APPENDIX F

SEDIMENT AND EROSION CONTROL PLAN

PROJECT PHASING

A. PHASE I ACTIVITIES INCLUDE, BUT ARE NOT NECESSARILY LIMITED TO THE FOLLOWING:

1. INSTALLATION OF SEDIMENT AND EROSION CONTROL MEASURES FOR PHASE I ACTIVITIES
2. SELECTED DEMOLITION OF SITE ROADWAYS AND PARKING SURFACES
3. REMOVAL OF UNDERGROUND FUEL STORAGE TANKS AND INSTALLATION OF NEW FUEL OIL TANK AND UNDERGROUND LIQUID PROPANE TANK.
4. EARTHWORK REQUIRED FOR NEW SERVICE AND EMERGENCY VEHICLE ACCESS ROAD, INCLUDING NEW CULVERT AND STABILIZATION OF EXISTING CULVERT.
5. SELECTED DEMOLITION AND RECONSTRUCTION OF ELECTRICAL POWER DISTRIBUTION COMPONENTS
6. CONSTRUCTION OF SITE EXTERIOR LIGHTING
7. SELECTED DEMOLITION AND RECONSTRUCTION OF WATER DISTRIBUTION COMPONENTS (BY OTHERS)
8. COMPLETE PUMP–DOWN OF EXISTING SEPTIC TANK AND INTERIOR SANITARY FACILITIES. PROPERLY TRANSPORT AND DISPOSE CONTENTS AS APPROVED BY STATE AND LOCAL WASTE MANAGEMENT REGULATIONS.
9. CONSTRUCTION OF NEW GREAS

JRBS AND OTHER EXTERIOR SURFACES (NOT INCLUDING NEW PATIO)

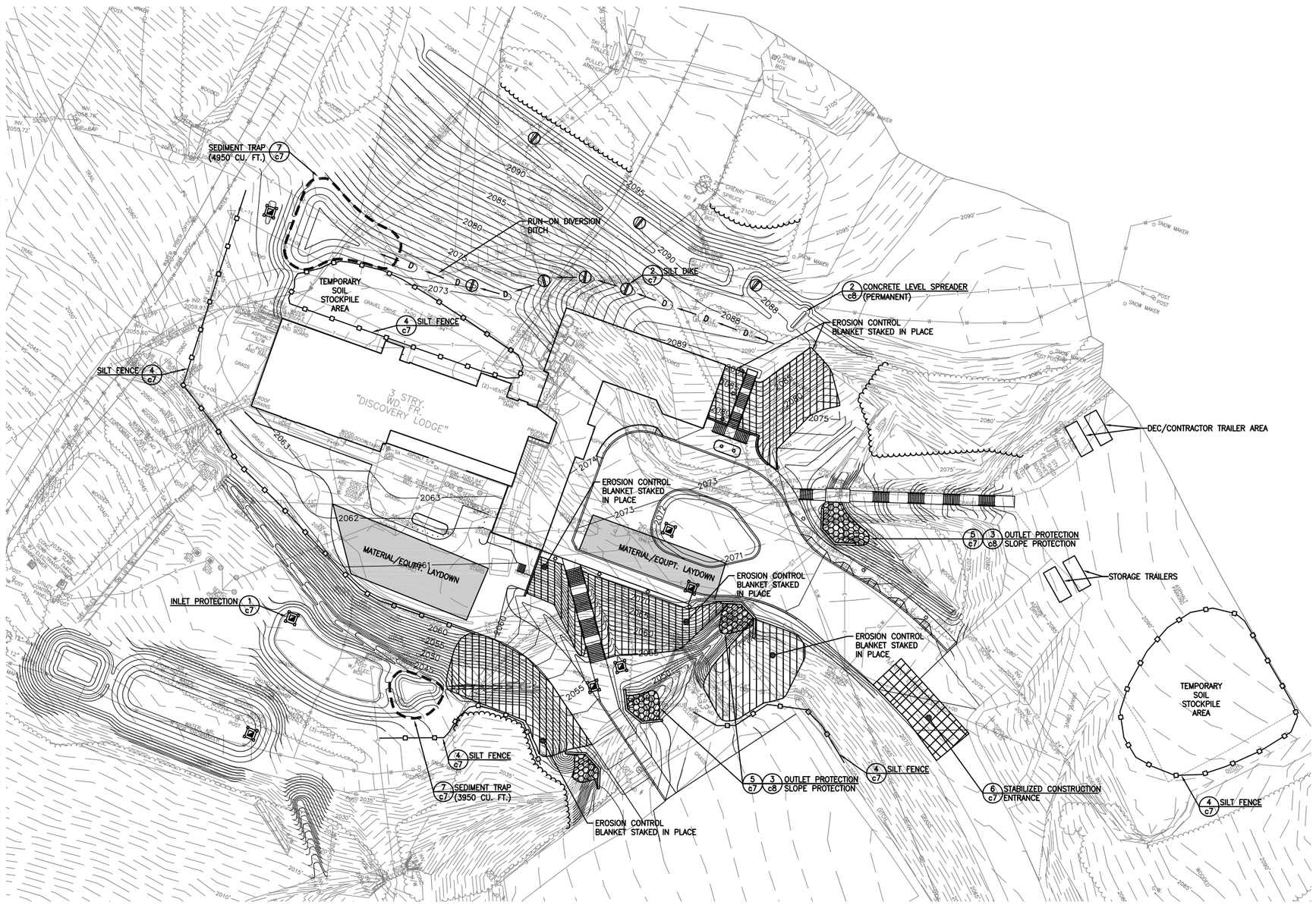
12. CONSTRUCTION OF NEW ADDITION, RENTAL SHOP AND OFFICE BUILDING.
13. PAVING OF RE–GRADED AND NEW ROADWAY SURFACES (BINDER COURSE ONLY)
14. FINAL SITE GRADING
15. SEEDING, MULCHING, AND STABILIZATION
16. SIGNAGE FOR PARKING, AND OTHER DIRECTIONAL MARKERS.

B. PHASE II ACTIVITIES INCLUDE, BUT ARE NOT NECESSARILY LIMITED TO THE FOLLOWING:

1. INSTALLATION OF PHASE II SEDIMENT AND EROSION CONTROL MEASURES
2. PARTIAL DEMOLITION AND RECONSTRUCTION OF THE EXISTING BASE LODGE STRUCTURE
3. INTERIOR WORK IN ALL NEW STRUCTURES
4. CONSTRUCTION OF NEW CONCRETE PATIO ON SOUTH SIDE OF LODGE (BY OTHERS)
5. FINAL PAVING AND PAVEMENT REPAIRS (TOP COURSE)
6. FINAL SIGNAGE AND TRAFFIC ROUTING
7. CONTRACTOR CLEANUP AND DEMOBILIZATION
8. BUILDING COMMISSIONING
9. FINAL SITE SEEDING, MULCHING, AND STABILIZATION
10. REMOVAL OF SEDIMENT AND EROSION CONTROL MEASURES, AS APPROVED BY ENGINEER.

SEDIMENT AND EROSION CONTROL NOTES

1. CONTRACTOR SHALL INSTALL AND MAINTAIN ALL SEDIMENT AND EROSION CONTROLS IN CONFORMANCE WITH THESE PLANS, AND ANY CONTRACTOR CONDUCTING EARTHWORK SHALL SIGN AND COMPLY WITH ALL ELEMENTS OF THE PROJECT STORMWATER POLLUTION PREVENTION PLAN.
2. ALL SOIL STOCKPILES OR OTHER AREAS OF DISTURBED SOIL SHALL BE STABILIZED WITH MULCH AND A FAST EMERGING GRASS SEED MIX WITHIN 2 WEEKS OF DISTURBANCE. PROTECT AND MONITOR UNTIL STABILIZED.
3. DISTURBED SLOPES GREATER THAN 1:3 SHALL BE SEEDED THEN STABILIZED WITH JUTE MESH, OR STRAW AND/OR EXCELSIOR MATTING. MESH OR MATTING SHALL BE INSTALLED AND STAKED IN CONFORMANCE WITH THE MANUFACTURER'S REQUIREMENTS.
4. MAINTAIN SEDIMENT AND EROSION CONTROL MEASURES UNTIL THE SITE IS RESTORED AND STABILIZED AND AS AUTHORIZED BY THE ENGINEER.
5. PROTECT NEWLY INSTALLED BIO–RETENTION BASIN FROM SEDIMENTATION UNTIL TURF ESTABLISHMENT AND LANDSCAPING HAVE ADEQUATELY STABILIZED THE DISTURBED SURFACE.
6. TOPSOIL AND EARTH FILL SHALL BE STRIPPED AND STOCKPILED ON SITE, IN A LOCATION APPROVED BY THE ENGINEER, AND SHOWN ON THE DRAWINGS. RE–USE ALL TOPSOIL AND EARTH FILL AS MUCH AS PRACTICAL. STABILIZE SOIL STOCKPILES WITH MULCH AND SILT FENCE.



LEGEND

- DROP INLET PROTECTION
- SILT FENCE
- EROSION CONTROL BLANKET STAKED IN PLACE
- STABILIZED CONSTRUCTION ENTRANCE
- STONE FILLING SLOPE PROTECTION
- TRAILERS
- TRIANGULAR SILT DIKE
- DIVERSION SWALE
- STONE FILLING SLOPE PROTECTION
- MATERIAL/EQUIPT. LAYDOWN
- TREE LINE

SITE PLAN

SCALE: 1" = 40'-0"

40' 0 40'

36x24 PLOT SHEET

Feb 07,2011 – 10:33am
J:\2005\06124.00 Belleayre Ski Area\CADD\Design_Redesign of stormwater–2010\06124C–erosion phase I.dwg

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

CONSULTANT

SHUMAKER
Consulting Engineering & Land Surveying, P.C.
430 Court St., Utica, New York Office
Telephone (315) 724-0100/ Fax (315) 724-3715

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CONTRACT:
CONSTRUCTION

TITLE:
DISCOVERY LODGE AT BELLEAYRE MOUNTAIN SKI CENTER REHABILITATION & ADDITION

LOCATION:
BELLEAYRE MOUNTAIN
PO BOX 313
HIGHMOUNT, NY 12441

CLIENT:
D.E.C.
(518) 402–9084

REVISED
STORMWATER MANAGEMENT PLANS
2-7-11

MARK	DATE	DESCRIPTION

PROJECT NUMBER:	03-2118
DESIGNED BY:	TMK
DRAWN BY:	SRR
FIELD CHECK:	
APPROVED:	WCN

SHEET TITLE:
PHASE I SEDIMENT AND EROSION CONTROL PLAN

DRAWING NUMBER:
G–2

SHEET OF

SEDIMENT AND EROSION CONTROL NOTES

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2. ALL SOIL STOCKPILES OR OTHER AREAS OF DISTURBED SOIL SHALL BE STABILIZED WITH MULCH AND A FAST EMERGING GRASS SEED MIX WITHIN 2 WEEKS OF DISTURBANCE. PROTECT AND MONITOR UNTIL STABILIZED.
3. DISTURBED SLOPES GREATER THAN 1:3 SHALL BE SEEDED THEN STABILIZED WITH JUTE MESH, OR STRAW AND/OR EXCELSIOR MATTING. MESH OR MATTING SHALL BE INSTALLED AND STAKED IN CONFORMANCE WITH THE MANUFACTURER'S REQUIREMENTS.
4. MAINTAIN SEDIMENT AND EROSION CONTROL MEASURES UNTIL THE SITE IS RESTORED AND STABILIZED AND AS AUTHORIZED BY THE ENGINEER.
5. PROTECT NEWLY INSTALLED BIO–RETENTION BASIN FROM SEDIMENTATION UNTIL TURF ESTABLISHMENT AND LANDSCAPING HAVE ADEQUATELY STABILIZED THE DISTURBED SURFACE.
6. TOPSOIL AND EARTH FILL SHALL BE STRIPPED AND STOCKPILED ON SITE, IN A LOCATION APPROVED BY THE ENGINEER, AND SHOWN ON THE DRAWINGS. RE–USE ALL TOPSOIL AND EARTH FILL AS MUCH AS PRACTICAL. STABILIZE SOIL STOCKPILES WITH MULCH AND SILT FENCE.
7. PERMANENT STORMWATER DETENTION BASIN COMPLETELY CONSTRUCTED, TO BE MAINTAINED, FOREBAY TO BE CLEANED PER O&M IN SWPPP.

B. PHASE II ACTIVITIES INCLUDE, BUT ARE NOT NECESSARILY LIMITED TO THE FOLLOWING:

1. INSTALLATION OF PHASE II SEDIMENT AND EROSION CONTROL MEASURES
2. PARTIAL DEMOLITION AND RECONSTRUCTION OF THE EXISTING BASE LODGE STRUCTURE
3. INTERIOR WORK IN ALL NEW STRUCTURES
4. CONSTRUCTION OF NEW CONCRETE PATIO ON SOUTH SIDE OF LODGE (BY OTHERS)
5. FINAL PAVING AND PAVEMENT REPAIRS (TOP COURSE)
6. FINAL SIGNAGE AND TRAFFIC ROUTING
7. CONTRACTOR CLEANUP AND DEMOBILIZATION
8. BUILDING COMMISSIONING
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8. COMPLETE PUMP–DOWN OF EXISTING SEPTIC TANK AND INTERIOR SANITARY FACILITIES. PROPERLY TRANSPORT AND DISPOSE CONTENTS AS APPROVED BY STATE AND LOCAL WASTE MANAGEMENT REGULATIONS.
9. CONSTRUCTION OF NEW GREASE INTERCEPTORS AND MODIFICATIONS TO EXTERIOR SANITARY SEWER CONNECTIONS
10. INSTALLATION OF NEW STORMWATER MANAGEMENT SYSTEM, INCLUDING STORMWATER TREATMENT MEASURES, CATCH BASINS, MANHOLES, SUBSURFACE PIPES, CULVERTS, STABILIZED ENTRANCES/OUTLETS, AND DETENTION BASIN.
11. INSTALLATION OF NEW CONCRETE WALKS, CURBS AND OTHER EXTERIOR SURFACES (NOT INCLUDING NEW PATIO)
12. CONSTRUCTION OF NEW ADDITION, RENTAL SHOP AND OFFICE BUILDING.
13. PAVING OF RE–GRADED AND NEW ROADWAY SURFACES (BINDER COURSE ONLY)
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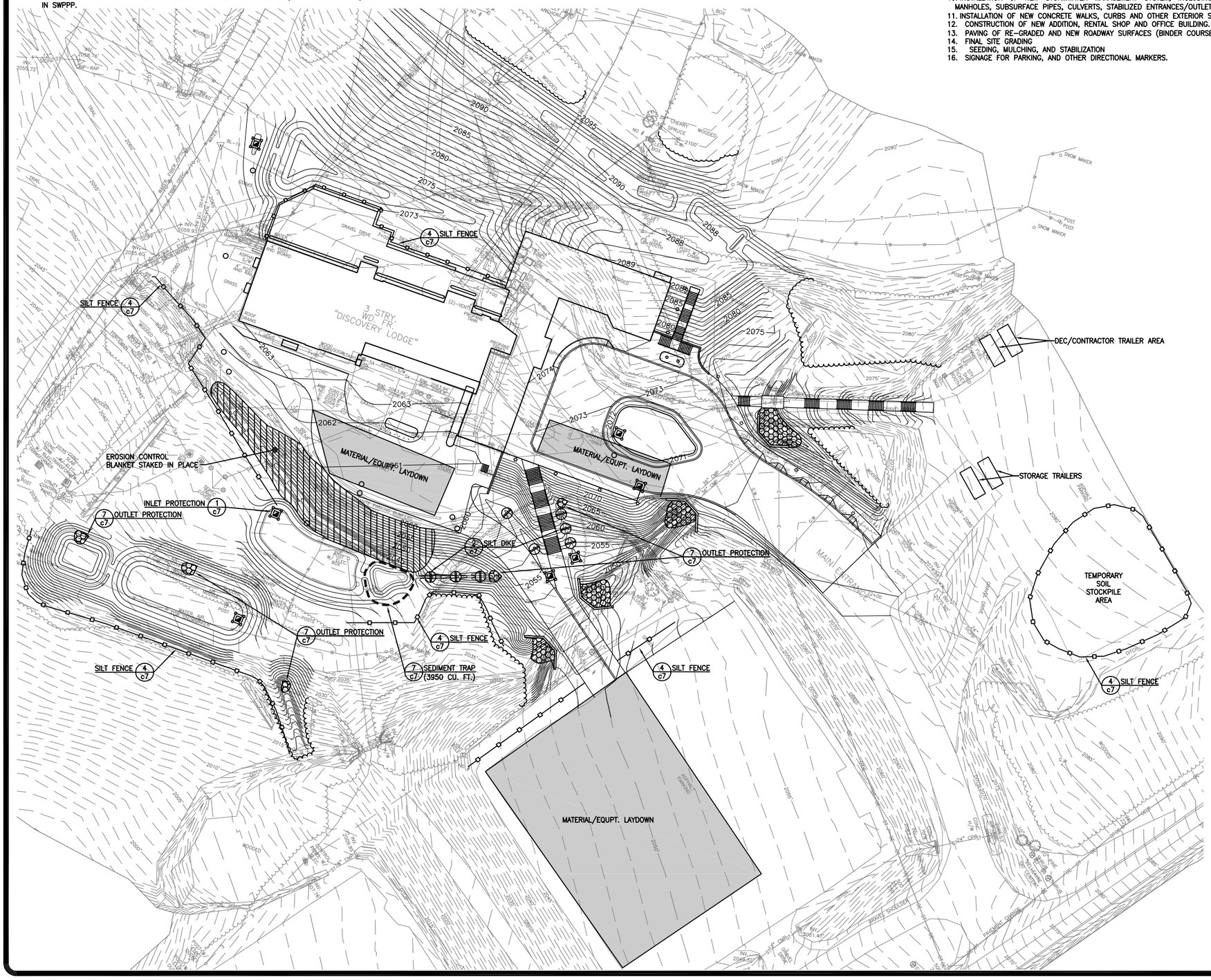

LEGEND

- DROP INLET PROTECTION
- SILT FENCE
- TRAILERS
- TRIANGULAR SILT DIKE
- MATERIAL/EQUPT. LAYDOWN
- STONE FILLING SLOPE PROTECTION
- EROSION CONTROL BLANKET STAKED IN PLACE

SITE PLAN

SCALE: 1" = 40'-0"

40' 0 40'

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CONSULTANT

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CONTRACT: CONSTRUCTION

TITLE: DISCOVERY LODGE AT BELLEAYRE MOUNTAIN SKI CENTER REHABILITATION & ADDITION

LOCATION: BELLEAYRE MOUNTAIN PO BOX 313 HIGHMOUNT, NY 12441

CLIENT: D.E.C. (518) 402–9084

REVISED STORMWATER MANAGEMENT PLANS 2-7-11

MARK	DATE	DESCRIPTION

PROJECT NUMBER:	03-2118
DESIGNED BY:	TMK
DRAWN BY:	SRR
FIELD CHECK:	
APPROVED:	WCN

SHEET TITLE: PHASE II SEDIMENT AND EROSION CONTROL PLAN

DRAWING NUMBER: G–3

SHEET OF

Feb 07,2011 – 10:35am
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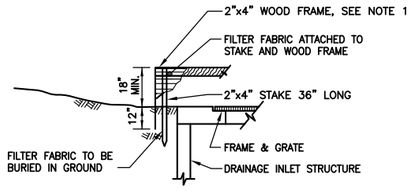
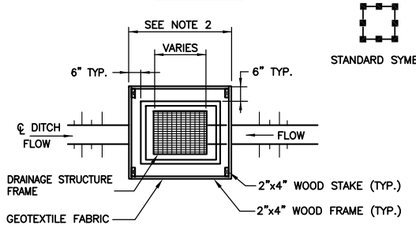
36x24 PLOT SHEET



ELEVATION



PLAN

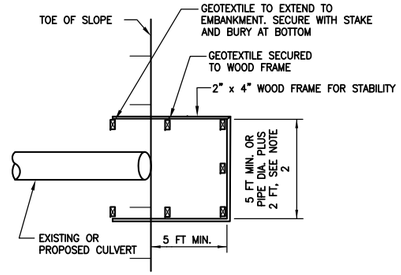
STANDARD SYMBOL

NOTES:

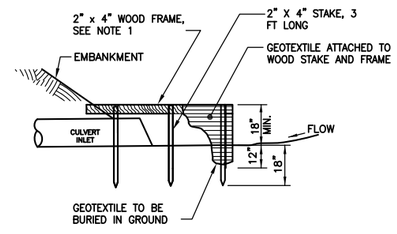
1. A 2"x4" WOOD FRAME SHALL BE COMPLETED AROUND THE TOP OF THE STAKES OVER THE ATTACHED FABRIC FOR OVERFLOW STABILITY.
2. SPACE STAKES EVENLY AROUND INLET MAXIMUM OF 3' SPACING AND DRIVE A MINIMUM 18" DEEP. SPANS GREATER THAN 3' MAY BE BRIDGED WITH THE USE OF WIRE MESH BEHIND THE FILTER FABRIC FOR SUPPORT.
3. CUT FABRIC FROM A CONTINUOUS ROLL TO ELIMINATE JOINTS. IF JOINTS ARE NEEDED THEY SHALL BE OVERLAPPED TO THE NEXT SPLICE.

1/c7 SILT FENCE FOR TEMPORARY SEDIMENT CONTROL AT DRAINAGE INLET STRUCTURES

NOT TO SCALE



PLAN



ELEVATION

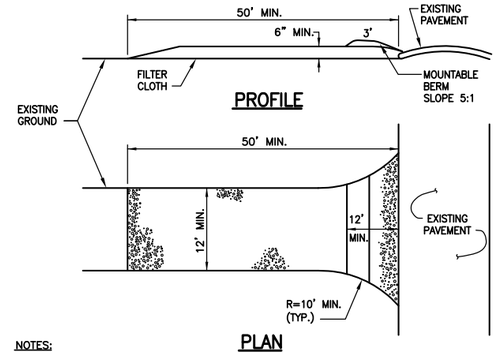
STANDARD SYMBOL

NOTES:

1. A 2" X 4" WOOD FRAME SHALL BE COMPLETED AROUND THE TOP OF THE STAKES OVER THE ATTACHED FABRIC FOR OVERFLOW STABILITY.
2. SPACE STAKES EVENLY AROUND INLET TO A MAXIMUM OF 36" APART.

3/c7 SILT FENCE FOR TEMPORARY SEDIMENT CONTROL AT CULVERT INLETS

NOT TO SCALE



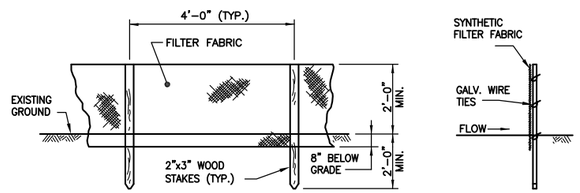
PLAN

NOTES:

1. STABILIZED CONSTRUCTION ENTRANCE SHALL BE PLACED AT ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS.
2. STONE SIZE – USE 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
3. WIDTH – TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
4. FILTER FABRIC – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
5. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
6. MAITENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
7. WASHING – WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS–OF–WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
8. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.
9. AT THE CONCLUSION OF CONSTRUCTION, BEYOND WHICH LITTLE OR NO SEDIMENTS WILL BE TRACKED ONTO PUBLIC RIGHTS–OF–WAY, THE STABILIZED CONSTRUCTION ENTRANCE SHALL BE ABANDONED, AND IF NECESSARY, REMOVED.

6/c7 STABILIZED CONSTRUCTION ENTRANCE

NOT TO SCALE



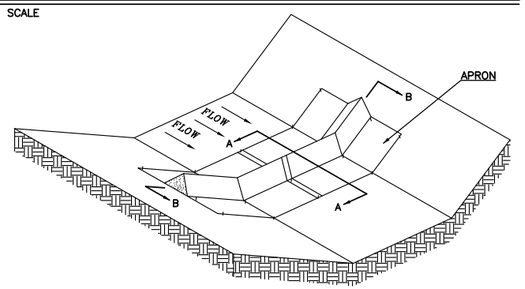
NOTES:

1. FENCE POSTS SHALL BE SPACED 4 FEET CENTER TO CENTER OR CLOSER. THEY SHALL EXTEND AT LEAST 2 FEET INTO THE GROUND. THEY SHALL EXTEND AT LEAST 2 FEET ABOVE GROUND.
2. A FILTER FABRIC, RECOMMENDED FOR SUCH USE BY THE MANUFACTURER SHALL BE BURIED AT LEAST 8 INCHES DEEP IN THE GROUND. THE FILTER FABRIC SHALL EXTEND AT LEAST 2 FEET ABOVE GROUND.

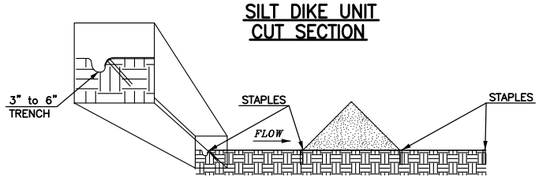
STANDARD SYMBOL

4/c7 SILT FENCE

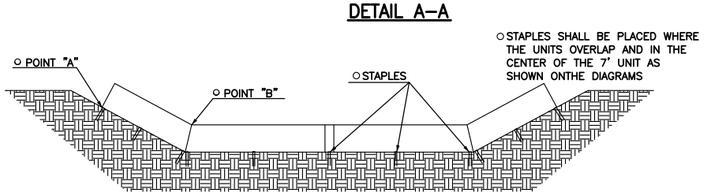
NOT TO SCALE



SILT DIKE UNIT CUT SECTION



DETAIL A–A



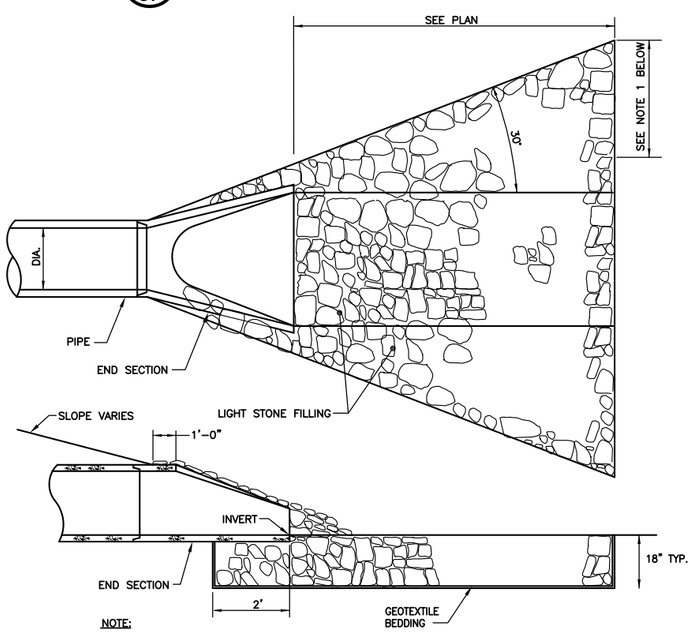
DIKE SECTION DETAIL B–B

POINT "A" MUST BE HIGHER THAN POINT "B" TO ENSURE THAT WATER FLOWS OVER THE DIKE AND NOT AROUNT THE ENDS.

STANDARD SYMBOL

2/c7 PRE–FAB TRIANGULAR SILT DIKE

NOT TO SCALE

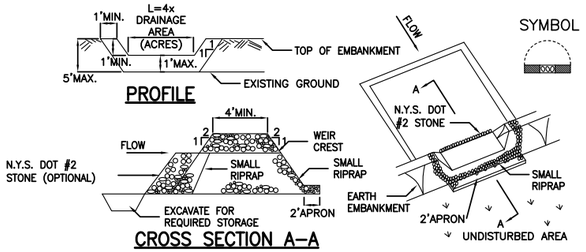


NOTE:

1. LATERAL APRON LIMITS SHOWN ABOVE ARE THE MAXIMUM LIMITS AND APPLY FOR A PIPE OUTLETTING INTO A WIDE OR SHALLOW CHANNEL. IN CASES WHERE THE CULVERT DISCHARGES INTO A NARROW WELL DEFINED CHANNEL THE APRON CAN BE DISCONTINUED AT THE TOP OF THE BANK CHANNEL, A.O.B.E.

5/c7 OUTLET PROTECTION

NOT TO SCALE



CROSS SECTION A–A

OPTION: A ONE FOOT LAYER OF N.Y.S. DOT #2 STONE MAY BE PLACED ON THE UPSTREAM SIDE OF THE RIPRAP INPLACE OF THE EMBEDDED FILTER CLOTH.

CONSTRUCTION SPECIFICATIONS

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS AND OTHER WOODY VEGETATION AS WELL AS OVER–SIZED STONES, ROCKS, ORGANIC MATERIAL OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. ALL CUT AND FILL SLOPES SHALL BE 2:1 OR FLATTER.
4. THE STONE USED IN THE OUTLET SHALL BE SMALL RIPRAP 4"–8" ALONG WITH A 1' THICKNESS OF 2" AGGREGATE PLACED ON THE UP–GRADE SIDE ON THE SMALL RIPRAP OR EMBEDDED FILTER CLOTH IN THE RIPRAP.
5. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMEN–SIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP.
6. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
7. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION IS MINIMIZED.
8. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

MAXIMUM DRAINAGE AREA 5 ACRES

7/c7 STONE OUTLET SEDIMENT TRAP ST–IV

NOT TO SCALE

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

CONSULTANT

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TITLE: DISCOVERY LODGE AT BELLEAYRE MOUNTAIN SKI CENTER REHABILITATION & ADDITION

LOCATION: BELLEAYRE MOUNTAIN PO BOX 313 HIGHMOUNT, NY 12441

CLIENT: D.E.C. (518) 402–9084

REVISED STORMWATER MANAGEMENT PLANS 2-7-11

MARK	DATE	DESCRIPTION

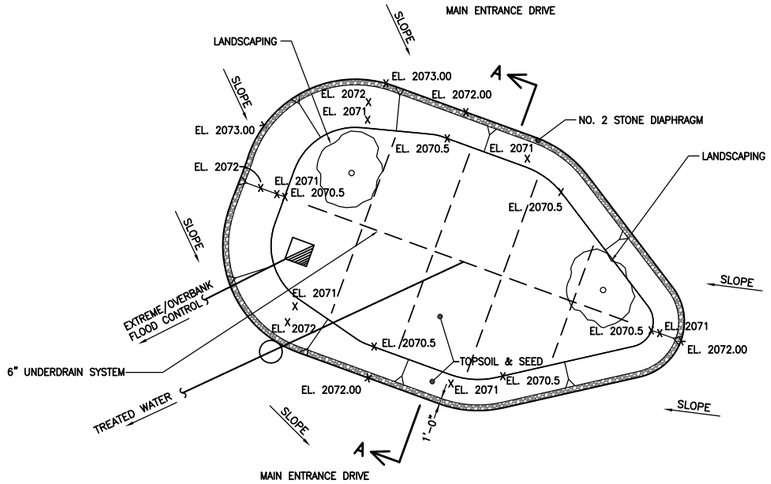
PROJECT NUMBER:	03-2118
DESIGNED BY:	TMK
DRAWN BY:	SRR
FIELD CHECK:	
APPROVED:	WCN

SHEET TITLE: DETAILS

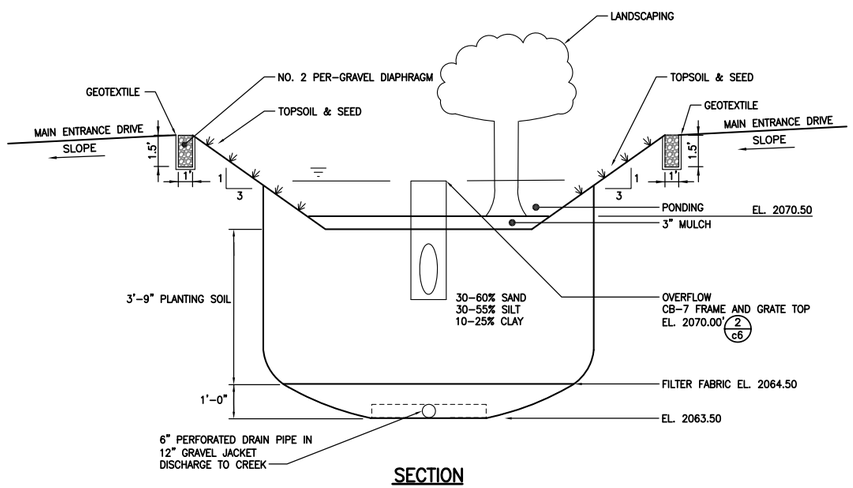
DRAWING NUMBER: C–7

SHEET OF

Feb 07,2011 – 10:38am
v:\2006\06124.00 Belleayre Ski Area\CADD\Design_Redesign of stormwater–2010\06124C–details.dwg
36x24 PLOT SHEET



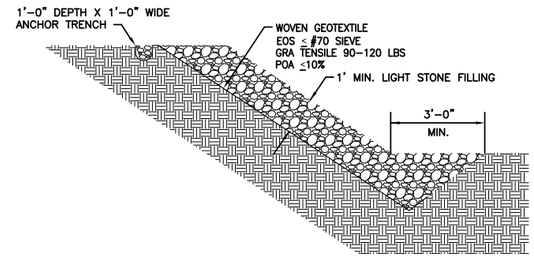
PLAN



SECTION

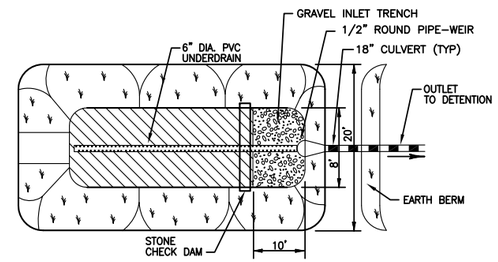
1/c8 BIORETENTION DETAIL

NOT TO SCALE

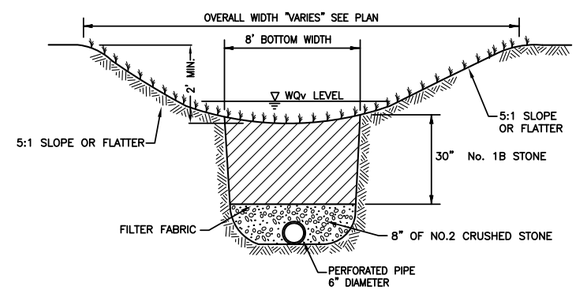


3/c8 RIPRAP SLOPE PROTECTION DETAIL

NOT TO SCALE



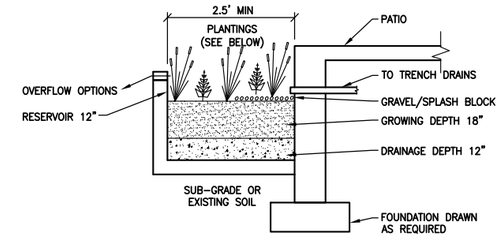
PLAN



SECTION

3/c8 DRY SWALE

NOT TO SCALE

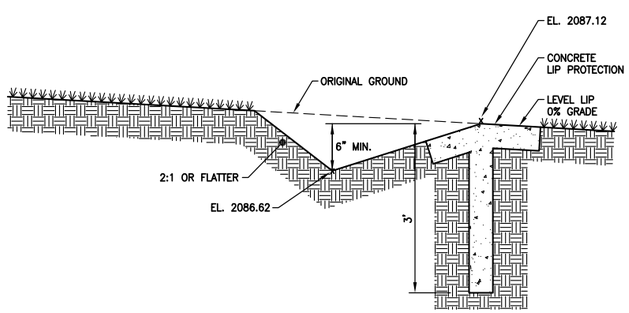


FLOW-THROUGH STORMWATER PLANTER

HERBACEOUS PLANTS FOR PLANTERS
CINNAMON FERN *Osmunda cinnamomea*
CUTLEAF CONEFLOWER *Rudbeckin laciniata*
WOOLGRASS *Scirpus cyperinus*
NEW ENGLAND ASTER *Aster novae-angliae*
FOX SEDGE *Carex vulpinoidea*
SPOTTED JOE-PYE WEED *Eupatorium maculatum*
SWITCH GRASS *Panicum virgatum*
GREAT BLUE LOBELIA *Lobelia siphatica*
WILD BERGMOT *Monarda fistulosa*
RED MILKWEED *Asclepias incarnate*

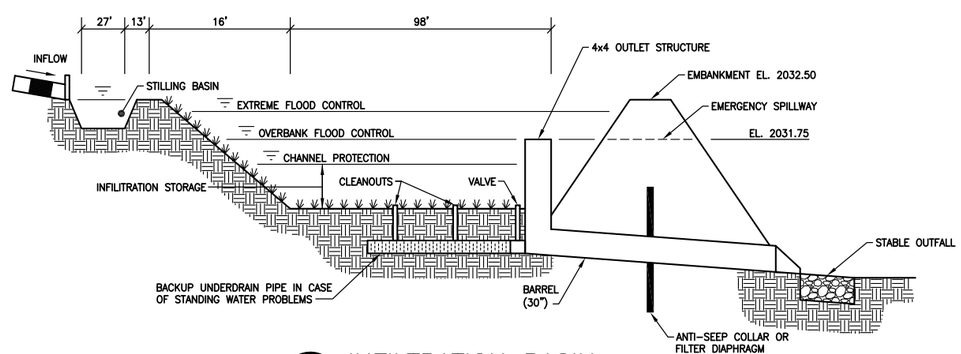
6/c8 PLANTER DETAIL

NOT TO SCALE



2/c8 CONCRETE LEVEL SPREADER

NOT TO SCALE



5/c8 INFILTRATION BASIN

NOT TO SCALE

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

CONSULTANT

SHUMAKER
Consulting Engineering & Land Surveying, P.C.
430 Court St., Utica, New York Office
Telephone (315) 724-0100/ Fax (315) 724-3715

WARNING:

THE ALTERATION OF THIS MATERIAL IN ANY WAY, UNLESS DONE UNDER THE DIRECTION OF A COMPARABLE PROFESSIONAL, I.E. ARCHITECT FOR AN ARCHITECT, ENGINEER FOR AN ENGINEER OR LANDSCAPE ARCHITECT FOR A LANDSCAPE ARCHITECT, IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW AND/OR REGULATIONS AND IS A CLASS 'A' MISDEMEANOR.

CONTRACT:
CONSTRUCTION

TITLE:
DISCOVERY LODGE AT BELLEAYRE
MOUNTAIN SKI CENTER
REHABILITATION & ADDITION

LOCATION:
BELLEAYRE MOUNTAIN
PO BOX 313
HIGHMOUNT, NY 12441

CLIENT:
D.E.C.
(518) 402-9084

REVISED
STORMWATER
MANAGEMENT PLANS
2-7-11

MARK	DATE	DESCRIPTION

PROJECT NUMBER:	03-2118
DESIGNED BY:	TMK
DRAWN BY:	SRR
FIELD CHECK:	
APPROVED:	WCN

SHEET TITLE:
STORMWATER MANAGEMENT DETAILS

DRAWING NUMBER:
C-8

SHEET OF

Feb 07,2011 - 10:39am
v:\2006\06124.00 Belleayre Ski Area\CADD\Design_Redesign of stormwater-2010\06124C-details.dwg
36x24 PLOT SHEET

APPENDIX G

ENGINEERING DESIGN CALCULATIONS

NYSDEC Green Infrastructure - Bioretention Calculations

Project: Belleayre Ski Area, Highmount, New York

Prepared by: Chester P. Szymanski III, P.E.
Date: February 7, 2011

Reference: NYSDEC Stormwater Management Design Manual, August 2010 Edition
Pages 6-44 to 6-58

Location: Upper Parking Circle, Center of Cul-de-Sac

Design Guidance

1. Underdrain must be 4 - 6 feet below grade.

2. Tributary area must be < 10 Ac.

3. Impervious area within the watershed to this practice is > 75%, therefore no sedimentation practice is required prior to treatment.

4. Practice must pass the 10-year storm to a non-erosive outlet.

5. Underdrain shall be 6-inch diameter perforated pipe in a gravel layer.

6. Filter fabric shall be provided to separate gravel and filter material.

7. The required 2-feet of separation between filter bottom and groundwater is provided.

8. Pretreatment required:

   a. 25-foot grass filter strip. (cannot be provided in this instance and, not necessarily required due to > 75% impervious area tributary to the practice)

   b. Minimum 6-inch width pea gravel diaphram.

   c. Mulch layer.

9. Solve for WQv:

$Area := 0.755 - 0.152$ Ac, area of tributary watershed

$I := \frac{(0.674 - 0.152)}{Area} \cdot 100$ percent impervious area in the tributary watershed

$I = 86.567$ percent

$R_v := 0.05 + 0.009I$

$R_v = 0.829$ note: Min Rv = 0.2 if WQv > RRv

$P := 1.3$ inches, 90% rainfall

$$WQ_v := \frac{(P \cdot R_v \cdot Area)}{12}$$

$WQ_v = 0.054$ Ac - ft, water quality volume

10. System must temporarily hold 75% of the WQv:

$WQ_v := 0.054 \cdot 43560$ cf

$WQ_v = 2352.24$ cf

$Temp_Storage := 0.75 \cdot WQ_v$ sf

$Temp_Storage = 1764.18$ cf

11. Filter Bed Depth (Equation, Section 6.4.4)

Variables

$d_f := 4$ ft

$k := 0.5$ ft/day, specified for bioretention soil

$h_f := 0.5$ ft

$t_f := 2$ days, standard for bioretention

Description of Variables

A_f	=	Surface Area of the Filter Bed, sf
WQ_v	=	Water Quality Volume to the Practice, cf
d_f	=	Coefficient of Permeability of the Filter Media, ft/day
h_f	=	Average Height of Water Above Filter Bed, ft
t_f	=	Design Filter Bed Drain Time, days

Evaluation

$$A_f := \frac{WQ_v \cdot d_f}{k \cdot (h_f + d_f) \cdot t_f}$$

$A_f = 2090.88$ sf

NYSDEC Green Infrastructure - Bioretention Calculations

Project: Belleayre Ski Area, Highmount, New York

Prepared by: Chester P. Szymanski III, P.E.
Date: January 21, 2011

Reference: NYSDEC Stormwater Management Design Manual, August 2010 Edition
Pages 6-44 to 6-58

Location: Kid's Camp Area

Design Guidance

1. Underdrain must be 4 - 6 feet below grade.

2. Tributary area must be < 10 Ac.

3. Impervious area within the watershed to this practice is < 75%, therefore a sedimentation practice is required prior to treatment.

