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: **JR006**

DATE VERIFIED: **June 15, 2012**

QUALITY ASSURANCE TECHNICIAN: **Leah Hardenbergh**

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA

Stormwater Division

MEMORANDUM

DATE: March 11, 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: JR006

PIN: 4520100013

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

Property Description: Senior Care/Retirement Facility

Site Address: 3400 John Tyler Highway

(For Internal use only) **Box** 12 **Drawer:** 7

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

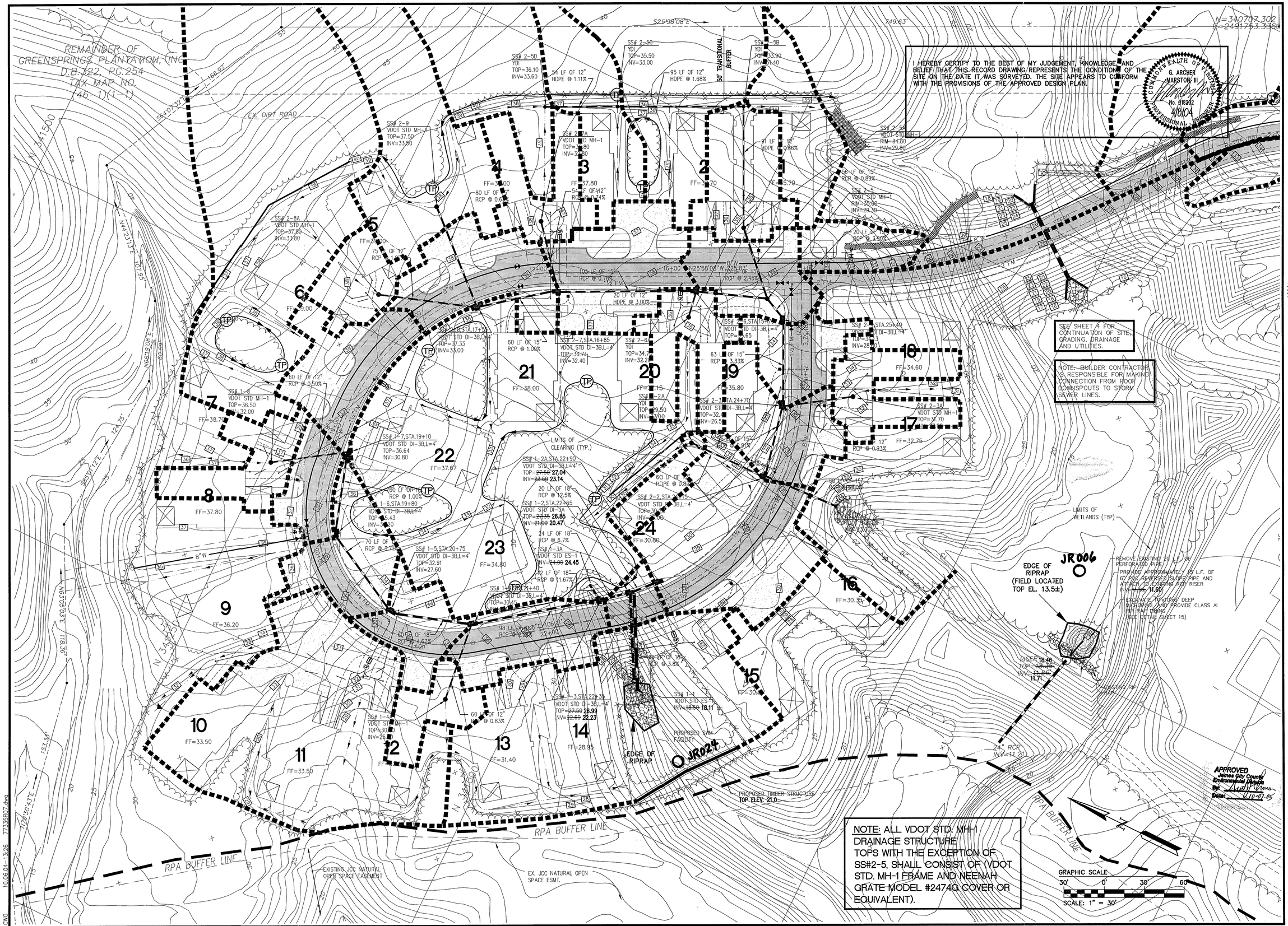
Comments
In error this file had two separate folders - folders have been combined.

JR-006

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



I HEREBY CERTIFY TO THE BEST OF MY JUDGEMENT, KNOWLEDGE AND BELIEF THAT THIS RECORD DRAWING REPRESENTS THE CONDITIONS OF THE SITE ON THE DATE IT WAS SURVEYED. THE SITE APPEARS TO CONFORM WITH THE PROVISIONS OF THE APPROVED DESIGN PLAN.

COMMONWEALTH OF VIRGINIA G. ARCHER MARSTON, III No. 818232 PROFESSIONAL ENGINEER 4/8/04

No.	DATE	REVISION / COMMENT / NOTE	BY
7	4/8/04	STORM WATER MANAGEMENT RECORD DRAWINGS	DPB
6	5/29/00	SITE PLAN AMENDMENT #1	CWG
5	2/9/00	REVISED FOR VDH SUBMITTAL	CBR
4	2/4/00	REVISED WATER METERS AND LINES, AND UNIT 24	CBR
3	1/4/00	REVISED RETAINING WALLS, DRAINAGE, AND GRADING PER OWNER	CBR
2	2/11/00	REVISED PER JCC COMMENTS	CBR
1	12/22/99	REVISED PER JCC COMMENT LETTER DATED 12/1/99	CBR

COMMONWEALTH OF VIRGINIA ANDREW HERR No. 03671 PROFESSIONAL ENGINEER DATE

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

DRAINAGE PLAN
PATRIOTS COLONY, PHASE II
CONTINUING CARE RETIREMENT COMMUNITY

DEVELOPER: RIVERSIDE RETIREMENT SERVICES INC.

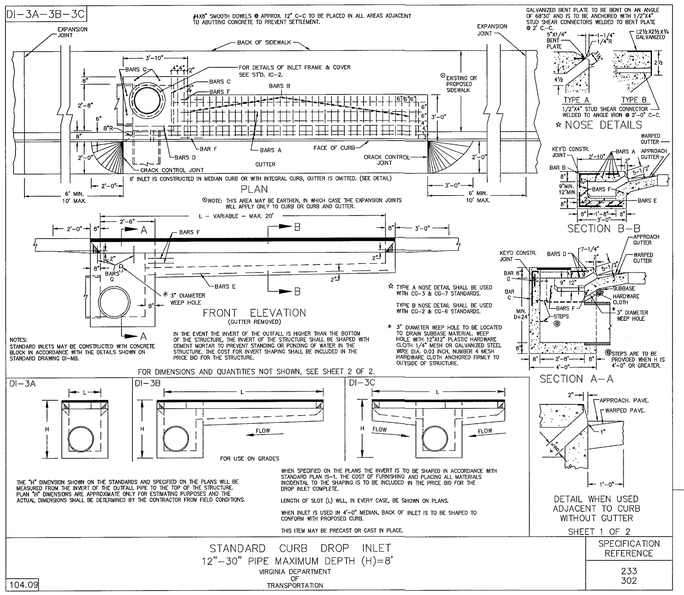
BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
CAH	RDS
Scale	Date
1"=30'	7/28/99
Project No.	
7733-5	
Drawing No.	
7	

S:\Jobs\7733\05\dwg\AS-BUILT-RECORD\7733SR07.dwg, 6/10/2004 1:32:09 PM, DPB

10.06.04-13:26 7733SR07.dwg CWG

JR006_PATRIOTS_COLONY_PHASE_1_BASIN_1_VILLA_CT_1 - 004



STANDARD CURB DROP INLET
12"–30" PIPE MAXIMUM DEPTH (H)=8'
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE: 233, 302

104.09

DI-3A–3B–3C SHEET 2 OF 2

TABLE OF CONTENTS

TYPE	L	AREA OF SLOT	CON-CRETE	REINFORCING STEEL															
				BARS A		BARS B		BARS C		BARS D		BARS E		BARS F		BARS G		WIEGHT
	FT.	SQ. FT.	CU. YDS.	NO.	LIN. FT. *	NO.	LIN. FT. *	NO.	LIN. FT. *	NO.	LIN. FT. *	NO.	LIN. FT. *	NO.	LIN. FT. *	NO.	LIN. FT. *	LBS.
DI-3A	2'-6"	1.15	2.26	–	–	–	–	1	5'-7"	3	3'-2"	–	–	–	–	6	1'-0"	22
DI-3B	4'	1.83	2.59	5	1'-6"	2	6'7"to6'10"	3	5'-7"	3	3'-2"	4	1'-6"	3	1'-6"	4	1'-0"	64
	6'	2.75	3.02	5	3'-6"	6	6'7"to6'10"	3	5'-7"	3	3'-2"	4	3'-6"	3	1'-6"	4	1'-0"	111
	8'	3.67	3.46	5	5'-6"	10	6'7"to6'10"	3	5'-7"	3	3'-2"	4	5'-6"	3	1'-6"	4	1'-0"	158
	10'	4.58	3.90	5	7'-6"	14	6'7"to6'10"	3	5'-7"	3	3'-2"	4	7'-6"	3	1'-6"	4	1'-0"	204
	12'	5.50	4.34	5	9'-6"	18	6'7"to6'10"	3	5'-7"	3	3'-2"	4	9'-6"	3	1'-6"	4	1'-0"	251
	14'	6.42	4.78	5	11'-6"	22	6'7"to6'10"	3	5'-7"	3	3'-2"	4	11'-6"	3	1'-6"	4	1'-0"	298
	16'	7.33	5.22	5	13'-6"	26	6'7"to6'10"	3	5'-7"	3	3'-2"	4	13'-6"	3	1'-6"	4	1'-0"	345
	18'	8.25	5.66	5	15'-6"	30	6'7"to6'10"	3	5'-7"	3	3'-2"	4	15'-6"	3	1'-6"	4	1'-0"	391
	20'	9.17	6.09	5	17'-6"	34	6'7"to6'10"	3	5'-7"	3	3'-2"	4	17'-6"	3	1'-6"	4	1'-0"	438
DI-3C	6'	2.75	3.01	10	1'-9"	4	6'7"to6'10"	5	5'-7"	3	3'-2"	8	1'-9"	6	1'-6"	2	1'-0"	111
	8'	3.67	3.45	10	2'-9"	8	6'7"to6'10"	5	5'-7"	3	3'-2"	8	2'-9"	6	1'-6"	2	1'-0"	158
	10'	4.58	3.89	10	3'-9"	12	6'7"to6'10"	5	5'-7"	3	3'-2"	8	3'-9"	6	1'-6"	2	1'-0"	205
	12'	5.50	4.33	10	4'-9"	16	6'7"to6'10"	5	5'-7"	3	3'-2"	8	4'-9"	6	1'-6"	2	1'-0"	252
	14'	6.42	4.77	10	5'-9"	20	6'7"to6'10"	5	5'-7"	3	3'-2"	8	5'-9"	6	1'-6"	2	1'-0"	298
	16'	7.33	5.21	10	6'-9"	24	6'7"to6'10"	5	5'-7"	3	3'-2"	8	6'-9"	6	1'-6"	2	1'-0"	345
	18'	8.25	5.65	10	7'-9"	28	6'7"to6'10"	5	5'-7"	3	3'-2"	8	7'-9"	6	1'-6"	2	1'-0"	392
	20'	9.17	6.09	10	8'-9"	32	6'7"to6'10"	5	5'-7"	3	3'-2"	8	8'-9"	6	1'-6"	2	1'-0"	439

* DENOTES LENGTH OF (1) BAR.

NOTES: ALL REINFORCING BARS TO BE NO. 5.

ALL CAST IN PLACE CONCRETE TO BE CLASS A3. FOR ACCEPTABLE ALTERNATE SEE PRECAST STANDARD DESIGNS.

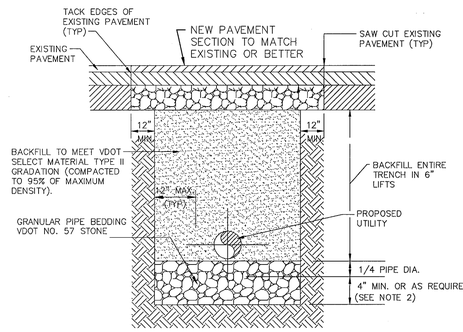
CONCRETE QUANTITIES ARE SHOWN FOR DEPTH (H) OF 5'–2" WITHOUT PIPES. THE AMOUNT DISPLACED BY PIPES MUST BE DEDUCTED TO OBTAIN TRUE QUANTITIES. FOR INLETS OF DIFFERENT DEPTHS ADD OR SUBTRACT 0.32 CU. YDS. OF CONCRETE FOR EACH FOOT OF DIFFERENCE OF DEPTH.

LENGTH OF ANGLE IRON AS SHOWN ON SHEET 1 IS TO BE L + 16" @ 4.10 LBS. PER FT.

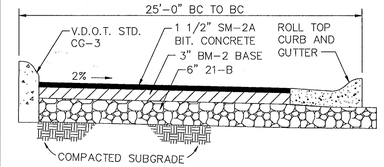
STANDARD CURB DROP INLET
12"–30" PIPE MAXIMUM DEPTH (H)=8'
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE: 233, 302

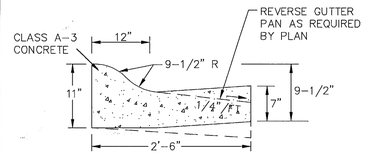
104.10



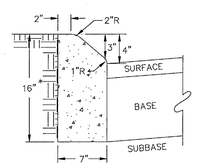
PAVEMENT PATCH DETAIL
N.T.S.



TYPICAL ROAD SECTION
N.T.S.



ROLL TOP CURB AND GUTTER
N.T.S.



NOTES

THIS ITEM MAY BE PRECAST OR CAST IN PLACE.

CONCRETE TO BE CLASS A3 IF CAST IN PLACE, 4000 PSI IF PRECAST.

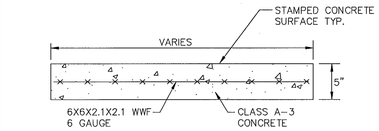
CURB HAVING A RADIUS OF 300ft. OR LESS (ALONG FACE OF CURB) WILL BE PAID FOR AS RADIAL CURB.

WHEN THIS STANDARD IS TO BE TIED INTO EXISTING BARRIER CURB, THE TRANSITION IS TO BE MADE WITHIN 10' OR THE CHANGE IN STANDARDS MADE AT REGULAR OPENINGS.

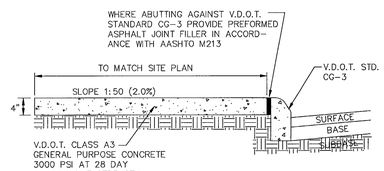
THIS CURB TO BE USED WHEN DESIGN SPEED IS 40 MPH OR LESS ON RURAL HIGHWAYS AND 45 MPH OR LESS IN URBAN AND SUBURBAN AREAS.

* THE DEPTH OF CURB MAY BE REDUCED AS MUCH AS 3" (13" DEPTH) OR INCREASED AS MUCH AS 3" (19" DEPTH) IN ORDER THAT THE BOTTOM OF THE CURB WILL COINCIDE WITH THE TOP OF A COURSE OF THE PAVEMENT SUBSTRUCTURE. OTHERWISE THE DEPTH IS TO BE 16" AS SHOWN. NO ADJUSTMENT IN THE PRICE BID IS TO BE MADE FOR A DECREASE OR AN INCREASE IN DEPTH.

STANDARD 4" CURB
N.T.S.

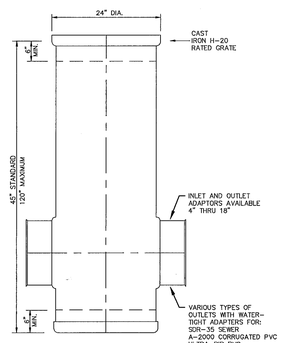


TYPICAL DRIVEWAY SECTION
N.T.S.

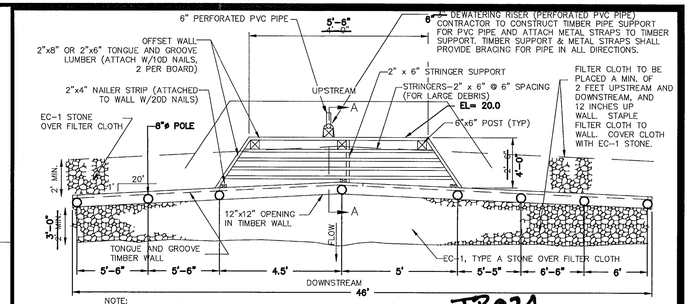


THIS CURB TO BE USED WHEN DESIGN SPEED IS 40 MPH OR MORE ON RURAL HIGHWAYS AND 45 MPH OR MORE IN URBAN AND SUBURBAN AREAS.

SIDEWALK DETAIL W/CURB
NOT TO SCALE



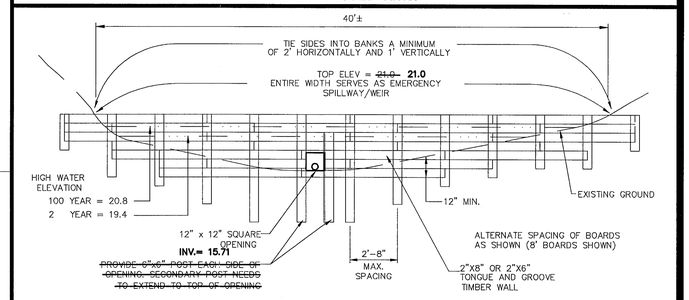
24" DROP INLET (YDI)
N.T.S.



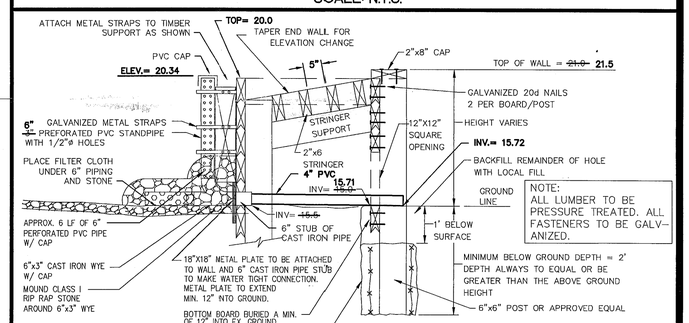
PLAN VIEW

JR024

PRESSURE TREATED WOOD DRY DETENTION STRUCTURE
SCALE: N.T.S.

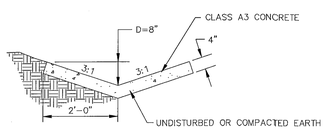


UPSTREAM ELEVATION
PRESSURE TREATED WOOD DRY DETENTION STRUCTURE
SCALE: N.T.S.

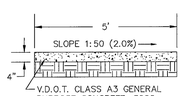


JR024

SECTION A-A
PRESSURE TREATED WOOD DRY DETENTION STRUCTURE
SCALE: N.T.S.

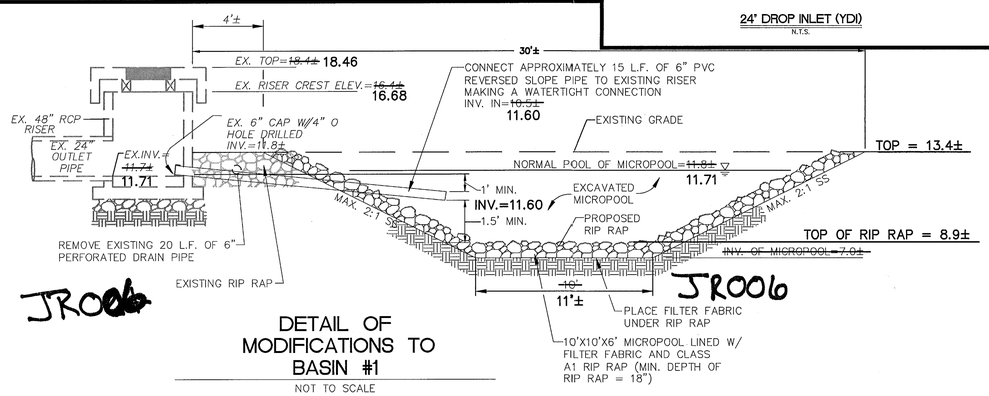


PAVED DITCH PG-2A MODIFIED
NOT TO SCALE



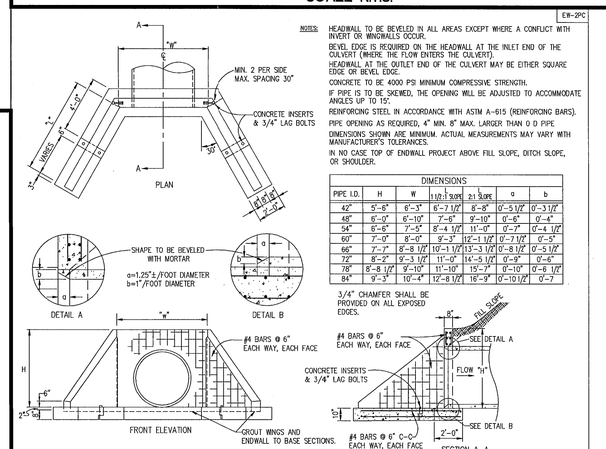
NOTE: HORIZONTAL CRACK CONTROL JOINTS SHALL BE 5' C/C.

