

Fac/Perm/Co ID #	Date	Doc ID#
06-03	9 13 109	8557



RICHARDSON SMITH GARDNER & ASSOCIATES
Engineering and Geological Services

RECEIVED

August 31, 2009

SEP - 3 2009

Ms. Starr Silvis, P.E.
Assistant Regional Engineer
NCDENR - Land Quality Section
2090 U.S. Highway 70
Swannanoa, North Carolina 28778

RSG SOLID WASTE SECTION
ASHEVILLE REGIONAL OFFICE

**RE: Stormwater Management Plan Modification
Avery County C & D Landfill Expansion
NC Solid Waste Permit No. 06-03**

Dear Ms. Silvis:

On behalf of Avery County, Richardson Smith Gardner & Associates (RSG) is hereby submitting two (2) copies of the **enclosed** modification¹ to the stormwater management plan for the expansion of the construction and demolition debris (C&D) landfill disposal area in Ingalls, North Carolina.

As you may recall², there was a potential impact to a gas line that runs along the southern portion of the property in the proximity of Sediment Basin No. 4. Following a field locate by Piedmont Natural Gas (Piedmont), the basin required modification to provide buffer from this gas line for safety purposes. RSG coordinated this modification with Piedmont to fit the revised Basin No. 4 between the landfill and their proposed easement. Therefore, we have included revised calculations for the sediment basin and drawing revisions (**attached**) to the Waste Relocation and Site Improvements³ project previously submitted.

We appreciate your attention and we are prepared to respond immediately to any questions or concerns regarding this modification.

¹ Correspondence dated August 19, 2009 regarding approval of land disturbance plan by Ms. Starr Silvis, P.E., NCDENR.

² Site meeting on August 4, 2009 at the Avery County C&D Landfill.

³ Waste Relocation Plan and Site Improvements Construction Drawings dated July 2009 by Richardson Smith Gardner & Associates, Inc.

Ms. Starr Silvis
May 18, 2009
Page 2 of 2

Please feel free to contact me by phone at (919) 828-0577 ext. 127 or by email at stacey@rsgengineers.com.

Sincerely,

Richardson Smith Gardner & Associates, Inc.

A handwritten signature in blue ink, appearing to read 'Stacey A. Smith', with a small 'a' written below the first 'S'.

Stacey A. Smith, P.E.
Project Manager

Att.

Cc: Mr. Henry "Buddy" Norris, Avery County Solid Waste Department
Mr. Allen Gaither, NCDENR
Mr. Bill Wagner, NCDENR
File



**Avery County Landfill
 Sediment Basin Analysis**

Basin No.: Basin - 4

DESIGN FOR WET (IF APPLICABLE) AND DRY STORAGE:

Areas Draining Into Basin:

Drainage Area	Area (acres)
A1. Landfill Slopes	2.7
A2. Other Areas	1.2
Total =	3.9 Acres

Basin Requirements:

Wet Storage:

Required Storage Capacity (ft³/Ac.) = **0 Enter "0" if Not Applicable.**
 Required Storage Capacity (ft³) = **0**
 Required Depth of Wet Storage (ft) = **0.0 Enter "0" if Not Applicable.**

Dry Storage:

Required Storage Capacity (ft³/Ac.) = **1,800 To Crest of Principal Spillway**
 Required Storage Capacity (ft³) = **7,020**
 Multiplier (X) for Desired Surface Area (Qp x X) = **0.01 At Crest of Principal Spillway**
 Peak Discharge from Basin (Qp) (cfs) = **13.7 From HydroCAD - 25-Yr, 24-Hr. Storm**
 Desired Surface Area (Ac) = **0.14**
 Desired Surface Area (ft²) = **5,955**

Determine Stage-Storage Function:

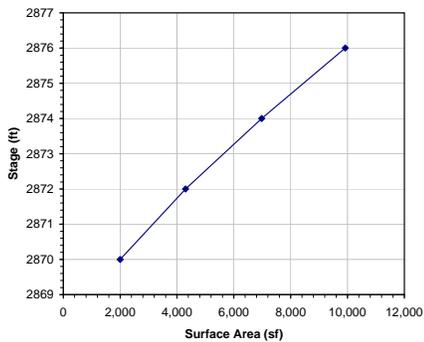
Contour	Area (ft ²)	Area (acres)	Incremental Volume (ft ³)	Cumulative Volume (ft ³)	Stage (ft)	In S	In Z	Z est
2,870	2,000	0.05		0	0			
2,872	4,305	0.10	6,305	6,305	2	8.75	0.69	2.00
2,874	6,982	0.16	11,287	17,592	4	9.78	1.39	4.00
2,876	9,924	0.23	28,458	34,763	6	10.46	1.79	6.00

Linear Regression Constants:

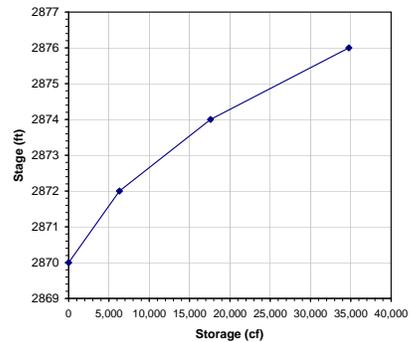
Ks = 2,133 Storage = 2133 z^{1.55}
 b = 1.55

***CAUTION: CHECK INPUT FOR REGRESSION ANALYSIS!**

Stage-Surface Area Relationship



Stage-Storage Relationship



Basin Design Elevations:

Elev. of Bottom of Basin = 2870.0

Wet Storage:

Required Storage Capacity (ft³) = 0
Min. Elev. of Wet Storage (Permanent Pool) = 2870.0
Selected Elev. of Wet Storage (Permanent Pool) = 2870.0 O.K.
Actual Wet Storage Volume (ft³) = 0 O.K.

Dry Storage:

Required Storage Capacity (ft³) = 7,020 = Required Dry Storage + Actual Wet Storage
Min. Elev. of Principal Spillway = 2872.2
Selected Elev. of Principal Spillway = 2873.0 O.K.
Actual Total Storage Volume (ft³) = 11,657 O.K.

Desired Surface Area (ft²) = 5,955
Actual Surface Area at Principal Spillway (ft²) = 6,008 O.K.

Cleanout:

Cleanout Requirement (% of Wet Storage) = 0 Enter "0" if Not Applicable
Cleanout Requirement (% of Total Storage) = 33
Basin Cleanout Volume (ft³) = 3,847 Based on 33% of Total Storage Volume
Basin Cleanout Elevation = 2871.5

Dewatering of Dry Storage:

Refer to Drain Time Calculation For Skimmer.

SHEET: /
JOB #: AVERY-07-1
DATE: 5/29/08, Rev2. 1/9/09, Rev3 8/27/09
BY: KBS, Rev1. TBM, Rev2. KBS 8/27/09
CHKD BY:

ROUTE DESIGN STORM: Use HydroCAD or Other Method.

Design Parameters:

Design Storm: 25-Yr, 24-Hr
Design Storm Rainfall (in) = 6.25
Rainfall Distribution: Type II
Runoff Method: SCS TR-20

Results:

Maximum Pool Elevation = 2874.20
Surface Area at Maximum Pool (ft²) = 7,219
Peak Discharge (cfs) = 13.7

Check Settling Efficiency:

Particle Data:

Diam. (microns) = 40
Specific Gravity = 2.65
Settling Veloc. (ft/s) = 0.004140
Reynolds No. (<0.5) = 0.044284 O.K.

Efficiency Data:

Desired Efficiency (%) = 80
No. of Effective Cells = 3 Use of baffles justifies 3 effective cells.
Settling Efficiency (%) = 80.6 O.K.

DESIGN OUTLET STRUCTURES:

Design Riser/Barrel Structures:

Riser Design:

Type of Riser: CPP-Circular
Riser Base Elevation = 2870.0
Riser Top Elevation = 2873.0
Riser Height (ft) = 3.0

Outlets:

Outlet No. 1 (for Dewatering Dry Storage): Size (in.):
Invert Elevation:
Outlet No. 2 (Principal Spillway): Size: 18"
Invert Elevation: 2873.0

No perforations in riser.

Barrel Design:

Type of Barrel: CMP
Diameter (in) = 15
Inv. In Elevation = 2870.0
Inv. Out Elevation = 2868.0
Length (ft) = 65.0
Slope (ft/ft) = 0.031

SHEET: /
JOB #: AVERY-07-1
DATE: 5/29/08, Rev2. 1/9/09, Rev3 8/27/09
BY: KBS, Rev1. TBM, Rev2. KBS 8/27/09
CHKD BY:

SHEET: /
 JOB #: AVERY-07-1
 DATE: 5/29/08, Rev2. 1/9/09, Rev3 8/27/09
 BY: KBS, Rev1. TBM, Rev2. KBS 8/27/09
 CHKD BY:

Riser Base Calculations:

Design Uplift Force:
 Factor of Safety = 1.25
 F (unadjusted) (lbs) = 413
 0
 0
 0
 0
 Buoyant Wt. of Riser Top (lbs) = 0
 Buoyant Wt. of Surrounding Soil Acting on Ext. Base (lbs) = 0
 Sliding Resistance of Surrounding Soil (lbs) = 0
 F (adjusted) (lbs) = 413

Concrete Base:

Required Volume of Concrete (ft³) = 4.7
 Length (ft) = 3.0
 Width (ft) = 3.0
 Thickness (ft) = 2.0
 Actual Volume of Concrete (ft³) = 18.0 O.K.

Anti-Seepage Collar Calculations: (Alternatively - Design Filter Diaphragm)

Slope of Upstream Embankment (zH:1V) = 3
 Slope of Outlet Pipe (ft/ft) = 0.031
 Ls (ft) = 24
 Number of Collars: 2
 Length of Each Collar (ft) = 3.0 From Design Chart Based on Ls and No. of Collars
 Width of Each Collar (ft) = 3.0 From Design Chart Based on Ls and No. of Collars
 Collar Projection, P (ft) = 0.875
 Spacing of Subsequent Anti-Seep Collars (ft) = 12 = 14P

Emergency Spillway Calculations:

Crest Elev. (ft) = 2874.0
 Required Freeboard (ft) = 2.0
 Top of Berm Elev. (ft) = 2876.0
 Required Capacity (cfs) = 4.2 From HydroCAD - 25-Yr, 24-Hr. Storm
 Driving Head (ft) = 0.2 From HydroCAD - 25-Yr, 24-Hr. Storm
 Weir Coefficient = 3.0
 Length of Crest (ft) = 15.8 Determine by Weir Equation*
 Design Crest Length (ft) = 20

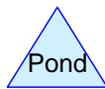
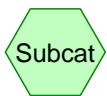
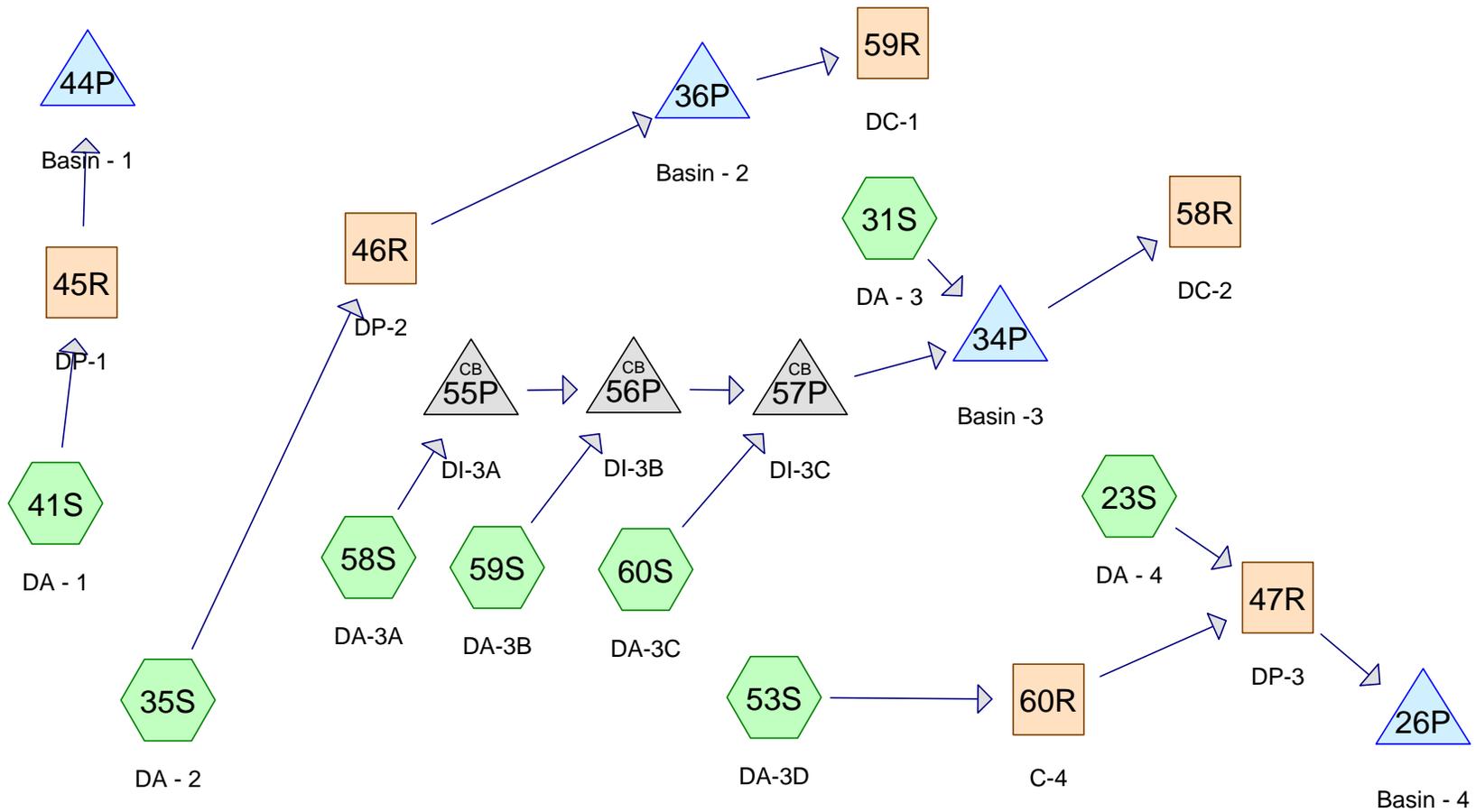
* Length = 20 ft minimum.

SUMMARY DATA:

Basin No.: Basin - 4

Elev. of Bottom of Basin = 2870.0
 Cleanout Elev. (ft) = 2871.5
 Elev. of Wet Storage (Permanent Pool) = NA
 Elev. of Principal Spillway = 2873.0
 Emergency Spillway Elev. (ft) = 2874.0
 Top of Berm Elev. (ft) = 2876.0
 Barrel Diameter (in) = 15
 Barrel Slope (%) = 3.1

See Above for Riser and Other Design Information.