4. Practice must pass the 10-year storm to a non-erosive outlet.

5. Underdrain shall be 6-inch diameter perforated pipe in a gravel layer.

6. Filter fabric shall be provided to separate gravel and filter material.

7. The required 2-feet of separation between filter bottom and groundwater is provided.

8. Pretreatment required:

    a. 25-foot grass filter strip.

    b. Minimum 6-inch width pea gravel diaphram.

    c. Mulch layer.

9. Solve for WQv:

$Area := 1.317 + 0.087 + 0.152$ Ac, area of tributary watershed

$I := \frac{(0.404 + 0.152)}{Area} \cdot 100$ percent impervious area in the tributary watershed

$I = 35.733$ percent

$R_v := 0.05 + 0.009I$

$R_v = 0.372$ note: Min Rv = 0.2 if WQv > RRv

$P := 1.3$ inches, 90% rainfall

$$WQ_v := \frac{(P \cdot R_v \cdot Area)}{12}$$

$WQ_v = 0.063$ Ac - ft, water quality volume

10. System must temporarily hold 75% of the WQv:

$WQ_{vv} := WQ_v \cdot 43560$ cf

$WQ_v = 2728.526$ cf

$Temp_Storage := 0.75 \cdot WQ_v$ sf

$Temp_Storage = 2046.394$ cf

11. Sedimentation Basin (Equation, Section 6.4.3)

Variables

$E := 0.90$

$W := 0.0004$ ft/sec

$$Q_o := \frac{WQ_v}{24 \cdot 3600}$$

$Q_o = 0.032$ cfs

Description of Variables

A_s = Sedimentation Basin Surface Area, sf

E = Sediment Trap Efficiency (use 90%)

W = Particle Settling Velocity, ft/sec
use 0.0004 ft/sec for imperviousness <= 75%
use 0.0033 ft/sec for imperviousness > 75% (N/A to bioretention)

Q_o = Discharge Rate from Basin

Evaluation

$$A_s := -\left(\frac{Q_o}{W}\right) \cdot \ln(1 - e)$$

$A_{ss} := 0.066 \cdot WQ_v$

$A_s = 180.083$ sf

12. Length to width ratio of sedimentation basin must be 1.5 : 1.

13. Filter Bed Area (Equation, Section 6.4.4)

Variables

$d_f := 4$	ft
$k := 0.5$	ft/day, specified for bioretention soil
$h_f := 0.5$	ft
$t_f := 2$	days, standard for bioretention

Description of Variables

A_f	=	Surface Area of the Filter Bed, sf
WQ_v	=	Water Quality Volume to the Practice, cf
d_f	=	Coefficient of Permeability of the Filter Media, ft/day
h_f	=	Average Height of Water Above Filter Bed, ft
t_f	=	Design Filter Bed Drain Time, days

Evaluation

$$A_f := \frac{WQ_v \cdot d_f}{k \cdot \left(h_f + d_f\right) \cdot t_f}$$

$A_f = 2425.356$ sf

NYSDEC Green Infrastructure - Stormwater Planter Calculations

Project: Belleayre Ski Area, Highmount, New York

Prepared by: Chester P. Szymanski III, P.E.
Date: January 26, 2011

Reference: NYSDEC Stormwater Management Design Manual, August 2010 Edition
Pages 5-97 to 5-105

Location: Rooftop Runoff

Design Guidance

1. Stormwater Planters shall not be designed to treat roadway or parking lot runoff.

2. Flow-through and infiltration stormwater planters should not recieve drainage from impervious areas greater than 15,000 square feet.

3. Excess stormwater needs to be directed to a secondary treatment system or released untreated to the storm drain system.

Solve for WQv

$Area := 0.19$ Ac, area of tributary watershed

$I := \frac{(0.19)}{Area} \cdot 100$ percent impervious area in the tributary watershed

$I = 100$ percent

$R_v := 0.05 + 0.009I$

$R_v = 0.95$ note: Min Rv = 0.2 if WQv > RRv

$P := 1.3$ inches, 90% rainfall

$WQ_v := \frac{(P \cdot R_v \cdot Area)}{12}$

$WQ_v = 0.02$ Ac - ft, water quality volume

$WQ_{vv} := WQ_v \cdot 43560$

$WQ_v = 851.779$ cf, water quality volume

Solve for Required Surface Area, Af

Variables

$d_f := 1$ ft

$k := 3.5$ ft/day

$h_f := 0.5$ ft

$t_f := 4$ hours

Description of Variables

A_f	=	Surface Area of the Practice, sf
WQ_v	=	Water Quality Volume to the Practice, cf
d_f	=	Depth of Soil Medium, ft
k	=	Hydraulic Conductivity, 3.5 ft / day for sand
h_f	=	Average Height of Water Above Planter Bed, 6 inches (max 12)
t_f	=	Design Time to Filter Treatment Volume Through Filter Media, 4 hours

Evaluation

$$A_f := \frac{WQ_v \cdot d_f}{k \cdot (h_f + d_f) \cdot t_f}$$

$A_f = 40.561$ sf

Width of the Stormwater Planter may vary from 1.5 to 2.5 feet

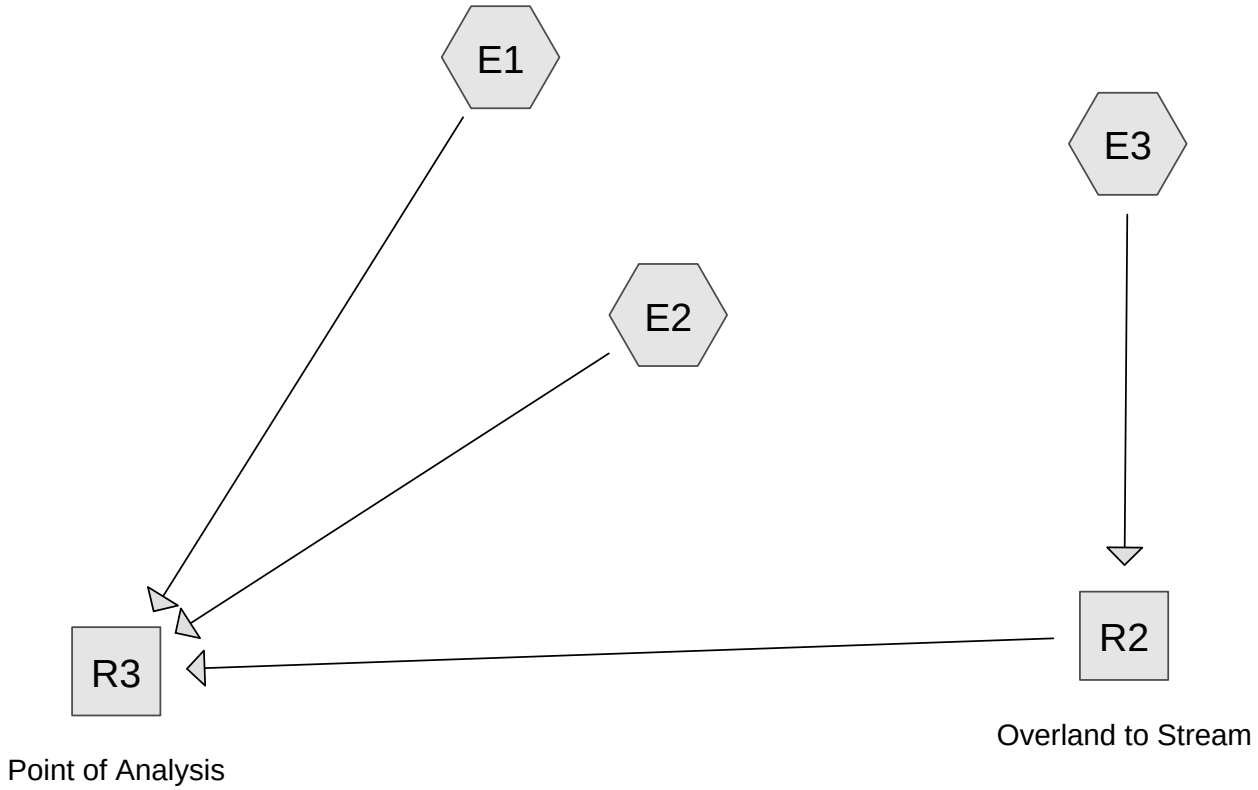
$Planter_Width := 2$ ft

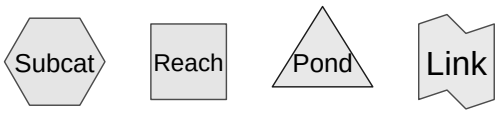
$$Planter_Length := \frac{A_f}{Planter_Width}$$

$Planter_Length = 20.28$ ft

APPENDIX H

EXISTING SITE HYDROLOGY





Drainage Diagram for WCN - Final Existing Site - 07Feb2011
Prepared by Shumaker Engineering, Printed 2/7/2011
HydroCAD® 8.50 s/n 005259 © 2007 HydroCAD Software Solutions LLC

Summary for Subcatchment E1:

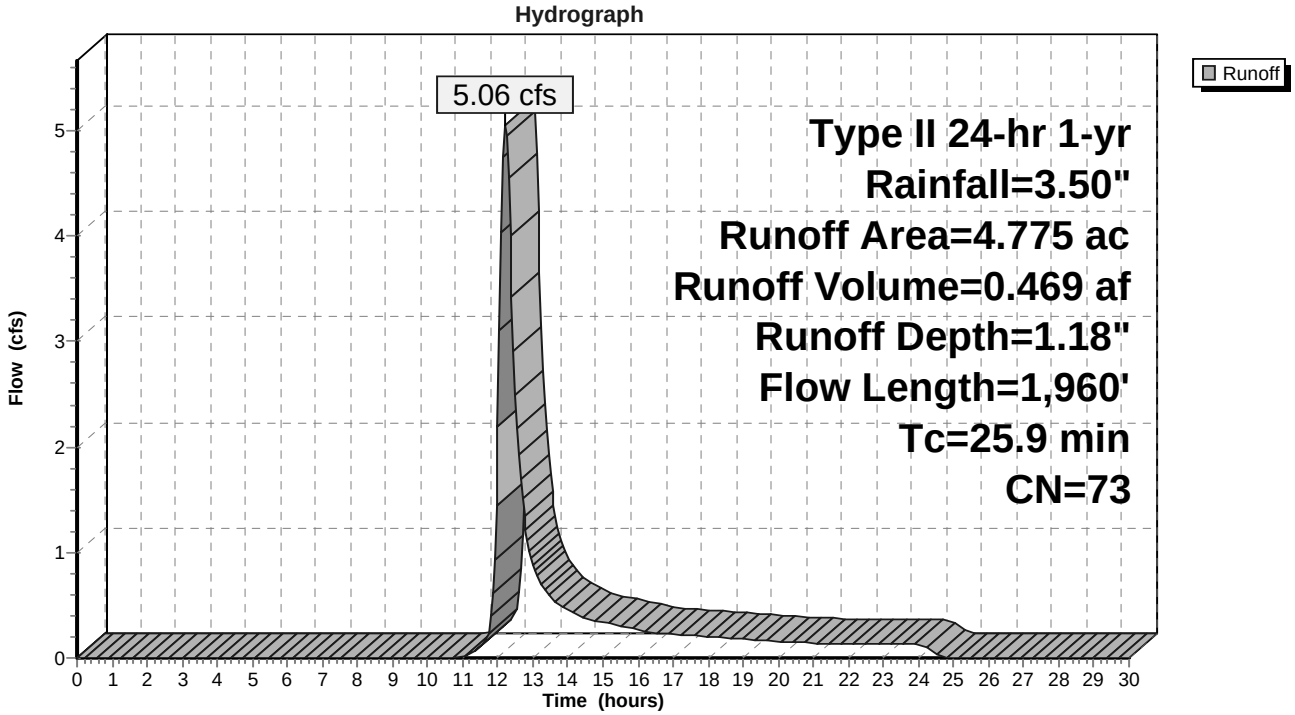
Runoff = 5.06 cfs @ 12.21 hrs, Volume= 0.469 af, Depth= 1.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=3.50"

Area (ac)	CN	Description
3.580	72	Woods/grass comb., Good, HSG C
1.195	74	Pasture/grassland/range, Good, HSG C
4.775	73	Weighted Average
4.775		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	100	0.1280	0.18		**Sheet Flow, SF1** Woods: Light underbrush n= 0.400 P2= 4.00"
16.0	1,720	0.1280	1.79		**Shallow Concentrated Flow, SCF1** Woodland Kv= 5.0 fps
0.8	140	0.0230	3.08		**Shallow Concentrated Flow, SCF2** Paved Kv= 20.3 fps
25.9	1,960	Total			

Subcatchment E1:



Summary for Subcatchment E2:

[49] Hint: Tc<2dt may require smaller dt

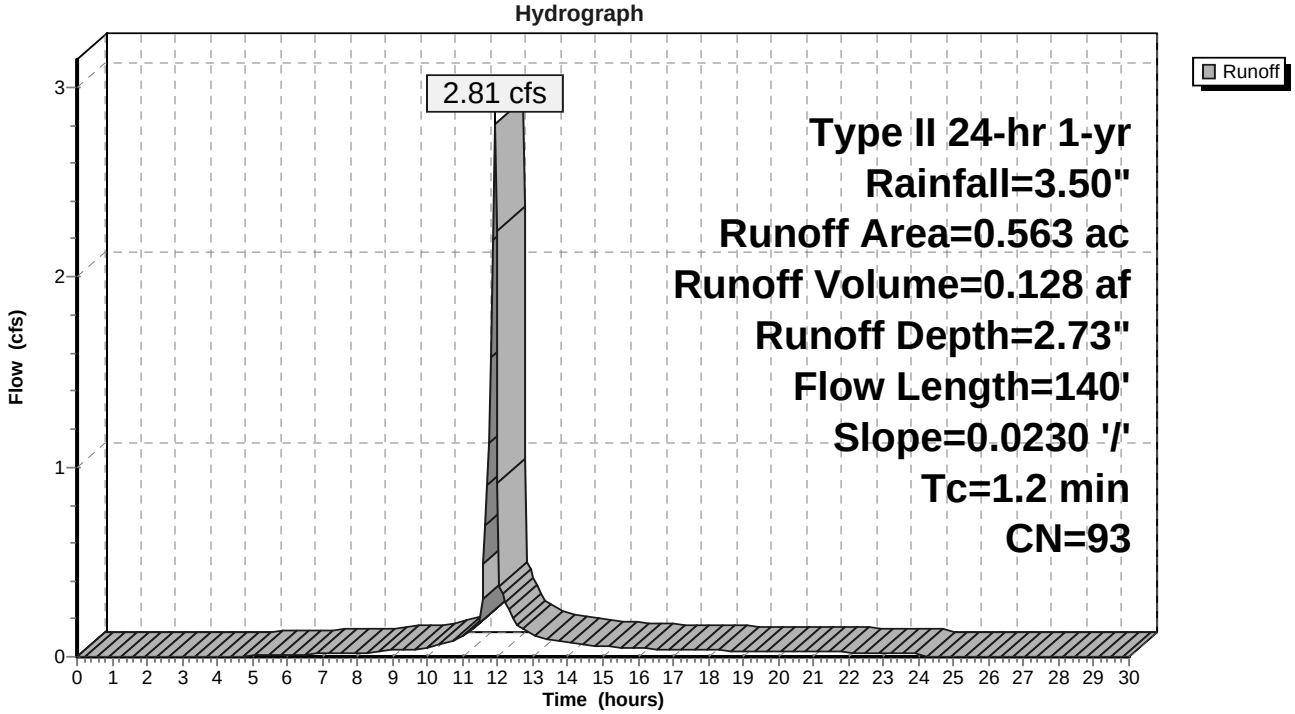
Runoff = 2.81 cfs @ 11.90 hrs, Volume= 0.128 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=3.50"

Area (ac)	CN	Description
0.360	98	Paved parking & roofs
0.123	89	Gravel roads, HSG C
0.080	74	>75% Grass cover, Good, HSG C
0.563	93	Weighted Average
0.203		Pervious Area
0.360		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	100	0.0230	1.63		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 4.00"
0.2	40	0.0230	3.08		**Shallow Concentrated Flow, SCF1** Paved Kv= 20.3 fps
1.2	140	Total			

Subcatchment E2:



Summary for Subcatchment E3:

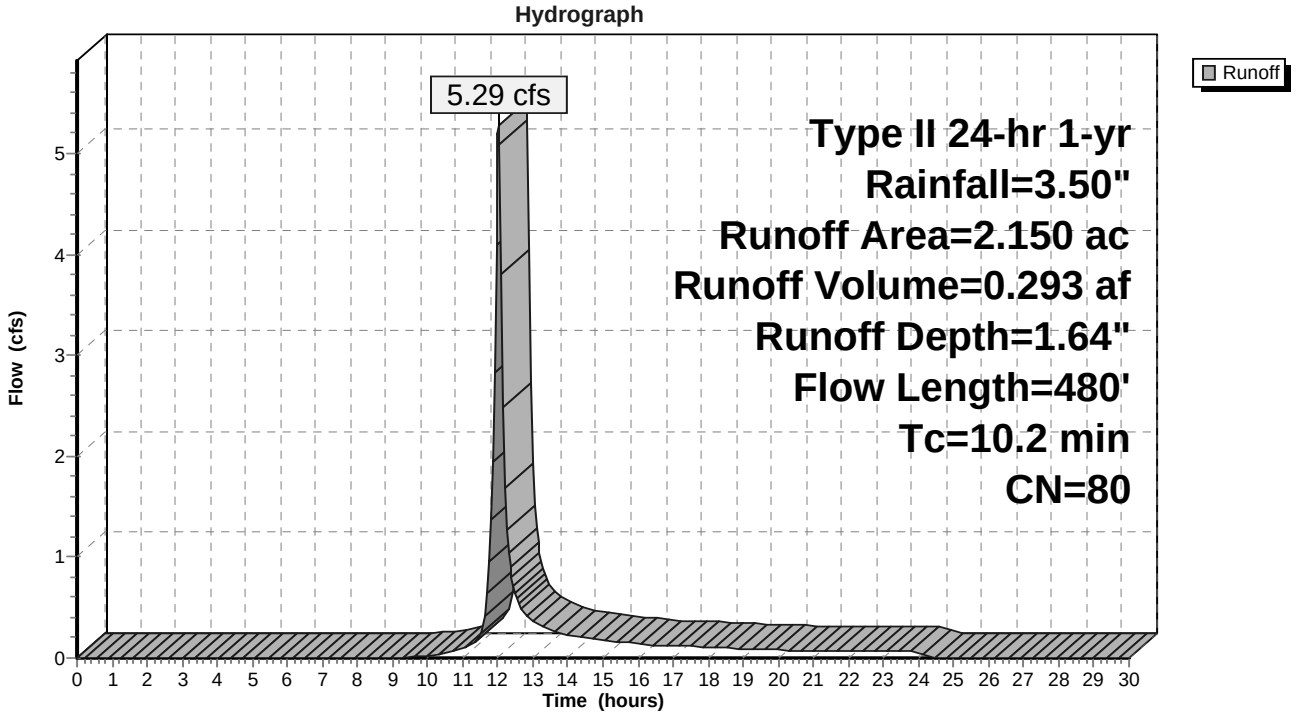
Runoff = 5.29 cfs @ 12.02 hrs, Volume= 0.293 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=3.50"

Area (ac)	CN	Description
0.605	98	Paved parking & roofs
0.524	72	Woods/grass comb., Good, HSG C
1.021	74	>75% Grass cover, Good, HSG C
2.150	80	Weighted Average
1.545		Pervious Area
0.605		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.1930	0.21		**Sheet Flow, SF1** Woods: Light underbrush n= 0.400 P2= 4.00"
1.4	190	0.1930	2.20		**Shallow Concentrated Flow, SCF1** Woodland Kv= 5.0 fps
0.3	90	0.0560	4.80		**Shallow Concentrated Flow, SCF2** Paved Kv= 20.3 fps
0.7	100	0.2300	2.40		**Shallow Concentrated Flow, SCF3** Woodland Kv= 5.0 fps
10.2	480	Total			

Subcatchment E3:



Summary for Reach R2: Overland to Stream

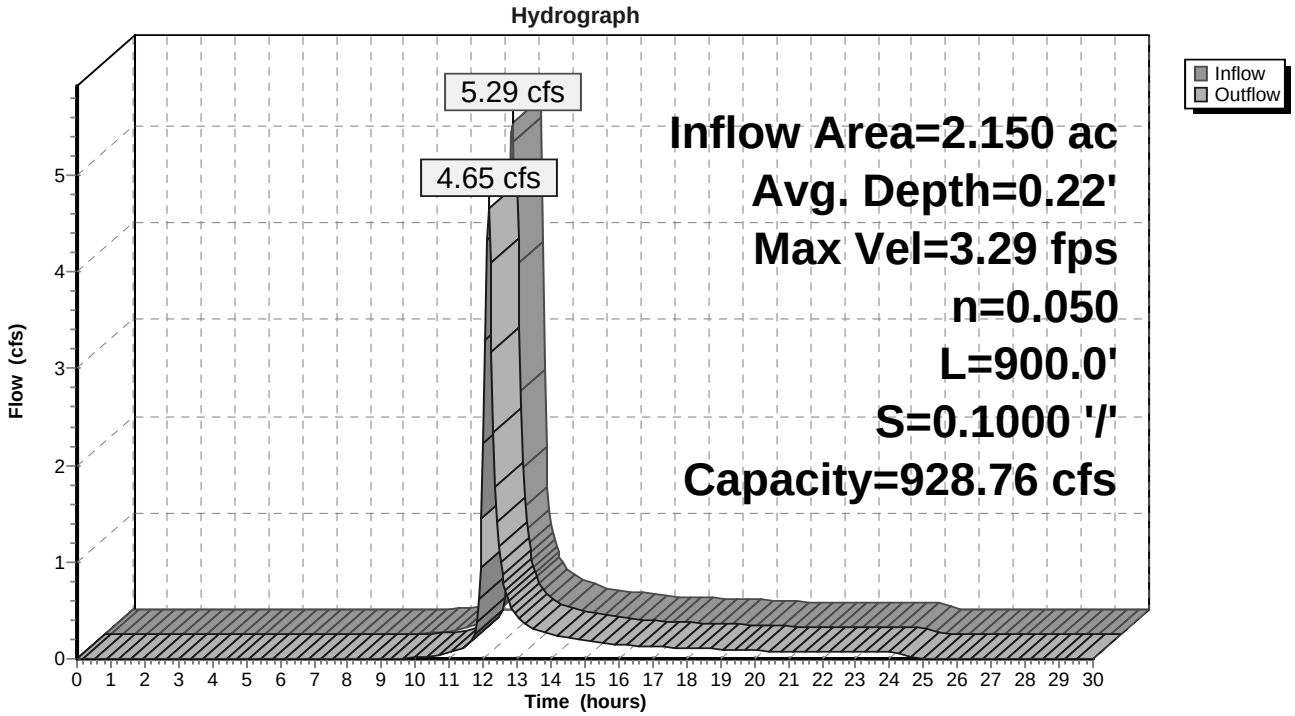
Inflow Area = 2.150 ac, 28.14% Impervious, Inflow Depth = 1.64" for 1-yr event
Inflow = 5.29 cfs @ 12.02 hrs, Volume= 0.293 af
Outflow = 4.65 cfs @ 12.14 hrs, Volume= 0.293 af, Atten= 12%, Lag= 7.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.29 fps, Min. Travel Time= 4.6 min
Avg. Velocity = 1.16 fps, Avg. Travel Time= 12.9 min

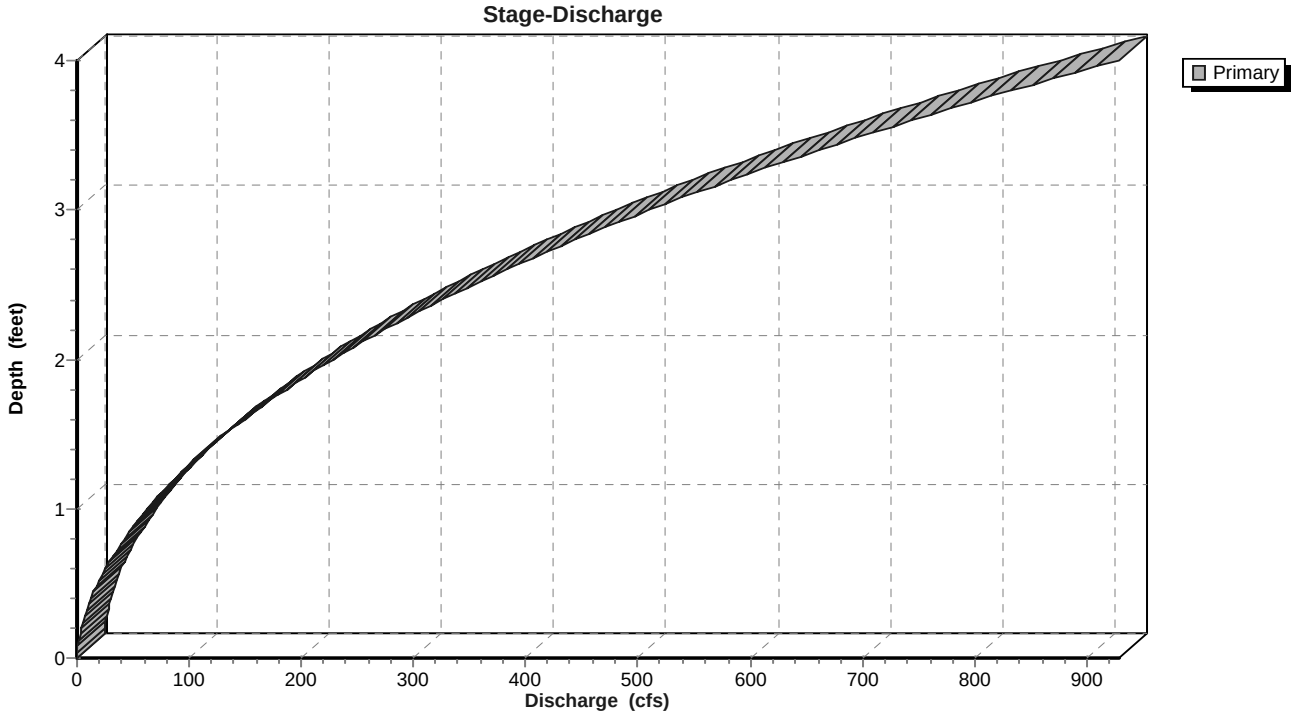
Peak Storage= 1,306 cf @ 12.07 hrs, Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 928.76 cfs

6.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Side Slope Z-value= 2.0 '/' Top Width= 22.00'
Length= 900.0' Slope= 0.1000 '/'
Inlet Invert= 2,015.00', Outlet Invert= 1,925.00'

Reach R2: Overland to Stream



Reach R2: Overland to Stream



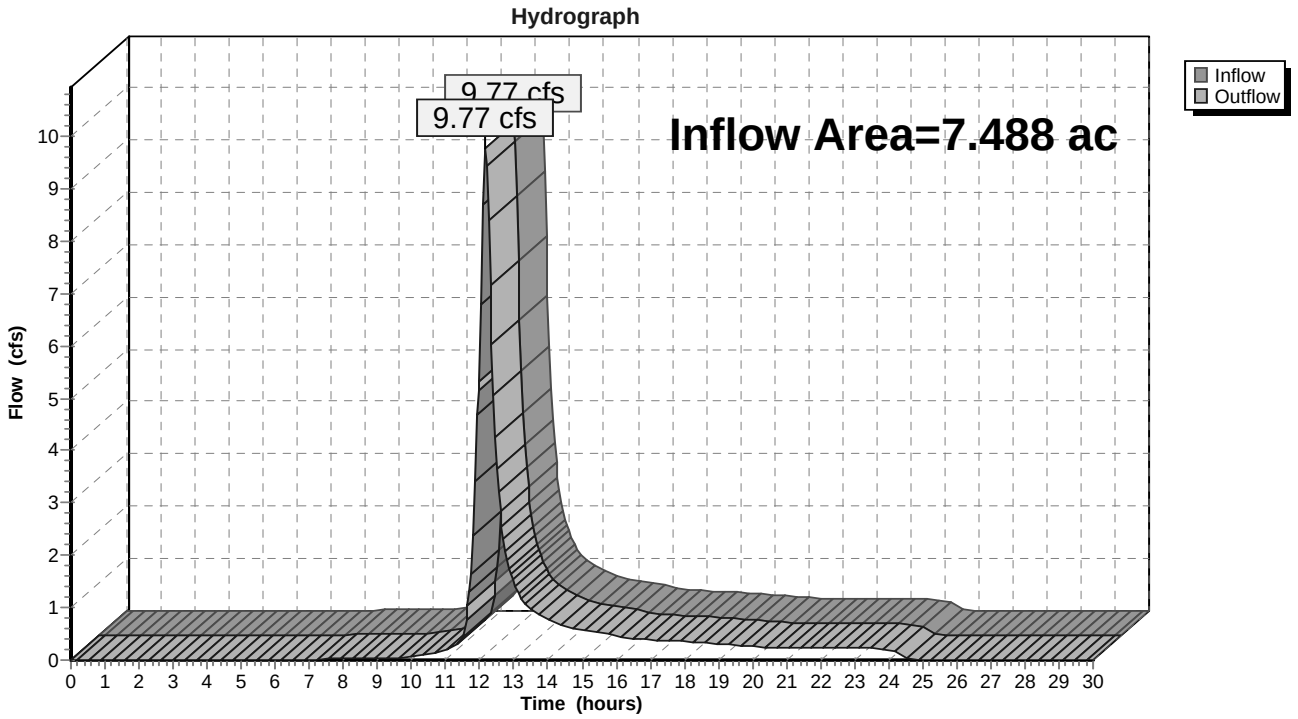
Summary for Reach R3: Point of Analysis

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 7.488 ac, 12.89% Impervious, Inflow Depth = 1.43" for 1-yr event
Inflow = 9.77 cfs @ 12.16 hrs, Volume= 0.891 af
Outflow = 9.77 cfs @ 12.16 hrs, Volume= 0.891 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach R3: Point of Analysis



Summary for Subcatchment E1:

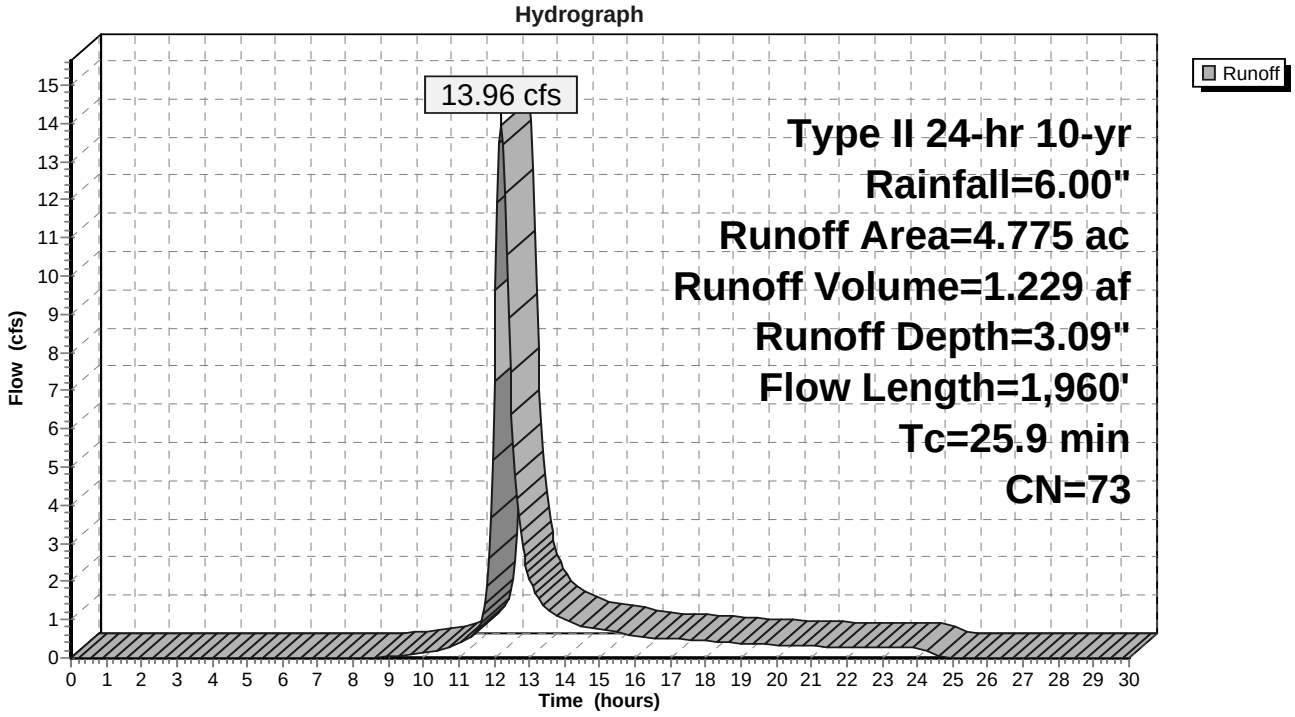
Runoff = 13.96 cfs @ 12.20 hrs, Volume= 1.229 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=6.00"

Area (ac)	CN	Description
3.580	72	Woods/grass comb., Good, HSG C
1.195	74	Pasture/grassland/range, Good, HSG C
4.775	73	Weighted Average
4.775		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	100	0.1280	0.18		**Sheet Flow, SF1** Woods: Light underbrush n= 0.400 P2= 4.00"
16.0	1,720	0.1280	1.79		**Shallow Concentrated Flow, SCF1** Woodland Kv= 5.0 fps
0.8	140	0.0230	3.08		**Shallow Concentrated Flow, SCF2** Paved Kv= 20.3 fps
25.9	1,960	Total			

Subcatchment E1:



Summary for Subcatchment E2:

[49] Hint: Tc<2dt may require smaller dt

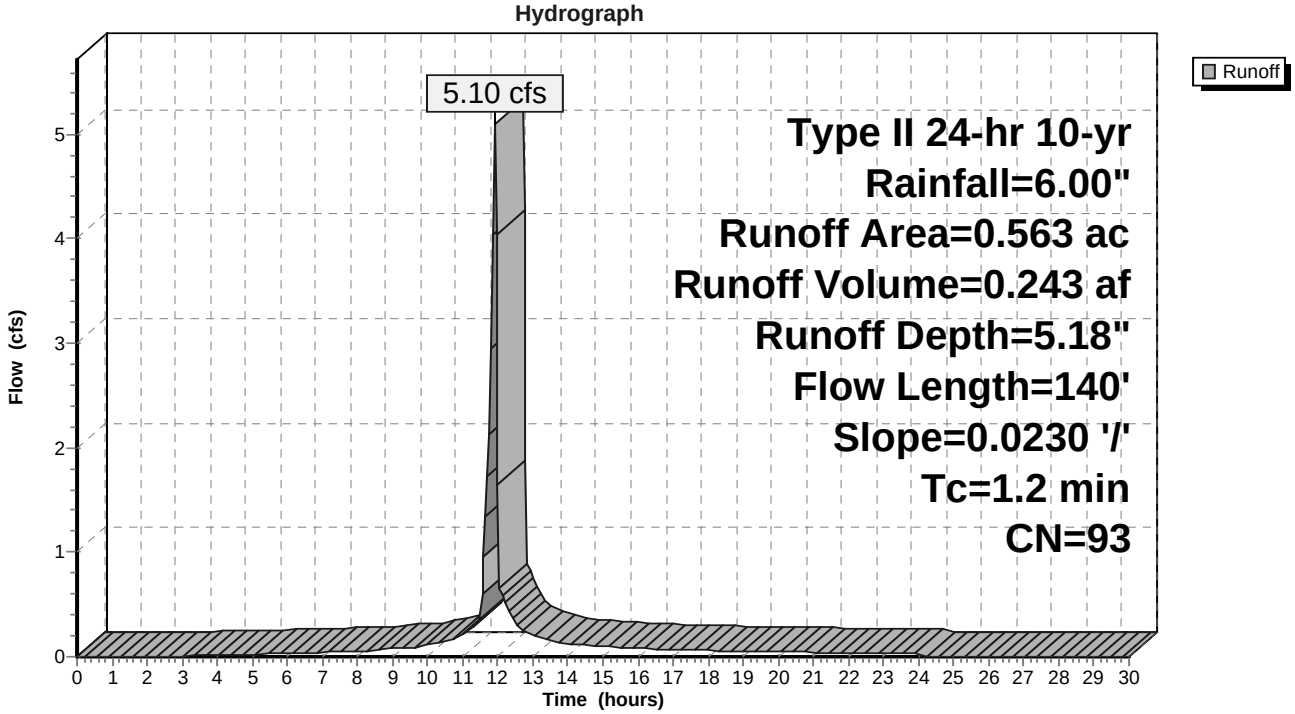
Runoff = 5.10 cfs @ 11.90 hrs, Volume= 0.243 af, Depth= 5.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=6.00"

Area (ac)	CN	Description
0.360	98	Paved parking & roofs
0.123	89	Gravel roads, HSG C
0.080	74	>75% Grass cover, Good, HSG C
0.563	93	Weighted Average
0.203		Pervious Area
0.360		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	100	0.0230	1.63		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 4.00"
0.2	40	0.0230	3.08		**Shallow Concentrated Flow, SCF1** Paved Kv= 20.3 fps
1.2	140	Total			

Subcatchment E2:



Summary for Subcatchment E3:

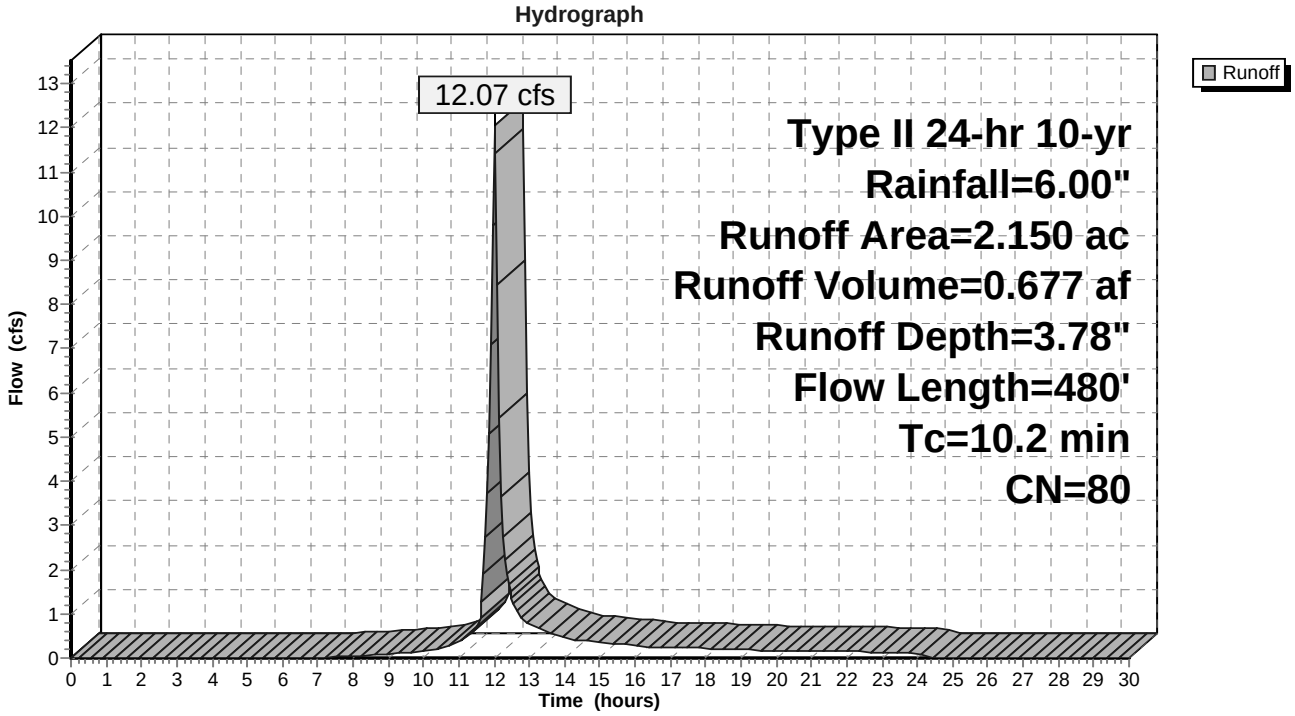
Runoff = 12.07 cfs @ 12.02 hrs, Volume= 0.677 af, Depth= 3.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=6.00"

Area (ac)	CN	Description
0.605	98	Paved parking & roofs
0.524	72	Woods/grass comb., Good, HSG C
1.021	74	>75% Grass cover, Good, HSG C
2.150	80	Weighted Average
1.545		Pervious Area
0.605		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.1930	0.21		**Sheet Flow, SF1** Woods: Light underbrush n= 0.400 P2= 4.00"
1.4	190	0.1930	2.20		**Shallow Concentrated Flow, SCF1** Woodland Kv= 5.0 fps
0.3	90	0.0560	4.80		**Shallow Concentrated Flow, SCF2** Paved Kv= 20.3 fps
0.7	100	0.2300	2.40		**Shallow Concentrated Flow, SCF3** Woodland Kv= 5.0 fps
10.2	480	Total			

Subcatchment E3:



Summary for Reach R2: Overland to Stream

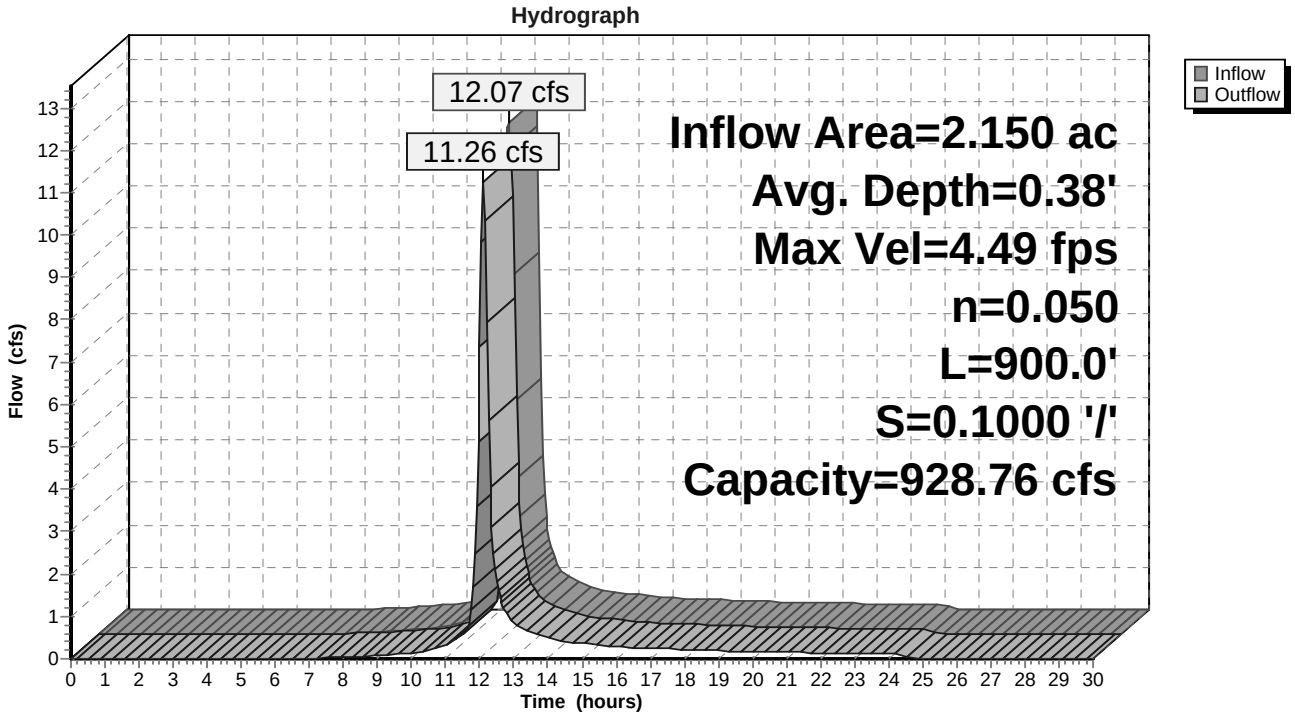
Inflow Area = 2.150 ac, 28.14% Impervious, Inflow Depth = 3.78" for 10-yr event
Inflow = 12.07 cfs @ 12.02 hrs, Volume= 0.677 af
Outflow = 11.26 cfs @ 12.11 hrs, Volume= 0.677 af, Atten= 7%, Lag= 5.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.49 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 1.25 fps, Avg. Travel Time= 12.0 min

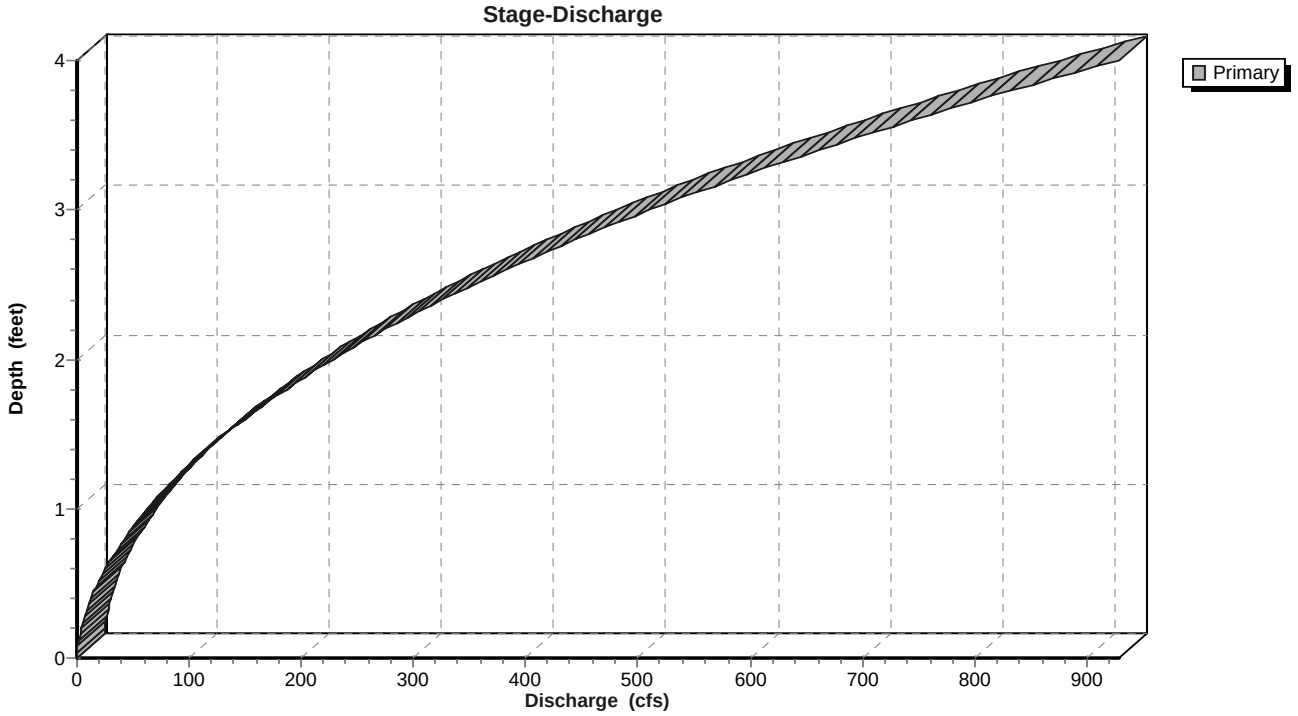
Peak Storage= 2,281 cf @ 12.05 hrs, Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 928.76 cfs

6.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Side Slope Z-value= 2.0 '/' Top Width= 22.00'
Length= 900.0' Slope= 0.1000 '/'
Inlet Invert= 2,015.00', Outlet Invert= 1,925.00'

Reach R2: Overland to Stream



Reach R2: Overland to Stream



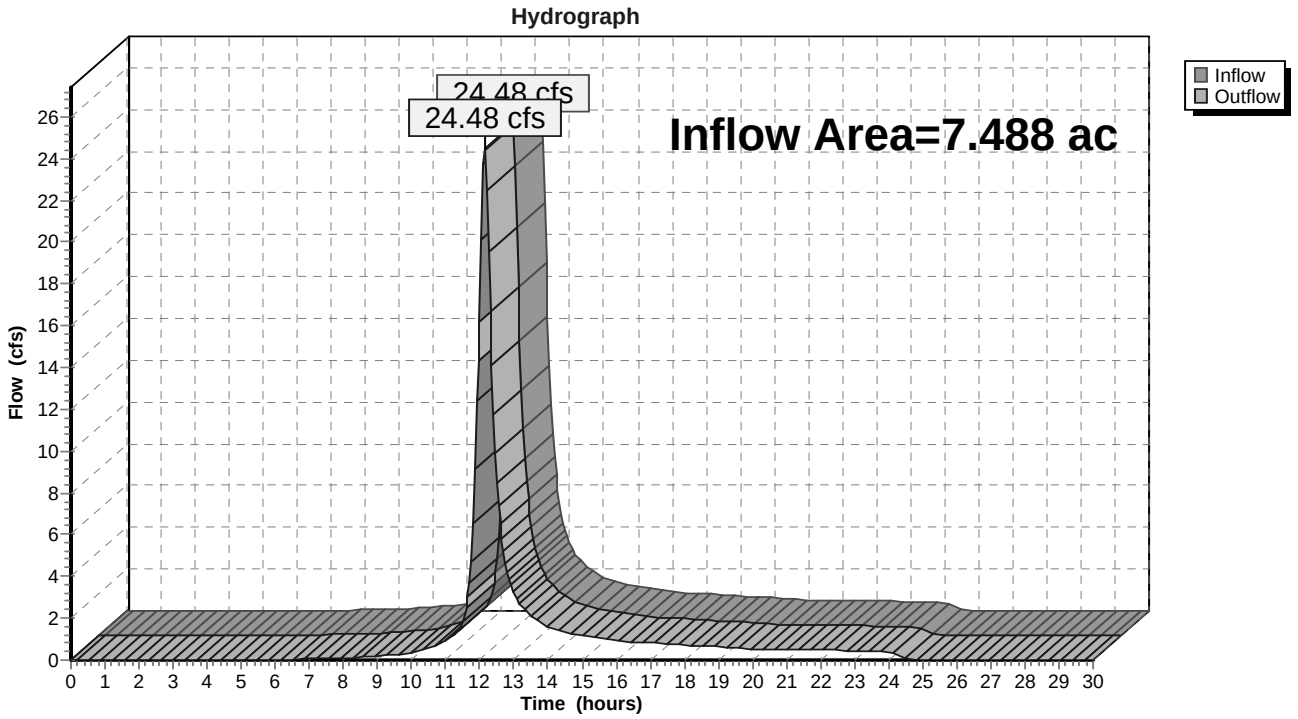
Summary for Reach R3: Point of Analysis

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 7.488 ac, 12.89% Impervious, Inflow Depth = 3.44" for 10-yr event
Inflow = 24.48 cfs @ 12.14 hrs, Volume= 2.150 af
Outflow = 24.48 cfs @ 12.14 hrs, Volume= 2.150 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach R3: Point of Analysis



Summary for Subcatchment E1:

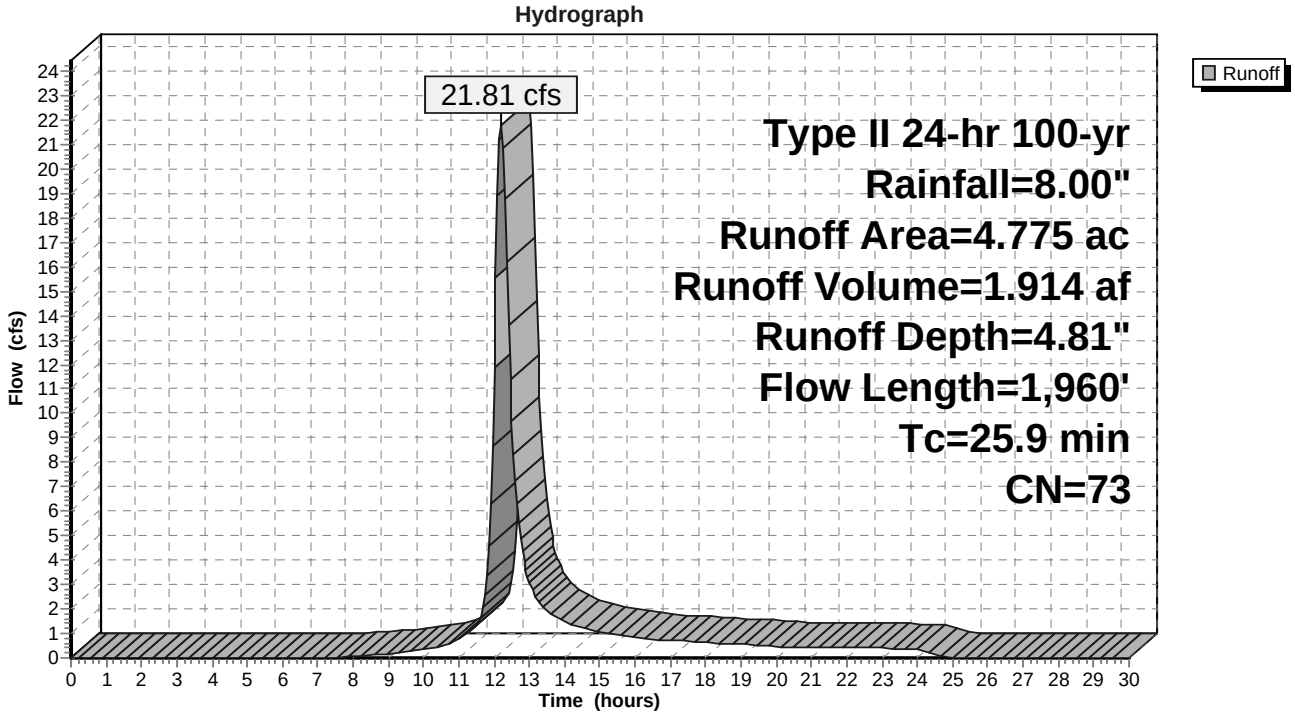
Runoff = 21.81 cfs @ 12.19 hrs, Volume= 1.914 af, Depth= 4.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.00"

Area (ac)	CN	Description
3.580	72	Woods/grass comb., Good, HSG C
1.195	74	Pasture/grassland/range, Good, HSG C
4.775	73	Weighted Average
4.775		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	100	0.1280	0.18		**Sheet Flow, SF1** Woods: Light underbrush n= 0.400 P2= 4.00"
16.0	1,720	0.1280	1.79		**Shallow Concentrated Flow, SCF1** Woodland Kv= 5.0 fps
0.8	140	0.0230	3.08		**Shallow Concentrated Flow, SCF2** Paved Kv= 20.3 fps
25.9	1,960	Total			

Subcatchment E1:



Summary for Subcatchment E2:

[49] Hint: Tc<2dt may require smaller dt

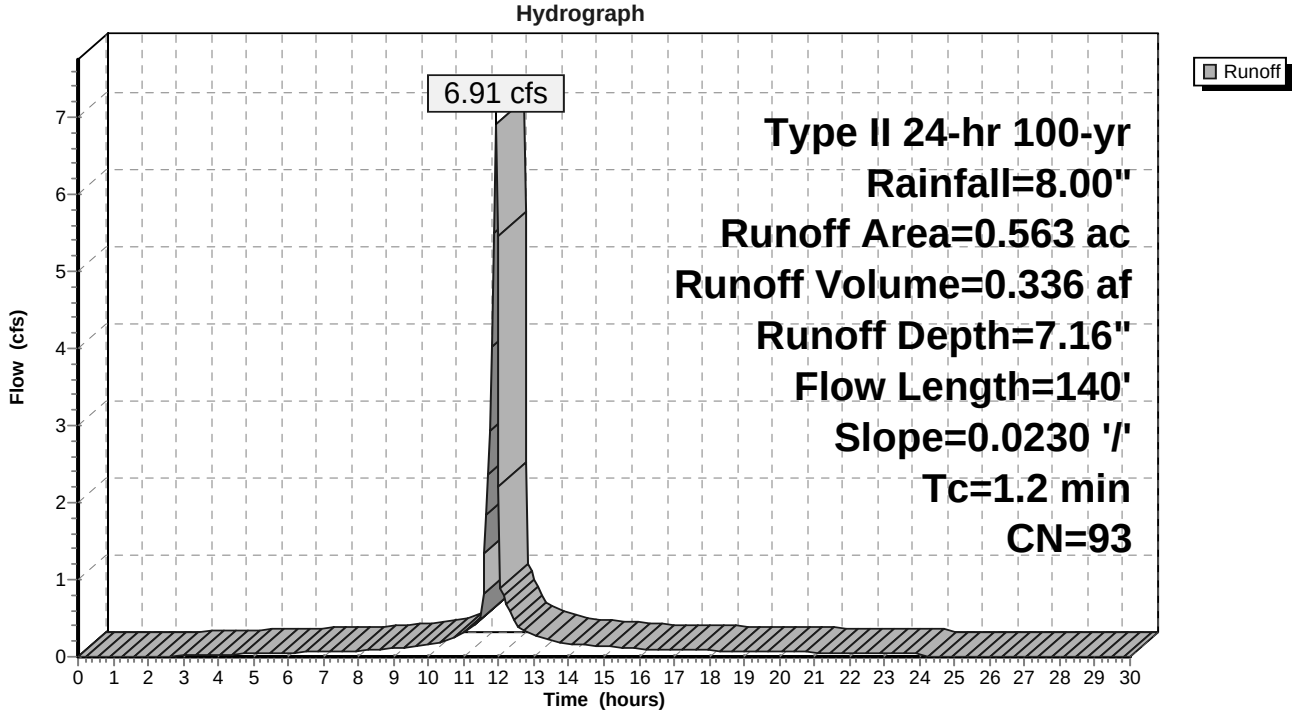
Runoff = 6.91 cfs @ 11.90 hrs, Volume= 0.336 af, Depth= 7.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.00"

Area (ac)	CN	Description
0.360	98	Paved parking & roofs
0.123	89	Gravel roads, HSG C
0.080	74	>75% Grass cover, Good, HSG C
0.563	93	Weighted Average
0.203		Pervious Area
0.360		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	100	0.0230	1.63		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 4.00"
0.2	40	0.0230	3.08		**Shallow Concentrated Flow, SCF1** Paved Kv= 20.3 fps
1.2	140	Total			

Subcatchment E2:



Summary for Subcatchment E3:

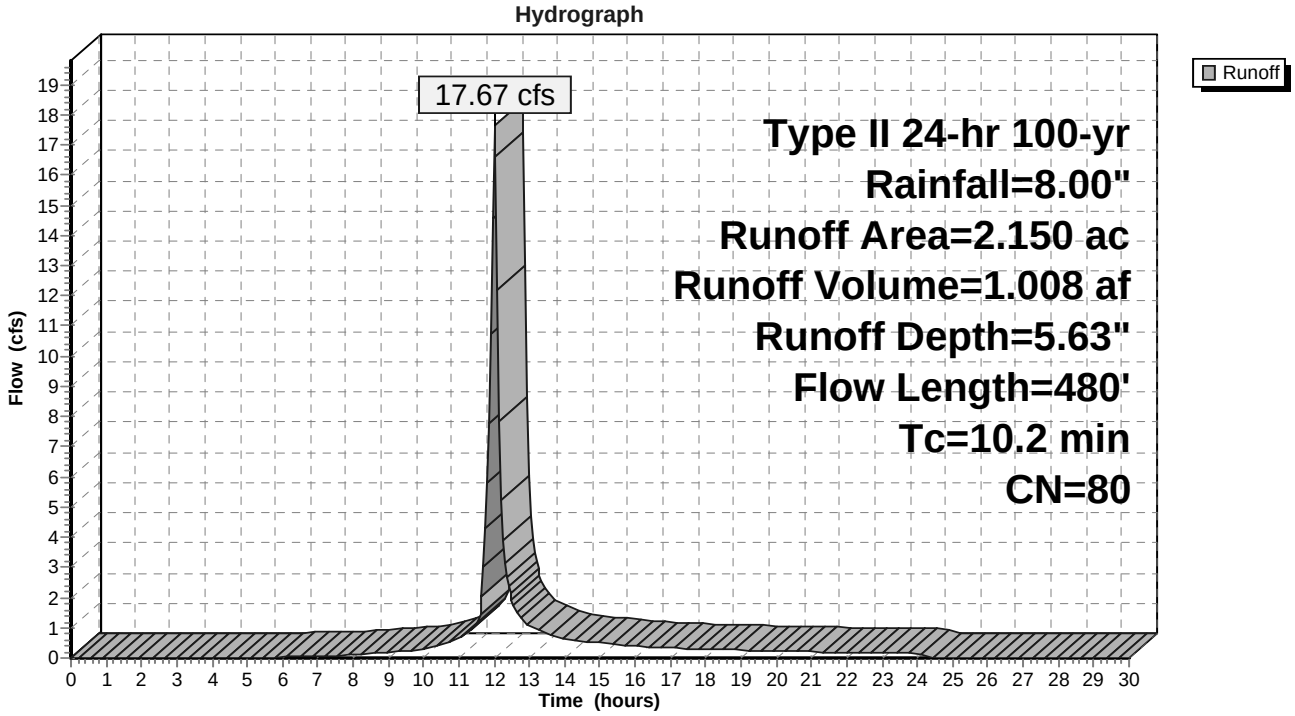
Runoff = 17.67 cfs @ 12.01 hrs, Volume= 1.008 af, Depth= 5.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.00"

Area (ac)	CN	Description
0.605	98	Paved parking & roofs
0.524	72	Woods/grass comb., Good, HSG C
1.021	74	>75% Grass cover, Good, HSG C
2.150	80	Weighted Average
1.545		Pervious Area
0.605		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.1930	0.21		**Sheet Flow, SF1** Woods: Light underbrush n= 0.400 P2= 4.00"
1.4	190	0.1930	2.20		**Shallow Concentrated Flow, SCF1** Woodland Kv= 5.0 fps
0.3	90	0.0560	4.80		**Shallow Concentrated Flow, SCF2** Paved Kv= 20.3 fps
0.7	100	0.2300	2.40		**Shallow Concentrated Flow, SCF3** Woodland Kv= 5.0 fps
10.2	480	Total			

Subcatchment E3:



Summary for Reach R2: Overland to Stream

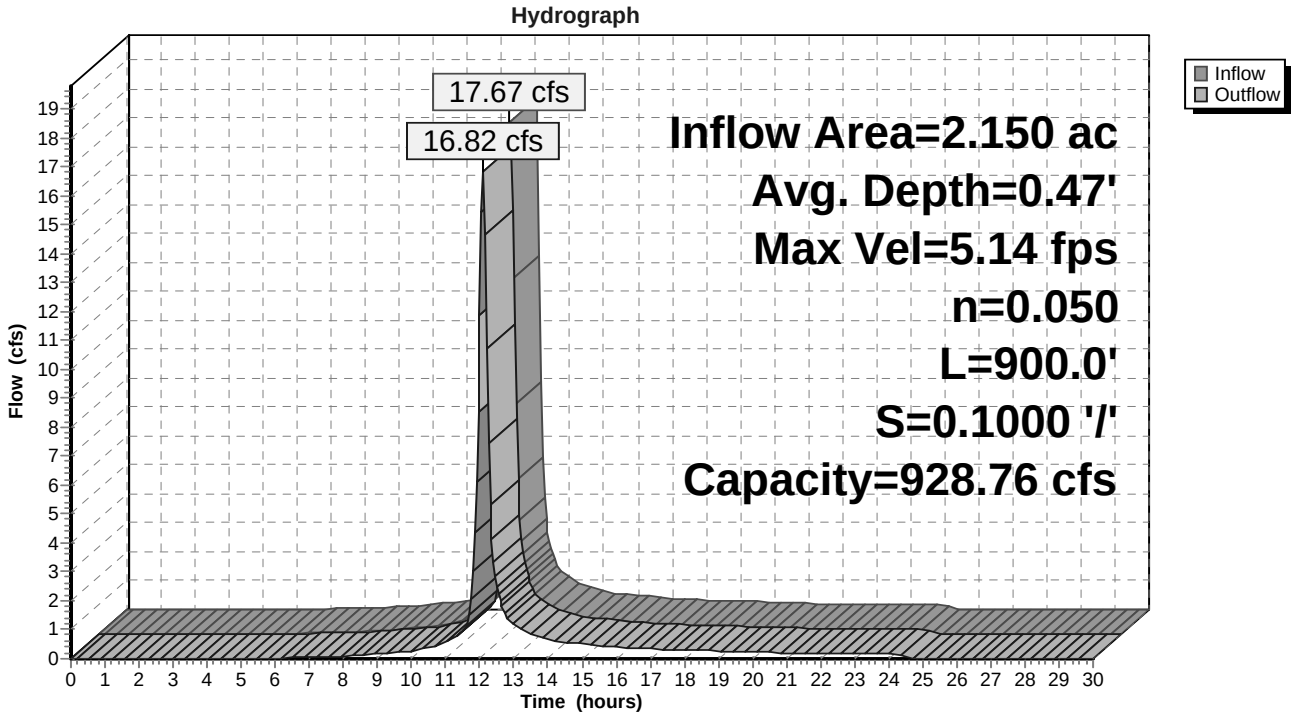
Inflow Area = 2.150 ac, 28.14% Impervious, Inflow Depth = 5.63" for 100-yr event
Inflow = 17.67 cfs @ 12.01 hrs, Volume= 1.008 af
Outflow = 16.82 cfs @ 12.09 hrs, Volume= 1.008 af, Atten= 5%, Lag= 4.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.14 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 1.33 fps, Avg. Travel Time= 11.3 min

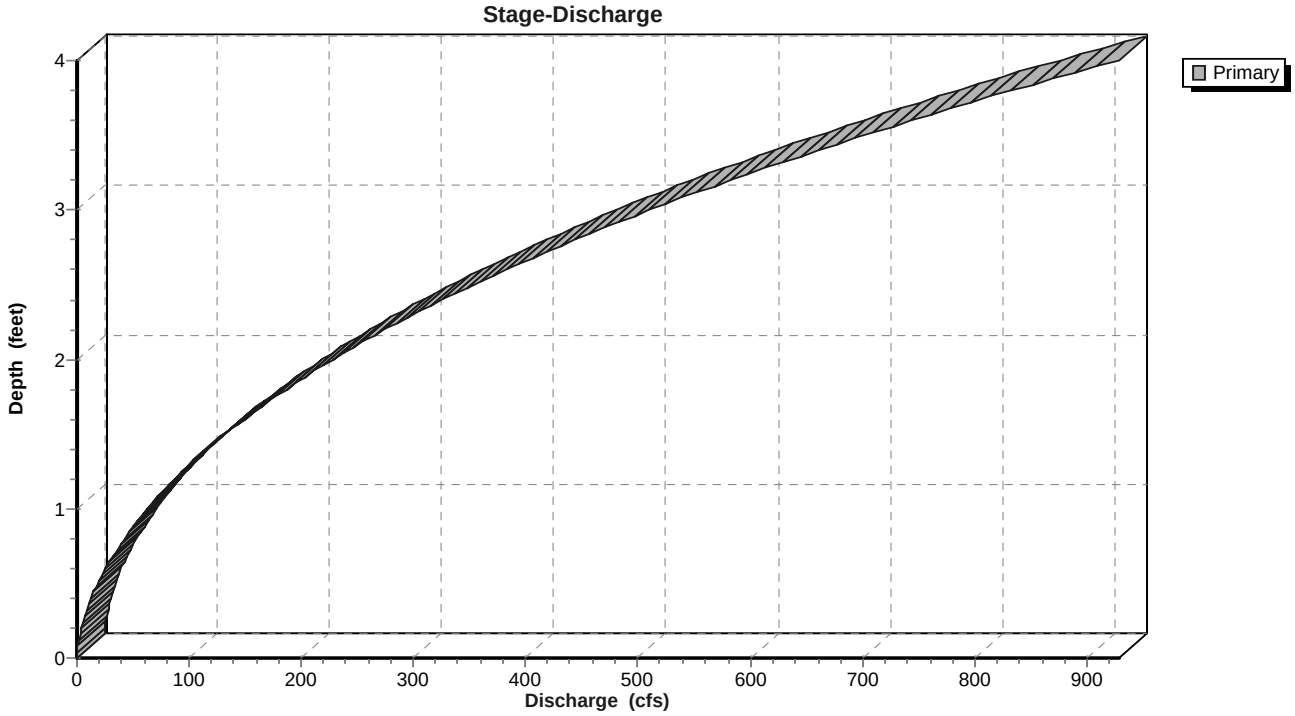
Peak Storage= 2,952 cf @ 12.05 hrs, Average Depth at Peak Storage= 0.47'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 928.76 cfs

6.00' x 4.00' deep channel, n= 0.050 Mountain streams w/large boulders
Side Slope Z-value= 2.0 '/' Top Width= 22.00'
Length= 900.0' Slope= 0.1000 '/'
Inlet Invert= 2,015.00', Outlet Invert= 1,925.00'

Reach R2: Overland to Stream



Reach R2: Overland to Stream



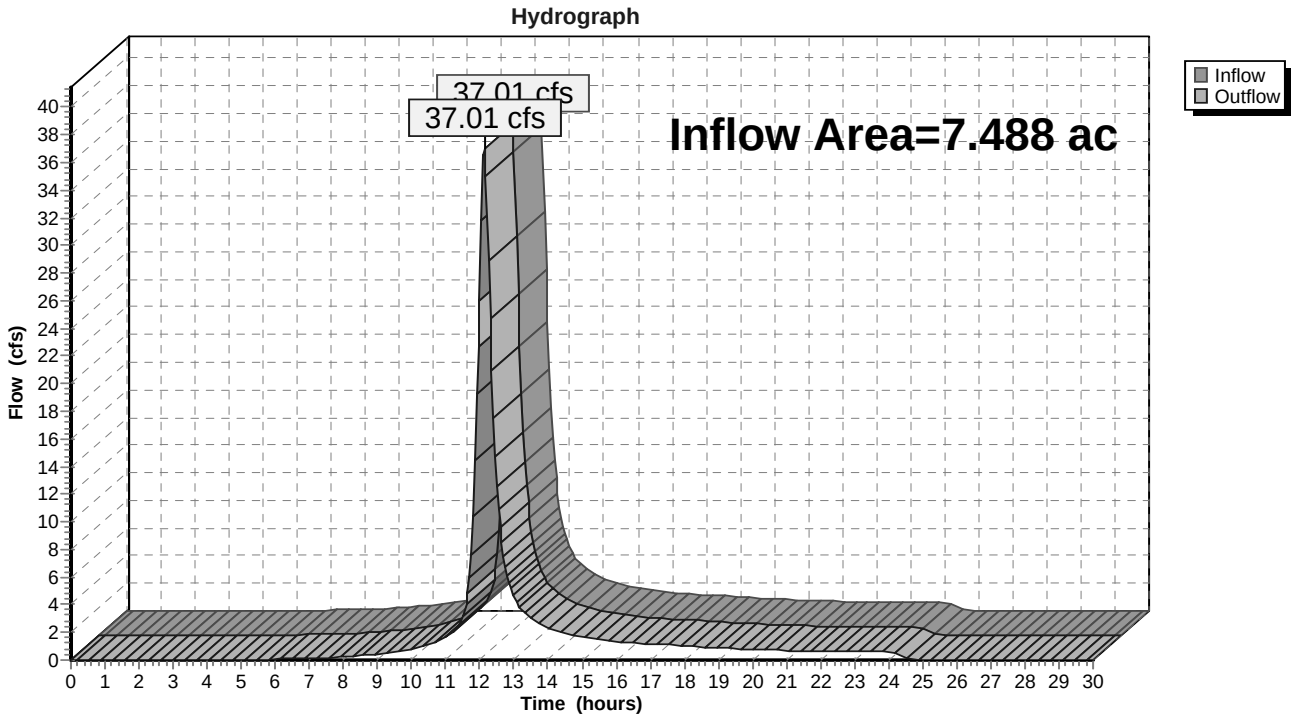
Summary for Reach R3: Point of Analysis

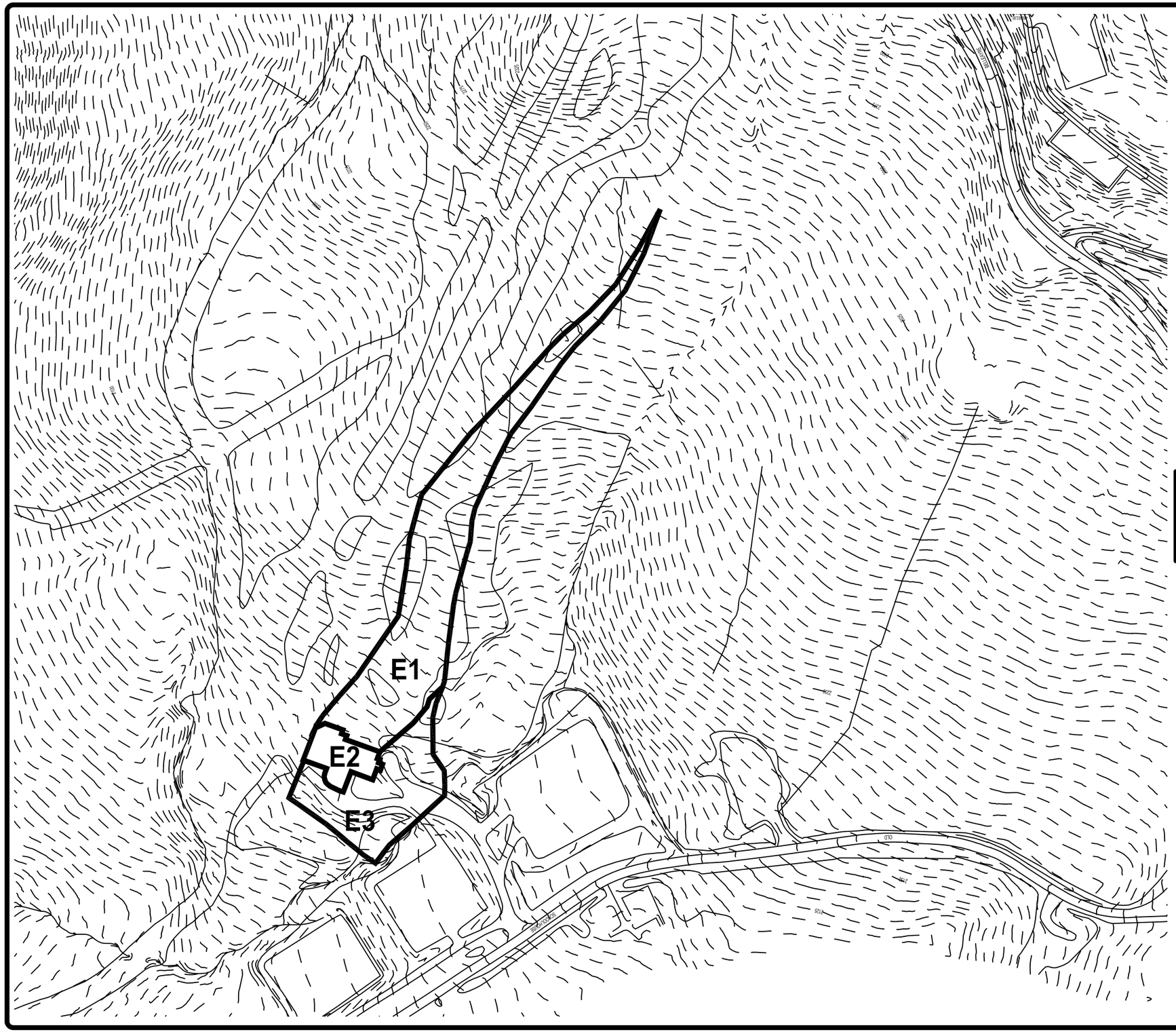
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 7.488 ac, 12.89% Impervious, Inflow Depth = 5.22" for 100-yr event
Inflow = 37.01 cfs @ 12.13 hrs, Volume= 3.258 af
Outflow = 37.01 cfs @ 12.13 hrs, Volume= 3.258 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach R3: Point of Analysis





DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PRE-CONSTRUCTION CONDITIONS

SUB-CATCHMENT AREA	SIZE (ACRE)
E1	4.775
E2	0.563
E3	2.150

FIGURE -

Drawn By: SRR
Checked By: TMK
Project Mgr: WCN
Date: 2/7/11
Project No: 03-2118

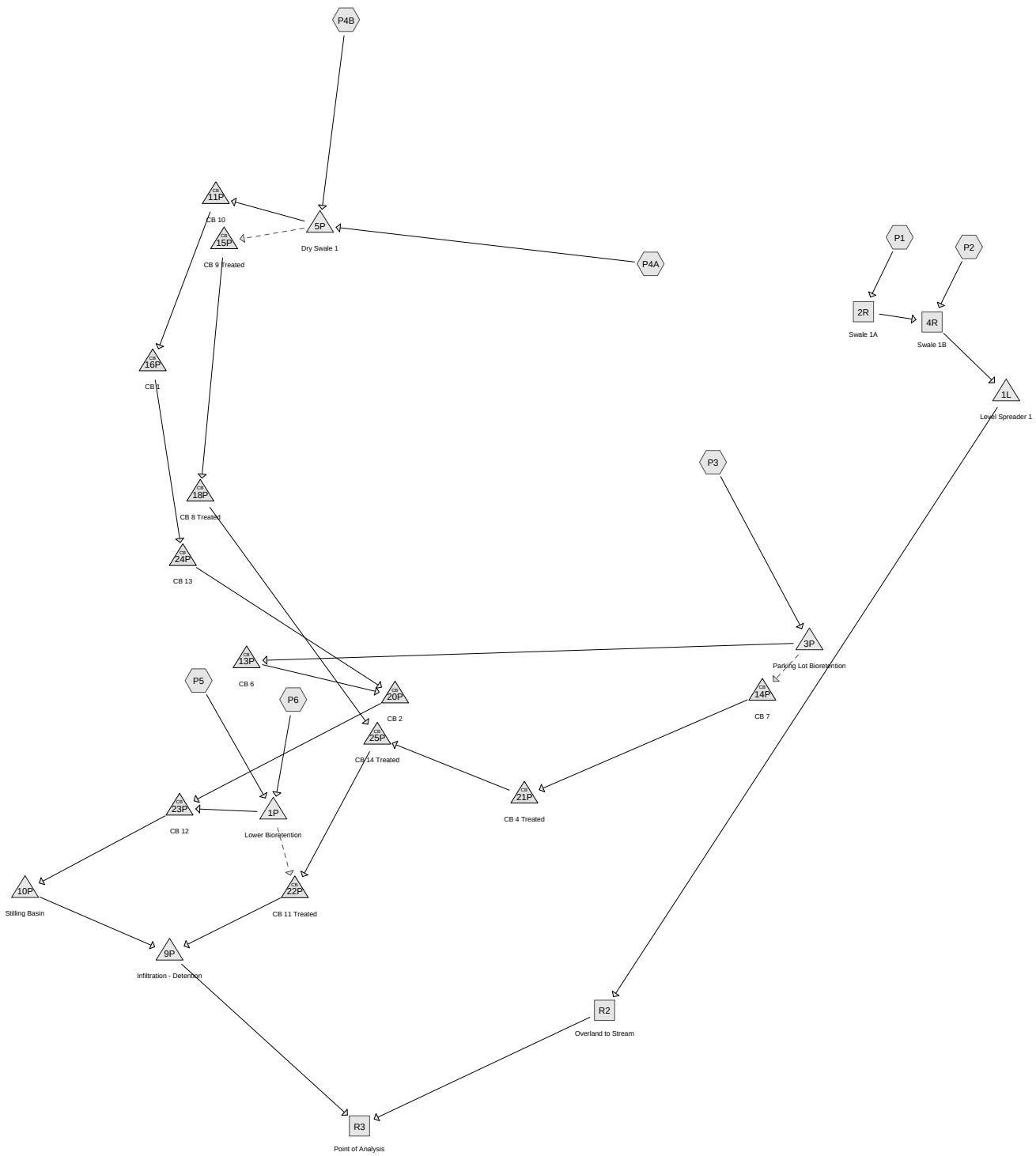
DRAWING TITLE
PRE-CONSTRUCTION CONDITIONS
WATERSHED AREAS

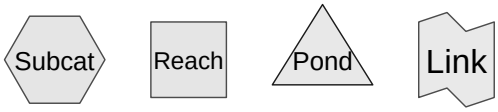
DISCOVERY LODGE AT BELLEYRE
MOUNTAIN SKI CENTER
REHABILITATION & ADDITION
HIGHMOUNT ULSTER

HUMPHREY
Consulting Engineering & Land Surveying, P.C.
430 Court Street, Suite 200, Utica, New York 13502
Telephone (315) 724-0100 Fax (315) 724-0315