SIDEWALK DETAIL
N.T.S.



JR006

DETAIL OF MODIFICATIONS TO BASIN #1
NOT TO SCALE



DIMENSIONS							
PIPE I.D.	H	W	1 1/2:1 SLOPE	2:1 SLOPE	a	b
42"	5'-6"	6'-3"	6'-7 1/2"	8'-8"	0'-5 1/2"	0'-3 1/2"
48"	6'-0"	6'-10"	7'-6"	9'-10"	0'-6"	0'-4"
54"	6'-6"	7'-5"	8'-4 1/2"	11'-0"	0'-7"	0'-4 1/2"
60"	7'-0"	8'-0"	9'-3"	12'-1 1/2"	0'-7 1/2"	0'-5"
66"	7'-7"	8'-8 1/2"	10'-1 1/2"	13'-3 1/2"	0'-8 1/2"	0'-5 1/2"
72"	8'-2"	9'-3 1/2"	11'-0"	14'-5 1/2"	0'-9"	0'-6"
78"	8'-8 1/2"	9'-10"	11'-10"	15'-7"	0'-10"	0'-6 1/2"
84"	9'-3"	10'-4"	12'-8 1/2"	16'-9"	0'-10 1/2"	0'-7"

3/4" CHAMFER SHALL BE PROVIDED ON ALL EXPOSED EDGES.

PRECAST ENDWALL FOR CIRCULAR PIPE CULVERTS
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE: 105.04, 302

101.06

No.	DATE	REVISION / COMMENT / NOTE	BY
7	4/8/04	STORM WATER MANAGEMENT RECORD DRAWING	DPB
6	5/23/00	SITE PLAN AMENDMENT #1	CWG
5	2/9/00	REVISED FOR VDH SUBMITTAL	CBR
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3	1/4/00	REVISED RETAINING WALLS, DRAINAGE, AND GRADING PER OWNER	CBR
2	2/11/00	REVISED PER JCC COMMENTS	CBR
1	12/22/99	REVISED PER JCC COMMENT LETTER DATED 12/7/99	CBR

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

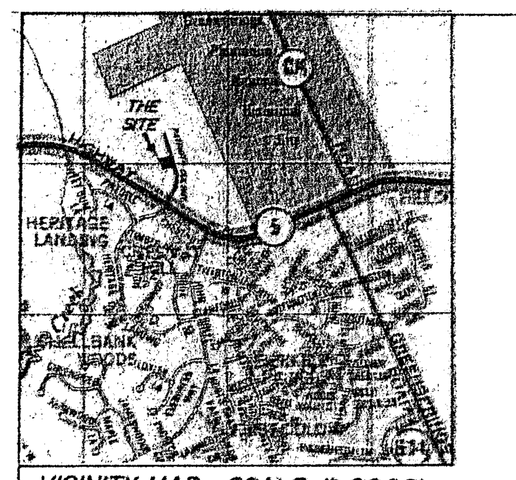
NOTES AND DETAILS
PATRIOTS COLONY, PHASE II
CONTINUING CARE RETIREMENT COMMUNITY
DEVELOPER: RIVERSIDE RETIREMENT SERVICES INC.
BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed	Drawn
CAH	AES
Scale	Date
N.T.S.	7/28/99

Project No. 7733–5
Drawing No. 15

RECORD DRAWING 4/8/04

Use the outer circles for creating the view named "PlotHalf" to be used with the JDL 5000 plotter for Half scale plots
Use the inner circles for creating the view named "PlotHalf" to be used with the JDL 5000 plotter
S:\Jobs\7733\05\dwg\AS-BUILT-RECORD\7733SR15.dwg, 6/10/2004 1:32:36 PM, DPB
CWG 10.06.04–13:32 7733SR15.dwg
D-CONCSW
JR006_PATRIOTS_COLONY_PHASE_1_BASIN_1_VILLA_CT_1 - 005



VICINITY MAP SCALE: 1"=2000'

SITE STATISTICS

- AREA OF SITE : 60,000 S.F. ±
- BUILDING AREA : 14,250 S.F. ± (24%)
- CARPORTS,WALKS & DRIVES : 12,000 S.F. ± (20%)
- GREEN AREA : 33,750 S.F.± (56%)
- IMPERVIOUS AREA : 26,250 S.F.± (44%)
- PARKING : 1 COVERED SPACE / UNIT PROVIDED = 8
  4 GUEST SPACES PROVIDED
- BUILDING DATA : VILLA RESIDENTIAL UNIT
  BUILDING HEIGHT : 23' ONE STORY
  USE GROUP : R-2
  CONSTRUCTION TYPE : 5-B UNPROTECTED

GENERAL NOTES :

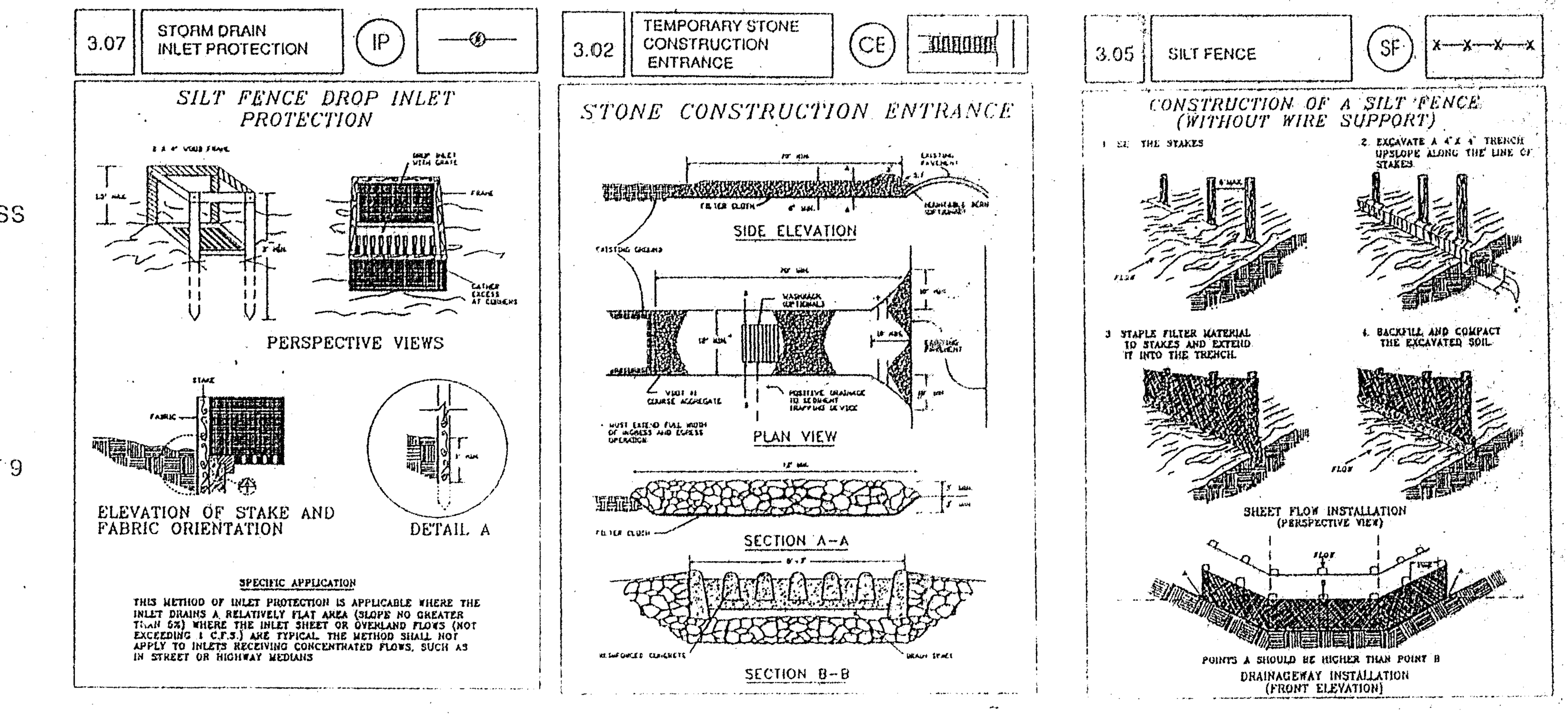
1. PATRIOTS COLONY CCRC IS LOCATED AT 3400 JOHN TYLER HIGHWAY AND IS TAX PARCEL (45-2)(01-0-0013).
2. SITE IS ZONED R-4 RESIDENTIAL PLANNED COMMUNITY WITH PROFFERS.
3. ALL UTILITIES SHALL BE PLACED UNDERGROUND.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING MISS UTILITY FOR EXISTING UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
5. EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND SHALL BE VERIFIED PRIOR TO CONSTRUCTION.
6. ALL EROSION & SEDIMENTATION CONTROLS SHALL BE IN PLACE PRIOR TO CONSTRUCTION.
7. WATER, SEWER AND DRAINAGE SYSTEMS SHOWN ON THIS PLAN WERE DESIGNED IN PHASE I PLANS (BY A.E.S. CONSULTING ENGINEERS) TO ACCOMMODATE THE BUILDINGS IN VILLA COURT 9

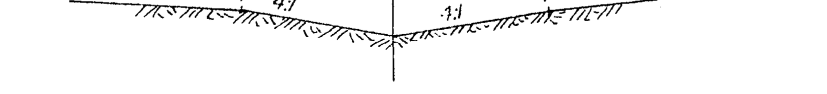
EROSION AND SEDIMENT CONTROL NOTES

The purpose of the erosion control measures shown on these plans shall be to preclude the transport of all waterborne sediments resulting from construction activities from entering onto adjacent properties or State waters. If field inspection reveals the inadequacy of the plan to confine sediment to the project site, appropriate modifications will be made to correct any plan deficiencies. In addition to these notes, all provisions of the Virginia Erosion and Sediment Control Regulations shall apply to this project.

1. All erosion and sediment control measures shall be installed and maintained in accordance with the "Virginia Erosion and Sediment Control Handbook." The contractor shall be thoroughly familiar with all applicable measures contained therein which may be pertinent to this project.
2. All points of construction ingress and egress shall be protected by a temporary construction entrance to prevent tracking of mud onto public right-of-ways. An entrance permit from VDOT is required prior to any construction activities within State right-of ways. Where sediment is transported onto a public road surface, the road shall be thoroughly cleaned at the end of each day.
3. A preconstruction meeting shall be held on site between the County, the Developer, the Project Engineer, and the Contractor prior to issuance of a Land Disturbing Permit. The Contractor shall submit a Sequence of Construction to the County for approval prior to the preconstruction meeting. The Contractor will supply Environmental Div. with the name of the individual who will be responsible for ensuring maintenance of installed measures on a daily basis.
4. Sediment basins and traps, perimeter dikes, sediment barriers and other measures intended to trap sediment on-site must be constructed as a first step in grading and be made functional before upslope land disturbance takes place. Earthen structures such as dams, dikes, and diversions must be seeded and mulched immediately after installation. Periodic inspections of the erosion control measures shall be made to assure their condition. Any necessary maintenance of the measures shall be accomplished immediately upon notification by the County and shall include the repair of measures damaged by any subcontractor including those of the public utility companies.
5. Surface flows over cut and fill slopes shall be controlled by either redirecting flows from transversing the slopes or by installing mechanical devices to safely lower water downslope without causing erosion. A temporary fill diversion (Std. & Spec. 3.10) shall be installed prior to the end of each working day.
6. Sediment control measures may require minor field adjustments at time of construction to insure their intended purpose is accomplished. Environmental Division approval will be required for other deviations from the approved plans.
7. The contractor shall place soil stockpiles at the locations shown on this plan or as directed by the engineer. Soil stockpiles shall be stabilized or protected with sediment trapping measures. Off-site waste or borrow areas shall be approved by the Environmental Division prior to the import of any borrow or export of any waste to or from the project site.
8. The contractor shall complete drainage facilities within 30 days after following completion of rough grading at any point within the project. The installation of drainage facilities shall take precedence over all underground utilities. Outfall ditches from drainage structures shall be stabilized immediately after construction of same. This includes installation of erosion control stone or paved ditches where required. Any drainage outfalls required for a street must be completed before street grading or utility installation begins.
9. Permanent or temporary soil stabilization must be applied to all denuded areas within 7 days after final grade is reached on any portion of the site. Soil stabilization must also be applied to denuded areas which may not be at final grade but will remain dormant (undisturbed) for longer than 30 days. Soil stabilization measures include vegetative establishment, mulching and the early application of gravel base material on areas to be paved.
10. No more than 500' of sanitary sewer, storm sewer, waterlines, or underground utility lines are to be open at one time. Following installation of any portion of these items, all disturbed areas are to be immediately stabilized (i.e., the same day).
11. If disturbed area stabilization is to be accomplished during the months of December, January, or February, stabilization shall consist of mulching in accordance with Specification 3.35. Seeding will then take place as soon as the season permits.
12. The term Seeding, Final Vegetative Cover or Stabilization, on this plan shall mean the successful germination and establishment of a stable grass cover from a properly prepared seedbed containing the specified amounts of seed, lime, and fertilizer in accordance with Specification 3.32, Permanent Seeding. Irrigation shall be required as necessary to ensure establishment of grass cover.
13. All slopes steeper than 3:1 shall require the use of erosion control blankets such as excelsior blankets to aid in the establishment of vegetative cover. Installation shall be in accordance with Specification 3.36, Matching and Manufacturer's Instructions. No slopes shall be created steeper than 2:1.
14. Inlet protection in accordance with Specification 3.07 shall be provided for all storm drain inlets as soon as practical following construction of same.
15. Temporary liners, such as polyethylene sheets, shall be provided for all paved ditches until the permanent concrete liner is installed.
16. Paved ditches shall be required wherever erosion is evident. Particular attention shall be paid to those areas where grades exceed 3 percent.
17. Temporary erosion control measures are not to be removed until all disturbed areas are stabilized. After stabilization is complete, all measures shall be removed within 30 days. Trapped sediment shall be spread and seeded.
18. As-built drawings must be provided for all detention/BMP facilities. Also upon completion, the construction of all detention/BMP facilities shall be certified by a professional engineer who inspected the structure during construction. The certification shall state that to the best of his/her judgment, knowledge, and belief, the structure was constructed in accordance with the approval plans and specifications.

REVISED 4/7/97



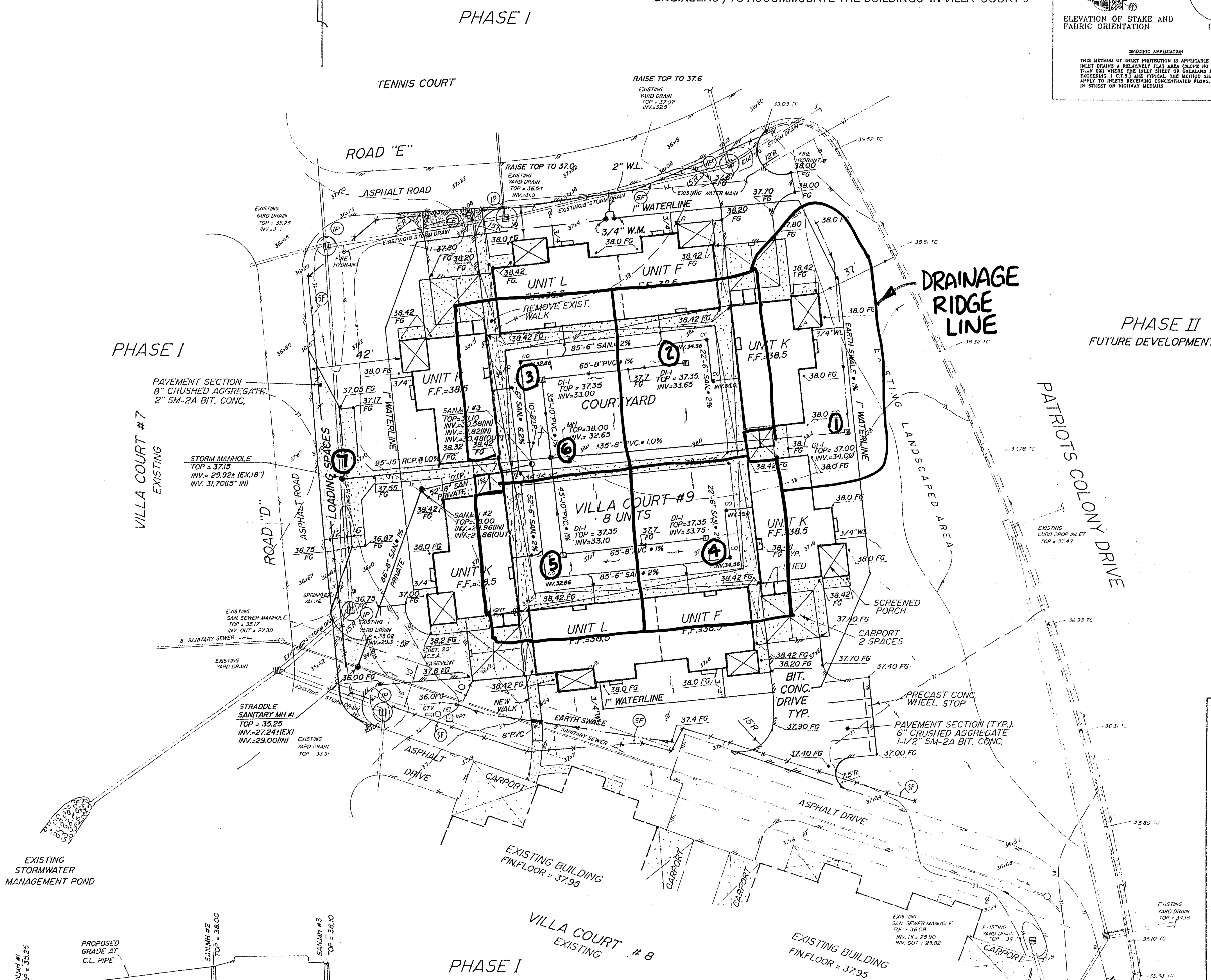


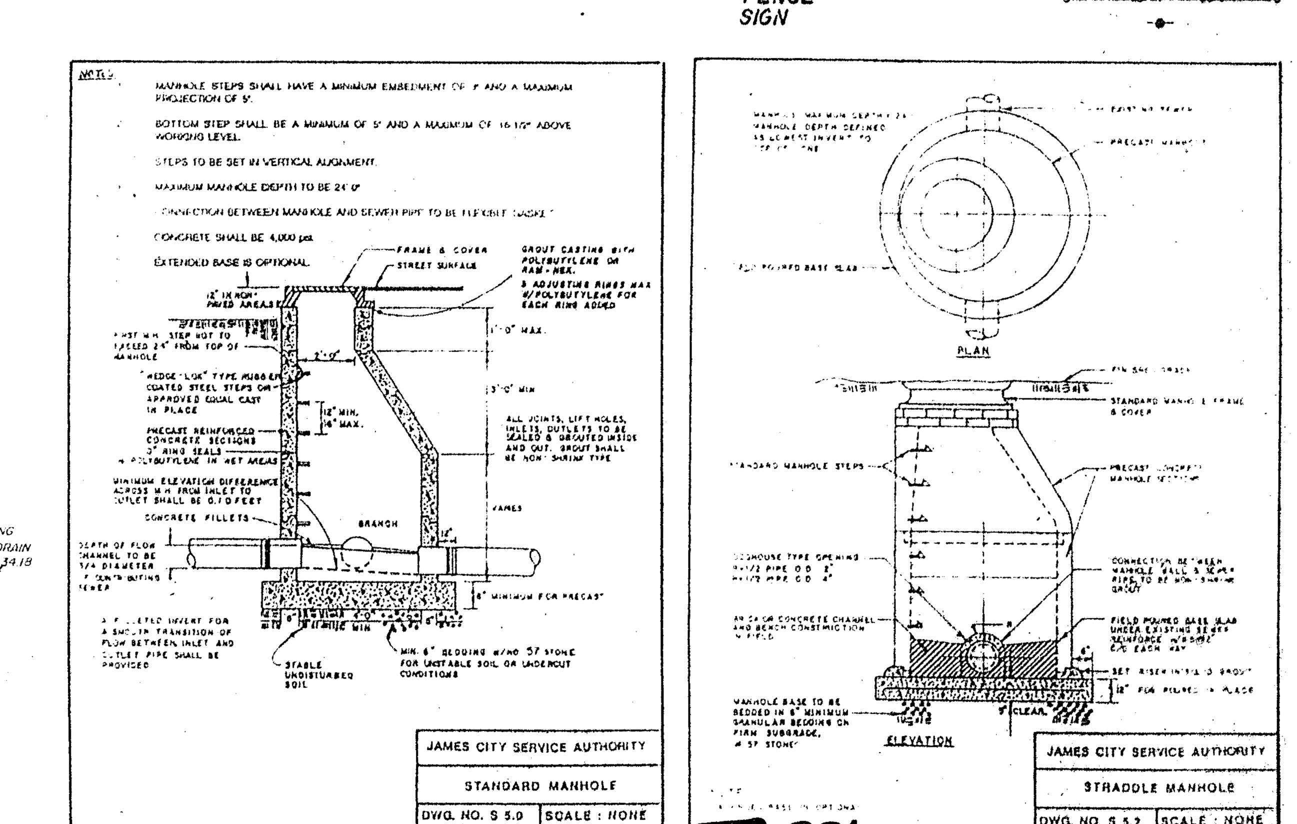
EARTH SWALE DETAIL
N.T.S.