Drainage Diagram for Avery co-Final rev 3

Prepared by Richardson Smith Gardner & Associates 12/31/2008
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Avery co-Final rev 4Prepared by Richardson Smith Gardner & Associates, Inc.
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8/31/2009**Area Listing (all nodes)**

<u>Area (acres)</u>	<u>CN</u>	<u>Description (subcats)</u>
18.450	69	50-75% Grass cover, Fair, HSG B (23S,31S,35S,41S,53S,58S,59S,60S)
<hr/>		
18.450		

Avery co-Final rev 4

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25-Year 24-Hour Storm Event
 Type II 24-hr 25-yr Rainfall=7.23"

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Time span=1.00-20.00 hrs, dt=0.05 hrs, 381 points
 Runoff by SCS TR-20 method, UH=SCS
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 23S: DA - 4	Runoff Area=2.700 ac Runoff Depth>3.41" Tc=5.0 min CN=69 Runoff=17.96 cfs 0.768 af
Subcatchment 31S: DA - 3	Runoff Area=0.570 ac Runoff Depth>3.41" Tc=5.0 min CN=69 Runoff=3.79 cfs 0.162 af
Subcatchment 35S: DA - 2	Runoff Area=5.700 ac Runoff Depth>3.41" Tc=5.0 min CN=69 Runoff=37.92 cfs 1.622 af
Subcatchment 41S: DA - 1	Runoff Area=3.730 ac Runoff Depth>3.41" Tc=5.0 min CN=69 Runoff=24.81 cfs 1.061 af
Subcatchment 53S: DA-3D	Runoff Area=1.200 ac Runoff Depth>3.41" Tc=5.0 min CN=69 Runoff=7.98 cfs 0.341 af
Subcatchment 58S: DA-3A	Runoff Area=1.070 ac Runoff Depth>3.41" Tc=5.0 min CN=69 Runoff=7.12 cfs 0.304 af
Subcatchment 59S: DA-3B	Runoff Area=1.920 ac Runoff Depth>3.41" Tc=5.0 min CN=69 Runoff=12.77 cfs 0.546 af
Subcatchment 60S: DA-3C	Runoff Area=1.560 ac Runoff Depth>3.41" Tc=5.0 min CN=69 Runoff=10.38 cfs 0.444 af
Reach 45R: DP-1	Avg. Depth=0.68' Max Vel=31.65 fps Inflow=24.81 cfs 1.061 af D=18.0" n=0.013 L=520.0' S=0.3115 '/' Capacity=58.63 cfs Outflow=24.20 cfs 1.061 af
Reach 46R: DP-2	Avg. Depth=0.89' Max Vel=34.41 fps Inflow=37.92 cfs 1.622 af D=18.0" n=0.013 L=750.0' S=0.2960 '/' Capacity=57.15 cfs Outflow=36.69 cfs 1.621 af
Reach 47R: DP-3	Avg. Depth=0.81' Max Vel=26.48 fps Inflow=25.90 cfs 1.110 af D=18.0" n=0.013 L=320.0' S=0.1875 '/' Capacity=45.49 cfs Outflow=25.42 cfs 1.109 af
Reach 58R: DC-2	Avg. Depth=0.19' Max Vel=5.07 fps Inflow=7.29 cfs 0.719 af n=0.035 L=340.0' S=0.1471 '/' Capacity=140.52 cfs Outflow=7.32 cfs 0.718 af
Reach 59R: DC-1	Avg. Depth=0.18' Max Vel=5.06 fps Inflow=7.34 cfs 0.807 af n=0.035 L=370.0' S=0.1514 '/' Capacity=142.56 cfs Outflow=7.34 cfs 0.805 af
Reach 60R: C-4	Avg. Depth=0.40' Max Vel=21.11 fps Inflow=7.98 cfs 0.341 af D=18.0" n=0.013 L=75.0' S=0.2400 '/' Capacity=51.46 cfs Outflow=7.94 cfs 0.341 af
Pond 26P: Basin - 4	Peak Elev=2,874.20' Storage=19,006 cf Inflow=25.42 cfs 1.109 af Discarded=0.11 cfs 0.090 af Primary=9.32 cfs 0.726 af Secondary=4.24 cfs 0.028 af Outflow=13.67 cfs 0.843 af

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Type II 24-hr 25-yr Rainfall=7.23"

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Pond 34P: Basin - 3 Peak Elev=2,934.73' Storage=30,168 cf Inflow=34.06 cfs 1.457 af
Discarded=0.21 cfs 0.171 af Primary=7.29 cfs 0.719 af Secondary=0.00 cfs 0.000 af Outflow=7.50 cfs 0.890 af

Pond 36P: Basin - 2 Peak Elev=2,948.74' Storage=33,957 cf Inflow=36.69 cfs 1.621 af
Discarded=0.21 cfs 0.170 af Primary=7.34 cfs 0.807 af Secondary=0.00 cfs 0.000 af Outflow=7.55 cfs 0.976 af

Pond 44P: Basin - 1 Peak Elev=3,011.75' Storage=25,946 cf Inflow=24.20 cfs 1.061 af
Discarded=0.21 cfs 0.160 af Primary=1.95 cfs 0.350 af Secondary=0.00 cfs 0.000 af Outflow=2.16 cfs 0.509 af

Pond 55P: DI-3A Peak Elev=3,014.44' Inflow=7.12 cfs 0.304 af
18.0" x 200.0' Culvert Outflow=7.12 cfs 0.304 af

Pond 56P: DI-3B Peak Elev=2,972.73' Inflow=19.89 cfs 0.851 af
24.0" x 250.0' Culvert Outflow=19.89 cfs 0.851 af

Pond 57P: DI-3C Peak Elev=2,939.00' Inflow=30.27 cfs 1.295 af
24.0" x 170.0' Culvert Outflow=30.27 cfs 1.295 af

Total Runoff Area = 18.450 ac Runoff Volume = 5.249 af Average Runoff Depth = 3.41"
100.00% Pervious Area = 18.450 ac 0.00% Impervious Area = 0.000 ac

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 Type II 24-hr 25-yr Rainfall=7.23"

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Subcatchment 23S: DA - 4

Runoff = 17.96 cfs @ 11.96 hrs, Volume= 0.768 af, Depth> 3.41"

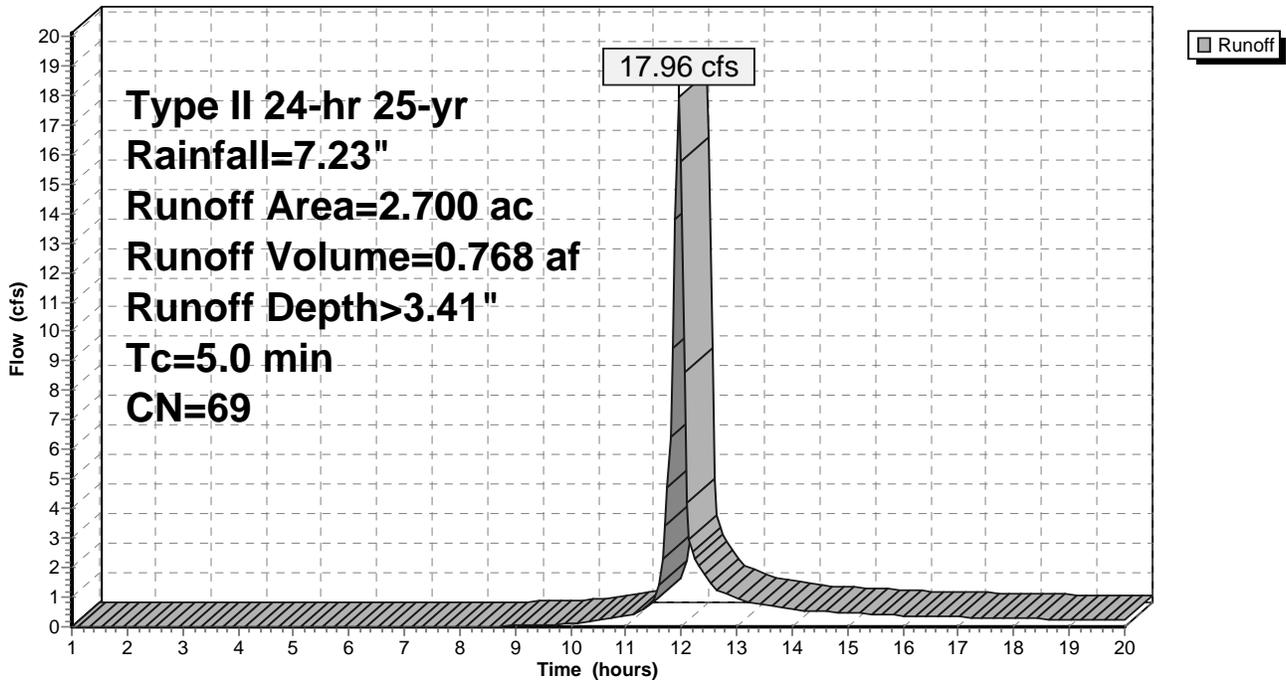
Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 25-yr Rainfall=7.23"

Area (ac)	CN	Description
2.700	69	50-75% Grass cover, Fair, HSG B
2.700		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 23S: DA - 4

Hydrograph



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25-Year 24-Hour Storm Event
Type II 24-hr 25-yr Rainfall=7.23"

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Subcatchment 31S: DA - 3

Runoff = 3.79 cfs @ 11.96 hrs, Volume= 0.162 af, Depth> 3.41"

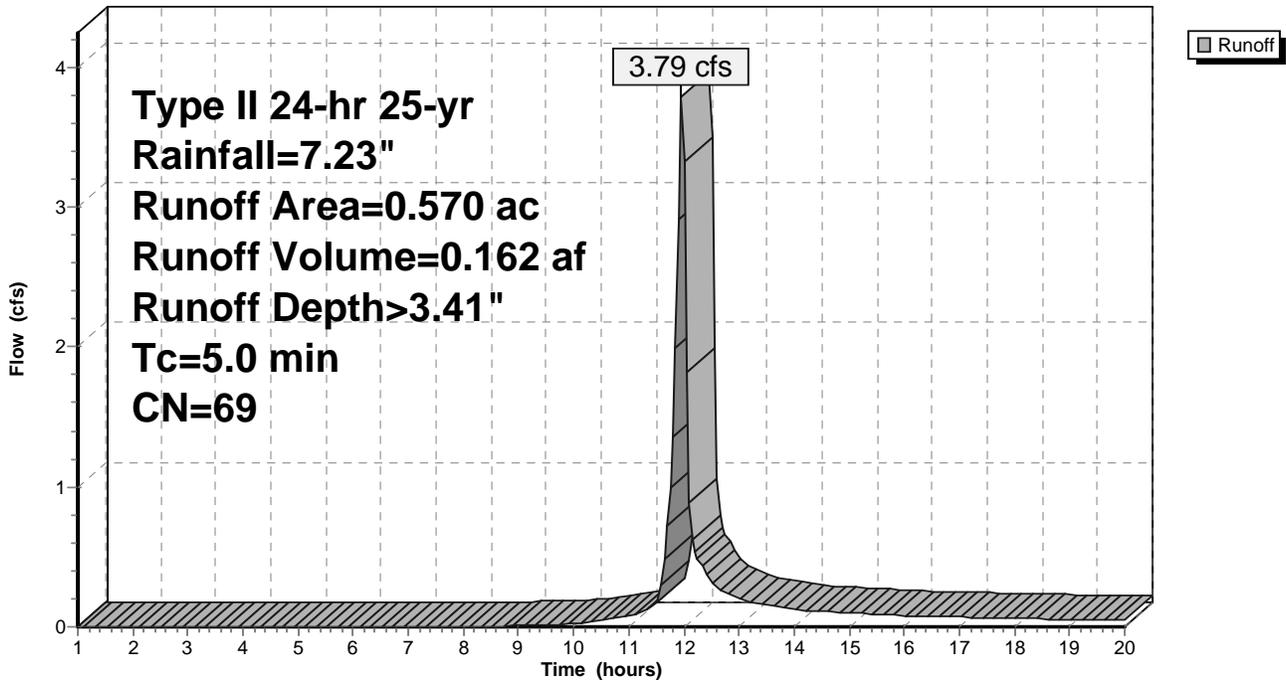
Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=7.23"

Area (ac)	CN	Description
0.570	69	50-75% Grass cover, Fair, HSG B
0.570		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 31S: DA - 3

Hydrograph



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25-Year 24-Hour Storm Event
Type II 24-hr 25-yr Rainfall=7.23"

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Subcatchment 35S: DA - 2

Runoff = 37.92 cfs @ 11.96 hrs, Volume= 1.622 af, Depth> 3.41"

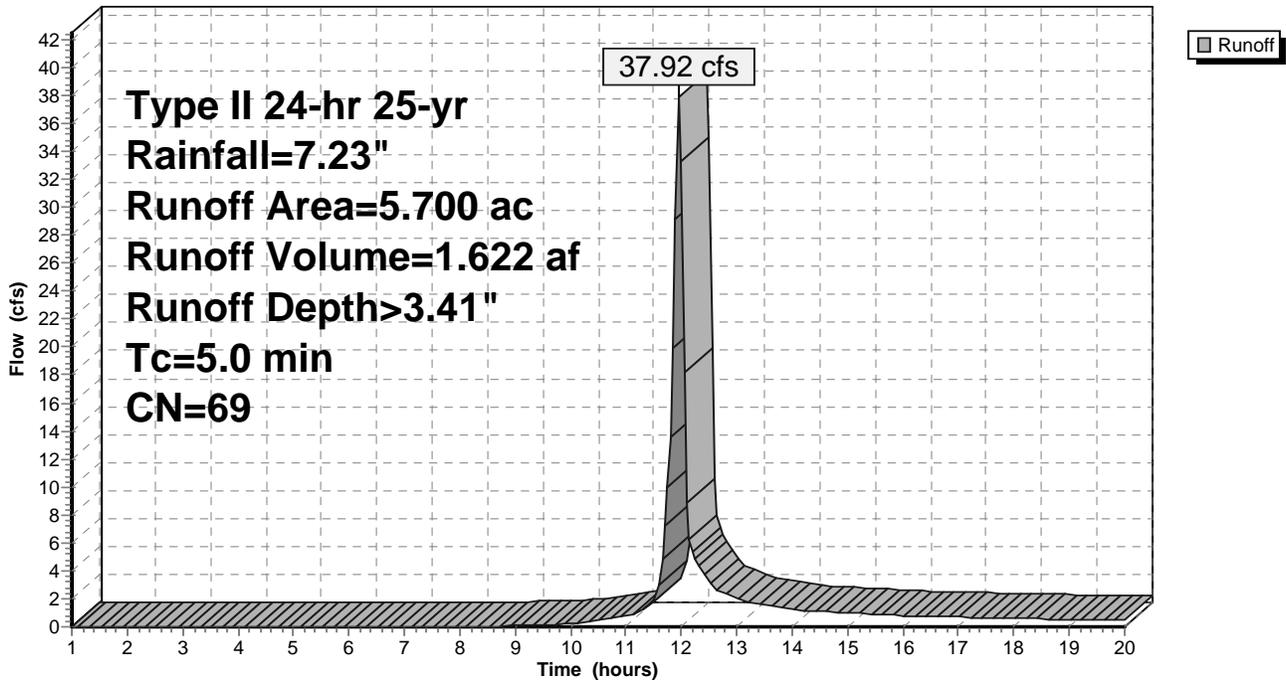
Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=7.23"

Area (ac)	CN	Description
5.700	69	50-75% Grass cover, Fair, HSG B
5.700		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 35S: DA - 2

Hydrograph



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Type II 24-hr 25-yr Rainfall=7.23"

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Subcatchment 41S: DA - 1

Runoff = 24.81 cfs @ 11.96 hrs, Volume= 1.061 af, Depth> 3.41"

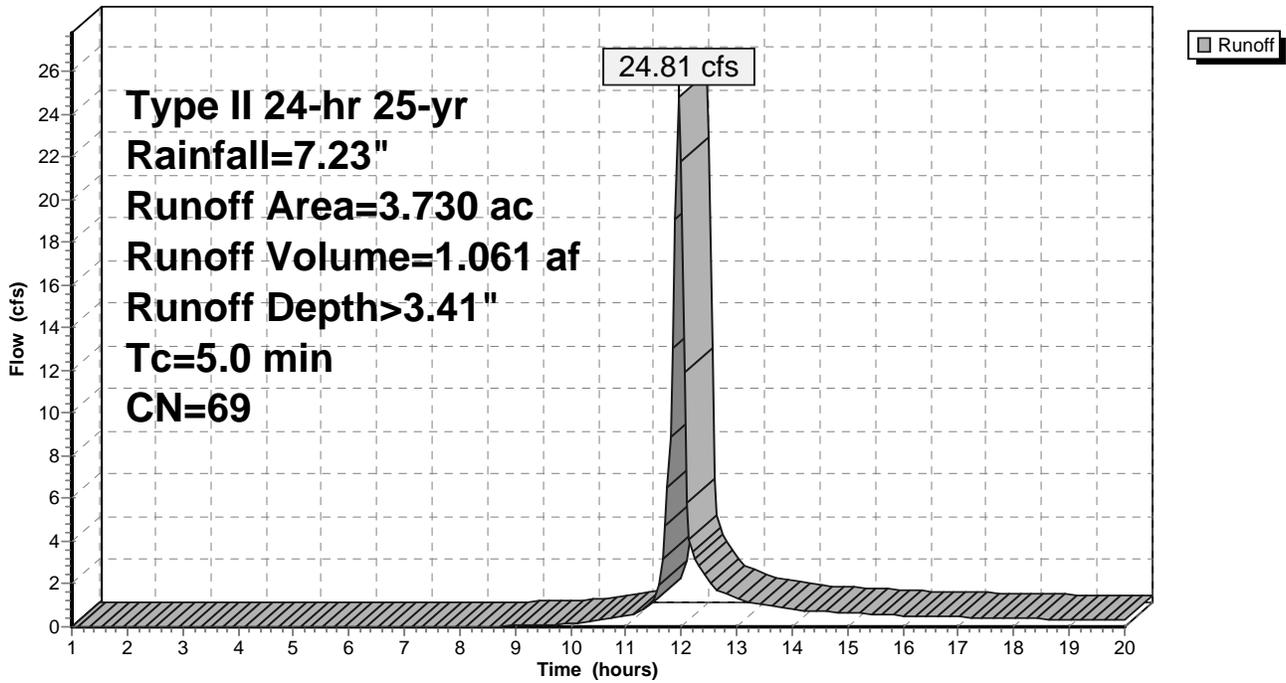
Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=7.23"

Area (ac)	CN	Description
3.730	69	50-75% Grass cover, Fair, HSG B
3.730		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 41S: DA - 1

Hydrograph



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25-Year 24-Hour Storm Event
Type II 24-hr 25-yr Rainfall=7.23"

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Subcatchment 53S: DA-3D

Runoff = 7.98 cfs @ 11.96 hrs, Volume= 0.341 af, Depth> 3.41"