APPENDIX I

PROPOSED SITE HYDROLOGY





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Prepared by Shumaker Engineering, Printed 2/7/2011
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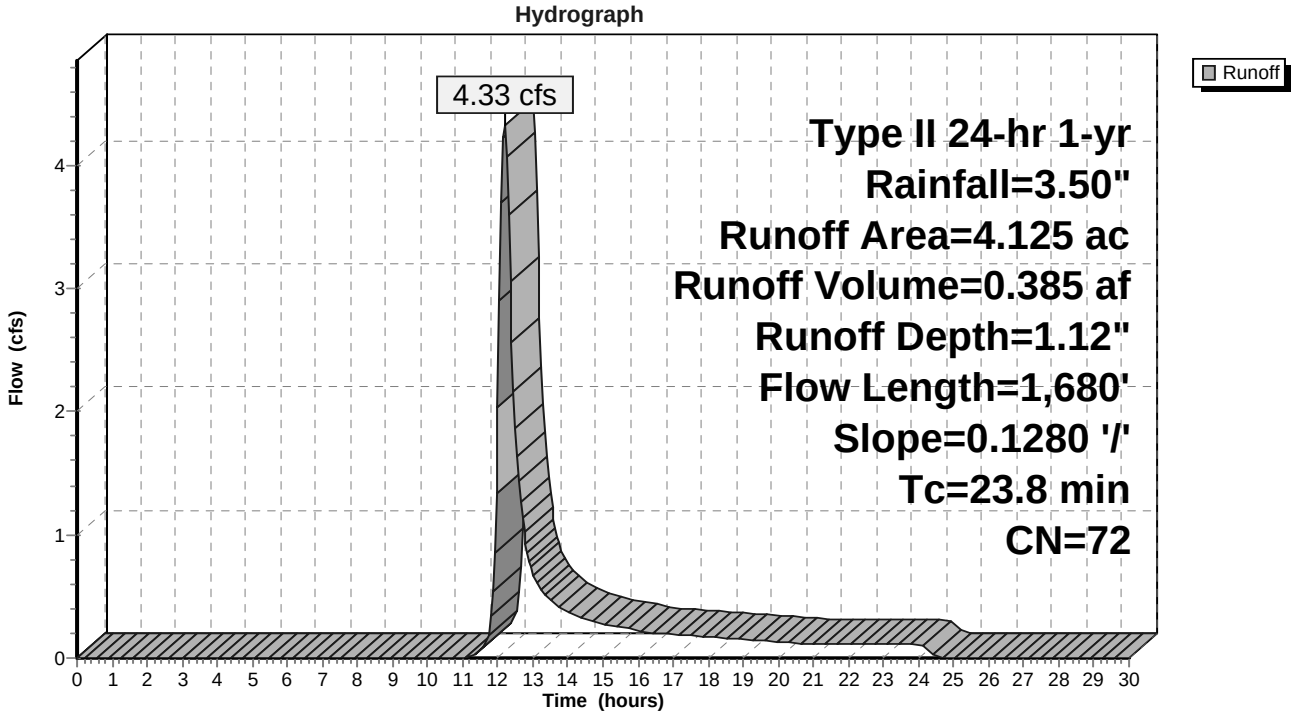
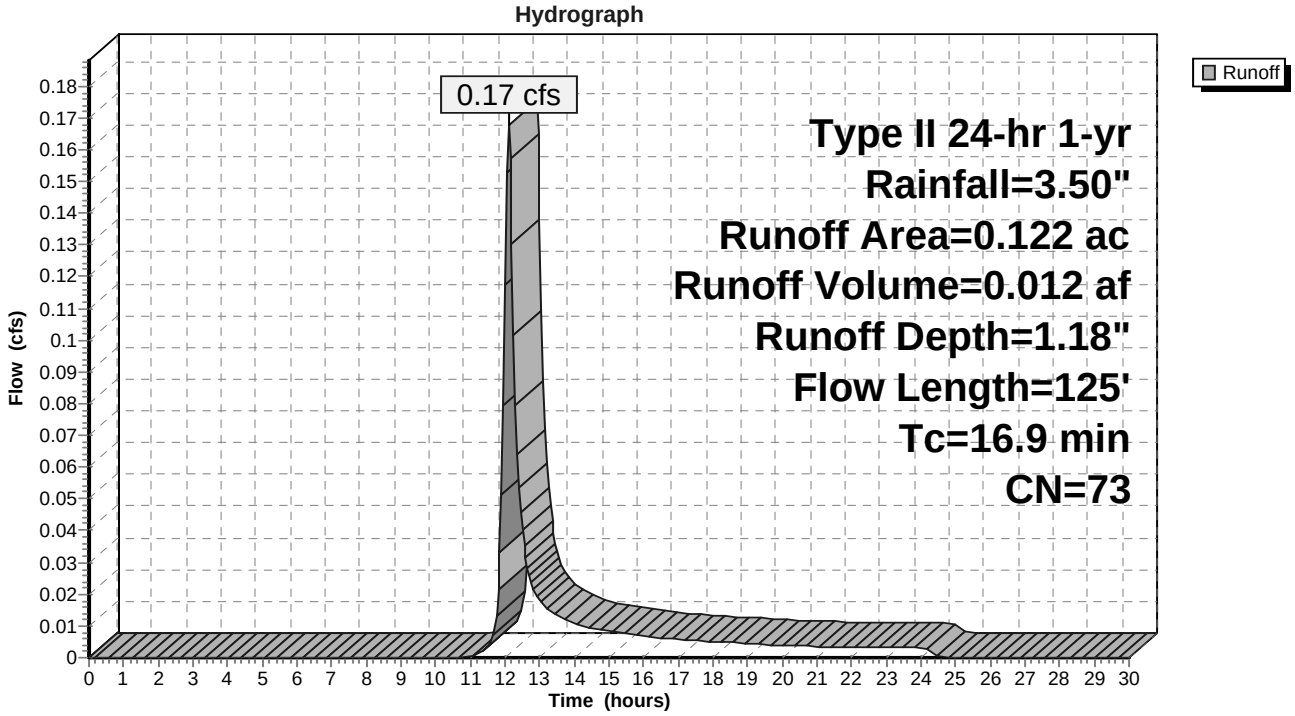
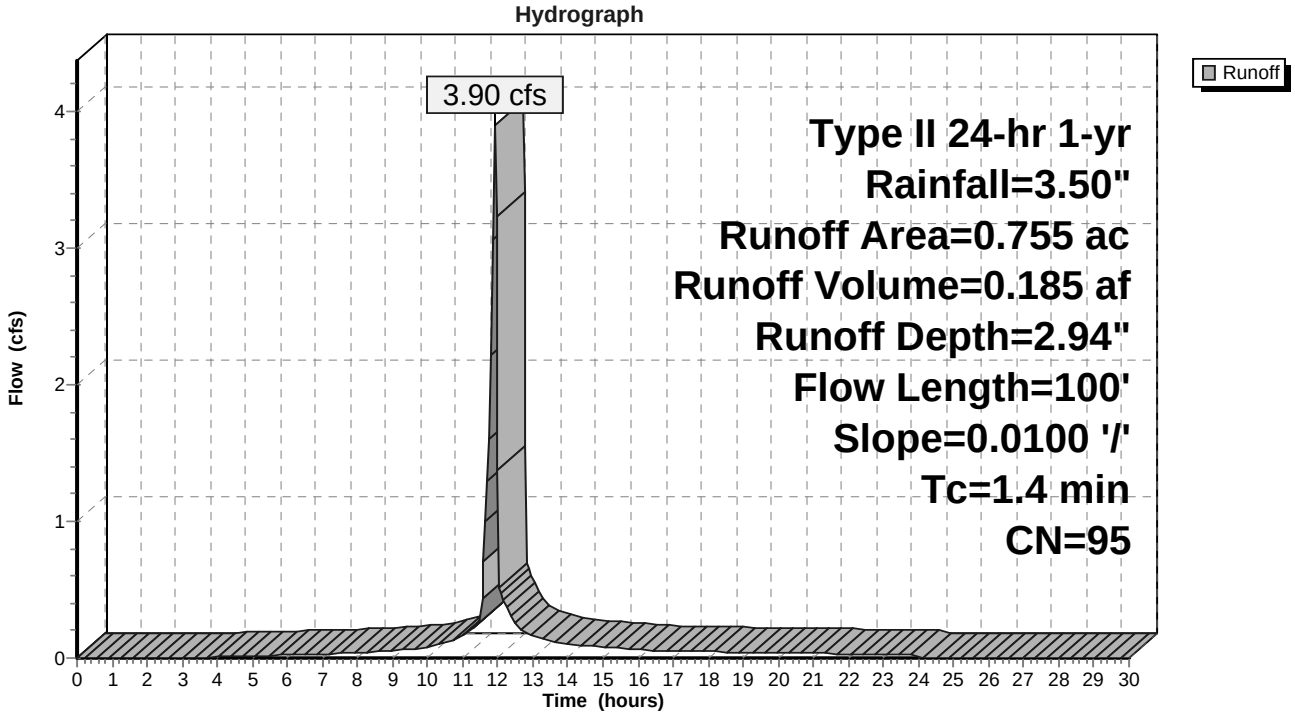
Subcatchment P1:



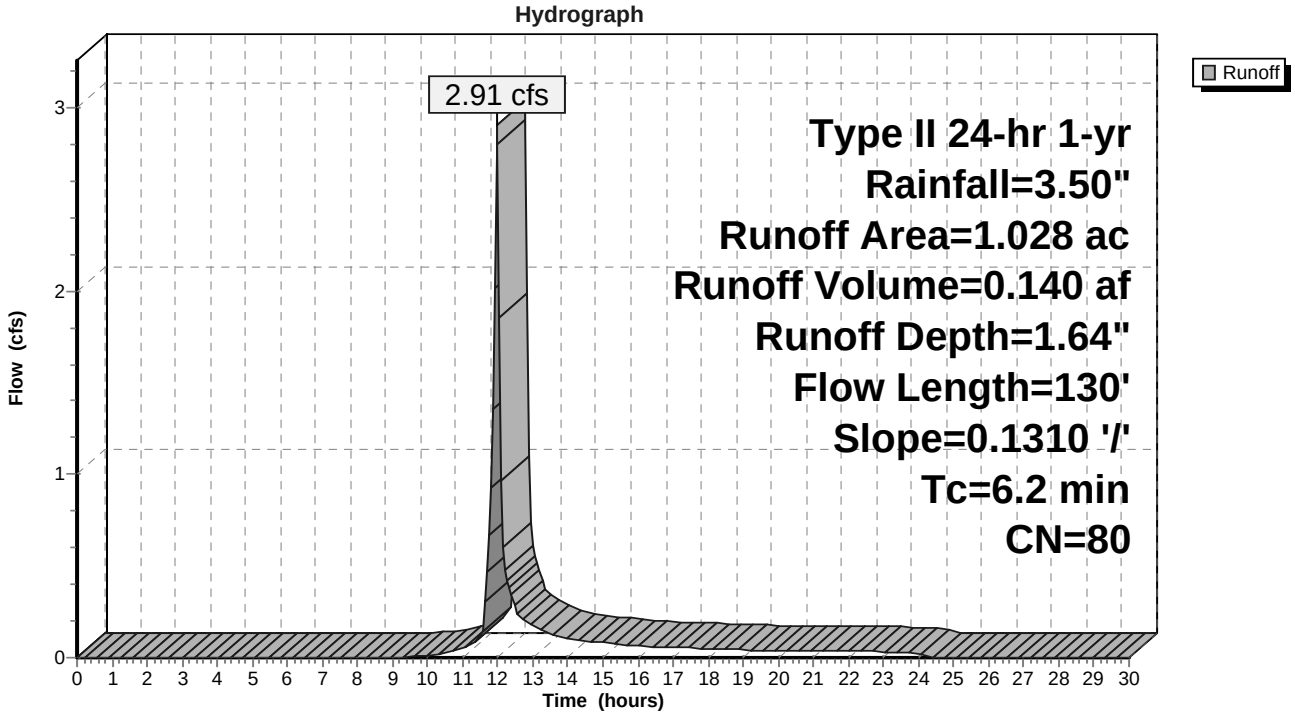
Subcatchment P2:



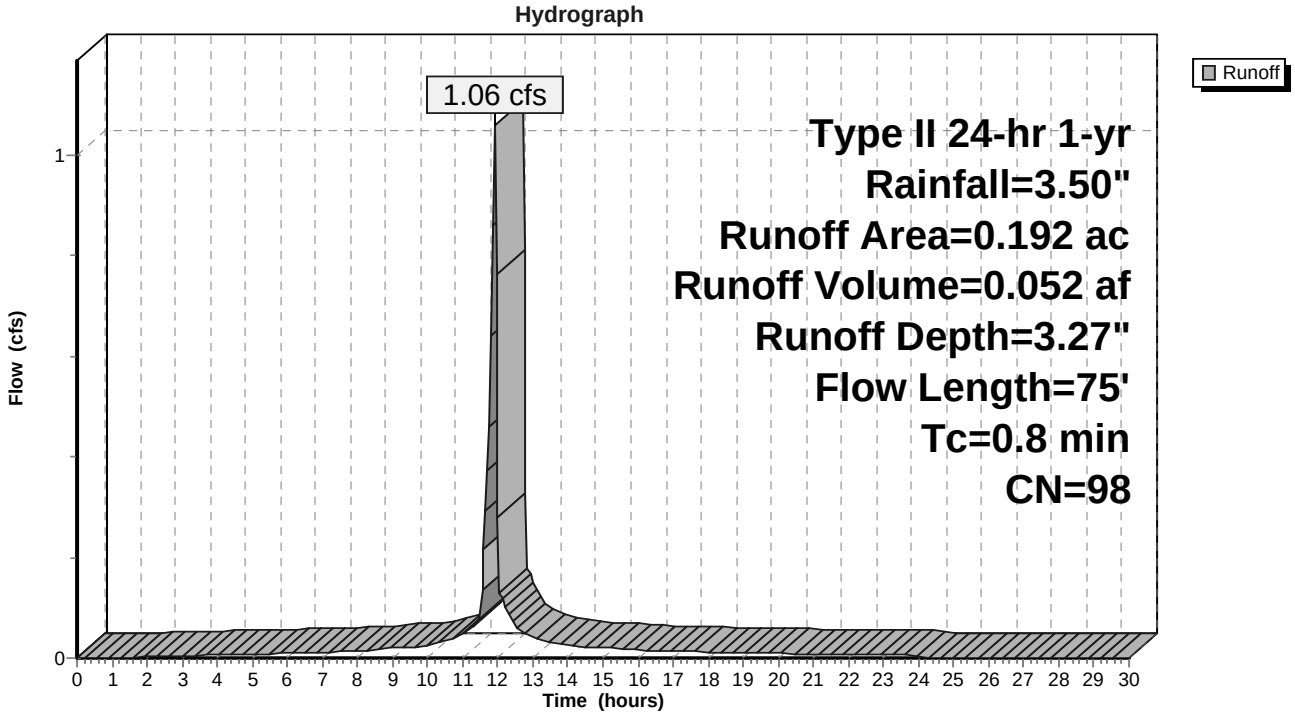
Subcatchment P3:



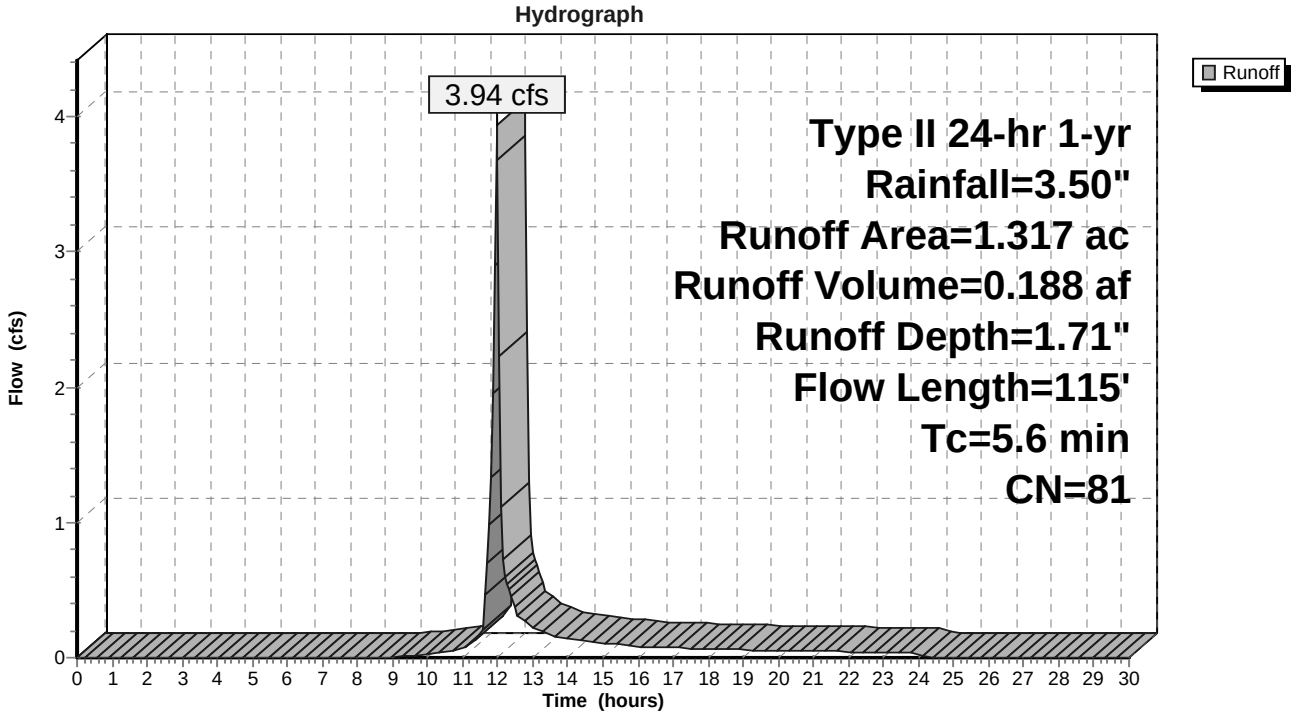
Subcatchment P4A:



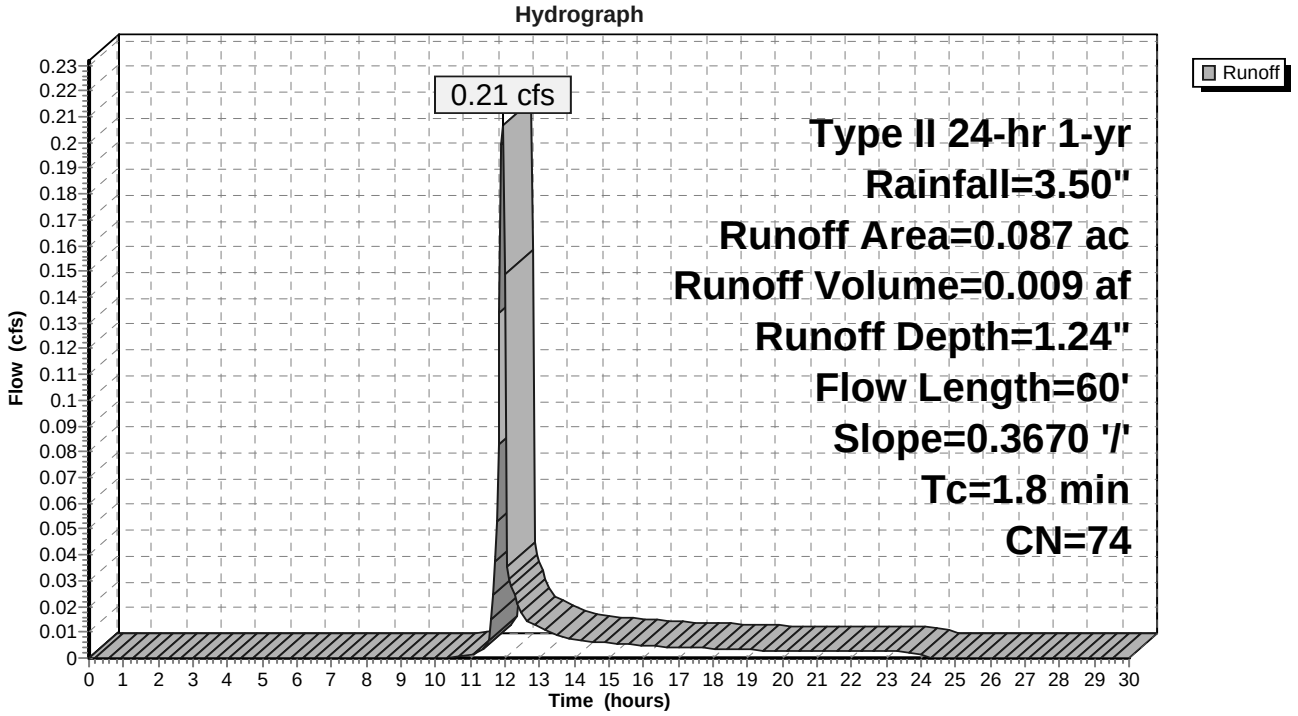
Subcatchment P4B:



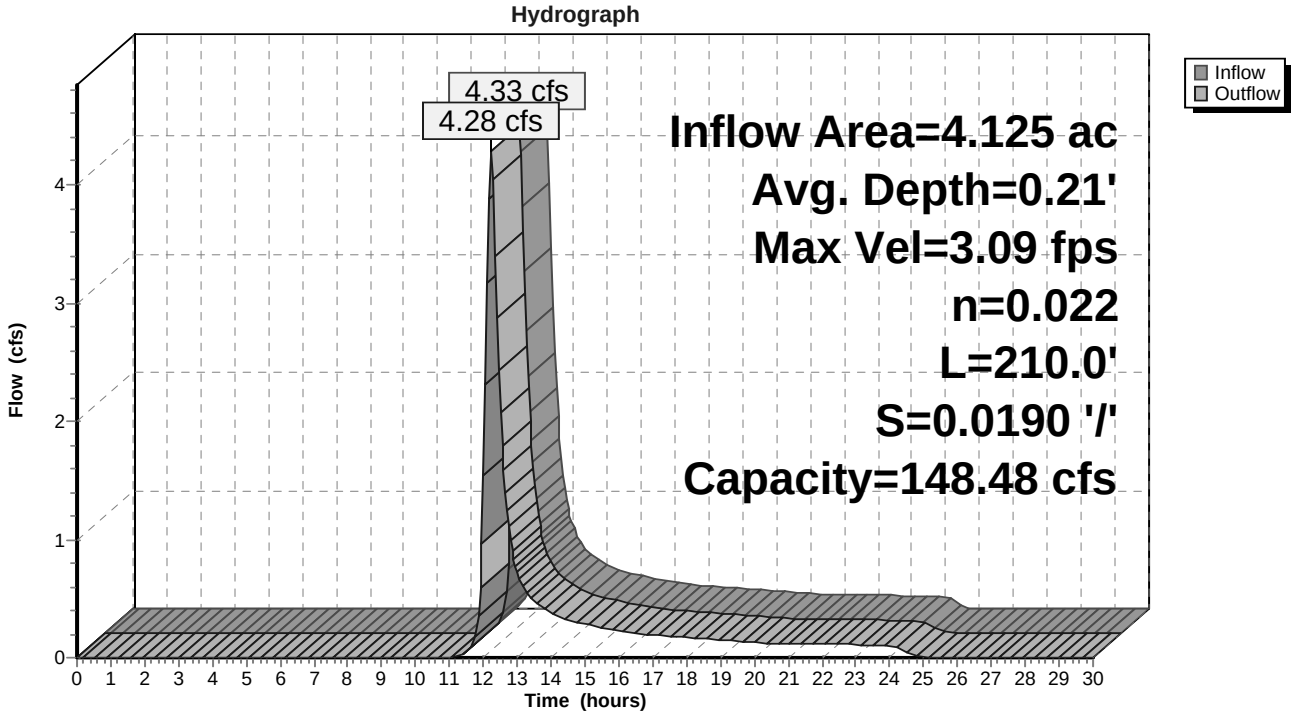
Subcatchment P5:



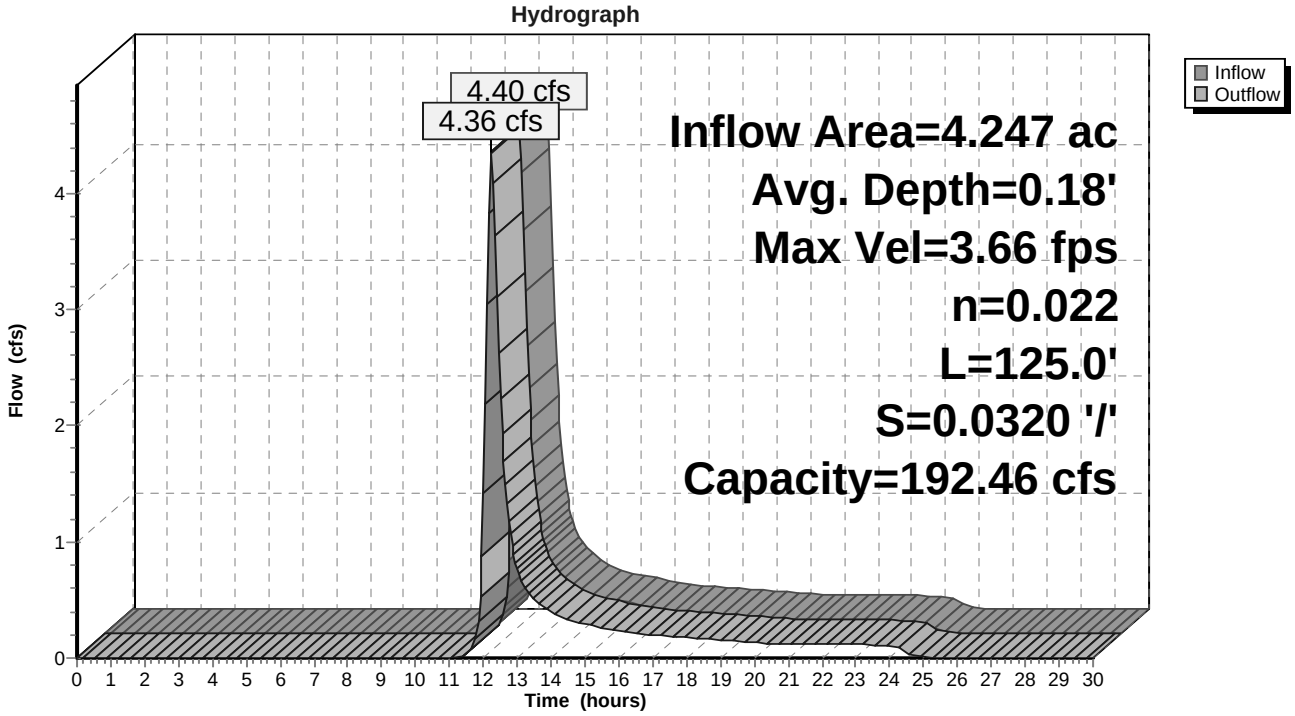
Subcatchment P6:



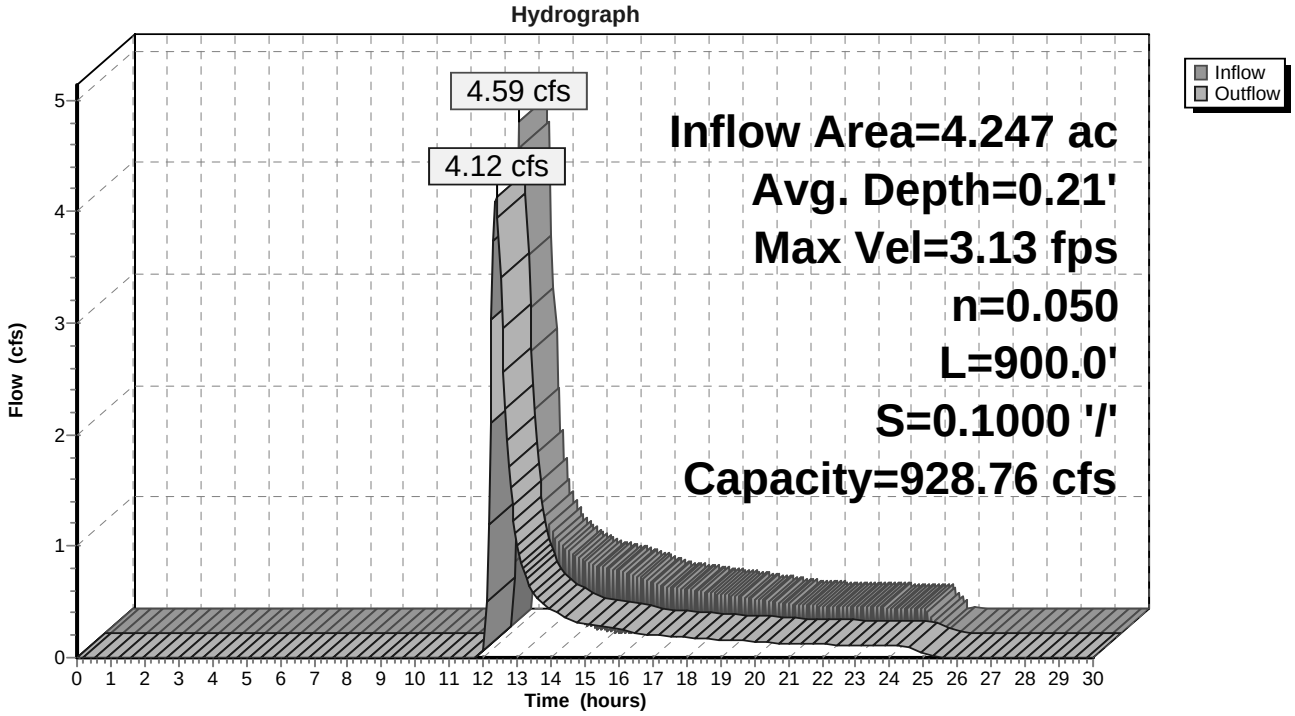
Reach 2R: Swale 1A



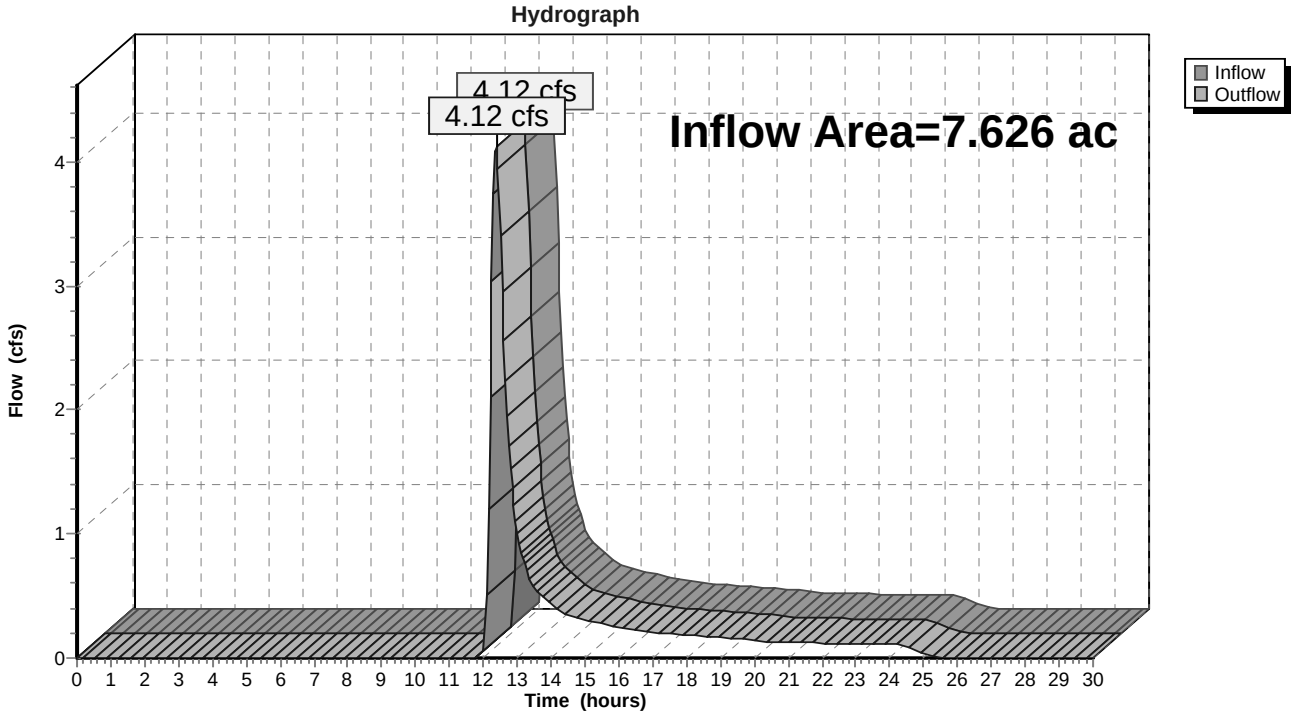
Reach 4R: Swale 1B



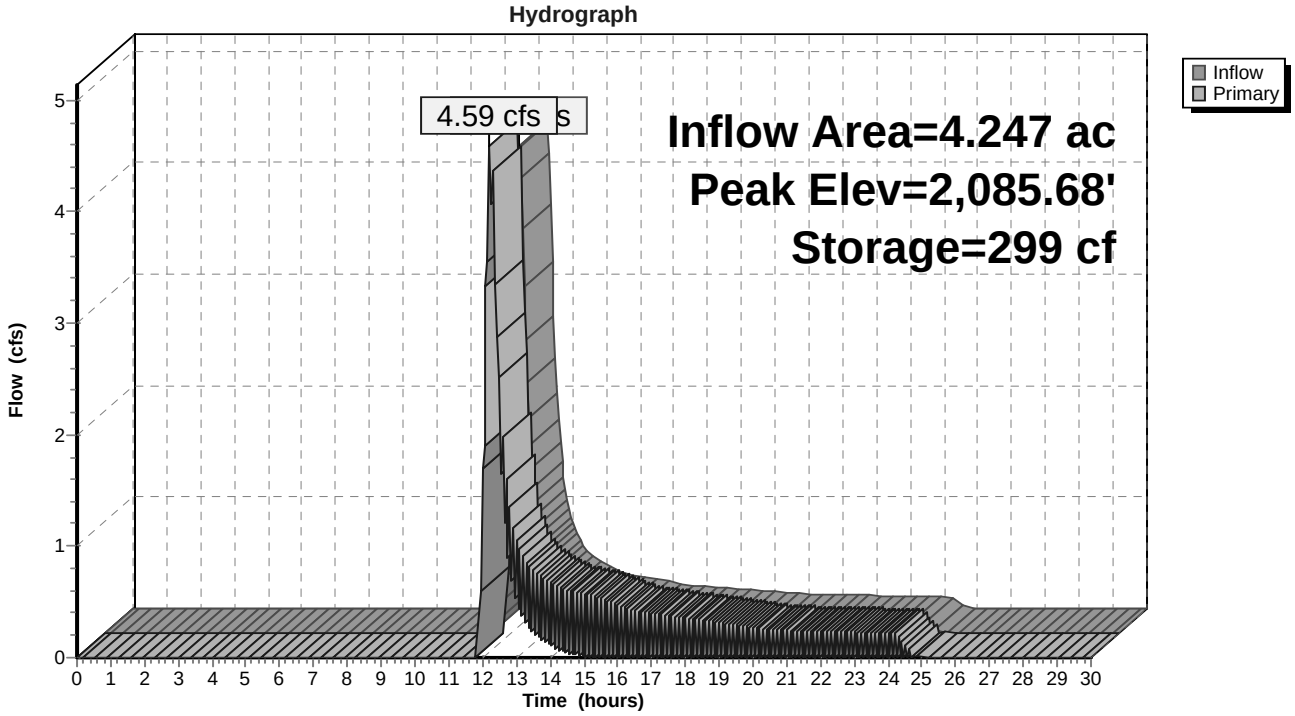
Reach R2: Overland to Stream



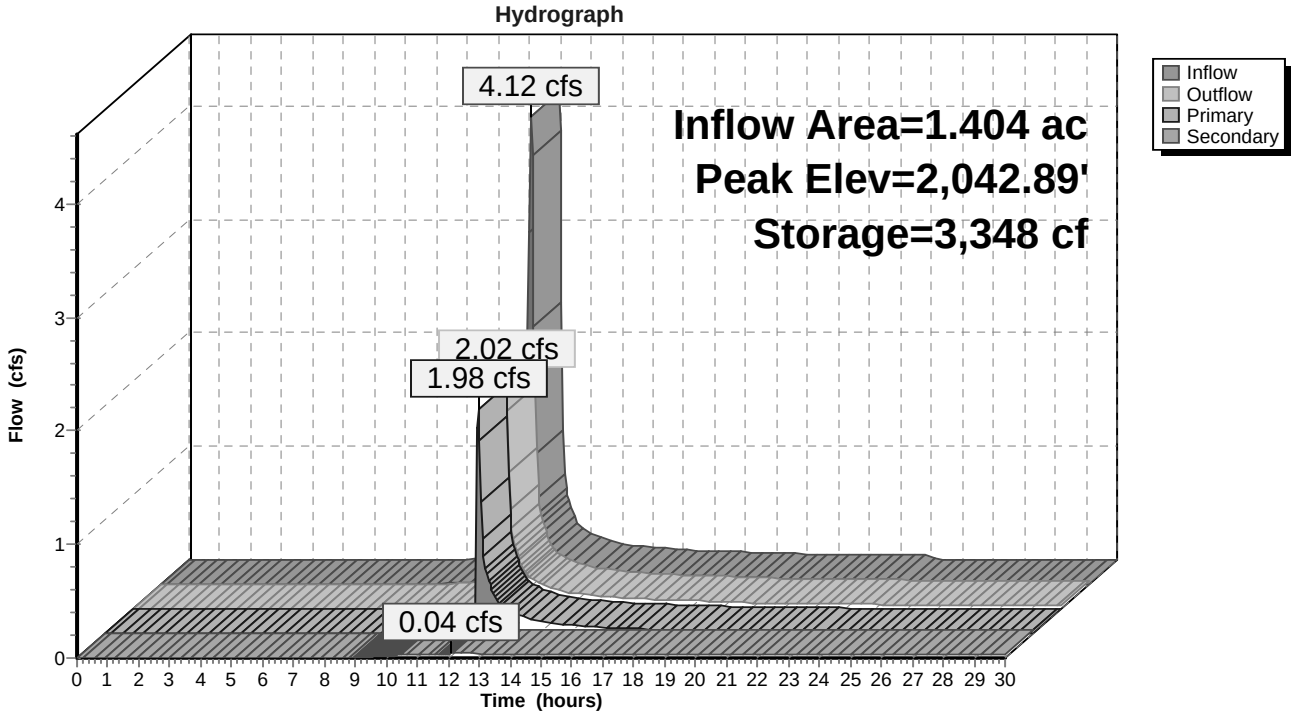
Reach R3: Point of Analysis



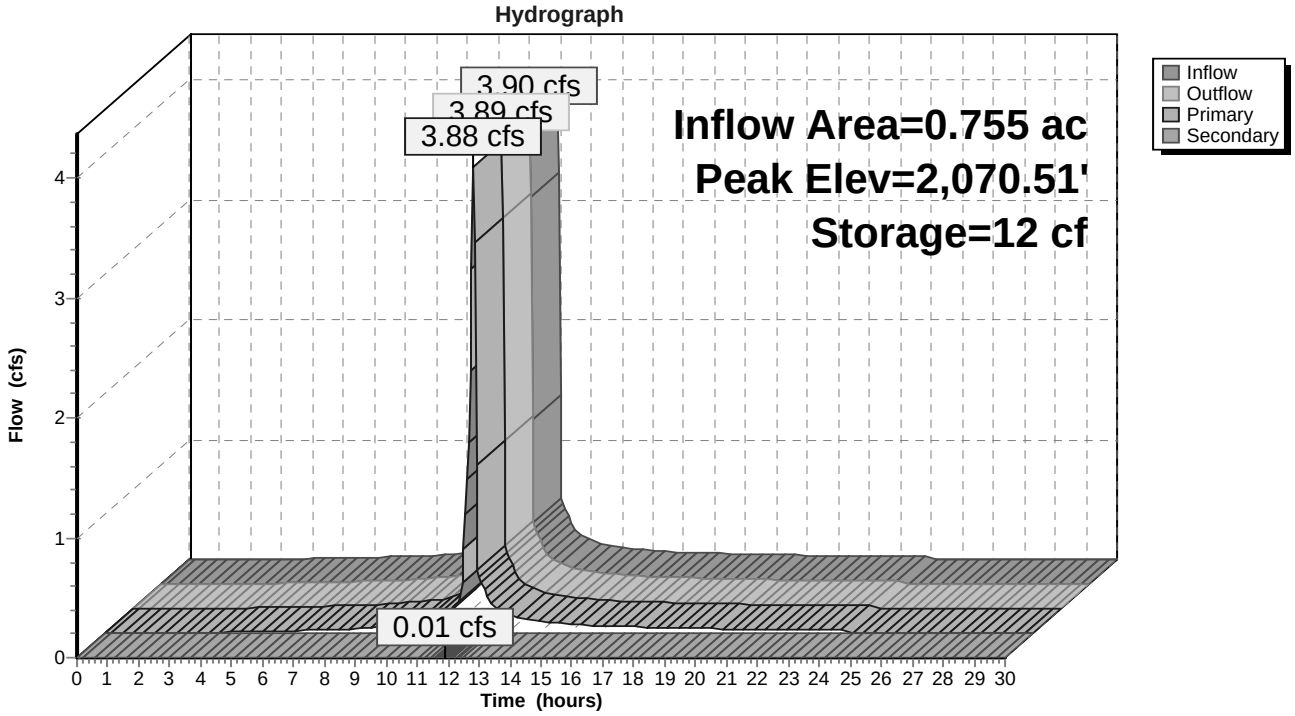
Pond 1L: Level Spreader 1



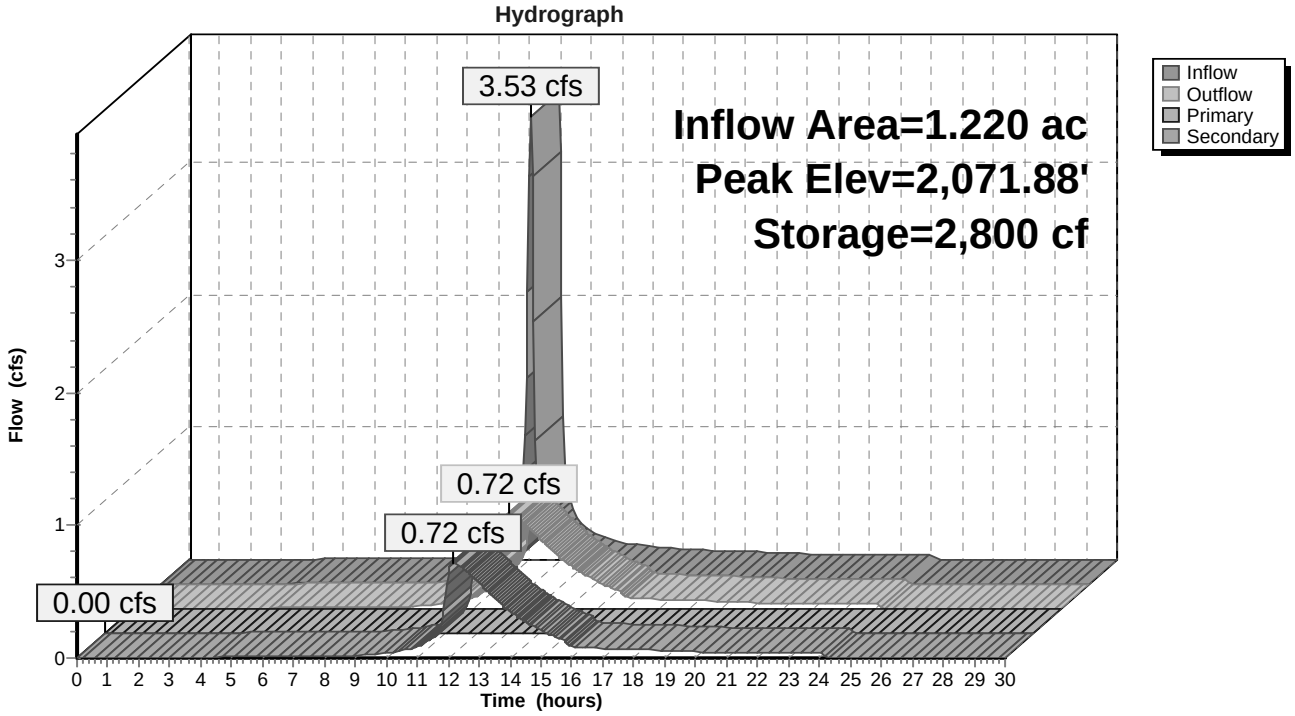
Pond 1P: Lower Bioretention



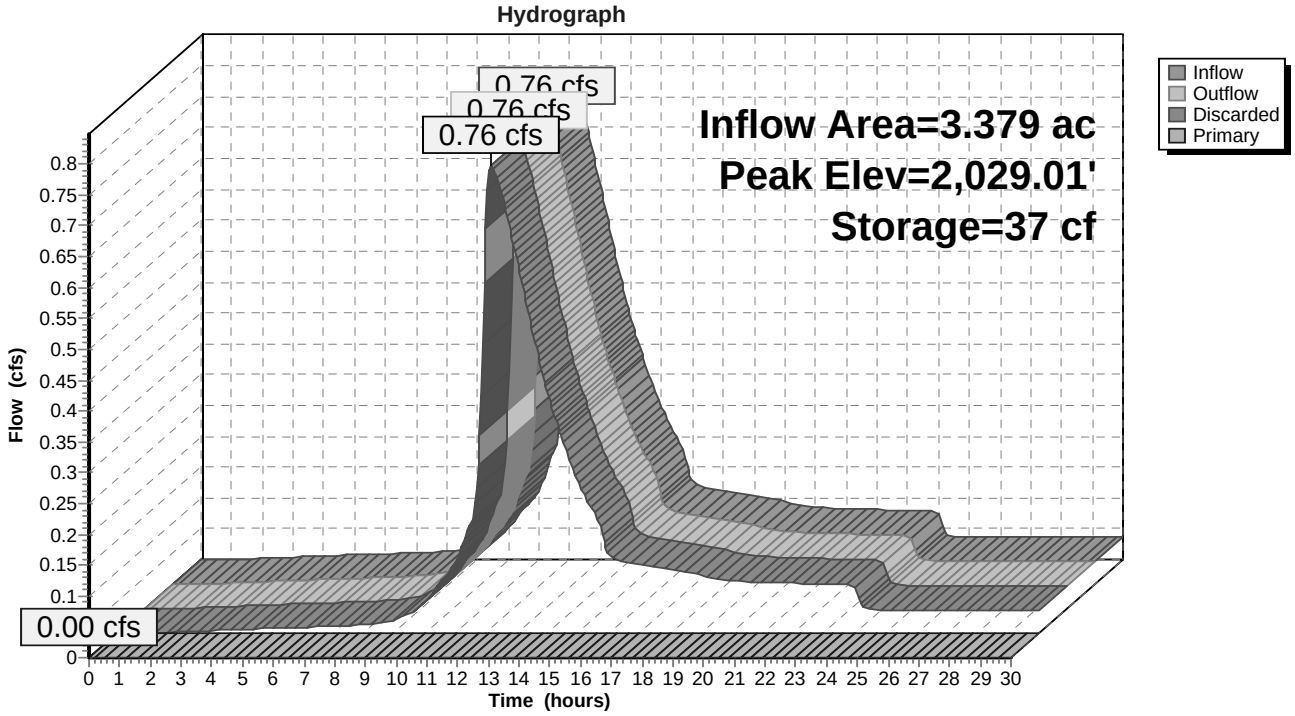
Pond 3P: Parking Lot Bioretention



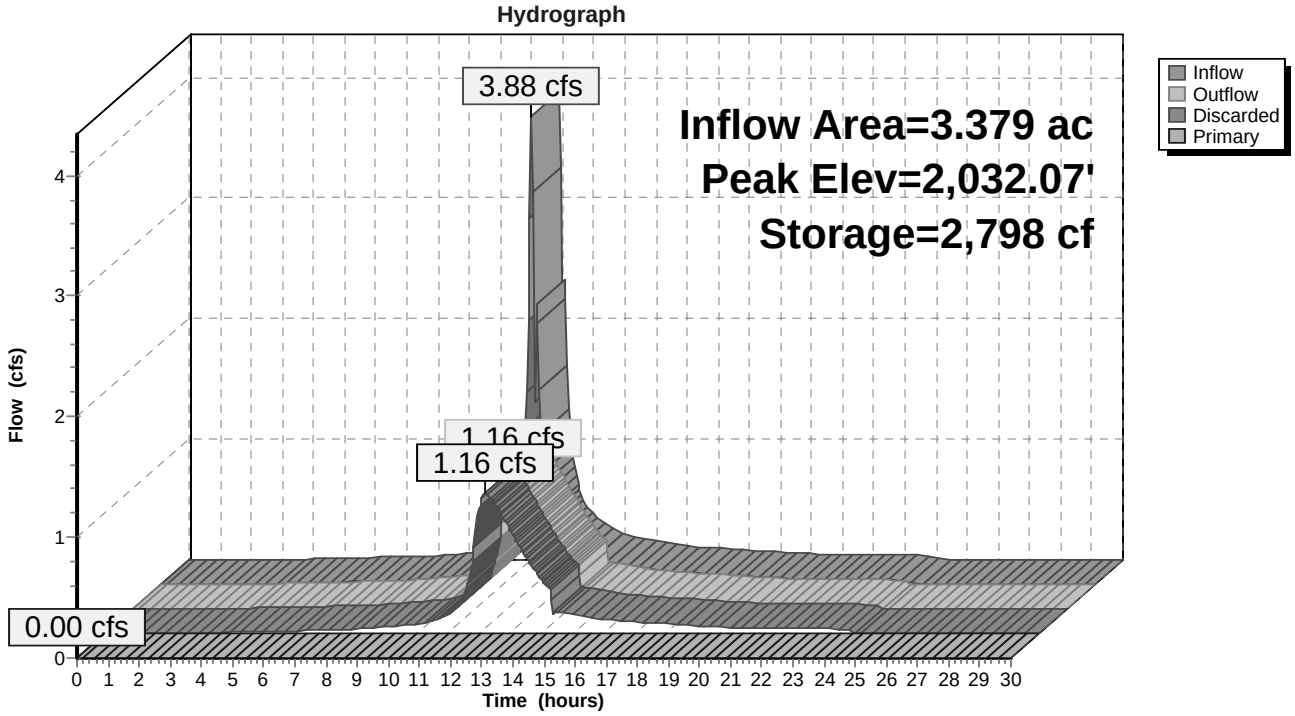
Pond 5P: Dry Swale 1



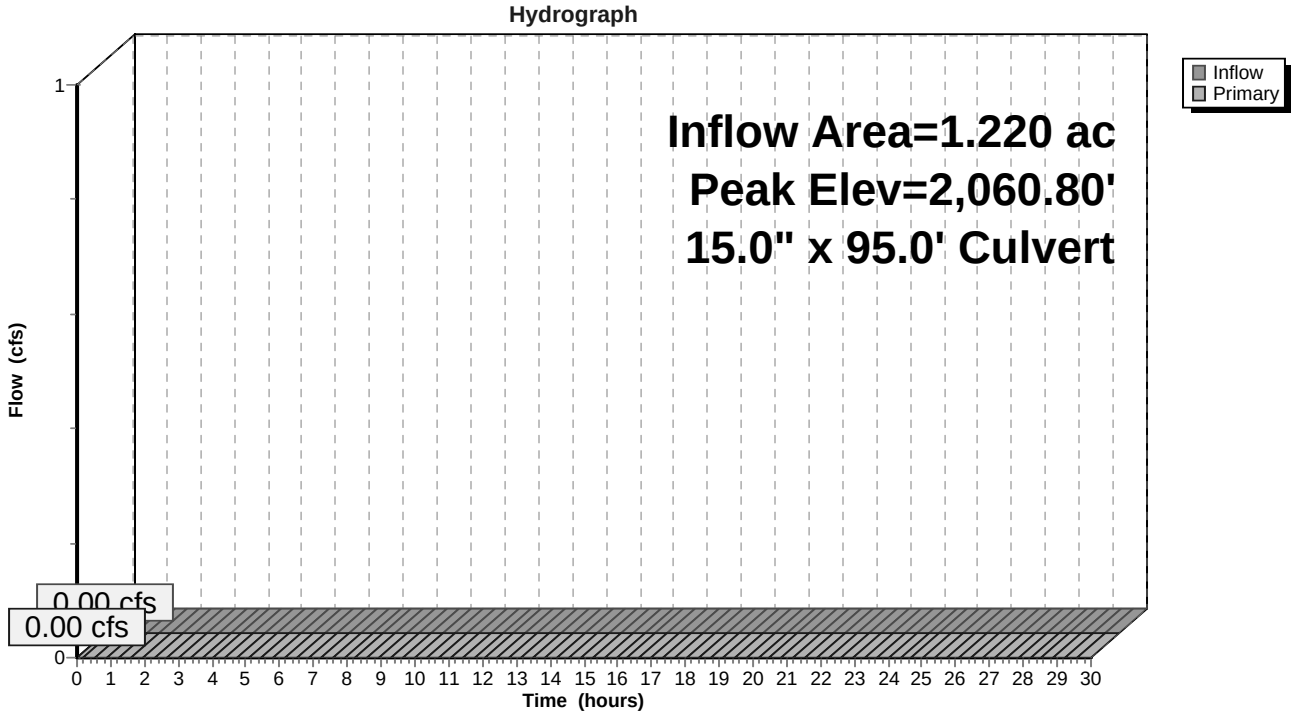
Pond 9P: Infiltration - Detention



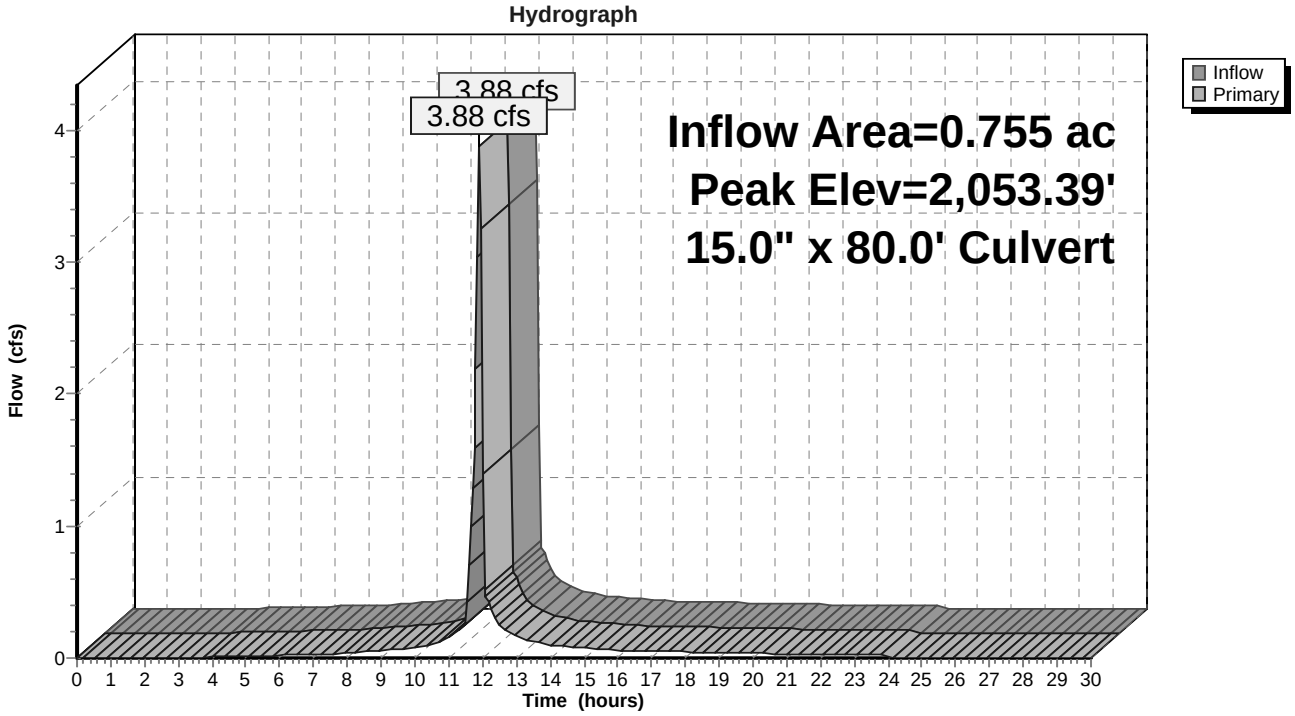
Pond 10P: Stilling Basin



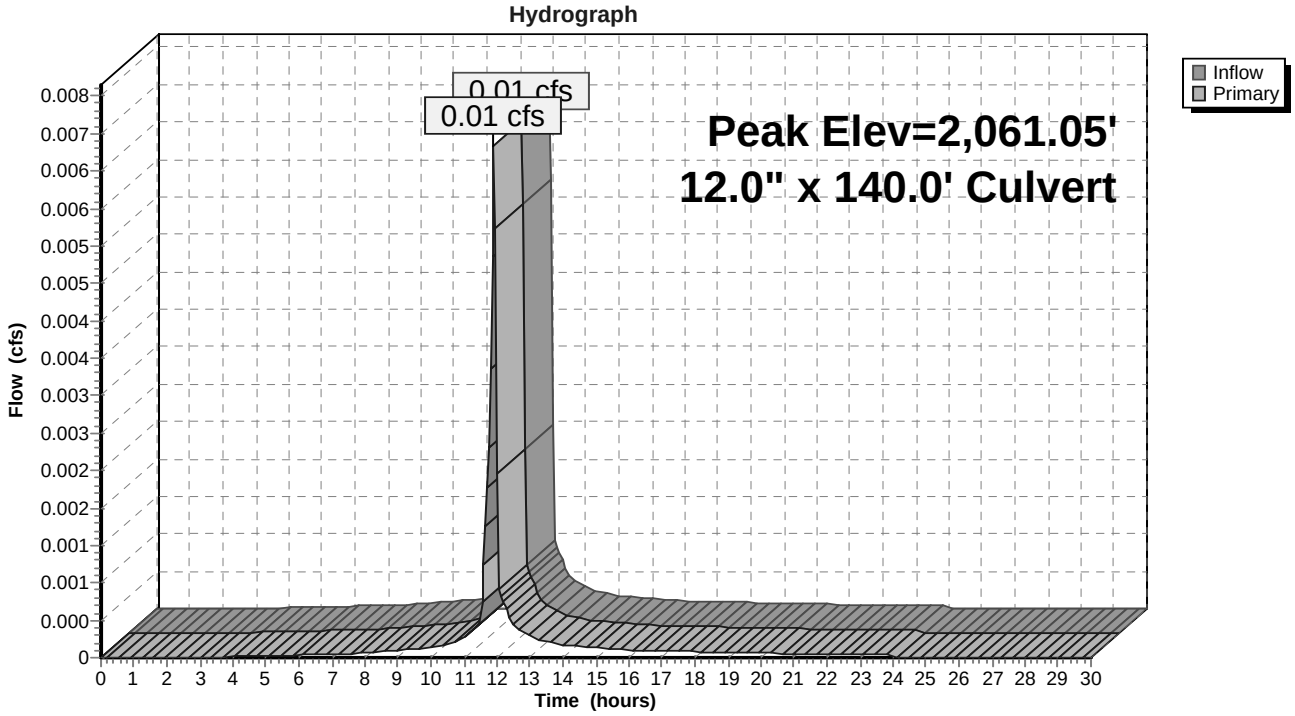
Pond 11P: CB 10



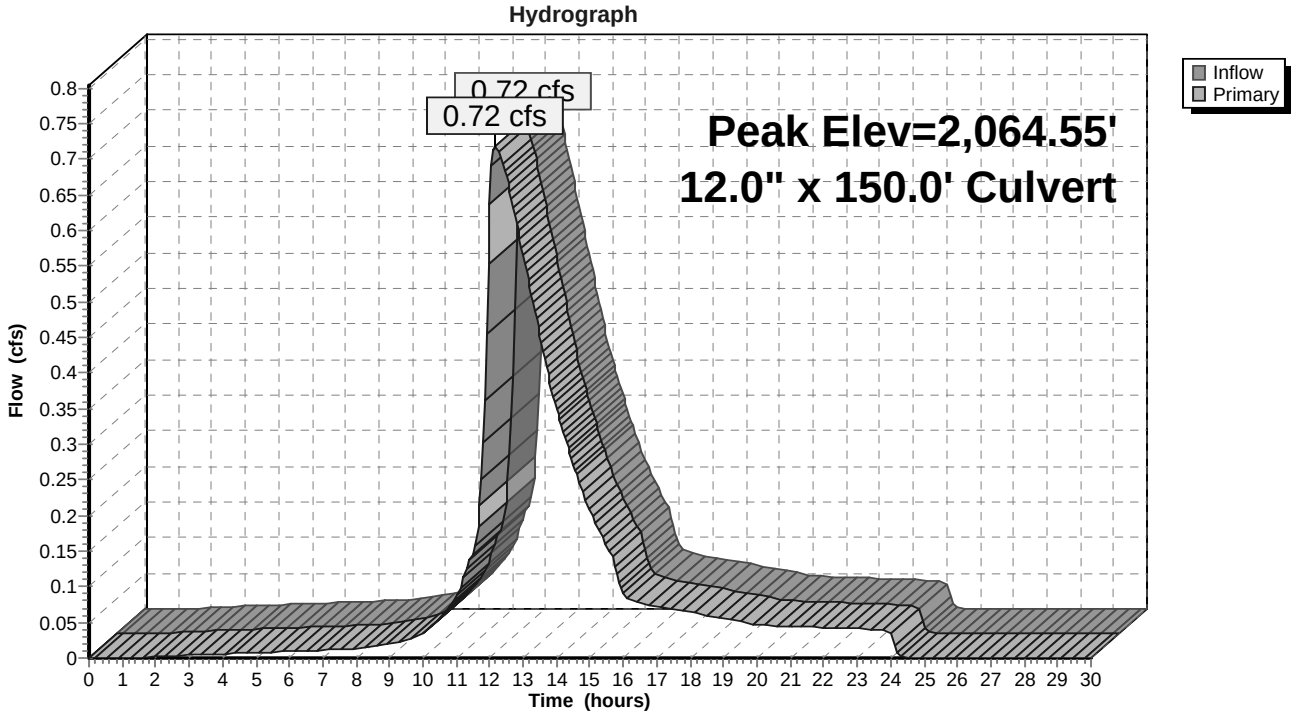
Pond 13P: CB 6



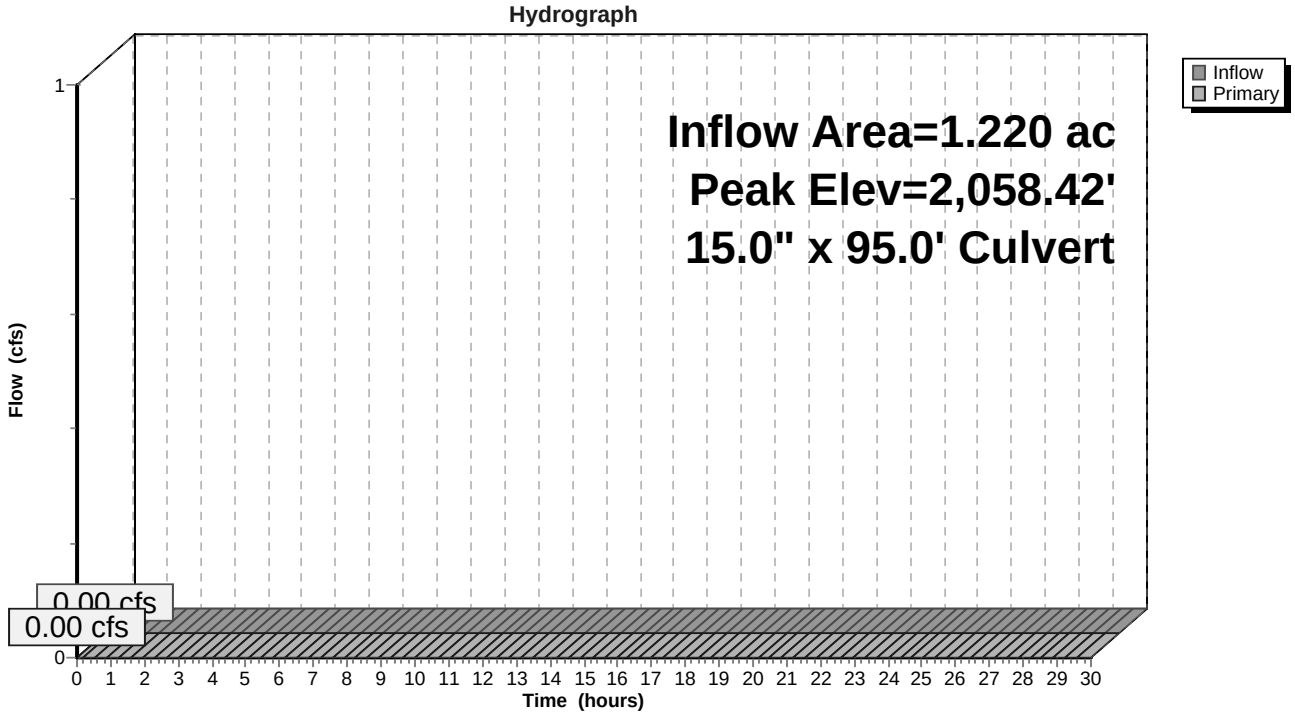
Pond 14P: CB 7



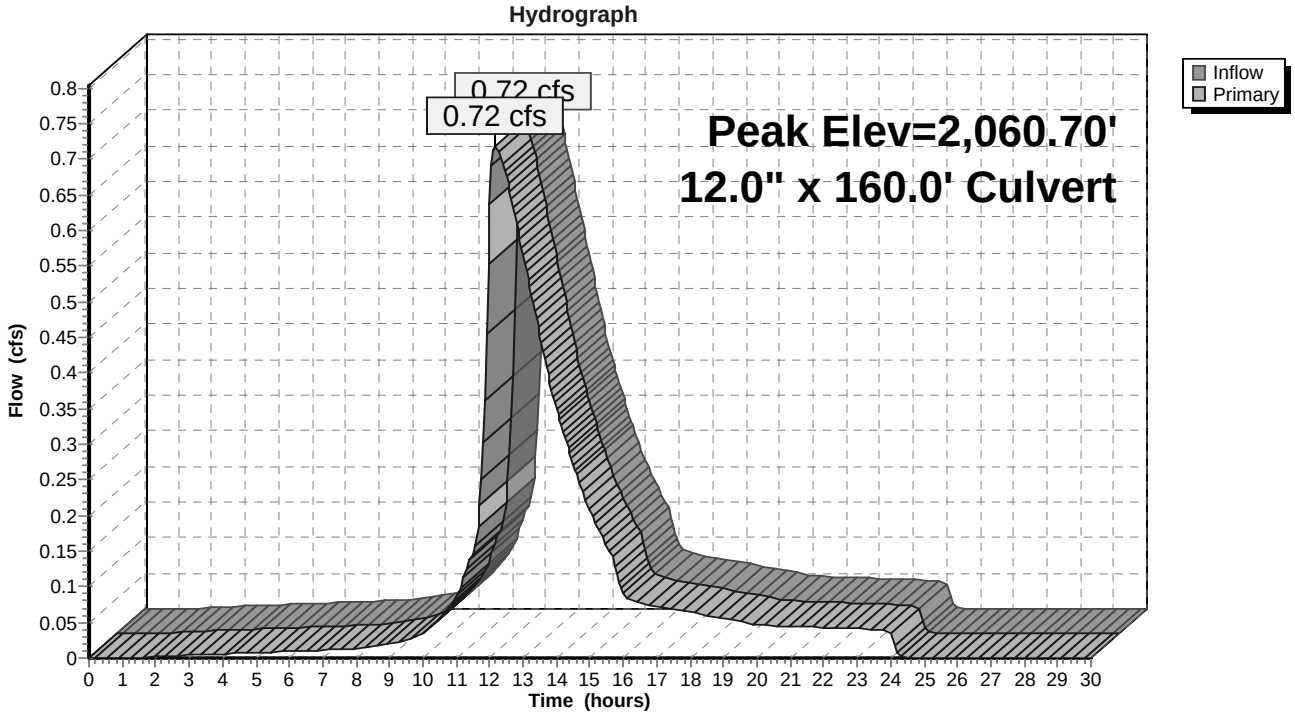
Pond 15P: CB 9 Treated



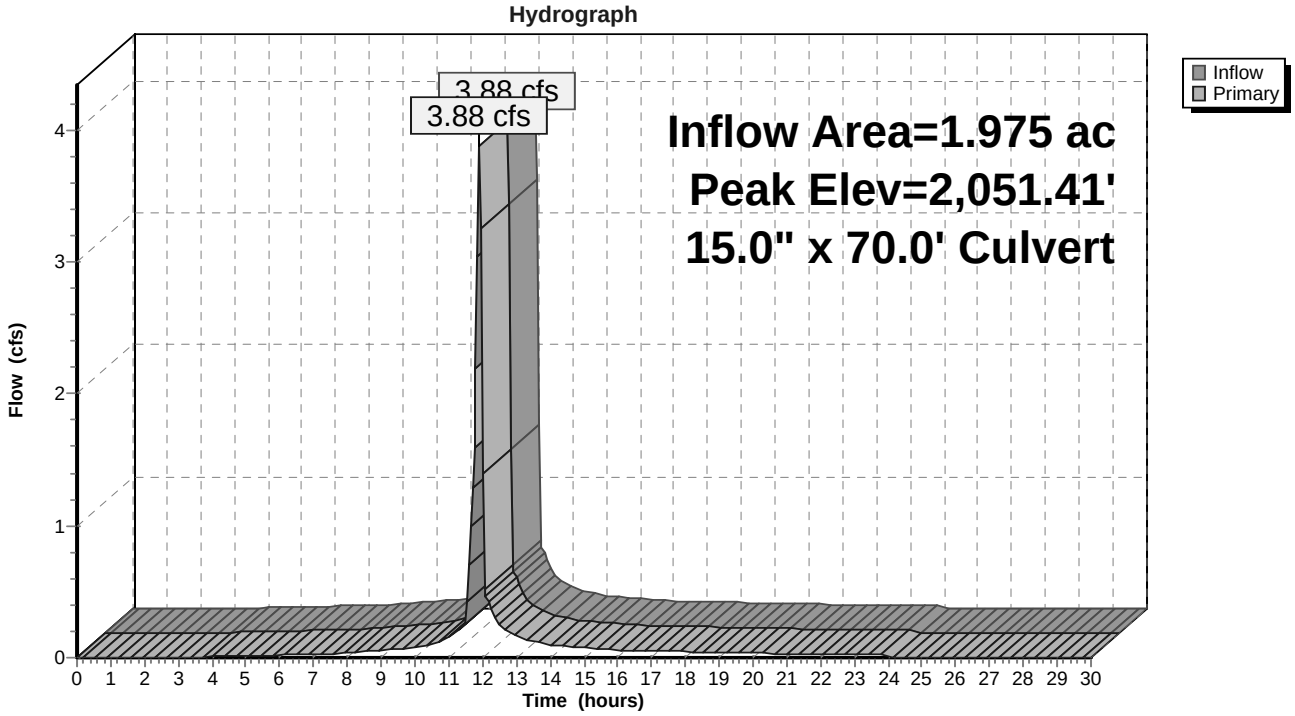
Pond 16P: CB 1



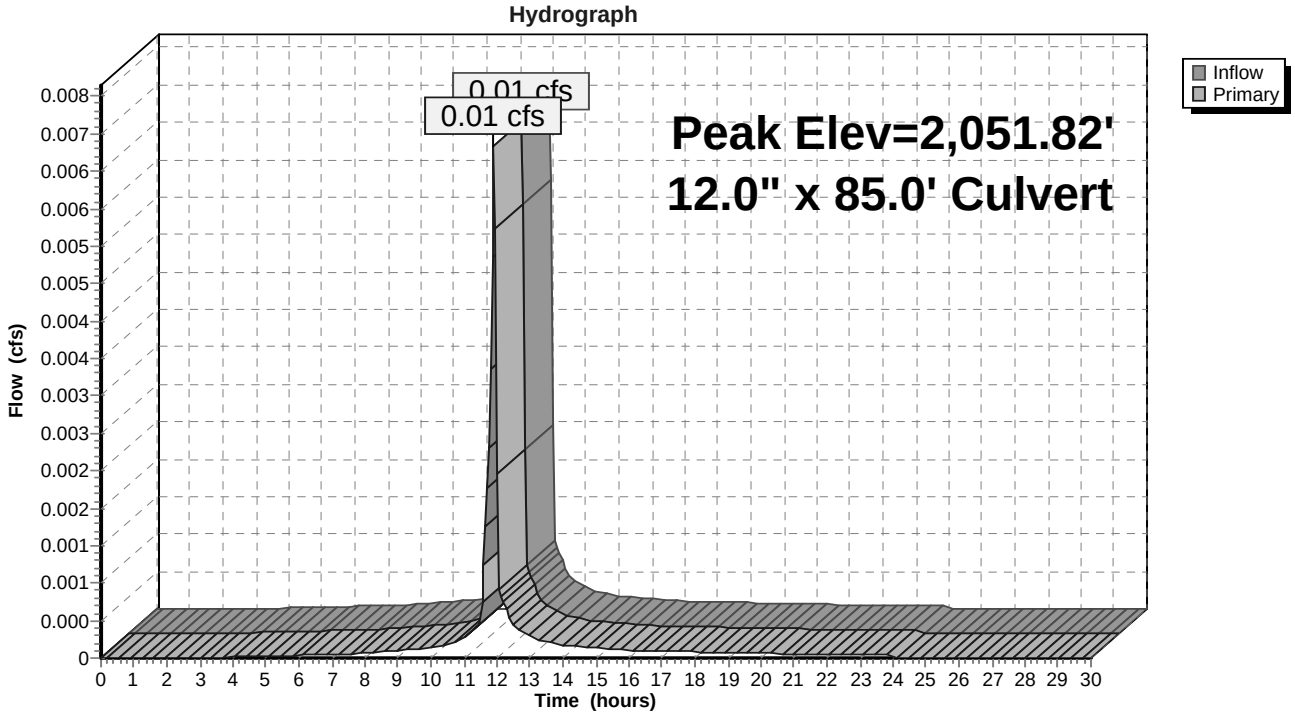
Pond 18P: CB 8 Treated



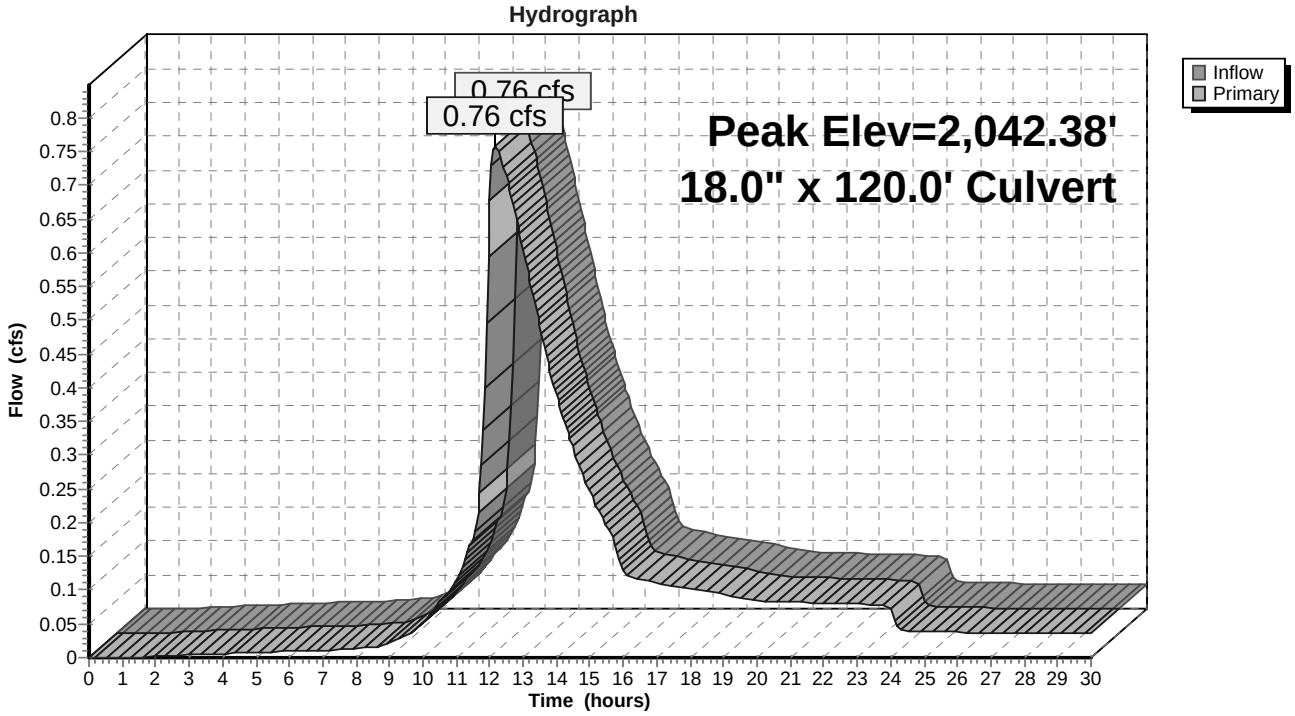
Pond 20P: CB 2



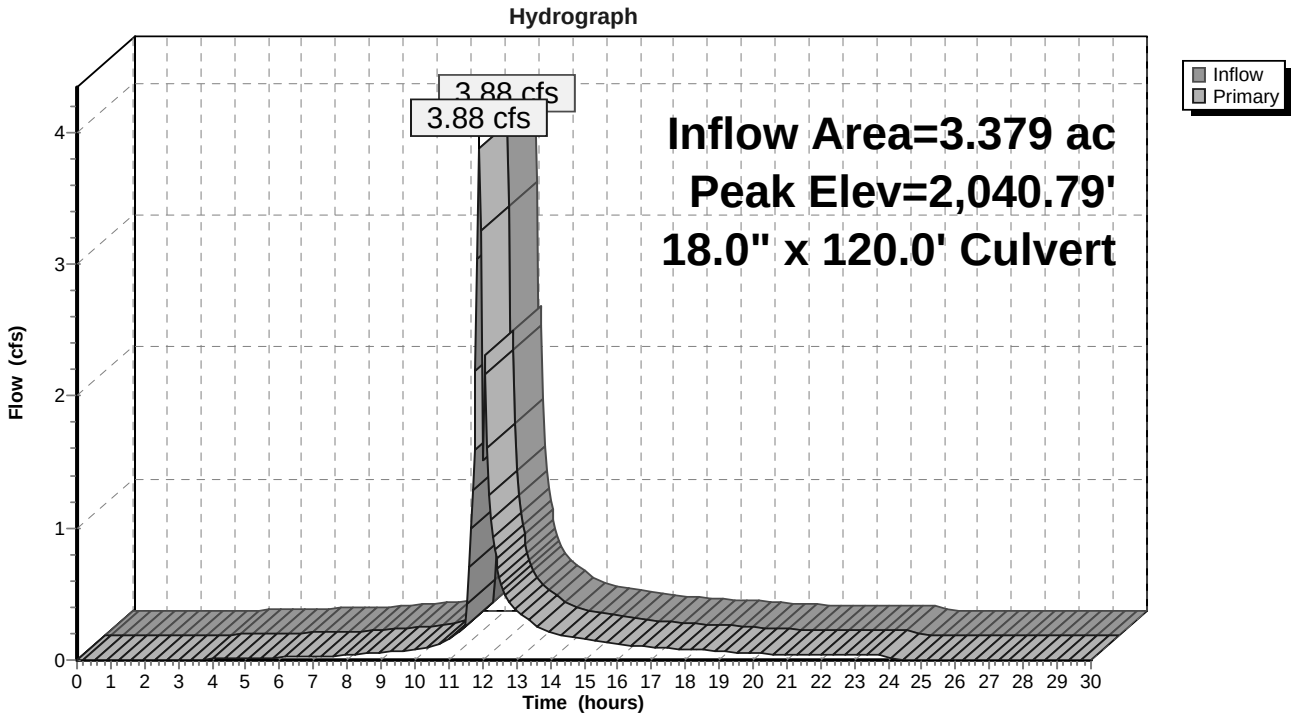
Pond 21P: CB 4 Treated



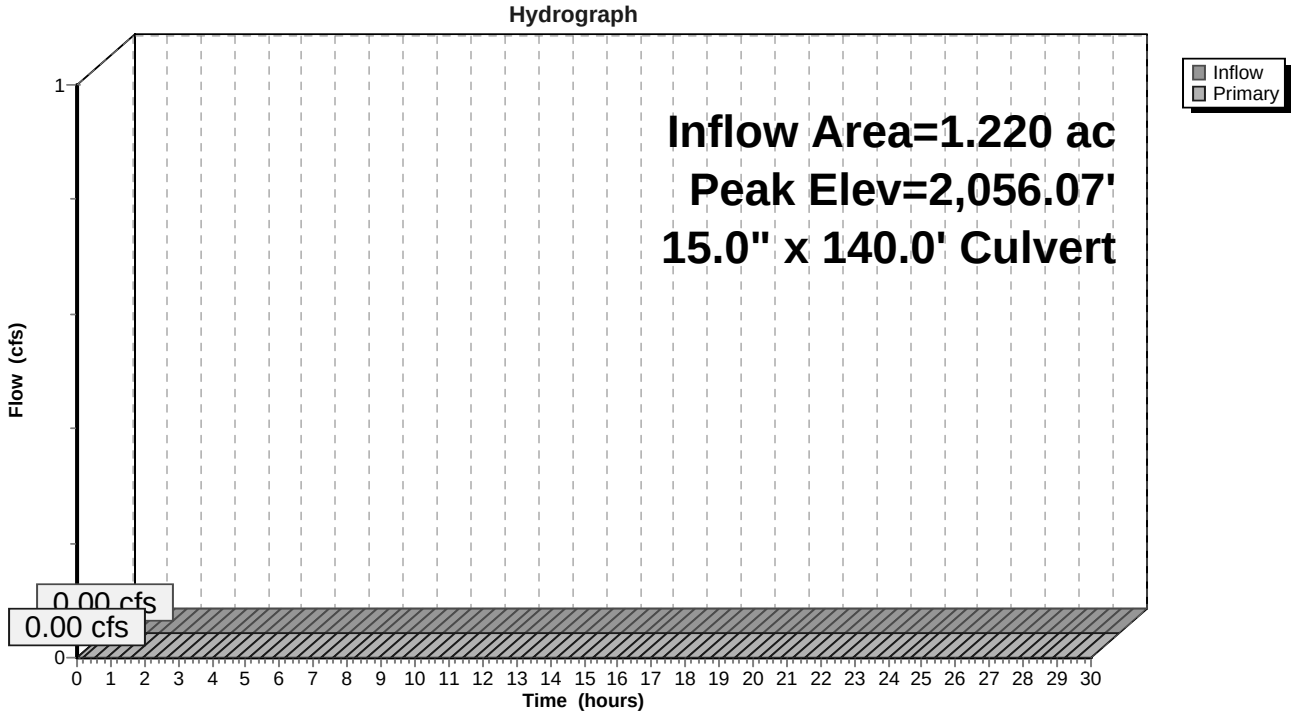
Pond 22P: CB 11 Treated



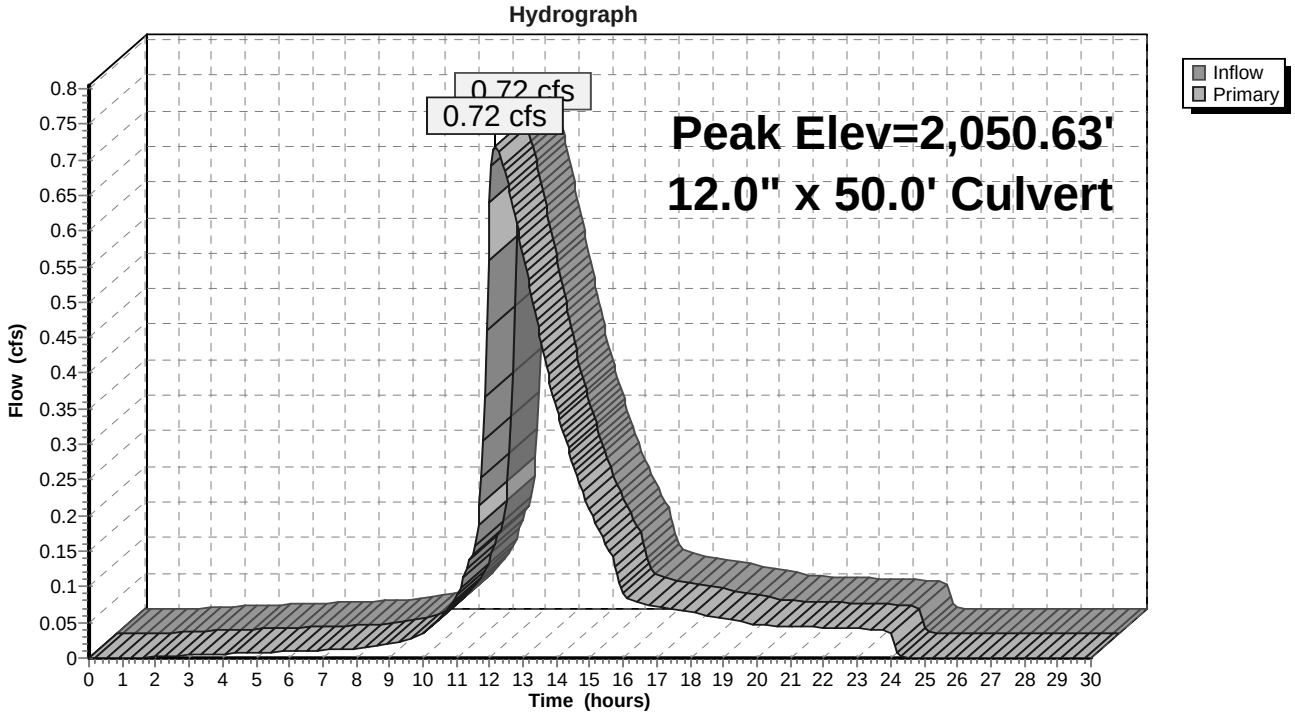
Pond 23P: CB 12

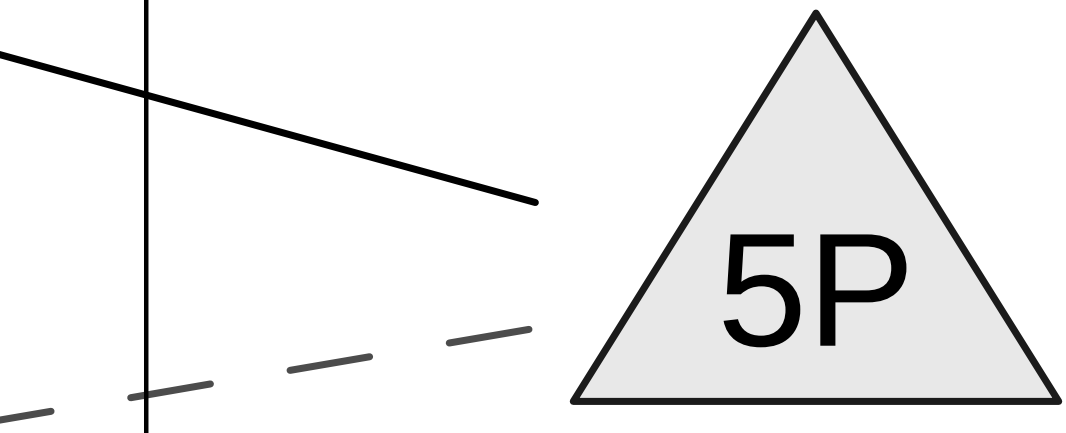


Pond 24P: CB 13

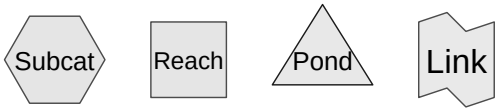


Pond 25P: CB 14 Treated





Dry Swale 1



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Summary for Pond 5P: Dry Swale 1

