310.0	0.001	0.0	868.5	871.5	1.50	41.65
315.0	0.001	0.0	865.6	868.5	1.43	41.64
320.0	0.001	0.0	862.9	865.6	1.37	41.64
325.0	0.001	0.0	860.3	862.9	1.31	41.63
330.0	0.001	0.0	857.8	860.3	1.25	41.62
335.0	0.001	0.0	855.4	857.8	1.19	41.61
340.0	0.001	0.0	853.1	855.4	1.14	41.61
345.0	0.001	0.0	850.9	853.1	1.10	41.60
350.0	0.001	0.0	848.7	850.9	1.10	41.59
355.0	0.001	0.0	846.5	848.7	1.10	41.58
360.0	0.001	0.0	844.3	846.5	1.10	41.58
365.0	0.001	0.0	842.1	844.3	1.10	41.57
370.0	0.001	0.0	839.9	842.1	1.10	41.56
375.0	0.001	0.0	837.7	839.9	1.10	41.55
380.0	0.001	0.0	835.5	837.7	1.10	41.55
385.0	0.001	0.0	833.3	835.5	1.10	41.54
390.0	0.001	0.0	831.1	833.3	1.10	41.53
395.0	0.001	0.0	828.9	831.1	1.10	41.52
400.0	0.001	0.0	826.7	828.9	1.10	41.52
405.0	0.001	0.0	824.5	826.7	1.10	41.51
410.0	0.001	0.0	822.3	824.5	1.10	41.50
415.0	0.001	0.0	820.1	822.3	1.10	41.49
420.0	0.001	0.0	817.9	820.1	1.10	41.49
425.0	0.001	0.0	815.7	817.9	1.10	41.48
430.0	0.001	0.0	813.5	815.7	1.10	41.47
435.0	0.001	0.0	811.3	813.5	1.10	41.46
440.0	0.001	0.0	809.1	811.3	1.10	41.46
445.0	0.001	0.0	806.9	809.1	1.10	41.45
450.0	0.001	0.0	804.7	806.9	1.10	41.44

Pond File: b:FF .PND
Inflow Hydrograph: b:FF100MX .HYD
Outflow Hydrograph: b:FF100OUT.HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
455.0	0.001	0.0	802.5	804.7	1.10	41.43
460.0	0.001	0.0	800.3	802.5	1.10	41.42
465.0	0.001	0.0	798.1	800.3	1.10	41.42
470.0	0.001	0.0	795.9	798.1	1.10	41.41
475.0	0.001	0.0	793.7	795.9	1.10	41.40
480.0	0.001	0.0	791.5	793.7	1.10	41.39
485.0	0.001	0.0	789.3	791.5	1.10	41.39
490.0	0.001	0.0	787.1	789.3	1.10	41.38
495.0	0.001	0.0	784.9	787.1	1.10	41.37
500.0	0.001	0.0	782.7	784.9	1.10	41.36
505.0	0.001	0.0	780.5	782.7	1.10	41.36
510.0	0.001	0.0	778.3	780.5	1.10	41.35
515.0	0.001	0.0	776.1	778.3	1.10	41.34
520.0	0.001	0.0	773.9	776.1	1.10	41.33
525.0	0.001	0.0	771.7	773.9	1.10	41.33
530.0	0.001	0.0	769.5	771.7	1.10	41.32
535.0	0.001	0.0	767.3	769.5	1.10	41.31
540.0	0.001	0.0	765.1	767.3	1.10	41.30
545.0	0.001	0.0	762.9	765.1	1.10	41.30
550.0	0.001	0.0	760.7	762.9	1.10	41.29
555.0	0.001	0.0	758.5	760.7	1.10	41.28
560.0	0.001	0.0	756.3	758.5	1.10	41.27
565.0	0.001	0.0	754.1	756.3	1.10	41.27
570.0	0.001	0.0	751.9	754.1	1.10	41.26
575.0	0.001	0.0	749.7	751.9	1.10	41.25
580.0	0.001	0.0	747.5	749.7	1.10	41.24
585.0	0.001	0.0	745.3	747.5	1.10	41.24
590.0	0.001	0.0	743.1	745.3	1.10	41.23
595.0	0.001	0.0	740.9	743.1	1.10	41.22
600.0	0.001	0.0	738.7	740.9	1.10	41.21
605.0	0.001	0.0	736.5	738.7	1.10	41.21
610.0	0.001	0.0	734.3	736.5	1.10	41.20
615.0	0.001	0.0	732.1	734.3	1.10	41.19
620.0	0.001	0.0	729.9	732.1	1.10	41.18
625.0	0.001	0.0	727.7	729.9	1.10	41.18
630.0	0.001	0.0	725.5	727.7	1.10	41.17
635.0	0.001	0.0	723.3	725.5	1.10	41.16
640.0	0.001	0.0	721.1	723.3	1.10	41.15
645.0	0.001	0.0	718.9	721.1	1.10	41.15
650.0	0.001	0.0	716.7	718.9	1.10	41.14
655.0	0.001	0.0	714.5	716.7	1.10	41.13
660.0	0.001	0.0	712.3	714.5	1.10	41.12
665.0	0.001	0.0	710.1	712.3	1.10	41.12
670.0	0.001	0.0	707.9	710.1	1.10	41.11
675.0	0.001	0.0	705.7	707.9	1.10	41.10
680.0	0.001	0.0	703.5	705.7	1.10	41.09

Pond File: b:FF .PND
Inflow Hydrograph: b:FF100MX .HYD
Outflow Hydrograph: b:FF100OUT.HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
685.0	0.00	0.0	701.3	703.5	1.10	41.09
690.0	0.00	0.0	699.1	701.3	1.10	41.08
695.0	0.00	0.0	697.0	699.1	1.09	41.07
700.0	0.00	0.0	694.8	697.0	1.09	41.06
705.0	0.00	0.0	692.6	694.8	1.09	41.05
710.0	0.00	0.0	690.4	692.6	1.09	41.04
715.0	0.00	0.0	688.2	690.4	1.09	41.04
720.0	0.00	0.0	686.1	688.2	1.09	41.03

Riser Crest 41.88

Pipe - out - 34.0

36" ø so head = 34 + 1.5 = 35.5

E.S. @ 45.0

	42" Riser	48" Riser	36" pipe	
H=1' - 42.88	34	40	7	102
2 - 43.9	65	86	8	109
3 - 44.9	80	104	9	116
4 - 45.9			10	122

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

Pond File: C:\DATA\FF .PND
Inflow Hydrograph: C:\DATA\FF100MX .HYD
Outflow Hydrograph: C:\DATA\FF100OUT.HYD

Starting Pond W.S. Elevation = 36.00 ft

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

Peak Inflow = 104.74 cfs
Peak Outflow = 69.23 cfs
Peak Elevation = 44.90 ft

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

Initial Storage = 1,748 cu-ft
Peak Storage From Storm = 328,304 cu-ft

Total Storage in Pond = 330,052 cu-ft

	L+M			JCC			
STORM	Qin	Qout	ELEV	Qin	Qout	ELEV	w/ 42" barrel
2	46.6	37.96	42.2	56.5	24.7	42.1	28.7 42.0
10	63.0	48.0	42.8	96.4	54.5	43.6	
100	104.7	69.2	44.9	158.8	89.9	45.8	w/ E.S. @ 45.9
				"	103.2	45.6	w/ E.S. @ 45.0
				"	111.0	45.4	w/ E.S. @ 44.5

36" Riser
41'=0'

H	Q	30" Barrel	
1 42	28	6	63.7
2 43	47	7	68.8
3 44	58	8	73.5
4 45	68	9	78
46	78		

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

Pond File: b:FF .PND
Inflow Hydrograph: b:FF100MX .HYD
Outflow Hydrograph: b:FF100OUT.HYD

Starting Pond W.S. Elevation = 34.60 ft

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

Peak Inflow	=	104.74 cfs
Peak Outflow	=	79.65 cfs
Peak Elevation	=	44.74 ft

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

Initial Storage	=	0 cu-ft
Peak Storage From Storm	=	317,807 cu-ft
Total Storage in Pond	=	317,807 cu-ft

VILLAGE SQUARE
PHASE 1

STORM SEWER DESIGN COMPUTATIONS

L & D 229

ROUTE _____ PROJ. _____
COUNTY _____ DISTRICT _____
DESCRIPTION _____

SHEET ____ OF ____

FROM POINT	TO POINT	AREA DRAIN. "A" ACRES	RUN-OFF COEF. C	CA INCRE-MENT	CA ACCUM-ULATED	INLET TIME MIN-UTES	RAIN FALL IN./HR.	RUNOFF Q C.F.S.	INVERT ELEVATIONS UPPER END	INVERT ELEVATIONS LOWER END	LENGTH FT.	SLOPE FT./FT.	DIA. IN.	CAPA-CITY C.F.S.	VEL. F.P.S.	FLOW TIME SEC.	REMARKS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1	2	0.98	0.35	—	0.34	10.0	6.0	2.04	63.98	60.91	146'	0.021	15"	9.36	6.10	23.9	Top #1 66.73
2	3	0.67	0.43	0.29	0.63	10.4	6.0	3.78	60.81	52.98	152'	0.0515	15"	14.66	10.02	15.2	Top #2 64.84
3	4	0.64	0.70	0.45	1.08	10.7	5.9	6.37	48.90	46.25	100'	0.0265	15"	10.01	8.64	11.6	Top #3 5[illegible]
5	6	0.31	0.35	—	0.11	7.0	6.6	0.73	66.75	57.58	50'	0.1834	15"	27.66	9.70	5.2	Top #5 69.50
6	7	0.90	0.40	0.36	0.47	12	5.8	2.73	57.48	55.16	108'	0.0215	15"	9.47	6.67	16.2	Top #6 61.50
7	8	1.05	0.45	0.47	0.94	12.3	5.8	5.45	54.91	54.60	58'	0.0053	18"	7.65	4.70	12.3	Top #7 59.08
8	9	0.51	0.80	0.41	1.35	12.5	5.8	7.83	54.50	55.20	120'	0.0058	18	8.00	5.16	23.3	Top #8 58.88
10	11	0.37	0.7	—	0.26	5	7.1	1.85	61.0	60.79	26'	0.008	15"	5.78	4.19	6.2	
11	12	0.36	0.7	0.25	0.51	5.1	7.1	3.62	60.69	60.17	52'	0.01	15"	6.46	5.41	9.6	
12	13	—			0.51	5.3	7.1	3.62	60.07	54.51	198'	0.0281	15"	10.83	7.94	23.2	
13	14	0.36	0.7	0.25	0.76	5.7	7.0	5.32	54.41	54.22	26'	0.0072	15"	5.48	5.09	5.1	Top #13 58.43
14	9	0.38	0.7	0.27	1.03	5.8	7.0	7.21	53.97	53.55	60'	0.0070	18"	8.79	5.55	10.8	Top #14 58.43
9	16A	—			2.40	12.7	5.7	13.68	53.30	52.20	133'	0.0083	21"	14.44	6.83	19.5	
16A	16	—			2.40	13.0	5.7	13.68	52.10	50.14	93'	0.0211	21"	23.02	9.98	9.3	
16	17A	0.49	0.40	0.20	2.60	13.2	5.6	14.56	50.04	48.37	95'	0.0176	21"	21.02	9.31	10.2	
17A	17	0.39	0.40	0.16	2.76	13.4	5.5	15.18	48.12	47.93	37'	0.0052	24"	16.31	5.90	6.3	
17B	17	0.53	0.75	—	0.40	7	6.4	2.56	49.26	49.07	26'	0.007	15"	5.40	4.34	6.0	
17	18	0.47	0.40	0.19	3.35	13.5	5.5	18.42	47.43	47.28	85'	0.0018	30"	20.09	4.4	19.1	