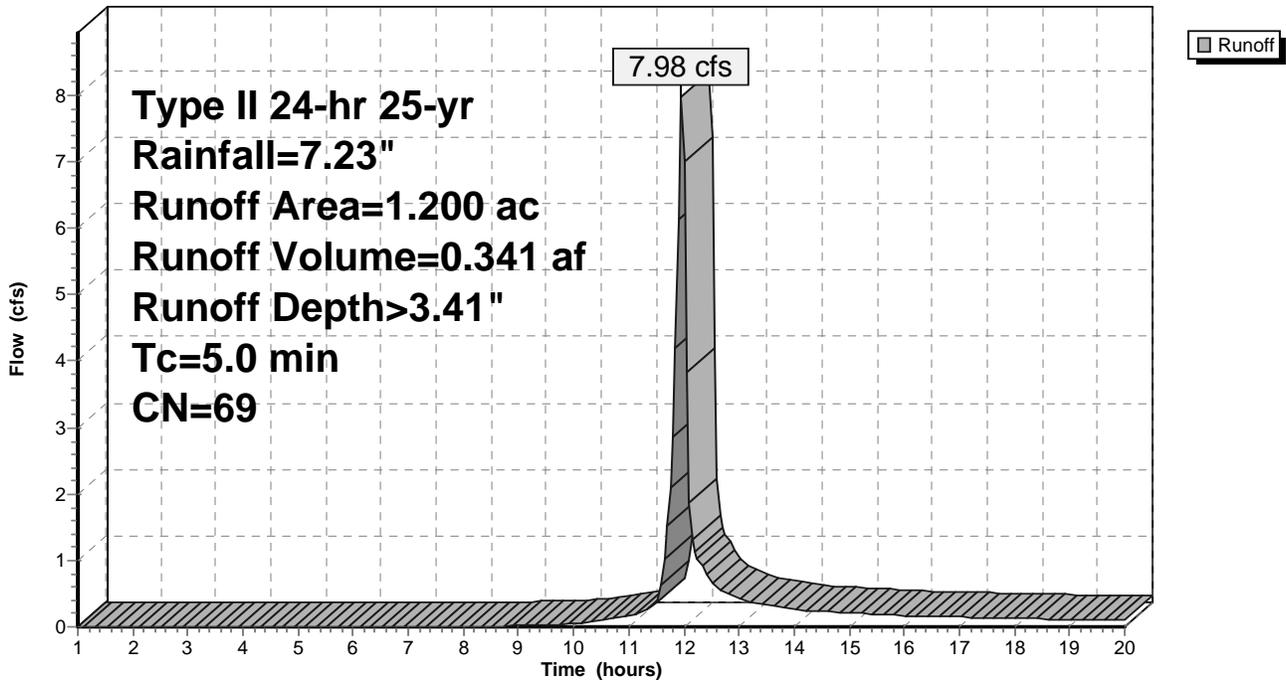
Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=7.23"

Area (ac)	CN	Description
1.200	69	50-75% Grass cover, Fair, HSG B
1.200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 53S: DA-3D

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25-Year 24-Hour Storm Event
Type II 24-hr 25-yr Rainfall=7.23"

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Subcatchment 58S: DA-3A

Runoff = 7.12 cfs @ 11.96 hrs, Volume= 0.304 af, Depth> 3.41"

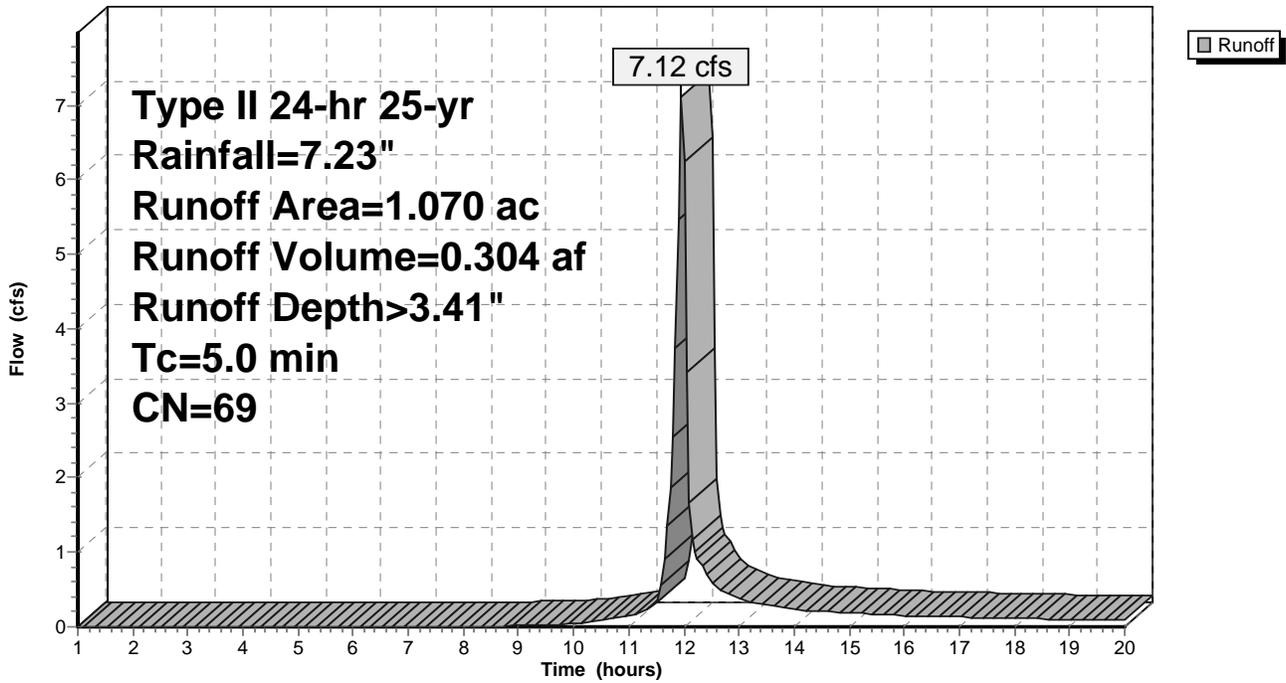
Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=7.23"

Area (ac)	CN	Description
1.070	69	50-75% Grass cover, Fair, HSG B
1.070		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 58S: DA-3A

Hydrograph



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25-Year 24-Hour Storm Event
Type II 24-hr 25-yr Rainfall=7.23"

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Subcatchment 59S: DA-3B

Runoff = 12.77 cfs @ 11.96 hrs, Volume= 0.546 af, Depth> 3.41"

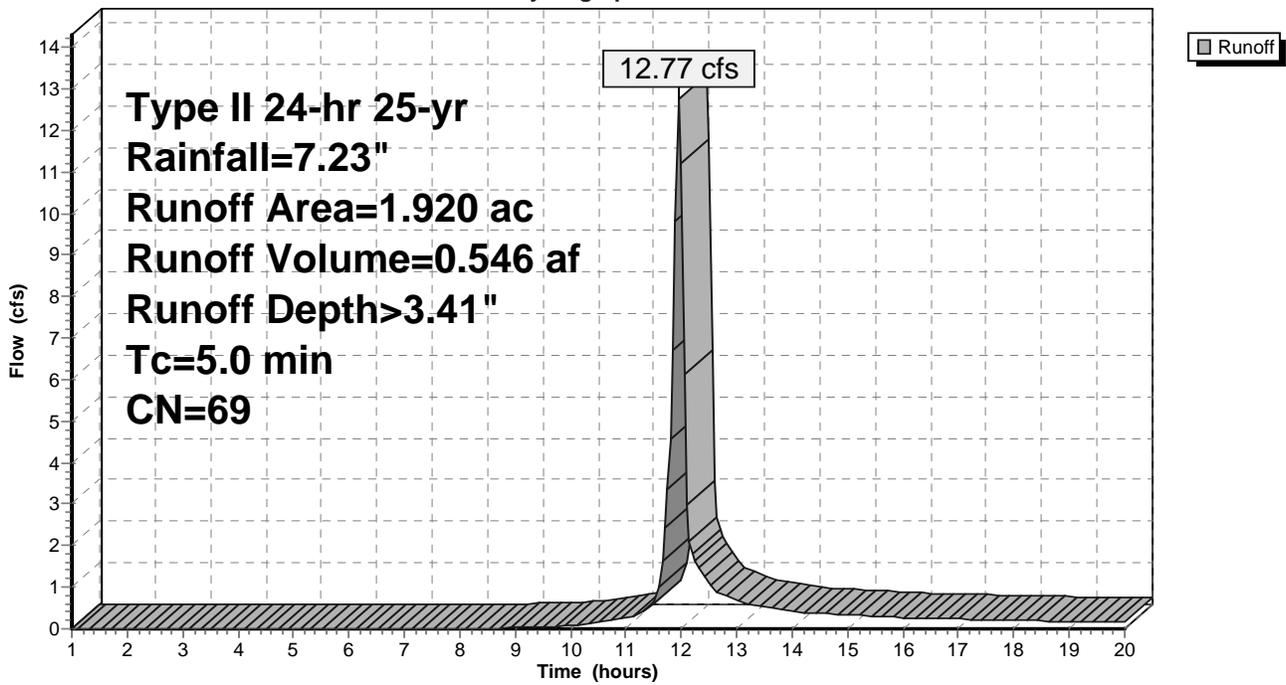
Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=7.23"

Area (ac)	CN	Description
1.920	69	50-75% Grass cover, Fair, HSG B
1.920		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 59S: DA-3B

Hydrograph



Avery co-Final rev 4

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25-Year 24-Hour Storm Event
Type II 24-hr 25-yr Rainfall=7.23"

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Subcatchment 60S: DA-3C

Runoff = 10.38 cfs @ 11.96 hrs, Volume= 0.444 af, Depth> 3.41"

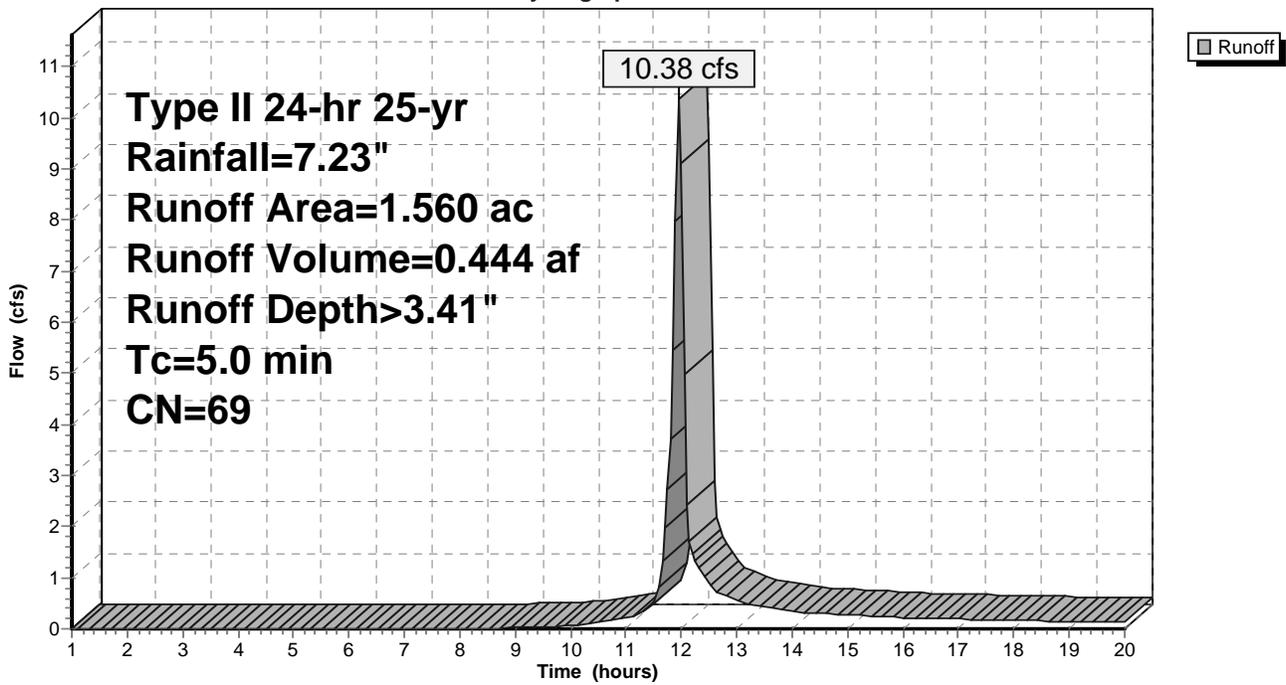
Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=7.23"

Area (ac)	CN	Description
1.560	69	50-75% Grass cover, Fair, HSG B
1.560		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 60S: DA-3C

Hydrograph



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25-Year 24-Hour Storm Event
Type II 24-hr 25-yr Rainfall=7.23"

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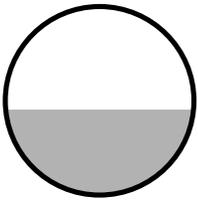
Reach 45R: DP-1

Inflow Area = 3.730 ac, Inflow Depth > 3.41" for 25-yr event
Inflow = 24.81 cfs @ 11.96 hrs, Volume= 1.061 af
Outflow = 24.20 cfs @ 11.97 hrs, Volume= 1.061 af, Atten= 2%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 31.65 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 10.56 fps, Avg. Travel Time= 0.8 min

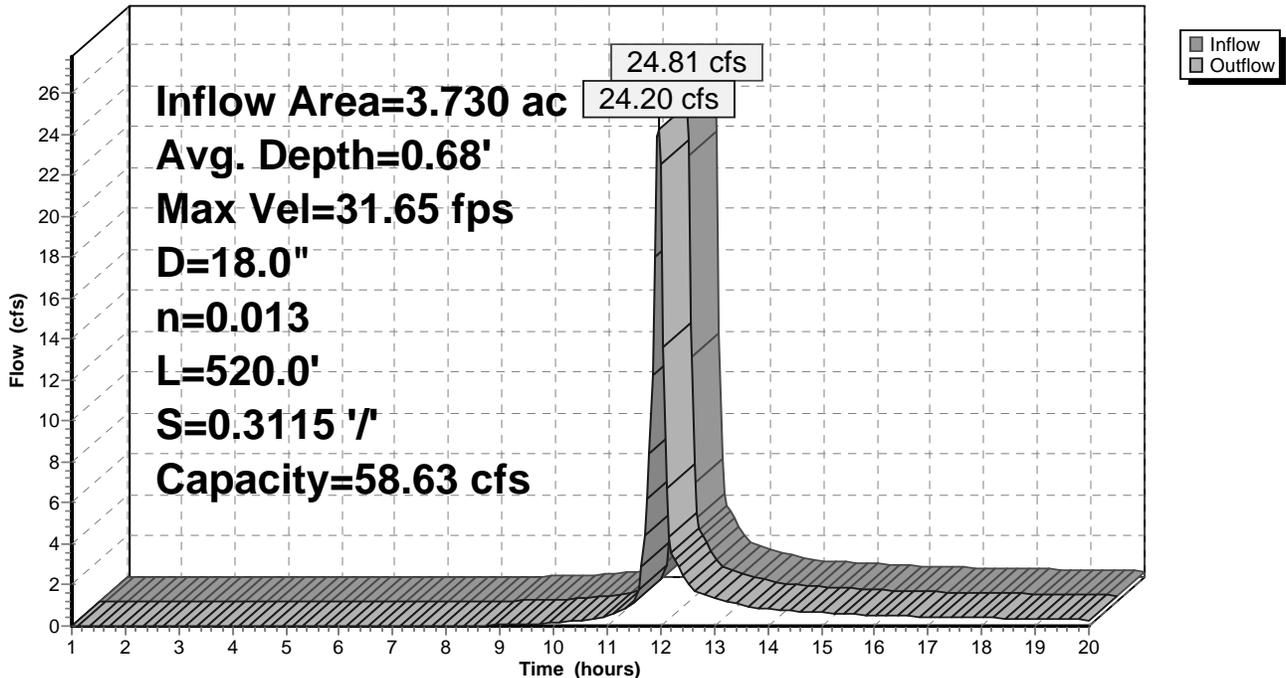
Peak Storage= 403 cf @ 11.96 hrs, Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 58.63 cfs

18.0" Diameter Pipe, n= 0.013 Corrugated PE, smooth interior
Length= 520.0' Slope= 0.3115 1/100'
Inlet Invert= 3,170.00', Outlet Invert= 3,008.00'



Reach 45R: DP-1

Hydrograph



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Type II 24-hr 25-yr Rainfall=7.23"

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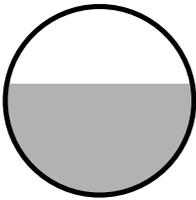
Reach 46R: DP-2

Inflow Area = 5.700 ac, Inflow Depth > 3.41" for 25-yr event
Inflow = 37.92 cfs @ 11.96 hrs, Volume= 1.622 af
Outflow = 36.69 cfs @ 11.97 hrs, Volume= 1.621 af, Atten= 3%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 34.41 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 11.76 fps, Avg. Travel Time= 1.1 min

