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: **PC125**

DATE VERIFIED: **November 1, 2012**

QUALITY ASSURANCE TECHNICIAN: **Leah Hardenbergh**

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA

Stormwater Division

MEMORANDUM

DATE: March 9, 2010

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

FROM: Jo Anna Ripley, Stormwater

PO: 270712

RE: Files Approved for Scanning

General File ID or BMP ID: PC125

PIN: 3310800001A

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

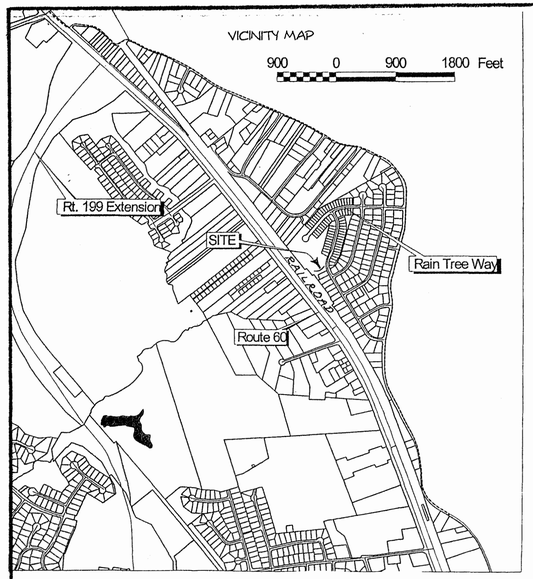
Property Description: Common Area Phase 1

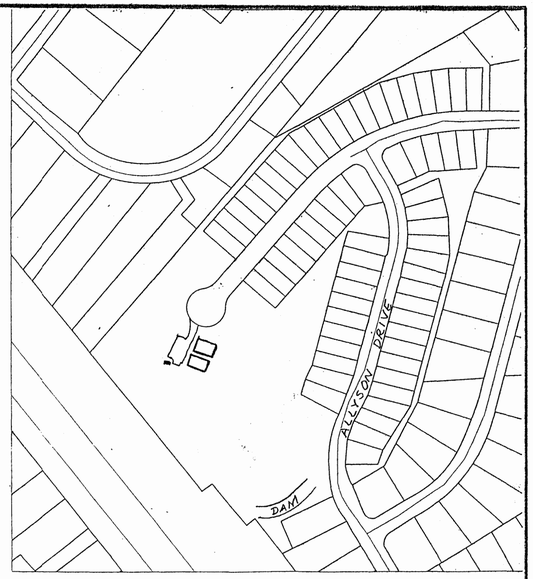
Site Address: 112 Raintree Way

(For internal use only) **Box** 6 **Drawer:** 3

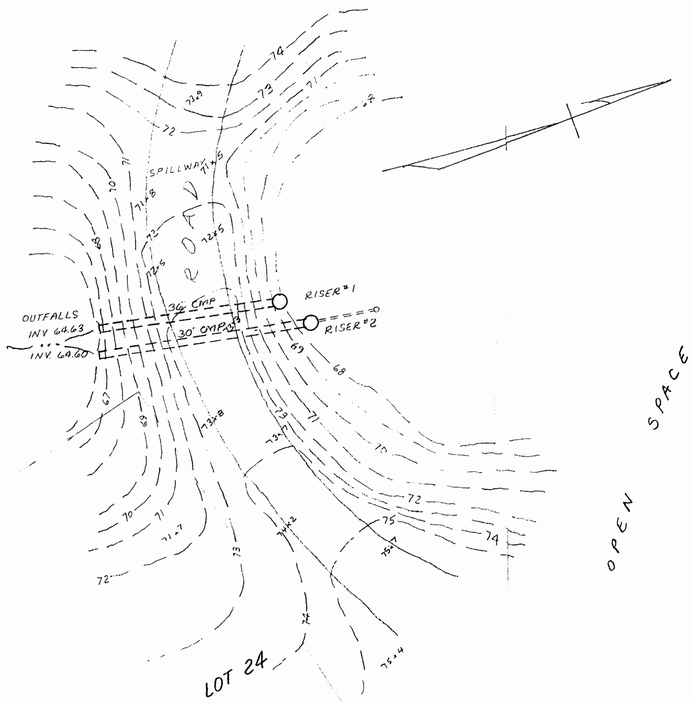
Agreements: (in file as of scan date) **N** **Book or Doc#:** **Page:**

Comments
NOTE: OLD BMP #YR009 NEW #PC125 see notes in file

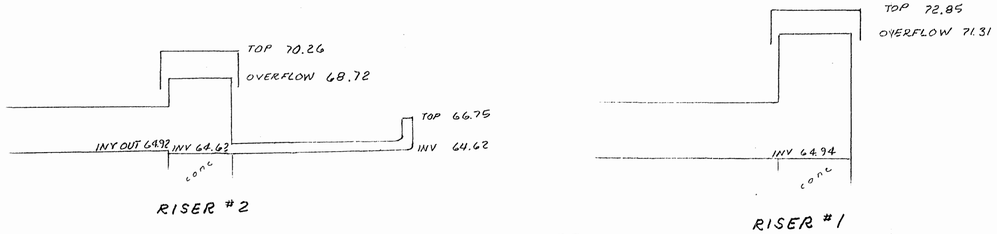




GENERAL SITE MAP 20' 10' 0 20' N



OPEN SPACE



PROFILES
Scale: 1" = 4'

PLAN
Scale: 1" = 20'

ALLYSON DRIVE 50' R/W

COMMONWEALTH OF VIRGINIA
R. C. Ackerman
No. 002258
8/18/99
LAND SURVEYOR

AS-BUILT DRAWING

RAINTREE RETENTION DAM

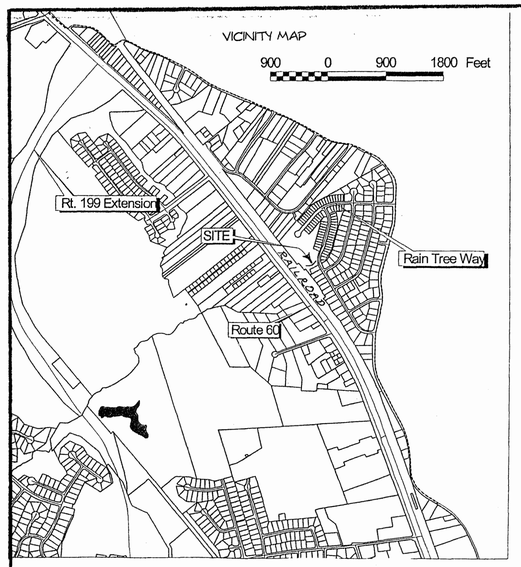
James City County, Virginia

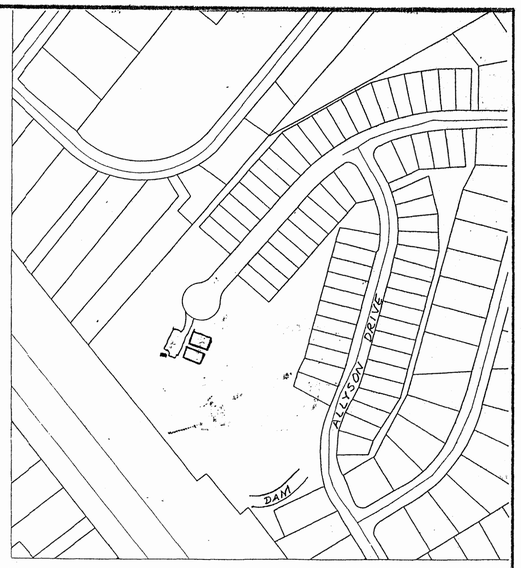
Scale: As shown Date: Aug 18, 1999

PENINSULA ENGINEERING & SURVEYING, Inc. 727 KEPPEL DRIVE NEWPORT NEWS, VIRGINIA 23608

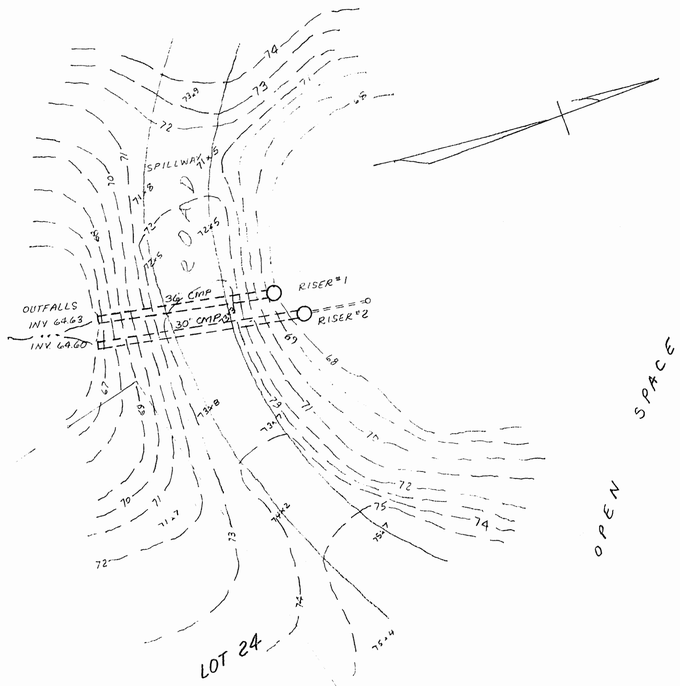
PC125_RAINTREE_VILLAS_PHASE_1_DRY_POND - 003

PC 025: S-34-93

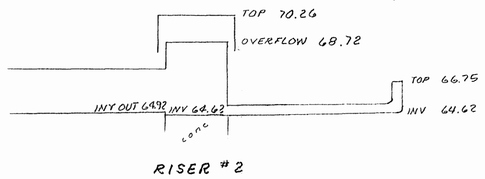


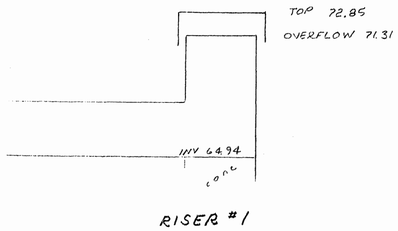


GENERAL SITE MAP 20' 10' 0 20' N



PLAN
Scale: 1" = 20'





PROFILES
Scale: 1" = 4'

OPEN SPACE

ALLYSON DRIVE 50' R/W

COMMONWEALTH OF VIRGINIA
R. C. Ackerman
No. 002258
8/18/99
LAND SURVEYOR

AS-BUILT DRAWING

RAINTREE RETENTION DAM

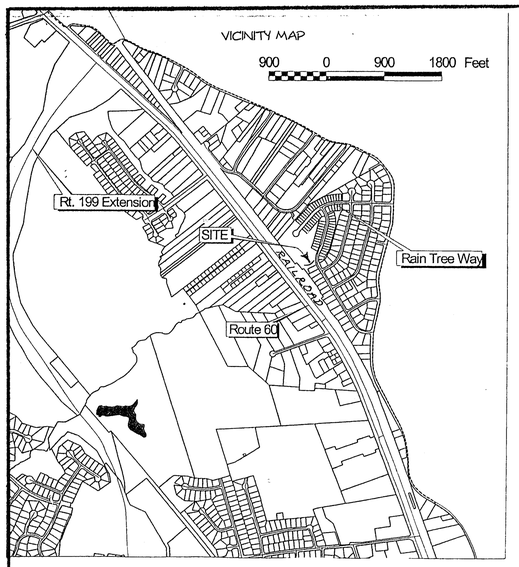
James City County, Virginia

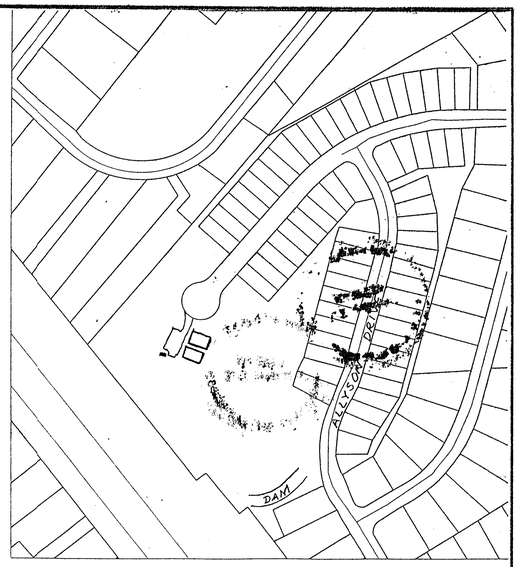
Scale: As shown Date: Aug 18, 1999

PENINSULA ENGINEERING & SURVEYING, Inc. 727 KEPPEL DRIVE NEWPORT NEWS, VIRGINIA 23608

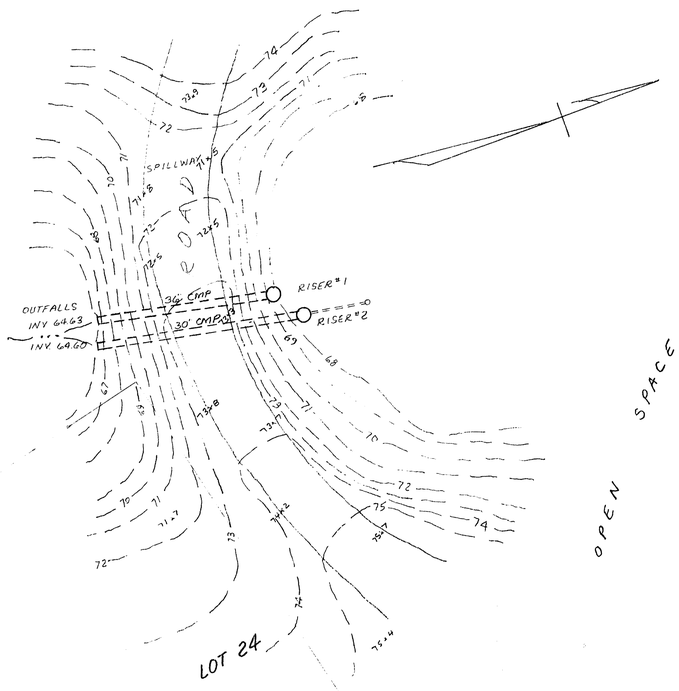
RAINTREE VILLAS
S-34-93 PC125

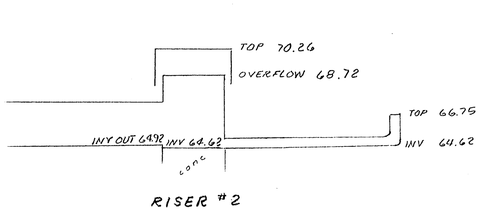
PC125_RAINTREE_VILLAS_PHASE_1_DRY_POND - 004

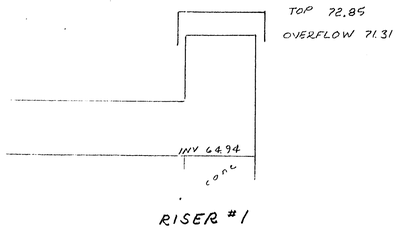




GENERAL SITE MAP 20' 10' 0 20' N







PROFILES
Scale: 1" = 4'

OPEN SPACE

PLAN
Scale: 1" = 20'

ALLYSON DRIVE 50' R/W

COMMONWEALTH OF VIRGINIA
R. C. Ackerman
No. 002258
8/18/99
LAND SURVEYOR

AS-BUILT DRAWING

RAINTREE RETENTION DAM

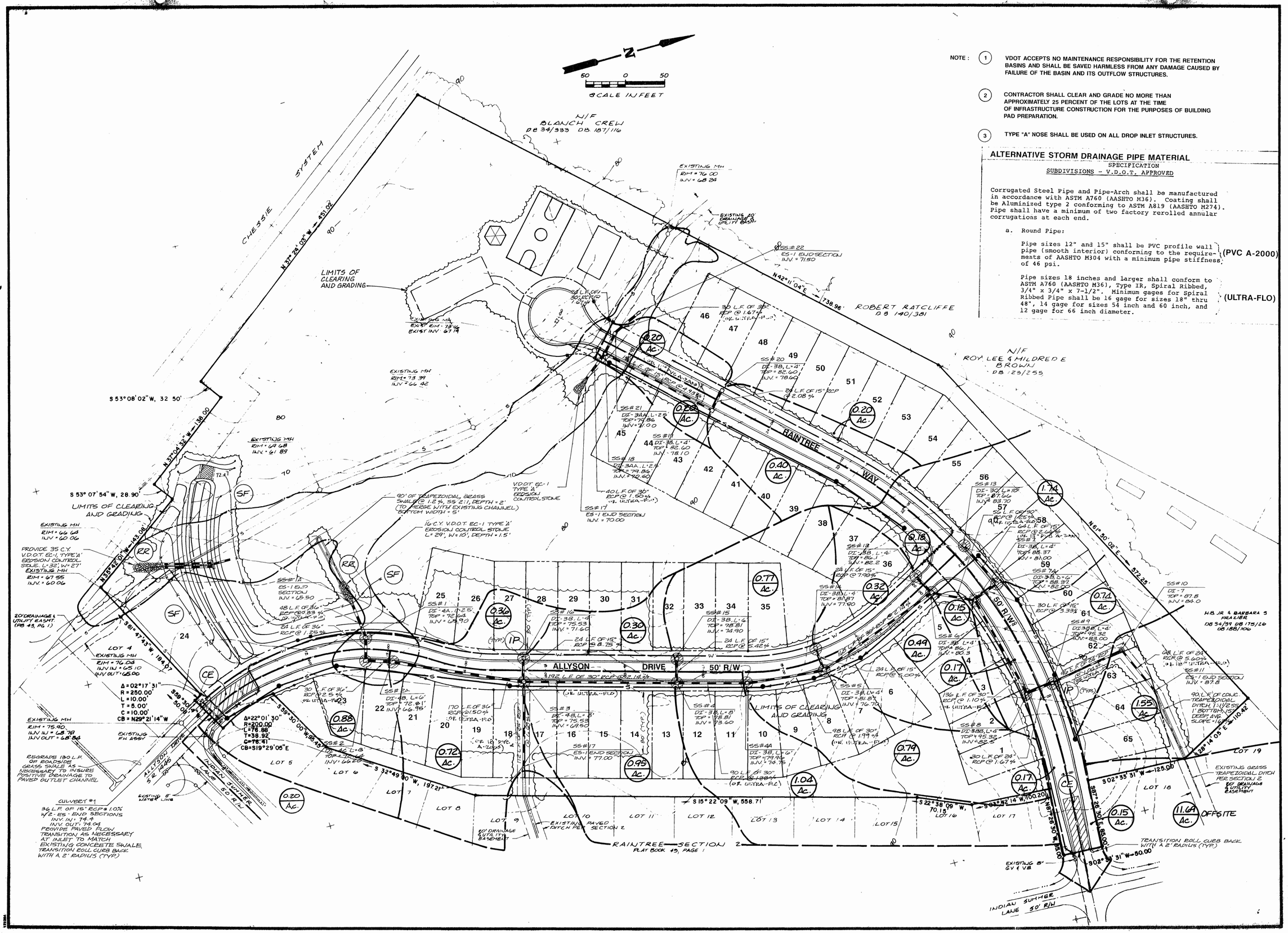
James City County, Virginia

Scale: As shown Date: Aug 18, 1999

PENINSULA ENGINEERING & SURVEYING, Inc. 727 KEPPEL DRIVE NEWPORT NEWS, VIRGINIA 23608

RAINTREE VILLAS

S-34-93 PC 125



NOTE :

1. VDOT ACCEPTS NO MAINTENANCE RESPONSIBILITY FOR THE RETENTION BASINS AND SHALL BE SAVED HARMLESS FROM ANY DAMAGE CAUSED BY FAILURE OF THE BASIN AND ITS OUTFLOW STRUCTURES.
2. CONTRACTOR SHALL CLEAR AND GRADE NO MORE THAN APPROXIMATELY 25 PERCENT OF THE LOTS AT THE TIME OF INFRASTRUCTURE CONSTRUCTION FOR THE PURPOSES OF BUILDING PAD PREPARATION.
3. TYPE "A" NOSE SHALL BE USED ON ALL DROP INLET STRUCTURES.

ALTERNATIVE STORM DRAINAGE PIPE MATERIAL

SPECIFICATION

SUBDIVISIONS - V.D.O.T. APPROVED

Corrugated Steel Pipe and Pipe-Arch shall be manufactured in accordance with ASTM A760 (AASHTO M36). Coating shall be Aluminized type 2 conforming to ASTM A819 (AASHTO M274). Pipe shall have a minimum of two factory rerolled annular corrugations at each end.

a. Round Pipe:

Pipe sizes 12" and 15" shall be PVC profile wall pipe (smooth interior) conforming to the requirements of AASHTO M304 with a minimum pipe stiffness of 46 psi. (PVC A-2000)

Pipe sizes 18 inches and larger shall conform to ASTM A760 (AASHTO M36), Type IR, Spiral Ribbed, 3/4" x 3/4" x 7-1/2". Minimum gages for Spiral Ribbed Pipe shall be 16 gage for sizes 18" thru 48", 14 gage for sizes 54 inch and 60 inch, and 12 gage for 66 inch diameter. (ULTRA-FLO)

No.	DATE	REVISION / COMMENT / NOTE	BY
3	7/22/94	REVISED TO ADD CUL-DE-SAC	SGW
2	1/6/94	REVISED DRAINAGE TO INCLUDE ULTRA-FLO PIPE	SGW
1	8/27/93	REVISED PER J.C.C. COMMENTS	SGW

COMMONWEALTH OF VIRGINIA
STEVEN G. WEGLEY
No. 016307
8-27-93
PROFESSIONAL ENGINEER

5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(804) 253-0040
Fax (804) 220-8994
CONSULTING ENGINEERS

DRAINAGE, GRADING AND EROSION AND SEDIMENT CONTROL PLAN

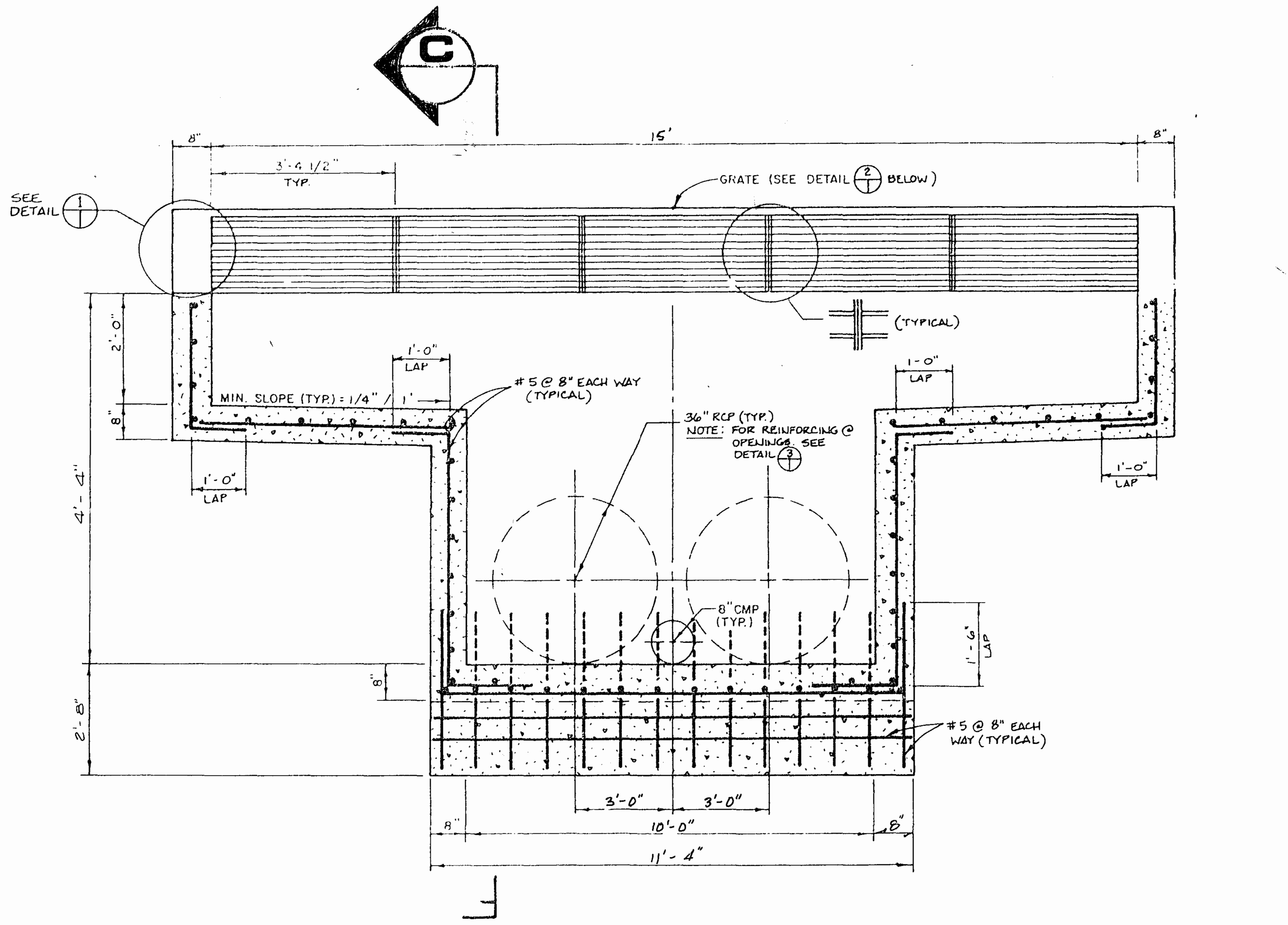
RAINTREE VILLAS

OWNER/DEVELOPER: LEONARD M. EPSTEIN

POWHATAN DISTRICT — JAMES CITY COUNTY — VIRGINIA

Designed	Drawn
CAH/SGW	
Scale: 1"=60'	Date: 8/30/93
Project No. 5919-5	
Drawing No. 4	

PC125_RAINTREE_VILLAS_PHASE_1_DRY_POND - 006

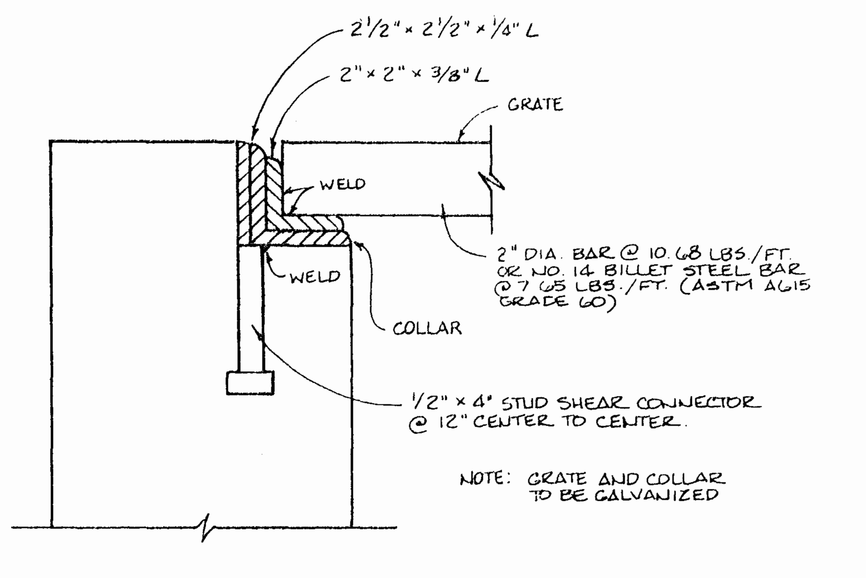


SECTION-MODIFIED EW-11 (B)

N.T.S.