MC008_VILLAGE_SO_FIVE_FORKS - 069

STORM SEWER DESIGN COMPUTATIONS

L & D 229

ROUTE _____ PROJ. _____
COUNTY _____ DISTRICT _____
DESCRIPTION _____

SHEET ____ OF ____

FROM POINT	TO POINT	AREA DRAIN. "A" ACRES	RUN-OFF COEF. C	CA INCRE-MENT	CA ACCUM-ULATED	INLET TIME MIN-UTES	RAIN FALL IN./HR.	RUNOFF Q C.F.S.	INVERT ELEVATIONS UPPER END	INVERT ELEVATIONS LOWER END	LENGTH FT.	SLOPE FT./FT.	DIA. IN.	CAPA-CITY C.F.S.	VEL. F.P.S.	FLOW TIME SEC.	REMARKS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
5	6	0.31	0.35	—	0.11	7.0	6.6	0.73	65.00	57.58	50'	0.1484	15"	24.86	9.01	5.5	Top #5 69.50
6A	6	0.38	0.85	—	0.32	6.0	6.9	2.21	57.58	57.24	26'	0.013	15"	7.37	5.25	7.1	Top #6A [illegible]
6	7	0.9	0.40	0.36	0.79	12	5.8	4.58	57.14	55.16	108'	0.0183	15"	8.74	7.20	15.0	Top #6 61.50
7	8	1.05	0.45	0.47	1.26	12.3	5.8	7.30	54.91	54.57	56'	0.0058	18"	8.00	4.68	12.4	Top #7 59.08
8	9	0.13	0.85	0.11	1.37	12.5	5.8	7.95	54.47	53.55	110'	0.0084	18"	9.63	6.09	18.1	Top #8 58.78

MC008_VILLAGE_SQ_FIVE_FORKS - 070

STORM SEWER DESIGN COMPUTATIONS

L & D 229

ROUTE _____ PROJ. _____
COUNTY _____ DISTRICT _____
DESCRIPTION _____

SHEET ____ OF ____

FROM POINT	TO POINT	AREA DRAIN. "A" ACRES	RUN-OFF COEF. C	CA INCRE-MENT	CA ACCUM-ULATED	INLET TIME MIN-UTES	RAIN FALL IN./HR.	RUNOFF Q C.F.S.	INVERT ELEVATIONS UPPER END	INVERT ELEVATIONS LOWER END	LENGTH FT.	SLOPE FT./FT.	DIA. IN.	CAPA-CITY C.F.S.	VEL. F.P.S.	FLOW TIME SEC.	REMARKS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
18	19	1.12	0.40	0.45	3.80	13.7	5.4	20.52	47.13	46.17	264'	0.0036	30"	24.61	5.50	48.0	
19	20	0.19	0.40	0.08	3.88	14.5	5.3	20.56	46.07	45.65	118'	0.0036	30"	24.61	5.61	21.4	
20	21	0.45	0.45	0.20	4.08	14.8	5.3	21.62	45.55	45.10	125'	0.0036	30"	24.61	5.66	22.1	
21	22	—						21.62	45.00	41.0	107'	0.0374	30"	79.32	13.76	7.8	
22	23							21.62	37.31	37.23	15'	0.0052	30"	29.58	6.58	2.3	

MC008_VILLAGE_SQ_FIVE_FORKS - 071

PROJECT 93054-5
HEC12 Version: V2.91 Run Date: 06-12-1993

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INLET NUMBER 2-DI-3B LENGTH 6.0 STATION 7+35-RT

DRAINAGE AREA = 0.670 ACRES C VALUE = .430 CA = 0.288
SUM CA= 0.288 INT= 3.50 CFS= 1.008 CD= 0.000 GUTTER FLOW= 1.008

GUTTER SLOPE = 0.0400 FT/FT PAVEMENT CROSS SLOPE = 0.0208 FT/FT

SPREAD	W	W/T	SW	SW/SX	Ec	a	S'W	SE
2.91	2.0	0.69	0.0833	4.0	0.99	3.5	0.146	0.165

XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
REQUIRED LENGTH (ft) = 8.4 EFFICIENCY= 0.90
CFS INTERCEPTED= 0.90 CFS CARRYOVER= 0.11

==========

INLET NUMBER 3-DI-3C LENGTH 6.0 STATION RADIUS POINT

DRAINAGE AREA = 0.180 ACRES C VALUE = .750 CA = 0.135
DRAINAGE AREA = 0.460 ACRES C VALUE = .700 CA = 0.322

FOR THE FIRST SIDE
SUM CA= 0.135 INT= 3.50 CFS= 0.473 CD= 0.110 GUTTER FLOW= 0.583
FOR THE OTHER SIDE
SUM CA= 0.322 INT= 3.50 CFS= 1.127 CD= 0.000 GUTTER FLOW= 1.127
AT THE INLET

SUM CA= 0.457 INT= 3.50 CFS= 1.600 CD= 0.110 GUTTER FLOW= 1.710

GUTTER SLOPE = 0.0050 FT/FT PAVEMENT CROSS SLOPE = 0.0323 FT/FT

SPREAD AT A SLOPE OF .005 (ft./ft.) AND 1.13 (cfs) IS 5.31 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 9.60 H (ft) = 0.375
DEPTH OF WATER (ft) = 0.18 SPREAD (ft) = 5.62

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==========================================================================
INLET NUMBER 6-DI-3B          LENGTH   8.0          STATION  14+00 Lt.

DRAINAGE AREA =  0.900 ACRES        C VALUE = .400        CA =  0.360
SUM CA=   0.360 INT=  3.50  CFS=   1.260  CD=  0.000 GUTTER FLOW=   1.260

GUTTER SLOPE = 0.0350 FT/FT        PAVEMENT CROSS SLOPE =  0.0208 FT/FT

SPREAD      W      W/T      SW        SW/SX      Eo       a      S'W     SE
  3.83     2.0     0.52   0.0833      4.0       0.96    3.5    0.146  0.160

      XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
    REQUIRED LENGTH (ft) =  9.0                EFFICIENCY= 0.98
    CFS INTERCEPTED=  1.24                 CFS CARRYOVER=  0.02


==========================================================================
INLET NUMBER 7-DI-3B          LENGTH   8.0          STATION  15+05 Lt.

DRAINAGE AREA =  1.050 ACRES        C VALUE = .450        CA =  0.472
SUM CA=   0.472 INT=  3.50  CFS=   1.654  CD=  0.020 GUTTER FLOW=   1.674

GUTTER SLOPE = 0.0113 FT/FT        PAVEMENT CROSS SLOPE =  0.0208 FT/FT

SPREAD      W      W/T      SW        SW/SX      Eo       a      S'W     SE
  6.73     2.0     0.30   0.0833      4.0       0.76    3.5    0.146  0.132

      XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
    REQUIRED LENGTH (ft) =  8.1                EFFICIENCY= 1.00
    CFS INTERCEPTED=  1.67                 CFS CARRYOVER=  0.00


==========================================================================
INLET NUMBER 8-DI-3C          LENGTH   6.0          STATION  15+55.56 Rt.

DRAINAGE AREA =  0.080 ACRES        C VALUE = .850        CA =  0.068
DRAINAGE AREA =  0.050 ACRES        C VALUE = .850        CA =  0.043

FOR THE FIRST SIDE
SUM CA=   0.068 INT=  3.50  CFS=   0.238  CD=  0.010 GUTTER FLOW=   0.248
FOR THE OTHER SIDE
SUM CA=   0.043 INT=  3.50  CFS=   0.149  CD=  0.000 GUTTER FLOW=   0.149
AT THE INLET

SUM CA=   0.111 INT=  3.50  CFS=   0.387  CD=  0.010 GUTTER FLOW=   0.397

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


SPREAD AT A SLOPE OF .001 (ft./ft.) AND   0.25 (cfs) IS  4.32 (ft.)

      XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
    P EFFEC. LENGTH (ft) =  9.60                H (ft) = 0.375
    DEPTH OF WATER (ft) =   0.07           SPREAD (ft)  =  3.29
```

PROJECT 94 3054
HEC12 Version: V2.91 Run Date: 06-13-1993

==========

INLET NUMBER 13 LENGTH 6.0 STATION 10+47

DRAINAGE AREA = 0.120 ACRES C VALUE = .850 CA = 0.102
DRAINAGE AREA = 0.240 ACRES C VALUE = .750 CA = 0.180

FOR THE FIRST SIDE
SUM CA= 0.102 INT= 3.50 CFS= 0.357 CO= 0.000 GUTTER FLOW= 0.357
FOR THE OTHER SIDE
SUM CA= 0.180 INT= 3.50 CFS= 0.630 CO= 0.000 GUTTER FLOW= 0.630
AT THE INLET

SUM CA= 0.282 INT= 3.50 CFS= 0.987 CO= 0.000 GUTTER FLOW= 0.987

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

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.63 (cfs) IS 7.62 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 9.60 H (ft) = 0.375
DEPTH OF WATER (ft) = 0.13 SPREAD (ft) = 6.05

==========

INLET NUMBER 14 LENGTH 6.0 STATION 10+47

DRAINAGE AREA = 0.250 ACRES C VALUE = .750 CA = 0.188
DRAINAGE AREA = 0.040 ACRES C VALUE = .900 CA = 0.036

FOR THE FIRST SIDE
SUM CA= 0.188 INT= 3.50 CFS= 0.656 CO= 0.000 GUTTER FLOW= 0.656
FOR THE OTHER SIDE
SUM CA= 0.036 INT= 3.50 CFS= 0.126 CO= 0.000 GUTTER FLOW= 0.126
AT THE INLET

SUM CA= 0.223 INT= 3.50 CFS= 0.782 CO= 0.000 GUTTER FLOW= 0.782

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

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 0.66 (cfs) IS 7.78 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
P EFFEC. LENGTH (ft) = 9.60 H (ft) = 0.375
DEPTH OF WATER (ft) = 0.11 SPREAD (ft) = 5.18

```
==========================================================================
INLET NUMBER 15                LENGTH   6.0        STATION

DRAINAGE AREA =  0.490 ACRES        C VALUE = .400        CA =  0.196
SUM CA=   0.196 INT=  3.50  CFS=   0.686  CO=  0.000 GUTTER FLOW=   0.686

GUTTER SLOPE = 0.0233 FT/FT        PAVEMENT CROSS SLOPE =  0.0208 FT/FT

SPREAD      W      W/T      SW        SW/SX      Eo       a      S'W     SE
  2.55     2.0     0.78   0.0833     4.0       1.00    3.5    0.146  0.166

      XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
    REQUIRED LENGTH (ft) =  6.0                EFFICIENCY= 1.00
    CFS INTERCEPTED=  0.69                 CFS CARRYOVER=  0.00


==========================================================================
INLET NUMBER 16                LENGTH   8.0        STATION

DRAINAGE AREA =  0.220 ACRES        C VALUE = .750        CA =  0.165
DRAINAGE AREA =  0.060 ACRES        C VALUE = .750        CA =  0.045

FOR THE FIRST SIDE
SUM CA=   0.165 INT=  3.50  CFS=   0.577  CO=  0.000 GUTTER FLOW=   0.577
FOR THE OTHER SIDE
SUM CA=   0.045 INT=  3.50  CFS=   0.157  CO=  0.000 GUTTER FLOW=   0.157
AT THE INLET

SUM CA=   0.210 INT=  3.50  CFS=   0.735  CO=  0.000 GUTTER FLOW=   0.735

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


SPREAD AT A SLOPE OF .001 (ft./ft.) AND   0.58 (cfs) IS  7.29 (ft.)

      XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
    P EFFEC. LENGTH (ft) = 11.60                H (ft) = 0.385
    DEPTH OF WATER (ft) =   0.09           SPREAD (ft)  =  4.38


==========================================================================
INLET NUMBER 17a               LENGTH   4.0        STATION

DRAINAGE AREA =  0.390 ACRES        C VALUE = .400        CA =  0.156
SUM CA=   0.156 INT=  3.50  CFS=   0.546  CO=  0.000 GUTTER FLOW=   0.546

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

SPREAD      W      W/T      SW        SW/SX      Eo       a      S'W     SE
  3.16     2.0     0.63   0.0833     4.0       0.98    3.5    0.146  0.164

      XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
    REQUIRED LENGTH (ft) =  4.3                EFFICIENCY= 0.99
    CFS INTERCEPTED=  0.54                 CFS CARRYOVER=  0.00
```

```
==========================================================================
INLET NUMBER 17                LENGTH   8.0        STATION

DRAINAGE AREA =  0.200 ACRES        C VALUE = .400        CA =  0.080
DRAINAGE AREA =  0.270 ACRES        C VALUE = .400        CA =  0.108

FOR THE FIRST SIDE
SUM CA=   0.080 INT=  3.50  CFS=   0.280  CO=  0.000 GUTTER FLOW=   0.280
FOR THE OTHER SIDE
SUM CA=   0.108 INT=  3.50  CFS=   0.378  CO=  0.000 GUTTER FLOW=   0.378
AT THE INLET

SUM CA=   0.188 INT=  3.50  CFS=   0.658  CO=  0.000 GUTTER FLOW=   0.658

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


SPREAD AT A SLOPE OF .001 (ft./ft.) AND   0.38 (cfs) IS  5.75 (ft.)

       XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
    P EFFEC. LENGTH (ft) = 11.60                H (ft) = 0.375
    DEPTH OF WATER (ft) =   0.08          SPREAD (ft)  =  4.07


==========================================================================
INLET NUMBER 18                LENGTH   8.0        STATION

DRAINAGE AREA =  1.120 ACRES        C VALUE = .400        CA =  0.448
SUM CA=   0.448 INT=  3.50  CFS=   1.568  CO=  0.000 GUTTER FLOW=   1.568

GUTTER SLOPE = 0.0192 FT/FT        PAVEMENT CROSS SLOPE =  0.0208 FT/FT

SPREAD      W      W/T      SW        SW/SX      Eo      a      S'W     SE
  5.56     2.0     0.36   0.0833     4.0       0.85   3.5    0.146  0.144

       XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
    REQUIRED LENGTH (ft) =  8.8                EFFICIENCY= 0.99
    CFS INTERCEPTED=  1.55                CFS CARRYOVER=  0.02


==========================================================================
INLET NUMBER 19                LENGTH   4.0        STATION

DRAINAGE AREA =  0.190 ACRES        C VALUE = .400        CA =  0.076
SUM CA=   0.076 INT=  3.50  CFS=   0.266  CO=  0.000 GUTTER FLOW=   0.266

GUTTER SLOPE = 0.0192 FT/FT        PAVEMENT CROSS SLOPE =  0.0208 FT/FT

SPREAD      W      W/T      SW        SW/SX      Eo      a      S'W     SE
  1.56     2.0     1.28   0.0833     4.0       1.00   3.5    0.146  0.167

       XXXXXXXXXX CURB INLET ON A CONTINUOUS GRADE XXXXXXXXXX
    REQUIRED LENGTH (ft) =  3.8                EFFICIENCY= 1.00
    CFS INTERCEPTED=  0.27                CFS CARRYOVER=  0.00
```

```
==================================================================================
INLET NUMBER 20                LENGTH   6.0          STATION

DRAINAGE AREA =  0.300 ACRES        C VALUE = .400        CA =  0.120
DRAINAGE AREA =  0.150 ACRES        C VALUE = .600        CA =  0.090

FOR THE FIRST SIDE
SUM CA=   0.120 INT=  3.50  CFS=   0.420  CO=  0.000 GUTTER FLOW=   0.420
FOR THE OTHER SIDE
SUM CA=   0.090 INT=  3.50  CFS=   0.315  CO=  0.000 GUTTER FLOW=   0.315
AT THE INLET

SUM CA=   0.210 INT=  3.50  CFS=   0.735  CO=  0.000 GUTTER FLOW=   0.735

GUTTER SLOPE = 0.0050 FT/FT        PAVEMENT CROSS SLOPE =  0.0208 FT/FT


SPREAD AT A SLOPE OF .005 (ft./ft.) AND   0.42 (cfs) IS  3.43 (ft.)

       XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX
    P EFFEC. LENGTH (ft) =  9.60                    H (ft) = 0.375
    DEPTH OF WATER (ft) =   0.10            SPREAD (ft)  =  4.97
```

POND-2 Version: 5.17
S/N: 1295130250

Sediment Basin C 20+39.47

CALCULATED 06-13-1993 21:07:14
DISK FILE: b:5 FORK .VOL

Planimeter scale: 1 inch = 50 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	* Volume (cubic-ft)	Volume Sum (cubic-ft)
48.00	0.32	800	0	0	0
49.00	0.87	2,175	4,294	1,431	1,431
50.00	1.79	4,475	9,770	3,257	4,688
50.25	*I*	4,973	14,166	1,180	5,868
51.00	2.65	6,625	16,545	5,515	10,203
51.25	*I*	7,176	20,697	1,725	11,928
51.50	3.10	7,750	21,540	3,590	13,793

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

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

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Subject Natural Channel Capacity
Computed By DSL Checked By WLB

Project No. 93054
Client
Date 6/28/93 Sheet No.

DISCHARGE AT NORTH END ROAD "B"

EXISTING CONDITIONS

DRAINAGE AREA = 6.2 Ac, MOSTLY WOODED
IN C'S 1.15 Ac WAREHOUSE & OPEN STORAGE
PLUS 0.87 Ac ROAD

$$\text{WEIGHTED 'C'} = \frac{0.87}{6.2} \times 0.90 + \frac{1.15}{6.2} \times 0.6 + \frac{6.2-(0.87+1.15)}{6.2} \times .2$$

$$= 0.13 + 0.11 + 0.13 = 0.37$$

TIME OF CONCENTRATION

600' OVERLAND, 25' FALL
300' CHANNEL, 15' FALL @ 5fps = 1
900' 40' FALL 25 MIN

$$Q_{10\ \text{pre development}} = CIA = (0.37)(3.8\ \text{in/hr})(6.2\ \text{Ac}) = 8.7\ \text{cfs}$$

RESIDENT DEVELOPMENT

ADDS 2.30 Ac RESIDENTIAL "C" = 0.45, NEW AREA = 8.5 Ac
CHANGES 0.40 Ac TO C = 0.45
T_c UNCHANGED FOR ENTIRE BASIN

$$\text{NEW WEIGHTED "C"} = \frac{2.7}{8.5} \times 0.45 + \frac{0.87}{8.5} \times .9 + \frac{1.15}{8.5} \times 0.6 + \frac{6.2-(0.87+1.15+.}{8.5} \times$$

$$= 0.14 + 0.09 + 0.08 + 0.09 = 0.40$$

$$Q_{10\ \text{post}} = (0.40)(3.8)(8.5) = 12.92\ \text{cfs}$$

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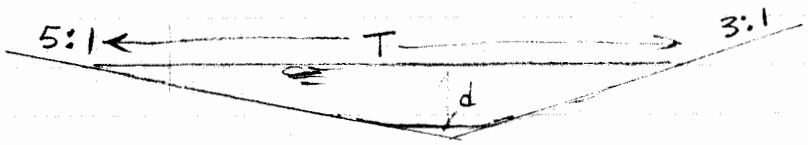
Subject _____

Computed By DSL Checked By WLB

Project No. 93054
Client WALTCIP
Date 6/28/93 Sheet No. 2

DETERMINE DEPTH AND VELOCITY IN CHANNEL
POST DEVELOPMENT Q = 12.9 cfs

CHANNEL X-SECTION - PARABOLIC w/ 3:1 & 5:1 SIDES



$S_L = 0.025$ FT/FT

$n = 0.025$

Manning's Equation for Parabolic Channels[1]

$$Q = \frac{K' T^{8/3} S^{1/2}}{n}$$, T = Top width, K' = 0.0160

For d = 1/2', T = 5'

$$Q = \frac{(0.0160)(5)^{8/3}(0.025)^{1/2}}{0.025} = 7.39 \text{ cfs}$$

For d = 3/4', T = 7.0'

$$Q = \frac{(0.0187)(7.0)^{8/3}(0.025)^{1/2}}{0.025} = 21.2 \text{ cfs}$$

For d = 0.67 T = 6'

Use ⇒ $$Q = \frac{(0.0160)(6)^{8/3}(0.025)^{1/2}}{0.025} = 12.03 \text{ cfs}$$

planimetered A = 2.6 FT²

For d = 0.7, T = 6.5, K = 0.017

$$Q = \frac{(0.017)(6.5)^{8/3}(0.025)^{1/2}}{0.025} = 15.82 \text{ cfs}$$

$$V = \frac{Q}{A} = \frac{12.9}{2.6} = 4.96 \text{ fps}$$ ok for Class I Rip Rap

---

1 Equation 7-44, p 7-19, Brater & King, Handbook of Hydraulics, 6th edition.

POND-2 Version: 5.17
S/N: 1295130250

FIVE FORKS DETENTION POND

See revised calcs dated 11/3/93 for Sec 2

CALCULATED 06-14-1993 00:32:12
DISK FILE: b:FF .VOL

Planimeter scale: 1 inch = 50 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	* Volume (cubic-ft)	Volume Sum (cubic-ft)
35.00	0.25	625	0	0	0
40.00	13.40	33,500	38,701	64,501	64,501
40.65	*I*	38,328	107,661	23,327	87,828
40.71	*I*	38,790	108,338	25,640	90,141
42.55	*I*	54,303	130,455	110,886	175,388
45.00	31.60	79,000	163,944	273,240	337,742

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

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

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

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

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

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

TEMPORARY SEDIMENT BASIN
DRAINAGE AREA: 48 AC
× 134 cy/AC
173,664 CF STORAGE VOLUME
SET STAND PIPE CREST @ ELEV 42.55 DURING CONSTRUCTION STAGE
DEWATERING ORIFICE @ 86,832 CF — USE 3" ϕ ORIFICE IN STANDPIPE @ ELEV 40.65

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Subject CHES. BAY CALC.
FIVE FORKS RESID.
Computed By N+M Checked By

Project No. 93-54
Client L. WALTRID
Date 6/26/93 Sheet No. 1

DUE TO INVOLVEMENT OF OFFSITE AREAS, STANDARD 10 POINT METHOD IS NOT APPLICABLE. CALCULATIONS ARE BASED ON COMPARISON OF PRE VS. POST DEVELOPMENT LOADINGS.
PRE-DEVELOPMENT LOADING BASED UPON CHES. BAY DEFAULT VALUE OF 16% FOR ENTIRE BASIN. THIS EQUATES TO A LOADING OF 0.45 Lbs/AC./YR.

TOTAL BASIN DRAINING TO BMP, PLUS ON-SITE AREAS NOT DRAINING TO BMP EQUALS 51.2 Ac.

PRE-DEVELOPMENT LOADING WITH 16% IMPERVIOUS COVER ASSUMED IS:

COLLECTION OF OTHER CONSTANTS IN LOADING EQUATION

$L = [0.05 + 0.009(16\%)](2.33)(51.2\ Ac.)$
$L = 23.1$ Lbs/YR.

POST-DEVELOPMENT LOADING REQUIRES CALCULATION OF EQUIV. "I" (Pg. C-23, CBLAM)

TOTAL PROJ. AREA = 28.8 Ac.
TOTAL OPEN SPACE = 10.8 Ac.
TOTAL AREA OF LOTS & R/W = 18.0 Ac.
TOTAL AREA OF R/W = -3.9 Ac.
TOTAL AREA OF LOTS = 14.1 Ac.

LOAD/AC. @ 32% IMPERV.
$[0.05 + 0.009(32\%)](2.33) = L/A.$
L/AC. = 0.79 Lb/Y.

AVG. LOT SIZE = 14.1 Ac ÷ 63 LOTS = 0.22 Ac.
IMPERVIOUS COVER = 32% (TABLE 1, CBLAM, Pg. C-10)

EQUIV "I" POST-DEV.

LAND USE	LOADING Lb/AC/YR.	# AC.	WEIGHTED LOAD Lbs./YR.
PRE-DEV. DEFAULT	0.45	51.2 - 18.0 = 33.2	14.9
0.22 Ac. LOTS	0.79 SEE ABOVE	18.0	14.2
		51.2 Ac.	29.1 Lbs/YR.

$\frac{29.1}{51.2} = 0.57$ Lbs/Ac.

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Subject CHES. BAY CALC.
FIVE FORKS RESID.
Computed By _____ Checked By _____

Project No. 93-54
Client L. WALTRIP
Date 6/26/93 Sheet No. 2.

CALC. OF EQUIV. "I" FOR 0.57 Lbs/Ac.

$$[0.05 + (0.009\ I)]\,2.33 = 0.57$$
$$0.1165 + 0.0210\ I = 0.57$$
$$0.0210\ I = 0.4535$$
$$I = 21.6\ \%$$

POST DEVELOPMENT LOADING

$$[0.05 + (0.009 \times 21.6\%)](2.33)(51.2) = 29.1\ \text{Lbs/YR.}$$

PRE DEVELOPMENT LOADING = 23.1 Lbs/YR (SEE PREV. PAGE)
POST DEVELOPMENT LOADING, ASSUMING A 30% EFFICIENT BMP IS APPLIED TO 47.7 Ac. @ I = 21.6%

$$[0.05 + (0.009 \times 21.6\%)](2.33)(47.7\ \text{Ac.}) = 27.2\ \text{Lbs/YR.}$$

TOTAL POST DEVELOPMENT DOWNSTREAM LOADING

$$(\overset{19.0\ \text{Lbs/YR}}{27.2\ \text{Lbs/YR} - 30\%}) + (\overset{1.9\ \text{Lbs/YR.}}{29.1\ \text{Lbs/YR.} - 27.2\ \text{Lbs/YR.}}) = 20.9\ \text{Lbs/YR.}$$

CONCLUSION
A 30% BMP APPLIED TO 47.7 Ac. MEETS THE NO NET INCREASE STANDARD

PRE-DEV. = 23.1 Lbs/YR
POST-DEV. = 20.9 Lbs/YR

6 PT BMP - SITE 28.8 ac
DA 47.7 ac

$$\frac{47.7}{28.8} = 1.656 \times 6\ \text{PTS} = 9.938$$

NOS Needed = $.062 = \frac{x}{28.8}$
$x = 1.8$ ac.

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Subject DET. BASIN PEAK FLOWS PRE & POST-DEV.
Computed By NHM Checked By

Project No. 93-54
Client L.W. ALTRIP
Date 6/24/93 Sheet No. 3

	①		② PRE-DEV. RUNOFF "C"	③ COL 1 x 2	④ POST-DEV. RUNOFF "C"	⑤ COL. 1 x 4	POST RCN
AREA NORTH OF INGRAM RD.	1.4 Ac.	@	0.30	0.42	0.30	0.42	70 ✓
FIVE FORKS SHPG. CTR	4.2 Ac.	@	0.70	2.90	0.70	2.94	90 ✓
BRANSCOME PARCEL 43 & 45	5.6 Ac.	@	0.55	3.08	0.55	3.08	84 ✓
PARCELS 40, 41, 42	2.5 Ac.	@	0.40	1.00	0.70	1.75	90 ✓
FUTURE COMM. PARCEL	10.2 Ac.	@	0.20	2.04	0.70	7.14	90 ✓
RESID. AREA TO B.M.P.	23.1 Ac.	@	0.20	4.62	0.50	11.55	83 ✓
PART OF PARCEL 46	4.5 ~~0.7~~ Ac	@	0.20	70 ~~0.14~~	7 ~~0.20~~	~~0.14~~	~~90~~ 11/16/93
	47.7 Ac.			14.20		27.02	~~86~~

PRE-DEV. COMP "C" = $\frac{14.20}{47.7}$ = 0.30

POST-DEV. COMP "C" = $\frac{27.02}{47.7}$ = 0.57

4055
-49
4006.7
90 x 52 = 468
4474.7
52.2 = 85.7
for Phase 2

PRE-DEV. T_c =

OVERLAND FLOW 300'

HIGH EL. = 73.0
LOW EL. = 70.0
3.0' ÷ 300' = 1%
TIME = 25 MIN.

SHALLOW CONC. FLOW 250'

HIGH EL. 70
LOW EL. -49
21' ÷ 250' = 0.084
AVG. VEL. = 5'/SEC.
250' ÷ 5 = 50 SEC. SAY 1 MIN

CHANNEL FLOW 700'

HIGH EL. = 49'
LOW EL. = 40'
9'
TIME = 6.5 MIN.

TOTAL T_c = 25 + 1 + 6.5 = 32.5 MIN.

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Subject _____

Computed By _____ Checked By _____

Project No. _____
Client _____
Date _____ Sheet No. 4

POST DEV. T_c

ASSUME THAT LONGEST PATH IS ACROSS OPEN SPACE TO SOUTH OF ENTRANCE OFF IRONBOUND. WATER THEN FLOWS INTO PIPE SYSTEM ON ROAD. APPROX. DIST. IN PIPE TO BMP IS 1700 FT. ASSUME AVG. PIPE VEL. TO BE 4 FT/SEC.

OVER LAND FLOW ACROSS OPEN SPACE = 100' ± ON GRADE OF 1%
TIME = 18 MIN.

PIPE FLOW
$1700' \div 4\ FT/SEC = \frac{425\ SEC}{60} = 7\ MIN.$

SAY POST DEV. T_c = 15 MIN.

"i" VALUES & PEAK FLOWS

RETURN FREQ.	AREA (AC.)	PRE-DEV "C"	POST-DEV. "C"	PRE-DEV. T_c	POST-DEV. T_c	PRE-DEV. i	POST-DEV. i	PRE-DEV. Q	POST-DEV. Q					
							ELEV	Q OUT	VS					
							41.86	34.60	3.2					
2 YR.	47.7	0.30	0.57	32.5	15	2.5	3.9	35.8	106.0	36.5	41.9	20.5	41.7	3.2
							42.40	45.43	3.8					
10 YR.	47.7	0.30	0.57	32.5	15	3.4	5.1	48.6	138.7	69.7	81.3	49.2	43.2	5.0
25 YR.	47.7	0.30	0.57	32.5	15		5.9		160.4					
100 YR.	47.7	0.30	0.57	32.5	15	4.9	7.2	70.1	195.8	129	143.5	109.5	44.5	6.9
							44.25	65.32	6.4			Σ: ESO	Elev	43.3
							NO VALUE -			ES	- 45.9	73.9	44.8	7.5

C=.85

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

Subject

Computed By Checked By

Project No. 93054-4
Client
Date 2/24/94 Sheet No.

RE: FIVE FORKS PARCEL 1

DARRYL:

THE CONTRACTOR IS HAVING DIFFICULTY MANUFACTURING THE 42" RISER FOR THIS DETENTION BASIN. THEY COULD MAKE A BETTER CONNECTION WITH THE 36" CONDUIT BY USING A 48" RISER.