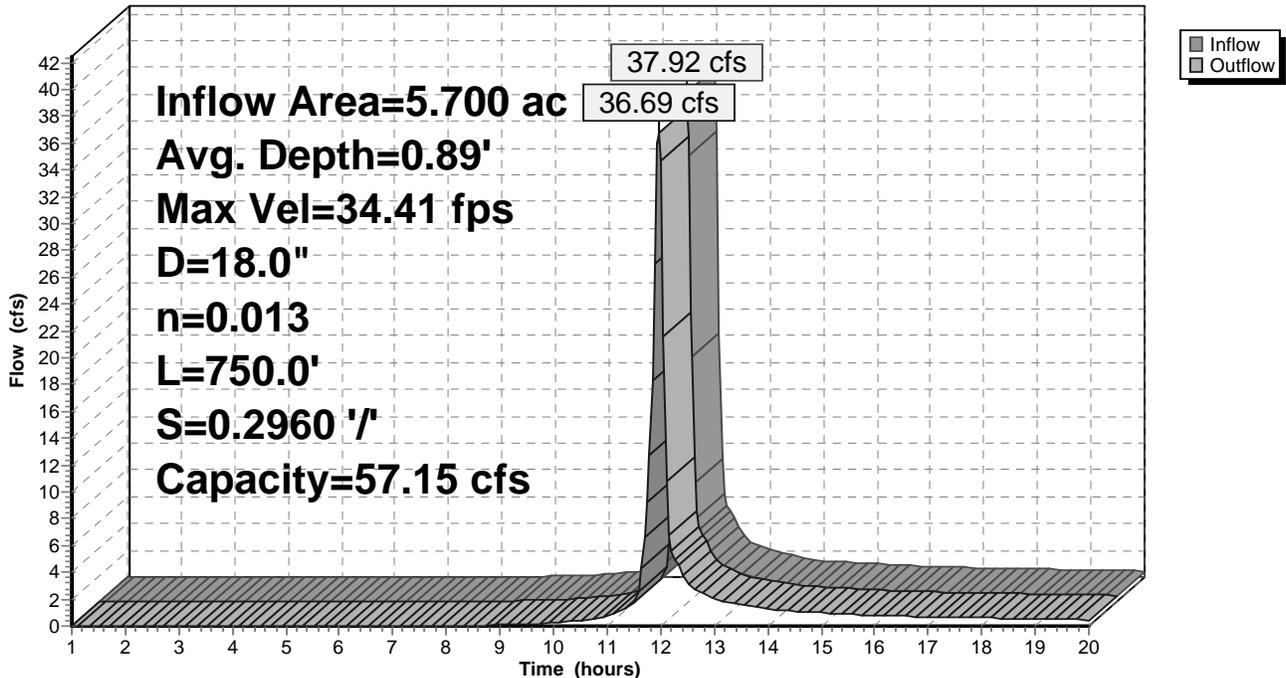
Peak Storage= 815 cf @ 11.96 hrs, Average Depth at Peak Storage= 0.89'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 57.15 cfs

18.0" Diameter Pipe, n= 0.013 Corrugated PE, smooth interior
Length= 750.0' Slope= 0.2960 '/'
Inlet Invert= 3,170.00', Outlet Invert= 2,948.00'



Reach 46R: DP-2

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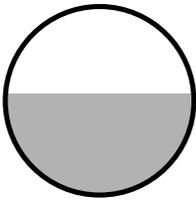
Reach 47R: DP-3

Inflow Area = 3.900 ac, Inflow Depth > 3.41" for 25-yr event
Inflow = 25.90 cfs @ 11.96 hrs, Volume= 1.110 af
Outflow = 25.42 cfs @ 11.96 hrs, Volume= 1.109 af, Atten= 2%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 26.48 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 8.95 fps, Avg. Travel Time= 0.6 min

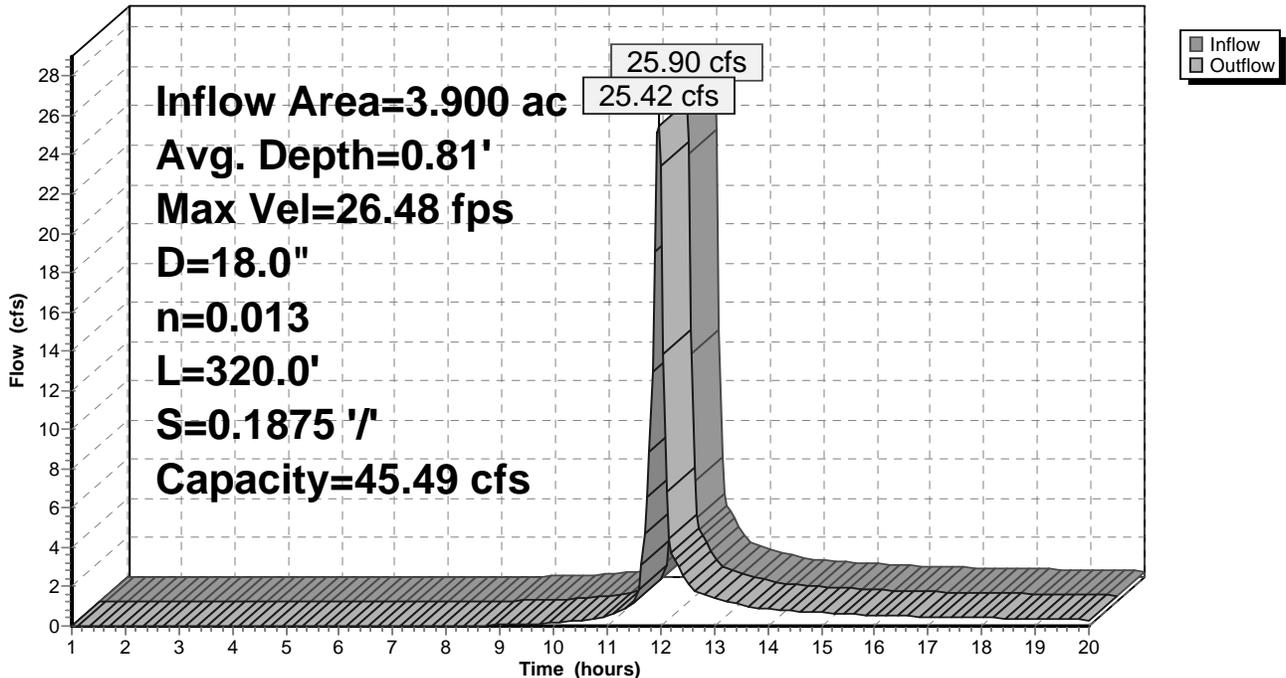
Peak Storage= 310 cf @ 11.96 hrs, Average Depth at Peak Storage= 0.81'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 45.49 cfs

18.0" Diameter Pipe, n= 0.013 Corrugated PE, smooth interior
Length= 320.0' Slope= 0.1875 '/'
Inlet Invert= 2,930.00', Outlet Invert= 2,870.00'



Reach 47R: DP-3

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Reach 58R: DC-2

Inflow Area = 5.120 ac, Inflow Depth > 1.69" for 25-yr event
Inflow = 7.29 cfs @ 12.12 hrs, Volume= 0.719 af
Outflow = 7.32 cfs @ 12.16 hrs, Volume= 0.718 af, Atten= 0%, Lag= 2.6 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.07 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 2.10 fps, Avg. Travel Time= 2.7 min

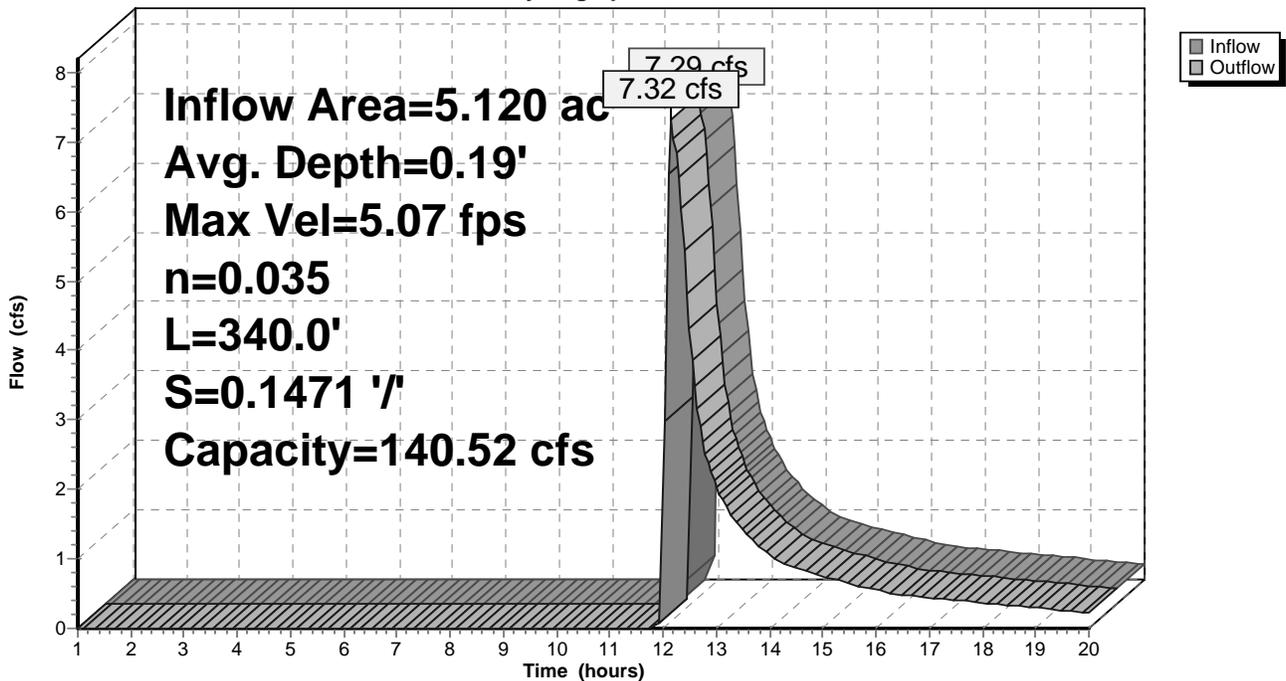
Peak Storage= 530 cf @ 12.12 hrs, Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 140.52 cfs

8.00' x 1.00' deep channel, n= 0.035
Side Slope Z-value= 2.0 '/ Top Width= 12.00'
Length= 340.0' Slope= 0.1471 '/
Inlet Invert= 2,928.00', Outlet Invert= 2,878.00'



Reach 58R: DC-2

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Reach 59R: DC-1

Inflow Area = 5.700 ac, Inflow Depth > 1.70" for 25-yr event
Inflow = 7.34 cfs @ 12.15 hrs, Volume= 0.807 af
Outflow = 7.34 cfs @ 12.15 hrs, Volume= 0.805 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.06 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 2.24 fps, Avg. Travel Time= 2.7 min

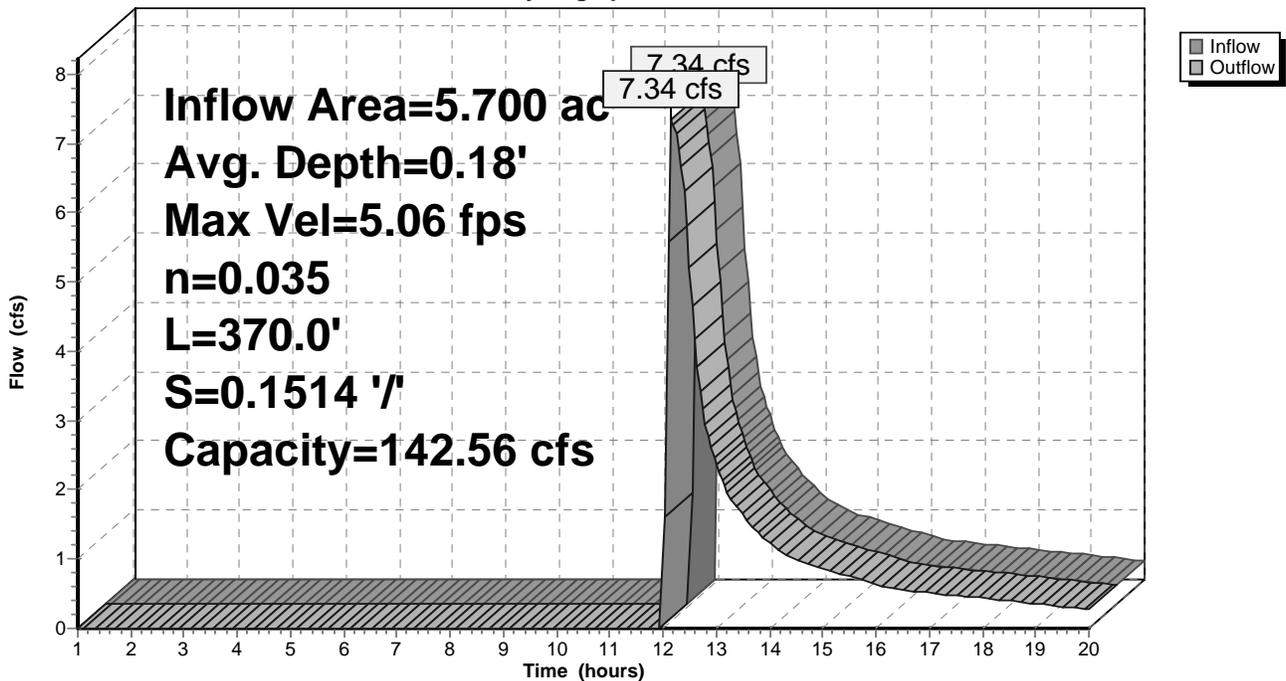
Peak Storage= 553 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 142.56 cfs

8.00' x 1.00' deep channel, n= 0.035
Side Slope Z-value= 2.0 '/ Top Width= 12.00'
Length= 370.0' Slope= 0.1514 '/
Inlet Invert= 2,942.00', Outlet Invert= 2,886.00'



Reach 59R: DC-1

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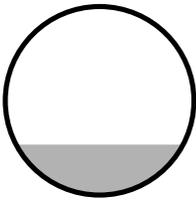
Reach 60R: C-4

Inflow Area = 1.200 ac, Inflow Depth > 3.41" for 25-yr event
Inflow = 7.98 cfs @ 11.96 hrs, Volume= 0.341 af
Outflow = 7.94 cfs @ 11.96 hrs, Volume= 0.341 af, Atten= 1%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 21.11 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 6.88 fps, Avg. Travel Time= 0.2 min

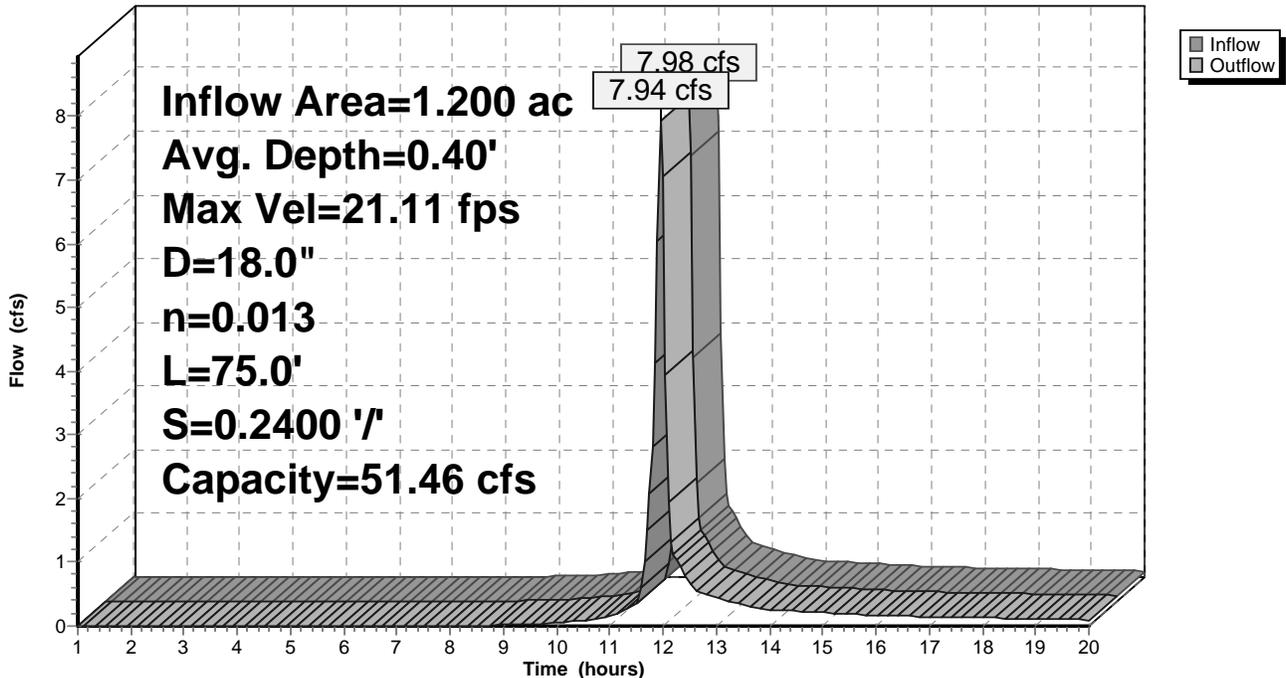
Peak Storage= 28 cf @ 11.96 hrs, Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 51.46 cfs

18.0" Diameter Pipe, n= 0.013 Concrete pipe, bends & connections
Length= 75.0' Slope= 0.2400 '/
Inlet Invert= 2,918.00', Outlet Invert= 2,900.00'



Reach 60R: C-4

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Pond 26P: Basin - 4

Inflow Area = 3.900 ac, Inflow Depth > 3.41" for 25-yr event
 Inflow = 25.42 cfs @ 11.96 hrs, Volume= 1.109 af
 Outflow = 13.67 cfs @ 12.06 hrs, Volume= 0.843 af, Atten= 46%, Lag= 5.8 min
 Discarded = 0.11 cfs @ 11.00 hrs, Volume= 0.090 af
 Primary = 9.32 cfs @ 12.06 hrs, Volume= 0.726 af
 Secondary = 4.24 cfs @ 12.06 hrs, Volume= 0.028 af

Routing by Stor-Ind method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 2,874.20' @ 12.06 hrs Surf.Area= 7,274 sf Storage= 19,006 cf

Plug-Flow detention time= 98.4 min calculated for 0.841 af (76% of inflow)
 Center-of-Mass det. time= 36.9 min (823.1 - 786.2)