LEGEND

EXISTING | PROPOSED

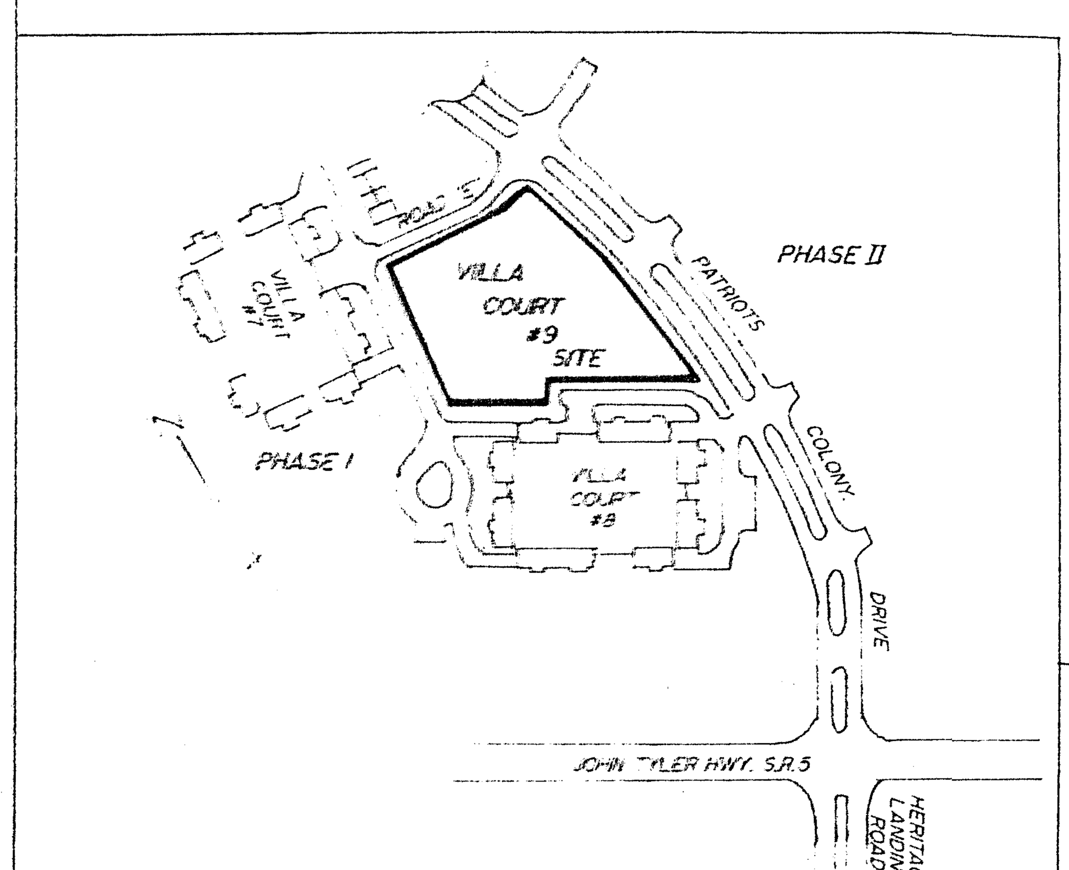
- PROPERTY LINE
- BUILDING SETBACK
- EASEMENT LINE
- CENTERLINE
- BUILDING
- STORM SEWER PIPE
- SANITARY SEWER PIPE
- WATERLINE
- GAS LINE
- TELEPHONE LINE
- ELECTRIC LINE
- MANHOLE
- DROP INLET
- CLEANOUT
- WATER METER
- WATER VALVE
- FIRE HYDRANT
- ELEC. TRANSFORMER
- UTILITY POLE
- TELE. JUNCTION BOX
- LIGHT POLE
- CONC. CURB
- CONC. CURB & GUTTER
- CONC. SIDEWALK
- CONC. SWALE /DITCH
- CONC. PAVEMENT
- BITUMINOUS PAVEMENT
- GROUND ELEVATION
- ELEVATION CONTOUR
- FINISHED GRADE
- TOP OF CURB ELEV.
- EDGE OF PAVEMENT
- DITCH
- DIRECTION OF FLOW
- TRAFFIC DIRECTION
- WOODS LINE
- TREE
- SHRUB
- FENCE
- SIGN



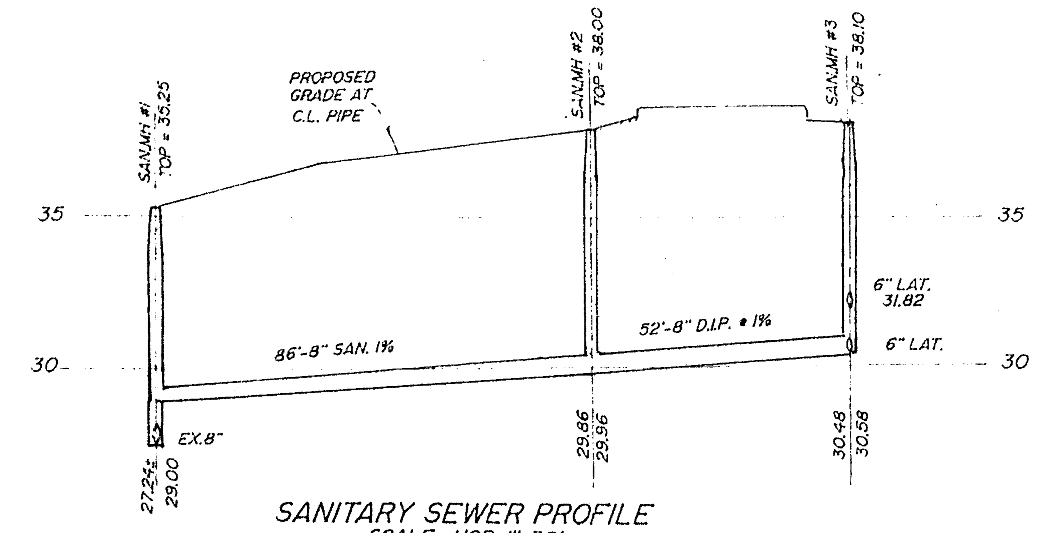


JR006

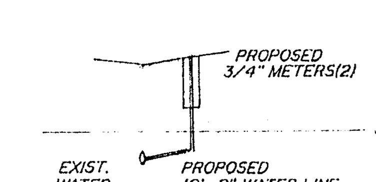
DRAINAGE AREAS



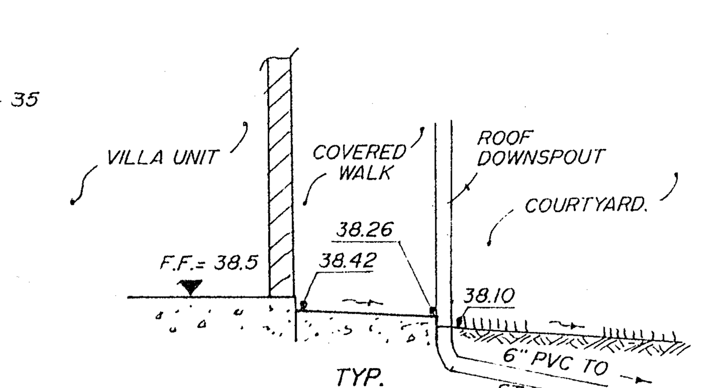
SITE
VICINITY MAP : 1"= 200'



SANITARY SEWER PROFILE
SCALE : HOR. 1"=30'
VERT. 1"=5'



WATER LINE PROFILE



TYP. WALK SECTION
N.T.S.

NOTE: SEE PHASE I DEVELOPMENT PLANS BY A.E.S. ENGINEERS FOR WATER,SEWER AND DRAINAGE SYSTEM DESIGN INFORMATION.

60' 30' 0' 30' 60'
SCALE : 1" = 30'

NOTE : ALL SANITARY SEWER AND WATER LINES ARE TO BE INSTALLED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE JAMES CITY SERVICE AUTHORITY.

DAVID P. CAMPBELL
12/4/98

SITE DEVELOPMENT PLAN			
VILLA COURT #9 PATRIOTS COLONY CONTINUING CARE RETIREMENT COMMUNITY PORTION OF PHASE II JAMES CITY COUNTY, VIRGINIA			
CAMPBELL LAND SURVEYING, INC. YORK COUNTY, VIRGINIA		DATE DEC.4, 1998	SCALE 1"=30'
DESIGN BY DPC	DRAWN BY DPC	CHECKED BY DPC	JOB NO. 98-1665
SHEET 1 OF 1			

No.	DATE	REVISION / COMMENT / NOTE	BY
4	10/29/98	ASBUILTS ON BASIN #1	CAH
3	12/19/96	REVISED PAVEMENT AT VILLAS #1 & #2 PER CONTRACTOR	AES
2	5/17/95	REVISED AS PER JCC COMMENTS	AES
1	3/8/95	REVISED AS PER JCC COMMENTS	AES

GRADING, DRAINAGE AND EROSION CONTROL PLAN
PATRIOTS COLONY

CONTINUING CARE RETIREMENT COMMUNITY

DEVELOPER: RIVERSIDE RETIREMENT SERVICES INC.

BERKELEY DISTRICT JAMES CITY COUNTY VIRGINIA

Designed GAM/CAH	Drawn SCL/BJJ	Date 11/1/95
Scale 1"=30'	Project No. 7733	Drawing No. 7 of 30

RECORD DRAWING-10/9/98

CONSULTING ENGINEERS

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

JR006_PATRIOTS_COLONY_PHASE_I_BASIN_I_VILLA CT_1-007

10.09.98-07.3733007.dwg

HYDROLOGIC REPORT FOR

PATRIOTS COLONY

BASIN #1

AES JOB #7733

JR006

AES CONSULTING ENGINEEERS

5248 OLDE TOWNE ROAD

SUITE 1

WILLIAMSBURG, VA. 23188

JANUARY 9,1995

1/5/95
JN 7733

PATRIOTS COLONY

DETERMINING BACKGROUND FLOW AT BASIN #1

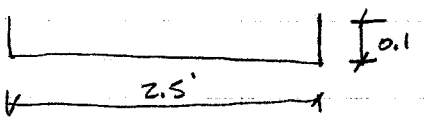
FROM FIELD INSPECTION, CHANNEL AT BASIN #2 LOCATION IS WELL DEFINED, WITH MODERATE MEANDER. THE NATURAL CHANNEL AVERAGES 2.5 FEET IN WIDTH, HAS VERTICAL SIDE SLOPES, AND FAIRLY FLAT BOTTOM. A CONSTANT FLOW IS OBSERVABLE, THOUGH SLIGHT. FIELD MEASUREMENT INDICTATE AN AVERAGE OF 0.1 FEET OF FLOW DEPTH, AND A CENTER VELOCITY OF 0.4 FEET PER SECOND.

FIND MANNING'S ROUGHNESS COEFFICIENT FOR NATURAL CHANNELS

CHANNELS INTO EARTH	=	0.02
MINOR DEGREE OF IRREGULARITY IN SIDE SLOPES	=	0.005
CHANGES IN SHAPE OCCUR GRADUALLY	=	0.001
EFFECT OF OBSTRUCTIONS	=	0.011
VEGETATION EFFECTS	=	0.001
MEANDER	=	0.005
ESTIMATED MANNINGS ROUGHNESS	=	0.043

USING MANNINGS EQUATION TO DETERMINE BACKGROUND FLOW

$$Q_B = 1.49\ S^{1/2}\ A\ R^{2/3} / n$$



CROSS-SECTIONAL AREA	=	0.1 * 2.5 =	0.25
WETTED PERIMETER	=	0.1 + 2.5 + 0.1 =	2.7
HYDRAULIC RADIUS	=	0.25 / 2.7 =	0.0926
SLOPE	=	1 FT / 160 FT =	= 0.0063 FT/FT

SO $Q_B = 1.49\ (0.0063)^{1/2}\ (0.25)\ (0.0926)^{2/3} / (0.043)$

$Q_B = 0.14$ CFS

EQUIVALENT ORIFICE (OR PIPE) TO DISCHARGE EQUIVALENT w/ 0.25 of HEAD = 2" ϕ

SO 3" ϕ ORIFICE / PIPE ADEQUATE FOR BACKGROUND FLOW

Design of Detention Basin #1
Patriots Colony

Detemining a pre-development discharge rate (i.e., pre-development 2-year 24-hour storm peak discharge rate) for Detention Basin #1

Pre-Development Conditions

-- Drainage Area = 67.50 Ac.

-- Soil Type / Land Use Breakdown

Hydro. Group	Pre-dev. Use	CN Assigned	Acres	CN * Ac.
C	Brush, fair condition	70	3.60	252.0
C	Woods, fair condition	73	61.10	4460.3
D	Woods, fair condition	79	2.80	221.2
TOTALS			67.50	4933.50
Weighted CN =				73.1

-- Time of Concentration

Overland flow

T=((0.007*(n*L)^0.8)/((P^0.5)*(s^0.4))
where
T=travel time (hours)

n=Manning's roughness coefficient	=	0.40
L=flow length (feet)	=	200.00
P=2-year, 24-hour rainfall (inches)	=	3.50
s=slope of hyd. grade line (ft/ft)	=	0.010

T= 0.79 hours

Design of Detention Basin #1
Patriots Colony

Shallow concentrated flow

T=L/(3600*V)
where
T=travel time (hours)
L=flow length (feet) = 1050.00
V=average velocity (ft/sec) = 0.75

T= 0.39 hours

Channel flow

T=L/(3600*V)
where
T=travel time (hours)
L=flow length (feet) = 1710.00
V=average velocity (ft/sec) = 2.30

T= 0.21 hours

Total time concentration (sum of travel times)

Tc= 1.38 hours

-- Ave. basin slope= 3.20 %

Design of Detention Basin #1
Patriots Colony

Post-Development Conditions

-- Drainage Area = 74.50 Ac.

-- Soil Type / Land Use Breakdown

Hydro. Group	Pre-dev. Use	CN Assigned	Acres	CN * Ac.
C	Brush, fair condition	70	3.60	252.0
C	Woods, fair condition	73	52.00	3796.0
C	High Density Urban areas	90	16.10	1449.0
D	Woods, fair condition	79	2.80	221.2
TOTALS			74.50	5718.20
Weighted CN =				76.8

Design of Detention Basin #1
Patriots Colony

-- Time of Concentration

Overland flow

T=((0.007*(n*L)^0.8)/((P^0.5)*(s^0.4))
where
T=travel time (hours)

n=Manning's roughness coefficient	=	0.40
L=flow length (feet)	=	200.00
P=100-year, 24-hour rainfall (inches)	=	8.10
s=slope of hyd. grade line (ft/ft)	=	0.010

T= 0.52 hours

Shallow concentrated flow

T=L/(3600*V)
where
T=travel time (hours)

L=flow length (feet)	=	1050.00
V=average velocity (ft/sec)	=	0.75

T= 0.39 hours

Channel flow

T=L/(3600*V)
where
T=travel time (hours)

L=flow length (feet)	=	1710.00
V=average velocity (ft/sec)	=	2.30

T= 0.21 hours

Total time concentration (sum of travel times)

Tc= 1.11 hours

Design of Detention Basin #1
Patriots Colony

-- Ave. basin slope= 3.20 %

Proposed estimated pond volume by elevation

Elevation	Depth	Area (sq. ft.)	Incre. Volume (cu. ft.)	Incre. Volume (cu. yd.)	Sum Volume (cu. ft.)	Sum Volume (cu. yd.)
12	0	716				
13	1	8533	4625	171	4625	171
14	1	14883	11708	434	16333	605
15	1	22899	18891	700	35224	1305
16	1	29728	26314	975	61537	2279
17	1	35908	32818	1215	94355	3495
18	1	48080	41994	1555	136349	5050
19	1	58426	53253	1972	189602	7022
20	1	69963	64195	2378	253797	9400
21	1	80268	75116	2782	328912	12182
22	1	90772	85520	3167	414432	15349

Sediment storage

-- SEDIMENT TO BE COLLECTED AND STORED AT UPHILL LOCATIONS

Design of Detention Basin #1
Patriots Colony

Required volume for 6-point BMP (First flush released in 24 Hr.)

Rv = 0.05 + (0.009)*(% of impervious post development area)

Vol. of pond = (1"/Acre)*(Drainage Area)* Rv

Impervious post development area

Description	Area (Acres)	% Impervious	Impervious Acres
Impervious brush areas	3.6	16	0.6
Impervious wooded areas	54.8	16	8.8
Impervious high density res.	16.1	70	11.3
Total impervious area	74.5		20.6

% impervious post development area = 27.7 %

Rv = 0.30

Vol. of pond = 1.78 Ac. ft.
77633 cu. ft.
2875 cu. yd.

Design of Detention Basin #1
Patriots Colony

SIZING ORIFICE FOR 24 HOUR DETENTION

77633 CF / (24 hr*60 min/hr*60 sec/min) = Ave. Release Rate

Average Release Rate required = 0.90 cfs

Amount of Head (feet)	Area of orifice (sf)	Area of orifice (sq. in.)	Size of orifice (dia. in inches)	
0.25	0.53	76.01	9.84	
0.50	0.37	53.74	8.27	
1.00	0.26	38.00	6.96	
2.00	0.19	26.87	5.85	
3.00	0.15	21.94	5.29	
4.00	0.13	19.00	4.92	
4.65	0.12	17.62	4.74	<--RECOMMENDED MIN. -- 4"

NOTE:

Pond has necessary volume for water quality to qualify as a 6-point BMP.