Inflow Area = 1.220 ac, 36.07% Impervious, Inflow Depth = 1.89" for 1-yr event
Inflow = 3.53 cfs @ 11.95 hrs, Volume= 0.192 af
Outflow = 0.72 cfs @ 12.16 hrs, Volume= 0.192 af, Atten= 80%, Lag= 12.7 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.72 cfs @ 12.16 hrs, Volume= 0.192 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 2,071.88' @ 12.16 hrs Surf.Area= 2,819 sf Storage= 2,800 cf
Flood Elev= 2,072.90' Surf.Area= 3,875 sf Storage= 4,877 cf

Plug-Flow detention time= 34.7 min calculated for 0.192 af (100% of inflow)
Center-of-Mass det. time= 34.7 min (845.6 - 810.9)

Volume	Invert	Avail.Storage	Storage Description
#1	2,070.00'	4,877 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

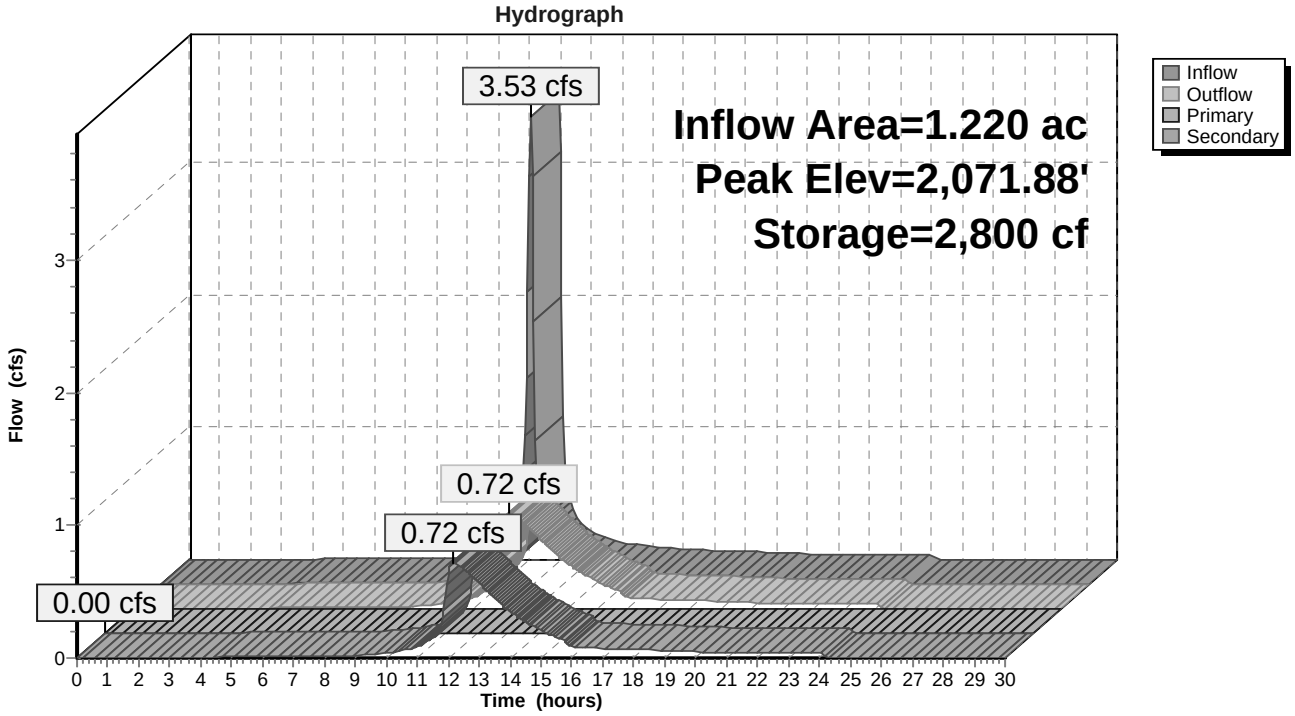
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,070.00	444	0	0
2,070.50	910	339	339
2,071.00	1,460	593	931
2,071.50	2,210	918	1,849
2,072.00	3,015	1,306	3,155
2,072.50	3,875	1,723	4,877

Device	Routing	Invert	Outlet Devices
#1	Primary	2,072.50'	**5.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Secondary	2,069.90'	**12.0" x 20.0' long Culvert** CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 2,060.80' S= 0.4550 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#3	Device 2	2,070.00'	**11.000 in/hr Exfiltration over Horizontal area above invert** Excluded Horizontal area = 0 sf

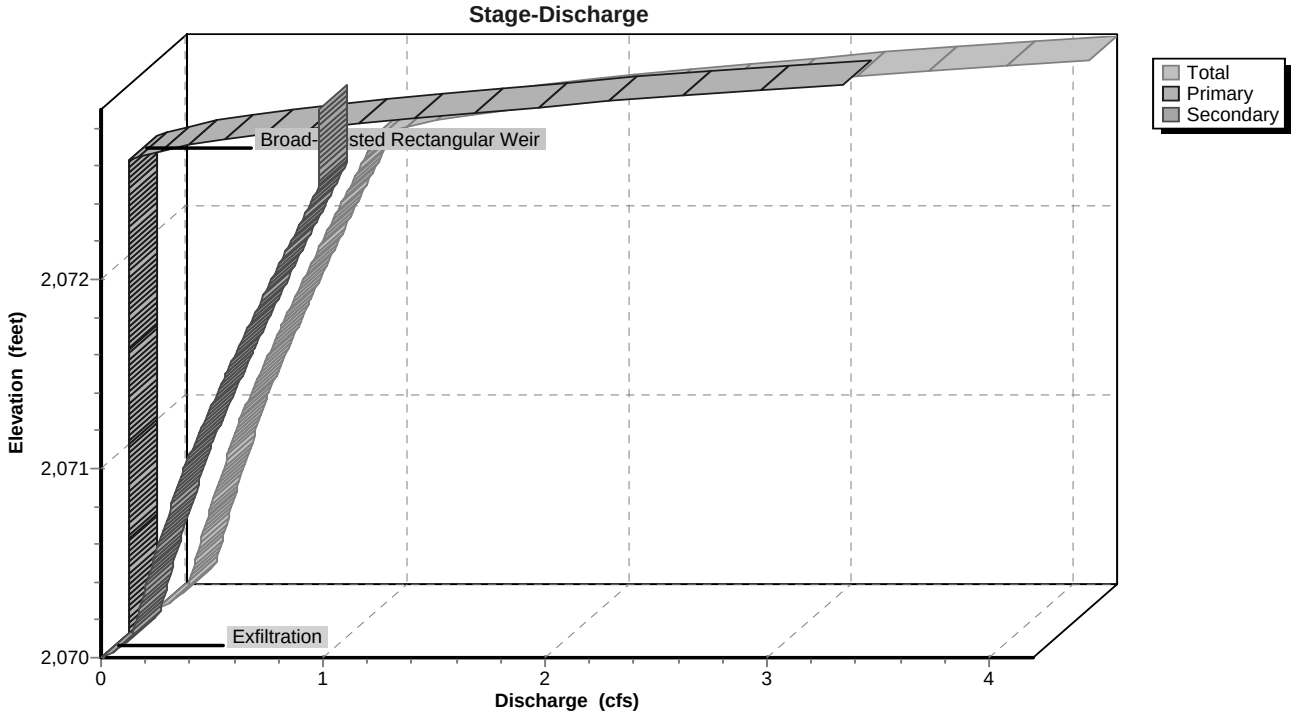
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=2,070.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.72 cfs @ 12.16 hrs HW=2,071.88' (Free Discharge)
└─**2=Culvert** (Passes 0.72 cfs of 3.63 cfs potential flow)
└─**3=Exfiltration** (Exfiltration Controls 0.72 cfs)

Pond 5P: Dry Swale 1



Pond 5P: Dry Swale 1



Summary for Pond 5P: Dry Swale 1

[93] Warning: Storage range exceeded by 0.74'
[58] Hint: Peaked 0.34' above defined flood level
[88] Warning: Qout>Qin may require Finer Routing>1

Inflow Area =	1.220 ac,	36.07% Impervious,	Inflow Depth =	4.09"	for 10-yr event
Inflow =	7.68 cfs @	11.95 hrs,	Volume=	0.416 af	
Outflow =	9.37 cfs @	12.00 hrs,	Volume=	0.416 af,	Atten= 0%, Lag= 3.0 min
Primary =	8.38 cfs @	12.00 hrs,	Volume=	0.054 af	
Secondary =	0.99 cfs @	12.00 hrs,	Volume=	0.362 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 2,073.24' @ 12.00 hrs Surf.Area= 3,875 sf Storage= 4,877 cf
Flood Elev= 2,072.90' Surf.Area= 3,875 sf Storage= 4,877 cf

Plug-Flow detention time= 40.7 min calculated for 0.415 af (100% of inflow)
Center-of-Mass det. time= 40.6 min (835.2 - 794.6)

Volume	Invert	Avail.Storage	Storage Description
#1	2,070.00'	4,877 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

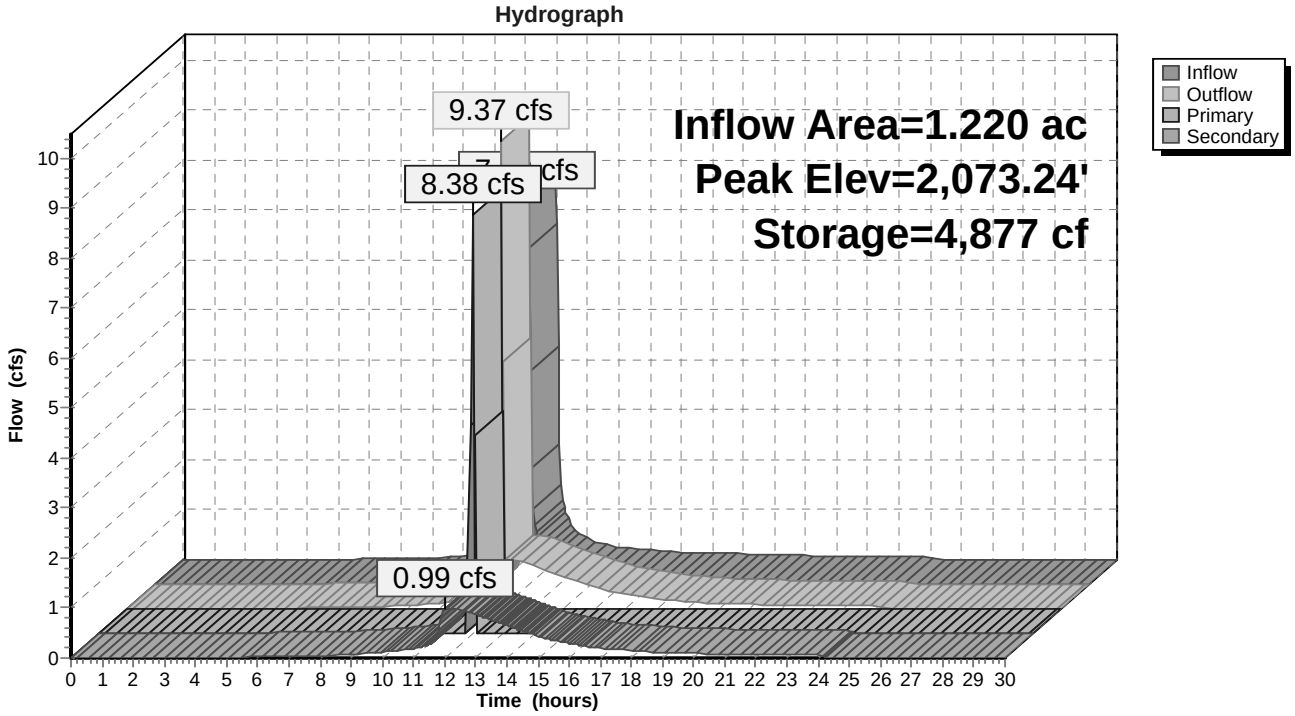
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,070.00	444	0	0
2,070.50	910	339	339
2,071.00	1,460	593	931
2,071.50	2,210	918	1,849
2,072.00	3,015	1,306	3,155
2,072.50	3,875	1,723	4,877

Device	Routing	Invert	Outlet Devices
#1	Primary	2,072.50'	**5.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Secondary	2,069.90'	**12.0" x 20.0' long Culvert** CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 2,060.80' S= 0.4550 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#3	Device 2	2,070.00'	**11.000 in/hr Exfiltration over Horizontal area above invert** Excluded Horizontal area = 0 sf

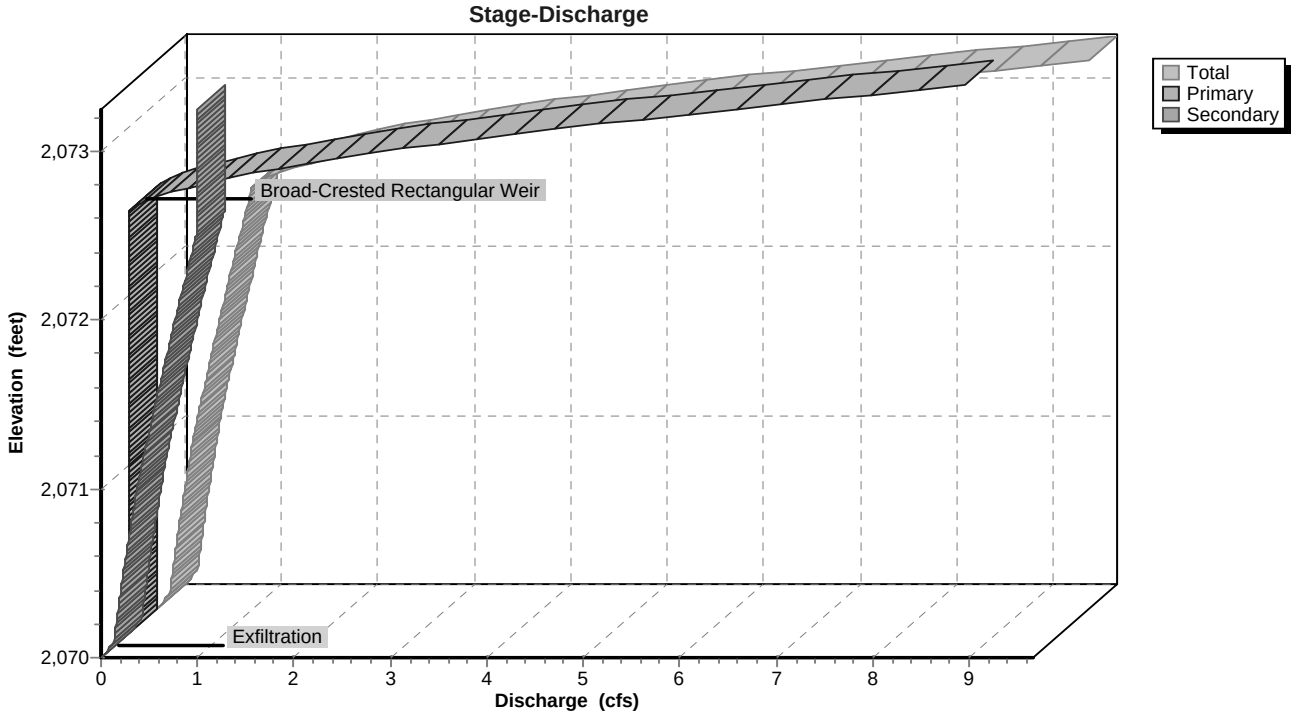
Primary OutFlow Max=8.17 cfs @ 12.00 hrs HW=2,073.22' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 8.17 cfs @ 2.27 fps)

Secondary OutFlow Max=0.99 cfs @ 12.00 hrs HW=2,073.23' (Free Discharge)
└─**2=Culvert** (Passes 0.99 cfs of 5.02 cfs potential flow)
└─**3=Exfiltration** (Exfiltration Controls 0.99 cfs)

Pond 5P: Dry Swale 1



Pond 5P: Dry Swale 1



Summary for Pond 5P: Dry Swale 1

[93] Warning: Storage range exceeded by 1.02'
[58] Hint: Peaked 0.62' above defined flood level
[88] Warning: Qout>Qin may require Finer Routing>1
[85] Warning: Oscillations may require Finer Routing>1

Inflow Area =	1.220 ac,	36.07% Impervious,	Inflow Depth =	5.96"	for 100-yr event
Inflow =	11.09 cfs @	11.95 hrs,	Volume=	0.606 af	
Outflow =	14.81 cfs @	11.95 hrs,	Volume=	0.606 af,	Atten= 0%, Lag= 0.0 min
Primary =	13.82 cfs @	11.95 hrs,	Volume=	0.150 af	
Secondary =	0.99 cfs @	11.90 hrs,	Volume=	0.456 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 2,073.52' @ 11.95 hrs Surf.Area= 3,875 sf Storage= 4,877 cf
Flood Elev= 2,072.90' Surf.Area= 3,875 sf Storage= 4,877 cf

Plug-Flow detention time= 36.4 min calculated for 0.606 af (100% of inflow)
Center-of-Mass det. time= 36.4 min (822.5 - 786.1)

Volume	Invert	Avail.Storage	Storage Description
#1	2,070.00'	4,877 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

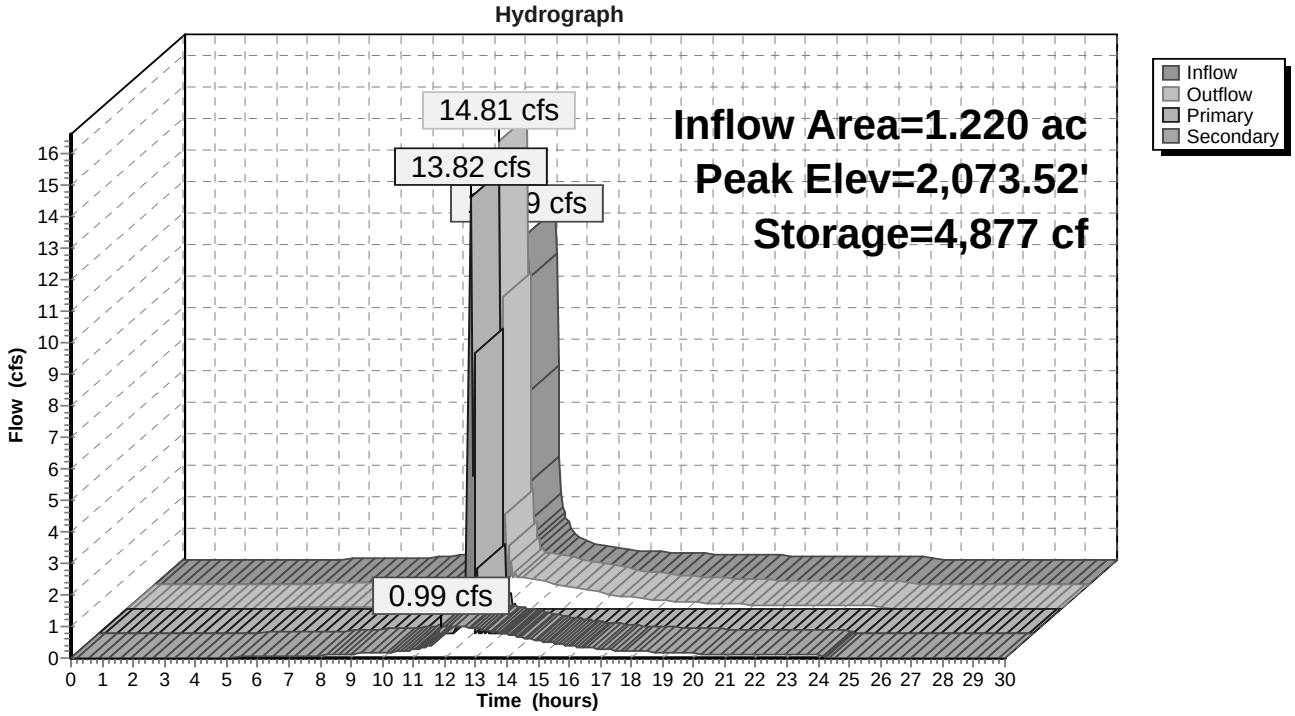
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,070.00	444	0	0
2,070.50	910	339	339
2,071.00	1,460	593	931
2,071.50	2,210	918	1,849
2,072.00	3,015	1,306	3,155
2,072.50	3,875	1,723	4,877

Device	Routing	Invert	Outlet Devices
#1	Primary	2,072.50'	**5.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Secondary	2,069.90'	**12.0" x 20.0' long Culvert** CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 2,060.80' S= 0.4550 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#3	Device 2	2,070.00'	**11.000 in/hr Exfiltration over Horizontal area above invert** Excluded Horizontal area = 0 sf

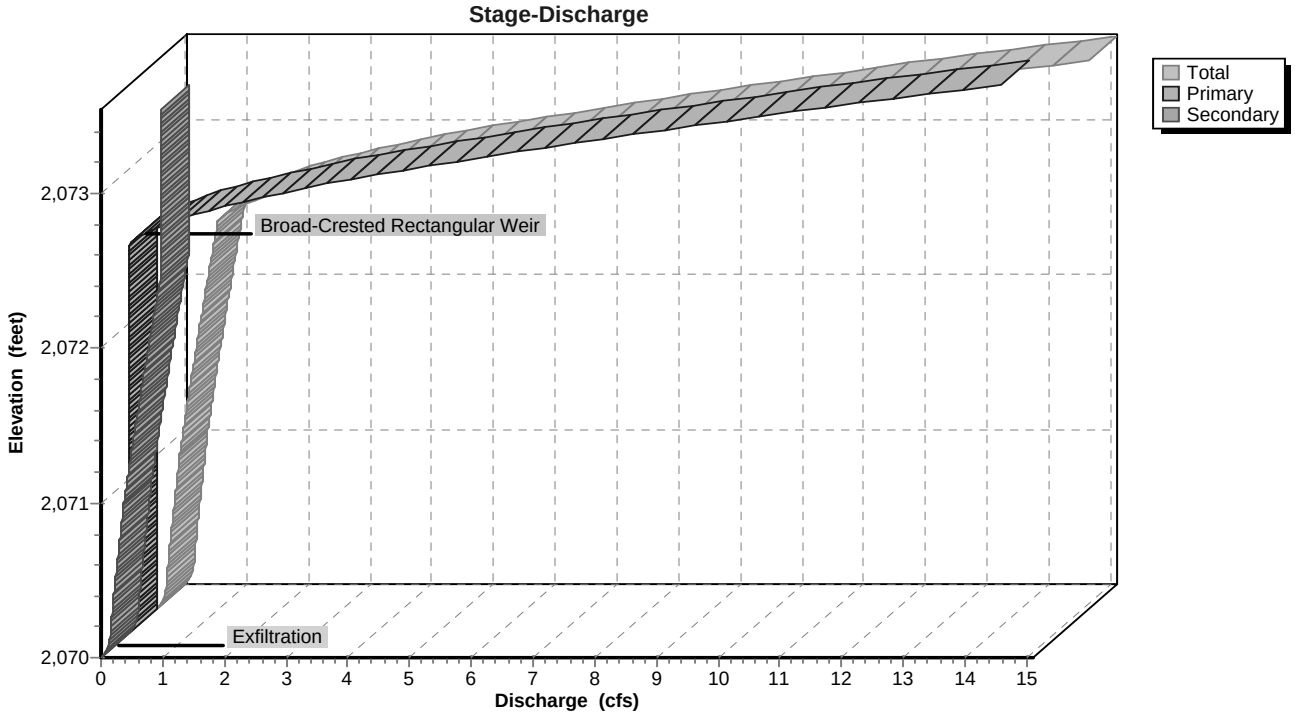
Primary OutFlow Max=13.81 cfs @ 11.95 hrs HW=2,073.52' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 13.81 cfs @ 2.70 fps)

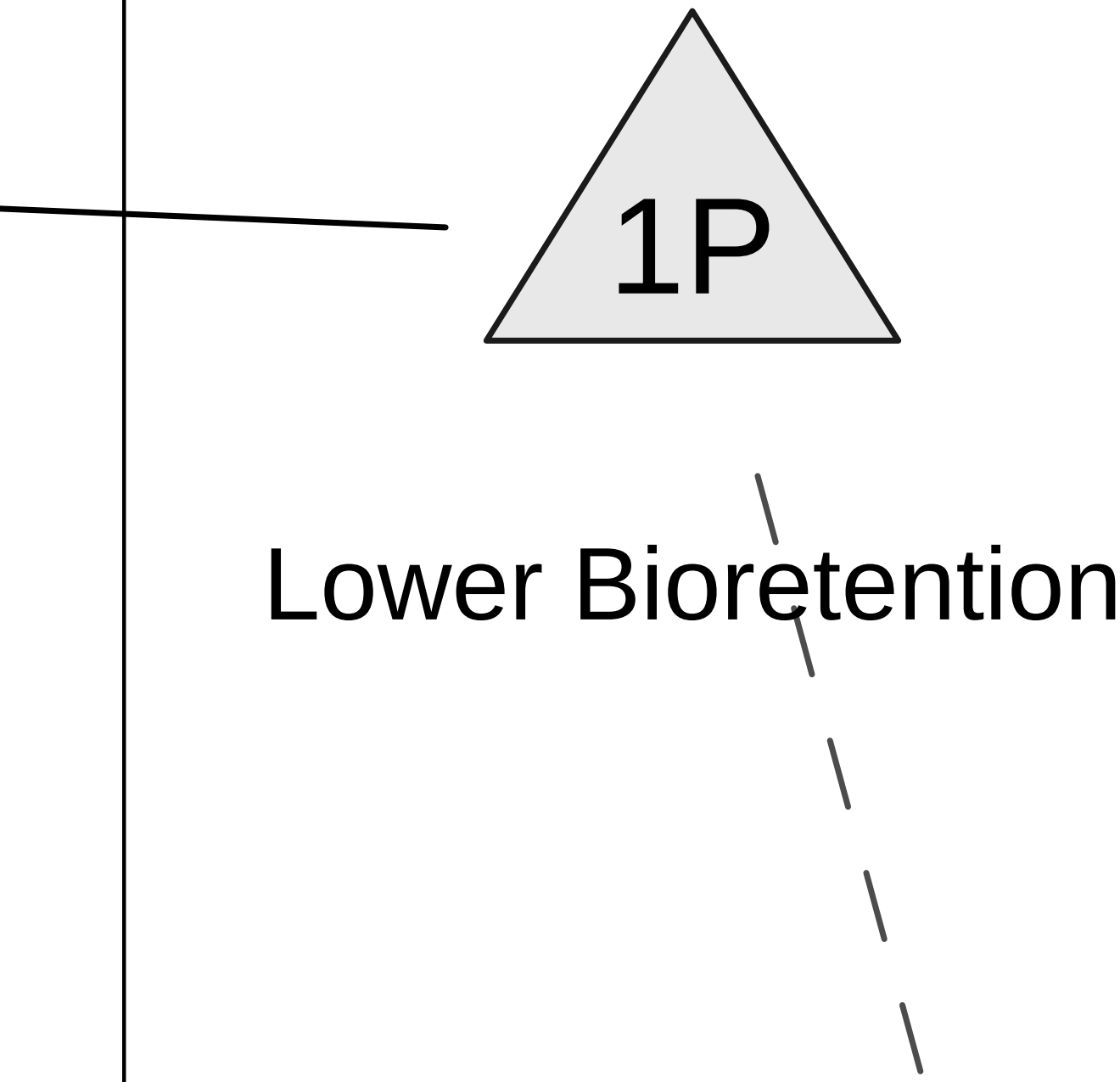
Secondary OutFlow Max=0.99 cfs @ 11.90 hrs HW=2,073.02' (Free Discharge)
└─**2=Culvert** (Passes 0.99 cfs of 4.83 cfs potential flow)
└─**3=Exfiltration** (Exfiltration Controls 0.99 cfs)

Pond 5P: Dry Swale 1



Pond 5P: Dry Swale 1





Subcat Reach Pond Link

Drainage Diagram for CPS - Proposed Site - 03Feb2011
Prepared by Shumaker Engineering, Printed 2/7/2011
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Summary for Pond 1P: Lower Bioretention

[58] Hint: Peaked 0.39' above defined flood level

Inflow Area =	1.404 ac, 28.77% Impervious, Inflow Depth = 1.68" for 1-yr event				
Inflow =	4.12 cfs @	11.96 hrs,	Volume=	0.197 af	
Outflow =	2.02 cfs @	12.07 hrs,	Volume=	0.149 af,	Atten= 51%, Lag= 6.5 min
Primary =	1.98 cfs @	12.07 hrs,	Volume=	0.087 af	
Secondary =	0.04 cfs @	12.07 hrs,	Volume=	0.062 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 2,042.89' @ 12.07 hrs Surf.Area= 3,416 sf Storage= 3,348 cf
Flood Elev= 2,042.50' Surf.Area= 3,120 sf Storage= 2,074 cf

Plug-Flow detention time= 251.8 min calculated for 0.149 af (76% of inflow)
Center-of-Mass det. time= 156.7 min (989.1 - 832.4)

Volume	Invert	Avail.Storage	Storage Description
#1	2,041.75'	3,729 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

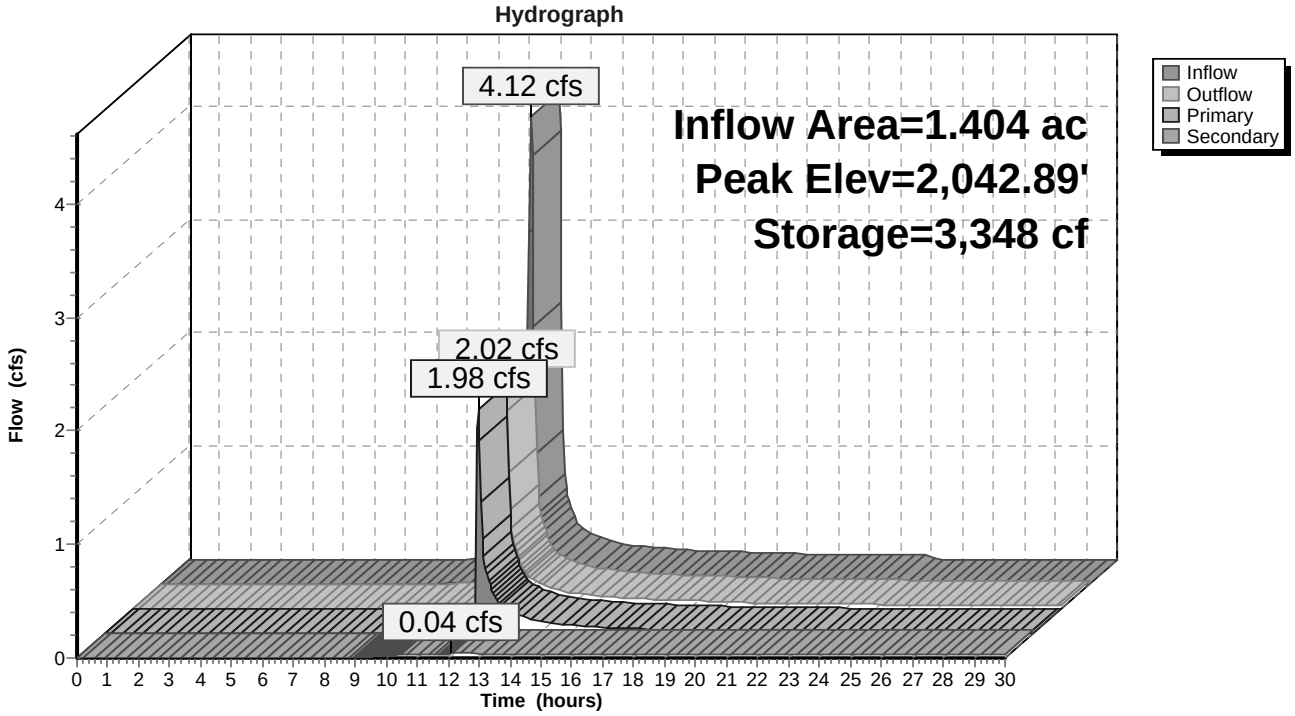
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,041.75	2,415	0	0
2,042.00	2,645	633	633
2,042.50	3,120	1,441	2,074
2,043.00	3,500	1,655	3,729

Device	Routing	Invert	Outlet Devices
#1	Primary	2,042.75'	**3.00' x 3.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#2	Secondary	2,036.75'	**6.0" x 90.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 2,028.00' S= 0.0972 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#3	Device 2	2,041.75'	**0.500 in/hr Exfiltration over Surface area**

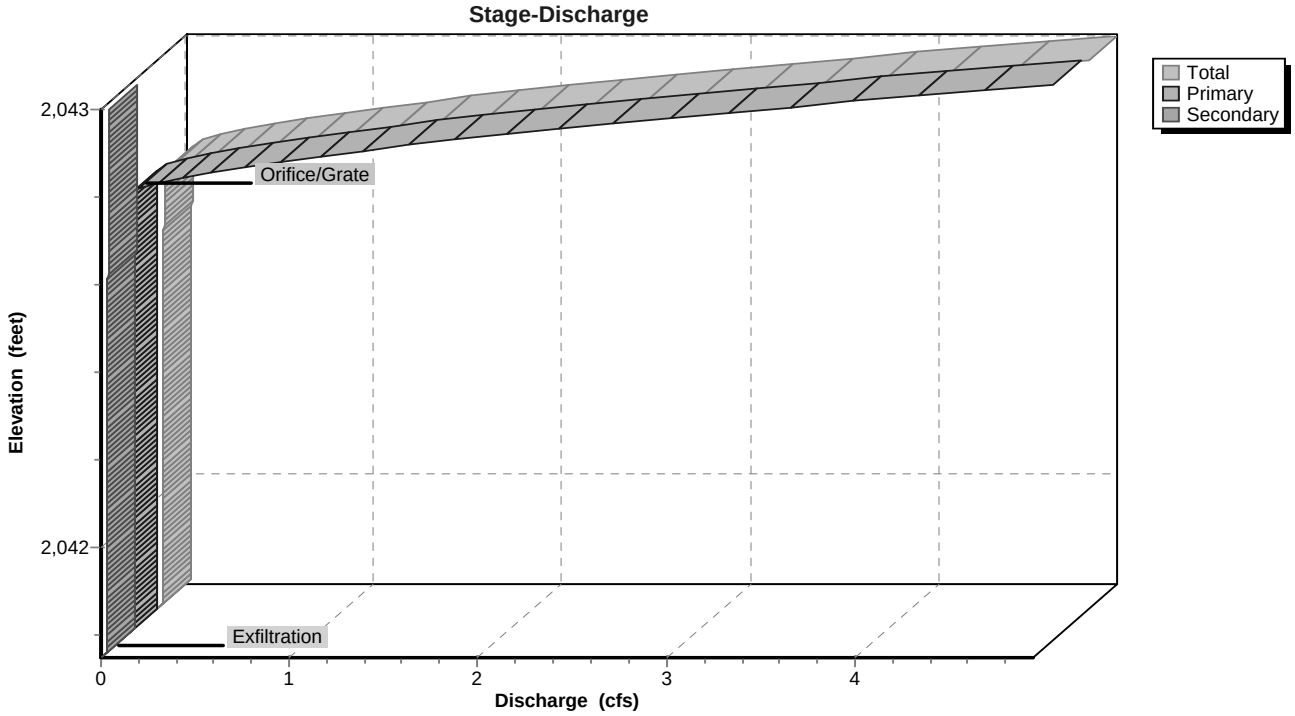
Primary OutFlow Max=1.75 cfs @ 12.07 hrs HW=2,042.88' (Free Discharge)
└─**1=Orifice/Grate** (Weir Controls 1.75 cfs @ 1.16 fps)

Secondary OutFlow Max=0.04 cfs @ 12.07 hrs HW=2,042.88' (Free Discharge)
└─**2=Culvert** (Passes 0.04 cfs of 2.04 cfs potential flow)
└─**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 1P: Lower Bioretention



Pond 1P: Lower Bioretention



Summary for Pond 1P: Lower Bioretention

[93] Warning: Storage range exceeded by 0.14'
[58] Hint: Peaked 0.64' above defined flood level
[88] Warning: Qout>Qin may require Finer Routing>1

Inflow Area =	1.404 ac, 28.77% Impervious, Inflow Depth = 3.84" for 10-yr event				
Inflow =	9.20 cfs @	11.96 hrs,	Volume=	0.449 af	
Outflow =	9.59 cfs @	11.96 hrs,	Volume=	0.401 af,	Atten= 0%, Lag= 0.0 min
Primary =	9.55 cfs @	11.96 hrs,	Volume=	0.332 af	
Secondary =	0.04 cfs @	11.90 hrs,	Volume=	0.069 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 2,043.14' @ 11.96 hrs Surf.Area= 3,500 sf Storage= 3,729 cf
Flood Elev= 2,042.50' Surf.Area= 3,120 sf Storage= 2,074 cf

Plug-Flow detention time= 116.8 min calculated for 0.400 af (89% of inflow)
Center-of-Mass det. time= 63.8 min (872.6 - 808.8)

Volume	Invert	Avail.Storage	Storage Description
#1	2,041.75'	3,729 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

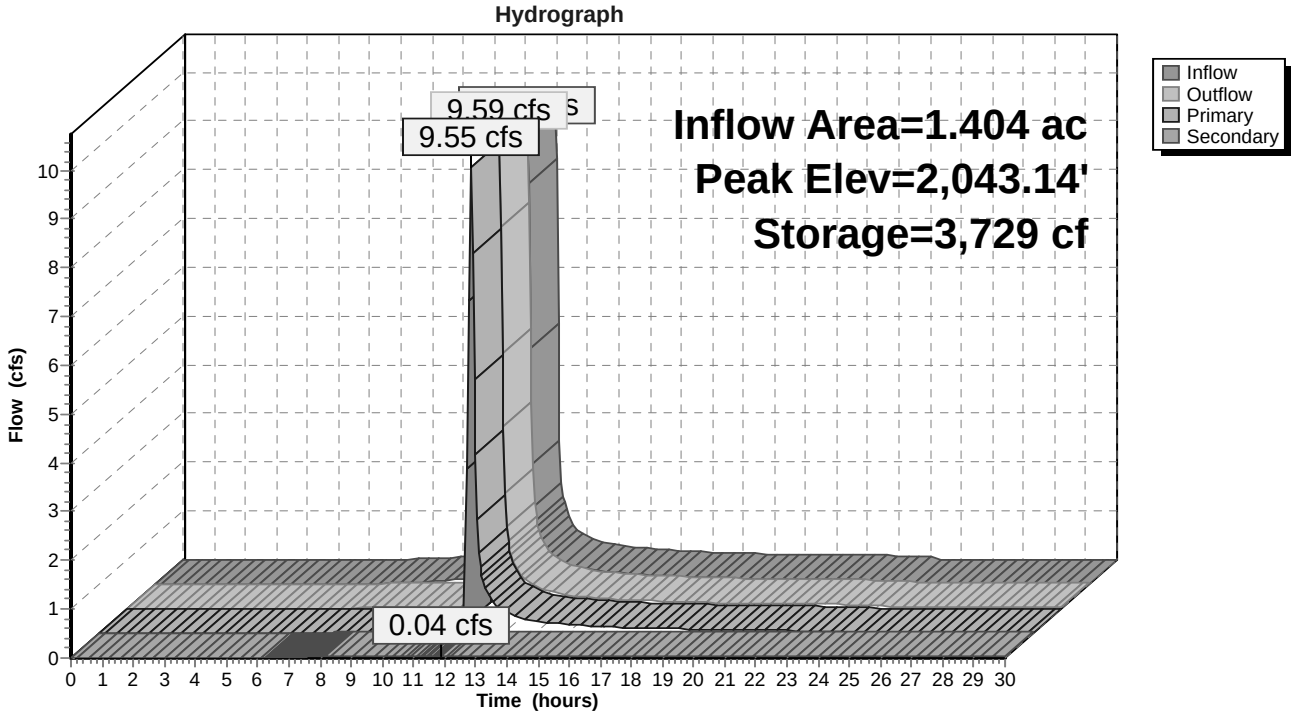
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,041.75	2,415	0	0
2,042.00	2,645	633	633
2,042.50	3,120	1,441	2,074
2,043.00	3,500	1,655	3,729

Device	Routing	Invert	Outlet Devices
#1	Primary	2,042.75'	**3.00' x 3.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#2	Secondary	2,036.75'	**6.0" x 90.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 2,028.00' S= 0.0972 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#3	Device 2	2,041.75'	**0.500 in/hr Exfiltration over Surface area**