Volume	Invert	Avail.Storage	Storage Description
#1	2,870.00'	34,498 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,870.00	2,000	0	0
2,872.00	4,305	6,305	6,305
2,874.00	6,982	11,287	17,592
2,876.00	9,924	16,906	34,498

Device	Routing	Invert	Outlet Devices
#1	Discarded	2,870.00'	Skimmer Head (feet) 0.00 0.50 6.00 Disch. (cfs) 0.000 0.110 0.110
#2	Primary	2,870.00'	15.0" x 65.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 2,868.00' S= 0.0308 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#3	Device 2	2,873.00'	18.0" Horiz. Riser Limited to weir flow C= 0.600
#4	Secondary	2,874.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.11 cfs @ 11.00 hrs HW=2,870.53' (Free Discharge)
 ↑1=Skimmer (Custom Controls 0.11 cfs)

Primary OutFlow Max=9.22 cfs @ 12.06 hrs HW=2,874.17' (Free Discharge)
 ↑2=Culvert (Passes 9.22 cfs of 11.13 cfs potential flow)
 ↑3=Riser (Orifice Controls 9.22 cfs @ 5.22 fps)

Secondary OutFlow Max=3.71 cfs @ 12.06 hrs HW=2,874.18' (Free Discharge)
 ↑4=Broad-Crested Rectangular Weir (Weir Controls 3.71 cfs @ 1.05 fps)

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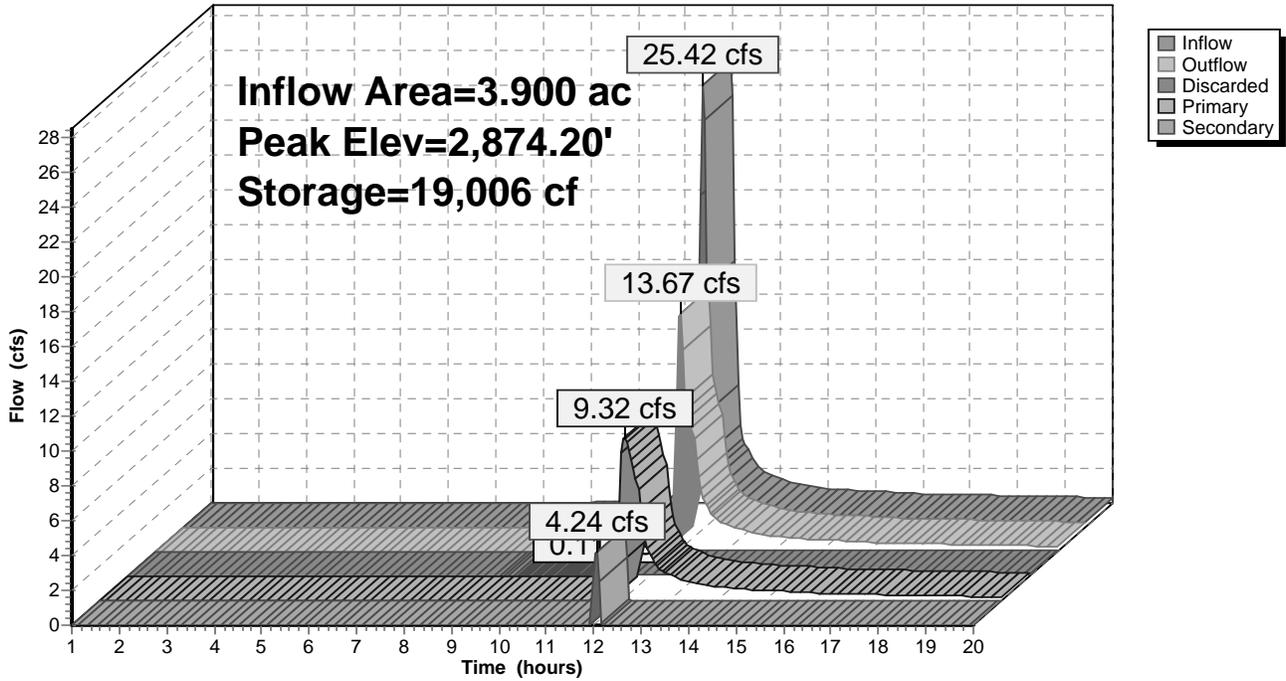
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Type II 24-hr 25-yr Rainfall=7.23"

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Pond 26P: Basin - 4

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Pond 34P: Basin -3

Inflow Area = 5.120 ac, Inflow Depth > 3.41" for 25-yr event
 Inflow = 34.06 cfs @ 11.96 hrs, Volume= 1.457 af
 Outflow = 7.50 cfs @ 12.12 hrs, Volume= 0.890 af, Atten= 78%, Lag= 9.7 min
 Discarded = 0.21 cfs @ 11.00 hrs, Volume= 0.171 af
 Primary = 7.29 cfs @ 12.12 hrs, Volume= 0.719 af
 Secondary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 2,934.73' @ 12.12 hrs Surf.Area= 8,547 sf Storage= 30,168 cf

Plug-Flow detention time= 136.6 min calculated for 0.888 af (61% of inflow)
 Center-of-Mass det. time= 61.5 min (847.3 - 785.7)

Volume	Invert	Avail.Storage	Storage Description
#1	2,929.00'	42,088 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,929.00	2,524	0	0
2,930.00	3,325	2,925	2,925
2,932.00	5,234	8,559	11,484
2,934.00	7,549	12,783	24,267
2,936.00	10,272	17,821	42,088

Device	Routing	Invert	Outlet Devices
#1	Discarded	2,929.00'	Skimmer Head (feet) 0.00 0.50 7.00 Disch. (cfs) 0.000 0.210 0.210
#2	Primary	2,929.00'	15.0" x 100.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 2,928.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#3	Device 2	2,934.00'	18.0" Horiz. Riser Limited to weir flow C= 0.600
#4	Secondary	2,935.00'	10.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.21 cfs @ 11.00 hrs HW=2,929.52' (Free Discharge)

↑**1=Skimmer** (Custom Controls 0.21 cfs)

Primary OutFlow Max=7.22 cfs @ 12.12 hrs HW=2,934.72' (Free Discharge)

↑**2=Culvert** (Passes 7.22 cfs of 11.77 cfs potential flow)

↑**3=Riser** (Orifice Controls 7.22 cfs @ 4.08 fps)

Secondary OutFlow Max=0.00 cfs @ 1.00 hrs HW=2,929.00' (Free Discharge)

↑**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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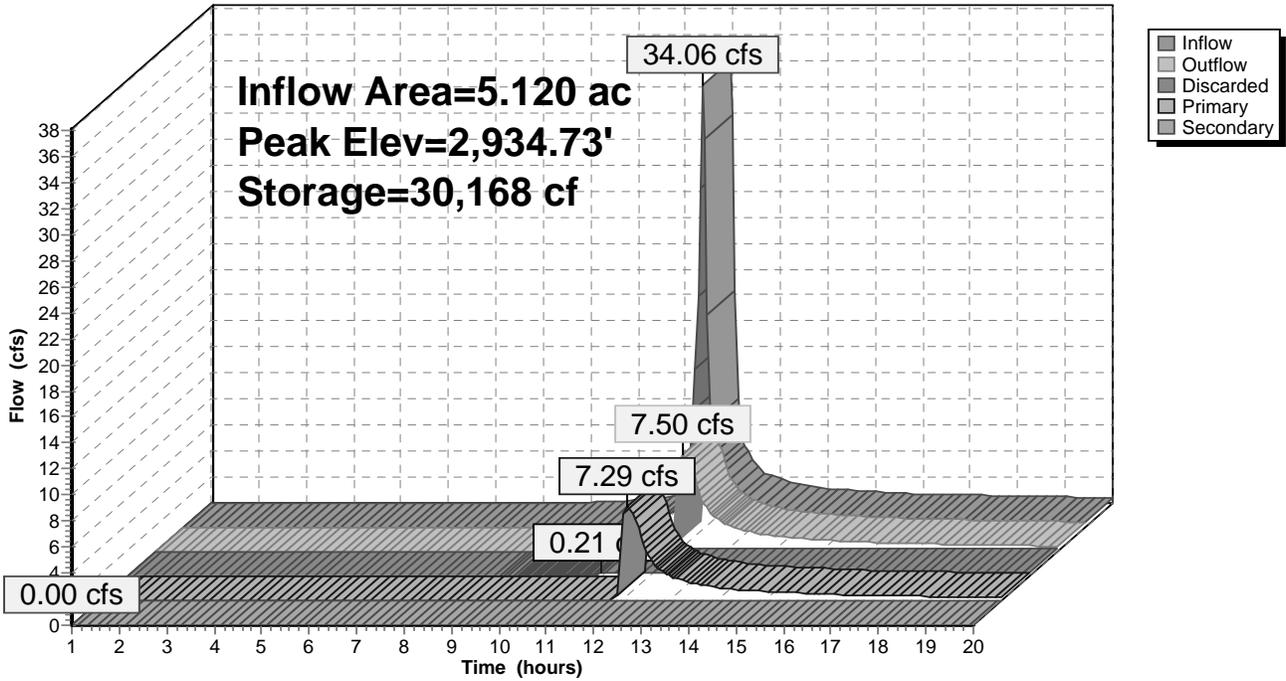
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Pond 34P: Basin -3

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Pond 36P: Basin - 2

Inflow Area = 5.700 ac, Inflow Depth > 3.41" for 25-yr event
 Inflow = 36.69 cfs @ 11.97 hrs, Volume= 1.621 af
 Outflow = 7.55 cfs @ 12.15 hrs, Volume= 0.976 af, Atten= 79%, Lag= 10.8 min
 Discarded = 0.21 cfs @ 11.05 hrs, Volume= 0.170 af
 Primary = 7.34 cfs @ 12.15 hrs, Volume= 0.807 af
 Secondary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 2,948.74' @ 12.15 hrs Surf.Area= 9,070 sf Storage= 33,957 cf

Plug-Flow detention time= 139.4 min calculated for 0.974 af (60% of inflow)
 Center-of-Mass det. time= 63.9 min (850.5 - 786.5)

Volume	Invert	Avail.Storage	Storage Description
#1	2,943.00'	46,331 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,943.00	3,153	0	0
2,944.00	4,001	3,577	3,577
2,946.00	5,919	9,920	13,497
2,948.00	8,134	14,053	27,550
2,950.00	10,647	18,781	46,331

Device	Routing	Invert	Outlet Devices
#1	Discarded	2,943.00'	Skimmer Head (feet) 0.00 0.50 7.00 Disch. (cfs) 0.000 0.210 0.210
#2	Primary	2,943.00'	15.0" x 50.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 2,942.00' S= 0.0200 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#3	Device 2	2,948.00'	18.0" Horiz. Riser Limited to weir flow C= 0.600
#4	Secondary	2,949.00'	20.0' long x 30.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.21 cfs @ 11.05 hrs HW=2,943.52' (Free Discharge)
 ↑1=Skimmer (Custom Controls 0.21 cfs)

Primary OutFlow Max=7.34 cfs @ 12.15 hrs HW=2,948.74' (Free Discharge)
 ↑2=Culvert (Passes 7.34 cfs of 13.37 cfs potential flow)
 ↑3=Riser (Orifice Controls 7.34 cfs @ 4.15 fps)

Secondary OutFlow Max=0.00 cfs @ 1.00 hrs HW=2,943.00' (Free Discharge)
 ↑4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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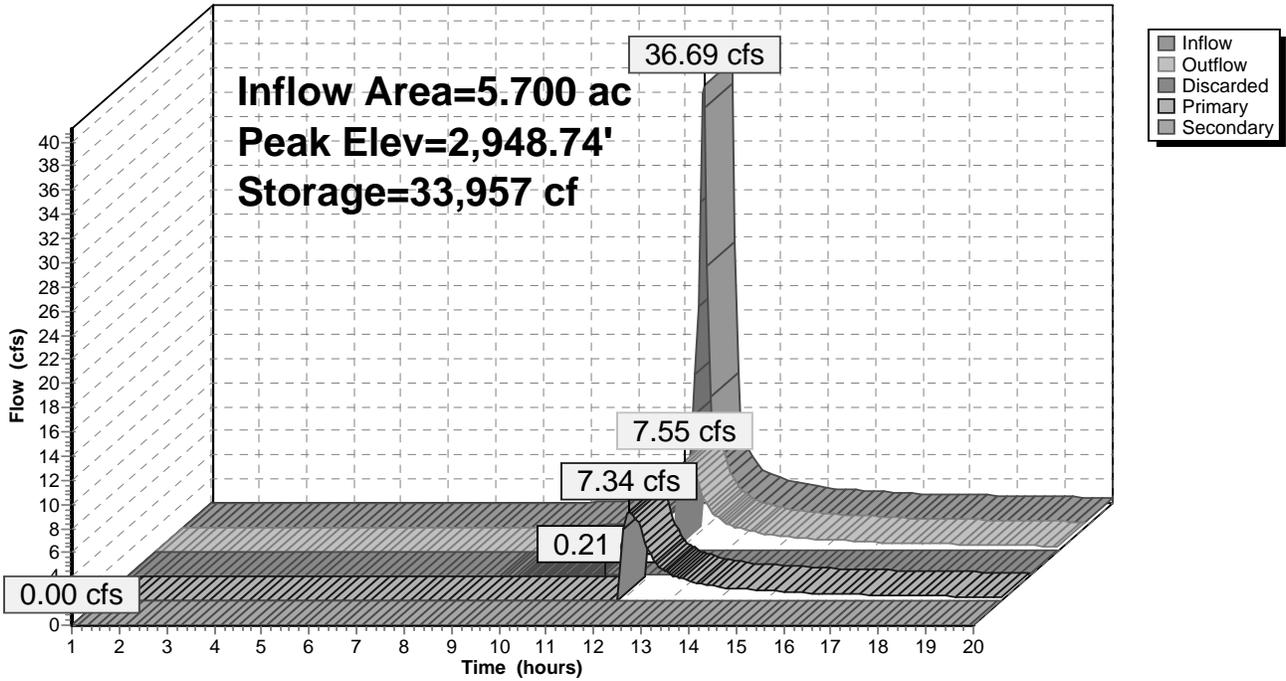
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Pond 36P: Basin - 2

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Pond 44P: Basin - 1

Inflow Area = 3.730 ac, Inflow Depth > 3.41" for 25-yr event
 Inflow = 24.20 cfs @ 11.97 hrs, Volume= 1.061 af
 Outflow = 2.16 cfs @ 12.50 hrs, Volume= 0.509 af, Atten= 91%, Lag= 32.2 min
 Discarded = 0.21 cfs @ 11.60 hrs, Volume= 0.160 af
 Primary = 1.95 cfs @ 12.50 hrs, Volume= 0.350 af
 Secondary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 3,011.75' @ 12.50 hrs Surf.Area= 9,070 sf Storage= 25,946 cf

Plug-Flow detention time= 176.5 min calculated for 0.508 af (48% of inflow)
 Center-of-Mass det. time= 96.0 min (882.3 - 786.3)

Volume	Invert	Avail.Storage	Storage Description
#1	3,008.00'	49,609 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
3,008.00	4,888	0	0
3,010.00	6,992	11,880	11,880
3,012.00	9,365	16,357	28,237
3,014.00	12,007	21,372	49,609

Device	Routing	Invert	Outlet Devices
#1	Discarded	3,008.00'	Skimmer Head (feet) 0.00 0.50 5.00 Disch. (cfs) 0.000 0.210 0.210
#2	Primary	3,008.00'	15.0" x 45.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 3,006.00' S= 0.0444 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#3	Device 2	3,011.50'	18.0" Horiz. Riser Limited to weir flow C= 0.600
#4	Secondary	3,012.50'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.21 cfs @ 11.60 hrs HW=3,008.52' (Free Discharge)
 ↑1=Skimmer (Custom Controls 0.21 cfs)

Primary OutFlow Max=1.94 cfs @ 12.50 hrs HW=3,011.75' (Free Discharge)
 ↑2=Culvert (Passes 1.94 cfs of 10.45 cfs potential flow)
 ↑3=Riser (Weir Controls 1.94 cfs @ 1.64 fps)