Option 1 STAGE / STORAGE TABLE R to reset

IMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM;

: 1. RESERVOIR No = 1. 2. RESERVOIR NAME = DRY DET 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	12.00.	716.....	0	0
5	1.00	13.00.	8533....	4624	4624
6	2.00	14.00.	14883...	11708	16332
7	3.00	15.00.	22899...	37782	54114
8	4.00	16.00.	29728...	26313	80427
9	5.00	17.00.	35908...	32818	113245
10	6.00	18.00.	48080...	41994	155239
11	7.00	19.00.	58426...	53253	208492
12	8.00	20.00.	69963...	64194	272686
13	9.00	21.00.	80268...	75115	347801
14	10.00	22.00.	90772...	85520	433321

HMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM<

Change item number: 0 *DY* to cont

Reservoir No. 1 OUTLET STRUCTURES

IMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM;

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

: 1. WIDTH (in) = 24. 9. WIDTH (in) = 4.. :
: 2. HEIGHT (in) = 24. 10. HEIGHT (in) = 4.. :
: 3. No. BARRELS = 1.. 11. No. BARRELS = 1.. :
: 4. INVERT ELEV. = 12....... 12. INVERT ELEV. = 11.85.... :
: 5. Co = 0.60 13. Co = 0.60 :
: 6. CULVERT LENGTH (ft) = 100. 14. CULVERT LENGTH (ft) = 0... :
: 7. CULVERT SLOPE (%) = .31. 15. CULVERT SLOPE (%) = 0... :
: 8. MANNING´S N-VALUE = .013 16. MANNING´S N-VALUE = .013 :
: 17. MULTI-STAGE OPTION ? (Y/N) Y :

: WEIR STRUCTURE A. Q=CwLH^EXP WEIR STRUCTURE B. Q=CwLH^EXP :

: 18. CREST LENGTH (ft) = 12.667. 23. CREST LENGTH (ft) = 20..... :
: 19. CREST ELEVATION = 16.5... 24. CREST ELEVATION = 21..... :
: 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 :

HMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM<

Change item number: 0 *DY* to cont

HYDROLOGIC REPORT

STAGE / STORAGE / DISCHARGE

RESERVOIR NUMBER = 1

RESERVOIR NAME = DRY DET POND (* Controlled by Culv Structure A)
STORAGE VALUES WERE INPUT MANUALLY

DISCHARGE VALUES: CULVERT STRUCT A. Q = .6 *A*[2gh/k]^.5 * 1
* CULVERT STRUCT B. Q = .6 *A*[2gh/k]^.5 * 1
* WEIR STRUCT A. Q = 3 * 12.667 * H ^ 1.5
WEIR STRUCT B. Q = 3 * 20 * H ^ 1.5

ELEVATION	DISCHARGE (cfs) CULVERT A	CULVERT B	WEIR A	WEIR B
12.00	0.00	0.06	0.00	0.00
13.00	5.21	0.38	0.00	0.00
14.00	15.12	0.56	0.00	0.00
15.00	21.39	0.70	0.00	0.00
16.00	26.20	0.81	0.00	0.00
17.00	30.25	0.79	13.44	0.00
18.00	33.82	0.00	69.81	0.00
19.00	37.05	0.00	150.21	0.00
20.00	40.02	0.00	248.83	0.00
21.00	42.78	0.00	362.76	0.00
22.00	45.37	0.00	490.16	60.00

STAGE	ELEVATION	INC STOR cu ft	TOT STOR cu ft	OUTFLOW cfs
0.00	12.00	0	0	0.00
1.00	13.00	4624	4624	0.38
2.00	14.00	11708	16332	0.56
3.00	15.00	37782	54114	0.70
4.00	16.00	26313	80427	0.81
5.00	17.00	32818	113245	14.23
6.00	18.00	41994	155239	33.82
7.00	19.00	53253	208492	37.05
8.00	20.00	64194	272686	40.02
9.00	21.00	75115	347801	42.78
10.00	22.00	85520	433321	105.37

HYDROLOGIC REPORT

PATRIOTS COLONY.....
BASIN #1.....
2-YEAR PRE-DEVELOPMENT

Hyd. No. 1

Hydrograph type	= S.C.S. RUNOFF	Peak discharge	= 32.63 cfs
Storm frequency	= 2 yr	Time interval	= 5 min
Basin area	= 67.5 ac	Basin curve No.	= 73.1
Ave basin slope	= 3.2 %	Hydraulic len	= 2860 ft
Basin lag	= 49.8 min	Time of concen	= 83.00 min
Total precip.	= 3.50 in	Distribution	= S.C.S. II

HYDROGRAPH DISCHARGE TABLE

TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfS)	
11.75	1.30	11.83	2.38	11.92	4.55	12.00	7.43
12.08	10.47	12.17	13.64	12.25	16.93	12.33	20.31
12.42	23.71	12.50	27.00	12.58	29.97	12.67	32.14
12.75	32.63	12.83	32.05	12.92	31.26	13.00	30.27
13.08	29.12	13.17	27.82	13.25	26.40	13.33	24.89
13.42	23.31	13.50	21.65	13.58	19.93	13.67	18.15
13.75	16.32	13.83	14.47	13.92	12.64	14.00	10.90
14.08	9.44	14.17	8.58	14.25	8.10	14.33	7.68
14.42	7.31	14.50	6.99	14.58	6.72	14.67	6.47
14.75	6.25	14.83	6.05	14.92	5.87	15.00	5.71
15.08	5.55	15.17	5.42	15.25	5.29	15.33	5.17
15.42	5.06	15.50	4.96	15.58	4.86	15.67	4.77
15.75	4.68	15.83	4.59	15.92	4.51	16.00	4.43
16.08	4.35	16.17	4.27	16.25	4.20	16.33	4.12
16.42	4.04	16.50	3.97	16.58	3.90	16.67	3.83
16.75	3.77	16.83	3.71	16.92	3.65	17.00	3.59
17.08	3.54	17.17	3.50	17.25	3.45	17.33	3.41
17.42	3.37	17.50	3.33	17.58	3.30	17.67	3.26
17.75	3.23	17.83	3.20	17.92	3.17	18.00	3.14
18.08	3.11	18.17	3.08	18.25	3.05	18.33	3.02
18.42	2.99	18.50	2.97	18.58	2.94	18.67	2.91
18.75	2.88	18.83	2.85	18.92	2.82	19.00	2.79
19.08	2.76	19.17	2.73	19.25	2.70	19.33	2.67
19.42	2.64	19.50	2.61	19.58	2.58	19.67	2.55
19.75	2.52	19.83	2.49	19.92	2.46	20.00	2.43
20.08	2.40	20.17	2.36	20.25	2.33	20.33	2.31
20.42	2.28	20.50	2.25	20.58	2.22	20.67	2.20
20.75	2.17	20.83	2.15	20.92	2.13	21.00	2.11
21.08	2.10	21.17	2.08	21.25	2.07	21.33	2.06

HYDROLOGIC REPORT

PATRIOTS COLONY.....
BASIN #1.....
2-YEAR POST-DEVELOPM..

Hyd. No. 7

Hydrograph type	= S.C.S. RUNOFF	Peak discharge	= 44.75 cfs
Storm frequency	= 2 yr	Time interval	= 5 min
Basin area	= 74.5 ac	Basin curve No.	= 76.8
Ave basin slope	= 3.2 %	Hydraulic len	= 2860 ft
Basin lag	= 49.8 min	Time of concen	= 83.00 min
Total precip.	= 3.50 in	Distribution	= S.C.S. II

HYDROGRAPH DISCHARGE TABLE

TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfS)	
11.42	1.15	11.50	1.38	11.58	1.68	11.67	2.19
11.75	3.07	11.83	4.71	11.92	7.79	12.00	11.77
12.08	15.93	12.17	20.25	12.25	24.68	12.33	29.21
12.42	33.72	12.50	38.00	12.58	41.76	12.67	44.38
12.75	44.75	12.83	43.74	12.92	42.46	13.00	40.94
13.08	39.21	13.17	37.30	13.25	35.25	13.33	33.09
13.42	30.83	13.50	28.50	13.58	26.09	13.67	23.62
13.75	21.09	13.83	18.56	13.92	16.08	14.00	13.77
14.08	11.85	14.17	10.74	14.25	10.13	14.33	9.59
14.42	9.12	14.50	8.72	14.58	8.37	14.67	8.06
14.75	7.78	14.83	7.52	14.92	7.29	15.00	7.08
15.08	6.89	15.17	6.72	15.25	6.55	15.33	6.40
15.42	6.26	15.50	6.13	15.58	6.01	15.67	5.89
15.75	5.78	15.83	5.67	15.92	5.57	16.00	5.47
16.08	5.37	16.17	5.27	16.25	5.17	16.33	5.08
16.42	4.98	16.50	4.89	16.58	4.80	16.67	4.72
16.75	4.63	16.83	4.56	16.92	4.49	17.00	4.42
17.08	4.35	17.17	4.29	17.25	4.24	17.33	4.19
17.42	4.14	17.50	4.09	17.58	4.04	17.67	4.00
17.75	3.96	17.83	3.92	17.92	3.88	18.00	3.85
18.08	3.81	18.17	3.77	18.25	3.74	18.33	3.70
18.42	3.67	18.50	3.63	18.58	3.59	18.67	3.56
18.75	3.52	18.83	3.48	18.92	3.45	19.00	3.41
19.08	3.37	19.17	3.34	19.25	3.30	19.33	3.26
19.42	3.22	19.50	3.19	19.58	3.15	19.67	3.11
19.75	3.07	19.83	3.04	19.92	3.00	20.00	2.96
20.08	2.92	20.17	2.88	20.25	2.85	20.33	2.81
20.42	2.77	20.50	2.74	20.58	2.71	20.67	2.68
20.75	2.65	20.83	2.62	20.92	2.60	21.00	2.57

HYDROLOGIC REPORT

PATRIOTS COLONY.....
RESERVOIR ROUTED.....
2-YEAR POST-DEVELOPM..

Hyd. No. 8

Hydrograph type = RESERVOIR ROUTE Peak discharge = 31.77 cfs
Storm frequency = 2 yr Time interval = 5 min
Inflow hyd. no. = 7 Reservoir no. = 1

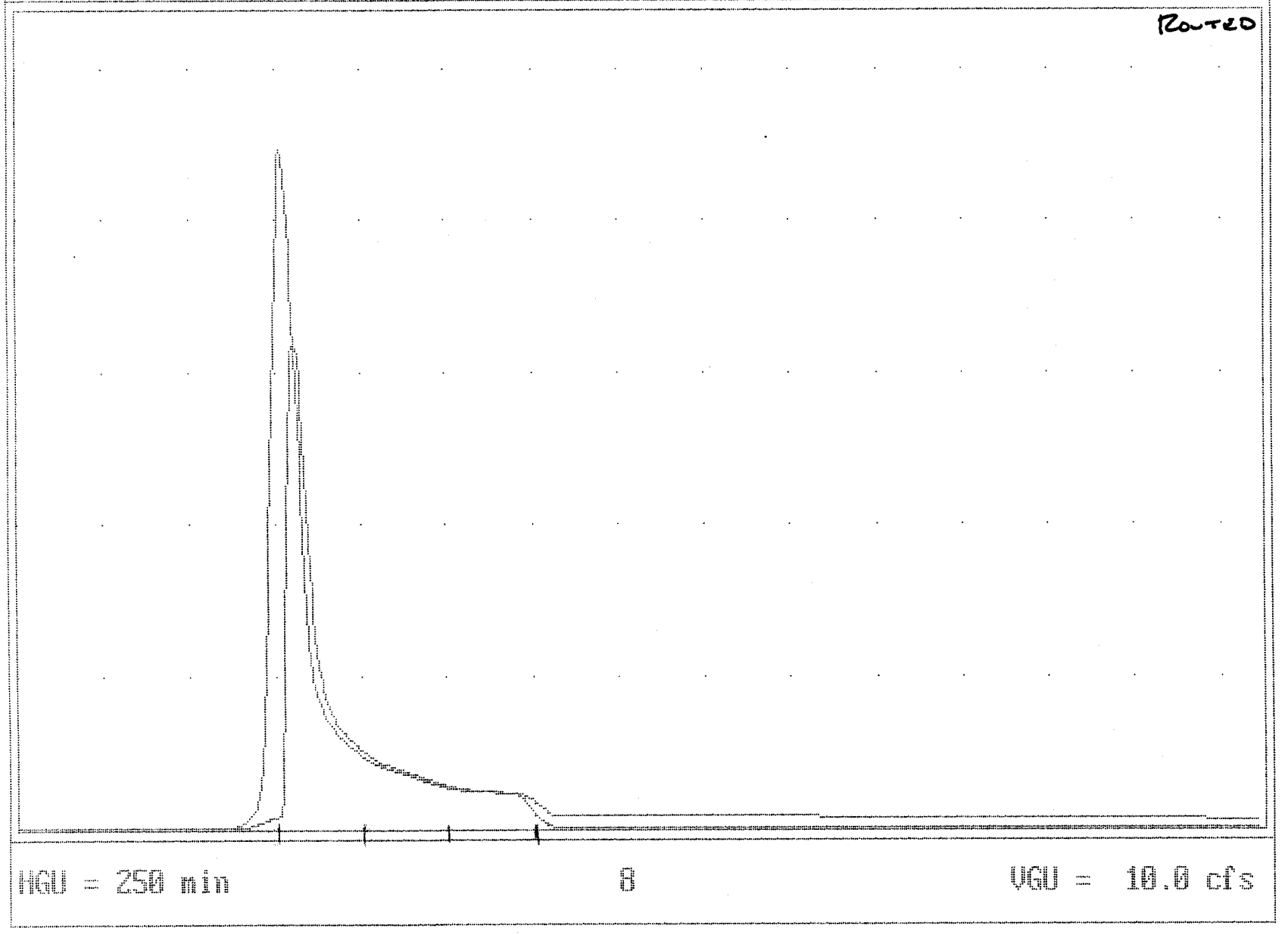
HYDROGRAPH DISCHARGE TABLE

TIME hrs	INFLOW (i) cfs	INFLOW (j) cfs	2S/dt-O (i) cfs	2S/dt+O (j) cfs	OUTFLOW cfs
11.42	1.15	1.38	9.65	10.04	0.19
11.50	1.38	1.68	11.75	12.18	0.21
11.58	1.68	2.19	14.33	14.81	0.24
11.67	2.19	3.07	17.65	18.21	0.28
11.75	3.07	4.71	22.28	22.92	0.32
11.83	4.71	7.79	29.32	30.06	0.37
11.92	7.79	11.77	41.00	41.82	0.41
12.00	11.77	15.93	59.66	60.57	0.46
12.08	15.93	20.25	86.34	87.37	0.52
12.17	20.25	24.68	121.38	122.52	0.57
12.25	24.68	29.21	165.12	166.31	0.59
12.33	29.21	33.72	217.77	219.02	0.62
12.42	33.72	38.00	279.39	280.70	0.66
12.50	38.00	41.76	349.72	351.10	0.69
12.58	41.76	44.38	427.99	429.47	0.74
12.67	44.38	44.75	512.53	514.12	0.80
12.75	44.75	43.74	599.98	601.66	0.84
12.83	43.74	42.46	680.89	688.47	3.79
12.92	42.46	40.94	739.26	767.09	13.92
13.00	40.94	39.21	779.90	822.66	21.38
13.08	39.21	37.30	806.45	860.05	26.80
13.17	37.30	35.25	823.39	882.97	29.79
13.25	35.25	33.09	833.17	895.95	31.39
13.33	33.09	30.83	837.98	901.51	31.76
13.42	30.83	28.50	838.37	901.90	31.77

Qp = 31.8 RESERVOIR ROUTE 2 Yr

POST-DEV.

ROUTED



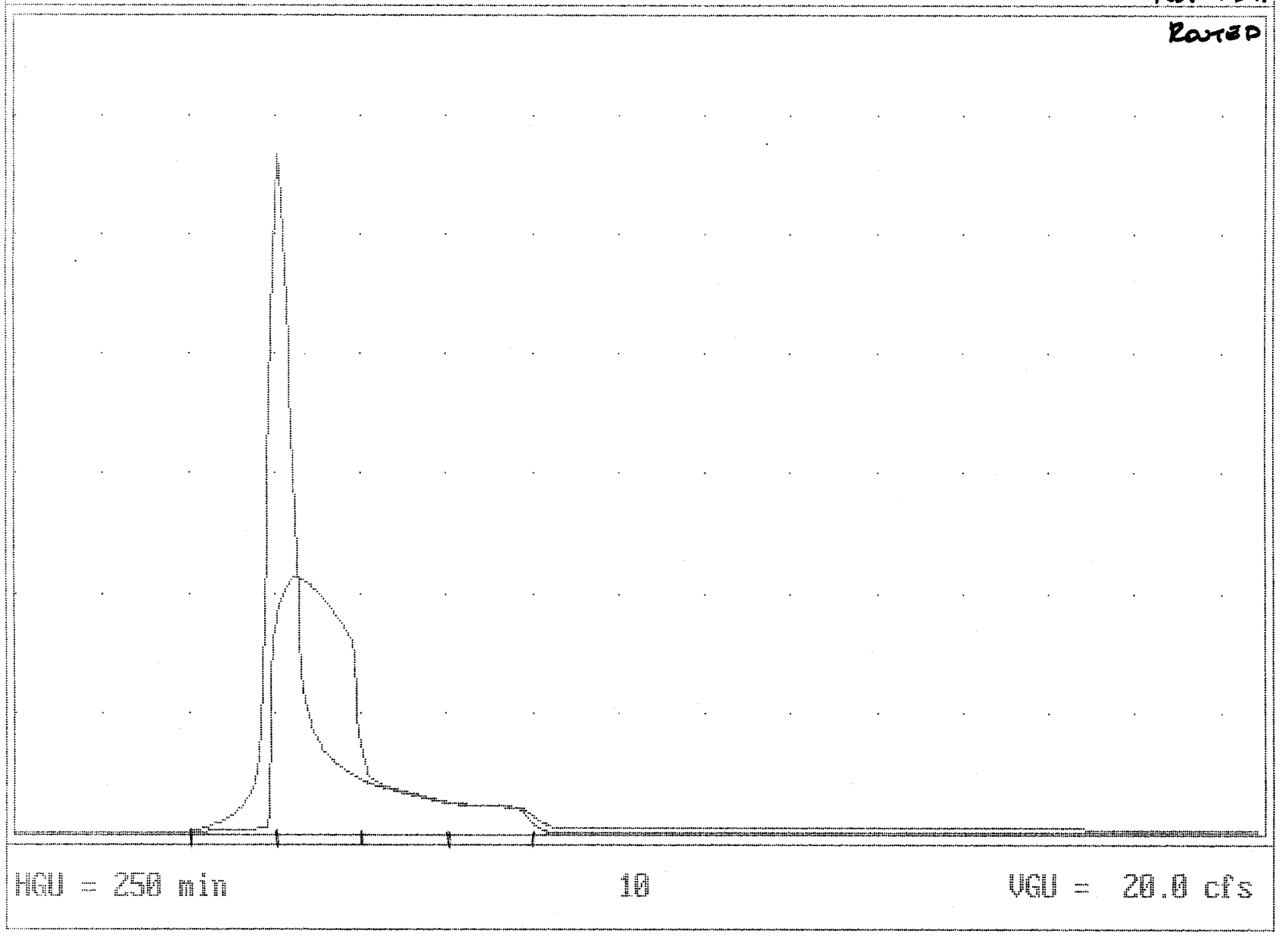
MAX STORAGE = 130520

MAX ELEVATION = [illegible]

Qp = 42.7 RESERVOIR ROUTE 10 Yr

POST-DEV.

ROUTED



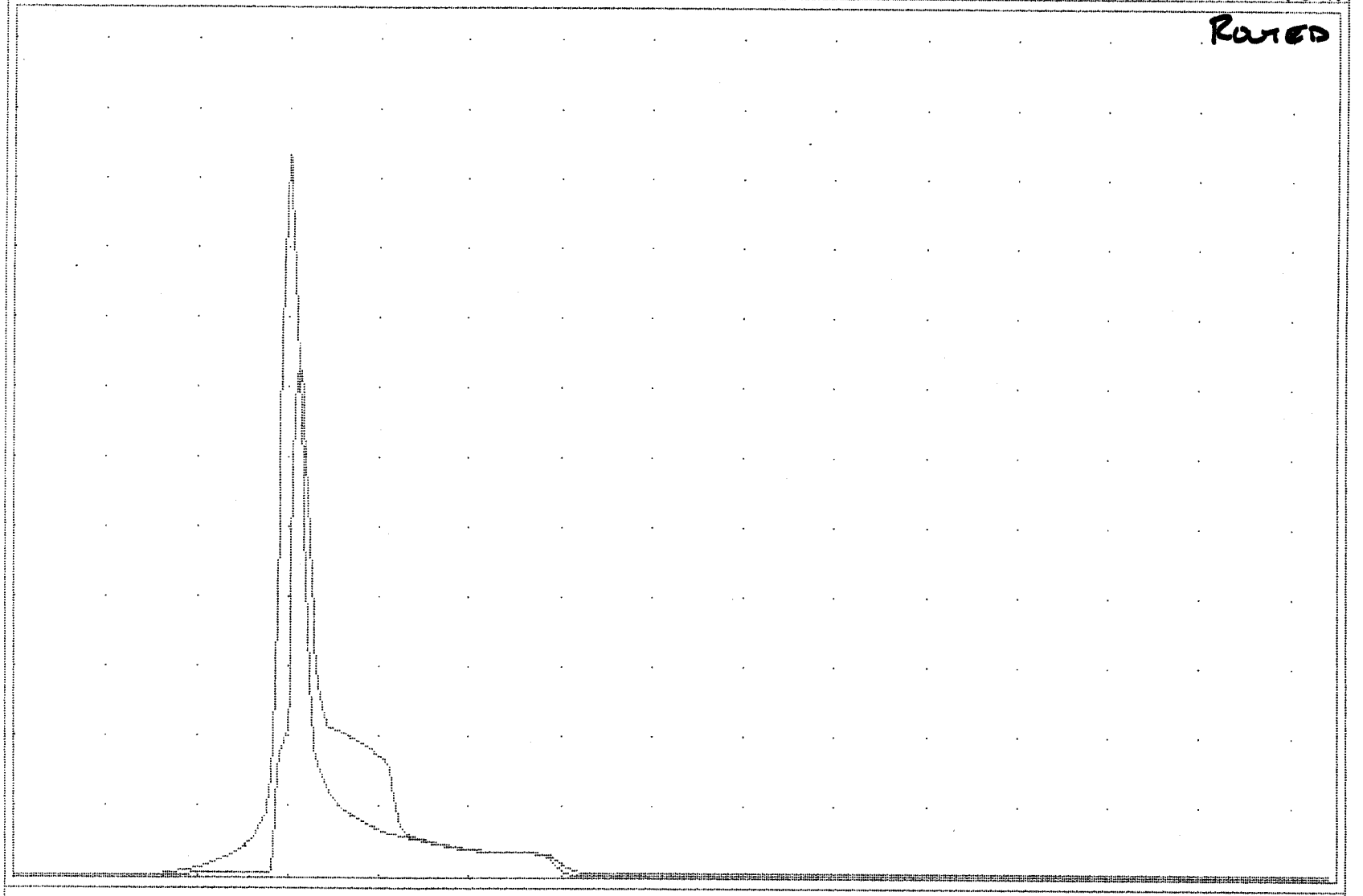
MAX STORAGE = 344977

MAX ELEVATION = 26.26

Qp = 145.3 RESERVOIR ROUTE 100 Yr

POST-DEV.