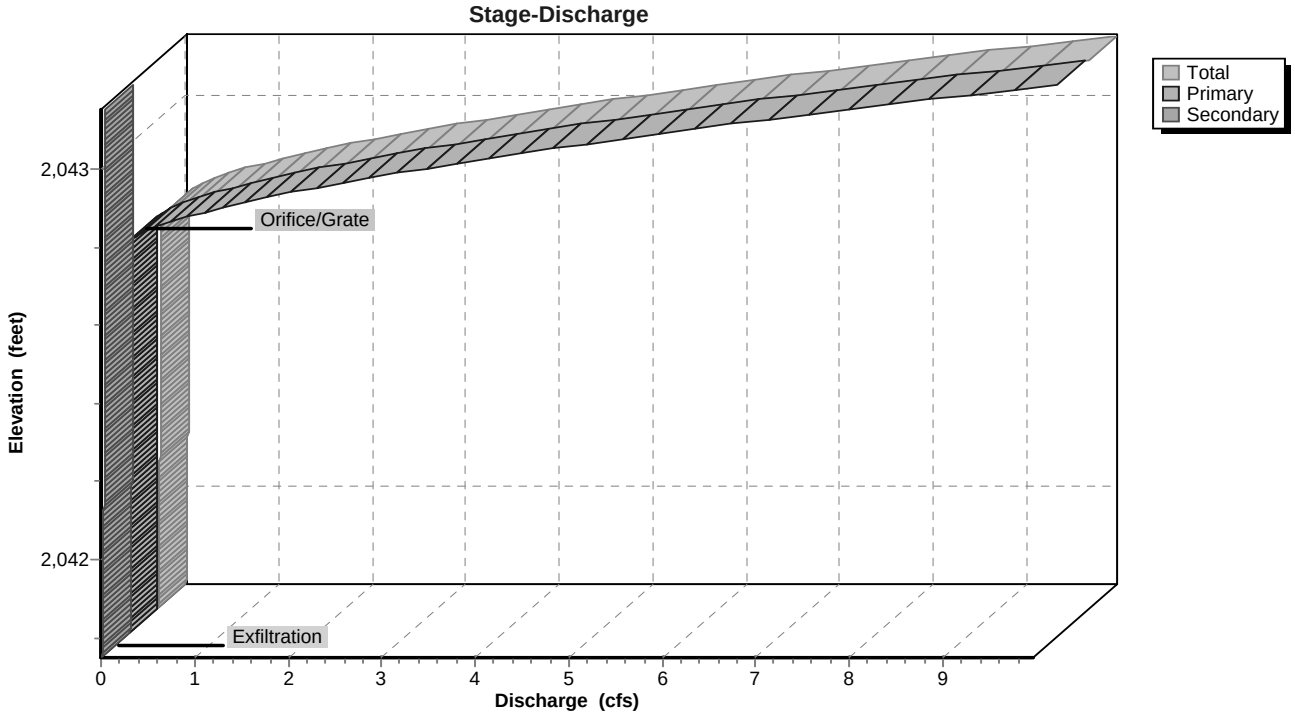
Primary OutFlow Max=9.33 cfs @ 11.96 hrs HW=2,043.13' (Free Discharge)
└─**1=Orifice/Grate** (Weir Controls 9.33 cfs @ 2.03 fps)

Secondary OutFlow Max=0.04 cfs @ 11.90 hrs HW=2,043.06' (Free Discharge)
└─**2=Culvert** (Passes 0.04 cfs of 2.05 cfs potential flow)
└─**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 1P: Lower Bioretention



Pond 1P: Lower Bioretention



Summary for Pond 1P: Lower Bioretention

[93] Warning: Storage range exceeded by 0.25'
[58] Hint: Peaked 0.75' above defined flood level
[88] Warning: Qout>Qin may require Finer Routing>1

Inflow Area =	1.404 ac,	28.77% Impervious,	Inflow Depth =	5.69"	for 100-yr event
Inflow =	13.37 cfs @	11.96 hrs,	Volume=	0.666 af	
Outflow =	13.89 cfs @	11.95 hrs,	Volume=	0.617 af,	Atten= 0%, Lag= 0.0 min
Primary =	13.85 cfs @	11.95 hrs,	Volume=	0.545 af	
Secondary =	0.04 cfs @	11.85 hrs,	Volume=	0.073 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 2,043.25' @ 11.95 hrs Surf.Area= 3,500 sf Storage= 3,729 cf
Flood Elev= 2,042.50' Surf.Area= 3,120 sf Storage= 2,074 cf

Plug-Flow detention time= 85.9 min calculated for 0.616 af (93% of inflow)
Center-of-Mass det. time= 47.0 min (844.7 - 797.7)

Volume	Invert	Avail.Storage	Storage Description
#1	2,041.75'	3,729 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

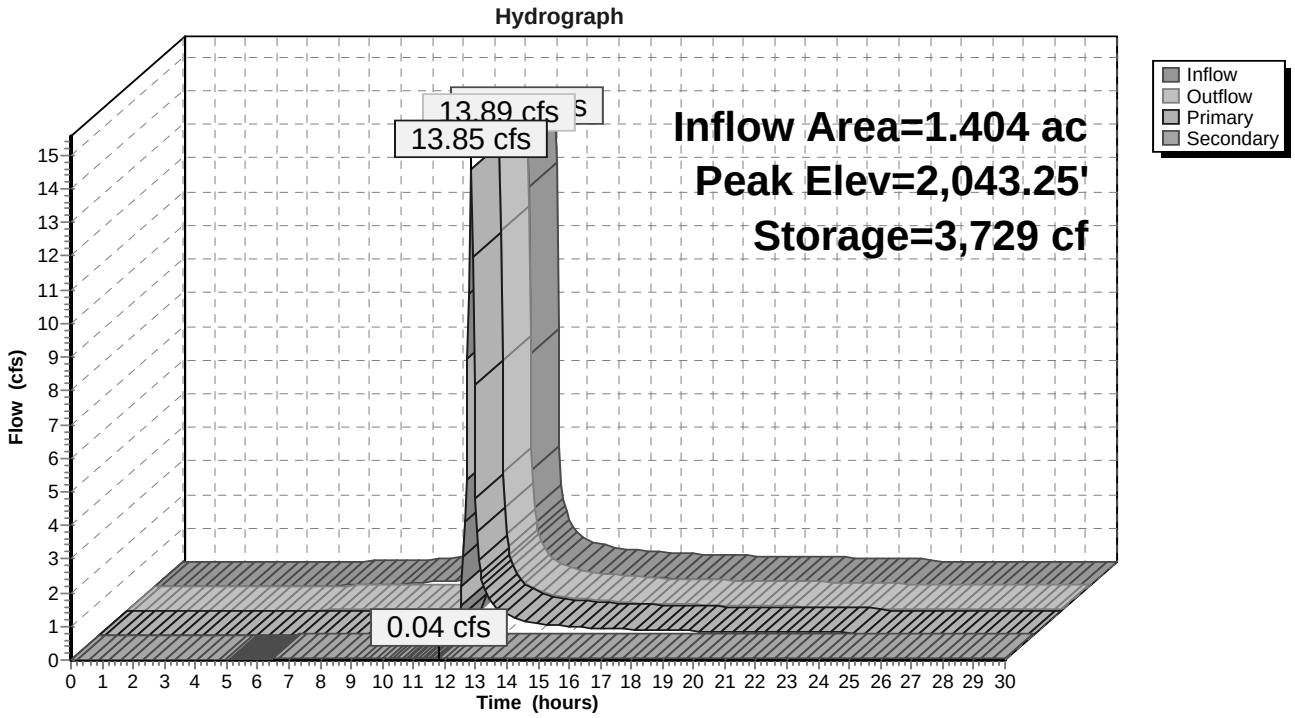
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,041.75	2,415	0	0
2,042.00	2,645	633	633
2,042.50	3,120	1,441	2,074
2,043.00	3,500	1,655	3,729

Device	Routing	Invert	Outlet Devices
#1	Primary	2,042.75'	**3.00' x 3.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#2	Secondary	2,036.75'	**6.0" x 90.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 2,028.00' S= 0.0972 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#3	Device 2	2,041.75'	**0.500 in/hr Exfiltration over Surface area**

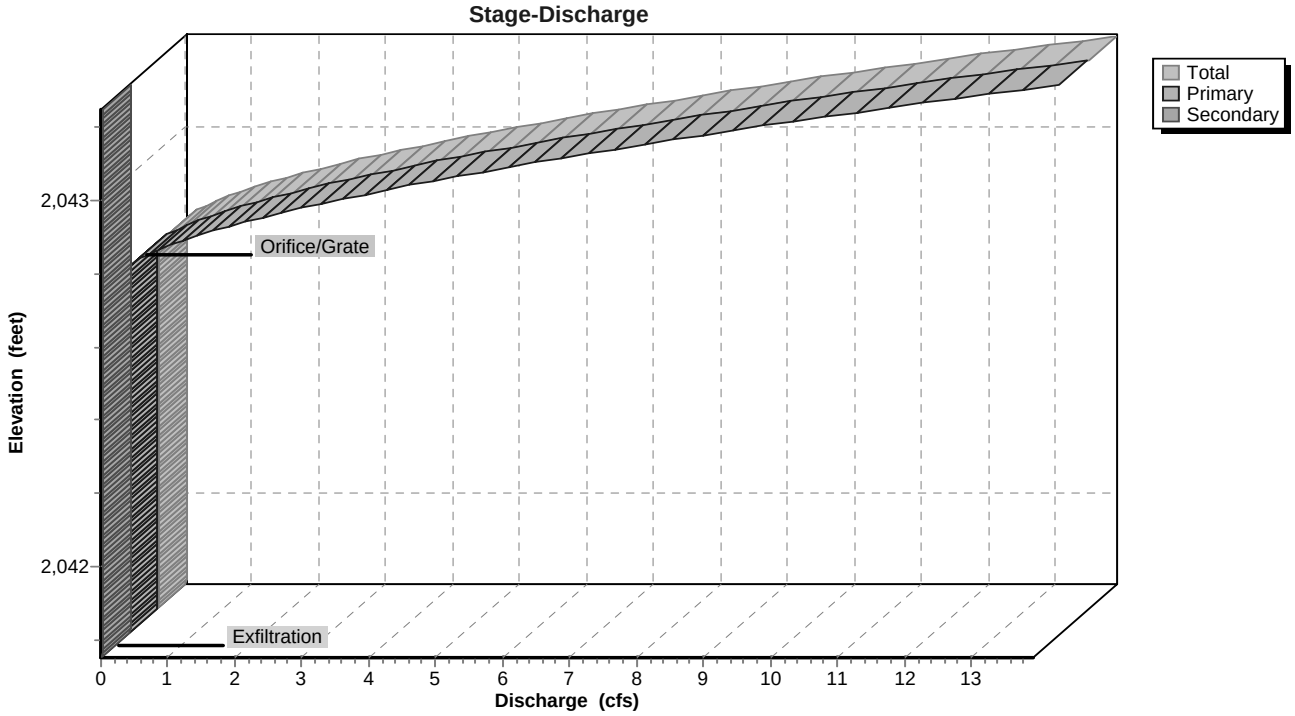
Primary OutFlow Max=13.60 cfs @ 11.95 hrs HW=2,043.24' (Free Discharge)
└─**1=Orifice/Grate** (Weir Controls 13.60 cfs @ 2.30 fps)

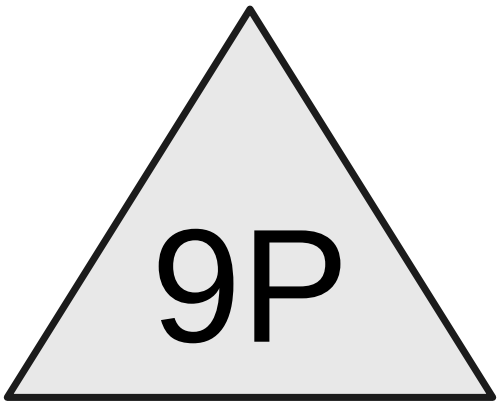
Secondary OutFlow Max=0.04 cfs @ 11.85 hrs HW=2,043.10' (Free Discharge)
└─**2=Culvert** (Passes 0.04 cfs of 2.05 cfs potential flow)
└─**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 1P: Lower Bioretention

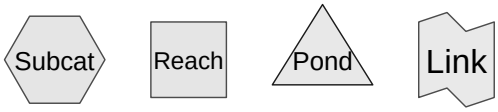


Pond 1P: Lower Bioretention





Infiltration - Detention



Drainage Diagram for CPS - Proposed Site - 03Feb2011
Prepared by Shumaker Engineering, Printed 2/7/2011
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Summary for Pond 9P: Infiltration - Detention

Inflow Area =	3.379 ac, 44.92% Impervious, Inflow Depth > 0.90" for 1-yr event				
Inflow =	0.76 cfs @	12.16 hrs,	Volume=	0.255 af	
Outflow =	0.76 cfs @	12.17 hrs,	Volume=	0.255 af,	Atten= 0%, Lag= 0.6 min
Discarded =	0.76 cfs @	12.17 hrs,	Volume=	0.255 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 2,029.01' @ 12.17 hrs Surf.Area= 2,294 sf Storage= 37 cf
Flood Elev= 2,032.50' Surf.Area= 6,100 sf Storage= 14,314 cf

Plug-Flow detention time= 0.8 min calculated for 0.255 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (933.6 - 932.9)

Volume	Invert	Avail.Storage	Storage Description
#1	2,029.00'	14,314 cf	**Custom Stage Data (Prismatic)** Listed below

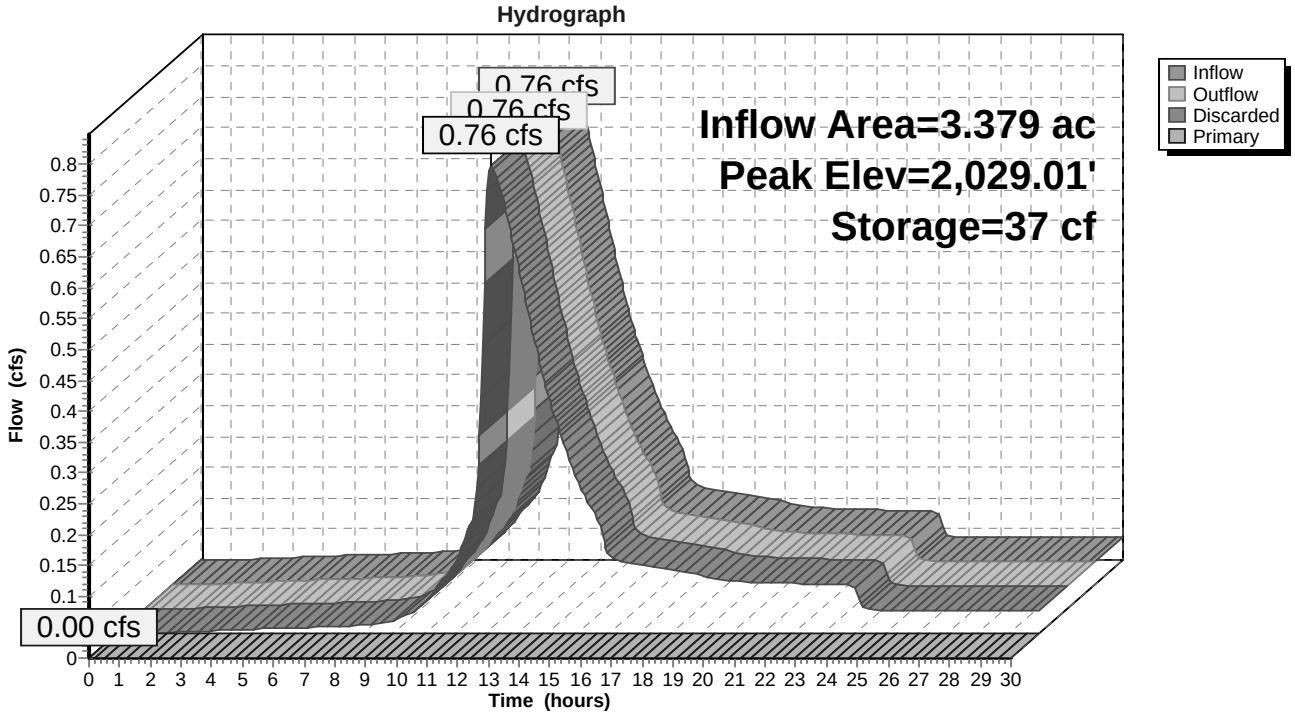
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,029.00	2,280	0	0
2,029.50	2,750	1,258	1,258
2,030.00	3,250	1,500	2,758
2,030.50	3,765	1,754	4,511
2,031.00	4,311	2,019	6,530
2,031.75	5,176	3,558	10,088
2,032.00	5,477	1,332	11,420
2,032.50	6,100	2,894	14,314

Device	Routing	Invert	Outlet Devices
#1	Primary	2,025.00'	**30.0" x 60.0' long Culvert** CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 2,023.80' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	2,031.75'	**4.00' x 4.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#3	Discarded	2,029.00'	**34.000 in/hr Exfiltration over Surface area**

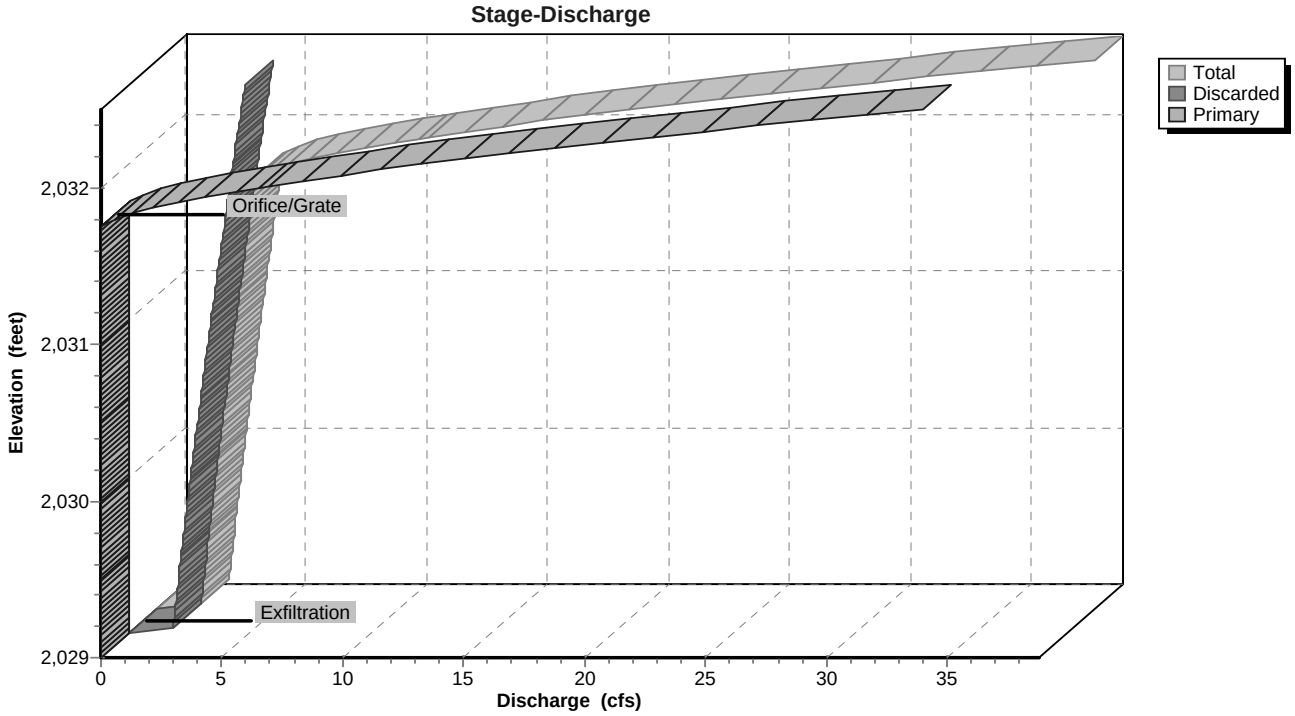
Discarded OutFlow Max=1.81 cfs @ 12.17 hrs HW=2,029.01' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 1.81 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=2,029.00' (Free Discharge)
└─**1=Culvert** (Passes 0.00 cfs of 30.94 cfs potential flow)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 9P: Infiltration - Detention



Pond 9P: Infiltration - Detention



Summary for Pond 9P: Infiltration - Detention

Inflow Area =	3.379 ac,	44.92% Impervious,	Inflow Depth >	2.41"	for 10-yr event
Inflow =	23.30 cfs @	11.95 hrs,	Volume=	0.679 af	
Outflow =	3.59 cfs @	12.19 hrs,	Volume=	0.679 af,	Atten= 85%, Lag= 14.1 min
Discarded =	3.59 cfs @	12.19 hrs,	Volume=	0.679 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 2,031.21' @ 12.19 hrs Surf.Area= 4,557 sf Storage= 7,543 cf
Flood Elev= 2,032.50' Surf.Area= 6,100 sf Storage= 14,314 cf

Plug-Flow detention time= 13.1 min calculated for 0.678 af (100% of inflow)
Center-of-Mass det. time= 13.0 min (846.6 - 833.6)

Volume	Invert	Avail.Storage	Storage Description
#1	2,029.00'	14,314 cf	**Custom Stage Data (Prismatic)** Listed below

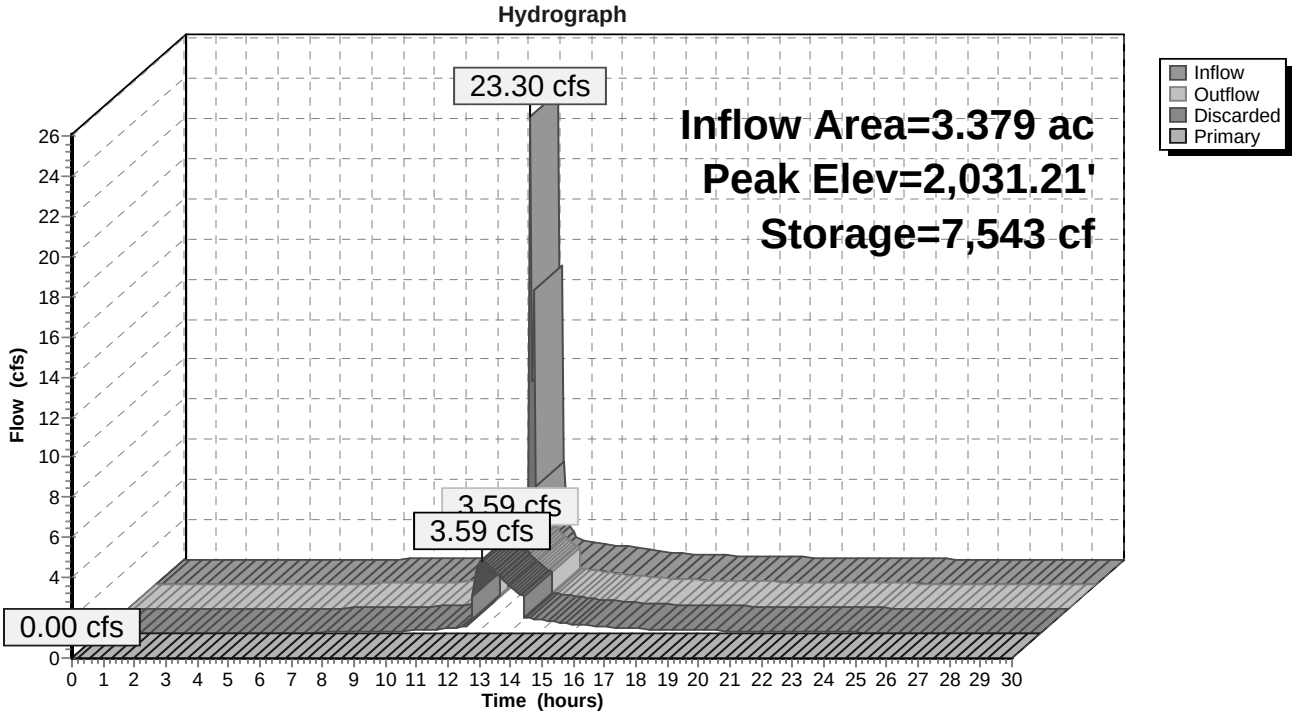
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,029.00	2,280	0	0
2,029.50	2,750	1,258	1,258
2,030.00	3,250	1,500	2,758
2,030.50	3,765	1,754	4,511
2,031.00	4,311	2,019	6,530
2,031.75	5,176	3,558	10,088
2,032.00	5,477	1,332	11,420
2,032.50	6,100	2,894	14,314

Device	Routing	Invert	Outlet Devices
#1	Primary	2,025.00'	**30.0" x 60.0' long Culvert** CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 2,023.80' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	2,031.75'	**4.00' x 4.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#3	Discarded	2,029.00'	**34.000 in/hr Exfiltration over Surface area**

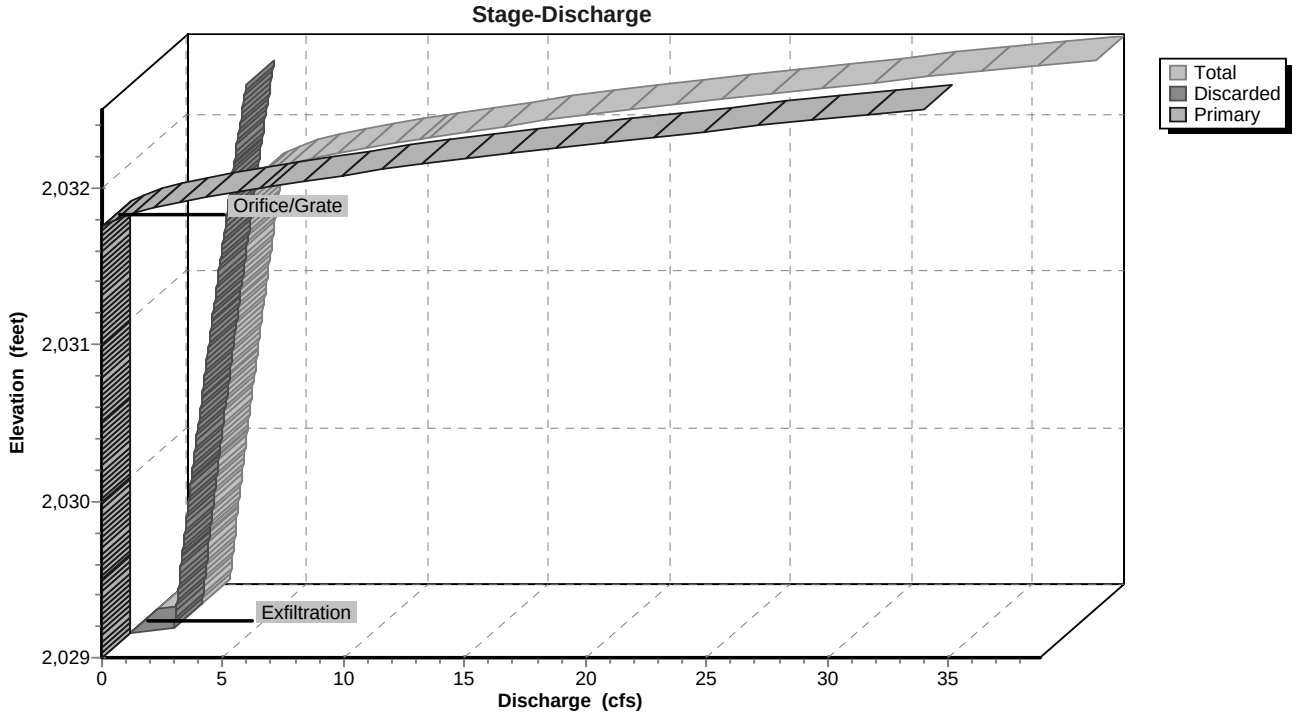
Discarded OutFlow Max=3.58 cfs @ 12.19 hrs HW=2,031.21' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 3.58 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=2,029.00' (Free Discharge)
└─**1=Culvert** (Passes 0.00 cfs of 30.94 cfs potential flow)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 9P: Infiltration - Detention



Pond 9P: Infiltration - Detention



Summary for Pond 9P: Infiltration - Detention

Inflow Area =	3.379 ac,	44.92% Impervious,	Inflow Depth >	3.82"	for 100-yr event
Inflow =	38.70 cfs @	11.95 hrs,	Volume=	1.075 af	
Outflow =	18.87 cfs @	12.03 hrs,	Volume=	1.074 af,	Atten= 51%, Lag= 4.7 min
Discarded =	4.48 cfs @	12.03 hrs,	Volume=	0.908 af	
Primary =	14.39 cfs @	12.03 hrs,	Volume=	0.166 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 2,032.17' @ 12.03 hrs Surf.Area= 5,694 sf Storage= 12,425 cf
Flood Elev= 2,032.50' Surf.Area= 6,100 sf Storage= 14,314 cf

Plug-Flow detention time= 15.4 min calculated for 1.073 af (100% of inflow)
Center-of-Mass det. time= 15.3 min (818.8 - 803.5)

Volume	Invert	Avail.Storage	Storage Description
#1	2,029.00'	14,314 cf	**Custom Stage Data (Prismatic)** Listed below

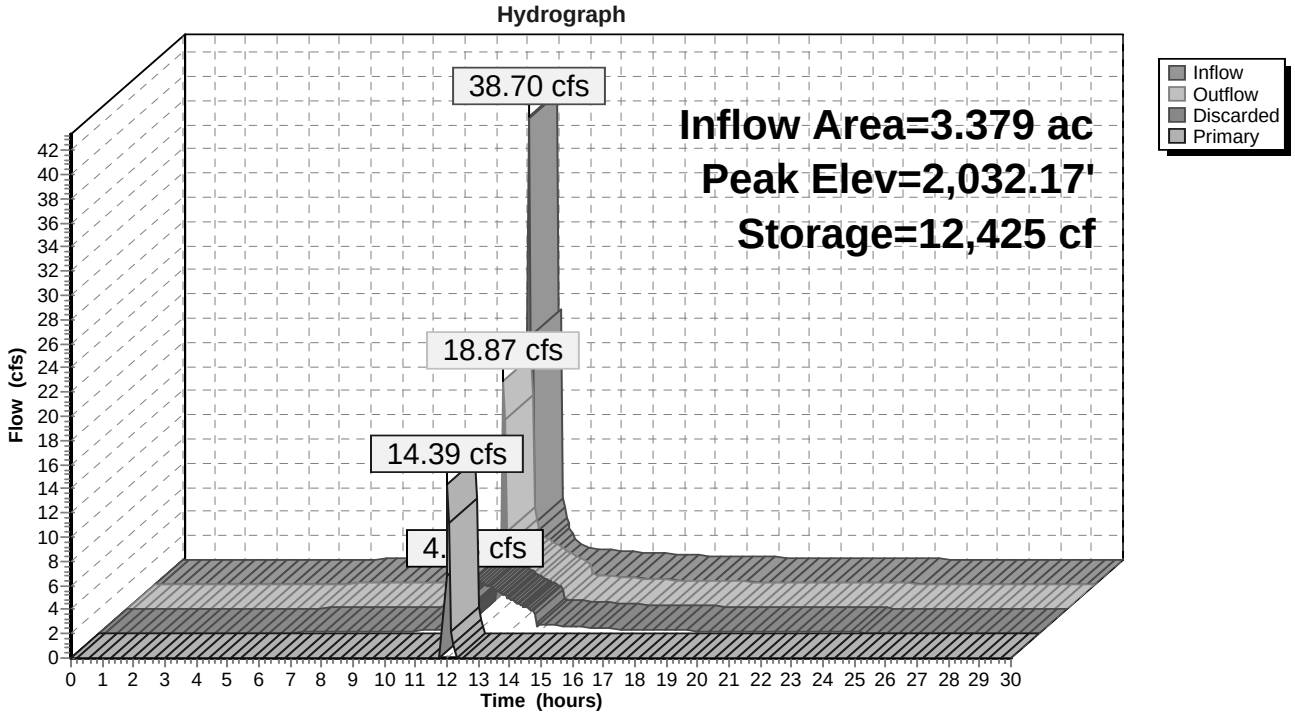
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,029.00	2,280	0	0
2,029.50	2,750	1,258	1,258
2,030.00	3,250	1,500	2,758
2,030.50	3,765	1,754	4,511
2,031.00	4,311	2,019	6,530
2,031.75	5,176	3,558	10,088
2,032.00	5,477	1,332	11,420
2,032.50	6,100	2,894	14,314

Device	Routing	Invert	Outlet Devices
#1	Primary	2,025.00'	**30.0" x 60.0' long Culvert** CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 2,023.80' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	2,031.75'	**4.00' x 4.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#3	Discarded	2,029.00'	**34.000 in/hr Exfiltration over Surface area**

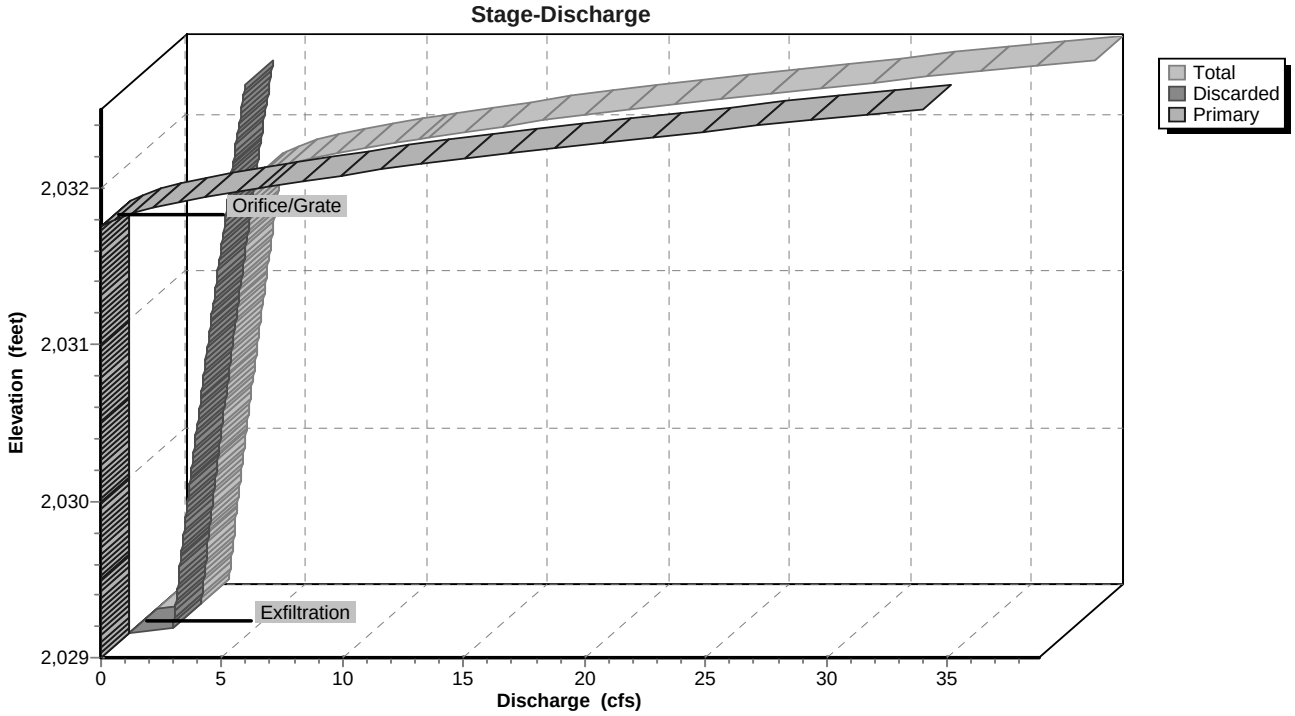
Discarded OutFlow Max=4.47 cfs @ 12.03 hrs HW=2,032.16' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 4.47 cfs)

Primary OutFlow Max=13.73 cfs @ 12.03 hrs HW=2,032.16' (Free Discharge)
└─**1=Culvert** (Passes 13.73 cfs of 45.36 cfs potential flow)
└─**2=Orifice/Grate** (Weir Controls 13.73 cfs @ 2.09 fps)

Pond 9P: Infiltration - Detention



Pond 9P: Infiltration - Detention



R3

Point of Analysis

Subcat Reach Pond Link

Drainage Diagram for CPS - Proposed Site - 03Feb2011
Prepared by Shumaker Engineering, Printed 2/7/2011
HydroCAD® 8.50 s/n 005259 © 2007 HydroCAD Software Solutions LLC

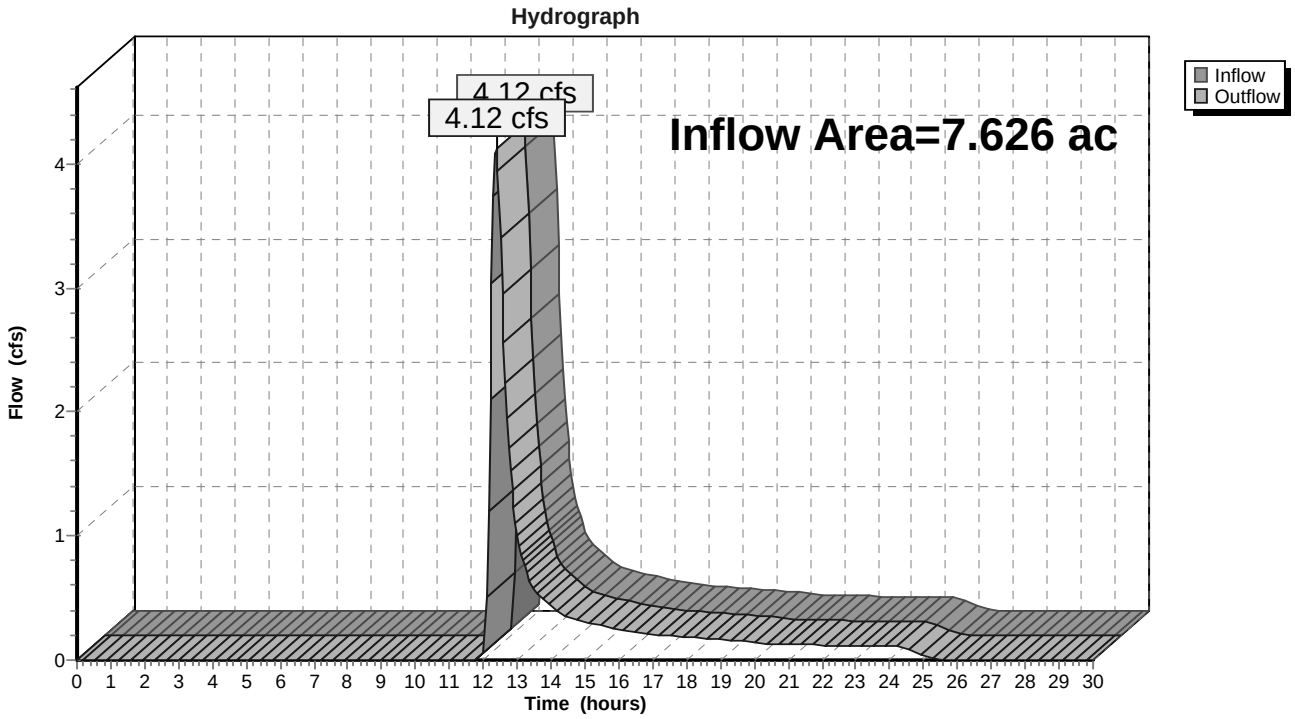
Summary for Reach R3: Point of Analysis

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 7.626 ac, 19.91% Impervious, Inflow Depth = 0.62" for 1-yr event
Inflow = 4.12 cfs @ 12.37 hrs, Volume= 0.391 af
Outflow = 4.12 cfs @ 12.37 hrs, Volume= 0.391 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach R3: Point of Analysis



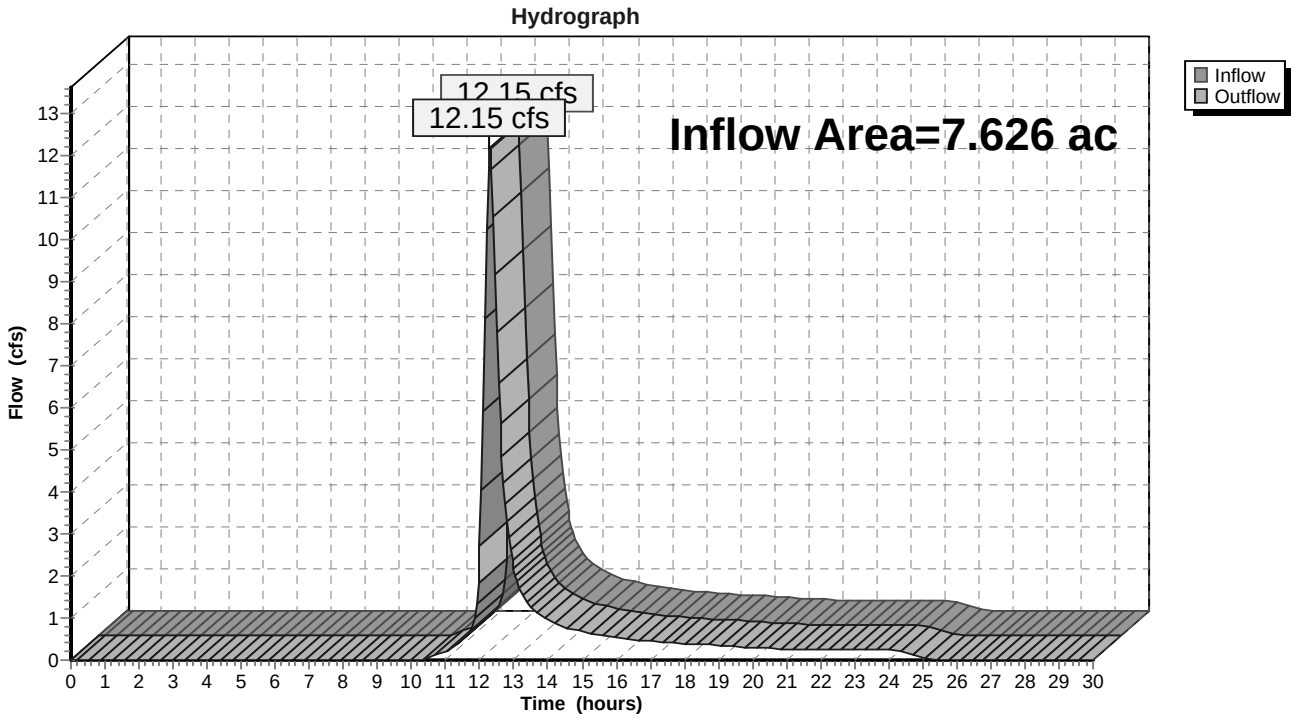
Summary for Reach R3: Point of Analysis

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 7.626 ac, 19.91% Impervious, Inflow Depth = 1.66" for 10-yr event
Inflow = 12.15 cfs @ 12.30 hrs, Volume= 1.054 af
Outflow = 12.15 cfs @ 12.30 hrs, Volume= 1.054 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach R3: Point of Analysis