Secondary OutFlow Max=0.00 cfs @ 1.00 hrs HW=3,008.00' (Free Discharge)
 ↑4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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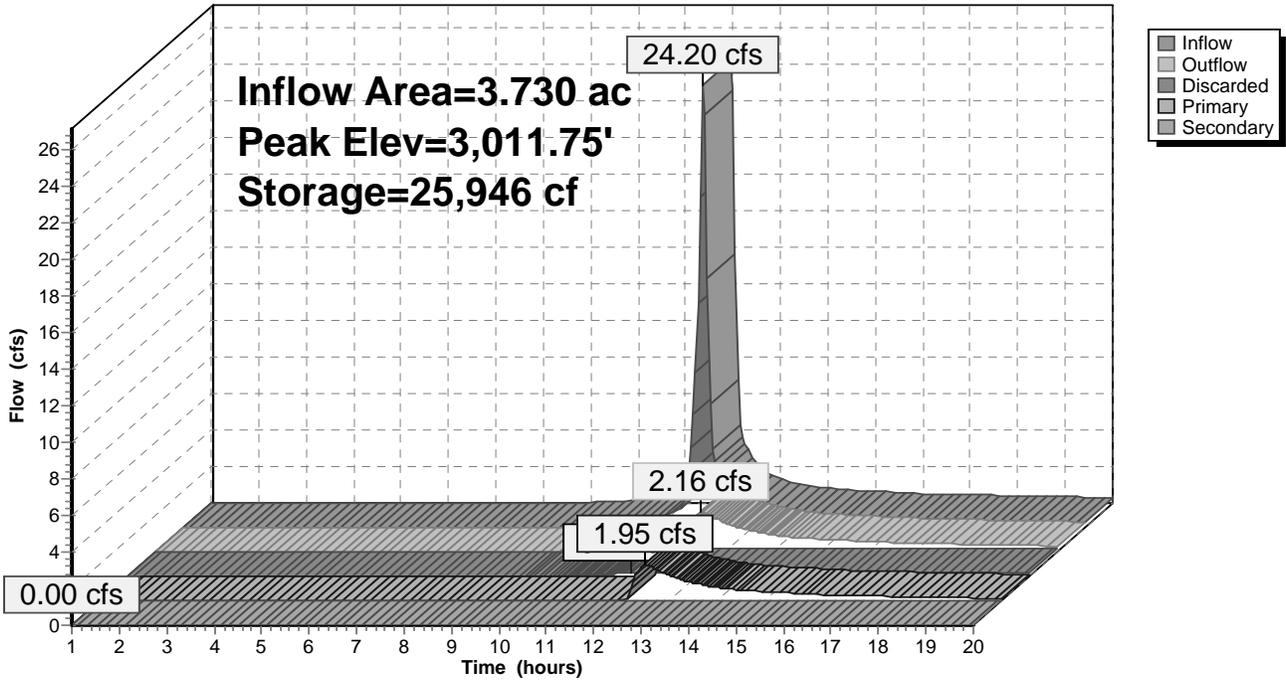
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Pond 44P: Basin - 1

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Pond 55P: DI-3A

Inflow Area = 1.070 ac, Inflow Depth > 3.41" for 25-yr event
Inflow = 7.12 cfs @ 11.96 hrs, Volume= 0.304 af
Outflow = 7.12 cfs @ 11.96 hrs, Volume= 0.304 af, Atten= 0%, Lag= 0.0 min
Primary = 7.12 cfs @ 11.96 hrs, Volume= 0.304 af

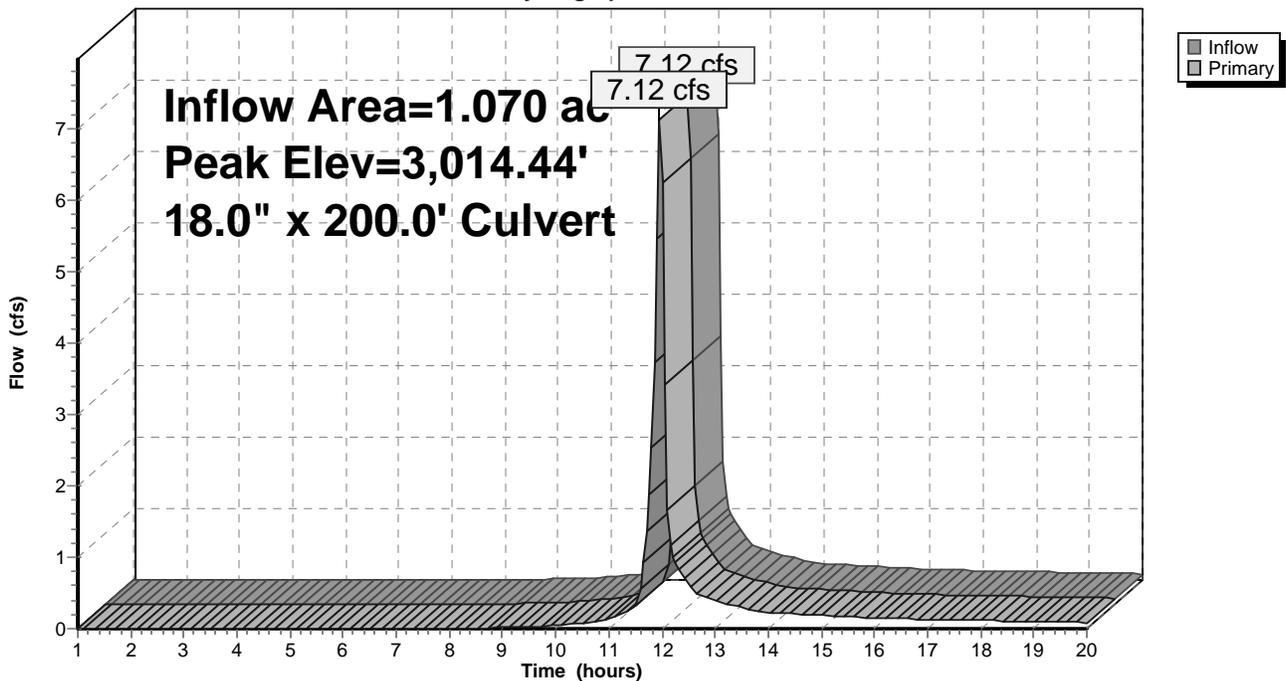
Routing by Stor-Ind method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 3,014.44' @ 11.96 hrs
Flood Elev= 3,016.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	3,013.00'	18.0" x 200.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 2,973.00' S= 0.2000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=6.97 cfs @ 11.96 hrs HW=3,014.41' (Free Discharge)
↑**1=Culvert** (Inlet Controls 6.97 cfs @ 4.04 fps)

Pond 55P: DI-3A

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Pond 56P: DI-3B

Inflow Area = 2.990 ac, Inflow Depth > 3.41" for 25-yr event
Inflow = 19.89 cfs @ 11.96 hrs, Volume= 0.851 af
Outflow = 19.89 cfs @ 11.96 hrs, Volume= 0.851 af, Atten= 0%, Lag= 0.0 min
Primary = 19.89 cfs @ 11.96 hrs, Volume= 0.851 af

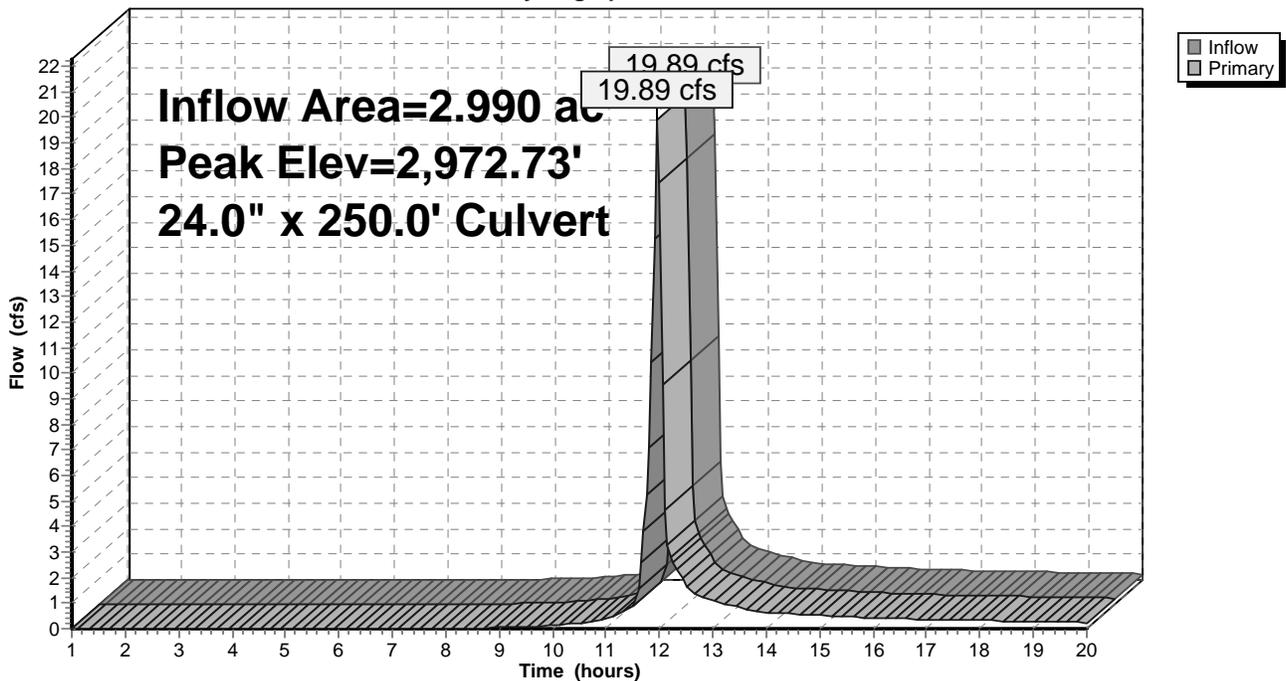
Routing by Stor-Ind method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,972.73' @ 11.96 hrs
Flood Elev= 2,976.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	2,970.00'	24.0" x 250.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 2,939.00' S= 0.1240 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=19.46 cfs @ 11.96 hrs HW=2,972.65' (Free Discharge)
↑1=Culvert (Inlet Controls 19.46 cfs @ 6.19 fps)

Pond 56P: DI-3B

Hydrograph



Avery co-Final rev 4

Prepared by Richardson Smith Gardner & Associates, Inc.
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25-Year 24-Hour Storm Event
Type II 24-hr 25-yr Rainfall=7.23"

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8/31/2009

Pond 57P: DI-3C

Inflow Area = 4.550 ac, Inflow Depth > 3.41" for 25-yr event
Inflow = 30.27 cfs @ 11.96 hrs, Volume= 1.295 af
Outflow = 30.27 cfs @ 11.96 hrs, Volume= 1.295 af, Atten= 0%, Lag= 0.0 min
Primary = 30.27 cfs @ 11.96 hrs, Volume= 1.295 af

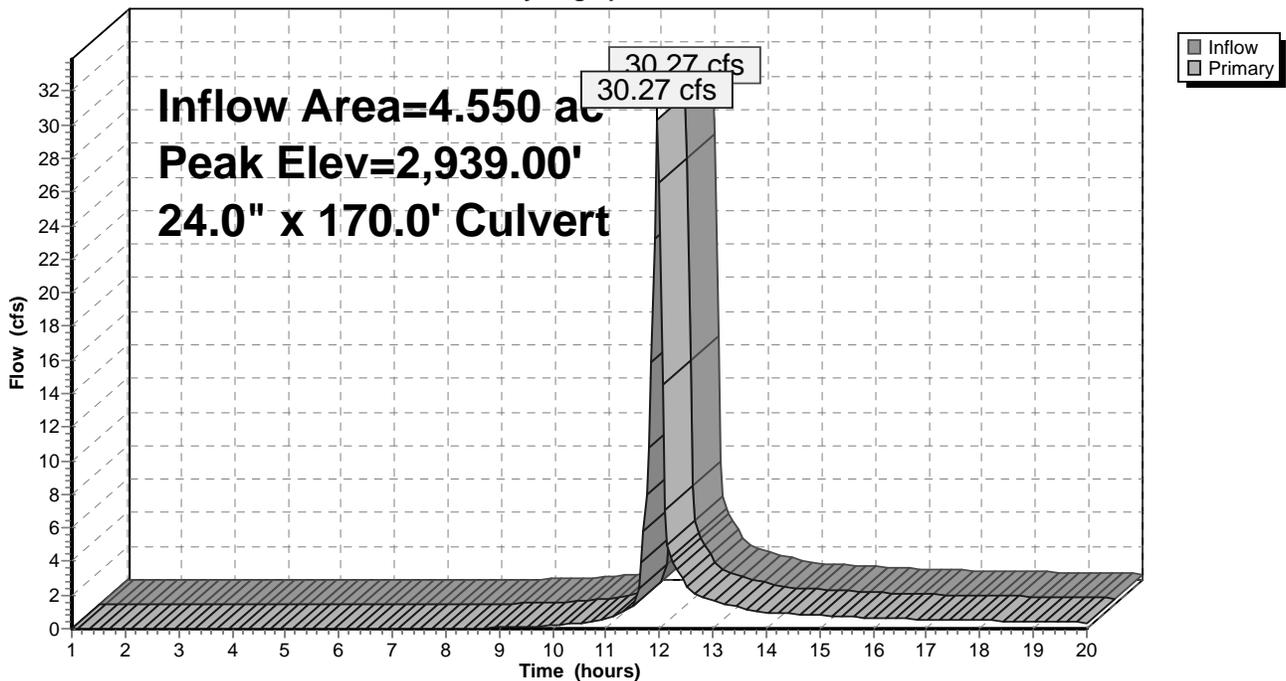
Routing by Stor-Ind method, Time Span= 1.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,939.00' @ 11.96 hrs
Flood Elev= 2,942.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	2,934.00'	24.0" x 170.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 2,930.00' S= 0.0235 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=29.61 cfs @ 11.96 hrs HW=2,938.83' (Free Discharge)
↑=Culvert (Inlet Controls 29.61 cfs @ 9.42 fps)

Pond 57P: DI-3C

Hydrograph



PROJECT Avery County C&D Landfill

SHEET 1 OF _____

JOB NO. AVERY-08-5

DATE 1/5/09 Rev.8/27/09

SUBJECT Skimmer Capacity Analysis

COMPUTED BY TBM, Rev. KBS

CHECKED BY _____

Objective To select the appropriate skimmer orifice size for a sediment basin skimmer outlet.

Reference North Carolina Division of Land Resources (2006), North Carolina Erosion & Sediment Control Planning & Design Manual, Raleigh, NC.

Analysis The following approach is used in the design of down pipes:

1. Select an orifice size. Calculate the discharge flow capacity and time to drain from the principal spillway crest to the bottom of the basin.
2. If the drain time exceeds 72 hours, then a larger orifice is needed. If the drain time is less than 24 hours, then a smaller orifice is needed

Calculations

- Orifice Equation:

$$Q = C_d a \sqrt{2gh}$$

where:

Q	=	flow capacity of inlet (cfs)
C_d	=	coefficient of discharge (use 0.6)
a	=	cross-sectional area of orifice (ft ²)
g	=	gravitational constant (32.2 ft/s ²)
h	=	head (assume 0.25 ft)

Results

For a 4-inch orifice, the calculated capacity is 0.21 cfs.
For a basin volume between 20,500 cf and 28,500 cf, the calculated drain time is 27 to 38 hours.
Therefore, a 4-inch orifice is suitable for Basins No. 1 through No. 3.

For a 3-inch orifice, the calculated capacity is 0.117 cfs.
For a basin volume 19,800 cf, the calculated drain time is 30 hours.
Therefore, a 3-inch orifice is suitable for Basin No. 4

SKIMMER CAPACITY.WPD



RICHARDSON SMITH GARDNER & ASSOCIATES

Engineering and Geological Services

14 N. Boylan Avenue, Raleigh, NC 27603

Telephone: (919) 828-0577

Skimmer Basin

Okay

3.9 Disturbed Area (Acres)
2.83 Peak Flow from 10-year Storm (cfs)

7020 Required Volume ft³
920 Required Surface Area ft²
21.4 Suggested Width ft
42.9 Suggested Length ft

170 Trial Top Width at Spillway Invert ft
50 Trial Top Length at Spillway Invert ft
3 Trial Side Slope Ratio Z:1
3 Trial Depth ft (2 to 3.5 feet above grade)

152 Bottom Width ft
32 Bottom Length ft
4864 Bottom Area ft²
19884 Actual Volume ft³
8500 Actual Surface Area ft²

Okay

Okay

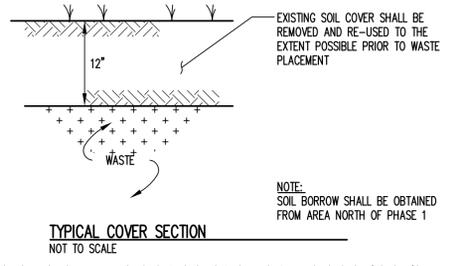
4 Trial Weir Length ft
0.5 Trial Depth of Flow ft
4.2 Spillway Capacity cfs

Okay

4 Skimmer Size (inches)
0.333 Head on Skimmer (feet)
3 Orifice Size (1/4 inch increments)
1.66 Dewatering Time (days)
Suggest about 3 days

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

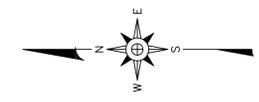
SAFETY NOTE:
 THE CONTRACTOR IS SOLELY RESPONSIBLE FOR SITE SAFETY ASSOCIATED WITH THE WORK UNDER THIS CONTRACT AND FOR COMPLIANCE WITH ALL FEDERAL, STATE AND LOCAL HEALTH AND SAFETY LAWS, CODES, REGULATIONS, AND ORDINANCES INCLUDING BUT NOT LIMITED TO THOSE CURRENTLY MANDATED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).



LECHLER, MARK S &
 10.67AC
 182100185065

PIEDMONT NATURAL GAS COMPANY
 EXISTING GAS LINE EASEMENT
 D.B. NO. 299, PG. 1495

FRIE, JAMES C. &
 6.32AC
 182100165990



PROJECT TITLE: AVERY COUNTY C&D LANDFILL WASTE RELOCATION AND SITE IMPROVEMENTS CONSTRUCTION DRAWINGS

DESIGNED BY: S.A.S. DRAWN BY: C.T.J.