ROUTED



HGU = 250 min 12 VGU = 20.0 cfs

MAX STORAGE = 471132

MAX ELEVATION = 35.41

HYDROLOGIC REPORT FOR

PATRIOTS COLONY

BASIN #3

AES JOB #7733

AES CONSULTING ENGINEEERS

5248 OLDE TOWNE ROAD

SUITE 1

WILLIAMSBURG, VA. 23188

JANUARY 9,1995

HYDROLOGIC REPORT

PATRIOTS COLONY.....
AMENITY BASIN #3.....
10-YEAR POST-DEVELOPME

Hyd. No. 1

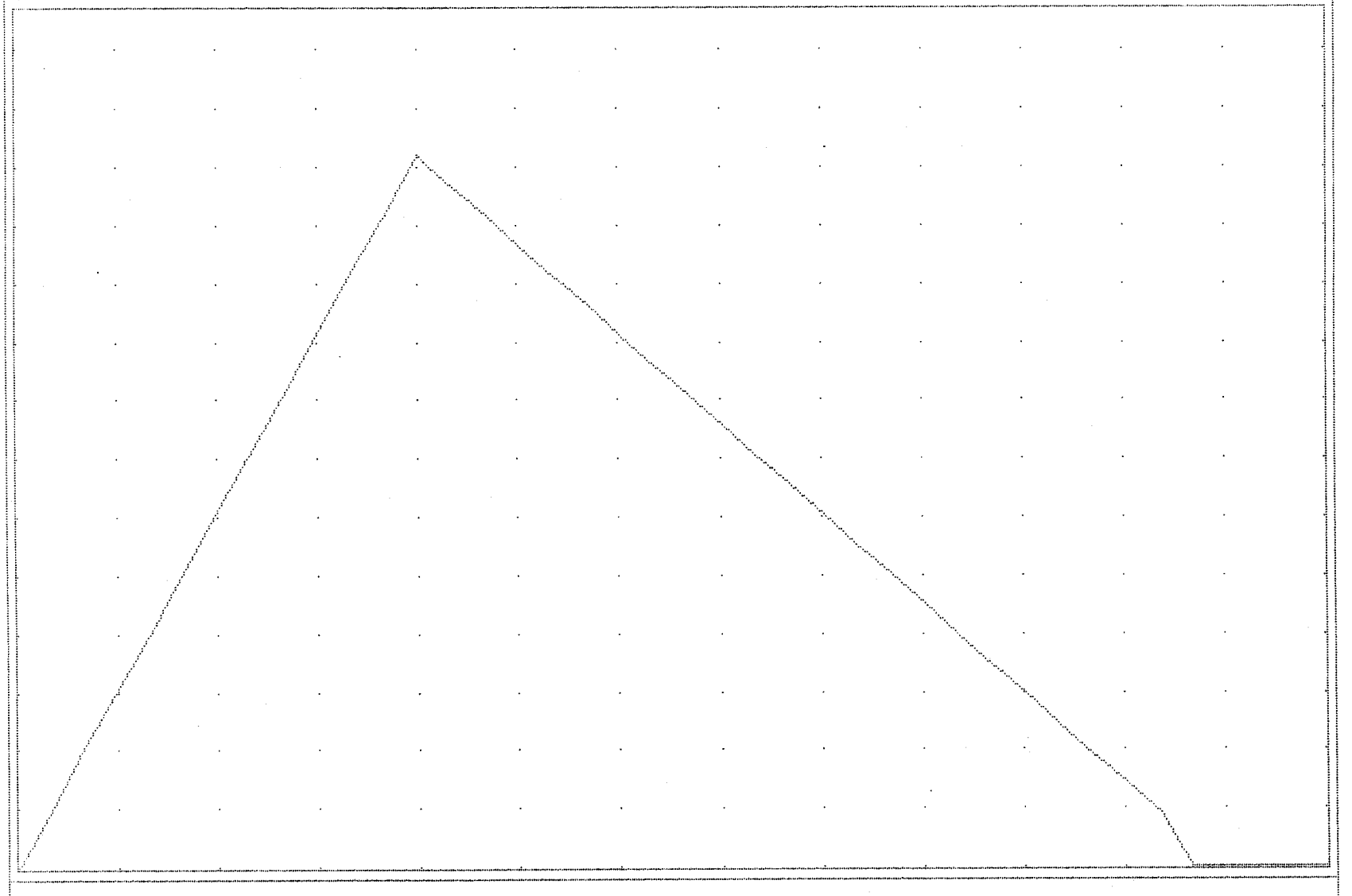
Hydrograph type	= RATIONAL	Peak discharge	= 6.11 cfs
Storm frequency	= 10 yr	Time interval	= 1 min
Time of conc.	= 12 min	Intensity	= 4.76 in/hr
Runoff coeff.	= .68	Basin area	= 1.89 ac

HYDROGRAPH DISCHARGE TABLE

TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfS)	
0.02	0.51	0.03	1.02	0.05	1.53	0.07	2.04
0.08	2.55	0.10	3.06	0.12	3.57	0.13	4.08
0.15	4.59	0.17	5.10	0.18	5.61	0.20	6.11
0.22	5.86	0.23	5.60	0.25	5.35	0.27	5.09
0.28	4.83	0.30	4.58	0.32	4.32	0.33	4.07
0.35	3.81	0.37	3.55	0.38	3.30	0.40	3.04
0.42	2.79	0.43	2.53	0.45	2.27	0.47	2.02
0.48	1.76	0.50	1.51	0.52	1.25	0.53	0.99

Qp = 6.1 RATIONAL 10 Yr

POST-DEV.



HGU = 3 min 1 VGU = 0.5 cfs

```
 Option 1                       STAGE / STORAGE TABLE                      R to reset
IMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM;
: 1. RESERVOIR No = 3.     2. RESERVOIR NAME = AMENITY BASI                        :
: 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        37.00.     6408....                0               0          :
:  5     1.00        38.00.     7416....             6912            6912          :
:  6     2.00        39.00.     9108....             8262           15174          :
:  7     0.00         0.00.     0.......                0               0          :
:  8     0.00         0.00.     0.......                0               0          :
:  9     0.00         0.00.     0.......                0               0          :
: 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          :
:                                                                                  :
:                                                                                  :
HMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM<
Change item number: 0                                                      DY to cont
```

```
 Reservoir No. 3                   OUTLET STRUCTURES
IMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM;
: CULVERT STRUC  A. Q=CoA[2gh/k]^.5    CULVERT STRUC  B. Q=CoA[2gh/k]^.5          :
:                                                                                  :
: 1. WIDTH  (in)     = 15.              9. WIDTH  (in)     = 0..                   :
: 2. HEIGHT (in)     = 15.             10. HEIGHT (in)     = 0..                   :
: 3. No. BARRELS     = 1..             11. No. BARRELS     = 0..                   :
: 4. INVERT ELEV.    = 37.......       12. INVERT ELEV.    = 0........             :
: 5. Co = 0.60                         13. Co = 0.60                               :
: 6. CULVERT LENGTH (ft) = 45..        14. CULVERT LENGTH (ft) = 0...              :
: 7. CULVERT SLOPE (%)   = 1...        15. CULVERT SLOPE (%)   = 0...              :
: 8. MANNING'S N-VALUE   = .013        16. MANNING'S N-VALUE   = .013              :
:                                      17. MULTI-STAGE OPTION ? (Y/N) N            :
:                                                                                  :
: WEIR STRUCTURE A.      Q=CwLH^EXP    WEIR STRUCTURE B.      Q=CwLH^EXP           :
:                                                                                  :
: 18. CREST LENGTH (ft)  = 40.....     23. CREST LENGTH (ft)  = 0......            :
: 19. CREST ELEVATION    = 38.8...     24. CREST ELEVATION    = 0......            :
: 20. Cw = 3.00                        25. Cw = 3.00                               :
: 21. EXP = 1.50                       26. EXP = 1.50                              :
: 22. MULTI-STAGE OPTION ? (Y/N) N     27. MULTI-STAGE OPTION ? (Y/N) N            :
:                                                                                  :
:                                                                                  :
HMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM<
Change item number: 0                                                      DY to cont
```

HYDROLOGIC REPORT

STAGE / STORAGE / DISCHARGE

RESERVOIR NUMBER = 3

RESERVOIR NAME = AMENITY BASI
STORAGE VALUES WERE INPUT MANUALLY

DISCHARGE VALUES: CULVERT STRUCT A. Q = .6 *A*[2gh/k]^.5 * 1
CULVERT STRUCT B. Q = .6 *A*[2gh/k]^.5 * 0
WEIR STRUCT A. Q = 3 * 40 * H ^ 1.5
WEIR STRUCT B. Q = 3 * 0 * H ^ 1.5

ELEVATION	DISCHARGE (cfs) CULVERT A	CULVERT B	WEIR A	WEIR B
37.00	0.00	0.00	0.00	0.00
38.00	3.80	0.00	0.00	0.00
39.00	6.77	0.00	10.73	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	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	37.00	0	0	0.00
1.00	38.00	6912	6912	3.80
2.00	39.00	8262	15174	17.51
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
0.00	0.00	0	0	0.00
0.00	0.00	0	0	0.00
0.00	0.00	0	0	0.00

HYDROLOGIC REPORT

PATRIOTS COLONY.....
AMENITY BASIN #3.....
10-YEAR POST ROUTED...

Hyd. No. 2

Hydrograph type = RESERVOIR ROUTE Peak discharge = 1.95 cfs
Storm frequency = 10 yr Time interval = 1 min
Inflow hyd. no. = 1 Reservoir no. = 3

HYDROGRAPH DISCHARGE TABLE

TIME hrs	INFLOW (i) cfs	INFLOW (j) cfs	2S/dt-O (i) cfs	2S/dt+O (j) cfs	OUTFLOW cfs
0.03	1.02	1.53	2.02	2.04	0.01
0.05	1.53	2.04	4.55	4.57	0.01
0.07	2.04	2.55	8.07	8.11	0.02
0.08	2.55	3.06	12.58	12.65	0.04
0.10	3.06	3.57	18.09	18.19	0.05
0.12	3.57	4.08	24.56	24.71	0.08
0.13	4.08	4.59	31.90	32.20	0.15
0.15	4.59	5.10	40.12	40.57	0.22
0.17	5.10	5.61	49.18	49.80	0.31
0.18	5.61	6.11	59.06	59.88	0.41
0.20	6.11	5.86	69.74	70.78	0.52
0.22	5.86	5.60	80.39	81.71	0.66
0.23	5.60	5.35	90.26	91.85	0.79
0.25	5.35	5.09	99.33	101.21	0.94
0.27	5.09	4.83	107.61	109.76	1.08
0.28	4.83	4.58	115.13	117.54	1.20
0.30	4.58	4.32	121.87	124.54	1.33
0.32	4.32	4.07	127.88	130.77	1.45
0.33	4.07	3.81	133.16	136.27	1.55
0.35	3.81	3.55	137.76	141.04	1.64
0.37	3.55	3.30	141.68	145.12	1.72
0.38	3.30	3.04	144.95	148.53	1.79
0.40	3.04	2.79	147.59	151.29	1.85
0.42	2.79	2.53	149.64	153.42	1.89
0.43	2.53	2.27	151.11	154.95	1.92

HYDROGRAPH DISCHARGE TABLE Cont'd

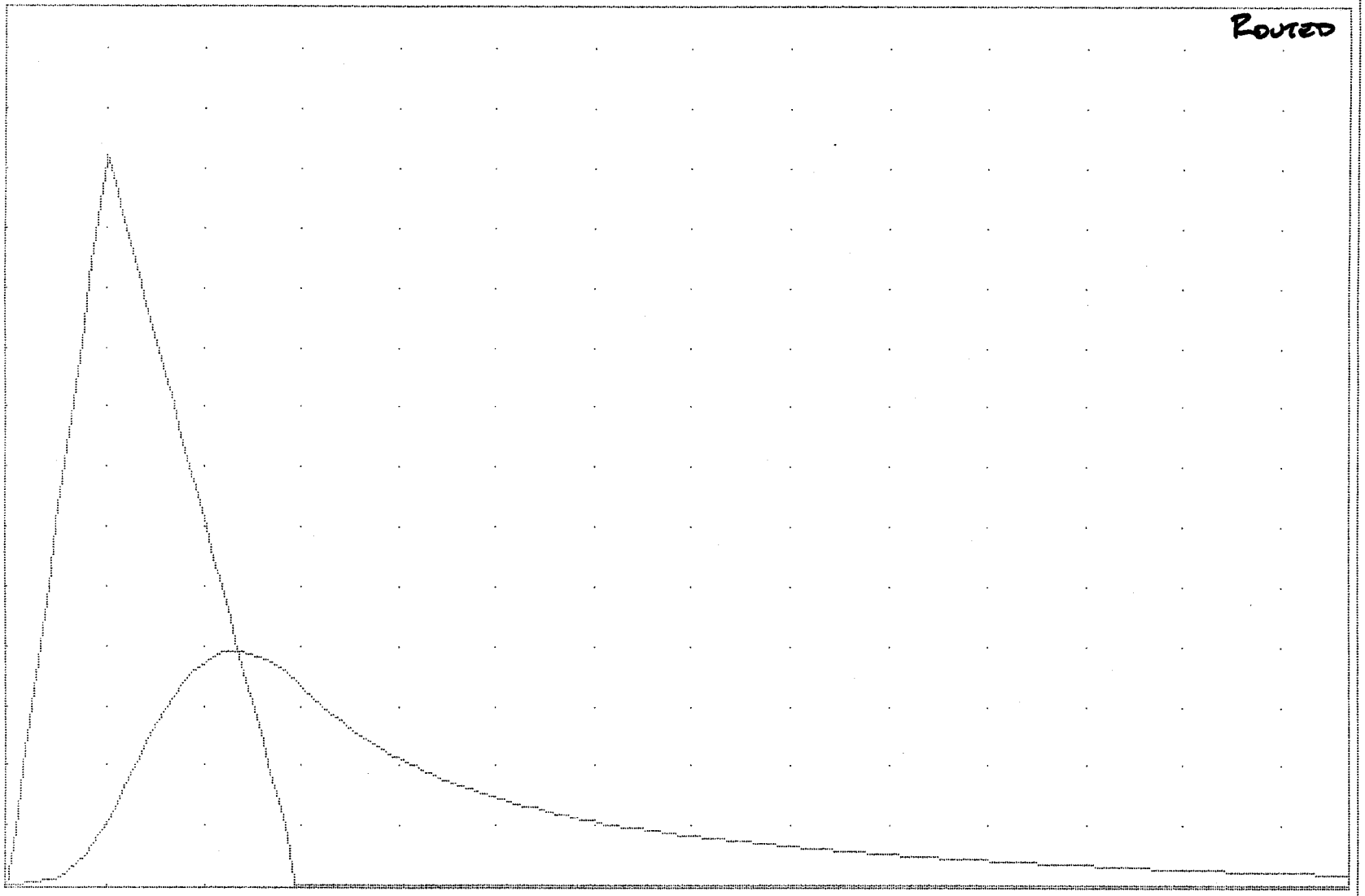
TIME hrs	INFLOW (i) cfs	INFLOW (j) cfs	2S/dt-O (i) cfs	2S/dt+O (j) cfs	OUTFLOW cfs
0.45	2.27	2.02	152.03	155.91	1.94
0.47	2.02	1.76	152.42	156.32	1.95
0.48	1.76	1.51	152.31	156.20	1.95
0.50	1.51	1.25	151.70	155.57	1.93
0.52	1.25	0.99	150.63	154.46	1.91
0.53	0.99	0.74	149.12	152.88	1.88
0.55	0.74	0.48	147.17	150.85	1.84
0.57	0.48	0.00	144.81	148.39	1.79
0.58	0.00	0.00	141.84	145.29	1.73
0.60	0.00	0.00	138.52	141.84	1.66
0.62	0.00	0.00	135.34	138.52	1.59
0.63	0.00	0.00	132.27	135.34	1.53
0.65	0.00	0.00	129.32	132.27	1.48
0.67	0.00	0.00	126.48	129.32	1.42
0.68	0.00	0.00	123.74	126.48	1.37
0.70	0.00	0.00	121.10	123.74	1.32
0.72	0.00	0.00	118.56	121.10	1.27
0.73	0.00	0.00	116.12	118.56	1.22
0.75	0.00	0.00	113.76	116.12	1.18
0.77	0.00	0.00	111.48	113.76	1.14
0.78	0.00	0.00	109.27	111.48	1.10
0.80	0.00	0.00	107.13	109.27	1.07
0.82	0.00	0.00	105.06	107.13	1.04
0.83	0.00	0.00	103.05	105.06	1.00

Maximum outflow (cfs) = 1.95
Maximum storage (cu ft) = 4631
Maximum elevation (ft) = 37.67

Qp = 1.9 RESERVOIR ROUTE 10 Yr

POST-DEV.

ROUTED



HGU = 12 min 2 VGU = 0.5 cfs

MAX STORAGE = 4631

HYDROLOGIC REPORT

PATRIOTS COLONY.....
AMENITY BASIN #3.....
100-YEAR POST-DEVELOPM

Hyd. No. 3

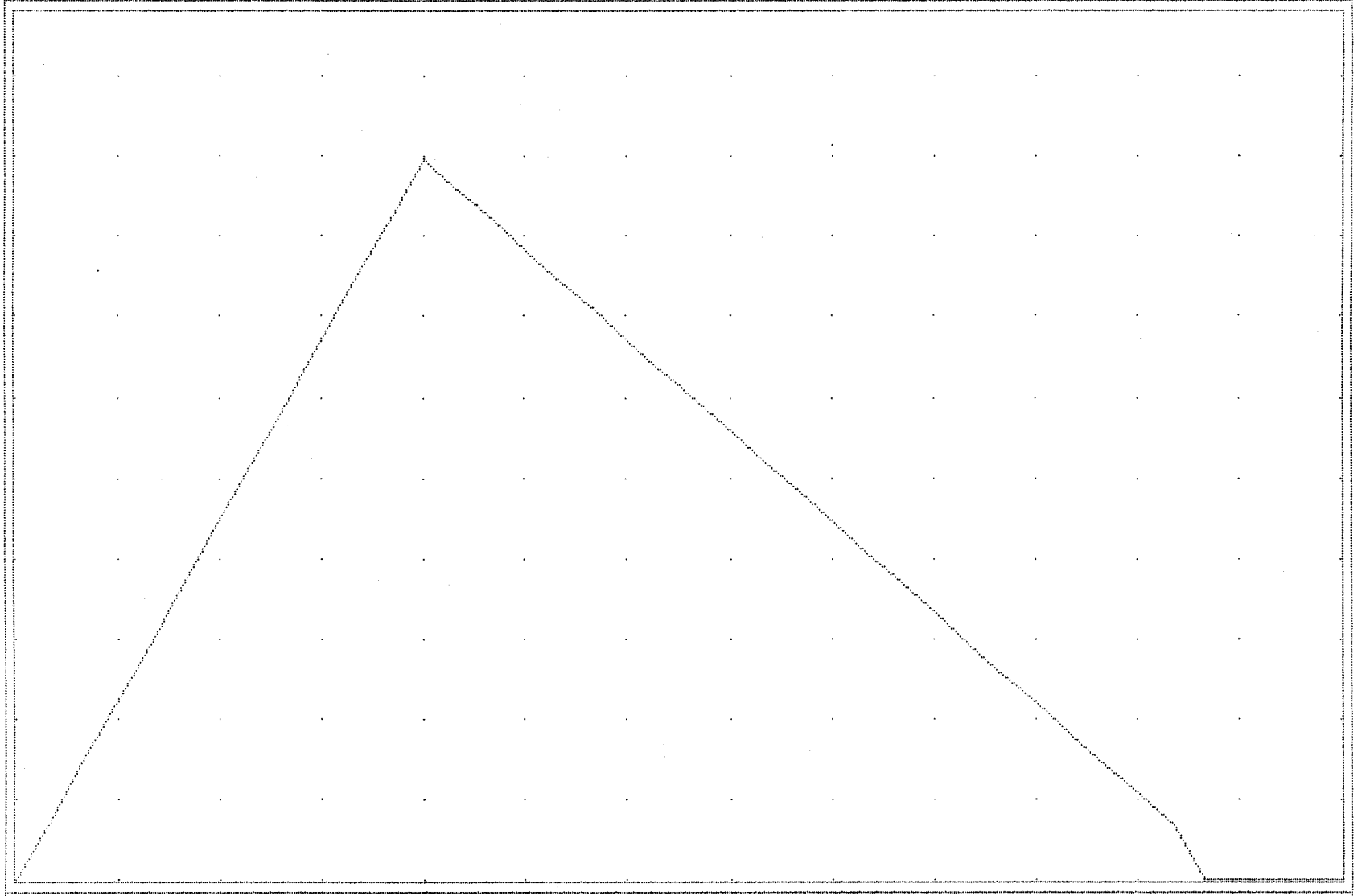
Hydrograph type	= RATIONAL	Peak discharge	= 8.98 cfs
Storm frequency	= 100 yr	Time interval	= 1 min
Time of conc.	= 12 min	Intensity	= 6.99 in/hr
Runoff coeff.	= .68	Basin area	= 1.89 ac

HYDROGRAPH DISCHARGE TABLE

TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfs)		TIME--OUTFLOW (hrs cfS)	
0.02	0.75	0.03	1.50	0.05	2.25	0.07	2.99
0.08	3.74	0.10	4.49	0.12	5.24	0.13	5.99
0.15	6.74	0.17	7.48	0.18	8.23	0.20	8.98
0.22	8.61	0.23	8.23	0.25	7.85	0.27	7.48
0.28	7.10	0.30	6.73	0.32	6.35	0.33	5.97
0.35	5.60	0.37	5.22	0.38	4.84	0.40	4.47
0.42	4.09	0.43	3.72	0.45	3.34	0.47	2.96
0.48	2.59	0.50	2.21	0.52	1.84	0.53	1.46
0.55	1.08	0.57	0.71	0.58	0.00	0.60	0.00

Qp = 9.0 RATIONAL 100 Yr

POST-DEV.