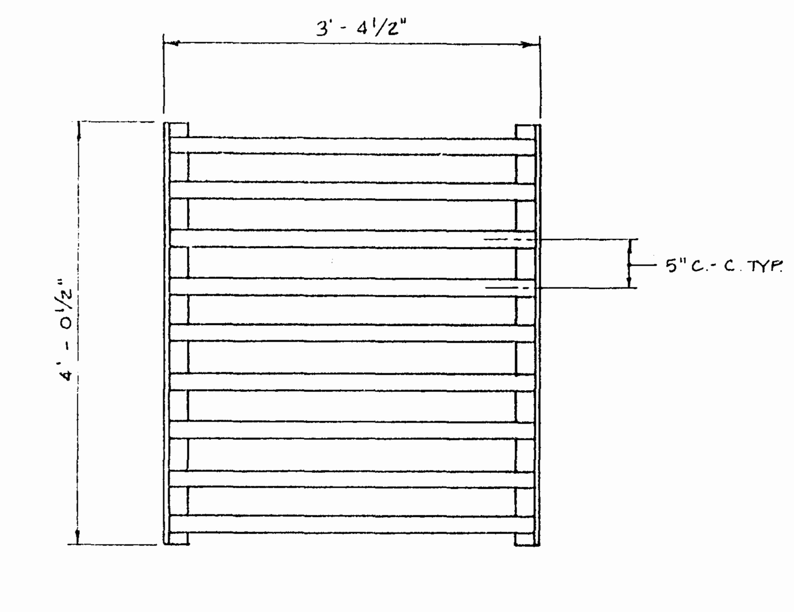
GENERAL NOTES:

1. CONCRETE TO BE 3000 PSI MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS.
2. IF PIPE IS TO BE SKEWED THE OPENING WILL BE ADJUSTED TO ACCOMODATE SKEW.
3. REINFORCING STEEL IN ACCORDANCE WITH ASTM A-615 GRADE 60.



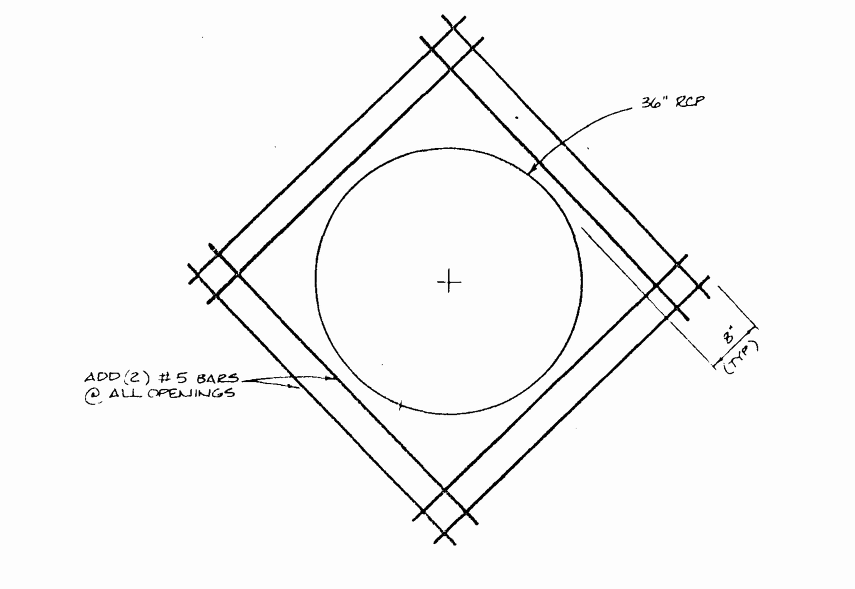
DETAIL (1)

SCALE: 3" = 1'-0"



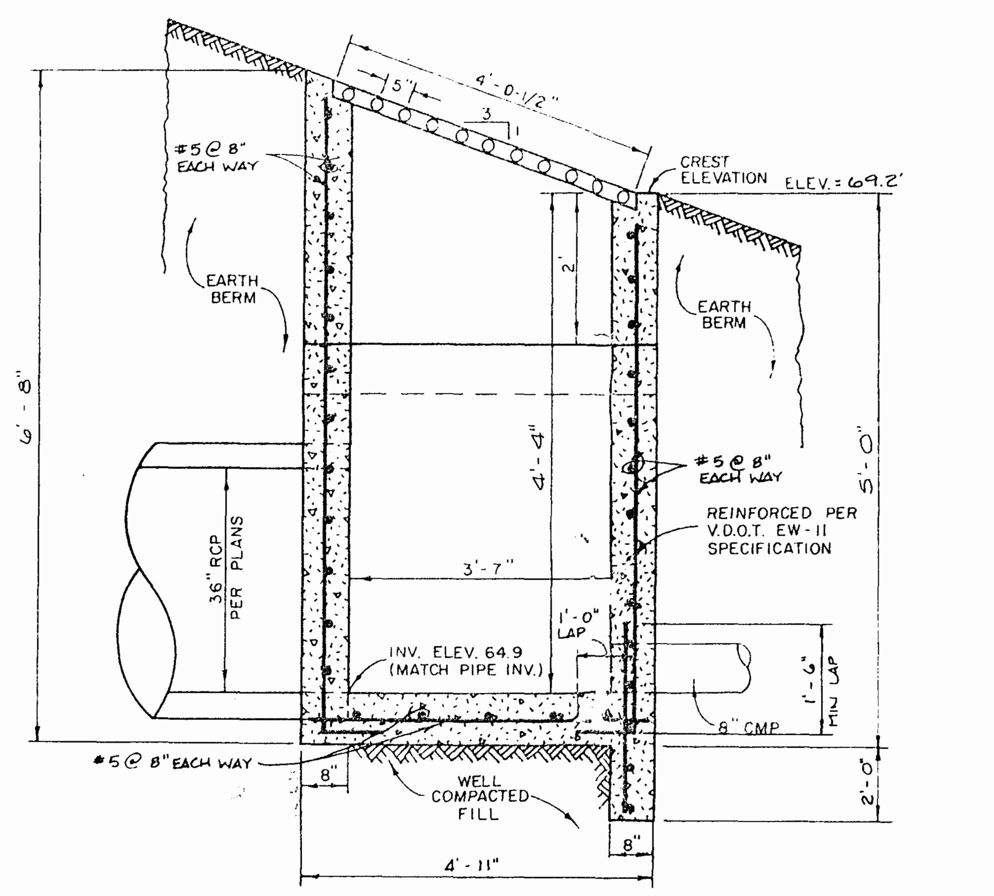
DETAIL (2)

SCALE: 3/4" = 1'-0"



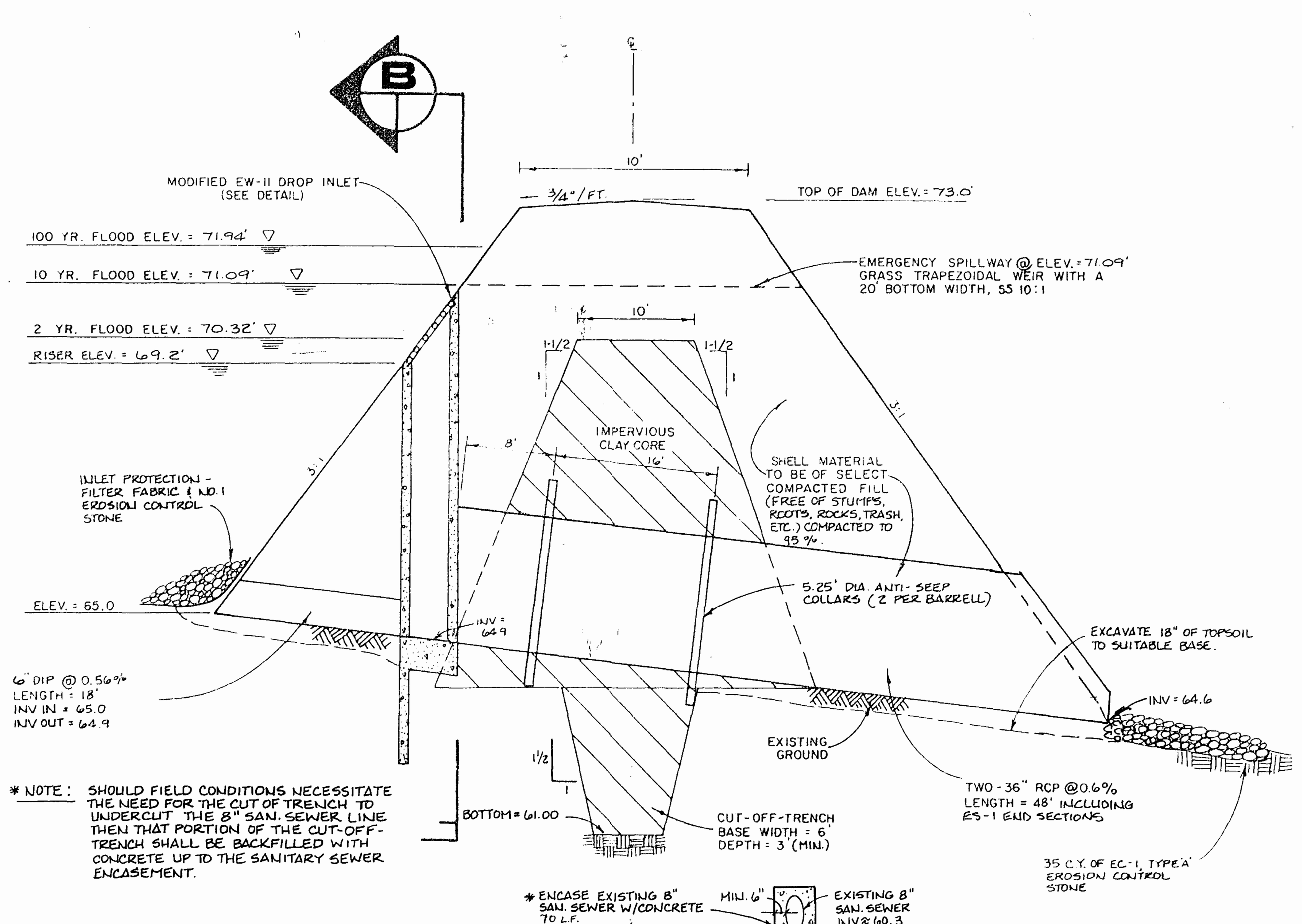
DETAIL (3)

N.T.S.



SECTION-MODIFIED EW-11 (C)

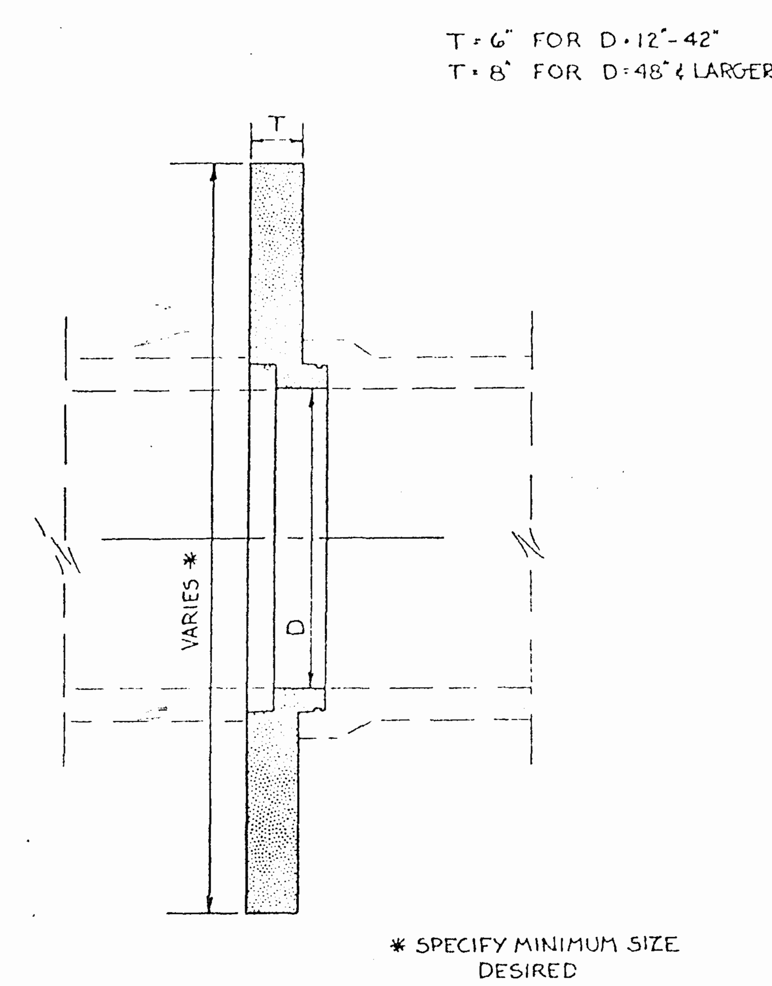
N.T.S.



DAM IMPOUNDMENT CROSS-SECTION A-A

N.T.S

* OR SEE ALTERNATE OUTLET DEVICE



ANTI-SEEP COLLAR FOR DAM SECTION

N.T.S.

ALTERNATIVE OUTLET DEVICE FOR DAM

AN ALTERNATIVE OUTLET DEVICE FOR THE DAM IS FOR A DUAL CORRUGATED STEEL PIPE DEVICE. THE DETAILS HAVE BEEN PROVIDED TO THE CONTRACTOR AND THE COUNTY OF JAMES CITY. THE DEVICE SHALL CONSIST OF THE FOLLOWING:

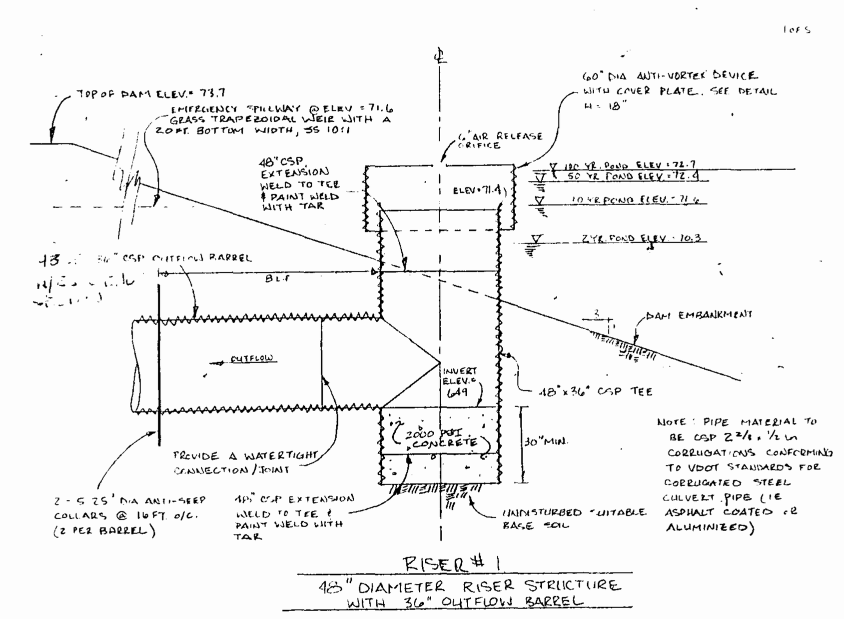
RISER #1 - 48" CSP RISER WITH A 36" BARREL
INVERT = 64.9 FT.
CREST ELEVATION = 71.4 FT.

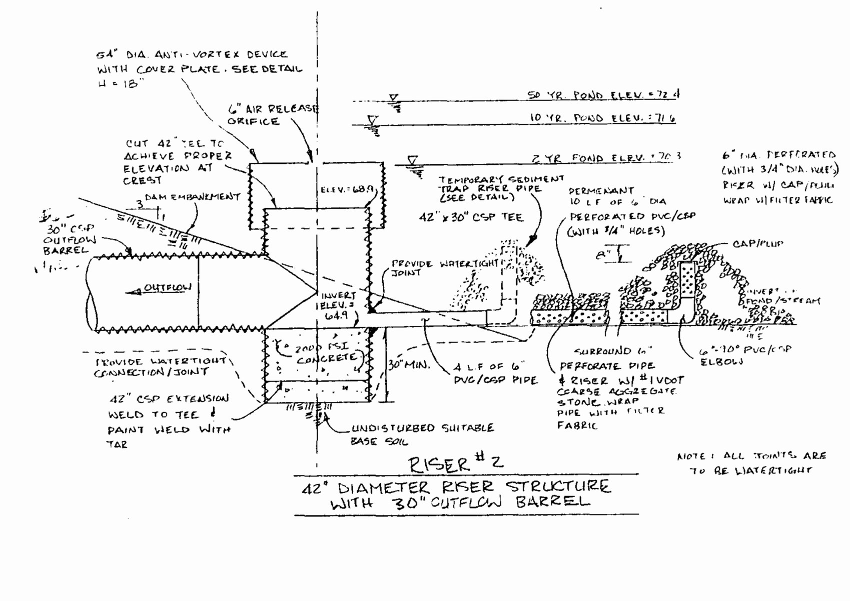
RISER #2 - 42" CSP RISER WITH A 30" BARREL
INVERT = 64.9 FT.
CREST ELEVATION = 68.9 FT.
A 6" DIA. PERFORATED INLET DEVICE SHALL EXTEND FROM THE INVERT OF THE RISER, AND BE FITTED WITH A TEMPORARY SEDIMENT TRAP RISER PIPE DURING CONSTRUCTION.

THE EMERGENCY SPILLWAY FOR THIS DEVICE SHALL BE A GRASS TRAPEZOIDAL WEIR WITH A 20 FT. BOTTOM SLOPE, 10:1 SIDESLOPE WITH A CREST ELEVATION = 72.7 FT. THE TOP OF DAM SHALL BE CONSTRUCTED TO ELEVATION = 73.7 FT.

ALL ASPECTS OF THE CONSTRUCTION FOR THE DAM ITSELF SHALL BE IN ACCORDANCE WITH THE DAM CONSTRUCTION NOTES.

THE DETAILS AS SUBMITTED TO THE COUNTY OF JAMES CITY ARE HEREBY MADE A PART OF THESE CONSTRUCTION DRAWINGS.





NOTES

DAM CONSTRUCTION NOTES

1. SITE PREPARATION: THE CONTRACTOR SHALL STRIP ALL AREAS OF THE PERMANENT CONSTRUCTION AND BORROW PITS TO REMOVE ALL UNSUITABLE MATERIALS. THE UNSUITABLE MATERIALS TO BE REMOVED BY STRIPPING SHALL INCLUDE ALL TOPSOIL, DEBRIS AND VEGETABLE MATTER, INCLUDING STUMPS AND ROOTS, AND ALL OTHER MATERIALS WHICH MAY BE UNSUITABLE FOR USE IN THE PERMANENT CONSTRUCTION.

2. BORROW PITS: BORROW PIT AREAS ARE TO BE LOCATED IN CLOSE PROXIMITY TO THE CONSTRUCTION SITE AND APPROVED BY THE ENGINEER OR HIS REPRESENTATIVE. BORROW PITS SHALL BE SO EXCAVATED THAT WATER WILL NOT COLLECT AND STAND THEREIN. BEFORE BEING ABANDONED, THE SIDES OF BORROW PITS SHALL BE BROUGHT TO STABLE SLOPES WITH SLOPE INTERSECTIONS SHAPED TO CARRY THE NATURAL CONTOUR OF ADJACENT UNDISTURBED TERRAIN INTO THE PIT OR BORROW AREA GIVING A NATURAL APPEARANCE. TOPSOIL STOCKPILES SHALL BE SHAPED TO PROVIDE A NATURAL APPEARANCE.

3. EMBANKMENT: THE FILL MATERIAL SHALL BE TAKEN FROM APPROVED BORROW AREAS. IT SHALL BE CLEAN MINERAL SOIL, FREE OF ROOTS, WOODY VEGETATION, OVERSIZED STONES, ROCKS, OR OTHER OBJECTIONABLE MATERIAL. SOILS WHICH ARE APPROVABLE FOR THE CONSTRUCTION OF THE IMPERVIOUS CLAY CORE, AS DEFINED BY THE UNIFIED SOIL CLASSIFICATION SYSTEM, ARE CH, INORGANIC CLAYS OF HIGH PLASTICITY; CL, INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS; SC, (WITH ENGINEERS APPROVAL) CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES. MATERIALS TO BE PLACED UNDER ROADWAYS SHALL BE THOSE WHICH ARE APPROVABLE BY THE VIRGINIA DEPARTMENT OF TRANSPORTATION FOR THE CONSTRUCTION OF ROADWAY EMBANKMENTS AND SHALL BE MORE PERVIOUS THAN THE IMPERVIOUS CLAY CORE. MATERIALS TO BE USED FOR THE CONSTRUCTION OF THE SHELL SHALL BE SELECT BACKFILL FREE OF STUMPS, ROOTS, ROCKS, TRASH, ETC. AND SHALL BE MORE PERVIOUS THAN THE IMPERVIOUS CLAY CORE. AREAS ON WHICH FILL IS TO BE PLACED SHALL BE SCARIFIED PRIOR TO PLACEMENT OF FILL. THE FILL MATERIAL'S MOISTURE CONTENT SHALL BE +3 TO -2 PERCENTAGE POINTS OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D2216 (I.E. IN GENERAL THE FILL MATERIAL SHOULD CONTAIN SUFFICIENT MOISTURE SO THAT IT CAN BE FORMED INTO A BALL WITHOUT CRUMBLING. IF WATER CAN BE SQUEEZED OUT OF THE BALL, IT IS TOO WET FOR PROPER COMPACTION). FILL MATERIAL WILL BE PLACED IN 6 TO 8-INCH CONTINUOUS LAYERS OVER THE ENTIRE LENGTH OF THE FILL. COMPACTION, AS NOTED ON PLAN, SHALL BE OBTAINED GENERALLY BY USING A SHEEPSFOOT COMPACTOR.
AN INDEPENDENT STATE APPROVED SOIL TESTING LABORATORY SHALL BE RETAINED BY THE CONTRACTOR TO PROVIDE A TESTING PROGRAM TO INSURE THE DAM EMBANKMENT IS BUILT IN ACCORDANCE WITH THE SPECIFICATIONS. THE LABORATORY SHALL, AT A MINIMUM, TEST EVERY LIFT OF FILL. IF THE LIFT EXCEEDS 15,000 SQUARE FEET THEN A TEST SHALL BE PROVIDED, AT A MINIMUM, FOR EACH 15,000 SQUARE FEET OF FILL IN THE LIFT. THESE TESTS SHALL BE PROVIDED TO THE ENGINEER OR HIS REPRESENTATIVE AT AN ONGOING BASIS. AT THE COMPLETION OF THE EMBANKMENT THE SOIL LABORATORY SHALL PROVIDE THE OWNER WITH A LETTER TO CERTIFY THAT SUFFICIENT TESTS HAVE BEEN TAKEN TO INSURE THE CONSTRUCTION IS IN ACCORDANCE WITH SPECIFICATIONS.