I HAVE RECALCULATED THE BASIN USING A 48" RISER WITH A CREST ELEVATION OF 42.375

PLEASE REVIEW THE ATTACHED DATA AND LET ME KNOW IF THIS WILL MEET WITH THE COUNTY'S APPROVAL.

BILL BROWN

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

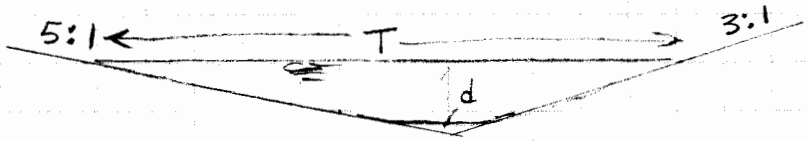
Subject

Computed By DSL Checked By WLB

Project No. 93054
Client WALTCIP
Date 6/28/93 Sheet No. 2

DETERMINE DEPTH AND VELOCITY IN CHANNEL
POST DEVELOPMENT Q = 12.9 cfs

CHANNEL X-SECTION - PARABOLIC w/ 3:1 & 5:1 SIDES



$S_L = 0.025$ FT/FT

$n = 0.025$

Manning's Equation for Parabolic Channels[1]

$$Q = \frac{K' T^{8/3} S^{1/2}}{n}$$, T = Top width, K' = 0.0160

For d = 1/2', T = 5'

$$Q = \frac{(0.0160)(5)^{8/3}(0.025)^{1/2}}{0.025} = 7.39 \text{ cfs}$$

For d = 3/4', T = 7.0'

$$Q = \frac{(0.0187)(7.0)^{8/3}(0.025)^{1/2}}{0.025} = 21.2 \text{ cfs}$$

For d = 0.67, T = 6'

Use ⇒ $$Q = \frac{(0.0160)(6)^{8/3}(0.025)^{1/2}}{0.025} = 12.03 \text{ cfs}$$

planimetered A = 2.6 FT²

For d = 0.7, T = 6.5, K = 0.017

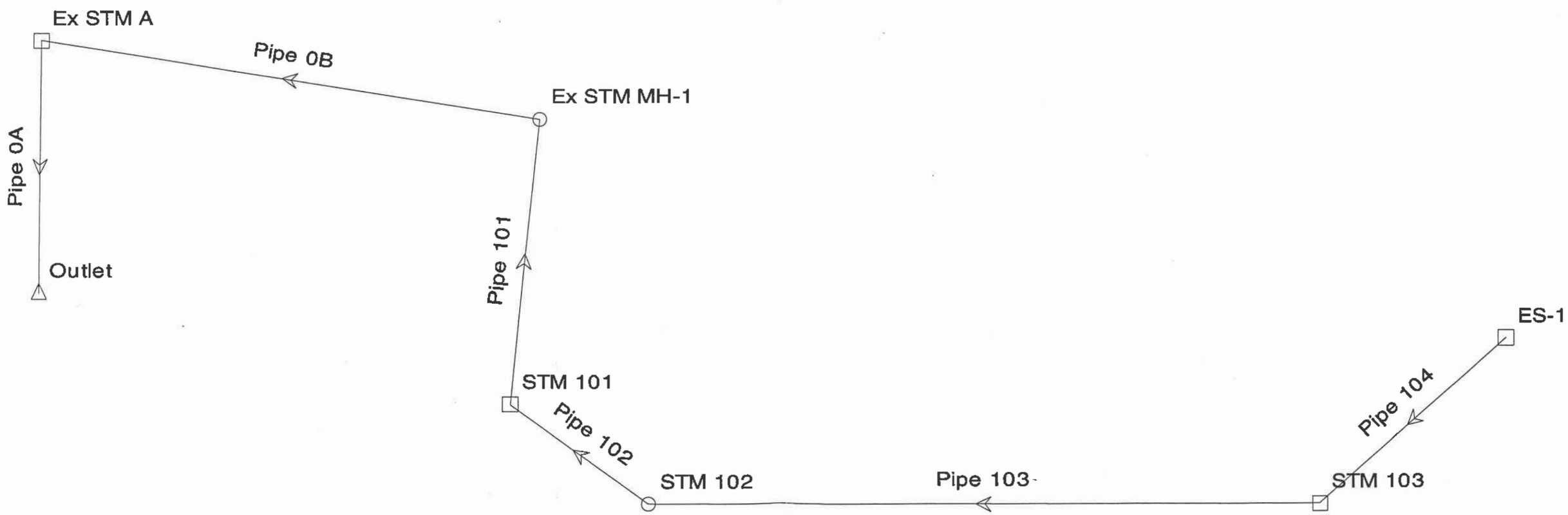
$$Q = \frac{(0.017)(6.5)^{8/3}(0.025)^{1/2}}{0.025} = 15.82 \text{ cfs}$$

$$V = \frac{Q}{A} = \frac{12.9}{2.6} = 4.96 \text{ fps}$$ ok for Class I Rip Rap

---

1 Equation 7-44, p 7-19, Brater & King, Handbook of Hydraulics, 6th edition.

Scenario: Base



Title: Buliding Specialties Warehouse Expansion
\\vawil\projects\31595\tech\31595 storm 12.09.03
12/09/03 09:12:23 AM

Vanasse Hangen Brustlin Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Steven Wigley, P.E.
StormCAD v5.5 [5.5003]
Page 1 of 1

2.5/10 scenario

Scenario: Base

10 - Yr Storm Event

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Full Capacity (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Description
Pipe 0A	Ex STM A	Outlet	0.06	0.40	0.02	0.61	6.93	4.27	10.30	24.00	0.025417	15 inch	0.013	46.79	46.18	47.63	46.78	48.61	46.18	0.57	-1.25	
Pipe 0B	Ex STM MH-1	Ex STM A	N/A	N/A	N/A	0.59	6.95	4.12	24.97	72.00	0.149444	15 inch	0.013	57.66	46.90	58.48	47.24	67.50	48.61	8.59	0.46	
Pipe 10	STM 101	Ex STM MH-	0.32	0.90	0.29	0.59	6.98	4.13	18.98	44.00	0.086364	15 inch	0.013	62.30	58.50	63.12	58.90	67.10	67.50	3.55	7.75	
Pipe 102	STM 102	STM 101	N/A	N/A	N/A	0.39	7.01	2.76	8.07	32.00	0.015625	15 inch	0.013	62.80	62.30	63.47	63.12	68.30	67.10	4.25	3.55	
Pipe 103	STM 103	STM 102	0.10	0.90	0.09	0.39	7.15	2.81	6.89	132.00	0.011364	15 inch	0.013	64.30	62.80	64.97	63.36	67.80	68.30	2.25	4.25	
Pipe 104	ES-1 End Secti	STM 103	0.39	0.80	0.31	0.31	7.20	2.26	9.63	54.00	0.022222	15 inch	0.013	65.50	64.30	66.10	64.97	65.50	67.80	-1.25	2.25	

CHESAPEAKE BAY COMPLIANCE NARRATIVE

FIVE FORKS SUBDIVISION

Get offsite credit

As indicated on Page 1 of the accompanying calculations, the involvement of off-site areas in the Chesapeake Bay Ordinance Compliance makes use of the County's 10 point system inappropriate. During the original rezoning process, and as shown on the development master plan, a significant area of the development could not be included into the stormwater management program. This is because it drains to a ravine system in which the property line follows the ravine's flow line. Construction of stormwater management facilities in this location would require acquisition of land or easements. It was determined that inclusion of already developed off-site areas, with high impervious cover, would offset the on-site areas that could not be included in the stormwater management process.

A comparison of pre-development and post-development pollutant runoff is included in the accompanying calculations. The post-development calculations are based upon the proposed 63 lot residential community. The pre-development calculations are based upon a consideration of the entire basin at the Chesapeake Bay Default Value of 16% impervious. It should be noted that on Page 1 a total basin acreage of 51.2 acres is indicated. This acreage includes approximately 3 1/2 acres of on-site land that does not drain to the BMP. It should also be noted that on Page 2 the pollutant reduction provided by a 30% efficient BMP is applied only to the 47.7 acres which in fact drains to the BMP. The post-development loading, as also indicated on Page 2, assumes the total 51.2 acres, which includes on-site areas not draining to the BMP. The conclusion of the compliance calculations, as indicated on Page 2, is that a pre-development loading of 23.1 pounds per year currently exists, based upon use of the Chesapeake Bay Default Value. The post-development loading is indicated to be 20.9 pounds per year, indicating a reduction in pollutant runoff after development.

The calculations on Page 3 and 4 provide the stormwater runoff review for routing through the detention basin. Page 4 indicates the peak pre-development flows from the 2, 10 and 100 year storms. These are 35.8 cfs, 48.6 cfs and 70.1 cfs respectively. The stormwater routing calculations on Page 38, 48 and 58 of the accompanying calculations indicate that the peak flows of all three storms are attenuated by the detention basin. **The post-development peak outflows from the detention basin are 34.7, 45.4, and 65.3 cfs for the 2, 10, and 100 year storms.**

DEVELOPMENT MANAGEMENT

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

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

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

COUNTY ENGINEER
(757) 253-6678

MOSQUITO CONTROL
(757) 259-4116

March 28, 2007

Mr. Adam Herman
Village Square HOA
4516 Misty Court
Williamsburg, Va. 23185

PROTECTED WITH PRIDE IN JAMES CITY COUNTY

Re: Village Square
Stormwater Management Facility
County Plan No.
County BMP ID Code: MC 008

Dear Mr. Herman:

It was a pleasure to talk with you recently about the stormwater management facility at Village Square. As discussed, I am providing you with some of our "***first contact***" information for your community association to use relative to maintenance of the BMP. The subject stormwater management facility (MC 008) is a dry pond stormwater management facility situated at the north end of the subdivision.

Information as attached includes: a watershed education brochure from our PRIDE program (www.protectedwithpride.org); landscaping tips for stormwater management BMP's; watershed awareness tips, a sample maintenance plan for a dry pond stormwater management facility; and three brochures related to liability and maintenance. One of these brochures is a good informational handout entitled *A Guide for Maintaining and Operating BMP's*. This publication is distributed through our office in response to a cooperative effort from the Hampton Roads Regional Stormwater Management Committee and HR STORM, a regional stormwater education program offered by the Hampton Roads Planning District Commission.

Our Division is always readily available to assist owners and HOA representatives with guidance related to stormwater management facilities and drainage and we sincerely look forward working with you in the future. If you have any additional questions or comments, call me at 757-253-6639.

Sincerely,

Scott J. Thomas, P.E.
Chief Engineer – Stormwater
Environmental Division

Attachments
SJT/sjt

SWMProg\Education\Subdivisions\VillageSquare.fc

DEVELOPMENT MANAGEMENT

101-E MOUNTS BAY ROAD, P.O. BOX 8784, WILLIAMSBURG, VIRGINIA 23187-8784
(757) 253-6671 Fax: (757) 253-6850 E-MAIL: devtman@james-city.va.us

CODE COMPLIANCE (757) 253-6626 codecomp@james-city.va.us
ENVIRONMENTAL DIVISION (757) 253-6670 environ@james-city.va.us
PLANNING (757) 253-6685 planning@james-city.va.us
COUNTY ENGINEER (757) 253-6678
INTEGRATED PEST MANAGEMENT (757) 259-4116

November 13, 2001

C. Lewis Waltrip II, Inc.
P.O. Box 3522
Williamsburg, Va. 23187

Attn: Stan Dykstra

Re: Village Square Phase I (formerly Five Forks Subdivision)
County Plan S-51-93
Stormwater Management Facility - Dry Pond
County BMP ID Code: MC 008

4/15/03 SITE VISIT: Draining pond, check riser/barrel connection; clear sediment around riser/CF orif; excavating for seep collar to seal off seepage to stone bedding along barrel.

5-9-03 Reinspect. Concrete seep collar poured, dam stabilized & matted. Grass growing. No sign of piping. Low flow orifice is working. Basin converted back to dry pond mode per plan. OK Scott

Dear Mr. Dykstra:

In response to your request on October 31st, 2001 to release surety on the above referenced project, the Environmental Division has reviewed record file information and performed a field inspection of the stormwater management facility for the project. The subject extended dry detention stormwater management facility for the site is located in the north corner near the end of Village Park Drive West (behind 4588 Village Park Drive East).

Based on our review of a previous submitted record drawing and a field observation as performed on November 9th 2001, the following items must be addressed prior to release of the developer's surety instrument for the stormwater management/BMP facility at the site:

Record Drawing:

✓ 1. The record drawing dated March 3rd 1997 is **satisfactory**.

Construction Certification:

✓ 2. Based on previous plans and Environmental Division comments for the project, a construction certification is **not required** for the facility. Previous notes only required a certified as-built plan, which was previously provided.

Construction-Related Items:

✓ 3. The entire fill embankment for the pond is covered with large trees and thick woody vegetation. Trees, shrubs and woody vegetation are not permitted to grow on any part of pond embankments constructed using engineered (compacted) fills. Saturated roots mats combined with high wind can cause trees to overtop and accelerate soil erosion and embankment failure conditions. For older facilities which may have established tree growth, we recommend that trees be cut flush to or below ground level and be maintained in that fashion as to not disturb root systems that may already be extensive. Efforts should then be made to reduce tree re-establishment and maintain a low-maintenance grass covering. Clear and remove all trees from the downstream fill embankment, top of dam and in the upper portions of the upstream fill embankment. Seed and mulch disturbed areas associated with subsequent tree clearing operations

cleared fall 02
cleared early summer 03

✓ OK 4. 5-9-03 Clear and remove trees and vegetation from within the emergency spillway and along the upstream embankment at the entrance to the emergency spillway. Flow to and through the emergency spillway shall not be obstructed.

✓ OK 5. 5-9-03 Clear and remove trees and thick vegetation within 10 ft. of the riser structure. Flow to the riser shall not be obstructed by vegetation. MATTED

6. ✓ OK 5-9-03 Clean and remove trash, debris and sediment deposits from the upstream end of the low flow orifice. The low flow orifice is a 4-inch diameter pipe which enters into the concrete riser structure. Based on our observations, sediments approximately 2-4 feet deep were severely obstructing flow into the low flow pipe and elevating the normal water surface elevation of the pond above what normally should occur. *(Note: At the time of our field inspection, water was trickling through the low flow pipe and was visually observed at the downstream end located within the riser box. However, the water surface elevation of the pond was well above the upstream end, indicative of obstructed conditions on the upstream end. Clean the upstream end of pipe and any associated grates and trash racks, respectively.)* 4 or 6" LOW FLOW ORIFICE VISIBLE

✓ 7. OK 5-9-03 A 6 foot long by 3 foot deep depression (hole) was formed at the toe of the upstream embankment directly behind the riser. This is indicative of seepage into or along the pond barrel. Upon clearing of vegetation around the riser, this area should be uncovered by excavation and a determination made whether seepage is present along the barrel or whether one of the first pipe segments from the riser has settled, displaced or detached. Corrective action or assessment by a qualified geotechnical engineer is required as information presents itself on this condition. Conc. ANTI-seep Collar. No sign of seepage

✓ 8. OK 5-9-03 Remove large dead wood pieces and logs that are present along the east and west shores of the pond. These pieces will float toward the riser and result in clogging of the flow control structure if not removed.

Once this work is satisfactorily completed, contact our office appropriately. We can then proceed with final release of the surety on the project. Please contact me at 757-253-6639 or the assigned Environmental Division inspector, Joe Buchite, at 757-253-6643 if you have any further comments or questions.

Sincerely,

Scott J. Thomas

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

G:\SWMProg\AsBuilts\S5193.mc008

C. LEWIS WALTRIP II, INC.

P.O. BOX 3522 WILLIAMSBURG, VIRGINIA 23187 (804) 253-1883 FAX (804) 253-0706

MAR 1997
RECEIVED
CODE COMPLIANCE OFFICE

March 7,1997

Mr. Darryl Cook
James City County Codes Compliance
101 E Mounts Bay Road
Williamsburg, Virginia 23185

Re: Village Square

Dear Mr Cook,

With the receipt of the detention pond as built drawings today we would like to request the release of all E&S bonds that are still held by James City County. If you have any questions please let me know.

Sincerely,

Lynn D. Evans

3/12

Pat -

Are there other issues we need to ~~address~~ resolve before release of money? Check w/ Mark on ~~adequacy~~ of as-builts.

Darryl

Scott Thomas

From: Scott Thomas
Sent: Friday, March 02, 2007 12:30 PM
To: 'adamsseptic@cox.net'
Subject: Village Square BMP
Attachments: VillageSquare.map.pdf; MC008-1s.jpg; MC008-2s.jpg; MC008-3s.jpg; MC008-4s.jpg; MC008-5s.jpg; MC008-6s.jpg; MC008-7s.jpg; MC008-8s.jpg; MC008-9s.jpg; MC008-10s.jpg; MC008-11s.jpg; MC008-12s.jpg; MC008-13s.jpg

Here's some information on the BMP including an aerial map of the area and photographs from when I did the final inspection in May 2003. The pond should be a dry pond, meaning it stays dry then fills up when it rains then it draws back down in about 24-36 hours. So if there is a permanent pool there, it's a sure sign that the low flow orifice is clogged.

The County BMP ID Code for this stormwater management facility is MC 008. The pond was approved as part of County Plan No. S-51-93. It serves 52.2 acres.

Scott J. Thomas, P.E.
Chief Engineer - Stormwater
James City County
Environmental Division

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

C. LEWIS WALTRIP II, INC.

P.O. BOX 2522 WILLIAMSBURG, VIRGINIA 23187 (804) 253-1883 FAX (804) 253-0706

TRANSMITTAL LETTER

Date: MARCH 7, 1997

Project: VILLAGE SQ.

To: DARYL COOK

MAR 1997 RECEIVED CODE COMPLIANCE OFFICE

The following items are being transmitted:

Date	Copies	Description
3/7	2	SWM POND AS BUILTS

These items are transmitted for:

____ Information

____ Approval

✓ As Requested

____ Review and Comment

Other: _____

Comments: _____

Copy to: _____

Signed LYNN

James City County Environmental Division
Stormwater Management / BMP Inspection Report
Detention and Retention Pond Facilities

5-51-93

County BMP ID Code (if known): MC 008

Name of Facility: Village Square BMP No.: ____ of ____ Date: 11/09/01

Location: North of 4588 Village Park Drive East

Name of Owner: Village Square of Wmbg. HOA Inc.

Name of Inspector: SJ Thomas, J Buchite

Type of Facility: Dry Pond w/ SHALLOW MARSH POOL

Weather Conditions: Sunny, Warm 60's Type: ☒ Final Inspection ☐ County BMP Inspection Program ☐ Owner Inspection

N

If an inspection item is not applicable, mark NA, otherwise mark the appropriate column.

O.K. - The item checked is in adequate condition and the maintenance program is currently satisfactory. No action required.
Routine - The item checked requires attention, but does not present an immediate threat to the function/integrity of the BMP.
Urgent - The item checked requires immediate attention to keep the BMP operational and to prevent damage to the facility.

Provide an explanation and details in the comment column, if routine or urgent are marked.

Facility Item	O.K.	Routine	Urgent	Comments
Embankments and Side Slopes: 3H:1V U/S & DS SIDESLOPES, TOP 10-12' WIDE. D/S SEWER BRIDGE.				
Grass Height	X			
Vegetation Condition		X	X	10' HIGH TREES & BRUSH
Tree Growth		X	X	COVER ENTIRE D/S EMBANK,
Erosion	X			TOP OF DAM + U/S SIDESLOPES.
Trash & Debris	X			LEAVES + GROUND COVER
Seepage	X			SOME WETNESS @ TOE 15'
Fencing or Benches				LEFT + RIGHT OF OUTFALL.
Interior Landscaping/Planted Areas: ☒ None ☐ Constructed Wetland/Shallow Marsh ☐ Naturally Established Vegetation				
Vegetated Conditions				Large wet pool. 3' deep at
Trash & Debris				riser. Deeper Pool in
Floating Material				Middle.
Erosion				Dead Wood Entire Pond Perimeter.
Sediment				Note: Supposed to be dry
Dead Plant		X		basin. TSB plug may still
Aesthetics				be in place. Appears
Other				to dewatering orifice.
Services SF Lots, RUANs & Commercial offsite.				

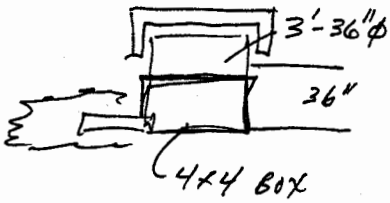
Facility Item	O.K.	Routine	Urgent	Comments
Water Pools: ☒ Permanent Pool (Retention Basin) ☐ Shallow Marsh (Detention Basin) ☐ None, Dry (Detention Basin)				
Shoreline Erosion	X			NATURAL SHORELINE ALL SIDES
Algae	X			
Trash & Debris	X			Leaves 40% perm pool
Sediment	X			About 1' deep at riser.
Aesthetics	X			Natural
Other				SHOULD NOT HAVE SIGNIFICANT PERM POOL.
Inflows (Describe Types/Locations): Open Channel Inflows at VARIOUS LOCATIONS; One SD Pipe at SouthEND				
Condition of Structure	X			
Erosion	X			
Trash and Debris	X			
Sediment	X			
Aesthetics	X			
Other	X			
Principal Flow Control Structure - Riser, Intake, etc. (Describe Location): 36" RCP RISER; 7' CONC CAP, MH LID				
Condition of Structure	X			NO Dewatering orifice visible in riser.
Corrosion	X			HEAVY Brush around riser.
Trash and Debris		X		Clear trees + thick brush + all
Sediment		X		trash 15' from riser
Aesthetics				SED 2' deep at LF ORIF u/s END
Other			X *	Riser 10' deep. SED 4' deep.
Principal Outlet Structure - Barrel, Conduit, etc.: 36" RCP W/ES-1 w/ OP Riprap				
Condition of Structure	X			
Settlement	X			
Trash & Debris	X			Some LEAVES IN ES.
Erosion/Sediment	X			
Outlet Protection	X			Sparse but OK. 10' x 10' SIZE