HGU = 3 min 3 VGU = 1.0 cfs

HYDROLOGIC REPORT

PATRIOTS COLONY.....
AMENITY BASIN #3.....
100-YR POST ROUTED....

Hyd. No. 4

Hydrograph type = RESERVOIR ROUTE Peak discharge = 3.26 cfs
Storm frequency = 100 yr Time interval = 1 min
Inflow hyd. no. = 3 Reservoir no. = 3

HYDROGRAPH DISCHARGE TABLE

TIME hrs	INFLOW (i) cfs	INFLOW (j) cfs	2S/dt-O (i) cfs	2S/dt+O (j) cfs	OUTFLOW cfs
0.03	1.50	2.25	2.97	2.99	0.01
0.05	2.25	2.99	6.68	6.72	0.02
0.07	2.99	3.74	11.85	11.92	0.03
0.08	3.74	4.49	18.48	18.59	0.05
0.10	4.49	5.24	26.52	26.72	0.10
0.12	5.24	5.99	35.88	36.25	0.18
0.13	5.99	6.74	46.54	47.11	0.28
0.15	6.74	7.48	58.46	59.27	0.40
0.17	7.48	8.23	71.59	72.68	0.55
0.18	8.23	8.98	85.84	87.31	0.74
0.20	8.98	8.61	101.11	103.05	0.97
0.22	8.61	8.23	116.25	118.70	1.23
0.23	8.23	7.85	130.10	133.09	1.49
0.25	7.85	7.48	142.70	146.19	1.74
0.27	7.48	7.10	154.06	158.03	1.98
0.28	7.10	6.73	164.23	168.64	2.20
0.30	6.73	6.35	173.25	178.06	2.40
0.32	6.35	5.97	181.17	186.32	2.58
0.33	5.97	5.60	188.04	193.49	2.73
0.35	5.60	5.22	193.89	199.61	2.86
0.37	5.22	4.84	198.78	204.71	2.96
0.38	4.84	4.47	202.74	208.85	3.05
0.40	4.47	4.09	205.79	212.06	3.13
0.42	4.09	3.72	207.95	214.35	3.20
0.43	3.72	3.34	209.27	215.76	3.24

HYDROGRAPH DISCHARGE TABLE Cont'd

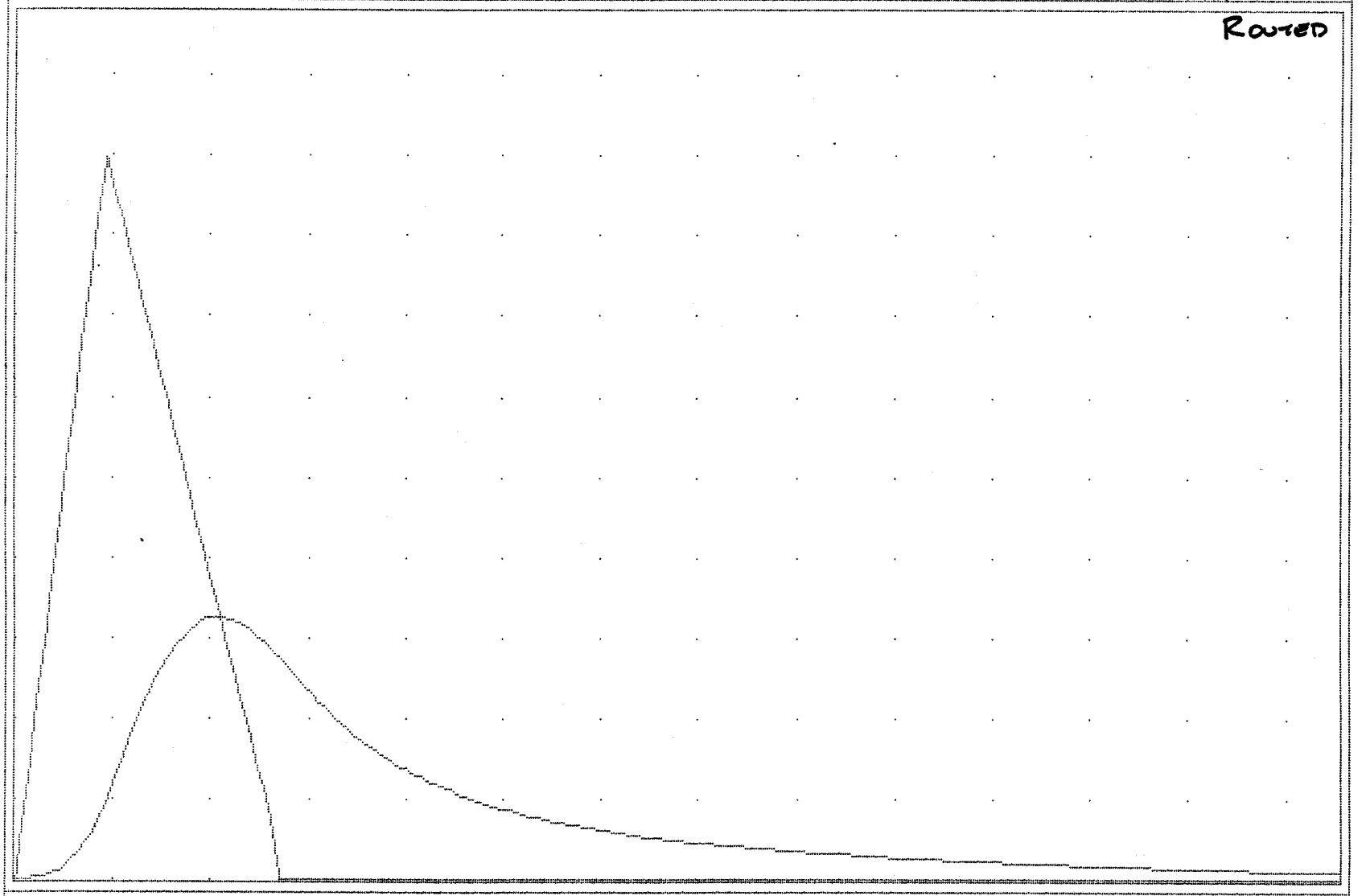
TIME hrs	INFLOW (i) cfs	INFLOW (j) cfs	2S/dt-O (i) cfs	2S/dt+O (j) cfs	OUTFLOW cfs
0.45	3.34	2.96	209.80	216.32	3.26
0.47	2.96	2.59	209.60	216.11	3.25
0.48	2.59	2.21	208.70	215.15	3.23
0.50	2.21	1.84	207.14	213.50	3.18
0.52	1.84	1.46	204.98	211.19	3.11
0.53	1.46	1.08	202.19	208.27	3.04
0.55	1.08	0.71	198.81	204.74	2.96
0.57	0.71	0.00	194.84	200.60	2.88
0.58	0.00	0.00	190.01	195.55	2.77
0.60	0.00	0.00	184.70	190.01	2.65
0.62	0.00	0.00	179.61	184.70	2.54
0.63	0.00	0.00	174.74	179.61	2.44
0.65	0.00	0.00	170.07	174.74	2.33
0.67	0.00	0.00	165.61	170.07	2.23
0.68	0.00	0.00	161.33	165.61	2.14
0.70	0.00	0.00	157.22	161.33	2.05
0.72	0.00	0.00	153.29	157.22	1.97
0.73	0.00	0.00	149.51	153.29	1.89
0.75	0.00	0.00	145.89	149.51	1.81
0.77	0.00	0.00	142.41	145.89	1.74
0.78	0.00	0.00	139.07	142.41	1.67
0.80	0.00	0.00	135.87	139.07	1.60
0.82	0.00	0.00	132.78	135.87	1.54
0.83	0.00	0.00	129.81	132.78	1.49
0.85	0.00	0.00	126.95	129.81	1.43
0.87	0.00	0.00	124.19	126.95	1.38
0.88	0.00	0.00	121.54	124.19	1.33
0.90	0.00	0.00	118.98	121.54	1.28
0.92	0.00	0.00	116.52	118.98	1.23
0.93	0.00	0.00	114.15	116.52	1.19
0.95	0.00	0.00	111.86	114.15	1.15
0.97	0.00	0.00	109.63	111.86	1.11
0.98	0.00	0.00	107.48	109.63	1.08
1.00	0.00	0.00	105.40	107.48	1.04
1.02	0.00	0.00	103.39	105.40	1.01

Maximum outflow (cfs) = 3.26
Maximum storage (cu ft) = 6392
Maximum elevation (ft) = 37.92

Qp = 3.3 RESERVOIR ROUTE 100 Yr

POST-DEV.

ROUTED



HGU = 13 min 4 VGU = 1.0 cfs

MAX STORAGE = 6392

MAX ELEVATION = 37.92

· PATRIOTS COLONY #7733 ✓ 2/23/95

TEMPORARY SEDIMENT TRAP DESIGN – TRAP #3

DA = 13.5 AC

→ TOTAL STORAGE REQD = (67 CY/AC)(13.5 AC)
REQD VOLUME = 905 CY = 24,422 CF ←

* STORAGE PROVIDED ≈ 25,597 CF ✓
MIN WET STORAGE VOLUME = 12,211 CF
MIN DRY STORAGE VOLUME = 12,211 CF

* NOTE: SEDIMENT CLEANOUT REQD WHEN WET STORAGE VOL. IS REDUCED TO 226 CY ≈ EL ≅ 20.7 ←

→ REQUIRED WET STORAGE VOLUME IS ACHIEVED @ ELEV. ≈
∴ INVERT OF STONE OUTLET = 22.0 ←

→ REQUIRED DRY STORAGE VOLUME IS ACHIEVED @ ELEV. ≈ 24.7
∴ TOP OF STONE OUTLET = 24.7 ←

PATRIOTS COLONY #7733 2/23/95

TEMPORARY SEDIMENT TRAP DESIGN – TRAP #3

FINAL DESIGN ELEVATIONS

→ INVERT OF BASIN = 18.0

→ INVERT OF STONE OUTLET = 22.0

→ TOP OF STONE OUTLET = 24.7

→ TOP OF EMPOUNDMENT = 25.2

→ SEDIMENT REMOVAL REQUIRED @ ELEV. = 20.7

→ LENGTH OF STONE OUTLET = 20FT

→ TOP WIDTH OF EMBANKMENT = 5FT

Option 1 STAGE / STORAGE TABLE R to reset

1. RESERVOIR No = 3. 2. RESERVOIR NAME = TRAP #3.....

3. S = Ks * Z^b

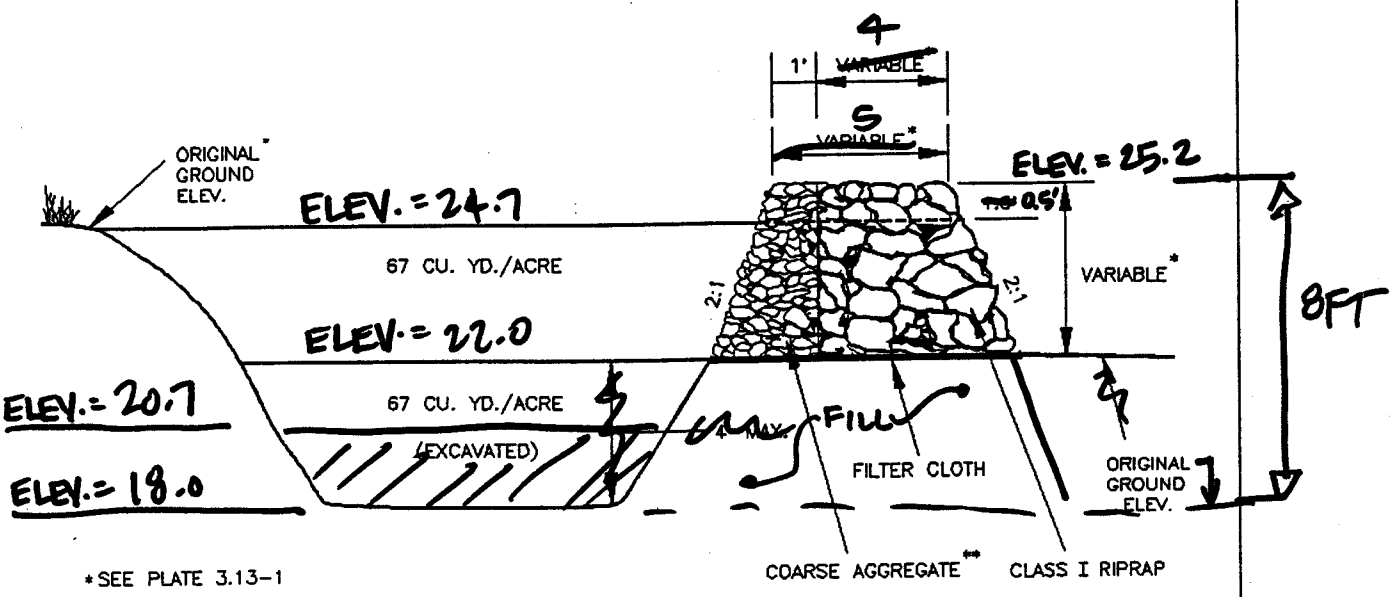
Ks = 0..... b = 0.....

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

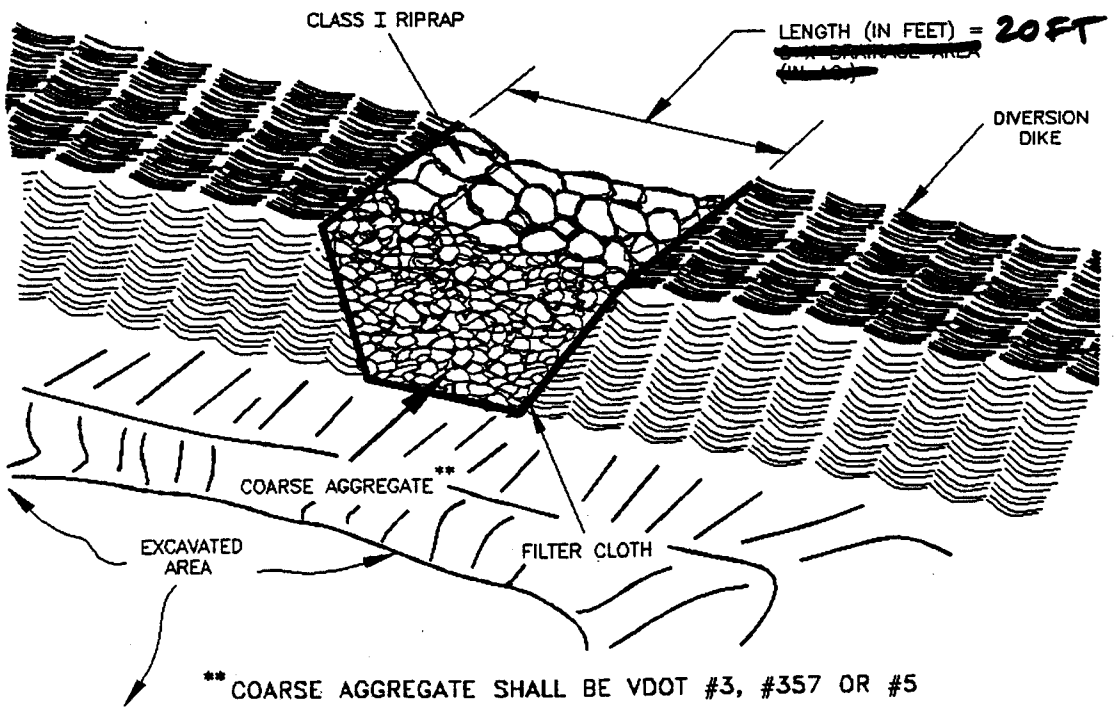
	STAGE ft	ELEVATION ft	CO AREA sq ft	INC STORAGE cu ft	TOT STORAGE cu ft
4	0.00	18.00.	365.....	0	0
5	2.00	20.00.	2365....	2730	2730
6	7.00	25.00.	6782....	22867	25597
7	0.00	0.00.	0.....	0	0
8	0.00	0.00.	0.....	0	0
9	0.00	0.00.	0.....	0	0
10	0.00	0.00.	0.....	0	0
11	0.00	0.00.	0.....	0	0
12	0.00	0.00.	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

TEMPORARY SEDIMENT TRAP #3



CROSS SECTION OF OUTLET



**COARSE AGGREGATE SHALL BE VDOT #3, #357 OR #5

OUTLET (PERSPECTIVE VIEW)

Source: Va. DSWC

Plate 3.13-2

PATRIOTS COLONY #7733 ✓ 2/23/95 ✓

TEMPORARY SEDIMENT TRAP DESIGN - TRAP #2

DA = 1.15 AC

→ TOTAL STORAGE REQD = (134 CY/ACRE)(1.15 AC)
REQD VOLUME = 154 CY = 4,161 CF ←

* STORAGE PROVIDED ≈ 4,386 CF ✓
MIN. WET STORAGE VOLUME = 2,080 CF
MIN. DRY STORAGE VOLUME = 2,080 CF

* NOTE: SEDIMENT CLEANOUT REQD WHEN WET STORAGE VOL. IS REDUCED TO 38.5 CY @ ELEV. ≈ 17.0

→ REQUIRED WET STORAGE IS ACHIEVED @ ELEV. ≅ 18.3
∴ INVERT OF STONE OUTLET @ ELEV = 18.3 ←

→ TOTAL STORAGE REQD IS ACHIEVED @ ELEV. ≅ 19.8 ←
∴ TOP OF STONE OUTLET @ ELEV. = 19.8 ←

PATRIOTS COLONY #7733 2/23/95

TEMPORARY SEDIMENT TRAP DESIGN - TRAP#2 CONT

FINAL DESIGN ELEVATION

→ INVERT OF BASIN = 14.0
→ INVERT OF STONE OUTLET = 18.3
→ TOP OF STONE OUTLET = 19.8
→ TOP OF EMPOUNDMENT = 20.3
→ SEDIMENT REMOVAL REQD @ ELEV. = 17.0
→ LENGTH OF STONE = 6(1.15) ≅ 7.0 FT
→ TOP WIDTH OF EMBANKMENT = 5FT

Option 1 STAGE / STORAGE TABLE R to reset

1. RESERVOIR No = 2. 2. RESERVOIR NAME = TRAP #2.....

3. S = Ks * Z^b

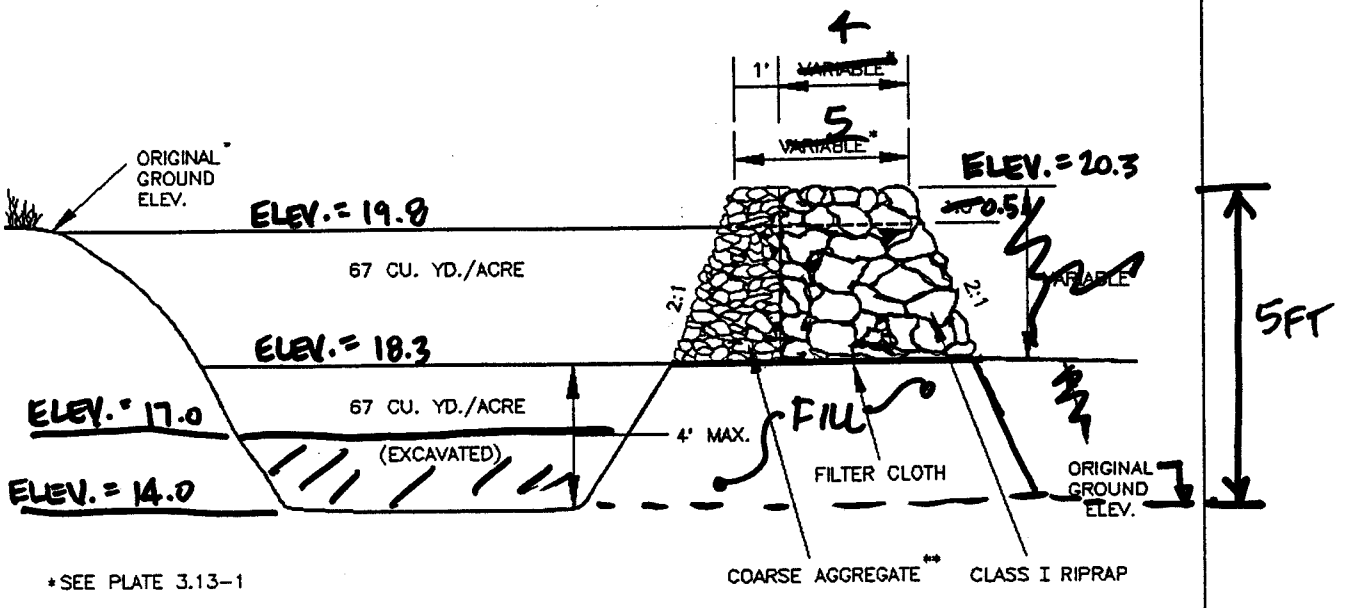
Ks = 0..... b = 0.....