4. CUTOFF TRENCH/KEY TRENCH: THE TRENCH SHALL BE EXCAVATED ALONG THE CENTERLINE OF THE DAM. THE MINIMUM DEPTH SHALL BE AS SHOWN ON THE PLANS AND SHALL EXTEND UP BOTH ABUTMENTS TO THE INDICATED ELEVATION. THE MINIMUM BOTTOM WIDTH SHALL BE 6 FEET, BUT WIDE ENOUGH TO PERMIT OPERATION OF COMPACTION EQUIPMENT. THE SIDE SLOPES SHALL BE NO STEEPER THAN 1-1/2:1. COMPACTION REQUIREMENTS SHALL BE THE SAME AS THOSE FOR THE EMBANKMENT. THE TRENCH SHALL BE KEPT DRAINED DURING THE BACKFILLING-COMPACTING OPERATIONS.

5. PRINCIPAL SPILLWAY: ALL JOINTS IN THE PRINCIPAL SPILLWAY RISER STRUCTURE AND BARREL SHALL BE OF WATERTIGHT CONSTRUCTION. THE RISER OF THE PRINCIPAL SPILLWAY SHALL BE SECURELY ATTACHED TO THE BARREL BY A WATERTIGHT CONNECTION. THE BARREL AND RISER SHALL BE PLACED ON A FIRM COMPACTED SOIL FOUNDATION, THE BASE OF THE RISER SHALL BE FIRMLY ANCHORED ACCORDING TO THE DESIGN CRITERIA TO PREVENT ITS FLOATING. PERVIOUS MATERIALS SUCH AS SAND, GRAVEL OR CRUSHED STONE SHALL NOT BE USED AS BACKFILL AROUND THE BARREL OR ANTI-SEEP COLLARS. FILL MATERIAL SHALL BE PLACED AROUND THE PIPE IN 4-INCH LAYERS AND COMPACTED BY HAND AT LEAST TO THE SAME DENSITY AS THE EMBANKMENT. A MINIMUM OF TWO FEET OF FILL SHALL BE HAND-COMPACTED OVER THE BARREL BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT.

6. EMERGENCY SPILLWAY: THE EMERGENCY SPILLWAY SHOULD NOT BE CONSTRUCTED OVER FILL MATERIAL. DESIGN ELEVATIONS, WIDTHS, ENTRANCE AND EXIT CHANNEL SLOPES ARE CRITICAL TO THE SUCCESSFUL OPERATION OF THE SPILLWAY AND SHOULD BE ADHERED TO CLOSELY DURING CONSTRUCTION.

7. VEGETATIVE STABILIZATION: FINAL VEGETATIVE COVER (STABILIZATION) SHALL CONSIST OF TOPSOILING, LIMING, FERTILIZING, SEEDING, AND MULCHING TO ASSURE A FIRM STAND OF GRASS AS SOON AS PRACTICAL. SEDIMENT BASINS AND OTHER TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED ONLY WHEN STABILIZATION IS COMPLETE. FINAL VEGETAL COVER SHALL BE PROVIDED IN ACCORDANCE WITH THE FOLLOWING:

TOPSOIL:	AT LEAST 2" THICKNESS OBTAINED FROM STOCKPILES ON SITE, FREE OF LARGE DEBRIS.
LIME:	4,000#/ACRE (90#/1,000 S.F.)
SEED:	KENTUCKY 31 TALL FESCUE 250#/ACRE (6#/1,000 S.F.)
FERTILIZER:	10/20/10 MIX, 1,000#/ACRE (25#/1,000 S.F.)
MULCH:	STRAW OR HAY (LOCALLY OBTAINED) 4,000#/ACRE (90#/1,000 S.F.)

No.	DATE	REVISION / COMMENT / NOTE	BY
2	..-..-94	REVISED TO INCLUDE ALTERNATE OUTLET DEVICE	S.O.W.
1	10/21/93	REVISED AS PER J.C.C. COMMENTS	SOW

COMMONWEALTH OF VIRGINIA — STEVEN O. WIGLEY — No. 019307 — 8-27-93 — PROFESSIONAL ENGINEER

AES CONSULTING ENGINEERS
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
(804) 253-0040
Fax (804) 220-8994

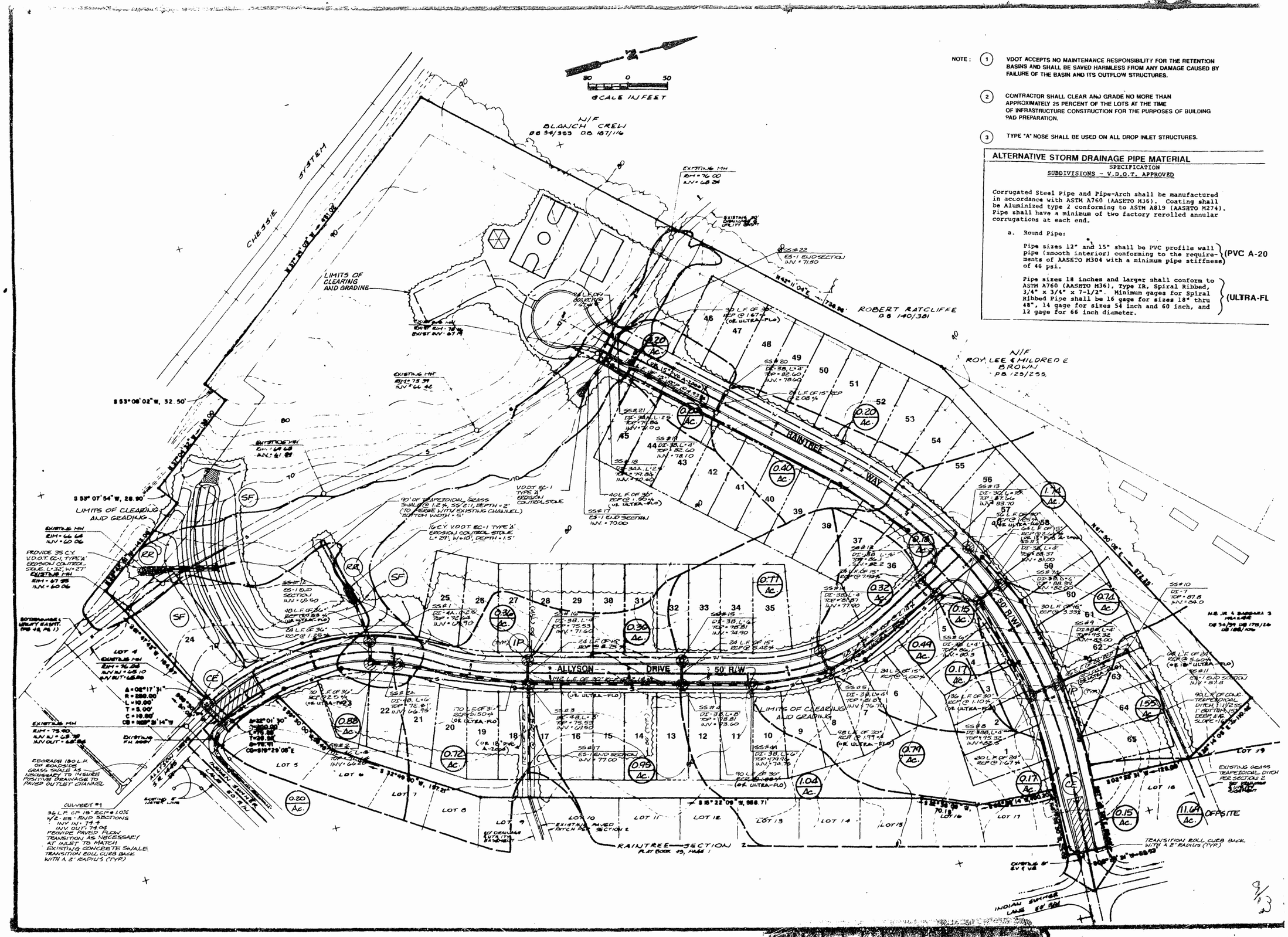
DAM & SPILLWAY DETAILS
RAINTREE VILLAS
OWNER/DEVELOPER: LEONARD M.EPSTEIN
POWHATAN DISTRICT — JAMES CITY COUNTY — VIRGINIA

Designed	Drawn
ELA	RMJ /EAW
Scale	Date
——	6/30/93

Project No. 5919-5

Drawing No. 7

PC125_RAINTREE_VILLAS_PHASE_1_DRY_POND - 007



NOTE:

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2. CONTRACTOR SHALL CLEAR AND GRADE NO MORE THAN APPROXIMATELY 25 PERCENT OF THE LOTS AT THE TIME OF INFRASTRUCTURE CONSTRUCTION FOR THE PURPOSES OF BUILDING PAD PREPARATION.
3. TYPE "A" NOSE SHALL BE USED ON ALL DROP INLET STRUCTURES.

ALTERNATIVE STORM DRAINAGE PIPE MATERIAL

SPECIFICATION

SUBDIVISIONS - V.D.O.T. APPROVED

Corrugated Steel Pipe and Pipe-Arch shall be manufactured in accordance with ASTM A760 (AASETO M36). Coating shall be Aluminized type 2 conforming to ASTM A819 (AASHTO M274). Pipe shall have a minimum of two factory rerolled annular corrugations at each end.

a. Round Pipe:

Pipe sizes 12" and 15" shall be PVC profile wall pipe (smooth interior) conforming to the requirements of AASHTO M304 with a minimum pipe stiffness of 46 psi. (PVC A-20

Pipe sizes 18 inches and larger shall conform to ASTM A760 (AASHTO M36), Type IR, Spiral Ribbed, 3/4" x 3/4" x 7-1/2". Minimum gages for Spiral Ribbed Pipe shall be 16 gage for sizes 18" thru 48", 14 gage for sizes 54 inch and 60 inch, and 12 gage for 66 inch diameter. (ULTRA-FL

RAINTREE VILLAS

1-11-93

BASIN OUTLET STRUCTURE REDESIGN

The following hydrographs for the 100 yr. storm is supplemental information to the calculations delivered to you on 1-10-93. These calculations are ~~upon~~ used to establish the top of dam.

Elevation of 100 yr. Storm

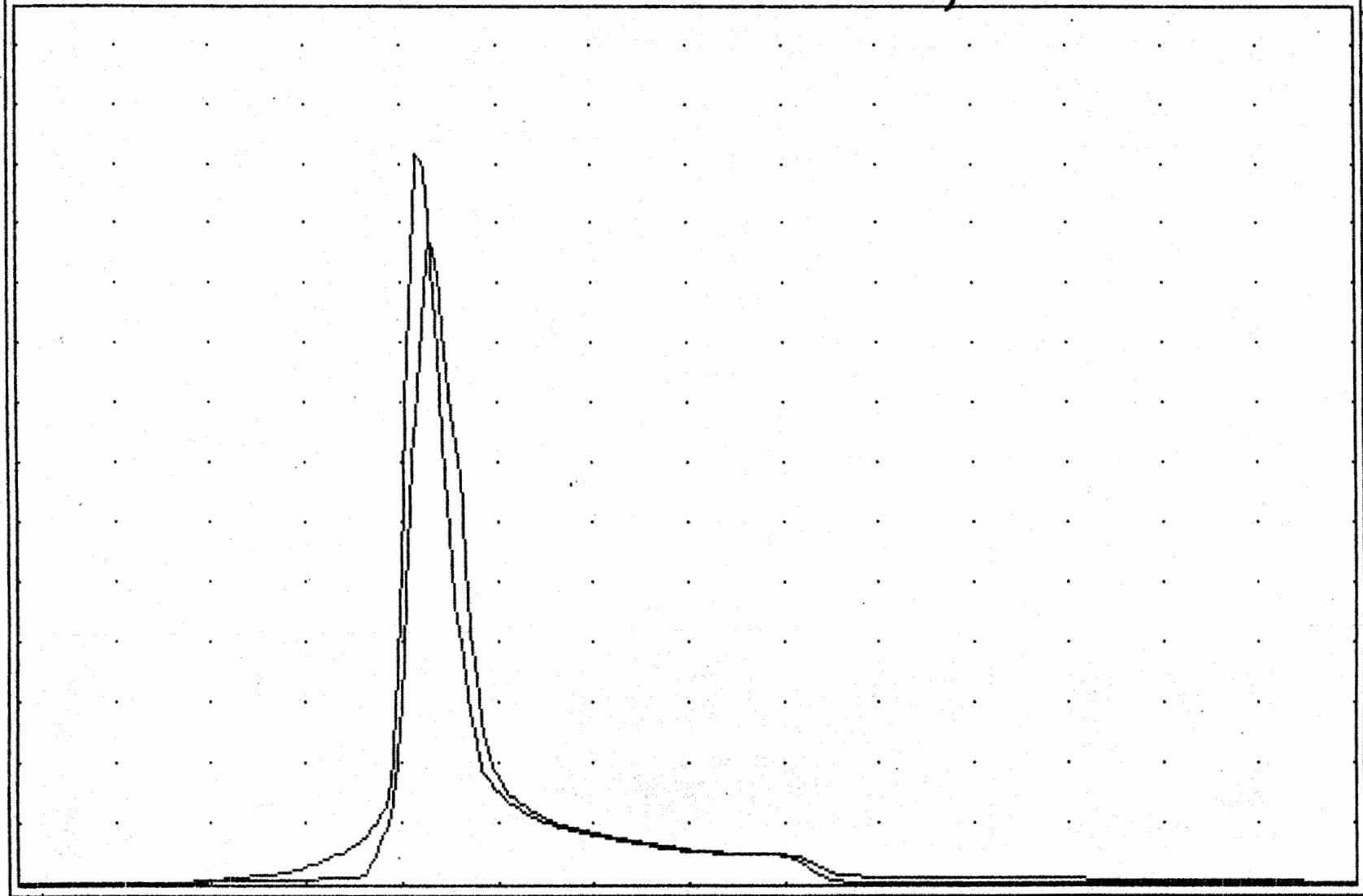
30" barrels	36" barrels	30"&36" Combo
72.94	72.46	72.7

Set top of dam at 73.7. This allows for a 1 foot freeboard above the one hundred year storm event.

Qp = 213.5 RESERVOIR ROUTE 36" BARRELS 100 Yr

RISER # 1 - 42", #2 - 48"

Simulated Risers w/ Emergency Spillway



HGU = 180 min 18 VGU = 20.0 cfs

MAX STORAGE = 317590

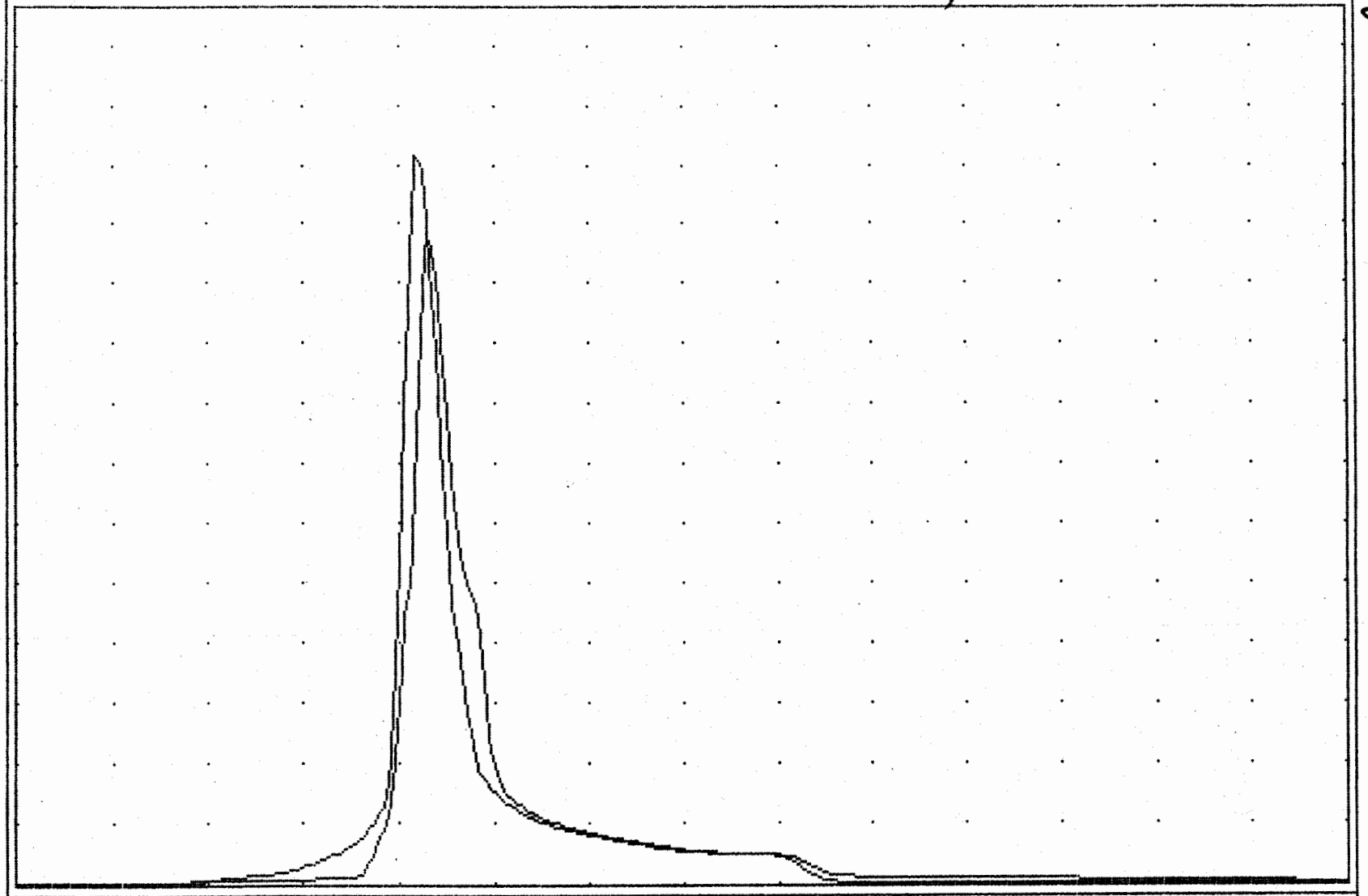
Reservoir #2

MAX ELEVATION = 72.46

Qp = 214.3 RESERVOIR ROUTE 30" BARRELS 100 Yr

RISER #1 - 42", #2 - 48"

Simulated Pond w/ Emergency Spillway

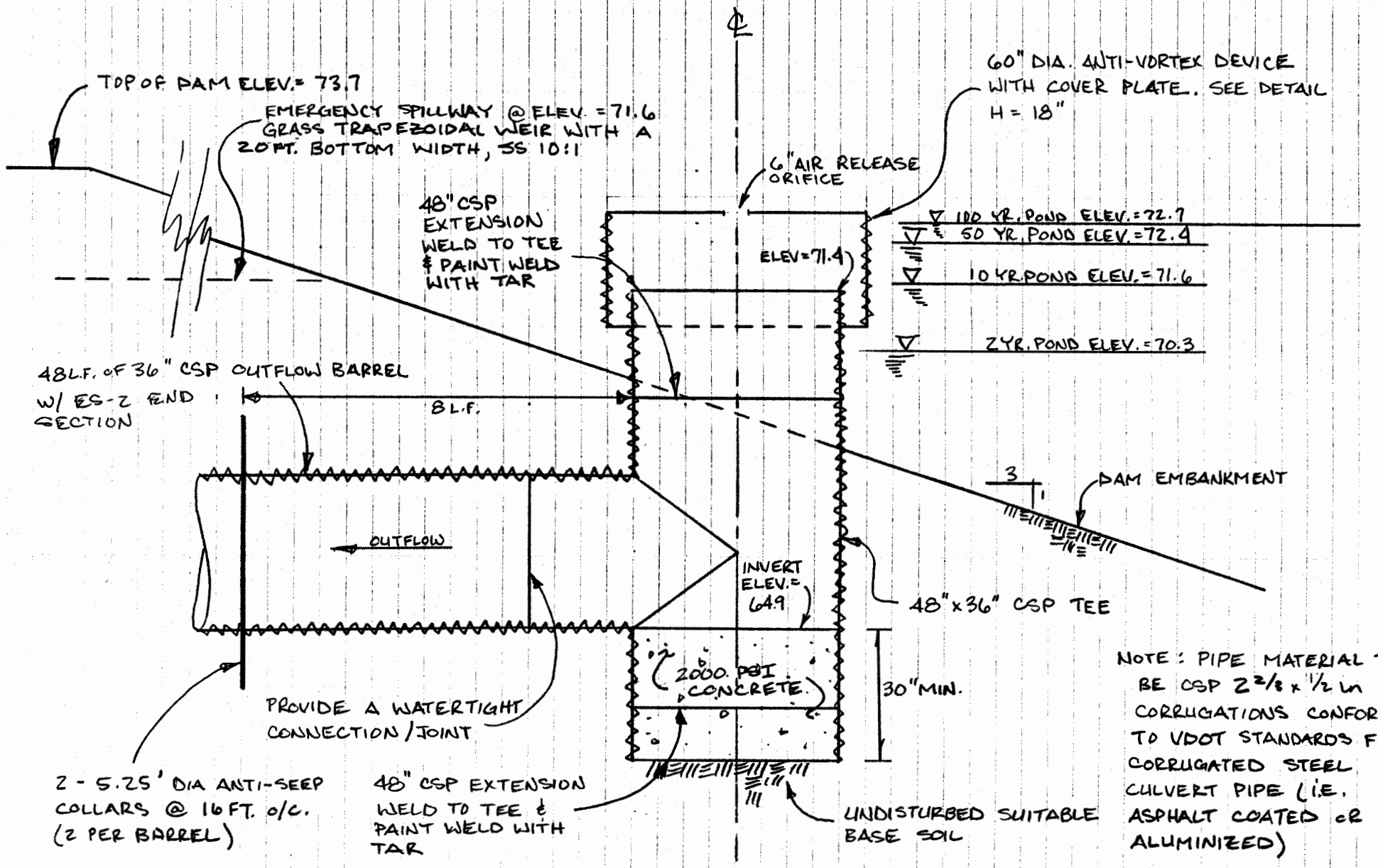


HGU = 180 min 18 VGU = 20.0 cfs

Reservoir #2

MAX STORAGE = 360441

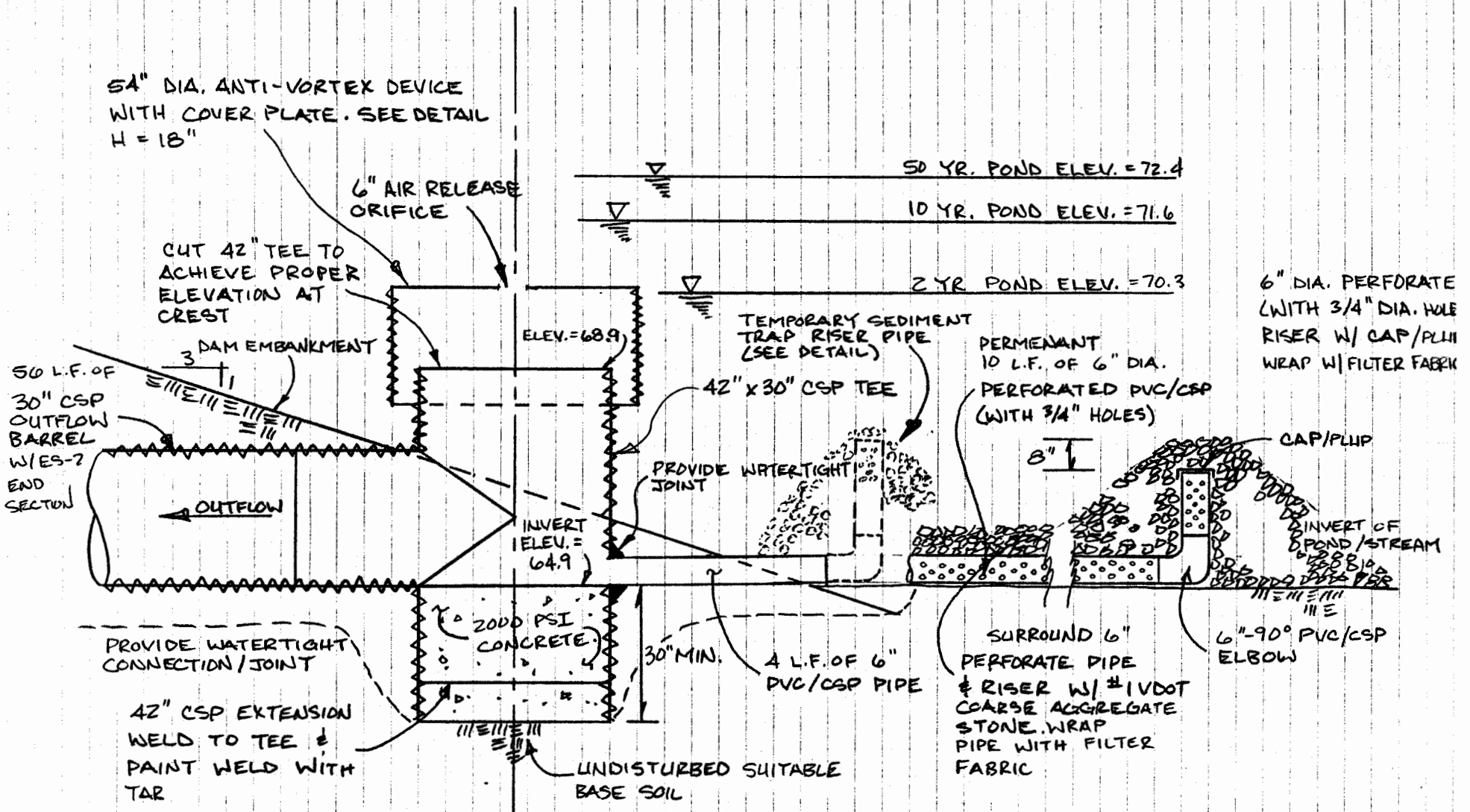
MAX ELEVATION = 72.94



NOTE: PIPE MATERIAL TO BE CSP 2 2/3 x 1/2 in CORRUGATIONS CONFORMIN TO VDOT STANDARDS FOR CORRUGATED STEEL CULVERT PIPE (I.E. ASPHALT COATED OR ALUMINIZED)