CHECKED BY: PROJECT NO.: AVERY 09-3

SCALE: DATE: JULY 2009

FILE NAME: AVERY-D0097A

SHEET NO.: DRAWING NO.: 4 S3

REVISIONS:

NO.	DATE	DESCRIPTION
1	8/28/09	ISSUED FOR CONSTRUCTION
2	7/20/09	PROPOSED GAS LINE EASEMENT RELOCATION

RICHARDSON SMITH GARDNER & ASSOCIATES
 14 N. Boylan Ave., Raleigh, N.C. 27603
 www.regsengineers.com
 ph: 919-428-0577
 fax: 919-428-3889

ISSUED FOR CONSTRUCTION

LEGEND

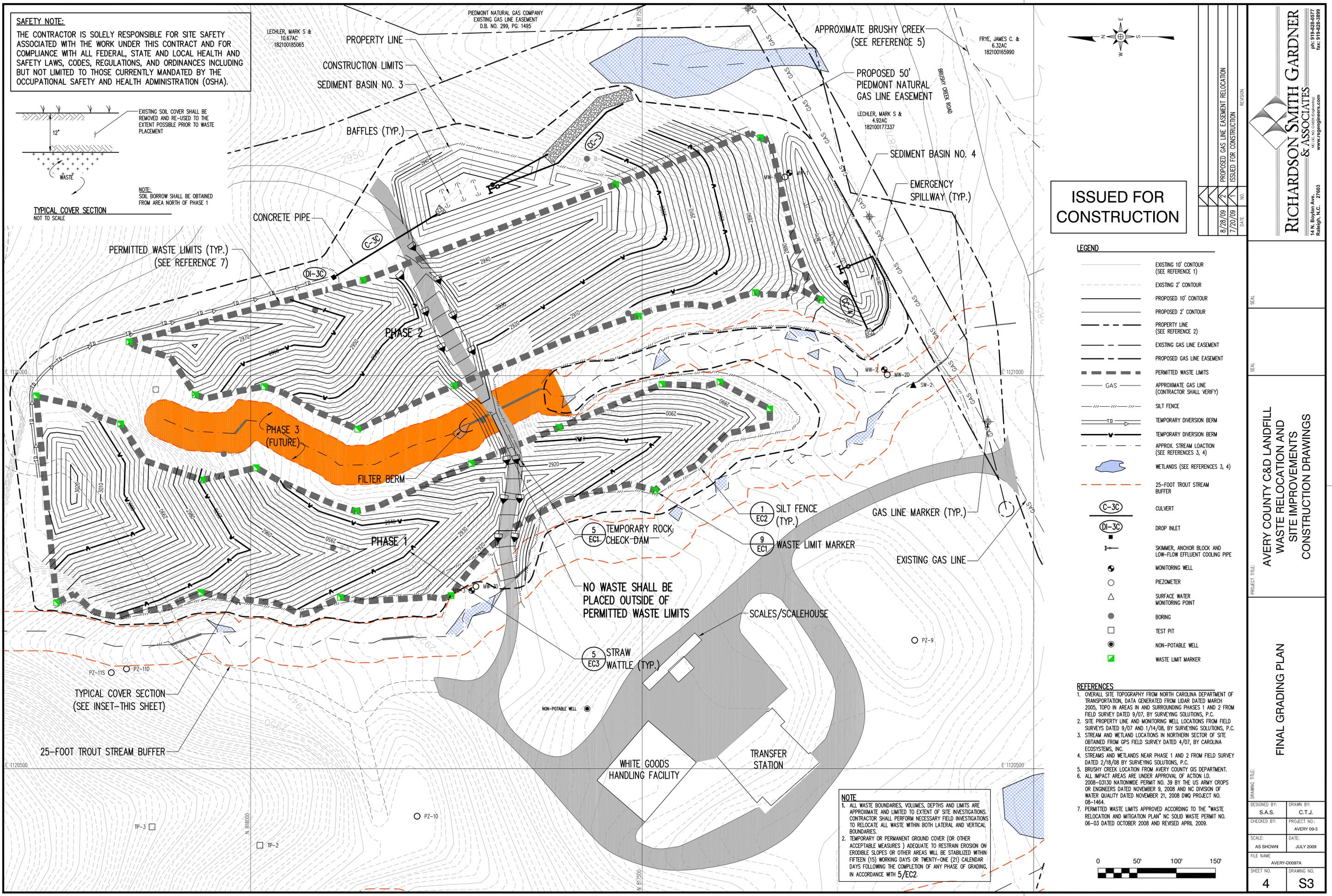
- EXISTING 10' CONTOUR (SEE REFERENCE 1)
- - - EXISTING 2' CONTOUR
- PROPOSED 10' CONTOUR
- - - PROPOSED 2' CONTOUR
- PROPERTY LINE (SEE REFERENCE 2)
- - - EXISTING GAS LINE EASEMENT
- - - PROPOSED GAS LINE EASEMENT
- - - PERMITTED WASTE LIMITS
- GAS
- - - APPROXIMATE GAS LINE (CONTRACTOR SHALL VERIFY)
- - - SILT FENCE
- - - TEMPORARY DIVERSION BERM
- - - TEMPORARY DIVERSION BERM
- - - APPROX. STREAM LOCATION (SEE REFERENCES 3, 4)
- WETLANDS (SEE REFERENCES 3, 4)
- - - 25-FOOT TROUT STREAM BUFFER
- (C-3C) CULVERT
- (DI-3C) DROP INLET
- SKIMMER, ANCHOR BLOCK AND LOW-FLOW EFFLUENT COOLING PIPE
- MONITORING WELL
- PIEZOMETER
- △ SURFACE WATER MONITORING POINT
- BORING
- TEST PIT
- NON-POTABLE WELL
- WASTE LIMIT MARKER

REFERENCES

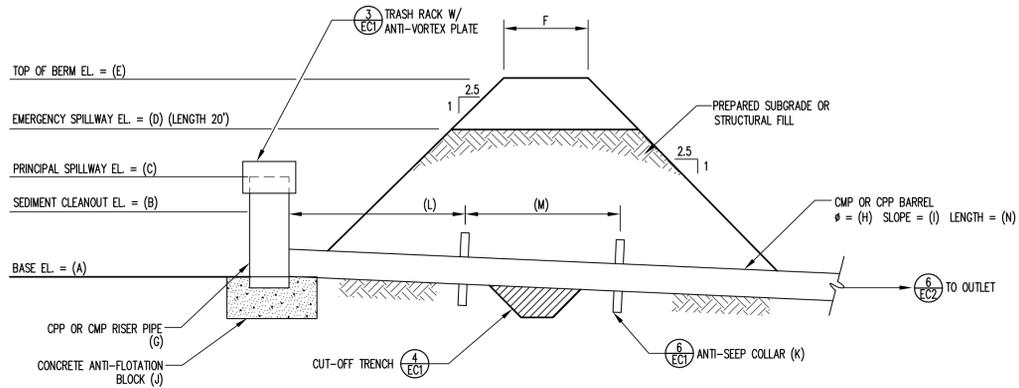
- OVERALL SITE TOPOGRAPHY FROM NORTH CAROLINA DEPARTMENT OF TRANSPORTATION, DATA GENERATED FROM LIDAR DATED MARCH 2005, TOPD IN AREAS IN AND SURROUNDING PHASES 1 AND 2 FROM FIELD SURVEY DATED 9/07, BY SURVEYING SOLUTIONS, P.C.
- SITE PROPERTY LINE AND MONITORING WELL LOCATIONS FROM FIELD SURVEYS DATED 9/07 AND 1/14/08, BY SURVEYING SOLUTIONS, P.C.
- STREAM AND WETLAND LOCATIONS IN NORTHERN SECTOR OF SITE OBTAINED FROM GPS FIELD SURVEY DATED 4/07, BY CAROLINA ECOSYSTEMS, INC.
- STREAMS AND WETLANDS NEAR PHASE 1 AND 2 FROM FIELD SURVEY DATED 2/18/08 BY SURVEYING SOLUTIONS, P.C.
- BRUSHY CREEK LOCATION FROM AVERY COUNTY GIS DEPARTMENT.
- ALL IMPACT AREAS ARE UNDER APPROVAL OF ACTION I.D. 2008-03130 NATIONWIDE PERMIT NO. 39 BY THE US ARMY CORPS OF ENGINEERS DATED NOVEMBER 9, 2008 AND NC DIVISION OF WATER QUALITY DATED NOVEMBER 21, 2008 DWO PROJECT NO. 08-1464.
- PERMITTED WASTE LIMITS APPROVED ACCORDING TO THE "WASTE RELOCATION AND MITIGATION PLAN" NC SOLID WASTE PERMIT NO. 06-03 DATED OCTOBER 2008 AND REVISED APRIL 2009.

NOTE

- ALL WASTE BOUNDARIES, VOLUMES, DEPTHS AND LIMITS ARE APPROXIMATE AND LIMITED TO EXTENT OF SITE INVESTIGATIONS. CONTRACTOR SHALL PERFORM NECESSARY FIELD INVESTIGATIONS TO RELOCATE ALL WASTE WITHIN BOTH LATERAL AND VERTICAL BOUNDARIES.
- TEMPORARY OR PERMANENT GROUND COVER (OR OTHER ACCEPTABLE MEASURES) ADEQUATE TO RESTRAIN EROSION ON ERODIBLE SLOPES OR OTHER AREAS WILL BE STABILIZED WITHIN FIFTEEN (15) WORKING DAYS OR TWENTY-ONE (21) CALENDAR DAYS FOLLOWING THE COMPLETION OF ANY PHASE OF GRADING, IN ACCORDANCE WITH 5/EC2.



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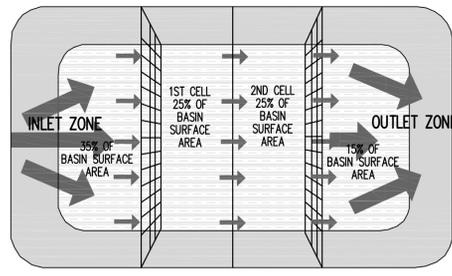


BASIN #	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)	F (FT)	G (IN)	H (IN)	I (%)	J (FT)	K (FT)	L (FT)	M (FT)	N (FT)
3	2,929.0	2,931.2	2,934.0	2,935.0	2,936.0	10.0	18	15	1.0	3.0x3.0x1.5	3.5x3.5	10	16	100
4	2,870.0	2,871.5	2,873.0	2,874.0	2,876.0	---	18	15	3.1	3.0x3.0x2.0	3.0x3.0	10	12	65

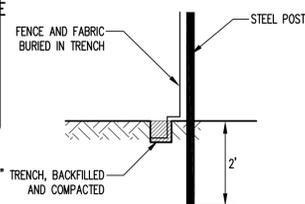
NOTE:
 1. REFER TO DETAIL (3) FOR SKIMMER DETAIL.
 2. A SKIMMER SHALL BE PROVIDED IN EACH BASIN.

TYPICAL SEDIMENT BASIN CROSS SECTION
 DETAIL (1) EC1
 NOT TO SCALE

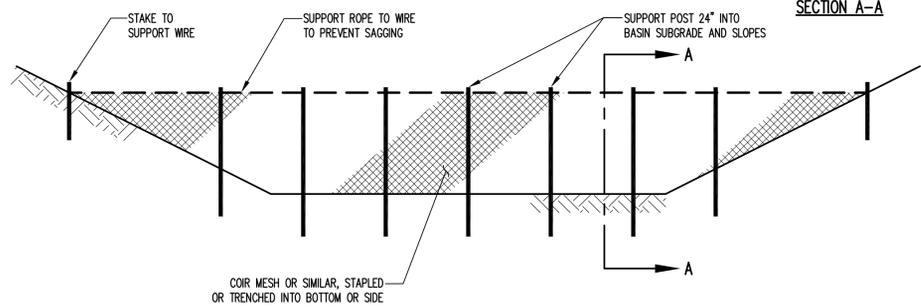
ISSUED FOR CONSTRUCTION



PLAN VIEW



SECTION A-A

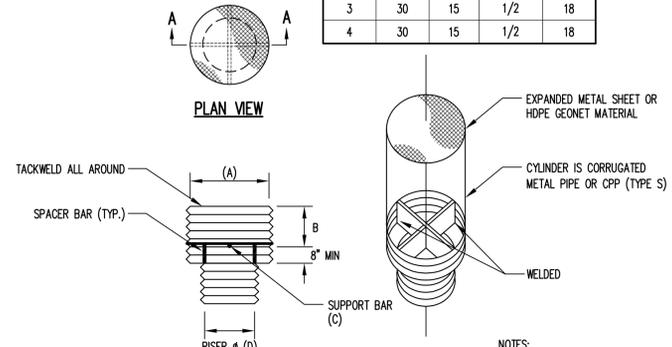


ELEVATION

STANDARD BAFFLES
 DETAIL (2) EC1
 NOT TO SCALE

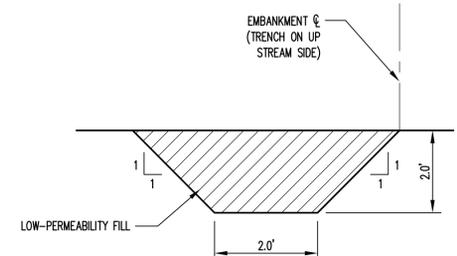
NOTES:
 1. BAFFLE MATERIAL SHOULD BE SECURED AT THE BOTTOM AND SIDES USING STAPLES OR BY TRENCHING AS FOR SILT FENCE.
 2. MOST OF THE SEDIMENT WILL ACCUMULATE IN THE FIRST BAY, WHICH SHOULD BE READILY ACCESSIBLE FOR MAINTENANCE.
 3. PROVIDE 3 BAFFLES (USE TWO IF LESS THAN 20 FEET IN LENGTH).
 4. BAFFLE SHALL BE 700 g/m² COIR EROSION BLANKET.
 5. TOPS OF BAFFLES SHOULD BE 2 INCHES LOWER THAN THE TOP OF THE BERMS.
 6. INSPECT BAFFLES FOR REPAIR ONCE A WEEK AND AFTER EACH RAINFALL.

TRASH RACK SCHEDULE				
BASIN	A (IN)	B (IN)	C (IN)	D (IN)
3	30	15	1/2	18
4	30	15	1/2	18



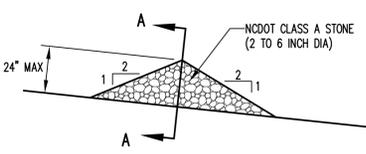
NOTES:
 1. THE CYLINDER MUST BE FIRMLY FASTENED TO THE TOP OF THE RISER.
 2. SUPPORT BARS ARE WELDED TO THE TOP OF THE RISER OR ATTACHED BY STRAPS BOLTED TO THE TOP OF THE RISER.

TRASH RACK ANTI-VORTEX
 DETAIL (3) EC1
 NOT TO SCALE

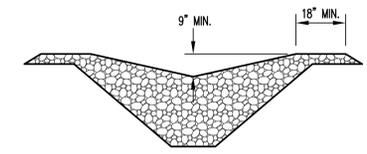


NOTES:
 1. CUT-OFF TRENCH SHALL BE LOCATED IN UNDISTURBED SOIL.
 2. CUT-OFF TRENCH SHALL BE EXTEND THE LENGTH OF THE EMBANKMENT TO THE PRINCIPAL SPILLWAY CREST ELEVATION AT EACH END.

CUTOFF TRENCH
 DETAIL (4) EC1
 NOT TO SCALE

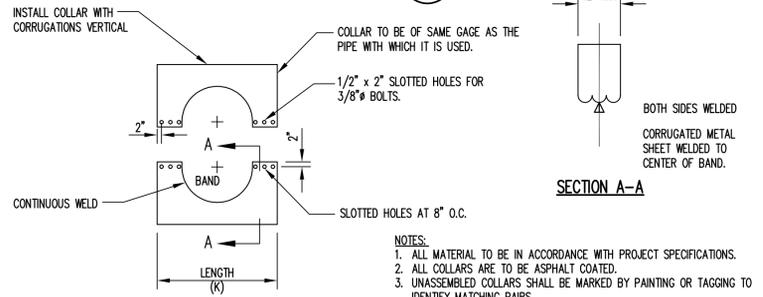


PROFILE SECTION



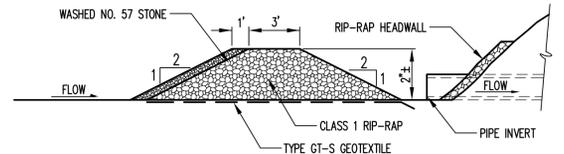
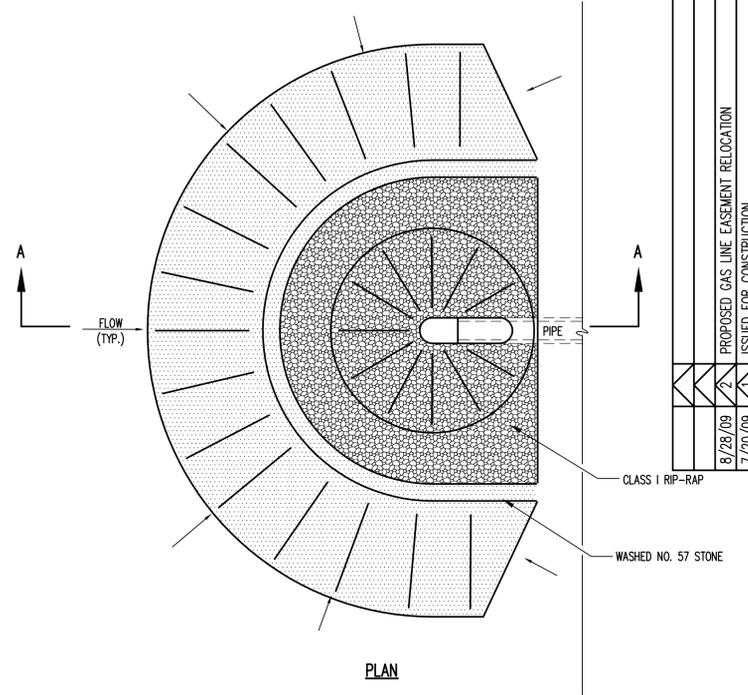
CENTER SECTION A-A

TEMPORARY ROCK CHECK DAM
 DETAIL (5) EC1
 NOT TO SCALE



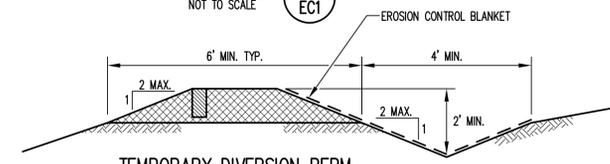
NOTES:
 1. ALL MATERIAL TO BE IN ACCORDANCE WITH PROJECT SPECIFICATIONS.
 2. ALL COLLARS ARE TO BE ASPHALT COATED.
 3. UNASSEMBLED COLLARS SHALL BE MARKED BY PAINTING OR TAGGING TO IDENTIFY MATCHING PAIRS.
 4. THE LAP BETWEEN THE TWO HALF SECTIONS AND BETWEEN THE PIPE AND CONNECTING BAND SHALL BE CAULKED WITH ASPHALT MASTIC AT TIME OF INSTALLATION.
 5. EACH COLLAR SHALL BE FURNISHED WITH TWO 1/2" RODS WITH STANDARD TANK LUGS FOR CONNECTING COLLARS TO PIPE.