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

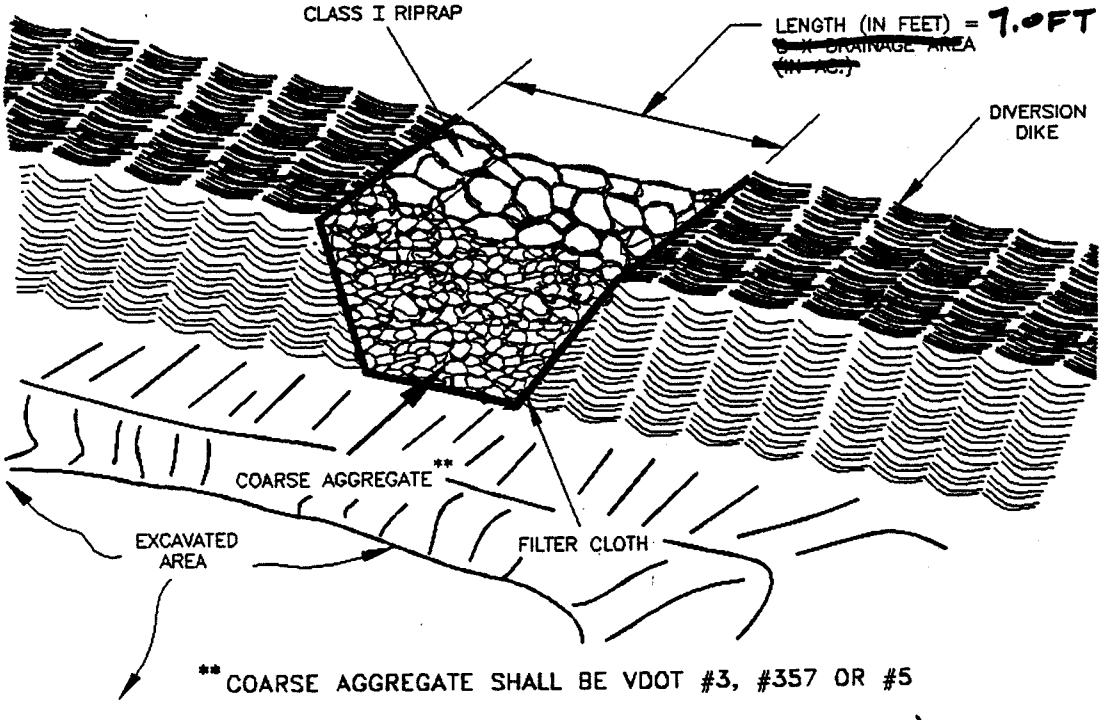
	STAGE ft	ELEVATION ft	CO AREA sq ft	INC STORAGE cu ft	TOT STORAGE cu ft
4	0.00	14.00.	45.....	0	0
5	1.00	15.00.	173.....	109	109
6	2.00	16.00.	317.....	245	354
7	4.00	18.00.	963.....	1280	1634
8	6.00	20.00.	1789....	2752	4386
9	0.00	0.00.	0.....	0	0
10	0.00	0.00.	0.....	0	0
11	0.00	0.00.	0.....	0	0
12	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

TEMPORARY SEDIMENT TRAP #2



CROSS SECTION OF OUTLET



**COARSE AGGREGATE SHALL BE VDOT #3, #357 OR #5

OUTLET (PERSPECTIVE VIEW)

Source: Va. DSWC

Plate 3.13-2

PATRIOTS COLONY #7733

2/23/95
REV. 4/17/95

TEMPORARY SEDIMENT BASIN DESIGN - BASIN #1

DA = 13.5 AC

→ TOTAL STORAGE REQD = (67 CY/AC)(13.5 AC)
REQD VOLUME = 905 CY = 24,422 CF ←

* STORAGE PROVIDED ≈ 25,597 CF ✓
MIN WET STORAGE VOLUME = 12,211 CF
MIN DRY STORAGE VOLUME = 12,211 CF

* NOTE: SEDIMENT CLEANOUT REQD WHEN WET STORAGE VOL. IS REDUCED TO 226 CY ≈ EL ≅ 20.7 ←

→ REQUIRED WET STORAGE VOLUME IS ACHIEVED @ ELEV. ≈
∴ INVERT OF DEWATERING ORIFICE = 22.0 ←

→ REQUIRED DRY STORAGE VOLUME IS ACHIEVED @ ELEV. ≈ 24.7
∴ ELEV. OF PRINCIPAL SPILLWAY = 24.7 ←

Option 1 STAGE / STORAGE TABLE R to reset

IMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM;

1. RESERVOIR No = 1. 2. RESERVOIR NAME = trap #3.....

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	18.00.	365.....	0	0
5	2.00	20.00.	2365....	2730	2730
6	7.00	25.00.	6782....	22867	25597
7	8.00	26.00.	7666....	7224	32821
8	9.00	27.00.	8550....	8108	40929
9	0.00	0.00.	0.......	0	0
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

HMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM<

Change item number: 0 *DY* to cont

Reservoir No. 1 OUTLET STRUCTURES

IMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM;

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

1. WIDTH (in) = 24.
2. HEIGHT (in) = 24.
3. No. BARRELS = 1..
4. INVERT ELEV. = 18.......
5. Co = 0.60
6. CULVERT LENGTH (ft) = 60..
7. CULVERT SLOPE (%) = 3.3.
8. MANNING'S N-VALUE = .013

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

9. WIDTH (in) = 4..
10. HEIGHT (in) = 4..
11. No. BARRELS = 1..
12. INVERT ELEV. = 22.......
13. Co = 0.60
14. CULVERT LENGTH (ft) = 0...
15. CULVERT SLOPE (%) = 0...
16. MANNING'S N-VALUE = .013
17. MULTI-STAGE OPTION ? (Y/N) N

WEIR STRUCTURE A. Q=CwLH^EXP

18. CREST LENGTH (ft) = 12.57..
19. CREST ELEVATION = 24.7...
20. Cw = 3.00
21. EXP = 1.50
22. MULTI-STAGE OPTION ? (Y/N) Y

WEIR STRUCTURE B. Q=CwLH^EXP

23. CREST LENGTH (ft) = 10.....
24. CREST ELEVATION = 25.7...
25. Cw = 3.00
26. EXP = 1.50
27. MULTI-STAGE OPTION ? (Y/N) N

HMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM<

Change item number: 0 *DY* to cont

PATRIOTS COLONY #7733
SEDIMENT BASIN #3

4/17/95

DEWATERING ORIFICE

$Q = S / 21{,}600$

$S = 12{,}211$ CF

$Q = 0.57$ $\qquad$ $h = 1.35$ ft

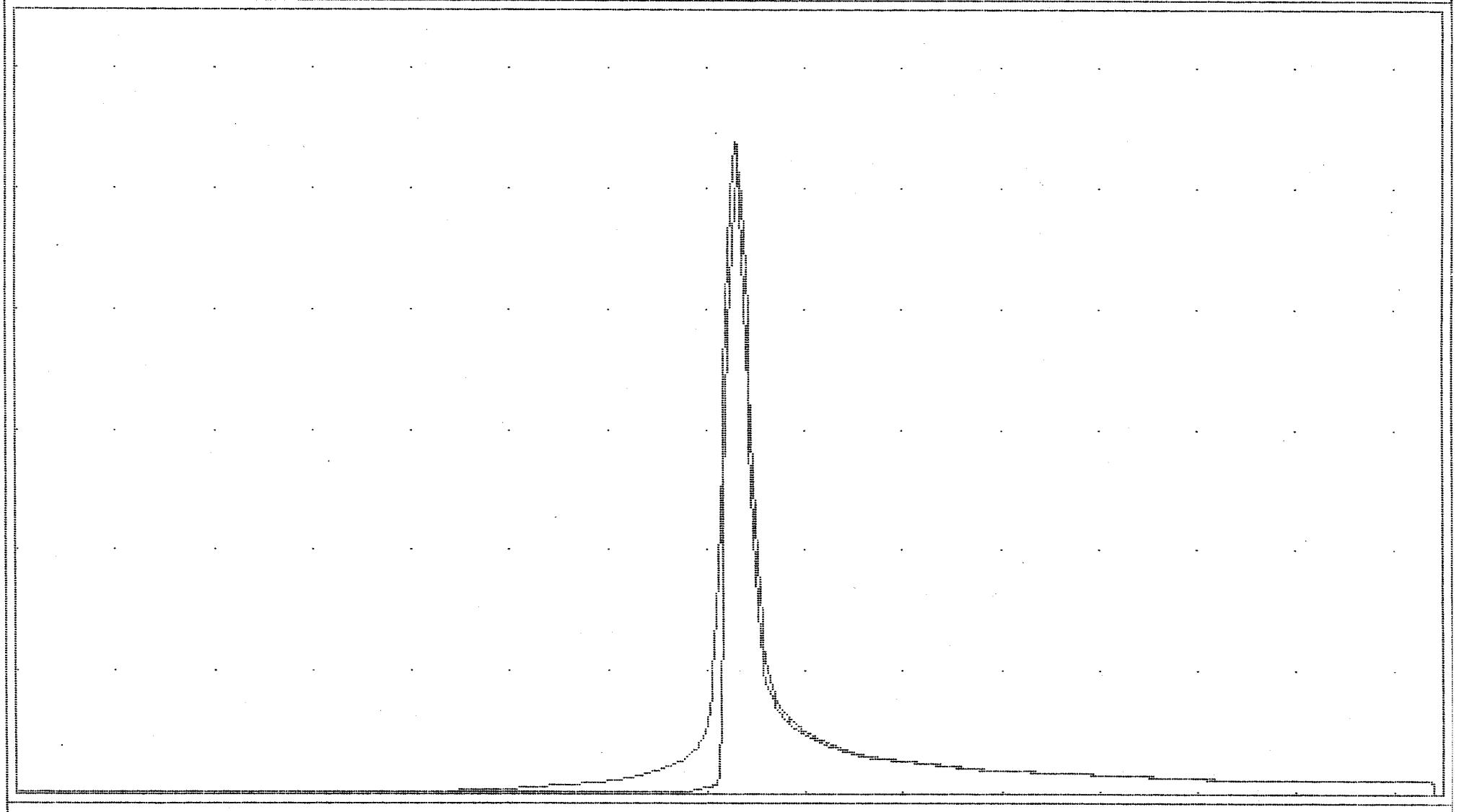
$A = Q / (64.32 * h/2)^{1/2} (0.6) = 0.57 / 3.95$

$A = 0.144$

$d = 2 \left(\frac{A}{3.14}\right)^{1/2} = 0.43$ ft $= 5''$ DIA MAX

$\boxed{\therefore \text{USE } 4'' \text{ DIA ORIFICE}}$

Qp = 51.8 RESERVOIR ROUTE 25 Yr



HGU = 100 min 2 VGU = 10.0 cfs

MAX STORAGE = 33492

MAX ELEVATION = [illegible]

PATRIOTS COLONY #7733 2/23/95

TEMPORARY SEDIMENT TRAP DESIGN – TRAP #3

FINAL DESIGN ELEVATIONS

→ INVERT OF BASIN = 18.0

→ INVERT OF DEWATERING ORIFICE = 22.0

→ CREST OF PRINCIPAL SPILLWAY = 24.7

→ TOP OF EMPOUNDMENT = 27.2

→ SEDIMENT REMOVAL REQUIRED @ ELEV. = 20.7

→ CREST OF EMERGENCY SPILLWAY = 25.7

→ TOP WIDTH OF EMBANKMENT = 10 FT

→ 25 YR HIGH WATER ELEV. = 26.2

Charles Lovett

From: Fran Geissler
Sent: Tuesday, May 24, 2016 11:04 AM
To: Charles Lovett
Subject: FW: Patriot's Colony - SWM Basin #1/JR006
Attachments: Patriot's_Colony_-_G_M__00258128.pdf; 2016-03-14 Engineering Report - Existing BMP Facilities.pdf

Chas: All of this info should be added to the as-built file for JR006, even the email as a PDF. THANKS!

From: Fran Geissler
Sent: Thursday, May 19, 2016 3:11 PM
To: Pat Menichino <Pat.Menichino@jamescitycountyva.gov>; Suzanne Dyba <Suzanne.Dyba@jamescitycountyva.gov>
Subject: FW: Patriot's Colony - SWM Basin #1/JR006

To your knowledge was this work driven by the Patriots Colony expansion or our inspection report or both?

From: Jonathan Jackson [mailto:jjackson@bowmanconsulting.com]
Sent: Thursday, May 19, 2016 3:00 PM
To: Fran Geissler <Fran.Geissler@jamescitycountyva.gov>
Cc: Juan Carlos Morgado <Juan.Morgado@jamescitycountyva.gov>; Deirdre Wells <Deirdre.Wells@jamescitycountyva.gov>; Kevin Cox <kcox@bowmanconsulting.com>; Deibler, Ruth <Ruth.Deibler@rivhs.com>; 'Maslin, Ted' <ted.maslin@rivhs.com>
Subject: Patriot's Colony - SWM Basin #1/JR006

Ms. Geissler,

Note that we recently prepared the attached work plan regarding clearing and other misc. maintenance at JR006 at Patriot's Colony. Note that this work has now been completed (see below photos and attached geotechnical report) and we would like to invite you and any other County staff to meet on site to review the performed.

Other than a few miscellaneous meetings, I'm generally available next week and the week after.

Thanks,

Jonathan Jackson, P.E., LEED Green Associate | Sr. Project Manager
Bowman Consulting

3951 Westerre Parkway, Suite 150, Richmond, VA 23233
direct: 804.616.3240 | fax: 804.270.2008 | mobile: 804.252.8020
jjackson@bowmanconsulting.com | bowmanconsulting.com |

— Go Green! Please consider the environment before printing this email.

Patriot's Colony Maintenance Building & Garden Expansion
SP-0108-2015

Engineering Report – Existing BMP Facility JR006

Prepared for:
Riverside Healthcare

Submitted to:
Department of Engineering and Resource Protection
James City County

March 10, 2016

COMMONWEALTH OF VIRGINIA
3/14/16
JONATHAN H. JACKSON
Lic. No. 032887
PROFESSIONAL ENGINEER

Bowman CONSULTING

3951 Westerre Parkway, Suite 150, Richmond VA 23233
Phone: (804) 616-3240 Fax: (804) 270-2008

Overview

This engineering report is being prepared for the James City County Department of Engineering and Resource Protection in conjunction with the pending site plan for the Patriot's Colony Maintenance Building & Garden Expansion (SP-0108-2015). This report analyzes the adequacy of existing BMP facilities for Patriot's Colony and makes recommendations for maintenance/solutions. A maintenance plan and schedule has been provided as well.

Existing Conditions and Field Survey

On February 22, 2016, County staff developer/owner representatives met on site at 3400 John Tyler Highway to survey the conditions of existing County BMP facility JR006. The following visible or potential infrastructure deficiencies were identified:

- Vegetation on and around the impoundment structure
- Erosion and Subsidence of the dam (note that per field work, site inspection, and internal investigation of the 24" BMP outfall pipe, this does not appear to be related to dam failure/soil infiltrating the 24" RCP outfall pipe)
- Outlet riprap apron degradation
- Litter

Field Imagery

The images below were taken in the field on February 22, 2016. Shown below, wild vegetation growth along the interior and exterior of the BMP dam embankment and earthen divots, are obvious.

Image 1: Trash located within BMP

Image 2: Vegetation Growth along Embankment

Image 3: Settlement/ Earthen divots along embankment

Image 4: Riprap Degradation at Outfall

Video Inspection – Outfall Pipe

County staff cited possible concerns with the existing 24" RCP outfall pipe from BMP JR006. On February 24, 2016, Prism Contractors & Engineers, LLC was contracted to perform a video inspection of the 74' long -24" diameter RCP outfall pipe for the existing BMP. The video footage shows no evidence of structural problems with the pipe or failure along its joints. The joints do show signs of seepage and there are some obvious lift holes and infiltration stains along the walls of the pipe. Because the pipe shows no sign of structural degradation, we recommend to further action. Please see Appendix A for the pipe inspection report from Prism. A DVD has been provided as well, containing a video of the pipe inspection.

Maintenance Solutions

Riverside Healthcare will hire maintenance staff and/or contractor to provide the following remedies:

- **Clear the interior of the BMP of inorganic trash and organic debris (fallen trees, large branches, and sticks).**
- **Place fill material in areas of settlement/earthen divots found along BMP embankment. This work is to be performed under the direct supervision of Engineer/testing agency of record. BMP/Dam embankments fill materials are to be as follows:**
    - **Material satisfactory for use in the stormwater pond dam and embankments shall consist of inorganic soils classified as CL, CH, SC, or a combination of these group symbols, per ASTM D 2487. This material shall contain a minimum 35% by dry weight Silt or Clay and be free of organic matter, debris, and shall contain no particle sizes greater than 4 inches in the largest dimension.**
- **Hand place additional riprap at outfall and shape/redirect towards existing channel.**
- **Vegetation removal from BMP dam embankment:**
    - **If > 8", excavate root ball, fill material to be per above geotechnical specification.**
    - **If < 8", cut flush at ground**

- **Tree debris to be chipped on site and deposited on natural areas. Chips need to be spread over a large area but are not to be placed within water bodies.**
- **All trees located within the natural channel are to remain**

Maintenance Schedule and Plan of Action

Riverside Healthcare will hire a contractor to complete all work specified. This maintenance work is estimated to cost $10,000, but will be bonded at 100% contingency or $20,000. Maintenance work will coincide with the construction of the garden area which is scheduled to begin late February of 2016.

Bowman
CONSULTING
3951 Westerre Parkway
Suite 150
Richmond, VA 23233

Project Name: Patriot's Colony Maintenance Building and Garden Expansion - BMP Maintenance Plan
Project Number: 9316-01-002
Plans/Stage Opinion Derived:
Calculated By: K. Cox
Date: March 14, 2016

Engineer's Opinion of Probable Site Work Construction Costs (BMP Maintenance Plan)

Item Description	Unit(s)	Quantity +/-	Unit Cost +/-	Sub Total	Notes
Site Preparations & Earthwork					
Earthwork (fill placement)	CY	10	$50.00	$500	Work to be performed under Engineer's supervision
Geotechnical Supervision	LS	1	$1,500.00	$1,500	
			Site Preparations & Earthwork Subtotal	**$2,000**	
Tree and Debris Removal					
Root Excavation, tree cutting, & chipping	LS	1	$7,500.00	$6,500	
Trash Removal	LS	1	$500.00	$500	
			Tree and Debris Removal Subtotal	**$7,000**	
Erosion Control					
Riprap	Tons	20.0	$50.00	$1,000	+/- 13 CY required
			Erosion Control Subtotal	**$1,000**	
Summary					
			Subtotal	**$10,000**	
		100%	**Contingency**	**$10,000**	
			Preliminary Total	**$ 20,000**	

NOTE: In providing these opinions of probable construction cost, the Client understands that Bowman has no control over costs, or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinions of probable construction cost provided herein are made on the basis of Bowman's relevant experience with similar projects, and are are also based only on conceptual design at this time. Bowman makes no warranty, expressed or implied, as to the accuracy of such opinions as compared to future bid or actual costs.