RISER #1

48" DIAMETER RISER STRUCTURE
WITH 36" OUTFLOW BARREL

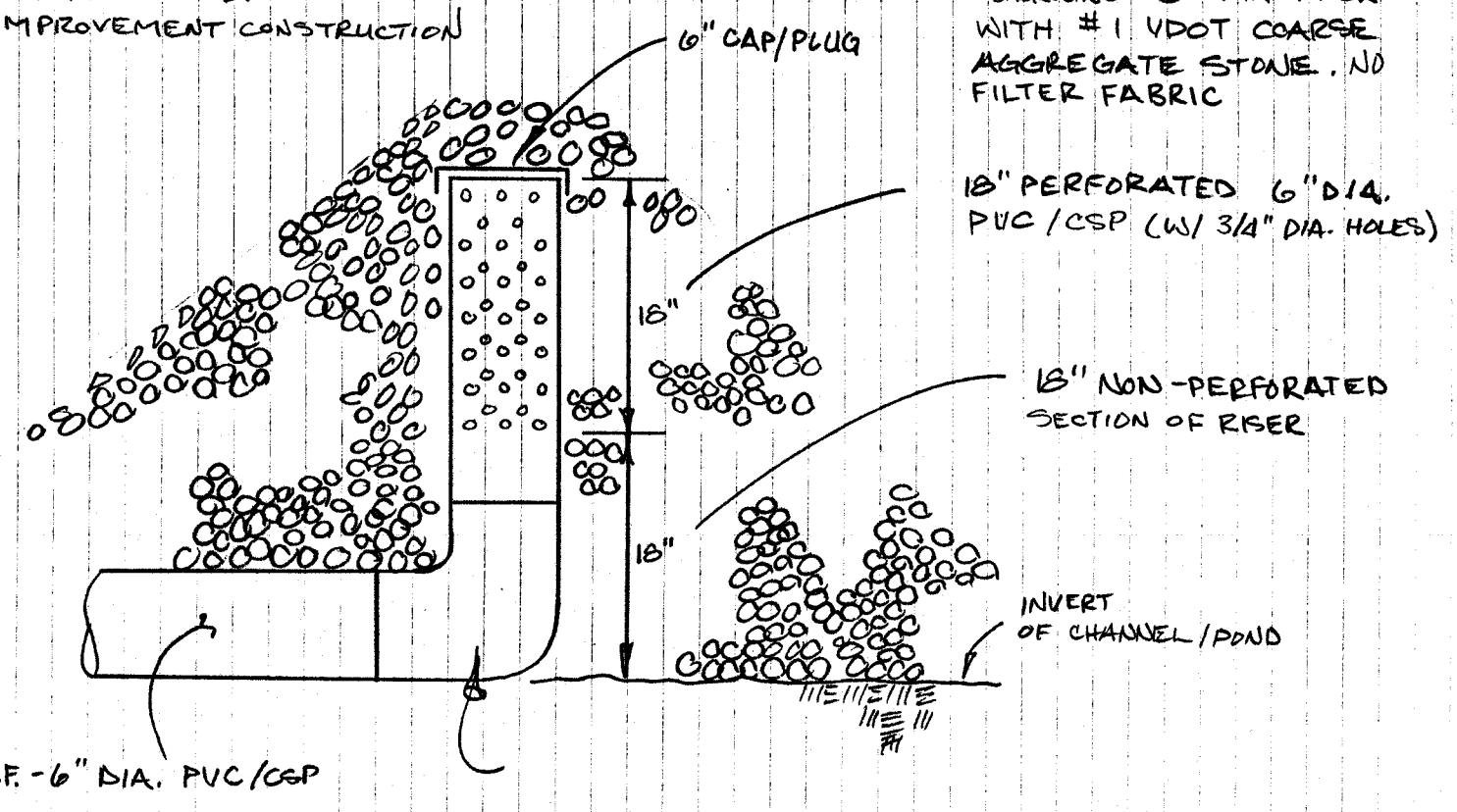


RISER #2

42" DIAMETER RISER STRUCTURE WITH 30" OUTFLOW BARREL

NOTE: ALL JOINTS ARE TO BE WATERTIGHT

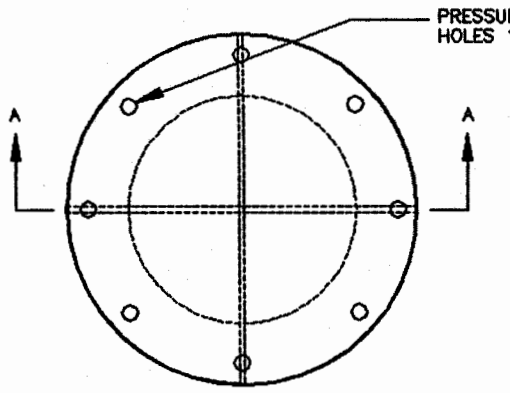
NOTE: TEMPORARY SEDIMENT TRAP RISER STRUCTURE SHALL BE PLACED IN THE BASIN AT BEGINNING OF CONSTRUCTION ACTIVITIES AND REMOVED AND REPLACED WITH PERMANENT DEVICE AT END OF SUBDIVISION IMPROVEMENT CONSTRUCTION



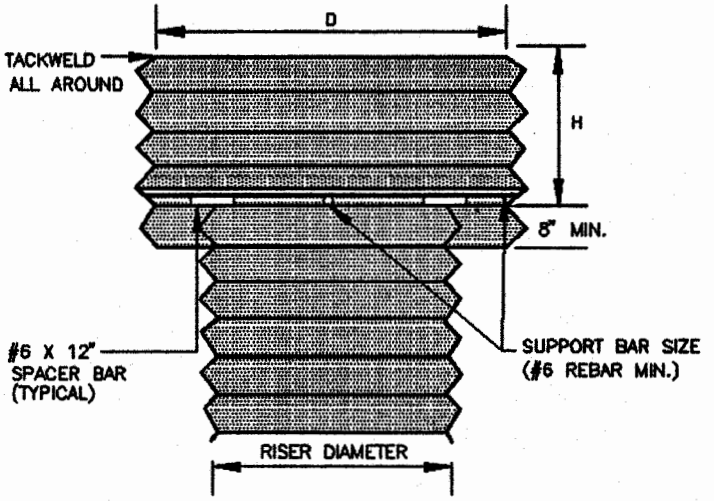
TEMPORARY SEDIMENT TRAP

RISER PIPE DETAIL

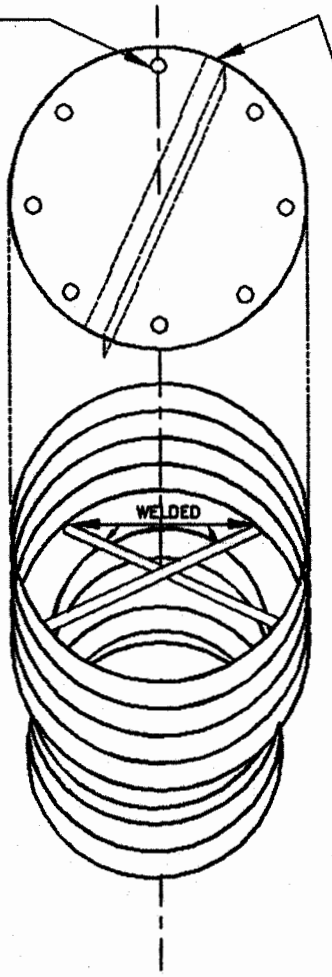
ANTI- VORTEX DEVICE DESIGN



PLAN VIEW



SECTION A–A



ISOMETRIC

TOP STIFFENER (IF REQUIRED) IS___X___X___ ANGLE WELDED TO TOP AND ORIENTED PER-PENDICULAR TO CORRUGATIONS.

TOP IS___ GAGE CORRUGATED METAL OR 1/8" STEEL PLATE. PRESSURE RELIEF HOLES MAY BE OMMITTED, IF ENDS OF CORRUGATIONS ARE LEFT FULLY OPEN WHEN THE TOP IS ATTACHED.

CYLINDER IS____ GAGE CORRUGATED METAL PIPE OR FABRICATED FROM 1/8" STEEL PLATE.

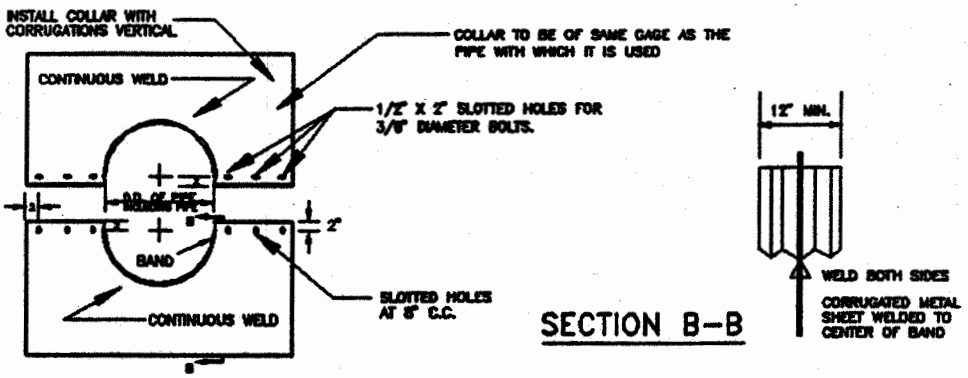
NOTES:

1. THE CYLINDER MUST BE FIRMLY FASTENED TO THE TOP OF THE RISER.
2. SUPPORT BARS ARE WELDED TO THE TOP OF THE RISER OR ATTACHED BY STRAPS BOLTED TO TOP OF RISER.

Source: USDA-SCS

Plate 3.14-10

DETAILS OF CORRUGATED METAL ANTI-SEEP COLLAR



ELEVATION OF UNASSEMBLED COLLAR

SECTION B-B

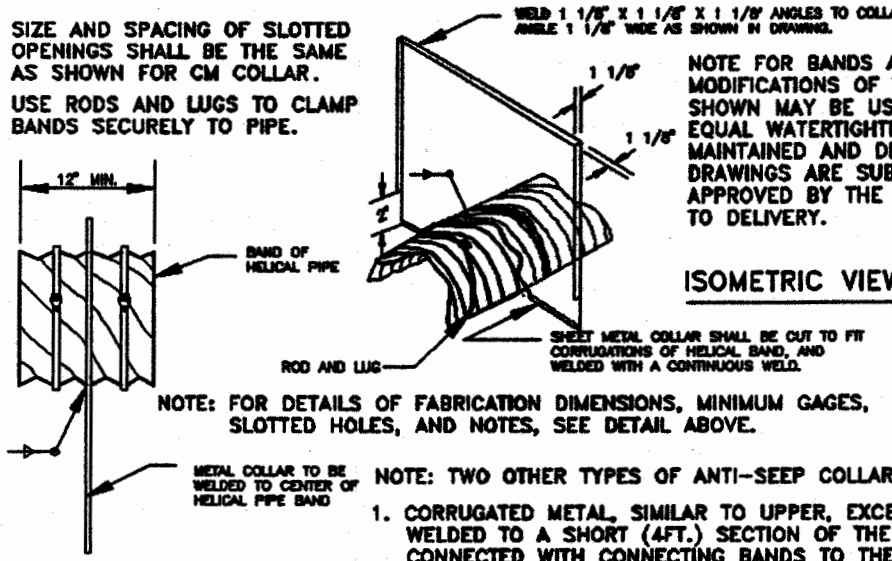
NOTES FOR COLLARS:

1. ALL MATERIALS TO BE IN ACCORDANCE WITH CONSTRUCTION AND CONSTRUCTION MATERIAL SPECIFICATIONS.
2. WHEN SPECIFIED ON THE PLANS, COATING OF COLLARS SHALL BE IN ACCORDANCE WITH CONSTRUCTION AND CONSTRUCTION MATERIAL SPECIFICATIONS.
3. UNASSEMBLED COLLARS SHALL BE MARKED BY PAINTING OR TAGGING TO IDENTIFY MATCHING PAIRS.
4. THE LAP BETWEEN THE TWO HALF SECTIONS AND BETWEEN THE PIPE AND CONNECTING BAND SHALL BE CAULKED WITH ASPHALT MASTIC AT TIME OF INSTALLATION.
5. EACH COLLAR SHALL BE FURNISHED WITH TWO 1/2" DIAMETER RODS WITH STANDARD TANK LUGS FOR CONNECTING COLLARS TO PIPE.

DETAIL OF HELICAL PIPE ANTI-SEEP COLLAR

SIZE AND SPACING OF SLOTTED OPENINGS SHALL BE THE SAME AS SHOWN FOR CM COLLAR.

USE RODS AND LUGS TO CLAMP BANDS SECURELY TO PIPE.



NOTE FOR BANDS AND COLLARS: MODIFICATIONS OF THE DETAILS SHOWN MAY BE USED PROVIDING EQUAL WATERTIGHTNESS IS MAINTAINED AND DETAILED DRAWINGS ARE SUBMITTED AND APPROVED BY THE ENGINEER PRIOR TO DELIVERY.

ISOMETRIC VIEW

NOTE: FOR DETAILS OF FABRICATION DIMENSIONS, MINIMUM GAGES, SLOTTED HOLES, AND NOTES, SEE DETAIL ABOVE.

PARTIAL ELEVATION

REF: ENGR. FIELD MANUAL

NOTE: TWO OTHER TYPES OF ANTI-SEEP COLLARS ARE:

1. CORRUGATED METAL, SIMILAR TO UPPER, EXCEPT SHOP WELDED TO A SHORT (4FT.) SECTION OF THE PIPE AND CONNECTED WITH CONNECTING BANDS TO THE PIPE.
2. CONCRETE, SIX INCHES THICK FORMED AROUND THE PIPE WITH #3 REBAR SPACED 15" HORIZONTALLY AND VERTICALLY.

Source: USDA-SCS

Plate 3.14-13

Darryl Cook

Item	Volume (ft³)	Crest/High Elev. (ft.)	Size (in)	Q Pre (cfs)	Q Post (cfs)	Description
Water Quality	60867	68.4				4" Orifice
Riser no. #1		68.9	36			Weir
2yr.		70.4		56.1	52.5	4" Orif. & 9.4' Weir
Riser no. #2		71.4	48			
10 yr.		71.6		128.3	122.4	4" Orif, 9.4' Weir & 12.6 Weir
Emergency Spillway		71.6				20 ft.
50 yr.		72.25		195.6	192.8	

Per Darryl Cook 1-6-94

try a Riser # 1 42", barrel 30"
Riser # 2 48", barrel 36

CALCULATIONS SHOW: Riser # 1 @ 42" and Riser #2 @ 48"
Barrel #1 @ 30" and Barrel #2 @ 36"

Storm	Max Elev. (ft.)	Q Pre (cfs)	Post (cfs) 36" barrels	30" barrels	Projected 36" & 30" Combo
			ORIGINAL DESIGN		
2yr.	70.28	56.1	70.32 54.5 Elev = 70.28	54.5 Elev. = 70.29	54.5 Elev. = 70.29
10 yr.	71.61 (EMER. SPILLWAY)	128.3	71.09 129.1 Elev. = 71.37	108.5 Elev. = 71.84	RR#1 118.8 Elev. = 71.61
50yr.	72.44	195.6	166.5 Elev. = 72.53	130.3 Elev. = 73.88	→ w/out E&S
	w/ E.S. @ 71.61		188.7 Elev. = 72.2	179.5 Elev. = 72.62	RR#2 184.1 Elev. = 72.41

100 year - 71.94
original design

1/10/94

OK - DEC

Plans to be modified + submitted

Option 1 STAGE / STORAGE TABLE R to reset

1. RESERVOIR No = 1. 2. RESERVOIR NAME = dry pond....

3. S = Ks * Z^b

Ks = 0............ b = 0..........

START ELEV = 0..... INCREMENT = 0...

	STAGE ft	ELEVATION ft	CO AREA sq ft	INC STORAGE cu ft	TOT STORAGE cu ft
4	0.00	65.00.	0.......	0	0
5	1.00	66.00.	5238....	2619	2619
6	3.00	68.00.	36030...	41268	43887
7	5.00	70.00.	58440...	94470	138357
8	7.00	72.00.	79773...	138213	276570
9	9.00	74.00.	98118...	177891	454461
10	0.00	0.00.	0.......	0	0
11	0.00	0.00.	0.......	0	0
12	0.00	0.00.	0.......	0	0
13	0.00	0.00.	0.......	0	0
14	0.00	0.00.	0.......	0	0

Change item number: 0 *DY* to cont

Reservoir No. 1 OUTLET STRUCTURES

CULVERT STRUC A. Q=CoA[2gh/k]^.5	CULVERT STRUC B. Q=CoA[2gh/k]^.5
1. WIDTH (in) = 36.	9. WIDTH (in) = 4..
2. HEIGHT (in) = 36.	10. HEIGHT (in) = 4..
3. No. BARRELS = 2..	11. No. BARRELS = 1..
4. INVERT ELEV. = 65.......	12. INVERT ELEV. = 65.......
5. Co = 0.60	13. Co = 0.60
6. CULVERT LENGTH (ft) = 48..	14. CULVERT LENGTH (ft) = 0...
7. CULVERT SLOPE (%) = .6..	15. CULVERT SLOPE (%) = 0...
8. MANNING'S N-VALUE = .019	16. MANNING'S N-VALUE = .012
	17. MULTI-STAGE OPTION ? (Y/N) Y

WEIR STRUCTURE A. Q=CwLH^EXP	WEIR STRUCTURE B. Q=CwLH^EXP
72"	48"
18. CREST LENGTH (ft) = 11.....	23. CREST LENGTH (ft) = 12.57..
19. CREST ELEVATION = 68.9...	24. CREST ELEVATION = 71.4...
20. Cw = 3.00	25. Cw = 3.00
21. EXP = 1.50	26. EXP = 1.50
22. MULTI-STAGE OPTION ? (Y/N) Y	27. MULTI-STAGE OPTION ? (Y/N) Y

Change item number: 0 *DY* to cont

HYDROLOGIC REPORT

STAGE / STORAGE / DISCHARGE

RESERVOIR NUMBER = 1

RESERVOIR NAME = dry pond.... (* Controlled by Culv Structure A)
STORAGE VALUES WERE INPUT MANUALLY

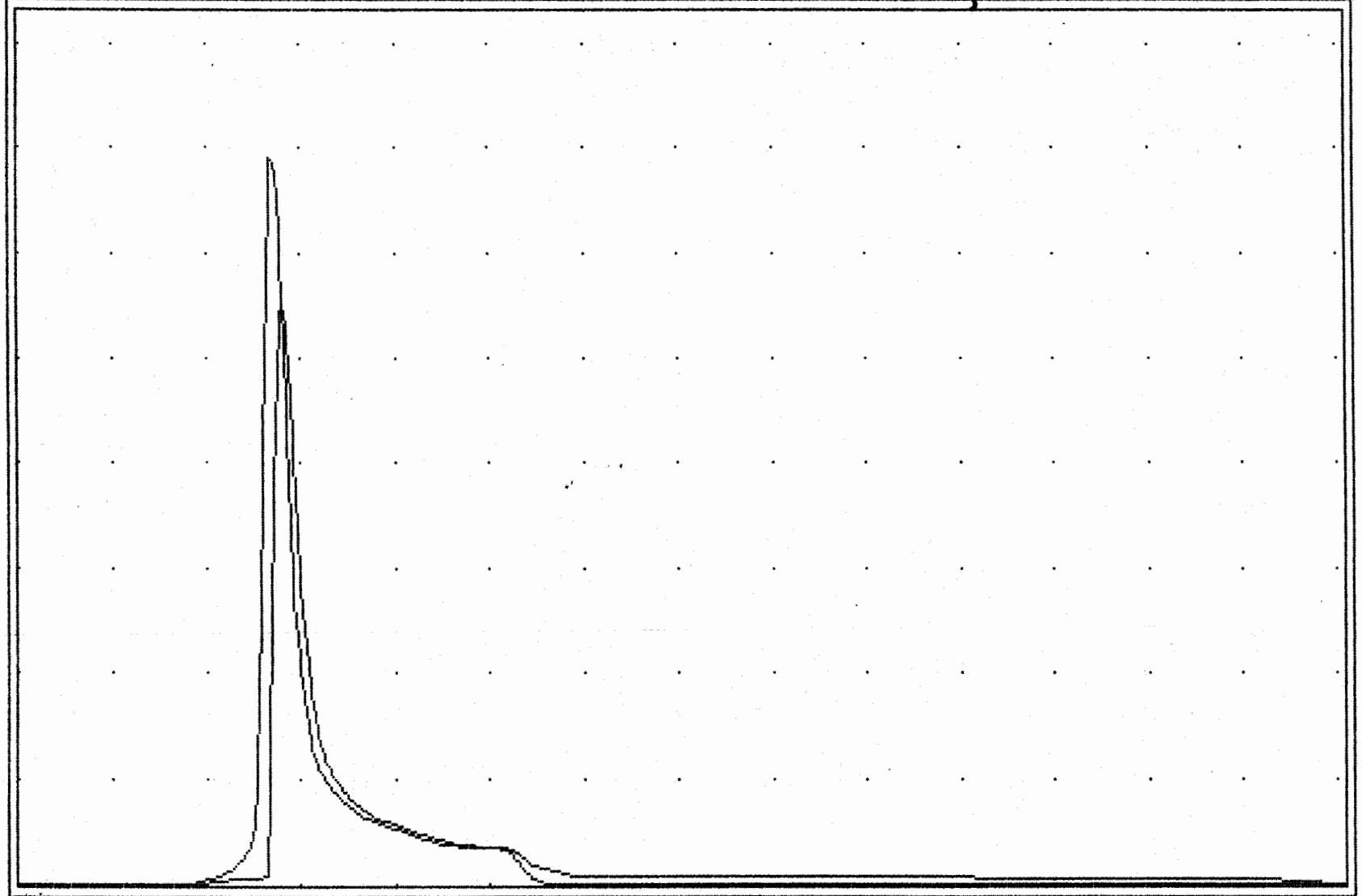
DISCHARGE VALUES: CULVERT STRUCT A. Q = .6 *A*[2gh/k]^.5 * 2
* CULVERT STRUCT B. Q = .6 *A*[2gh/k]^.5 * 1
* WEIR STRUCT A. Q = 3 * 11 * H ^ 1.5
* WEIR STRUCT B. Q = 3 * 12.57 * H ^ 1.5