Other				D/S NATURAL CHANNEL NO EROSION.
Emergency Spillway (Overflow): Riprap CLI 5' BW; 2' deep; Geotextile				
Vegetation		X		Trees in ES AND AT ENTRANCE TO ES on upstream slope.
Lining	X			Riprap
Erosion	X			None.
Trash & Debris	X			
Other				

* Large Depression back side of riser 6' wx 3' deep. Possible barrel seepage.

Facility Item	O.K.	Routine	Urgent	Comments
Nuisance Type Conditions:				
Mosquito Breeding	X			
Animal Burrows	X			
Graffiti	X			
Other				
Surrounding Perimeter Conditions:	Woods Surround entire facility. Subdiv. to EAST.			
Land Uses	X			Woods, Natural Buffer.
Vegetation	X			
Trash & Debris	X			
Aesthetics	X			Natural Setting. Remote from subdiv
Access /Maintenance Roads or Paths	X			Easier access from Branscomb site.
Other				

Remarks:

- CLEAR + REMOVE ALL TREES + SAPLINGS FROM D/S EMB, TOP OF DAM AND UPPER PORTION OF U/S EMB FILL ALONG T.O.D. (UPPER 10' VERT. U/S SLOPE)
- Appears 4"ϕ LF orif plug was not removed. Water pool to dewatering orifice level. (No U/S END IS CLOGGED)
- clear + remove all trees, thick brush, trash + wood debris 15' ft. from riser.
- IT APPEARS 4" LF ORIF IS present & no dewatering orif on riser. U/S end of LF orif is blocked. Some flow trickling. Appears water pool is higher due to clogging of U/S end of Low flow BMP orif. (Sed. 4' deep around riser)
- Fill Depression back of riser 6' x 3' deep. Possible sign of barrel seepage.
- Remove Dead wood pieces along entire pond perimeter.
- Remove Trees + Sapling ESAND ON U/S EMB @ ES.



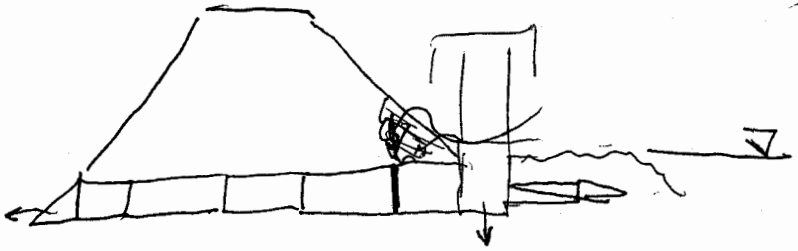
Overall Environmental Division Internal Rating: X (Trees on Embank, Perm Pool, Clogging LF orif.)

REINSPECT 3 5-9-03 (NALTRIP REPAIRS)

Signature: _____ **Date:** _____

Title: _____

SWMProg\BMP\CoInspProg\DetRet.wpd



WATERSHED	MC	MAINTENANCE PLAN	No	CTRL STRUC DESC	RCP Riser
BMP ID NO	008	SITE AREA acre	27.8	CTRL STRUC SIZE inches	48
PLAN NO	Unknown	LAND USE	Gen Residential	OTLT BARRL DESC	RCP Barrel
TAX PARCEL	(47-01)(15-1B)	old BMP TYP	Dry Pond SM	OTLT BARRL SIZE inch	36
PIN NO	4711500001B	JCC BMP CODE			
CONSTRUCTION DATE	12/3/1993	POINT VALUE	6	EMERG SPILLWAY	Yes
PROJECT NAME	Village Square			DESIGN HW ELEV	44.56
FACILITY LOCATION	North of 4588 Village Park Dr East			PERM POOL ELE	34.3
CITY-STATE	Williamsburg, Va. 23185	SVC DRAIN AREA acres	52.2	2-YR OUTFLOW cfs	27.86
CURRENT OWNER	Village Square of Williamsburg HOA Inc			10-YR OUTFLOW cfs	51.26
OWNER ADDRESS	4493 Village Park Dr West			REC DRAWING	Yes
OWNER ADDRESS 2		SERVICE AREA DESCRI	Sudivision, Commercial and road offsite		
CITY-STATE-ZIP CODE	Williamsburg, Va. 23185	IMPERV AREA acres	27.48	CONSTR CERTI	No
OWNER PHONE		RECV STREAM	UT of Mill Creek		
MAINT AGREEMENT	Yes	EXT DET-WQ-CTRL	Yes	LAST INSP DATE	12/12/2000
EMERG ACTION PLAN	No	WTR QUAL VOL acre-ft	2.81	INTERNAL RATING	4
		CHAN PROT CTRL	No	MISC/COMMENTS	
		CHAN PROT VOL acre-ft	0	form Five Forks Subdiv.	
		SW/FLOOD CONTROL	Yes		
		GEOTECH REPORT	No		

Get Last BMP No

Return to Menu

SEE DATABASE

WATERSHED	MC	MAINTENANCE PLAN	No	CTRL STRUC DESC	RCP Riser
BMP ID NO	008	SITE AREA acre	27.8	CTRL STRUC SIZE inches	48
PLAN NO	S-51-93	LAND USE	Gen Residential	OTLT BARRL DESC	RCP Barrel
TAX PARCEL	(47-01)(15-1B)	old BMP TYP	Dry Pond	OTLT BARRL SIZE inch	36
PIN NO	4711500001B	JCC BMP CODE			
CONSTRUCTION DATE	12/3/1993	POINT VALUE	6	EMERG SPILLWAY	Yes
PROJECT NAME	Village Square Phase 1			DESIGN HW ELEV	44.56
FACILITY LOCATION	North of 4588 Village Park Dr East			PERM POOL ELE	34.3
CITY-STATE	Williamsburg, Va. 23185	SVC DRAIN AREA acres	52.2	2-YR OUTFLOW cfs	27.86
CURRENT OWNER	Village Square of Williamsburg HOA Inc			10-YR OUTFLOW cfs	51.26
OWNER ADDRESS	4493 Village Park Dr West			REC DRAWING	Yes
OWNER ADDRESS 2		SERVICE AREA DESCRI	Sudivision, Commercial and road offsite		
CITY-STATE-ZIP CODE	Williamsburg, Va. 23185	IMPERV AREA acres	27.48	CONSTR CERTI	No
OWNER PHONE		RECV STREAM	UT of Mill Creek		
MAINT AGREEMENT	Yes	EXT DET-WQ-CTRL	Yes	LAST INSP DATE	11/9/2001
EMERG ACTION PLAN	No	WTR QUAL VOL acre-ft	2.81	INTERNAL RATING	2
		CHAN PROT CTRL	No	MISC/COMMENTS	
		CHAN PROT VOL acre-ft	0	form Five Forks Subdiv. Ph 2 S-90-93.	
		SW/FLOOD CONTROL	Yes		
		GEOTECH REPORT	No		

Get Last BMP No

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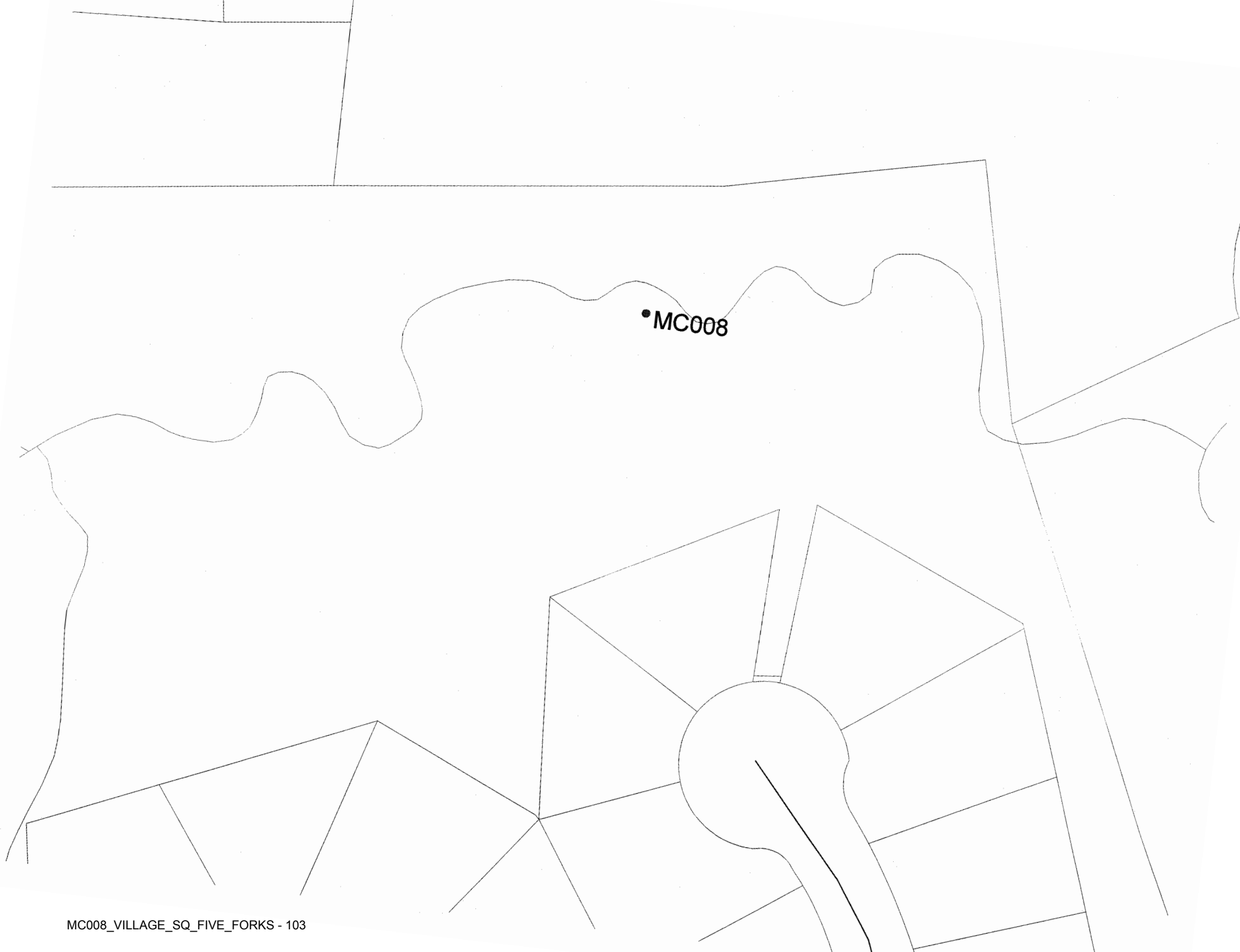

MC008_VILLAGE_SQ_FIVE_FORKS - 103

James City County Environmental Division
Building Specialties Warehouse Expansion
County Plan Number SP-144-03
January 15, 2004

General:

1) A Land-Disturbing Permit and Siltation Agreement, with surety, are required for this project.

2) Water and sewer inspection fees, as applicable, must be paid in full prior to issuance of a Land-Disturbing Permit.

3) Plan Number. Please reference the assigned County plan number (SP-144-03) on all subsequent submissions.

4) Site Tabulation. Provide total proposed impervious cover and disturbed area estimates in the site tabulation for the project and show the limits of disturbed area.

5) Watershed. Provide a note on the cover sheet of the plans indicating that the project is situated in the Mill Creek watershed.

6) Professional seal and signature is required on final and complete approved stormwater management plans, drawings, technical reports and specifications.

7) VPDES. It appears that the calculated area of disturbance is incorrectly noted as 0.98 acres, and that the actual area of land disturbance for the project exceeds one (1) acre. If that is the case, it is the owner's responsibility to register for a General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Construction Activities, in accordance with current requirements of the Virginia Department of Environmental Quality and 9 VAC 25-180-10 et seq. Contact the Tidewater Regional Office of the DEQ at (757) 518-2000 or the Central Office at (804) 698-4000 for further information. Failure to obtain the required permit will likely result in enforcement action from the DEQ.

Chesapeake Bay Preservation:

8) Environmental Inventory. Although a tabular environmental inventory was provided on the plan set, there is no indication on the plan sheets where the components are located. The required components are listed under Section 23-10(2) of the Chesapeake Bay Preservation Ordinance. An inventory needs to list the components, state whether there are impacts or not, and quantify impacts (acres, square feet, linear feet, etc.), as applicable. The inventory should also show the limits of work for site clearing and grading, including that associated with utilities and installation of erosion and sediment controls, clearly transposed onto the sheet to properly evaluate impacts of the development plan to environmentally sensitive areas.

9) Steep Slope Areas. Section 23-5 of the Chesapeake Bay Preservation Ordinance does not allow land-disturbing activities to be performed on slopes 25 percent or greater without an exception being granted. It appears that steep slope areas are being disturbed in locations where proposed contours are shown tying into existing ground on the eastern and western sides of the site. Therefore, a written request for an exception is required.

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may include additional E&SC measures, cleaning and sediment removal within the basin or connecting pipe systems, and coordination with the owner, engineer, or the County.

Stormwater Management / Drainage:

22) Stormwater Compliance. The existing BMP for Village Square was designed to control the stormwater from this site. However, the Chesapeake Bay Ordinance requires that evidence be provided that the downstream BMP facility is in good working order and performing at the design level of service. A field inspection and certification letter by a registered professional engineer will provide proof of conformance to this requirement.

NOT ADDRESSED

23) Drainage. Provide grading to maintain positive drainage to the two drop inlets at the southern edge of the site. Currently, a swale is shown in this area; however, proposed spot grades show it as being a ridge rather than a depression. Correct plans as needed.

24) Drainage Map. Provide a drainage map showing proposed drainage sub areas with divides for all stormwater drainage pipes and channels, BMPs and special points of analyses. Include the size of each drainage area as well as applicable runoff coefficients, times of concentration, flow path, and applicable offsite service area.

25) Stormwater Management Narrative. Please provide a brief stormwater management narrative which describes existing drainage at the site and proposed onsite stormwater drainage facilities and how the site obtains compliance with the County requirements.

26) Channel Adequacy. Provide channel adequacy calculations at the outfall of the storm drain system in accordance with procedure as outlined in pages V-122 through V-141 of the VESCH and Technical Bulletin No. 1, Stream Channel Erosion Control by the Virginia Department of Conservation and Recreation.

27) Storm Drain system. Provide invert and type of structure to be used at the southeastern most portion of the stormwater conveyance system (ES-1, EW-11, etc).