Appendix A: Pipe Inspection Report

Tel:
Fax:
E-mail:

Legend of Drawing:

WATER FLOW

Tree_Winter

Tree_Summer

Tel:
Fax:
E-mail:

Inspection Report

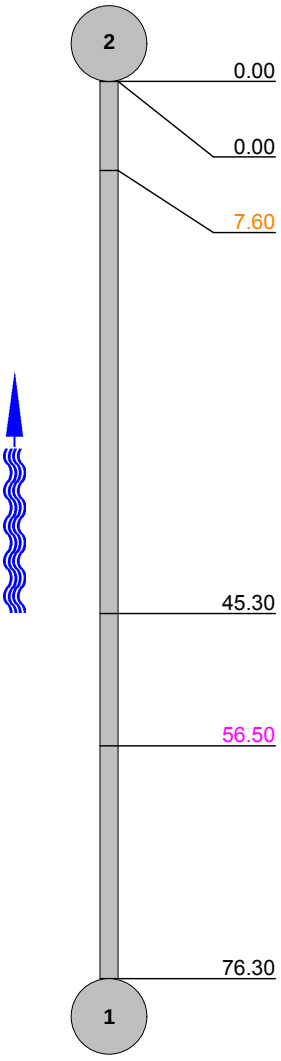
Date	P/O. No.	Weather	Surveyor's Name	Pipe Segment Reference	Section No.
2/24/2016			**AARON TENNEY**		**1**
Certificate No.	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning	Sewer Category
U-910-11174				**No Pre-Cleaning**	

Street123	**PATRIOTS COLONY**	Use of Sewer		Upstream MH	**1**
City	**WILLIAMSBURG**	Drainage Area		Dowstream MH	**2**
Loc. details		Flow Control		Dir. of Survey	**Upstream**
Location Code		Length surveyed	**76.30 ft**	Section Length	**76.30 ft**

Purpose of Survey		Joint Length	
Year Laid		Dia./Height	**24 inch**
Year Rehabilitated		Material	**Reinforced Concrete Pipe**
Tape / Media No.		Lining Method	

Add. Information :

1:196 **Position** **Observation**



Position	Observation
0.00	Downstream Manhole, Survey Begins / 2
0.00	Water Level, 15 %of cross sectional area
7.60	Hole, at 12 o'clock, within 8 inches of joint: NO
45.30	Infiltration Stain, from 12 to 12 o'clock, within 8 inches of joint: YES
56.50	Infiltration Runner, at 12 o'clock, within 8 inches of joint: NO
76.30	Upstream Manhole, Survey Ends / 1

0 FT // 00:00:01

0 FT // 00:00:05

7.6 FT // 00:00:28

45.3 FT // 00:02:37

56.5 FT // 00:03:30

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
3100	**4100**	**3**	**4**	**7**	**3**	**4**	**3.5**

Tel:
Fax:
E-mail:

Inspection photos

City :	Street :	Date :	Pipe Segment Reference :	Section No :
WILLIAMSBURG	**PATRIOTS COLONY**			**1**

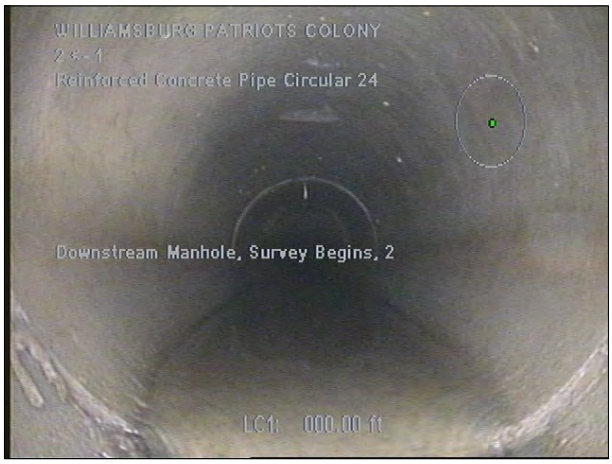


Photo: 1_1A, 00:00:01
0FT, Downstream Manhole, Survey Begins / 2

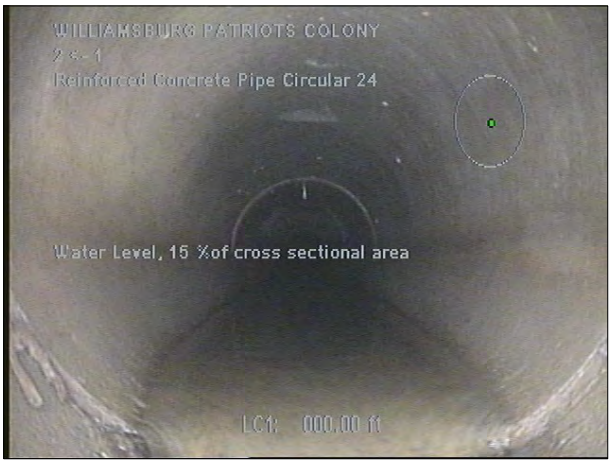


Photo: 1_2A, 00:00:05
0FT, Water Level, 15 %of cross sectional area

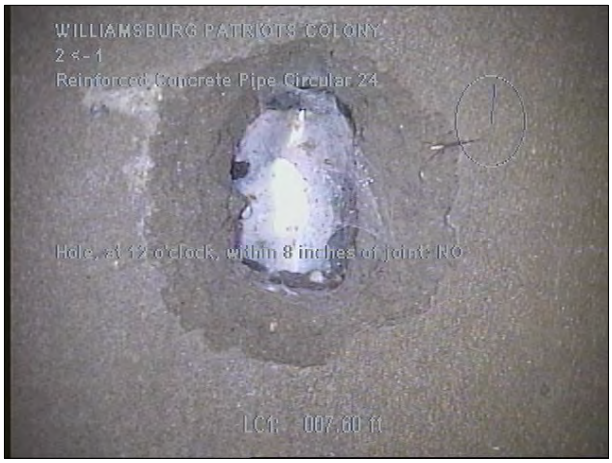


Photo: 1_3A, 00:00:28
7.6FT, Hole, at 12 o'clock, within 8 inches of joint: NO

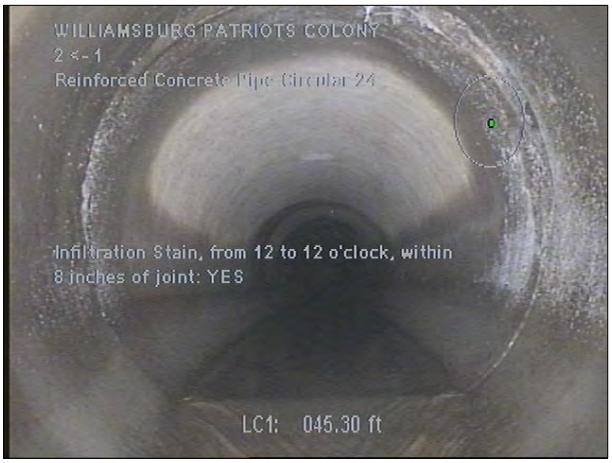


Photo: 1_4A, 00:02:37
45.3FT, Infiltration Stain, from 12 to 12 o'clock, within 8 inches of joint: YES

Tel:
Fax:
E-mail:

Inspection photos

City :	Street :	Date :	Pipe Segment Reference :	Section No :
WILLIAMSBURG	**PATRIOTS COLONY**			**1**

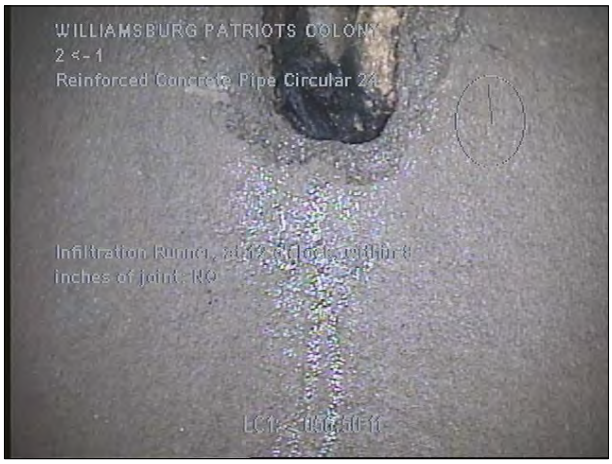
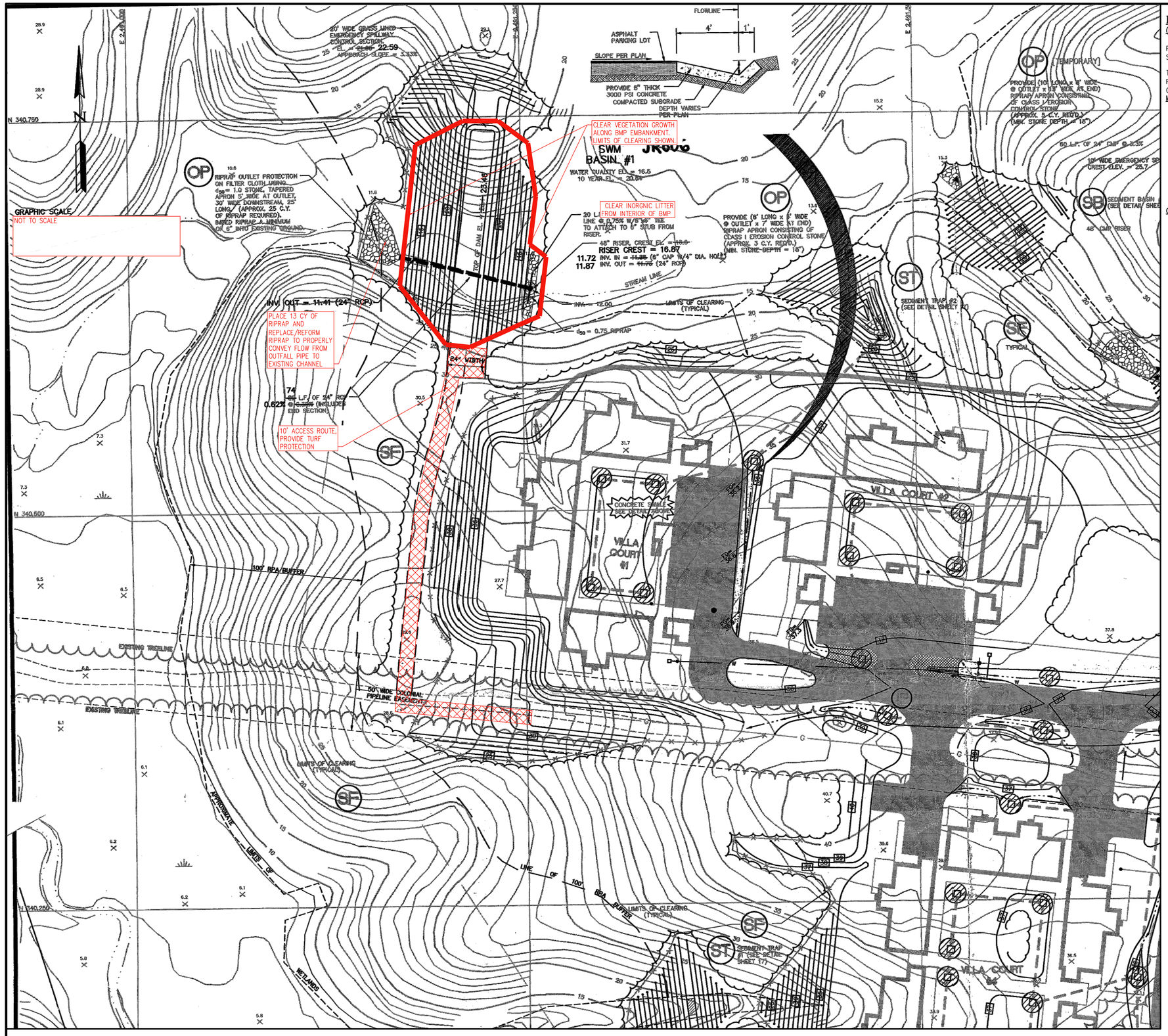


Photo: 1_5A, 00:03:30
56.5FT, Infiltration Runner, at 12 o'clock, within 8 inches of joint: NO

Photo: 1_6A, 00:05:07
76.3FT, Upstream Manhole, Survey Ends / 1



EXISTING BMP MAINTENANCE PLAN

(NOT TO SCALE)

PLAN EXCERPTS SHOWN HEREON ARE TAKEN FROM THE PATRIOTS COLONY CONTINUING CARE RETIREMENT COMMUNITY SITE PLAN AND ASSOCIATED DESIGN CALCULATIONS BY AES CONSULTING, DATED 1/11/95.

THIS PLAN IS BEING PREPARED FOR THE JAMES CITY COUNTY DEPARTMENT OF ENGINEERING AND RESOURCE PROTECTION IN CONJUNCTION WITH THE PENDING SITE PLAN FOR THE PATRIOT'S COLONY MAINTENANCE BUILDING & GARDEN EXPANSION (SP-0108-2015).

MAINTENANCE ACTIONS:

- PROVIDE 10' ACCESS ROUTE FROM VILLAS PARKING AREA TO BMP JR006. CONTRACTOR TO PROVIDE TURF PROTECTION ALONG ENTIRE ROUTE.
- CLEAR THE INTERIOR OF THE BMP OF INORGANIC TRASH.
- PLACE ENGINEERED FILL MATERIAL IN AREAS OF SUBSIDENCE FOUND ALONG BMP EMBANKMENT. THIS WORK IS TO BE PERFORMED UNDER THE DIRECT SUPERVISION OF ENGINEER/TESTING AGENCY OF RECORD. SEE GEOTECHNICAL NOTE BELOW FOR FILL MATERIAL SPECIFICATIONS.
- REMOVE TREES FROM BMP EMBANKMENT:
  - IF > 8", EXCAVATE ROOT BALL. SEE GEOTECHNICAL NOTE BELOW FOR FILL MATERIAL SPECIFICATIONS.
  - IF < 8", CUT FLUSH AT GROUND
  - TREE DEBRIS TO BE CHIPPED ON SITE AND DEPOSITED ON NATURAL AREAS.
  - ALL TREES LOCATED WITHIN THE NATURAL CHANNEL ARE TO REMAIN.

GEOTECHNICAL NOTES:

- BMP/DAM EMBANKMENTS FILL MATERIALS ARE TO BE AS FOLLOWS:
  - O MATERIAL SATISFACTORY FOR USE IN THE STORMWATER POND DAM AND EMBANKMENTS SHALL CONSISTS OF INORGANIC SOILS CLASSIFIED AS CL, CH, SC, OR A COMBINATION OF THESE GROUP SYMBOLS, PER ASTM D 2487. THIS MATERIAL SHALL CONTAIN A MINIMUM 35% BY DRY WEIGHT SILT OR CLAY AND BE FREE OF ORGANIC MATTER, DEBRIS, AND SHALL CONTAIN NO PARTICLE SIZES GREATER THAN 4 INCHES IN THE LARGEST DIMENSION.

Bowman CONSULTING

SP-0108-2015

Bowman Consulting Group, Ltd.
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Suite 150
Richmond, Virginia 23233

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www.bowmanconsulting.com
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EXISTING BMP JR006 MAINTENANCE PLAN
PATRIOT'S COLONY
MAINTENANCE BUILDING & GARDEN EXPANSION
JAMES CITY COUNTY

COUNTY PROJECT NUMBER

PLAN STATUS	
DATE	DESCRIPTION

DESIGN	DRAWN	CHKD
SCALE	H: V:	
JOB No. 9316		
DATE : Feb. 25, 2016		
FILE No.		
SHEET 1 OF		

Path: P:\009316 - Patriots Colony\009316-01-002 (ENG) - Maint Bldg\Engineering\Exhibits\2016-02-23 BMP Maintenance Plan.dwg, Plot Created Mar 03, 2016 - 3:12pm by kcox

Date Record Created:

Created By:

WS_BMPNO: JR006

Print Record

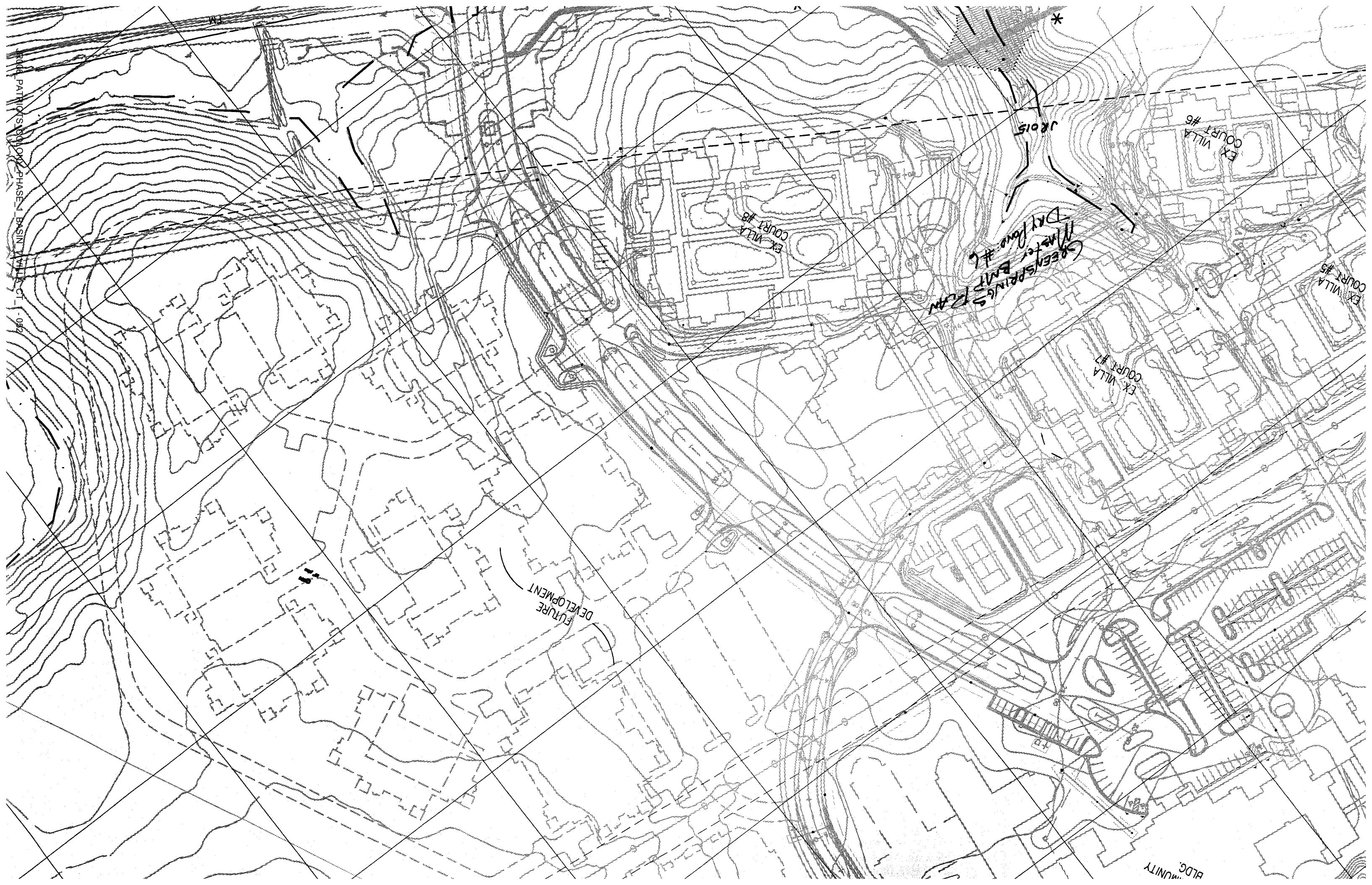
PRINTED ON
Thursday, March 11, 2010
12:52:48 PM

WATERSHED	JR
BMP ID NO	006
PLAN NO	SP-92-99
TAX PARCEL	(45-2)(1-1)
PIN NO	4520100001
CONSTRUCTION DATE	5/1/1995
PROJECT NAME	Patriot's Colony Basin 1
FACILITY LOCATION	3400 John Tyler Highway
CITY-STATE	Williamsburg, VA
CURRENT OWNER	Riverside Healthcare Association
OWNER ADDRESS	606 Denbigh Blvd.
OWNER ADDRESS 2	Suite 605
CITY-STATE-ZIP CODE	Newport News, VA 23608
OWNER PHONE	
MAINT AGREEMENT	Yes
EMERG ACTION PLAN	No

Get Last BMP No | Return to Menu

MAINTENANCE PLAN	No	CTRL STRUC DESC	RCP Riser
SITE AREA acre	90	CTRL STRUC SIZE inches	48
LAND USE	INSTIT	OTLT BARRL DESC	RCP Barrel
old BMP TYP	Dry Pond	OTLT BARRL SIZE inch	24
JCC BMP CODE	F2 Dry ED with forebay		
POINT VALUE	6	EMERG SPILLWAY	Yes
		DESIGN HW ELEV	
		PERM POOL ELEV	
SVC DRAIN AREA acres	74	2-YR OUTFLOW cfs	
		10-YR OUTFLOW cfs	
		REC DRAWING	Yes
SERVICE AREA DESCRI	BASIN ONE OF TWO		
IMPERV AREA acres		CONSTR CERTIF	No
RECV STREAM	JAMES RIV. TRIB		
EXT DET-WQ-CTRL	No	LAST INSP DATE 10/26/2001	Inspected by:
WTR QUAL VOL acre-ft	1.78	INTERNAL RATING	3
CHAN PROT CTRL	No	MISC/COMMENTS	
CHAN PROT VOL acre-ft	3	Dry Pond # 3 South of Villa Court 6.	
SW/FLOOD CONTROL	No		
GEOTECH REPORT	No		

Additional Comments:


Greenspring's BMP Plan
Dry Pond #6
EX. VILLA COURT #8
EX. VILLA COURT #7
EX. VILLA COURT #6
EX. VILLA COURT #5
FUTURE DEVELOPMENT
BLDG.
JR015
TM