ELEVATION	DISCHARGE (cfs)			
	CULVERT A	CULVERT B	WEIR A	WEIR B
65.00	0.00	0.00	0.00	0.00
66.00	14.73	0.38	0.00	0.00
68.00	83.36	0.71	0.00	0.00
70.00	127.33	0.75	38.07	0.00
72.00	157.07	0.00	180.12	17.53
74.00	186.39	0.00	380.07	158.09
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00

STAGE	ELEVATION	INC STOR cu ft	TOT STOR cu ft	OUTFLOW cfs
0.00	65.00	0	0	0.00
1.00	66.00	2619	2619	0.38
3.00	68.00	41268	43887	0.71
5.00	70.00	94470	138357	38.82
7.00	72.00	138213	276570	157.07
9.00	74.00	177891	454461	186.39
0.00	0.00	0	0	0.00
0.00	0.00	0	0	0.00
0.00	0.00	0	0	0.00
0.00	0.00	0	0	0.00
0.00	0.00	0	0	0.00

Qp = 54.5 RESERVOIR ROUTE 36" Barrels 2 Yr

Riser #1 - 42", #2 - 48"



HGU = 280 min 16 VGU = 10.0 cfs

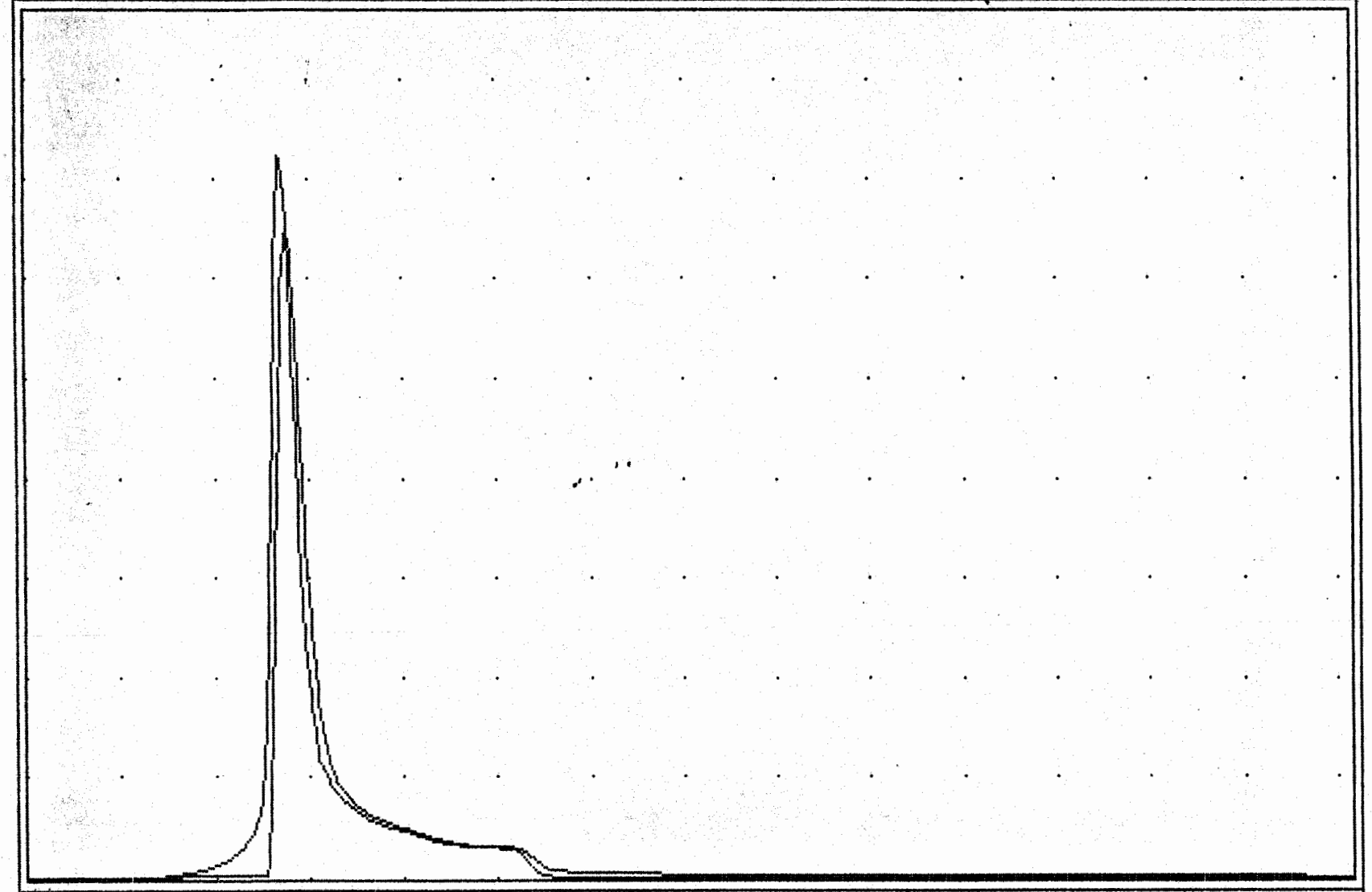
Reservoir #1

MAX STORAGE = 158014

MAX ELEVATION = 70.28

Qp = 129.1 RESERVOIR ROUTE 36" Barrels 10 Yr

Riser #1-42", #2-48"



HGU = 280 min 17 VGU = 20.0 cfs

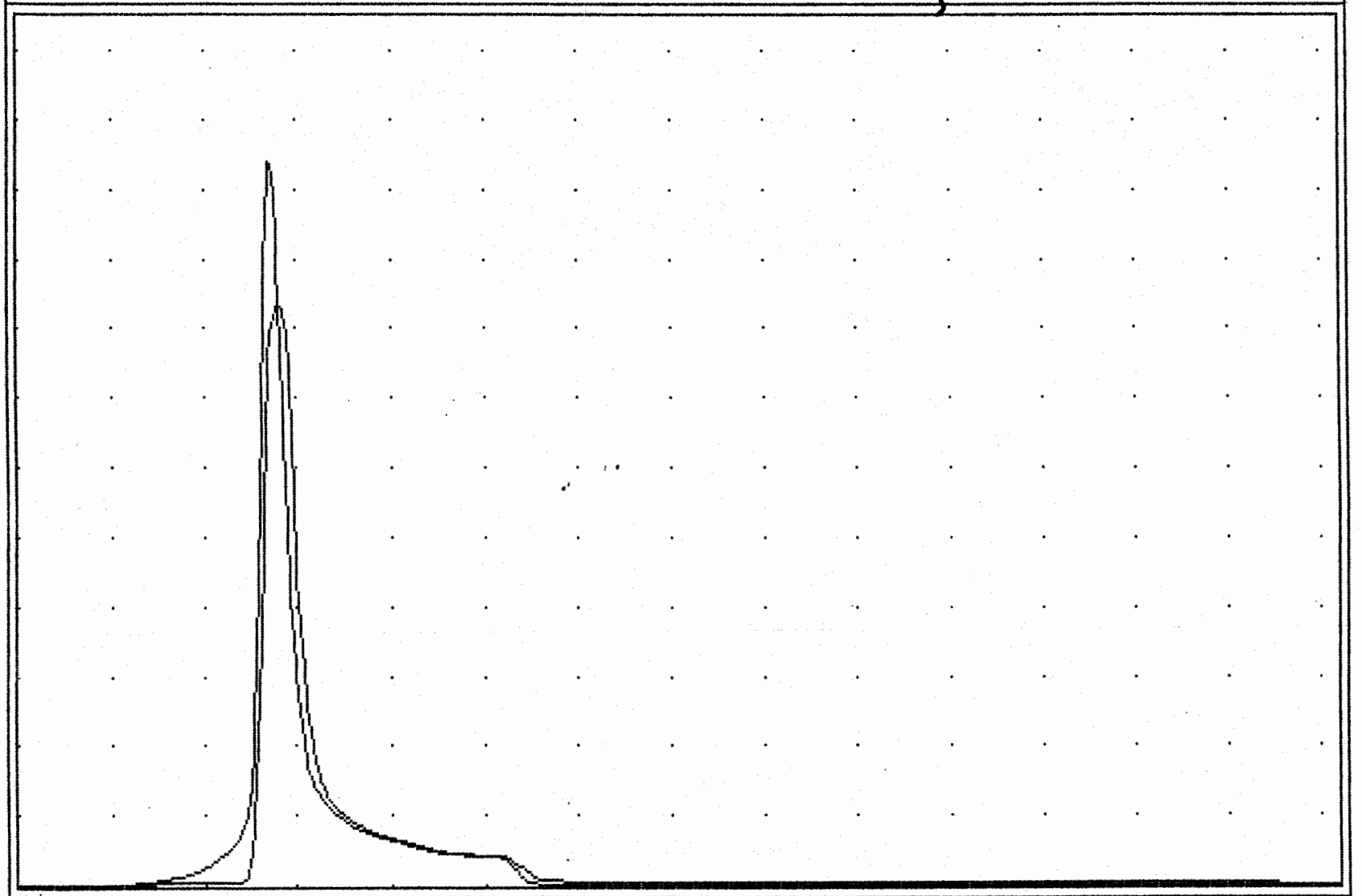
Reservoir #1

MAX STORAGE = 233320

MAX ELEVATION = 71.37

Qp = 166.5 RESERVOIR ROUTE 36" Barrels 50 Yr

Riser #1-42", #2-48"



HGU = 280 min 18 VGU = 20.0 cfs

Reservoir #1

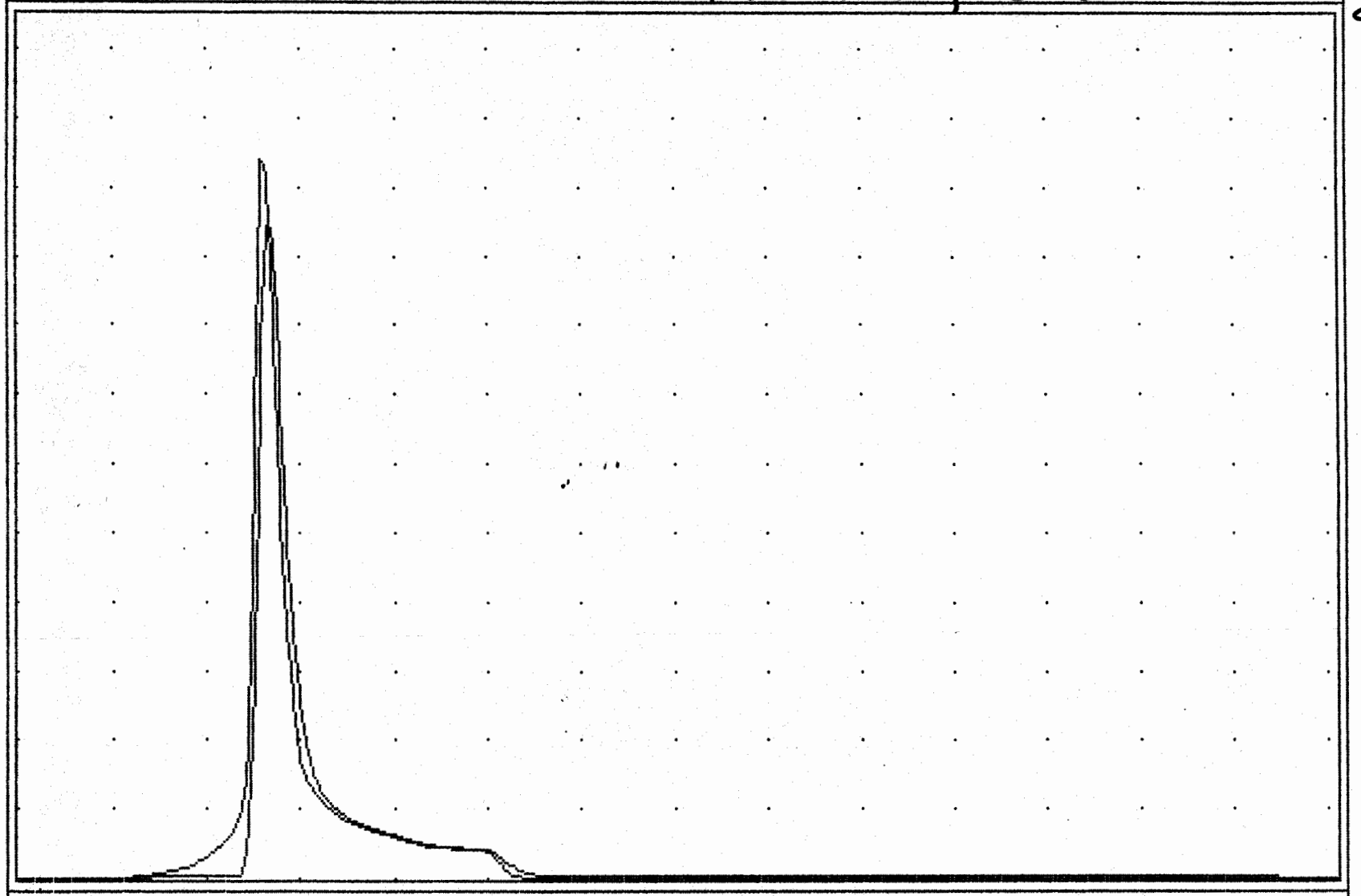
MAX STORAGE = 323683

MAX ELEVATION = 72.53

Qp = 188.7 RESERVOIR ROUTE 36" Barrels 50 Yr

Riser #1 - 42", #2 - 48"

Simulated Risers with Emergency Spillway



HGU = 290 min 18 VGU = 20.0 cfs

Reservoir #2

MAX STORAGE = 294475

MAX ELEVATION = 72.20

Option 1 — STAGE / STORAGE TABLE — R to reset

1. RESERVOIR No = 1.   2. RESERVOIR NAME = dry pond....

3. S = Ks * Z^b

Ks = 0............   b = 0..........

START ELEV = 0.....   INCREMENT = 0...

	STAGE ft	ELEVATION ft	CO AREA sq ft	INC STORAGE cu ft	TOT STORAGE cu ft
4	0.00	65.00.	0.......	0	0
5	1.00	66.00.	5238....	2619	2619
6	3.00	68.00.	36030...	41268	43887
7	5.00	70.00.	58440...	94470	138357
8	7.00	72.00.	79773...	138213	276570
9	9.00	74.00.	98118...	177891	454461
10	0.00	0.00.	0.......	0	0
11	0.00	0.00.	0.......	0	0
12	0.00	0.00.	0.......	0	0
13	0.00	0.00.	0.......	0	0
14	0.00	0.00.	0.......	0	0

Change item number: 0   DY to cont

Reservoir No. 1 — OUTLET STRUCTURES

CULVERT STRUC A. Q=CoA[2gh/k]^.5

1. WIDTH (in) = 30.
2. HEIGHT (in) = 30.
3. No. BARRELS = 2..
4. INVERT ELEV. = 65.......
5. Co = 0.60
6. CULVERT LENGTH (ft) = 48..
7. CULVERT SLOPE (%) = .6..
8. MANNING'S N-VALUE = .019

CULVERT STRUC B. Q=CoA[2gh/k]^.5

9. WIDTH (in) = 4..
10. HEIGHT (in) = 4..
11. No. BARRELS = 1..
12. INVERT ELEV. = 65.......
13. Co = 0.60
14. CULVERT LENGTH (ft) = 0...
15. CULVERT SLOPE (%) = 0...
16. MANNING'S N-VALUE = .012
17. MULTI-STAGE OPTION ? (Y/N) Y

WEIR STRUCTURE A. Q=CwLH^EXP

42

18. CREST LENGTH (ft) = 11.....
19. CREST ELEVATION = 68.9...
20. Cw = 3.00
21. EXP = 1.50
22. MULTI-STAGE OPTION ? (Y/N) Y

WEIR STRUCTURE B. Q=CwLH^EXP

48

23. CREST LENGTH (ft) = 12.57..
24. CREST ELEVATION = 71.4...
25. Cw = 3.00
26. EXP = 1.50
27. MULTI-STAGE OPTION ? (Y/N) Y

Change item number: 0   DY to cont

HYDROLOGIC REPORT

STAGE / STORAGE / DISCHARGE

RESERVOIR NUMBER = 1

RESERVOIR NAME = dry pond.... (* Controlled by Culv Structure A)
STORAGE VALUES WERE INPUT MANUALLY

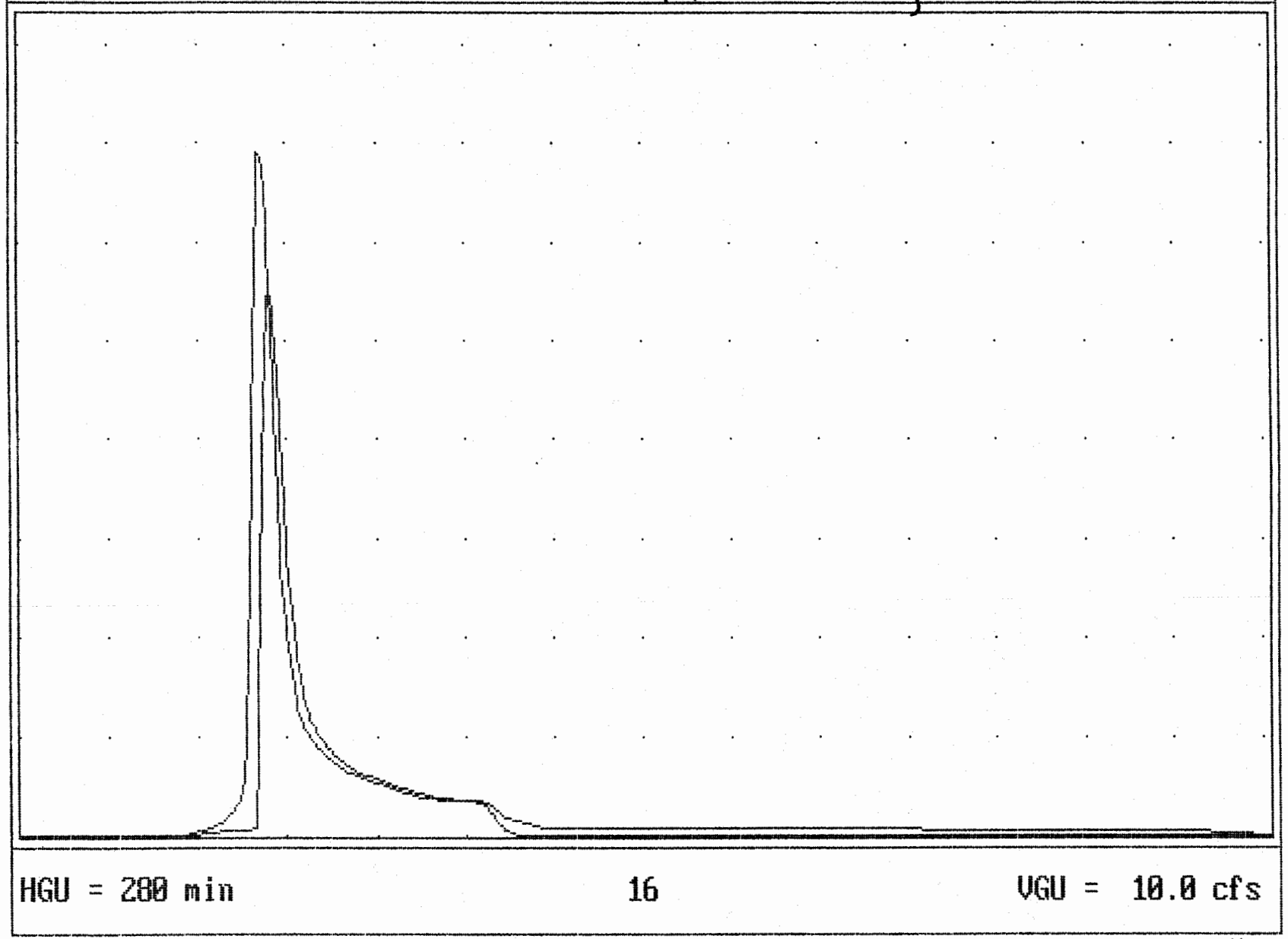
DISCHARGE VALUES: CULVERT STRUCT A. Q = .6 *A*[2gh/k]^.5 * 2
* CULVERT STRUCT B. Q = .6 *A*[2gh/k]^.5 * 1
* WEIR STRUCT A. Q = 3 * 11 * H ^ 1.5
* WEIR STRUCT B. Q = 3 * 12.57 * H ^ 1.5

ELEVATION	DISCHARGE (cfs) CULVERT A	CULVERT B	WEIR A	WEIR B
65.00	0.00	0.00	0.00	0.00
66.00	13.38	0.38	0.00	0.00
68.00	44.78	0.70	0.00	0.00
70.00	84.23	0.67	38.07	0.00
72.00	110.38	0.00	180.12	17.53
74.00	131.43	0.00	380.07	158.09
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00

STAGE	ELEVATION	INC STOR cu ft	TOT STOR cu ft	OUTFLOW cfs
0.00	65.00	0	0	0.00
1.00	66.00	2619	2619	0.38
3.00	68.00	41268	43887	0.70
5.00	70.00	94470	138357	38.74
7.00	72.00	138213	276570	110.38
9.00	74.00	177891	454461	131.43
0.00	0.00	0	0	0.00
0.00	0.00	0	0	0.00
0.00	0.00	0	0	0.00
0.00	0.00	0	0	0.00
0.00	0.00	0	0	0.00

Qp = 54.5 RESERVOIR ROUTE 30" Barrels 2 Yr

Riser #1 - 42", #2 - 48"



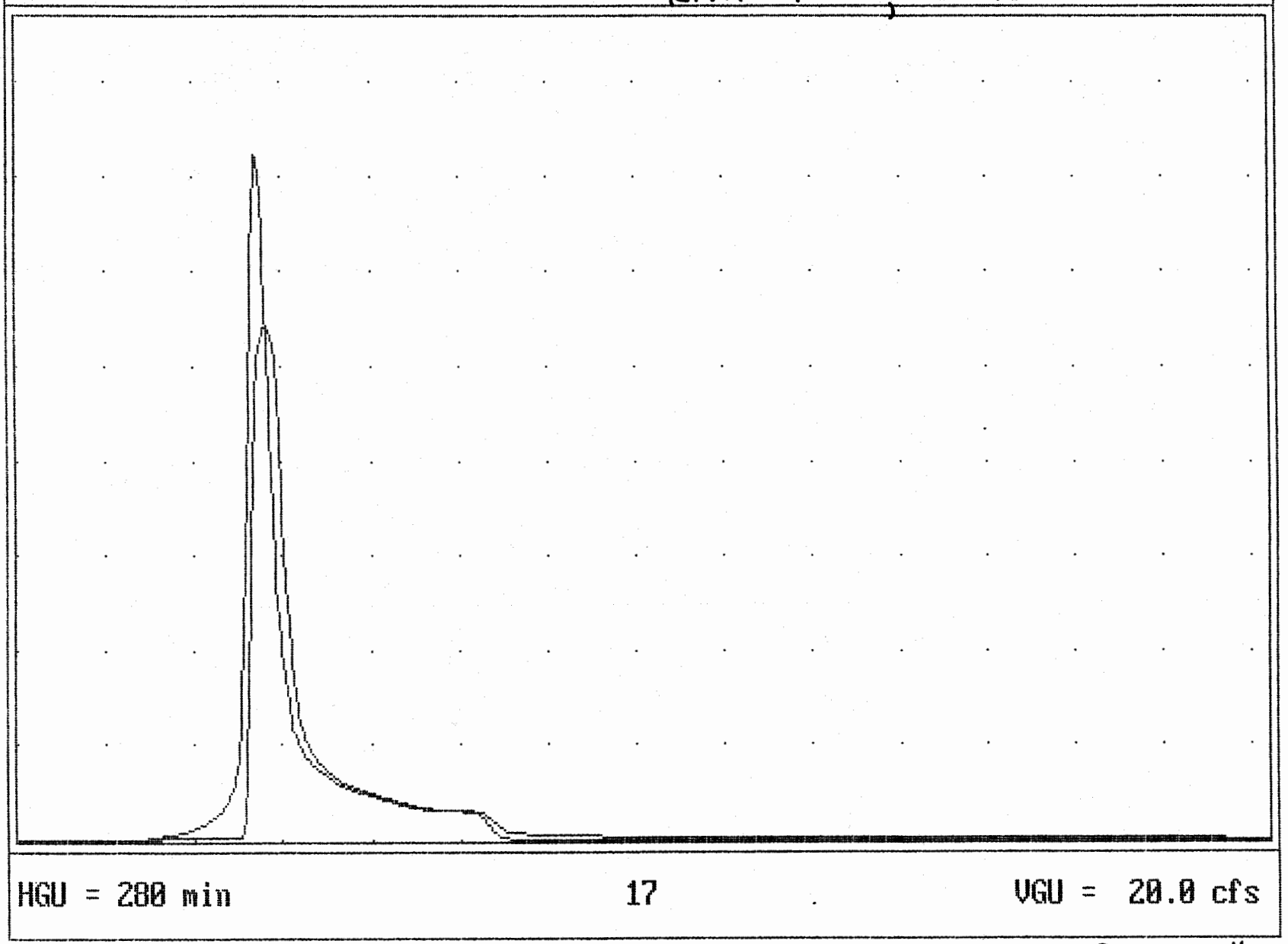
Reservoir #1

MAX STORAGE = 158063

MAX ELEVATION = 70.29

Qp = 108.5 RESERVOIR ROUTE 30" Barrels 10 Yr

Riser #1-42", #2-48"