ANTI-SEEP COLLAR
 DETAIL (6) EC1
 NOT TO SCALE



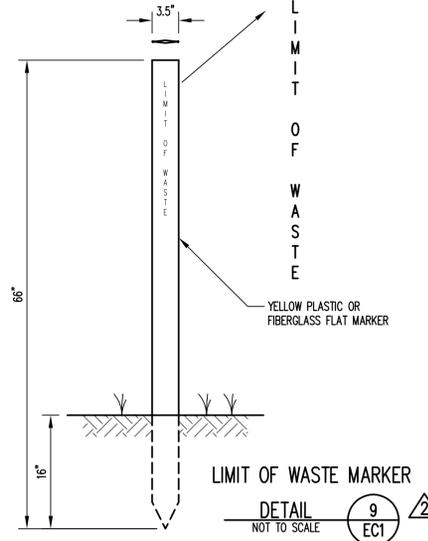
SECTION A-A

FILTER BERM
 DETAIL (7) EC1
 NOT TO SCALE



SECTION A-A

TEMPORARY DIVERSION BERM
 DETAIL (8) EC1
 NOT TO SCALE



NOTES:
 1. PLACE LIMIT OF WASTE MARKERS EVERY 100' ON-CENTER AND AT BREAK POINTS.

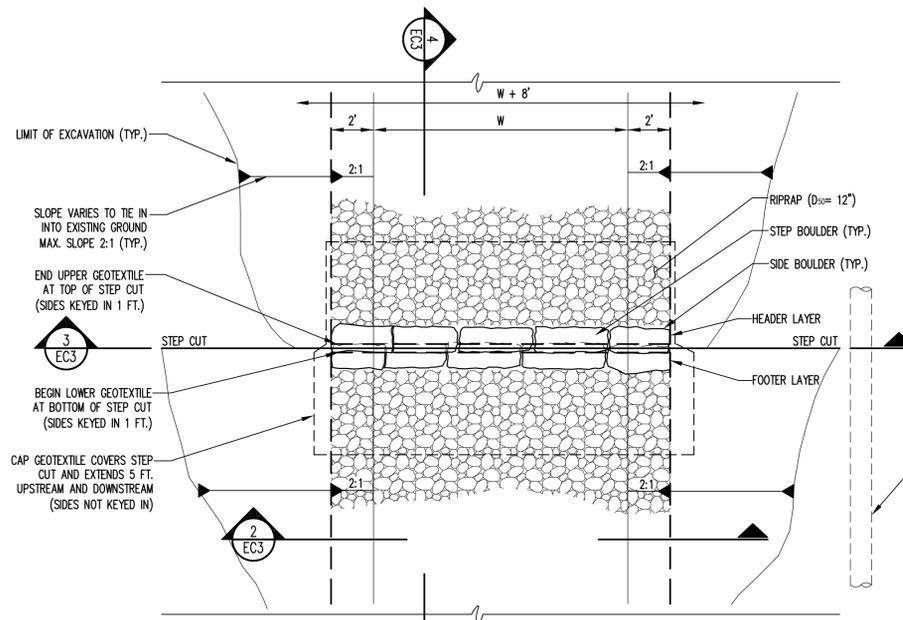
RICHARDSON SMITH GARDNER & ASSOCIATES
 14 N. Boylan Ave.
 Raleigh, N.C. 27603
 ph: 919-428-0577
 fax: 919-428-3889
 www.rsgengineers.com

PROJECT TITLE:
EVERY COUNTY C&D LANDFILL WASTE RELOCATION AND SITE IMPROVEMENTS CONSTRUCTION DRAWINGS

DRAWING TITLE:
EROSION AND SEDIMENTATION CONTROL DETAILS (SHEET 1 OF 4)

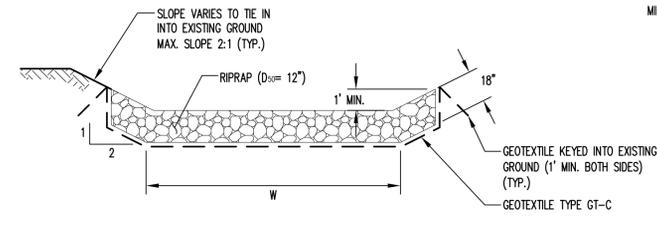
DESIGNED BY: S.A.S.	DRAWN BY: J.A.L.
CHECKED BY:	PROJECT NO.: AVERY 09-3
SCALE:	DATE: JULY 2009
AS SHOWN	FILE NAME: AVERY-D009BA
SHEET NO. 5	DRAWING NO. EC1

PROPOSED GAS LINE EASEMENT RELOCATION	REVISION
ISSUED FOR CONSTRUCTION	NO.
8/28/09	2
7/20/09	1
DATE	NO.

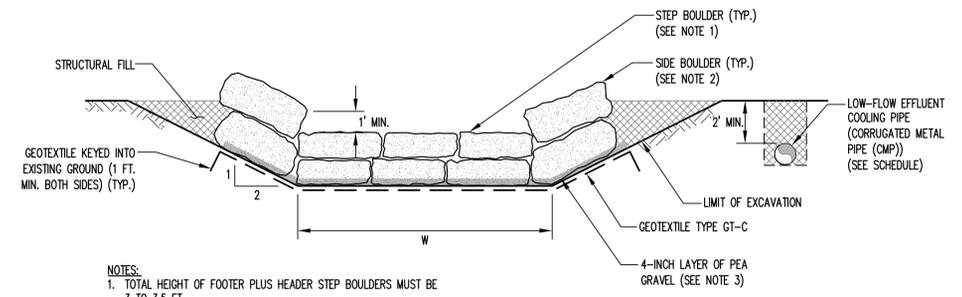


TYPICAL PLAN - CASCADE
 DETAIL 1 EC3

BASIN	DIAMETER (INCHES)	AVERAGE SLOPE (%) (SEE NOTE 2)
3	6	10.4
4	6	2.2



TYPICAL SECTION - CASCADE
 DETAIL 2 EC3



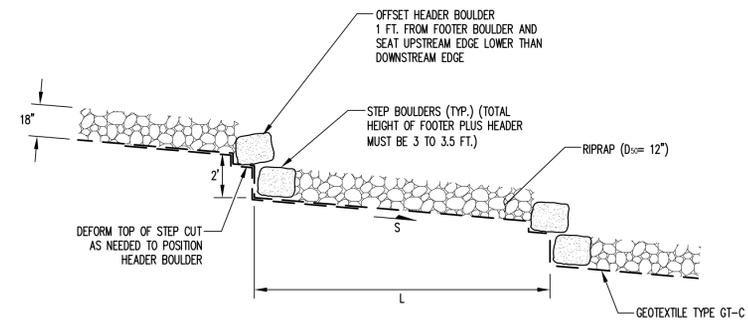
TYPICAL SECTION - STEP
 DETAIL 3 EC3

- NOTES:**
- TOTAL HEIGHT OF FOOTER PLUS HEADER STEP BOULDERS MUST BE 3 TO 3.5 FT.
 - SIDE BOULDERS SHALL BE LARGER THAN STEP BOULDERS. TOTAL HEIGHT OF FOOTER PLUS HEADER SIDE BOULDERS MUST BE 3.5 TO 4.5 FT. AND MUST FORM A MIN. 1 FT. DEEP CHANNEL.
 - PLACE 4-INCH LAYER OF PEA GRAVEL ON GEOTEXTILE BEFORE SETTING BOULDERS IN PLACE. PEA GRAVEL IS NOT REQUIRED UNDER RIPRAP.

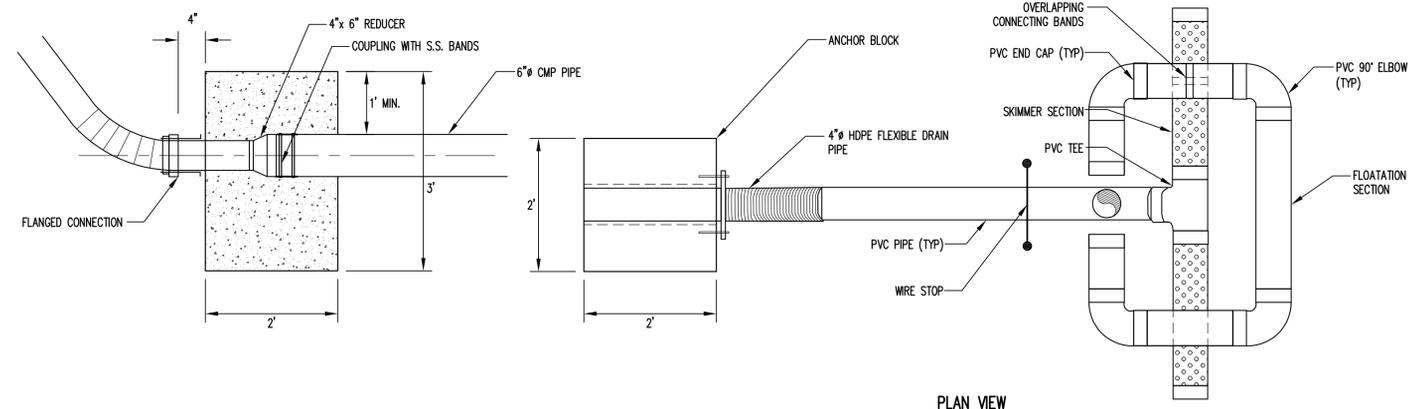
STEP NO. FROM TOP DOWN	H (FEET)	TYPICAL L (FEET)	S (INTERSTEP SLOPE)	W (FEET)	REMARKS
CASCADE I.D.: SB-3 OUTLET					
1-17	2	7	5%	8	AVERAGE GROUND SLOPE= 32.0%

- NOTES:**
- H= STEP HEIGHT; L= STEP LENGTH
- FIELD ADJUST L TO MAINTAIN CHANNEL EXCAVATION BETWEEN 2.5 AND 4.5 FEET AND MATCH REQUIRED CASCADE LENGTH.
 - CONTRACTOR SHALL PERFORM WORK IN THE PRESENCE OF AND TO THE SATISFACTION OF THE COA ENGINEER.
 - CONTRACTOR MUST OBTAIN APPROVAL OF THE COA ENGINEER FOR EACH BOULDER PLACED.

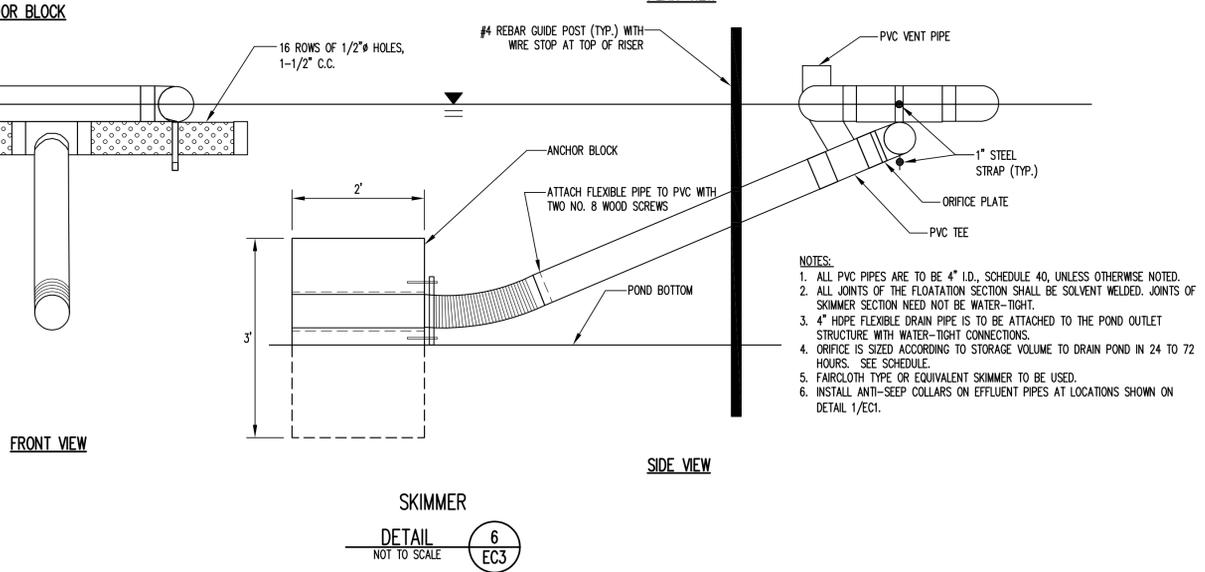
ISSUED FOR CONSTRUCTION



TYPICAL PROFILE - CASCADE
 DETAIL 4 EC3

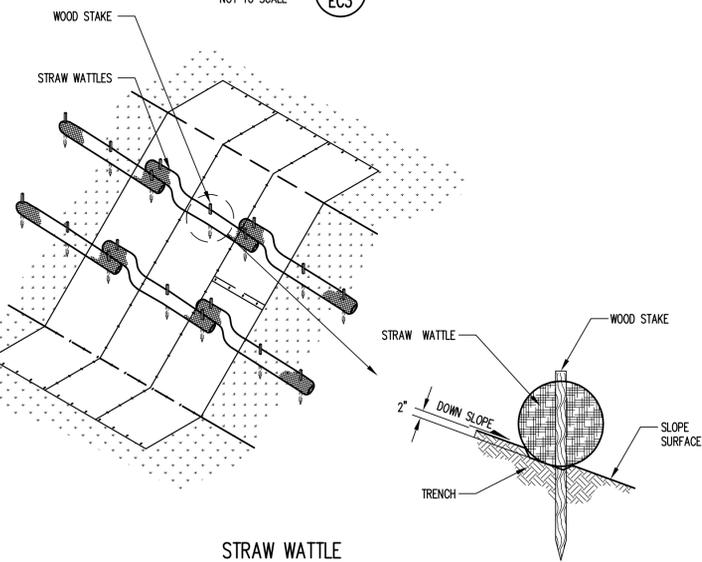


BASIN	ANTI-SEEP COLLARS (FT)	ORIFICE DIAMETER (IN)	MINIMUM EFFLUENT PIPE LENGTH (FT)
3	1 x 1	4.0	280
4	1 x 1	3.0	135



SKIMMER
 DETAIL 6 EC3

- NOTES:**
- ALL PVC PIPES ARE TO BE 4" I.D., SCHEDULE 40, UNLESS OTHERWISE NOTED.
 - ALL JOINTS OF THE FLOTATION SECTION SHALL BE SOLVENT WELDED. JOINTS OF SKIMMER SECTION NEED NOT BE WATER-TIGHT.
 - 4" HDPE FLEXIBLE DRAIN PIPE IS TO BE ATTACHED TO THE POND OUTLET STRUCTURE WITH WATER-TIGHT CONNECTIONS.
 - ORIFICE IS SIZED ACCORDING TO STORAGE VOLUME TO DRAIN POND IN 24 TO 72 HOURS. SEE SCHEDULE.
 - FAIRCLOTH TYPE OR EQUIVALENT SKIMMER TO BE USED.
 - INSTALL ANTI-SEEP COLLARS ON EFFLUENT PIPES AT LOCATIONS SHOWN ON DETAIL 1/EC1.



STRAW WATTLE
 DETAIL 5 EC3

AVERY COUNTY C&D LANDFILL WASTE RELOCATION AND SITE IMPROVEMENTS CONSTRUCTION DRAWINGS

EROSION AND SEDIMENTATION CONTROL DETAILS (SHEET 3 OF 4)

DESIGNED BY: S.A.S.	DRAWN BY: C.T.J.
CHECKED BY:	PROJECT NO.: AVERY 09-3
SCALE: AS SHOWN	DATE: JULY 2009
FILE NAME: AVERY-D0100A	DRAWING NO.:
SHEET NO. 7	EC3