28) Stormwater Conveyance Channel Computations. Provide calculations to support the design of all stormwater conveyance channels and swales. Include drainage areas, times of concentration, runoff coefficients or curve numbers, and intensities for the 2- and 10-year design events and channel design assumptions (slopes, lining, sideslopes, etc.).

29) RCP Pipe. Show class required for all proposed onsite reinforced concrete pipe storm drains and culverts. Consider dead and live loads and cover depths during and following construction.

30) IS-1 Shaping. Inlet shaping is recommended for the storm drain structure at the tie-in point due to the severity of the angle. Inlet shaping will help to minimize and prevent debris buildups due to changes in pipe alignment. Use notes or details to specify inlet shaping in accordance with VDOT Standard IS-1. In addition, if final depths of the inlets are greater than 4 ft., include provisions for steps in accordance with VDOT Standard ST-1.

31) Storm Drain Notes. Provide in note 6 under "Utilities" on sheet C-1 the classification of the reinforced concrete pipe to be used.

Stormwater Division

MEMORANDUM

DATE: July 22, 2014
TO: Michael J. Gillis, Virginia Correctional Enterprises Document Management Services
FROM: Jacob Smith, Stormwater Intern
PO: 110426
RE: Files Approved for Scanning

NAME PDF/SCANNED FILE:	GOVERNORS GREEN SHOPPING CENTER		
BMP ID OR GEN FILE NUMBER:	MC008	**OWNER NAME:**	~~DD/FILE~~ CONTRADICTORY
PIN:	~~DD/FILE~~ CONTRADICTORY	**SITE ADDRESS:**	ADJACENT TO 4588 VILLAGE PARK DRIVE EAST
		LEGAL DESCRIPTION:	CONSERVATION ARE P-1 VILLAGE SQUARE A

MAINTENANCE AGREEMENT IN FILE:	YES	**BOOK/PAGE OR DOCUMENT NO.:**	N/A	**OTHER DESCRIPTION:**	N/A

BOX NO.:	1	**COMMENTS:**	DECLARATION INSPECTION/MAINTENANCE

Governor's Green Shopping Center
PH1 - 4710100054
PH2 - 4710100111
PH3A - 4710100112
PH3B - 4710100113

MC008
(not the recorded copy)

DECLARATION OF COVENANTS

INSPECTION/MAINTENANCE OF RUNOFF CONTROL FACILITY

THIS DECLARATION, made this 24th day of March, 1994, between IRONBOUND MARKETPLACE PARTNERS, L.L.C., a Virginia limited liability company ("Marketplace Partners"), JAMESTOWN, INC., a Virginia corporation ("Jamestown, Inc."), and IRONBOUND COMPANY, L.C., a Virginia limited liability company ("Company"), and all successors in interest, hereinafter referred to as the "COVENANTOR(S)," (index as "grantors" and "grantees") and JAMES CITY COUNTY, VIRGINIA, hereinafter referred to as the "COUNTY" (index as a "grantee").

WITNESSETH:

RECITALS:

A. Marketplace Partners owns or is to acquire that parcel of real property ("Phase I") designated as "PHASE I GOVERNOR'S GREEN 5.9442," as shown on that subdivision plat (the "Plat") entitled "PLAT OF GOVERNOR'S GREEN BEING A SUBDIVISION OF PROPERTY OF IRONBOUND COMPANY, L.C. JAMES CITY COUNTY, VIRGINIA," dated February 18, 1994, prepared by Langley and McDonald, P.C., which plat is or will be recorded in the James City County, Virginia Circuit Court Clerk's Office in Map Book ____, at page ____.

B. Company is the owner of three parcels of real property designated as "PHASE IIIA 0.8937 ACRES" ("Phase IIIA") and "PHASE IIIB 0.8399 ACRES" ("Phase IIIB") and "PHASE II 2.7888 ACRES" ("Phase II"), on the Plat.

C. Jamestown, Inc. owns certain real property (the "Residential Property") more particularly described on EXHIBIT A attached hereto and by this reference made a part hereof (Phase I, Phase II, Phase IIA, Phase IIIB and the Residential Property are hereinafter collectively referred to as the "Benefitted Property").

D. The parties hereto have agreed that a runoff control facility is to be constructed and operated on the Residential Property, subject to the terms and conditions set forth herein.

DECLARATION AND AGREEMENT

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

1. The COVENANTOR(S) shall provide maintenance for the runoff control facility, hereinafter referred to as the "FACILITY", located on and serving the Benefitted Property to ensure that the FACILITY is and remains in proper working condition in accordance with approved design standards, and with the law and applicable executive regulations. The cost of such maintenance shall be prorated among the COVENANTORS in accordance with their "Percentage of Responsibility" shown following the respective parcels of the Benefitted Property:

Phase I	50%
Phase II	20%
Phase IIIA	5%
Phase IIIB	5%
Residential Property	20%

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

3. The COVENANTOR(S) shall provide and maintain perpetual access from public right-of-ways to the FACILITY for the COUNTY and Marketplace Partners, and their respective agents and contractors.

4. The COVENANTOR(S) shall grant the COUNTY and Marketplace Partners, and their respective agents and contractors, a right of entry to the FACILITY for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining or repairing the FACILITY.

5. If, after reasonable notice by the COUNTY or any of the owners of the Benefitted Property, the owners of the Benefitted Property shall fail to maintain the FACILITY in accordance with the approved design standards and with the law and applicable executive regulations, the COUNTY or Marketplace Partners may, but shall not be obligated to, perform all necessary repair or maintenance work, and whichever of the COUNTY or Marketplace Partners performing such work may assess the owners of all the Benefitted Property served by the FACILITY, in accordance with the respective Percentages of Responsibility, for the cost of the work and any applicable penalties.

6. The COVENANTOR(S), for themselves and their successors (including, without limitation, successors in title) and assigns, agree to, in accordance with their respective Percentages of Responsibility, indemnify and save the COUNTY harmless from any and all claims for damages to persons or property arising from the installation, construction, maintenance, repair, operation or use of the FACILITY, unless such damages are determined to be the result of the willful or negligent acts or omissions of one or more of the COVENANTOR(S) or such successors or assigns in which event such COVENANTOR(S) or successors or assigns shall be solely responsible for such indemnity and hold harmless obligation arising therefrom and all other COVENANTOR(S) shall not be subject to such obligation relating to such damages.

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

8. The covenants contained herein shall run with the land and shall bind the COVENANTOR(S) and the COVENANT(S)' heirs, executors, administrators, successors and assignees, and shall bind all present and subsequent owners of the Benefitted Property served by the FACILITY in accordance with their applicable Percentage of Responsibility. Upon the legal transfer of the property owned by COVENANTOR being served by the FACILITY, by acceptance of such transfer, the transferee assumes all of the obligations of such COVENANTOR as set forth herein, the COVENANTOR legally transferring such property to the transferee, shall thereupon be relieved of any further liability or responsibility hereunder with respect to such property transferred.

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

IN WITNESS WHEREOF, the COVENANTOR(S) have executed this DECLARATION OF COVENANTS as of this 24th day of March, 19 94.

COVENANTOR(S)

JAMESTOWN, INC.

President

ATTEST:

_____

COVENANTOR(S)

IRONBOUND MARKETPLACE PARTNERS L.L.C.

~~ATTEST:~~

COVENANTOR(S)

IRONBOUND COMPANY L.C.

Managing Member

ATTEST:

Managing Member

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF NEWPORT NEWS

I, the undersigned Notary Public, in and for the jurisdiction aforesaid, do certify that Jeffrey L. Weeks, President of Jamestown, Inc. whose name is signed as such to the foregoing writing bearing date 24th day of March, 1994, this day sworn the same before me in my jurisdiction aforesaid.

GIVEN under my hand this 24th day of March, 1994.

Carol J. Whitley
Notary Public

My commission expires: July 31, 1995

Approved as to form:

_____

COMMONWEALTH OF VIRGINIA
CITY/~~COUNTY~~ OF NORFOLK

I, the undersigned Notary Public, in and for the jurisdiction aforesaid, do certify that John L. Gibson, III as manager of Jamestown Hartkatpleet Partners LLC whose name is signed as such to the foregoing writing bearing date 24th day of March, 1994, this day sworn the same before me in my jurisdiction aforesaid.

GIVEN under my hand this 24th day of March, 1994.

Donna P. Booth
Notary Public

My commission expires: September 30, 1997

Approved as to form:

_____

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF NEWPORT NEWS

I, the undersigned Notary Public, in and for the jurisdiction aforesaid, do certify that Joseph H. Latchum, Jr. and Jeffrey L. Weeks* whose name is signed as such to the foregoing writing bearing date _____ day of _____, 19__, this day sworn the same before me in my jurisdiction aforesaid.

GIVEN under my hand this 24th day of March, 19 94.

*Managing Members of Ironbound Company, L.C.

Carol J. Whitley
Notary Public

My commission expires: July 31, 1995

Approved as to form:

_____