HGU = 280 min 17 VGU = 20.0 cfs

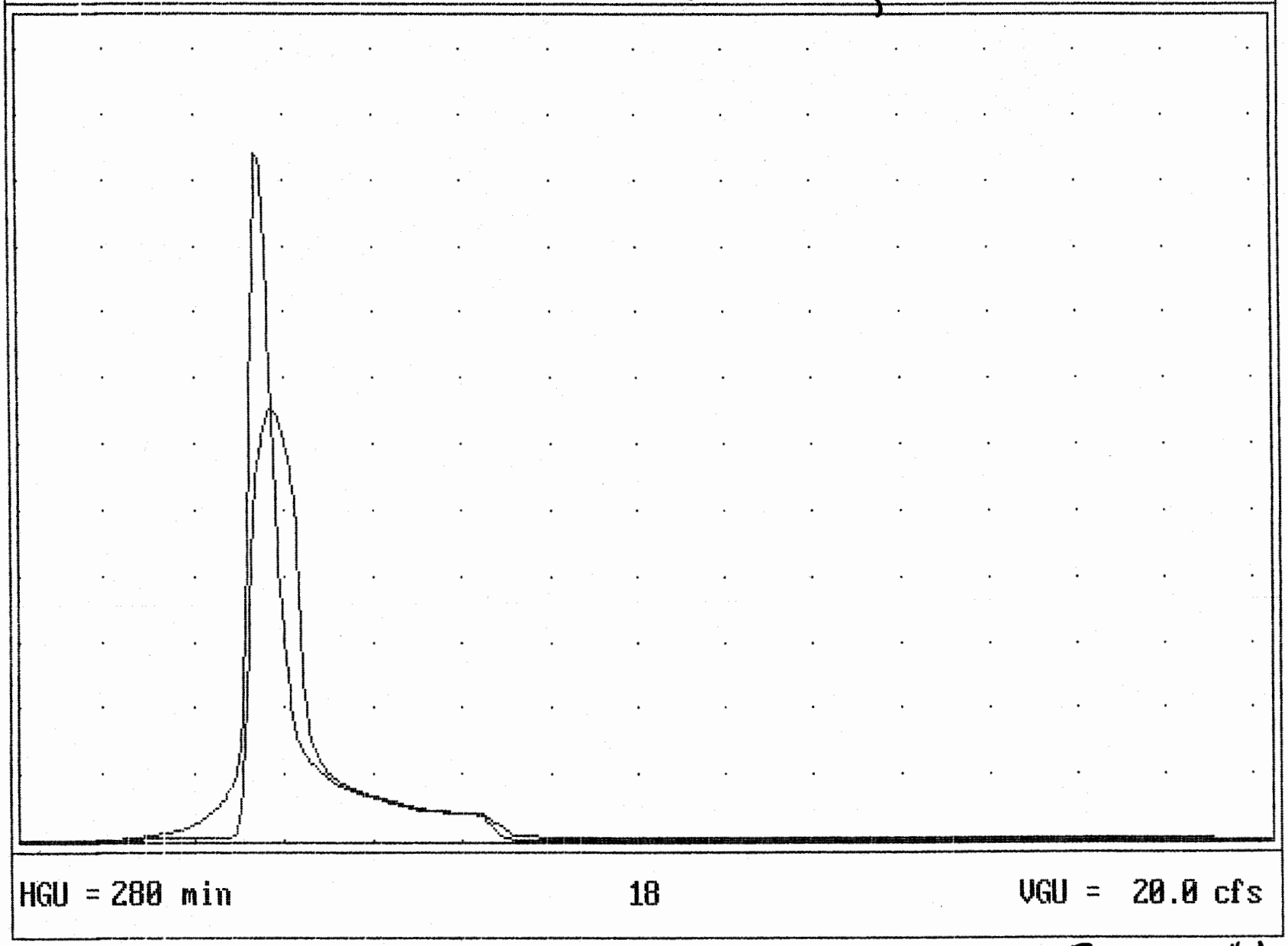
Reservoir #1

MAX STORAGE = 265373

MAX ELEVATION = 71.84

Qp = 130.3 RESERVOIR ROUTE 30" Barrels 50 Yr

Riser #1-42", #2-48"



HGU = 280 min 18 VGU = 20.0 cfs

Reservoir #1

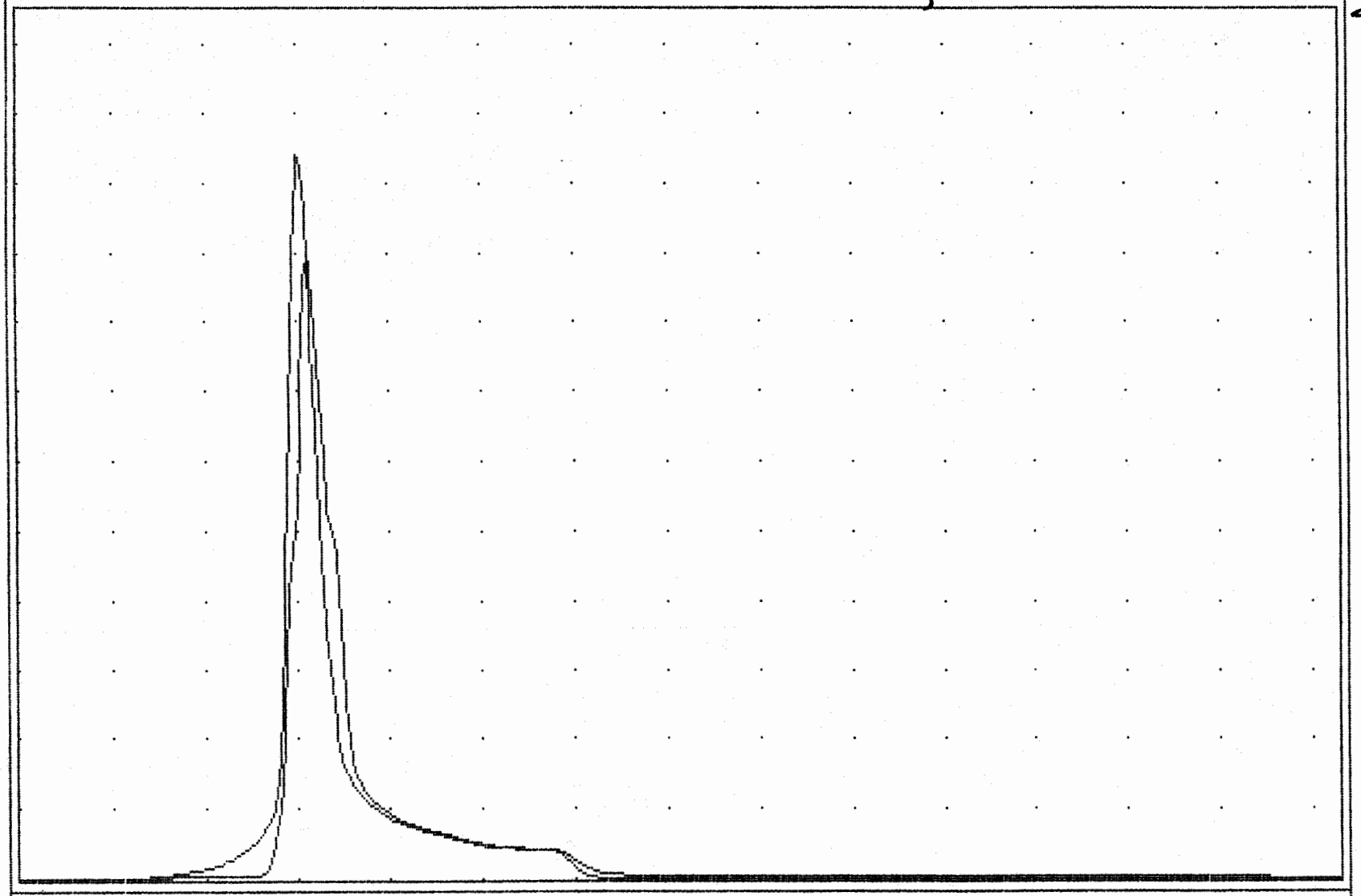
MAX STORAGE = 444141

MAX ELEVATION = 73.88

Qp = 179.5 RESERVOIR ROUTE 30" Barrels 50 Yr

Riser #1 - 42", #2 - 48"

Simulated Risers w/ Emergency Spillway



HGU = 250 min 18 VGU = 20.0 cfs

MAX STORAGE = 331984

Reservoir #2

MAX ELEVATION = 72.62

```
 Option 1                          STAGE / STORAGE TABLE                          R to reset
IMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM;
: 1. RESERVOIR No = 2.     2. RESERVOIR NAME = dry pond....                                    :
: 3. S = Ks * Z^b                                                                              :
:      Ks = 0............     b = 0..........                                                  :
:      START ELEV = 0.....    INCREMENT = 0...                                                 :
:                                                                                              :
:      STAGE      ELEVATION      CO AREA       INC STORAGE      TOT STORAGE                    :
:      ft         ft             sq ft         cu ft            cu ft                          :
:                                                                                              :
:  4    0.00        65.00.      0.......                0                0                       :
:  5    1.00        66.00.      5238....             2619             2619                       :
:  6    3.00        68.00.      36030...            41268            43887                       :
:  7    5.00        70.00.      58440...            94470           138357                       :
:  8    7.00        72.00.      79773...           138213           276570                       :
:  9    9.00        74.00.      98118...           177891           454461                       :
: 10    0.00         0.00.      0.......                0                0                       :
: 11    0.00         0.00.      0.......                0                0                       :
: 12    0.00         0.00.      0.......                0                0                       :
: 13    0.00         0.00.      0.......                0                0                       :
: 14    0.00         0.00.      0.......                0                0                       :
:                                                                                              :
:                                                                                              :
HMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM<
Change item number: 0                                                                    DY to cont
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```
 Reservoir No. 2                        OUTLET STRUCTURES
IMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM;
: CULVERT STRUC  A. Q=CoA[2gh/k]^.5     CULVERT STRUC  B. Q=CoA[2gh/k]^.5                      :
:                                                                                              :
: 1. WIDTH  (in)     = 30.               9. WIDTH  (in)     = 4..                              :
: 2. HEIGHT (in)     = 30.              10. HEIGHT (in)     = 4..                              :
: 3. No. BARRELS     = 2..              11. No. BARRELS     = 1..                              :
: 4. INVERT ELEV.    = 65.......        12. INVERT ELEV.    = 65.......                        :
: 5. Co = 0.60                          13. Co = 0.60                                          :
: 6. CULVERT LENGTH (ft) = 48..         14. CULVERT LENGTH (ft) = 0...                         :
: 7. CULVERT SLOPE (%)   = .6..         15. CULVERT SLOPE (%)   = 0...                         :
: 8. MANNING'S N-VALUE   = .019         16. MANNING'S N-VALUE   = .012                         :
:                                       17. MULTI-STAGE OPTION ? (Y/N) Y                       :
:                                                                                              :
: WEIR STRUCTURE A.       Q=CwLH^EXP    WEIR STRUCTURE B.       Q=CwLH^EXP                   :
:                                                                                              :
: 18. CREST LENGTH (ft)  = 12.5...      23. CREST LENGTH (ft)  = 20.....                       :
: 19. CREST ELEVATION    = 68.5...      24. CREST ELEVATION    = 71.6...                       :
: 20. Cw = 3.00                         25. Cw = 3.00                                          :
: 21. EXP = 1.50                        26. EXP = 1.50                                         :
: 22. MULTI-STAGE OPTION ? (Y/N) Y      27. MULTI-STAGE OPTION ? (Y/N) N                       :
:                                                                                              :
:                                                                                              :
HMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM<
Change item number: 0                                                                    DY to cont
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HYDROLOGIC REPORT

STAGE / STORAGE / DISCHARGE

RESERVOIR NUMBER = 2

RESERVOIR NAME = dry pond.... (* Controlled by Culv Structure A)
STORAGE VALUES WERE INPUT MANUALLY

DISCHARGE VALUES: CULVERT STRUCT A. Q = .6 *A*[2gh/k]^.5 * 2
* CULVERT STRUCT B. Q = .6 *A*[2gh/k]^.5 * 1
* WEIR STRUCT A. Q = 3 * 12.5 * H ^ 1.5
WEIR STRUCT B. Q = 3 * 20 * H ^ 1.5

ELEVATION	DISCHARGE (cfs)			
	CULVERT A	CULVERT B	WEIR A	WEIR B
65.00	0.00	0.00	0.00	0.00
66.00	13.38	0.38	0.00	0.00
68.00	44.78	0.70	0.00	0.00
70.00	84.23	0.52	68.89	0.00
72.00	110.38	0.00	245.55	15.18
74.00	131.43	0.00	483.70	223.08
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00

STAGE	ELEVATION	INC STOR cu ft	TOT STOR cu ft	OUTFLOW cfs
0.00	65.00	0	0	0.00
1.00	66.00	2619	2619	0.38
3.00	68.00	41268	43887	0.70
5.00	70.00	94470	138357	69.41
7.00	72.00	138213	276570	125.56
9.00	74.00	177891	454461	354.52
0.00	0.00	0	0	0.00
0.00	0.00	0	0	0.00
0.00	0.00	0	0	0.00
0.00	0.00	0	0	0.00
0.00	0.00	0	0	0.00

Reservoir No. 2 STAGE / STORAGE / DISCHARGE dry pond

Storage values were input manually
Discharge values: Culvert struct A. Q = .6 * A * [2gh/k]^.5 * 2
Culvert struct B. Q = .6 * A * [2gh/k]^.5 * 1
Weir struct A. Q = 3 * 12.5 * H ^ 1.5
Weir struct B. Q = 3 * 20 * H ^ 1.5

ELEVATION	DISCHARGE (cfs) CULVERT A		CULVERT B		WEIR A	WEIR B	TOTAL
65.00	0.00	-	0.00	-	0.00	0.00	0.00
65.10	0.22	IC	0.00	-	0.00	0.00	0.00
65.20	0.73	IC	0.09	IC	0.00	0.00	0.09
65.30	1.66	IC	0.15	IC	0.00	0.00	0.15
65.40	3.14	IC	0.20	IC	0.00	0.00	0.20
65.50	3.18	OC	0.23	OC	0.00	0.00	0.23
65.60	5.20	OC	0.28	IC	0.00	0.00	0.28
65.70	7.68	OC	0.31	IC	0.00	0.00	0.31
65.80	9.15	IC	0.33	IC	0.00	0.00	0.33
65.90	10.51	OC	0.36	IC	0.00	0.00	0.36
66.00	13.38	IC	0.38	IC	0.00	0.00	0.38

[PgDn] [Esc] to exit

Reservoir No. 2 STAGE / STORAGE / DISCHARGE dry pond....

Storage values were input manually
Discharge values: Culvert struct A. Q = .6 * A * [2gh/k]^.5 * 2
Culvert struct B. Q = .6 * A * [2gh/k]^.5 * 1
Weir struct A. Q = 3 * 12.5 * H ^ 1.5
Weir struct B. Q = 3 * 20 * H ^ 1.5

ELEVATION	DISCHARGE (cfs) CULVERT A		CULVERT B		WEIR A	WEIR B	TOTAL
66.00	13.38	IC	0.38	IC	0.00	0.00	0.38
66.20	13.52	OC	0.43	IC	0.00	0.00	0.43
66.40	16.55	OC	0.47	IC	0.00	0.00	0.47
66.60	19.43	OC	0.50	IC	0.00	0.00	0.50
66.80	21.99	OC	0.54	IC	0.00	0.00	0.54
67.00	25.75	OC	0.57	IC	0.00	0.00	0.57
67.20	26.84	OC	0.60	IC	0.00	0.00	0.60
67.40	27.56	OC	0.63	IC	0.00	0.00	0.63
67.60	31.42	OC	0.65	IC	0.00	0.00	0.65
67.80	38.68	OC	0.68	IC	0.00	0.00	0.68
68.00	44.78	OC	0.70	IC	0.00	0.00	0.70

[PgDn] [Esc] to exit

Reservoir No. 2 STAGE / STORAGE / DISCHARGE dry pond.

Storage values were input manually
Discharge values: Culvert struct A. Q = .6 * A * [2gh/k]^.5 * 2
Culvert struct B. Q = .6 * A * [2gh/k]^.5 * 1
Weir struct A. Q = 3 * 12.5 * H ^ 1.5
Weir struct B. Q = 3 * 20 * H ^ 1.5

ELEVATION	DISCHARGE (cfs) CULVERT A		CULVERT B		WEIR A	WEIR B	TOTAL
68.00	44.78	OC	0.70	IC	0.00	0.00	0.70
68.20	50.14	OC	0.73	IC	0.00	0.00	0.73
68.40	54.98	OC	0.75	IC	0.00	0.00	0.75
68.60	59.43	OC	0.77	IC	1.19	0.00	1.96
68.80	63.57	OC	0.78	IC	6.16	0.00	6.95
69.00	67.46	OC	0.77	IC	13.26	0.00	14.02
69.20	71.13	OC	0.72	IC	21.96	0.00	22.69
69.40	74.62	OC	0.67	IC	32.02	0.00	32.69
69.60	77.96	OC	0.59	IC	43.26	0.00	43.85
69.80	81.15	OC	0.57	IC	55.58	0.00	56.15
70.00	84.23	OC	0.52	IC	68.89	0.00	69.41

[PgDn] [Esc] to exit

Reservoir No. 2 STAGE / STORAGE / DISCHARGE dry pond....

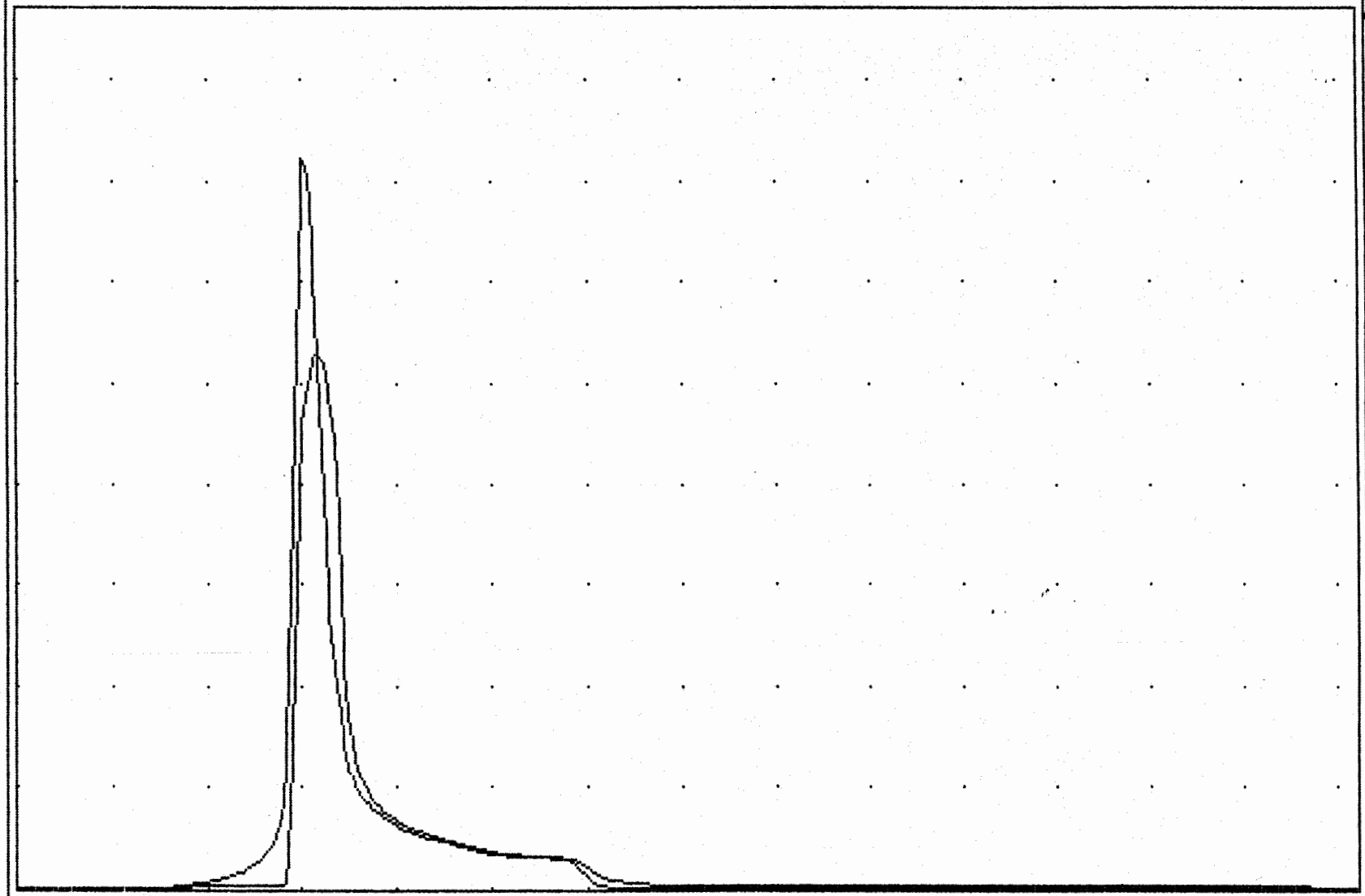
Storage values were input manually
Discharge values: Culvert struct A. Q = .6 * A * [2gh/k]^.5 * 2
Culvert struct B. Q = .6 * A * [2gh/k]^.5 * 1
Weir struct A. Q = 3 * 12.5 * H ^ 1.5
Weir struct B. Q = 3 * 20 * H ^ 1.5

ELEVATION	DISCHARGE (cfs) CULVERT A		CULVERT B		WEIR A	WEIR B	TOTAL
70.00	84.23	OC	0.52	IC	68.89	0.00	69.41
70.20	87.20	OC	0.44	IC	83.12	0.00	83.56
70.40	90.07	OC	0.28	IC	98.21	0.00	90.07
70.60	92.85	OC	0.00	-	114.12	0.00	92.85
70.80	95.56	OC	0.00	-	130.80	0.00	95.56
71.00	98.18	OC	0.00	-	148.23	0.00	98.18
71.20	100.74	OC	0.00	-	166.37	0.00	100.74
71.40	103.24	OC	0.00	-	185.19	0.00	103.24
71.60	105.67	OC	0.00	-	204.68	0.00	105.67
71.80	108.05	OC	0.00	-	224.80	5.37	113.42
72.00	110.38	OC	0.00	-	245.55	15.18	125.56

[PgDn] [Esc] to exit

Qp = 105.7 RESERVOIR ROUTE 30" Barrels 10 Yr

Simulated Risers w/ Emergency Spillway



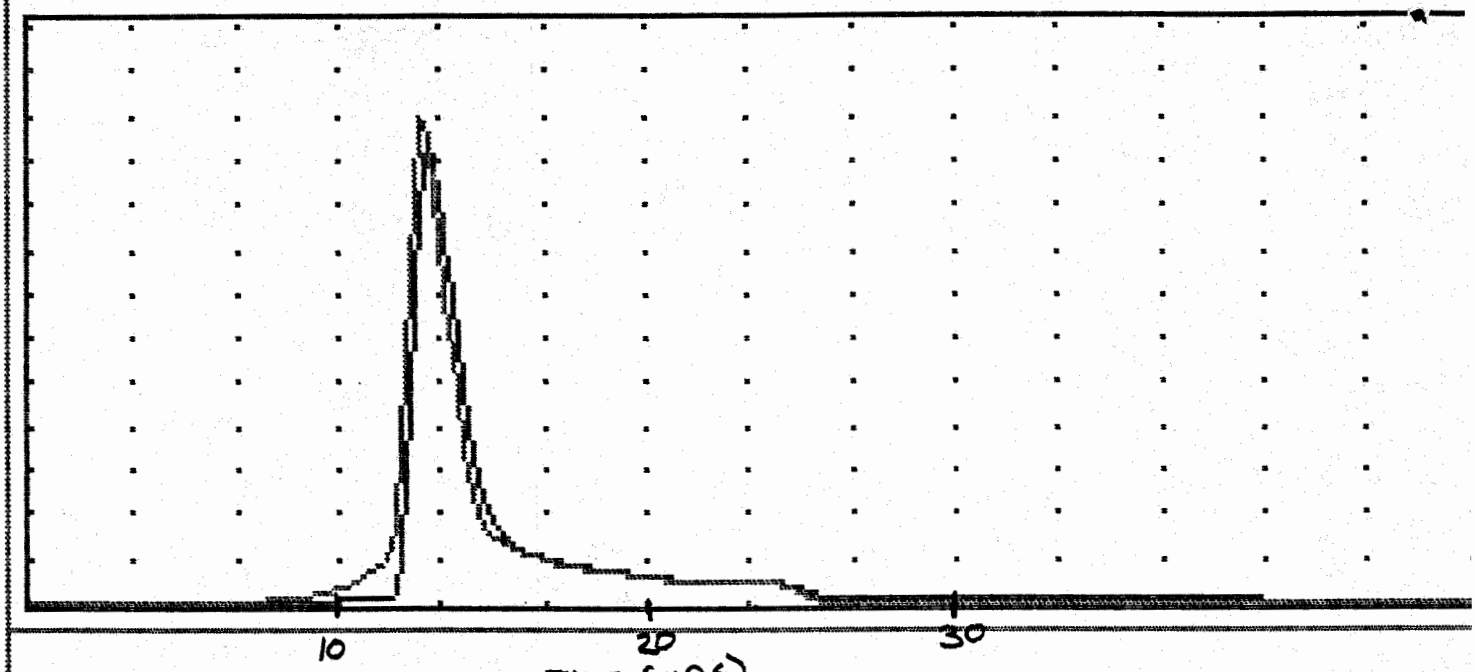
HGU = 250 min 17 VGU = 20.0 cfs

MAX STORAGE = 248888

MAX ELEVATION = 71.60

100 YR STORM ROUTED THROUGH BASIN

Qp = 205.5 RESERVOIR ROUTE 100 Yr



HGU = 200 min 15 VGU = 20.0 cfs

MAX STORAGE = 272086

MAX ELEVATION = 71.94

Item	Volume (ft³)	Crest/High Elev. (ft.)	Size (in)	Q Pre (cfs)	Q Post (cfs)	Description
Water Quality	60867 ✓	68.4 ✓				4" Orifice (6" before)
Riser no.#1		68.9	36			Weir
2yr.		70.4		56.1	52.5	4" Orif. & 9.4' Weir
Riser no.#2		71.4	48			
10 yr.		71.6		128.3	127.4	4" Orif, 9.4' Weir & 12.6
Emergency Spillway		71.6				20 ft.
50 yr.		72.25		195.6	192.8	

No.#1)
68.9 crest
64.6 inv. out
4.3
-1.5
H = 2.8'

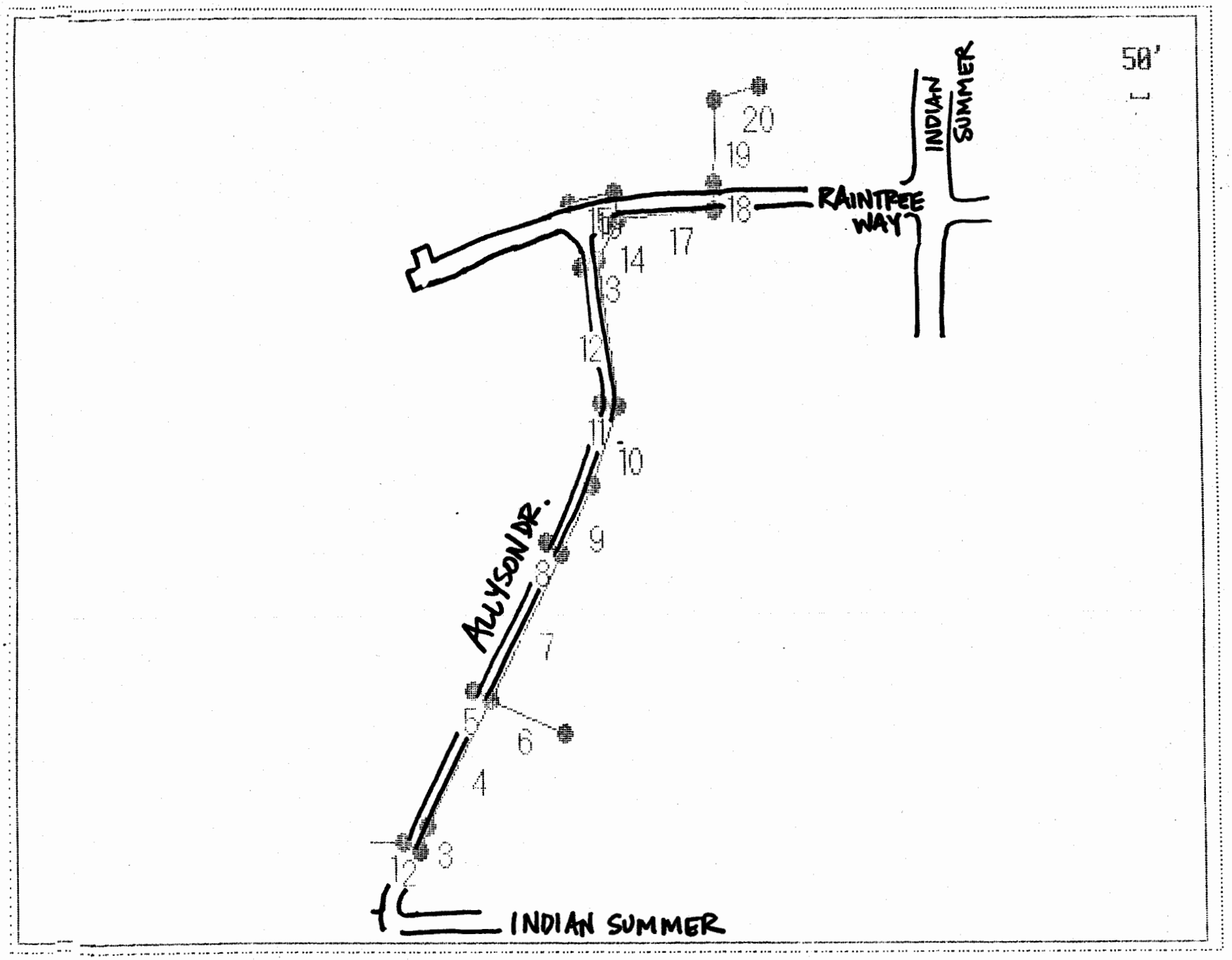
36" Riser –

			Release	Barrel 30	Barrel 36	Try 42"	48" ✓
68.9	–	0 - crest		≈ 32	– 49.9		~~40~~
69.9	–	29 cfs	– weir	37	– 57.7	34	40
70.1	–	36 cfs	– weir/orif	40	≈ 60	54 (1.35)	75 (1.5)
70.9	–	47 cfs	– orif	42	64.5	65	86
71.9	–	58 cfs	– orif	46	70.6	80	

w/o = 1.15 - 36

w/o - 54 cfs 1.35

36 + 30 ←
or 42 + 30 – prefer
or 48 + 36 ←



[← ↑ → ↓] Move [Space] Label's [Home] Reset

[PgUp] Enlarge [PgDn] Reduce [Esc] Exit

HYDRAULIC REPORT FOR

RAINTREE VILLAS

PERFORMANCE EVALUATION

FOR DENSER DEVELOPMENT

prepared by

AES, a professional corp.

Williamsburg, Virginia

Revised January 5, 1994

Job No. 5919-5

Return Period = 10 Yrs
Rainfall file: JCC

Run Date: 08-07-1993
File: a:5919-5R.ST3

LINE 1 / Q = 54.19 / HT = 36 / WID = 36 / N = .014 / L = 48 / JLC = 1.2

SS#1 TO OUT#1A / Outfall (ULTRA-FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	69.00	36.00	65.50	7.67	69.91	0.00	-2.5	7.07
UPSTRM	69.37	36.00	65.90	7.67	70.28	0.00	3.73	7.07

Drainage area (ac) =	0.46	Slope of invert (%) =	0.8333
Runoff coefficient =	0.40	Slope energy grade line (%) =	0.7658
Time of conc (min) =	22.87	Critical depth (in) =	28.15
Inlet time (min) =	5.00	Natural ground elev. (ft) =	72.64
Intensity (in/hr) =	3.91	Upstream surcharge (ft) =	0.47
Cumulative C*A =	13.86	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	54.19	Line capacity (cfs) =	56.53
Q catchment (cfs) =	1.29	Inlet length (ft) =	0.00
Q carryover (cfs) =	65.42	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	66.71	Ponding width (ft) =	N/A

LINE 2 / Q = 53.53 / HT = 36 / WID = 36 / N = .014 / L = 24 / JLC = 1

SS#2 TO SS#1 / DNLN = 1 (ULTRA-FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	70.46	36.00	65.90	7.57	71.35	0.00	3.73	7.07
UPSTRM	70.64	36.00	66.20	7.57	71.53	0.00	3.44	7.07

Drainage area (ac) =	0.88	Slope of invert (%) =	1.2500
Runoff coefficient =	0.40	Slope energy grade line (%) =	0.7473
Time of conc (min) =	22.82	Critical depth (in) =	27.98
Inlet time (min) =	11.00	Natural ground elev. (ft) =	72.64
Intensity (in/hr) =	3.91	Upstream surcharge (ft) =	1.44
Cumulative C*A =	13.68	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	53.53	Line capacity (cfs) =	69.24
Q catchment (cfs) =	1.91	Inlet length (ft) =	0.00
Q carryover (cfs) =	63.52	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	65.42	Ponding width (ft) =	N/A

LINE 3 / Q = 52.23 / HT = 36 / WID = 36 / N = .014 / L = 30 / JLC = 1

SS#2A TO SS#2 / DNLN = 2 (ULTRA-FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	71.53	36.00	66.20	7.39	72.38	0.00	3.44	7.07
UPSTRM	71.75	36.00	66.95	7.39	72.59	0.00	2.86	7.07

Drainage area (ac) =	0.72	Slope of invert (%) =	2.5000
Runoff coefficient =	0.40	Slope energy grade line (%) =	0.7114
Time of conc (min) =	22.75	Critical depth (in) =	27.63
Inlet time (min) =	10.00	Natural ground elev. (ft) =	72.81
Intensity (in/hr) =	3.92	Upstream surcharge (ft) =	1.80
Cumulative C*A =	13.33	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	52.23	Line capacity (cfs) =	97.92
Q catchment (cfs) =	1.62	Inlet length (ft) =	0.00
Q carryover (cfs) =	61.90	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	63.52	Ponding width (ft) =	N/A

LINE 4 / Q = 51.54 / HT = 36 / WID = 36 / N = .014 / L = 170 / JLC = 1

SS#3 TO SS#2A.. / DNLN = 3 (ULTRA-FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	72.59	36.00	66.95	7.29	73.42	0.00	2.86	7.07
UPSTRM	73.77	36.00	69.50	7.29	74.60	0.00	3.02	7.07

Drainage area (ac) =	0.95	Slope of invert (%) =	1.5000
Runoff coefficient =	0.37	Slope energy grade line (%) =	0.6928
Time of conc (min) =	22.36	Critical depth (in) =	27.45
Inlet time (min) =	11.00	Natural ground elev. (ft) =	75.53
Intensity (in/hr) =	3.95	Upstream surcharge (ft) =	1.27
Cumulative C*A =	13.04	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	51.54	Line capacity (cfs) =	75.85
Q catchment (cfs) =	1.90	Inlet length (ft) =	0.00
Q carryover (cfs) =	59.99	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	61.90	Ponding width (ft) =	N/A

LINE 5 / Q = 0.84 / HT = 12 / WID = 12 / N = .011 / L = 24 / JLC = 1.2

SS#16 TO SS#3.... / DNLN = 4 (PVC A-2000)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	74.60	12.00	69.50	1.07	74.62	0.00	5.02	0.79
UPSTRM	74.63	12.00	71.60	1.07	74.65	0.00	2.93	0.79

Drainage area (ac) =	0.30	Slope of invert (%) =	8.7500
Runoff coefficient =	0.40	Slope energy grade line (%) =	0.1282
Time of conc (min) =	5.00	Critical depth (in) =	4.66
Inlet time (min) =	5.00	Natural ground elev. (ft) =	75.53
Intensity (in/hr) =	6.99	Upstream surcharge (ft) =	2.03
Cumulative C*A =	0.12	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	0.84	Line capacity (cfs) =	12.45
Q catchment (cfs) =	0.84	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.00	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	0.84	Ponding width (ft) =	N/A

LINE 6 / Q = 18.45 / HT = 18 / WID = 18 / N = .011 / L = 112 / JLC = .9

IN#17 TO SS#3 / DNLN = 4 (PVC A-2000)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	74.60	18.00	69.50	10.44	76.29	0.00	4.52	1.77
UPSTRM	80.01	17.62	77.00	10.49	81.72	5.17	-1.5	1.76

Drainage area (ac) =	11.05	Slope of invert (%) =	6.6964
Runoff coefficient =	0.40	Slope energy grade line (%) =	4.8448
Time of conc (min) =	20.00	Critical depth (in) =	17.62
Inlet time (min) =	20.00	Natural ground elev. (ft) =	77.00
Intensity (in/hr) =	4.17	Upstream surcharge (ft) =	1.51
Cumulative C*A =	4.42	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	18.45	Line capacity (cfs) =	32.12
Q catchment (cfs) =	18.45	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.00	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	18.45	Ponding width (ft) =	N/A

LINE 7 / Q = 32.54 / HT = 30 / WID = 30 / N = .014 / L = 192 / JLC = 1.2

SS#4 TO SS#3..... / DNLN = 4 (ULTRA-FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	74.60	30.00	69.50	6.63	75.28	0.00	3.52	4.91
UPSTRM	75.83	26.77	73.60	7.04	76.60	18.59	2.7	4.62

Drainage area (ac) =	1.04	Slope of invert (%) =	2.1354
Runoff coefficient =	0.41	Slope energy grade line (%) =	0.6869
Time of conc (min) =	21.89	Critical depth (in) =	22.87
Inlet time (min) =	11.00	Natural ground elev. (ft) =	78.81
Intensity (in/hr) =	3.99	Upstream surcharge (ft) =	0.00
Cumulative C*A =	8.15	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	32.54	Line capacity (cfs) =	55.65
Q catchment (cfs) =	2.31	Inlet length (ft) =	0.00
Q carryover (cfs) =	38.40	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	40.71	Ponding width (ft) =	N/A

LINE 8 / Q = 2.21 / HT = 12 / WID = 12 / N = .011 / L = 24 / JLC = .9

SS#15 TO SS#4 / DNLN = 7 (PVC A-2000)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	76.75	12.00	73.60	2.81	76.88	0.00	4.2	0.79
UPSTRM	76.93	12.00	74.90	2.81	77.05	0.00	2.9	0.79

Drainage area (ac) =	0.77	Slope of invert (%) =	5.4167
Runoff coefficient =	0.41	Slope energy grade line (%) =	0.7343
Time of conc (min) =	5.00	Critical depth (in) =	7.56
Inlet time (min) =	5.00	Natural ground elev. (ft) =	78.81
Intensity (in/hr) =	6.99	Upstream surcharge (ft) =	1.03
Cumulative C*A =	0.32	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	2.21	Line capacity (cfs) =	9.80
Q catchment (cfs) =	2.21	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.00	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	2.21	Ponding width (ft) =	N/A

LINE 9 / Q = 29.74 / HT = 30 / WID = 30 / N = .014 / L = 90 / JLC = 1

SS#4A TO SS#4 / DNLN = 7 (ULTRA-FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	76.75	30.00	73.60	6.06	77.32	0.00	2.7	4.91
UPSTRM	77.25	29.95	74.75	6.06	77.82	2.56	2.7	4.91

Drainage area (ac) =	0.79	Slope of invert (%) =	1.2778
Runoff coefficient =	0.41	Slope energy grade line (%) =	0.5462
Time of conc (min) =	21.65	Critical depth (in) =	21.87
Inlet time (min) =	5.00	Natural ground elev. (ft) =	79.96
Intensity (in/hr) =	4.02	Upstream surcharge (ft) =	0.00
Cumulative C*A =	7.40	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	29.74	Line capacity (cfs) =	43.05
Q catchment (cfs) =	2.26	Inlet length (ft) =	0.00
Q carryover (cfs) =	33.93	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	36.19	Ponding width (ft) =	N/A

LINE 10 / Q = 28.60 / HT = 30 / WID = 30 / N = .014 / L = 98 / JLC = 1.2

SS#5 TO SS#4A / DNLN = 9 (ULTRA-FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	77.82	30.00	74.75	5.83	78.34	0.00	2.7	4.91
UPSTRM	78.49	21.44	76.70	7.62	79.39	27.09	2.67	3.75

Drainage area (ac) =	0.49	Slope of invert (%) =	1.9898
Runoff coefficient =	0.41	Slope energy grade line (%) =	1.0664
Time of conc (min) =	21.40	Critical depth (in) =	21.44
Inlet time (min) =	5.00	Natural ground elev. (ft) =	81.87
Intensity (in/hr) =	4.04	Upstream surcharge (ft) =	0.00
Cumulative C*A =	7.08	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	28.60	Line capacity (cfs) =	53.72
Q catchment (cfs) =	1.40	Inlet length (ft) =	0.00
Q carryover (cfs) =	32.52	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	33.93	Ponding width (ft) =	N/A

LINE 11 / Q = 0.92 / HT = 12 / WID = 12 / N = .011 / L = 24 / JLC = .9

SS#14 TO SS#5 / DNLN = 10 (PVC A-2000)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	79.57	12.00	76.70	1.17	79.59	0.00	4.17	0.79
UPSTRM	79.60	12.00	77.90	1.17	79.62	0.00	2.97	0.79

Drainage area (ac) =	0.32	Slope of invert (%) =	5.0000
Runoff coefficient =	0.41	Slope energy grade line (%) =	0.1268
Time of conc (min) =	5.00	Critical depth (in) =	4.87
Inlet time (min) =	5.00	Natural ground elev. (ft) =	81.87
Intensity (in/hr) =	6.99	Upstream surcharge (ft) =	0.70
Cumulative C*A =	0.13	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	0.92	Line capacity (cfs) =	9.41
Q catchment (cfs) =	0.92	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.00	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	0.92	Ponding width (ft) =	N/A

LINE 12 / Q = 27.53 / HT = 30 / WID = 30 / N = .014 / L = 168 / JLC = 1.2

SS#6 TO SS#5..... / DNLN = 10 (ULTRA-FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	79.57	30.00	76.70	5.61	80.06	0.00	2.67	4.91
UPSTRM	82.05	21.04	80.30	7.49	82.92	27.46	3.29	3.68

Drainage area (ac) =	0.15	Slope of invert (%) =	2.1429
Runoff coefficient =	0.41	Slope energy grade line (%) =	1.7062
Time of conc (min) =	20.98	Critical depth (in) =	21.04
Inlet time (min) =	5.00	Natural ground elev. (ft) =	86.10
Intensity (in/hr) =	4.08	Upstream surcharge (ft) =	0.00
Cumulative C*A =	6.75	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	27.53	Line capacity (cfs) =	55.75
Q catchment (cfs) =	0.43	Inlet length (ft) =	0.00
Q carryover (cfs) =	31.18	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	31.61	Ponding width (ft) =	N/A

LINE 13 / Q = 0.69 / HT = 12 / WID = 12 / N = .011 / L = 24 / JLC = 1.2

SS#12 TO SS#6 / DNLN = 12 (PVC A-2000)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	83.10	12.00	80.30	0.88	83.11	0.00	4.79	0.79
UPSTRM	83.12	10.81	82.20	0.93	83.13	7.17	2.9	0.75

Drainage area (ac) =	0.18	Slope of invert (%) =	7.9166
Runoff coefficient =	0.55	Slope energy grade line (%) =	0.0881
Time of conc (min) =	5.00	Critical depth (in) =	4.23
Inlet time (min) =	5.00	Natural ground elev. (ft) =	86.10
Intensity (in/hr) =	6.99	Upstream surcharge (ft) =	0.00
Cumulative C*A =	0.10	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	0.69	Line capacity (cfs) =	11.84
Q catchment (cfs) =	0.69	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.00	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	0.69	Ponding width (ft) =	N/A

LINE 14 / Q = 26.98 / HT = 30 / WID = 30 / N = .014 / L = 56 / JLC = 1.2

SS#7 TO SS#6..... / DNLN = 12 (ULTRA-FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	83.10	30.00	80.30	5.50	83.57	0.00	3.29	4.91
UPSTRM	83.33	28.00	81.00	5.66	83.83	14.96	4.87	4.77

Drainage area (ac) =	0.17	Slope of invert (%) =	1.2500
Runoff coefficient =	0.55	Slope energy grade line (%) =	0.4715
Time of conc (min) =	20.81	Critical depth (in) =	20.82
Inlet time (min) =	5.00	Natural ground elev. (ft) =	88.37
Intensity (in/hr) =	4.10	Upstream surcharge (ft) =	0.00
Cumulative C*A =	6.59	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	26.98	Line capacity (cfs) =	42.58
Q catchment (cfs) =	0.65	Inlet length (ft) =	0.00
Q carryover (cfs) =	29.83	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	30.48	Ponding width (ft) =	N/A

LINE 15 / Q = 6.13 / HT = 12 / WID = 12 / N = .011 / L = 30 / JLC = 1

SS#7A TO #7 / DNLN = 14 (PVC A-2000)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	83.93	12.00	81.00	7.81	84.88	0.00	6.37	0.79
UPSTRM	84.57	12.00	82.00	7.81	85.51	0.00	5.37	0.79

Drainage area (ac) =	0.74	Slope of invert (%) =	3.3333
Runoff coefficient =	0.41	Slope energy grade line (%) =	2.1226
Time of conc (min) =	8.19	Critical depth (in) =	11.65
Inlet time (min) =	5.00	Natural ground elev. (ft) =	88.37
Intensity (in/hr) =	6.03	Upstream surcharge (ft) =	1.57
Cumulative C*A =	1.02	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	6.13	Line capacity (cfs) =	7.68
Q catchment (cfs) =	2.12	Inlet length (ft) =	0.00
Q carryover (cfs) =	4.34	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	6.46	Ponding width (ft) =	N/A

LINE 16 / Q = 4.34 / HT = 12 / WID = 12 / N = .011 / L = 64 / JLC = .9

SS#13 TO SS#7A / DNLN = 15 (PVC A-2000)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	85.51	12.00	82.00	5.52	85.99	0.00	5.37	0.79
UPSTRM	86.62	12.00	83.70	5.52	87.09	0.00	2.96	0.79

Drainage area (ac) =	1.74	Slope of invert (%) =	2.6562
Runoff coefficient =	0.41	Slope energy grade line (%) =	1.7275
Time of conc (min) =	8.00	Critical depth (in) =	10.62
Inlet time (min) =	8.00	Natural ground elev. (ft) =	87.66
Intensity (in/hr) =	6.08	Upstream surcharge (ft) =	1.92
Cumulative C*A =	0.71	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	4.34	Line capacity (cfs) =	6.86
Q catchment (cfs) =	4.34	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.00	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	4.34	Ponding width (ft) =	N/A

LINE 17 / Q = 22.65 / HT = 30 / WID = 30 / N = .014 / L = 136 / JLC = 1.2

SS#8 TO SS#7..... / DNLN = 14 (ULTRA-FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	83.93	30.00	81.00	4.62	84.26	0.00	4.87	4.91
UPSTRM	84.24	20.92	82.50	6.20	84.84	27.57	10.31	3.65

Drainage area (ac)	= 0.16	Slope of invert (%)	= 1.1029
Runoff coefficient	= 0.55	Slope energy grade line (%)	= 0.4258
Time of conc (min)	= 20.39	Critical depth (in)	= 19.08
Inlet time (min)	= 5.00	Natural ground elev. (ft)	= 95.32
Intensity (in/hr)	= 4.14	Upstream surcharge (ft)	= 0.00
Cumulative C*A	= 5.48	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 22.65	Line capacity (cfs)	= 39.99
Q catchment (cfs)	= 0.61	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 22.76	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 23.37	Ponding width (ft)	= N/A

LINE 18 / Q = 22.33 / HT = 24 / WID = 24 / N = .014 / L = 30 / JLC = 1

SS#9 TO SS#8..... / DNLN = 17 (ULTRA-FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	84.96	24.00	82.50	7.11	85.74	0.00	10.81	3.14
UPSTRM	85.30	24.00	83.00	7.11	86.08	0.00	10.31	3.14

Drainage area (ac)	= 0.17	Slope of invert (%)	= 1.6667
Runoff coefficient	= 0.55	Slope energy grade line (%)	= 1.1303
Time of conc (min)	= 20.32	Critical depth (in)	= 20.08
Inlet time (min)	= 5.00	Natural ground elev. (ft)	= 95.32
Intensity (in/hr)	= 4.14	Upstream surcharge (ft)	= 0.30
Cumulative C*A	= 5.39	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 22.33	Line capacity (cfs)	= 27.11
Q catchment (cfs)	= 0.65	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 22.11	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 22.76	Ponding width (ft)	= N/A

LINE 19 / Q = 22.06 / HT = 24 / WID = 24 / N = .014 / L = 96 / JLC = 1.2

SS#10 TO SS#9 / DNLN = 18 (ULTRA-FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	86.08	24.00	83.00	7.02	86.85	0.00	10.31	3.14
UPSTRM	87.14	24.00	84.30	7.02	87.91	0.00	1.5	3.14

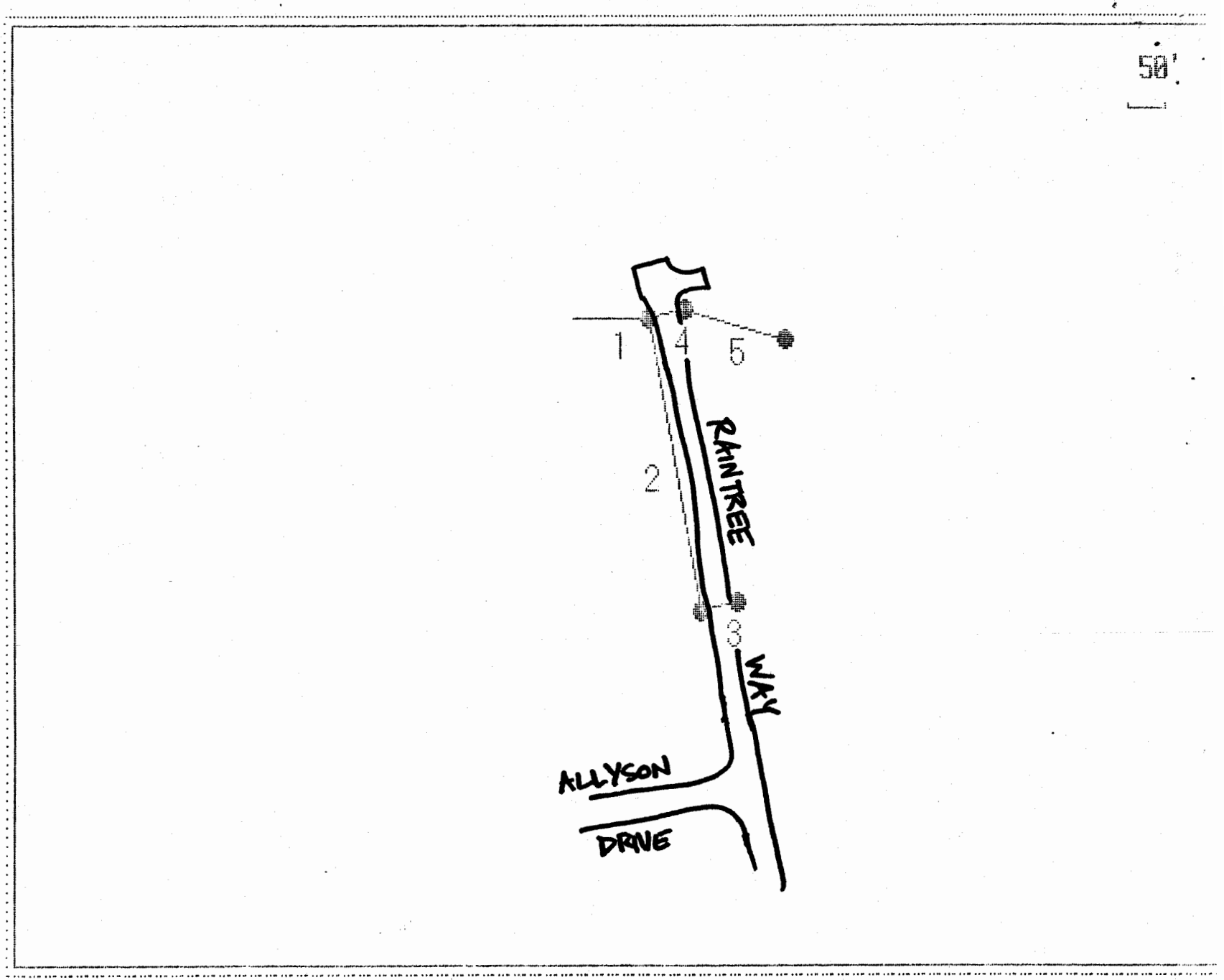
Drainage area (ac) =	0.00	Slope of invert (%) =	1.3542
Runoff coefficient =	0.40	Slope energy grade line (%) =	1.1033
Time of conc (min) =	20.09	Critical depth (in) =	19.96
Inlet time (min) =	11.00	Natural ground elev. (ft) =	87.80
Intensity (in/hr) =	4.17	Upstream surcharge (ft) =	0.84
Cumulative C*A =	5.30	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	22.06	Line capacity (cfs) =	24.44
Q catchment (cfs) =	0.00	Inlet length (ft) =	0.00
Q carryover (cfs) =	22.11	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	22.11	Ponding width (ft) =	N/A

LINE 20 / Q = 22.11 / HT = 18 / WID = 18 / N = .011 / L = 68 / JLC = .9

IN#11 TO SS#10 / DNLN = 19 (ULTRA-FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	88.06	18.00	84.30	12.51	90.49	0.00	2	1.77
UPSTRM	92.41	18.00	87.80	12.51	94.84	0.00	-1.5	1.77

Drainage area (ac) =	13.24	Slope of invert (%) =	5.1471
Runoff coefficient =	0.40	Slope energy grade line (%) =	3.1734
Time of conc (min) =	20.00	Critical depth (in) =	17.84
Inlet time (min) =	20.00	Natural ground elev. (ft) =	87.80
Intensity (in/hr) =	4.17	Upstream surcharge (ft) =	3.11
Cumulative C*A =	5.30	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	22.11	Line capacity (cfs) =	28.16
Q catchment (cfs) =	22.11	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.00	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	22.11	Ponding width (ft) =	N/A



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HYDRAULIC REPORT FOR

RAINTREE VILLAS

PERFORMANCE EVALUATION

FOR DENSER DEVELOPMENT

prepared by

AES, a professional corp.

Williamsburg, Virginia

Revised January 5, 1994

Job No. 5919-5

Return Period = 10 Yrs
Rainfall file: JCC

Run Date: 08-07-1993
File: a:5919-5NR.ST3

LINE 1 / Q = 47.21 / HT = 30 / WID = 30 / N = .014 / L = 40 / JLC = 1.1

SS#18 TO OUT#17 / Outfall (ULTRA FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	72.29	27.45	70.00	10.03	73.85	28.70	-3.5	4.71
UPSTRM	72.99	27.45	70.70	10.03	74.55	16.73	6.66	4.71

Drainage area (ac) =	0.20	Slope of invert (%) =	1.7500
Runoff coefficient =	0.70	Slope energy grade line (%) =	1.7500
Time of conc (min) =	34.10	Critical depth (in) =	27.45
Inlet time (min) =	5.00	Natural ground elev. (ft) =	79.86
Intensity (in/hr) =	3.17	Upstream surcharge (ft) =	0.00
Cumulative C*A =	14.87	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	47.21	Line capacity (cfs) =	50.38
Q catchment (cfs) =	0.98	Inlet length (ft) =	0.00
Q carryover (cfs) =	48.59	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	49.57	Ponding width (ft) =	N/A

LINE 2 / Q = 2.21 / HT = 12 / WID = 12 / N = .011 / L = 152 / JLC = 1.1

SS#19 TO SS#18 / DNLN = 1 (PVC A-2000)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	74.71	12.00	70.70	2.82	74.83	0.00	8.16	0.79
UPSTRM	78.73	7.57	78.10	4.24	79.01	11.58	3.5	0.52

Drainage area (ac) =	0.40	Slope of invert (%) =	4.8684
Runoff coefficient =	0.50	Slope energy grade line (%) =	2.7508
Time of conc (min) =	5.20	Critical depth (in) =	7.57
Inlet time (min) =	5.00	Natural ground elev. (ft) =	82.60
Intensity (in/hr) =	6.92	Upstream surcharge (ft) =	0.00
Cumulative C*A =	0.32	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	2.21	Line capacity (cfs) =	9.29
Q catchment (cfs) =	1.40	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.84	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	2.24	Ponding width (ft) =	N/A

LINE 3 / Q = 0.84 / HT = 12 / WID = 12 / N = .011 / L = 24 / JLC = .9

SS#20 TO SS#19 / DNLN = 2 (PVC A-2000)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	79.04	11.26	78.10	1.10	79.06	11.62	3.5	0.77
UPSTRM	79.11	4.72	78.60	2.93	79.25	11.72	3	0.29

Drainage area (ac) =	0.20	Slope of invert (%) =	2.0833
Runoff coefficient =	0.60	Slope energy grade line (%) =	0.7875
Time of conc (min) =	5.00	Critical depth (in) =	4.66
Inlet time (min) =	5.00	Natural ground elev. (ft) =	82.60
Intensity (in/hr) =	6.99	Upstream surcharge (ft) =	0.00
Cumulative C*A =	0.12	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	0.84	Line capacity (cfs) =	6.07
Q catchment (cfs) =	0.84	Inlet length (ft) =	0.00
Q carryover (cfs) =	0.00	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	0.84	Ponding width (ft) =	N/A

LINE 4 / Q = 45.78 / HT = 30 / WID = 30 / N = .014 / L = 24 / JLC = 1.1

SS#21 TO SS#18 / DNLN = 1 (ULTRA-FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	74.71	30.00	70.70	9.33	76.06	0.00	6.66	4.91
UPSTRM	75.05	30.00	71.05	9.33	76.40	0.00	6.3	4.91

Drainage area (ac) =	0.20	Slope of invert (%) =	1.4584
Runoff coefficient =	0.70	Slope energy grade line (%) =	1.4455
Time of conc (min) =	34.05	Critical depth (in) =	27.45
Inlet time (min) =	5.00	Natural ground elev. (ft) =	79.86
Intensity (in/hr) =	3.18	Upstream surcharge (ft) =	1.50
Cumulative C*A =	14.41	Additional Q (cfs) =	0.00
Q = CA * I (cfs) =	45.78	Line capacity (cfs) =	45.99
Q catchment (cfs) =	0.98	Inlet length (ft) =	0.00
Q carryover (cfs) =	45.38	Gutter slope (ft/ft) =	0.0000
Q captured (cfs) =	0.00	Cross slope (ft/ft) =	0.0000
Q bypassed (cfs) =	46.35	Ponding width (ft) =	N/A

LINE 5 / Q = 45.38 / HT = 30 / WID = 30 / N = .014 / L = 30 / JLC = .9

IN#22 TO SS#21 / DNLN = 4 (ULTRA - FLO)

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	76.54	30.00	71.05	9.25	77.87	0.00	6.3	4.91
UPSTRM	78.16	30.00	71.50	9.24	79.49	0.00	-2.5	4.91

Drainage area (ac)	= 54.90	Slope of invert (%)	= 1.5000
Runoff coefficient	= 0.26	Slope energy grade line (%)	= 1.4200
Time of conc (min)	= 34.00	Critical depth (in)	= 27.02
Inlet time (min)	= 34.00	Natural ground elev. (ft)	= 71.50
Intensity (in/hr)	= 3.18	Upstream surcharge (ft)	= 4.16
Cumulative C*A	= 14.27	Additional Q (cfs)	= 0.00
Q = CA * I (cfs)	= 45.38	Line capacity (cfs)	= 46.64
Q catchment (cfs)	= 45.38	Inlet length (ft)	= 0.00
Q carryover (cfs)	= 0.00	Gutter slope (ft/ft)	= 0.0000
Q captured (cfs)	= 0.00	Cross slope (ft/ft)	= 0.0000
Q bypassed (cfs)	= 45.38	Ponding width (ft)	= N/A

2-12-91

(A) SIZE A CHANNEL TO RECIEVE THE DISCHARGE FROM THE STORM SEWER DISCHARGE PIPE

$Q_{10} = 61.1$ CFS HYDRAFLOW $S \approx 1.2\%$, SS 2:1
$n = .05$ GRASS

$\therefore Qn = 61.1(.05) = 3.06$ CFS

$\therefore$ FROM FIGURE 2.8.54 VDOT DRAINAGE MANUAL

WE CAN USE A 5' WIDE x 2' DEEP TRAPEZOIDAL GRASS DITCH WILL WORK

(B) SIZE DITCH COMING INTO STORM SEWER # 11 ✓

$Q_{10} = 23.3$ (HYDRAFLOW) $S = 1.6\%$

$n = .015$ PAVEMENT

$\therefore Qn = 23.3(.015) = .35$ CFS

FROM FIG 2.8.50 $d = 14''$
FROM VDOT DRAINAGE MANUAL

$\therefore$ USE A 1' WIDE x 15" DEEP TRAPEZOIDAL PAVED DITCH.

Culvert Calculations

8-26-93
SDW.

Culvert #1 (at Allyson and Indian Summer Drive)

Drainage Area = 0.2 Ac.
C = 0.75

T_c = 5 min

I_2 = 5.6 in/hr
I_{10} = 7.0 in/hr.

Q_2 = 0.84 cfs
Q_{10} = 1.05 cfs

per VDOT Drainage Manual Fig 3.9.3.2 use a:

15" RCP @ 1.0%

Q_{cap} = 6 cfs > 1.05 cfs **GOOD**

Scott Thomas

From: Danny Poe
Sent: Friday, May 11, 2001 4:02 PM
To: Scott Thomas
Subject: FW: Sanitary Sewer Main Under BMP - Raintree Villas

I thought I would send this to you since Darryl is out until May 16. If you can meet with me earl next week that would be great.

-----Original Message-----
From: Danny Poe
Sent: Friday, May 11, 2001 4:00 PM
To: Darryl Cook
Cc: Tom Ebert
Subject: Sanitary Sewer Main Under BMP - Raintree Villas

JCSA has a sewer main under a BMP at Raintree Villas on Allyson Drive. The sewer main has a belly in it, and one spot is crushed. We suspect the damage was done when the BMP was constructed, but it would be difficult to prove. At any rate, we need to replace the main to eliminate a maintenance problem. The segment of sewer in question runs directly under the principal spillway and embankment fill. The area immediately upstream from the embankment is wet and soft even though this is a dry pond.

I would like to schedule a site visit with you to review the situation and find out what type of issues you see that will impact the rehabilitation of the sewer main.

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

(804) 253-0040
FAX (804) 220-8994

LETTER OF TRANSMITTAL

TO James City County
Code Compliance

DATE	JOB NO.
1-11-94	5919-5

ATTENTION Mr. Darryl Cook

RE: Raintree Villas
Basin Release Structure
Redesign

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

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			100 yr hydrographs 30" barrels & 36" barrels
1			Riser structure details.

THESE ARE TRANSMITTED as checked below:

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

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

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

☐ For review and comment ☐ _____

☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS

COPY TO _____ SIGNED: Steven D. Wigley

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

PRODUCT 238 AESE Inc. Groton, Mass. 01471 To Order PHONE TOLL FREE 1-800-225-6380

WATERSHED	PC	MAINTENANCE PLAN	No	CTRL STRUC DESC	Conc. Box
BMP ID NO	125	SITE AREA acre	18	CTRL STRUC SIZE inches	EW-11
PLAN NO	S-34-93	LAND USE	SF Residential	OTLT BARRL DESC	Dual CMP
TAX PARCEL	(33-01)(08-1A)	old BMP TYP	Dry Pond	OTLT BARRL SIZE inch	30
PIN NO	3310800001A	JCC BMP CODE			
CONSTRUCTION DATE	5/1/1994	POINT VALUE	6	EMERG SPILLWAY	Yes
PROJECT NAME	Raintree Villas Phase 1			DESIGN HW ELEV	71.94
FACILITY LOCATION	112 Raintree Way (North of 130 Allyson)			PERM POOL ELEV	na
CITY-STATE	Williamsburg, Va. 23188	SVC DRAIN AREA acres	18	2-YR OUTFLOW cfs	54.50
CURRENT OWNER	Raintree HOA, Inc.			10-YR OUTFLOW cfs	108.50
OWNER ADDRESS	1443 East Pembroke Ave.			REC DRAWING	Yes
OWNER ADDRESS 2		SERVICE AREA DESCRI	Residential Lots & Roadways		
CITY-STATE-ZIP CODE	Hampton, Va. 23663	IMPERV AREA acres	0.00	CONSTR CERTI	No
OWNER PHONE		RECV STREAM	UT to Powhatan Creek		
MAINT AGREEMENT	Yes	EXT DET-WQ-CTRL	Yes	LAST INSP DATE	
EMERG ACTION PLAN	No	WTR QUAL VOL acre-ft	1.45	INTERNAL RATING	
		CHAN PROT CTRL	No	MISC/COMMENTS	
		CHAN PROT VOL acre-ft	0	form YR009. Dual riser & 30/36 inch barrels. Riser 2 BMP orif. Access Allyson Dr	
		SW/FLOOD CONTROL	Yes		
		GEOTECH REPORT	No		

Get Last BMP No

Return to Menu

WATERSHED	PC	MAINTENANCE PLAN	No	CTRL STRUC DESC	Dual Conc.
BMP ID NO	125	SITE AREA acre	18	CTRL STRUC SIZE inches	Unk
PLAN NO	S-34-93	LAND USE	SF Residential	OTLT BARRL DESC	Dual CMP
TAX PARCEL	(33-01)(08-1A)	old BMP TYP	Dry Pond	OTLT BARRL SIZE inch	30
PIN NO	3310800001A	JCC BMP CODE			
CONSTRUCTION DATE	5/1/1994	POINT VALUE	6	EMERG SPILLWAY	No
PROJECT NAME	Raintree Villas Phase 1			DESIGN HW ELEV	Unk
FACILITY LOCATION	112 Raintree Way (North of 130 Allyson)			PERM POOL ELEV	na
CITY-STATE	Williamsburg, Va. 23188	SVC DRAIN AREA acres	18	2-YR OUTFLOW cfs	0.00
CURRENT OWNER	Raintree HOA, Inc.			10-YR OUTFLOW cfs	0.00
OWNER ADDRESS	1443 East Pembroke Ave.			REC DRAWING	Yes
OWNER ADDRESS 2		SERVICE AREA DESCRI	Residential Lots & Roadways		
CITY-STATE-ZIP CODE	Hampton, Va. 23663	IMPERV AREA acres	0	CONSTR CERTI	No
OWNER PHONE		RECV STREAM	UT to Powhatan Creek		
MAINT AGREEMENT	Yes	EXT DET-WQ-CTRL	Yes	LAST INSP DATE	
		WTR QUAL VOL acre-ft	1.45	INTERNAL RATING	
EMERG ACTION PLAN	No	CHAN PROT CTRL	No	MISC/COMMENTS	
		CHAN PROT VOL acre-ft	0	form YR009. Dual riser & 30/36 inch barrels. Riser 2 BMP orif. Access Allyson Dr	
		SW/FLOOD CONTROL	Yes		
		GEOTECH REPORT	No		

Get Last BMP No

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WATERSHED	YR	MAINTENANCE PLAN	No	CTRL STRUC DESC	
BMP ID NO	009	SITE AREA acre	18	CTRL STRUC SIZE inches	
PLAN NO		LAND USE	SFRES	OTLT BARRL DESC	RCP
TAX PARCEL	(33-1)(1-13)	old BMP TYP	DRY POND	OTLT BARRL SIZE inch	30
PIN NO	33101000013	JCC BMP CODE			
CONSTRUCTION DATE	5/1/1994	POINT VALUE	6	EMERG SPILLWAY	No
PROJECT NAME	RAINTREE VILLAS			DESIGN HW ELEV	
FACILITY LOCATION	INDIAN SPRINGS & ALLYSON			PERM POOL ELEV	
CITY-STATE	WILLIAMSBURG VA	SVC DRAIN AREA acres	18	2-YR OUTFLOW cfs	
CURRENT OWNER	LEONARD M. EPSTEIN			10-YR OUTFLOW cfs	
OWNER ADDRESS	1443 EAST PEMBROKE AVE.			REC DRAWING	No
OWNER ADDRESS 2	HAMPTON, VA 23663-2029	SERVICE AREA DESCRI	NONE		
CITY-STATE-ZIP CODE		IMPERV AREA acres		CONSTR CERTI	No
OWNER PHONE		RECV STREAM	YORKRIVER TRIB		
MAINT AGREEMENT	Yes	EXT DET-WQ-CTRL	No	LAST INSP DATE	
EMERG ACTION PLAN	No	WTR QUAL VOL acre-ft	1.45	INTERNAL RATING	
		CHAN PROT CTRL	No	MISC/COMMENTS	
		CHAN PROT VOL acre-ft	2.17		
		SW/FLOOD CONTROL	No		
		GEOTECH REPORT	No		

Get Last BMP No

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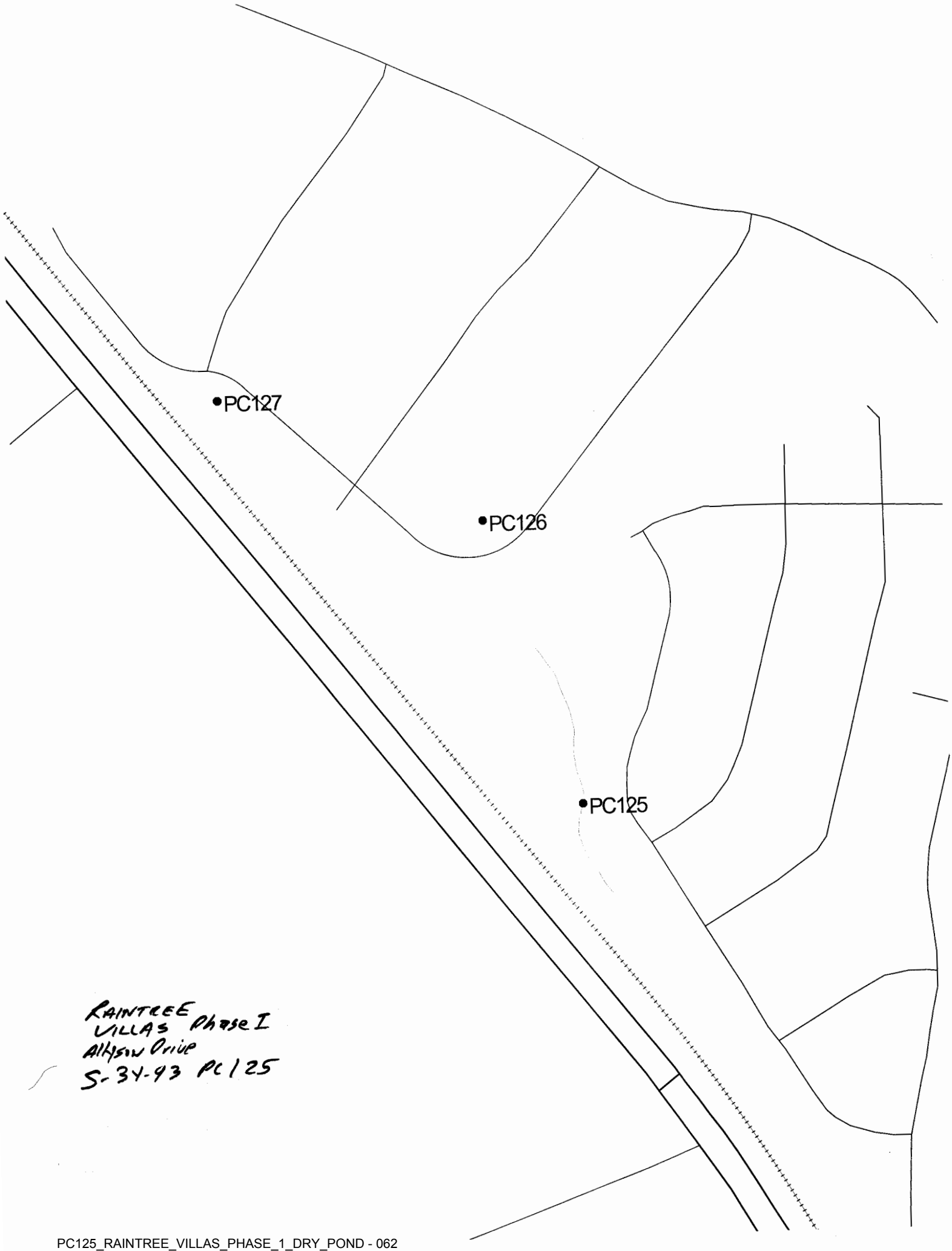
DO NOT USE
* See PC125

OLD # / NEW #
YR 009 = PC125

PC125_RAINTREE_VILLAS_PHASE_1_DRY_POND - 061


PC127
PC126
PC125
RAINTREE VILLAS Phase I
Allyson Drive
S-34-93 PC125