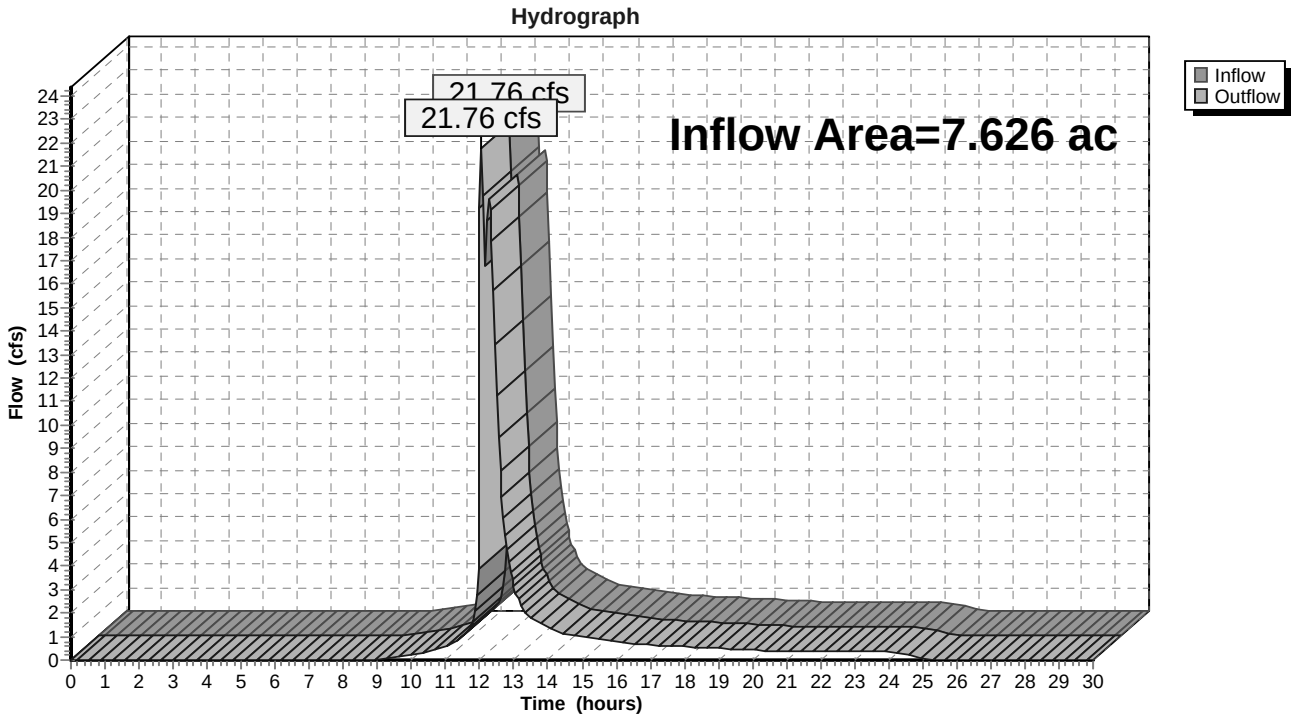
Summary for Reach R3: Point of Analysis

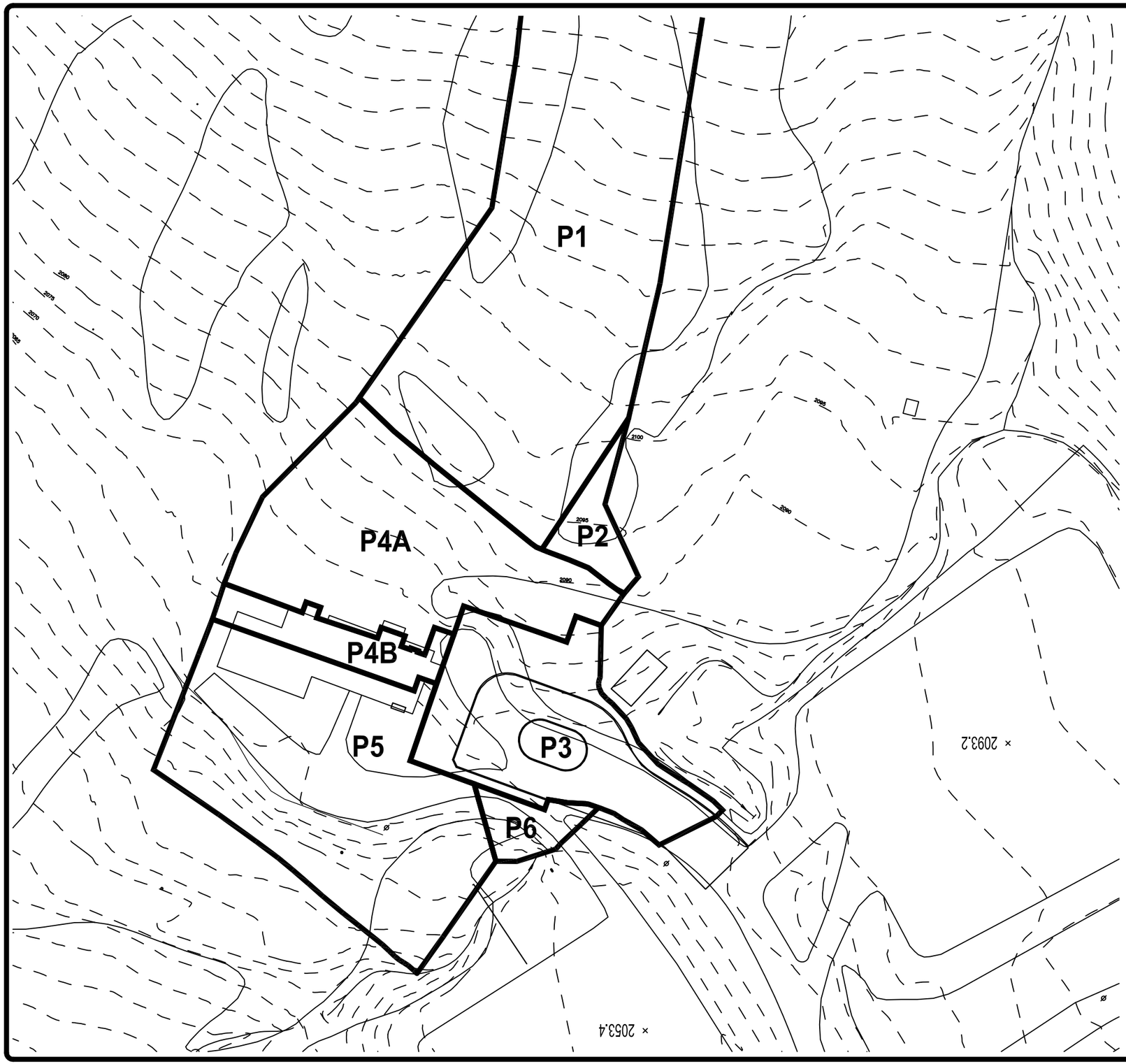
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 7.626 ac, 19.91% Impervious, Inflow Depth = 2.87" for 100-yr event
Inflow = 21.76 cfs @ 12.05 hrs, Volume= 1.822 af
Outflow = 21.76 cfs @ 12.05 hrs, Volume= 1.822 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach R3: Point of Analysis





DEPARTMENT OF ENVIRONMENTAL CONSERVATION

POST-CONSTRUCTION WATERSHED AREAS

SUB-CATCHMENT AREA	SIZE (ACRE)	IMPERVIOUS AREA (AC)	PERVIOUS AREA (AC)
P1	4.125	0	4.125
P2	0.089	0	0.122
P3	0.755	0.674	0.081
P4A	1.028	0.248	0.780
P4B	0.192	0.192	0
P5	1.317	0.404	0.913
P6	0.087	0	0.087

100' 0 100'

FIGURE -

Drawn By: SRR
Checked By: TMK
Project Mgr: WCN
Date: 2/7/11
Project No: 03-2118

DRAWING TITLE
PRE-CONSTRUCTION CONDITIONS WATERSHED AREAS

DISCOVERY LODGE AT BELLEYRE MOUNTAIN SKI CENTER REHABILITATION & ADDITION

HIGHMOUNT ULSTER

SHUMAKER
Consulting Engineering & Land Surveying D.P.C.
428 Court Street, Suite 200, Utica, New York 13502
Telephone: (315) 724-0097 Fax: (315) 724-0173

APPENDIX J

BEST MANAGEMENT PRACTICES

BMP: Construction Waste Management
Purpose • Prevent discharge of pollutants from materials obtained during construction to the water drainage system.
Practices • Select an area on the site that is to be designated as the waste collection area. • Containers must be large enough in number to hold waste at any one time. • Containers should be covered during inclement weather and at night. • Collection should be performed prior to containers overflowing – arrangements should be made for collection regularly. • Litter and debris should be collected daily - spills should be cleaned immediately. • Containers should not contain toxic or hazardous waste. • Do not wash out dumpsters on site – materials inside may become contaminated. • Make sure waste is properly collected and disposed. Contact local authorities for guidance. • All personnel should be trained in proper solid waste management techniques. Inspection • Monitor storage and disposal of trash and debris. • Containers should be inspected for leaks in their construction and covers. Leaks should be repaired immediately. • Waste materials observed in flowing water should be removed

BMP: Sediment and Erosion Control
Purpose: • To minimize the removal and deposition of soil from disturbed construction area(s), and to identify measures to minimize the potential for erosion following site construction • Minimal clearing helps reduce storm water runoff by creating better flow patterns, stabilizing the ground, and maintaining already present vegetation. • Stable drainage ways provide for a reduction in erosion, sedimentation deposits, and control the velocity of water.
Practices • Sites with uneven terrain and easily erodible soils should be considered for land grading. This would provide for a greater deal of stability and reduction in runoff velocity. Attempt to maintain drainage patterns if possible. • Permanent diversions are useful when trying to protect low ground from runoff of higher ground, protection of higher ground from erosion, and promotion of growth on the lower ground. • Natural vegetation should be maintained if possible. These areas should be marked before clearing of work areas commences. Natural vegetation allows for erosion and sediment control in an established environment, as well as reducing storm water runoff. Maintenance is generally low, and the established area is more attractive. • Construction entrances reduce the amount of sediment that leaves the area if constructed properly. If water is used to wash trucks, it should be collected and disposed of properly. • Check dams are useful as temporary installments that aids in reducing erosion by reducing the velocity of water in a swale. They are also helpful in acting as a catch basin for sediment. • Silt Fences are an effective means of diverting water and providing sediment control. They should be used near roads or traffic areas on a construction site. • Grass-lined channels are an effective means of routing storm water runoff. They are an effective means of reducing runoff velocity, and acting as a filter for sediment. • Riprap is an effective means of combating erosion in concentrated runoff areas by stabilizing drainageways and outlets. • Sediment Trap shall be utilized to remove turbidity form large volumes of stormwater runoff.

BMP: Hazardous Waste Management

Purpose

- To minimize discharge of hazardous waste to waterways.

Practices

- Contact local authorities regarding hazardous waste management regulations.
- Waste containers should meet all regulations. Including construction and proper labeling.
- Products should not be mixed together unless recommended by manufacturer.
- Temporary containment areas should be constructed.
- Containers should be stored on pallets and under a roofed area.
- Do not dispose of liquid waste directly in dumpsters.
- Personnel to be trained in proper disposal of hazardous waste.
- Sandblasting grit should be treated as hazardous if used to clean structures containing lead, cadmium or chrome based paints.

Inspection

- Proper labeling and storage.
- Dispose of waste properly.
- Spill cleanup kits should be kept in hazardous waste area. Personnel should be trained in their use.
- MSDS should be kept on site for all hazardous materials used on site.

Containment measures should be inspected and repaired as needed

BMP: Liquid Waste Management
Purpose: Prevent discharge of on-site non-hazardous water to storm water discharge.
Practices • Specific permits may be required for disposal. • Collect water and dispose of properly. • Educate personnel on identification and proper disposal of waste water. • Properly store water until disposal is arranged – onsite treatment may be necessary.
Inspection • Personnel should be monitored to ensure proper disposal. • Dispose of separated solids accordingly. • Inspect all equipment and repair immediately.

BMP: Materials Storage
Purpose • Minimize discharge of hazardous materials that are brought about by the handling and storage of materials..

Practices
• Proper storage and handling essential.
  o Keep storage areas clean and equipped.
  o A covered storage area is preferred.
  o Ensure all containers are properly marked, and stored upright in watertight, leakproof containers
• Do not allow spills to come into contact with storm water
  o Personnel should be properly trained in spill cleanup.
  o Spill cleanup kits should be available in storage area.
  o Storage area should be surrounded by proper containment measures.
• Contact local authorities for information on proper treatment and disposal of contaminated materials.

BMP: Pesticide, Fertilizer, and Detergent Management
Purpose • Prevent water contamination by onsite uses of these products.
Practices • Store products in a protected area • Educate personnel on proper usage of products. • Construction of containments measures necessary incase of spill. • Dispose of all water that comes into contact properly. • Keep storm water away from site. • Apply products on as recommended by manufacturer
Inspection • Inspect containment measures and repair as needed. • Ensure proper use of products. • Maintain MSDS files on site.

BMP: Residual Concrete and Pavement Disposal
Purpose • Prevent pollution resulting from concrete and pavement operations.
Practices • Designate a washout area. • Contain water used in washing out trucks. • Area should be contained so that contact is not made with storm water discharge. • Water may be recycled. • Collect and dispose of waste concrete, waste asphalt, and concrete residuals at a facility permitted for Construction and Demolition (C&D) debris disposal.
Inspection • Washout water to be properly disposed and should not be allowed to come into contact with storm water discharge.

BMP: Runoff Control – Minimize Clearing

Purpose

- Minimal clearing helps reduce storm water runoff by creating better flow patterns, stabilizing the ground, and maintaining already present vegetation.

Practices

- Sites with uneven terrain and easily erodible soils should be considered for land grading. This would provide for a greater deal of stability and reduction in runoff velocity. Attempt to maintain drainage patterns if possible.
- Permanent diversions are useful when trying to protect low ground from runoff of higher ground, protection of higher ground from erosion, and promotion of growth on the lower ground.
- Natural vegetation should be maintained if possible. These areas should be marked before clearing of work areas commences. Natural vegetation allows for erosion and sediment control in an established environment, as well as reducing storm water runoff. Maintenance is generally low, and the established area is more attractive.
- Construction entrances reduce the amount of sediment that leaves the area if constructed properly. If water is used to wash trucks, it should be collected and disposed of properly.

Inspections

- Graded land should be checked weekly or after significant rainfall. Maintenance of sediment and erosion should be performed continuously.
- Permanent diversions should be checked and cleared of all debris. The vegetation should also be maintained, especially before the diversion is stabilized.
- Inspections of natural vegetation areas should ensure that the native vegetation that is damaged is replaced immediately to ensure its effectiveness.
- Inspection of construction entrances should include ensuring the proper amount of stone is in place for stabilization, and sediment that is washed off vehicles should be swept and disposed of properly.

BMP: Soil Restoration
Purpose • To restore soil to its pre-construction hydrologic conditions by adding compost and topsoil along with aeration, deep mixing, or tilling of the ground surface. • Implemented as part of Green Infrastructure Planning, as presented in Chapter 5 of the NYSDEC New York State Stormwater Management Design Manual
Practices • Apply 3” (minimum) compost to the ground surface • Till compost utilizing ripper, disk, or equivalent equipment to a depth of 12” over all compacted surfaces • Rock pick and remove stones in excess of 4” in diameter • Apply 6” of topsoil • Vegetate, per plans and specifications.
Inspection • Inspector shall be able to insert a 3/8” metal bar at least 12” into the ground utilizing normal body weight.

BMP: Spill Management

Purpose

- Minimize discharge of hazardous materials to water systems that are brought about by spills.

Practices

- Proper storage and handling essential.
    - Keep storage areas clean and equipped.
    - A covered storage area is preferred.
- Do not allow spills to come into contact with storm water
    - Personnel should be properly trained in spill cleanup.
    - Spill cleanup kits should be available in storage area.
    - Storage area should be surrounded by proper containment measures.
- Contact local authorities for information on proper treatment and disposal of contaminated materials.

Inspections

- Inspect fueling and maintenance areas for evidence of spillage
- Inspect secondary containment for released liquids
- Inspect job site storage containers for potential leakage
- Conduct periodic spill response training

BMP: Stabilize Drainage Ways

Purpose

- Stable drainage ways provide for a reduction in erosion, sedimentation deposits, and control the velocity of water.

Practices

- Check dams are useful as temporary installments that aids in reducing erosion by reducing the velocity of water in a swale. They are also helpful in acting as a catch basin for sediment.
- Filter berms are an effective means of diverting water and providing sediment control. They should be used near roads or traffic areas on a construction site.
- Grass-lined channels are an effective means of routing storm water runoff. They are an effective means of reducing runoff velocity, and acting as a filter for sediment.
- Riprap is an effective means of combating erosion in concentrated runoff areas by stabilizing drainageways and outlets.

Inspections

- Due to their temporary nature check dams should be inspected after each significant rain fall. They should be kept free of debris and sediment. Any breaches in check dams should be repaired immediately.
- Filter berms will only function properly if they are not damaged by vehicles, rain, or if sediment is not built up. They should be inspected regularly, and after each rain with repairs being made immediately.
- Though requiring minimal maintenance, grass-lined channels should be checked regularly for debris and cleared. Also, they should be maintained extensively during the time vegetation is being established.
- Riprap should be inspected after major storms, with prompt repairs being made. Otherwise, little maintenance is required.

BMP: Manage Stockpiled Materials
Purpose • Need to reduce pollution of storm water by on-site materials such as hay, asphalt, stone, etc.
Practices • Keep stockpiles away from storm water flow. • Physical separation from water flow can be achieved by using temporary berms, sand/gravel bags, etc. These barriers can later be moved for transport of material. • Control dust. • Bagged materials should be placed on pallets away from water and covered with plastic.
Inspection • Inspect physical separation controls to ensure no breaks in this system. • Inspect covers during and following inclement weather conditions. • Repair all failures in pollution prevention as the need arises.

BMP: Street Sweeping
Purpose • Allows for cleanup of materials that have been removed from site by vehicles.
Practices • Clean tracked materials daily. • Dispose of materials as contaminated waste.
Inspection • Locations where sediment may be collected. • Ensure proper disposal of waste.

BMP: Vehicle and Equipment Cleaning
Purpose • Prevent transport of materials off site. Also to prevent transport of foreign biological materials onsite.
Practices • Do not clean vehicles with detergent, solvents or steam. • Contain water that is used in washing purpose for proper disposal. • Washing area should be paved – prevent runoff/runon.
Inspection • Inspect measures that are in place so that wash water is not making it into water flow. • Personnel should be trained in proper washing techniques. • Sediments should be collected and disposed of properly.

BMP: Vehicle Maintenance and Fueling

Purpose

- Minimize potential for pollution of storm water drainage system by fuel spills and other contaminants.

Practices

- Fueling should be performed off site unless necessary.
- Designated area should be established for fueling and maintenance. Area should be located away from waterways/
- Spill cleanup kits should be available at designated fueling area.
- Fueling equipment should be equipped with automatic shutoff mechanism.
- Properly dispose of waste oil, batteries and tires in accordance with local, state and federal regulations.
- Area should not be cleaned with detergents or solvents.
- Area should be isolated using proper techniques.

Inspection

- Vehicles should be inspected regularly for leaks and repaired immediately.
- Area should be inspected for spills and cleaned regularly.
- Spill kits/materials should be kept in good supply.

BMP: Water Conservation
Purpose • Reduce soil erosion. • Help stop removal of contaminated soil from site.
Practices • Use proper amount of water dependent on variations of site (soil type, slope, season, etc.) • Construct runoff to go to areas where absorption can occur – not into other bodies of water. • Control dust, but do not use excessive amount of water to do so. • Do not wash sediment into drains, instead treat as contaminated. • Maintain and repair water equipment as needed. • Wash vehicles only in designated areas and under BMPs in place for that practice. • Sweep paved areas, avoid washing with water.
Inspection • Inspect weekly • Prevent excess water flow by repairing all breaks in water dispensing equipment.

APPENDIX K

CONSTRUCTION INSPECTION GUIDANCE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Construction Stormwater Inspection Manual

Primarily for Government Inspectors Evaluating Compliance with Construction Stormwater Control Requirements

New York State
Department of Environmental Conservation

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Version 1.05 (8/27/07)

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1.0 INTRODUCTION AND PURPOSE

The New York State Department of Environmental Conservation Division of Water (DOW) considers there to be two types of inspections germane to construction stormwater; compliance inspections and self-inspections.

This manual is for use by DOW and other regulatory oversight construction stormwater inspectors in performing compliance inspections, as well as for site operators in performing self inspections. The manual should be used in conjunction with the *New York State Standards and Specifications for Erosion and Sediment Control*, August 2005.

1.1 Compliance Inspections

Regulatory compliance inspections are performed by regulatory oversight authorities such as DOW staff, or representatives of DOW and local municipal construction stormwater inspectors. These inspections are intended to determine compliance with the state or local requirements for control of construction stormwater through erosion and sediment control and post construction practices. Compliance inspections focus on determinations of compliance with legal and water quality standards. Typically, compliance inspections can be further sub-categorized to include comprehensive inspections, and follow-up or reconnaissance inspections.

Compliance inspectors will focus on determining whether:

- the project is causing water quality standard violations;
- the required Stormwater Pollution Prevention Plan (SWPPP) includes appropriate erosion and sediment controls and, to some extent, post construction controls;
- the owner/operator is complying with the SWPPP;
- where required, self-inspections are being properly performed; and
- where self-inspections are required, the owner/operator responds appropriately to the self-inspector's reports.

1.1.1 Comprehensive Inspection

Comprehensive inspections are designed to verify permittee compliance with all applicable regulatory requirements, effluent controls, and compliance schedules. This inspection involves records reviews, visual observations, and evaluations of management practices, effluents, and receiving waters.

Comprehensive inspections should be conducted according to a neutral or random inspection scheme, or in accordance with established priorities. A neutral monitoring scheme provides some objective basis for scheduling inspections and sampling visits by establishing a system (whether complex factor-based, alphabetic, or geographic) for setting prioritiesto ensure that a particular facility is not unfairly selected for inspection or sampling. The selection of which

facility to inspect must be made without bias to ensure that the regulatory oversight authority, if challenged for being arbitrary and capricious manner, can reasonably defend itself.

A neutral inspection scheme should set the criteria the inspector uses to choose which facilities to inspect, but the schedule for the actual inspection should remain confidential, and may be kept separate from the neutral plan.

A routine comprehensive compliance inspection is most effective when it is unannounced or conducted with very little advance warning.

1.1.2 Reconnaissance Inspection

A reconnaissance inspection is performed in lieu of, or following a comprehensive inspection to obtain a preliminary overview of an owner/operator's compliance program, to respond to a citizen complaint, or to assess a non-permitted site. The inspector performs a brief (generally about an hour) visual inspection of the site, discharges and receiving waters. A reconnaissance inspection uses the inspector's experience and judgement to summarize potential compliance problems, without conducting a full comprehensive inspection. The objective of a reconnaissance inspection is to expand inspection coverage without increasing inspection resource expenditures. The reconnaissance inspection is the shortest and least resource intensive of all inspections.

Reconnaissance inspections may be initiated in response to known or suspected violations, a public complaint, a violation of regulatory requirements, or as follow-up to verify that necessary actions were taken in response to a previous inspection.

1.2 Self-inspections

For some projects, the site owner/operator is required by their State Pollutant Discharge Elimination System (SPDES) Permit and/or local requirements to have a qualified professional[1] perform a "self-inspection" at the site. In self-inspections, the qualified professional determines whether the site is being managed in accordance with the SWPPP, and whether the SWPPP's recommended erosion and sediment controls are effective. If activities are not in accordance with the SWPPP, or if the SWPPP erosion and sediment controls are not effective, the qualified professional inspecting the site recommends corrections to the owner/operator.

[1] A "Qualified professional" is a person knowledgeable in the principles and practice of erosion and sediment controls, such as a licensed professional engineer, Certified Professional in Erosion and Sediment Control (CPESC), licensed landscape architect or soil scientist.

2.0 PRE-INSPECTION ACTIVITIES

2.1 Regulatory Oversight Authorities

This section is intended for inspectors with regulatory oversight authority such as agents of the DOW or a local municipality, or others acting on their behalf, such as county Soil and Water Conservation District staff. Examples of other regulatory oversight authorities include: the United States Environmental Protection Agency (EPA); New York City Department of Environmental Protection (DEP), Adirondack Park Agency (APA); the Lake George Park Commission (LGPC), and the Skaneateles Lake Watershed Authority (SLWA). Before arriving on-site to conduct the inspection, considerations concerning communication, documentation and equipment must be made.

Regulatory oversight authority is granted by state or local law to government agencies or, depending upon the particular law, an authorized representative of state or local government. SPDES rules 6 NYCRR 750-2.3 and Environmental Conservation Law 17-0303(6) and 17-0829(a) all allow for authorized representatives of the (NYSDEC) commissioner to perform all the duties of an inspector.

2.1.1 Communication

<u>Coordination with Other Entities</u>
Where appropriate, prior to selecting sites for inspection, compliance inspectors should communicate with other regulatory oversight authorities to avoid unnecessary duplication or to coordinate follow-up to inspections performed by other regulatory oversight authorities.

<u>Announced vs. Unannounced Inspection</u>
Inspections may be announced or unannounced. Each method has its own advantages and disadvantages. Unannounced inspections are preferred, however many job sites are not continuously manned, or not always staffed by someone who is familiar with the SWPPP, thus necessitating an announced inspection. As an alternative, when an announced inspection is necessary, inspectors should try to give as little advanced warning as possible (24 hours is suggested).

<u>Itinerary</u>
For obvious safety reasons, inspectors should be sure to inform someone in their office which site or sites they will be visiting prior to leaving the to perform inspections.

2.1.2 Documentation

<u>Data Review</u>
The inspector should review any available information such as:

- Notice of Intent
- Stormwater Pollution Prevention Plan
- Past inspection records
- Phasing plan

- Construction sequence
- Inspection and Maintenance schedules
- Site specific issues
- Consent Orders
- Access agreements

Inspection Form
The inspector should have copies of, and be familiar with, the inspection form used by their regulatory oversight authority (example in Attachment 1) before leaving the office. Static information such as name, location and permit number can be entered onto the inspection form prior to arriving at the inspection site.

Credentials
Inspectors should always carry proper identification to prove that they are employed by an entity with jurisdictional authority. Failure to display proper credentials may be legal grounds for denial of entry to a site.

2.1.3 Equipment

Personal Protective Equipment
DOW employees must conform to the DOW Health and Safety policy as it relates to personal protective equipment. Other regulatory oversight authorities should have their own safety policies or, if not, may wish to consult the OSHA health and safety tool at: www.osha.gov/dep/etools/ehasp/ to develop a health and safety plan.

The following is a list of some of the most common health and safety gear that may be needed:

- Hard hat (Class G, Type1 or better)
- Safety toe shoes
- Reflective vest
- Hearing protection (to achieve 85 dBA - 8 hr TWA)
- Safety glasses with side shields

If the construction is on an industrial site or a hazardous waste site, special training may be required prior to entering the site. The inspector should consult with OSHA or NYSDEC prior to entering such a site.

Monitoring Equipment
The following is a list of some equipment that may be helpful to document facts and verify compliance:

- Digital Camera
- Measuring tape or wheel
- Hand level or clinometer
- Turbidity meter (in limited circumstances)

2.2 Permittee's Self-inspection

This section is intended for qualified professionals who conduct site self-inspections on behalf of owner/operators. Self-inspectors are responsible for performing inspections in accordance with permit requirements and reporting to site owners and operators the results and any recommendations resulting from the inspection.

Prior to conducting inspections, qualified professionals should ensure familiarity with the Stormwater Pollution Prevention Plan and previous inspection reports.

3.0 ON-SITE INSPECTION PROCESS

3.1 Compliance Inspections

3.1.1 Professionalism

Don't Pretend to Possess Knowledge

Unless the inspector has experience with a particular management practice, do not pretend to possess knowledge. Inspectors cannot be expert in all areas; their job is to collect information, not to demonstrate superior wisdom. Site operators are often willing to talk to someone who is inquisitive and interested. Within reason, asking questions to obtain new information about a management practice, construction technique or piece of equipment is one of the inspector's main roles in an inspection.

Don't Recommend Solutions

The inspector should not recommend solutions or endorse products. The solution to a compliance problem may appear obvious based on the inspector's experience. However, the responsibility should be placed on the site owner to implement a workable solution to a compliance problem that meets NYSDEC standards. The inspector should refer the site operator to the New York Standards and Specifications for Erosion and Sediment Control (the Blue Book) or the New York State Stormwater Management Design Manual (the Design Manual).

Key advice must be offered carefully. One experienced stormwater inspector suggests saying: "I can't direct you or make recommendations, but what we've seen work in other situations is ..."

The way inspectors present themselves is important to the effectiveness of the inspection. An inspector cannot be overly familiar, but will be more effective if able to establish a minimum level of communication.

3.1.2 Safety

DOW employees must conform to Division health and safety policies when on a construction site. Other regulatory oversight authorities should have their own safety policies or, if not, may

wish to consult the OSHA health and safety tool at:

www.osha.gov/dep/etools/ehasp to develop a health and safety plan.

Some general protections for construction sites are:

- Beware of heavy equipment, avoid operator blind spots and make sure of operator eye contact around heavy equipment.
- Avoid walking on rock rip-rap if possible. Loose rock presents a slip hazard.
- Stay out of confined spaces like tanks, trenches and foundation holes.
- Avoid lightning danger. Monitor weather conditions, get out of water, avoid open areas and high points, do not huddle in groups or near trees.
- Protect yourself from sun and heat exposure. Use sun screen or shading clothing. Remain hydrated by drinking water, watching for signs of heat cramps, exhaustion (fatigue, nausea, dizziness, headache, cool or moist skin), or stroke (high body temperature; red, hot and dry skin)
- Protect yourself from cold weather. Wear multiple layers of thin clothing. Wear a warm hat. Drink warm fluids or eat hot foods, and keep dry.
- Avoid scaffolding in excess of 4 feet above grade.
- Beware of ticks, stinging insects, snakes and poison ivy or sumac.

3.1.3 Legal access

DOW has general powers, set forth under ECL 17-0303, subparagraph 6, to enter premises for inspections. In addition, ECL 3-0301.2 conveys general statutory authority granting the DOW the power to access private property to fulfill DOW obligations under the law.

ECL 15-0305 gives the DOW the authority to enter at all times in or upon any property, public or private, for the purpose of inspecting or investigating conditions affecting the construction of improvements to or developments of water resources for the public health, safety or welfare.

ECL 17-0829 allows an authorized DOW representative, upon presentation of their credentials, to enter upon any premises where any effluent source is located, or in which records are required to be maintained. The representative may at reasonable times have access to, and sample discharges/pollutants to the waters or to publicly owned treatment plants where the effluent source is located. This subparagraph provides DOW representatives performing their duties authority to enter a site to pursue administrative violations. Pursuing criminal violations may require a warrant or the owner's permission to enter the site.

For sites that are permitted, DOW has authority under the permit to enter the site.

If the owner/operator's representatives onsite deny access, the inspector *should not* physically force entry. Under these circumstances the attorney representing the inspector should be immediately notified and consideration should be given to soliciting the aid of a law officer to obtain entry.

DOW staff have the right to enter at any reasonable time. If no one is available, and the site is fenced or posted, DOW staff should make all reasonable efforts to identify, contact and notify the owner that the DOW is entering the site. If the inspector has made all reasonable efforts to contact site owners, but was unable to do so, the site can then be accessed. All efforts should be taken not to cause any damage to the facility.

Other regulatory oversight authorities should seek advice on their legal authorities to enter a job site. Municipalities that have adopted Article 6 of the New York State Sample Local Law for Stormwater Management and Erosion and Sediment Control (NYSDEC, 2004, updated 2006) will have legal authority to enter sites in accordance with that chapter and any other existing municipal authority .

Agents of DOW have authority similar DOW staff authority to enter sites. However, DOW staff enjoy significant personal liability protections as state employees. That liability protection may not be the same for authorized representatives of DOW. For authorized representatives of DOW (or other regulatory oversight authorities), it is prudent to obtain permission to enter the site. If such permission is denied, the authorized representatives should inform the appropriate DOW contact, usually the regional water manager.

3.1.4 Find the Legally Responsible Party (Construction Manager, Self-inspector)

The first action a compliance inspector should take upon entering a construction site is to find the construction trailer or the construction or project manager if they are available. The inspector should present appropriate identification to the site's responsible party and state the reason for the inspection; construction stormwater complaint response or neutral construction stormwater inspection. If the inspection is initiated as a response to a complaint, frequently the responsible party will ask who made the complaint. DOW keeps private individual complainants confidential. If the complainant is another regulatory oversight authority, DOW tends to make that known to the site's responsible party.

3.1.5 On-site records review (NOI, SWPPP, Self-inspection Reports, Permit)

Generally, the compliance inspector should next review the on-site records. Verify that a copy of the construction stormwater permit and NOI are on-site. Verify that the acreage, site conditions, and receiving water listed on the NOI are accurate. Compare the on-site documentation with documentation already submitted to, or obtained by the compliance inspector.

If the SWPPP has not been reviewed in the office, verify that it exists and contains the minimum required components (16 for a basic plan and 22 for a full plan). On-site review of the SWPPP should determine if: there is an appropriate phasing plan; the acreage disturbed in each phase, construction sequence for each phase; proposed implementation of erosion and sediment control measures; and, where required, post construction controls. For each of the erosion and sediment control practices, the SWPPP must show design details in accordance with the NYS Standards for Erosion and Sediment Controls. The SWPPP must also include provisions for maintenance of practices during construction. On-site review of post construction controls is generally limited to verification that the proposed stormwater management practices are shown on the site plan.

Where self-inspections are required, self-inspection reports are a significant tool for the compliance inspector to determine the performance history of the site. The self-inspection reports should be done with the required frequency . Self-inspection reports must include all the details required by the permit. Generally, it is desirable for permit information to be shown on a site plan. The compliance inspector should become familiar with the report and use that familiarity to judge whether the self-inspections are being performed correctly and that the site operator is correcting deficiencies noted in the report.

3.1.6 Walk the Site

During wet weather conditions, it may be advantageous to observe the receiving waters prior to walking the rest of the site. At some point during the inspection, the receiving water conditions must be observed and noted. It is critical to note if there is a substantial visible contrast to natural conditions, or evidence of deposition, streambank erosion, construction debris or waste materials (e.g. concrete washdown) in the receiving stream.

Each inspector should evaluate actual implementation and maintenance of practices on-site compared to how implementation and maintenance is detailed in the SWPPP. At a minimum, the compliance inspector should observe all areas of active construction. Observing equipment or materials storage, recently stabilized areas, or stockpile areas is also appropriate to evaluate the effectiveness of management practices.

3.1.7 Taking Photographs

Evidence of poor receiving water conditions and poor or ineffective practices should be documented with digital photographs. Those photographs should be logged date stamped and stored on media that cannot be edited (e.g. write only CDs). Photos should also be appended to the site inspector's report.

It is also beneficial to take photographs of good practices for educational and technology transfer reasons.

3.1.8 Exit Interview

Clearly communicate expectations and consequences. If it is clear from the inspection that the owner/operator must modify the SWPPP, or modify management practices within an assigned period (e.g. 24 hours, 48 hours, one week, two weeks), then that finding should be communicated at the time of the exit interview. The inspector should assign the period based on factors such as how long it would reasonably take to complete such modifications and the level of risk to water quality associated with failure to make such modifications.

The inspector should make clear that NYSDEC reserves rights to future enforcement actions. If the inspector's supervisor or enforcement coordinator determines additional enforcement actions are necessary, the inspector *should not* reassure the owner/operator that the current situation is acceptable.

3.2 Non-permitted Site Inspections

For sites not authorized in accordance with state or local laws, the process will be abbreviated. First verify the need for authorization and observe receiving waters to detect water quality standard violations. If there is a violation, notify the owner of the violation or other compliance actions in response to their illicit activity. For DOW staff, Attachment 2 or a similar notice can be used to notify the site owner/operator that stormwater authorization is required.

3.3 Self-inspections

The role of the self-inspector is to verify that the site is complying with stormwater requirements. In particular, the self-inspector verifies that the SWPPP is being properly implemented. The self-inspector also documents SWPPP implementation so regulatory agencies can review implementation activities.

It is <u>not</u> the role of the self-inspector to report directly to regulatory authorities.

Appendix H of *The New York Standards and Specifications for Erosion and Sediment Control* - August 2005 (the Blue Book) includes a Construction Duration Inspection checklist that can be used by the owner/operators qualified professional for self-inspections. The Blue Book is available on the NYSDEC website.

3.3.1 Purpose

The self inspector should ensure that the project's SWPPP is being properly implemented. This includes ensuring that the erosion and sediment control practices are properly installed and being maintained in accordance with the SWPPP/Blue Book.

The project must be properly phased to limit the disturbance to less than five acres, and the construction sequence for each phase must be followed. The SWPPP must also be modified to address evolving circumstances. Finally, and most importantly, receiving waters must be protected.

If a soil disturbance will be greater than five acres at any given time, the site operator must obtain written permission from the DOW regional office.

3.3.2 Pre-construction Conference

The parties responsible for various aspects of stormwater compliance should be identified at the pre-construction conference. Responsible parties may include, but are not limited to, owner's engineer, owner/operator/permittee, contractors, and subcontractors.

Typical responsibilities include: installation of erosion and sediment control (E & SC) practices; maintenance of E & SC practices, inspection of E&SC practices, installation of post construction stormwater management practices (SMPs), inspection of post construction SMPs, SWPPP revisions, and contractor direction.

All parties should clearly know what is expected of them. Responsible parties should complete the Pre-construction Site Assessment Checklist provided in Appendix H of the Blue Book.

3.3.3 Inspection Preparation

The inspector should review the project's SWPPP (including the phasing plan, construction sequence and site specific issues) and the last few inspection reports (if the inspector has them available).

3.3.4 Self-inspection Components

Inspect installation, performance and maintenance of all E&SC practices

The self inspector should inspect all areas that are under active construction or disturbance and areas that are vulnerable to erosion. The self-inspector should also inspect areas that will be disturbed prior to the next inspection for measures required prior to construction (e.g. silt barriers, stabilized construction entrance, diversions). Finally, self-inspectors should inspect post-construction controls during and after installation.

Identify site deficiencies and corrective measures

The self-inspector's reports must be maintained in a log book on site and the log book must be made available to the regulatory authorities. Although the legal responsibility for filing a Notice of Termination lies with the owner/operator, the self-inspector may also be called upon to perform a final site inspection, including post construction SMPs, prior to filing the Notice of Termination.

4.0 POST-INSPECTION ACTIVITIES

4.1 Regulatory Oversight Authorities

This section is intended for inspectors with regulatory oversight authority such as agents of the DOW or a local municipality, or others acting on their behalf (such as County Soil and Water Conservation District staff.) Upon completion of an inspection, inspection results should be documented for the record.

4.1.1 Written Notification

The inspector should inform the permittee or the on-site representative of their inspection results in writing by sending the permittee a complete, signed copy of the inspection report. The inspection report should be transmitted under a cover letter which elaborates on any deficiencies noted in the inspection report. It is not a good idea to commend exceptional efforts by the owner/operator in a letter, because such letters tend to undermine enforcement efforts when compliance status at a site degrades.

The inspector should consider providing a copy of the cover letter and inspection report to other parties with including:

- Permittee
- Contractor(s)
- Other regulatory oversight authorities
- Other parties present during the inspection (e.g. SWPPP preparer, permittee's self-inspector, etc.)

For DOW staff, an example of the inspection cover letter is included as Attachment 3.

4.1.2 Inspection Tracking

DOW staff must enter their inspection results into the electronic *Water Compliance System*.

Local municipalities and other regulatory oversight authorities are encouraged to develop an electronic tracking system in which to record their inspections.

4.2 Permittee's Self-inspections

This section is intended for qualified professionals who conduct site inspections for permittees in accordance with a SPDES permit or local requirements.

4.2.1 Written Records

<u>Inspection Reports</u>
The inspector shall prepare a written report summarizing inspection results. The inspection report is then provided to the permittee, or the permittee's duly authorized representative, and to the contractor responsible for implementing stormwater controls on-site in order to correct deficiencies noted in the inspection report. Finally, the inspection report must be added to the site log book that is required to be maintained on-site, and be available to regulatory oversight authorities for review.

4.2.2 Stormwater Pollution Prevention Plan Revisions

The inspector must inform the permittee of his/her duty to amend the Stormwater Pollution Prevention Plan (SWPPP) whenever an inspection proves the SWPPP to be ineffective in:

- Eliminating or significantly minimizing pollutants from on-site sources
- Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity
- Eliminating discharges that cause a substantial visible contrast to natural conditions

ATTACHMENT 1

Construction Stormwater Compliance Inspection Report

Project Name and Location:	Date:	Page 1 of 2
	Permit # (if any): **NYR**	
Municipality: County:	Entry Time:	Exit Time:
On-site Representative(s) and contact information:	Weather Conditions:	
Name and Address of SPDES Permittee/Title/Phone/Fax Numbers: Contacted: Yes ☐ No ☐		

INSPECTION CHECKLIST

SPDES Authority

	Yes	No	N/A		Law, rule or permit citation
1.	☐	☐	☐	Is a copy of the NOI posted at the construction site for public viewing?	
2.	☐	☐	☐	Is an up-to-date copy of the signed SWPPP retained at the construction site?	
3.	☐	☐	☐	Is a copy of the SPDES General Permit retained at the construction site?	

SWPPP Content

	Yes	No	N/A		Law, rule or permit citation
4.	☐	☐	☐	Does the SWPPP describe and identify the erosion & sediment control measures to be employed?	
5.	☐	☐	☐	Does the SWPPP provide a maintenance schedule for the erosion & sediment control measures?	
6.	☐	☐	☐	Does the SWPPP describe and identify the post-construction SW control measures to be employed?	
7.	☐	☐	☐	Does the SWPPP identify the contractor(s) and subcontractor(s) responsible for each measure?	
8.	☐	☐	☐	Does the SWPPP include all the necessary 'CONTRACTOR CERTIFICATION' statements?	
9.	☐	☐	☐	Is the SWPPP signed/certified by the permittee?	

Recordkeeping

	Yes	No	N/A		Law, rule or permit citation
10.	☐	☐	☐	Are inspections performed as required by the permit (every 7 days and after ½" rain event)?	
11.	☐	☐	☐	Are the site inspections performed by a qualified professional?	
12.	☐	☐	☐	Are all required reports properly signed/certified?	
13.	☐	☐	☐	Does the SWPPP include copies of the monthly/quarterly written summaries of compliance status?	

Visual Observations

	Yes	No	N/A		Law, rule or permit citation
14.	☐	☐	☐	Are all erosion and sediment control measures installed/constructed?	
15.	☐	☐	☐	Are all erosion and sediment control measures maintained properly?	
16.	☐	☐	☐	Have all disturbances of 5 acres or more been approved prior to the disturbance?	
17.	☐	☐	☐	Are stabilization measures initiated in inactive areas?	
18.	☐	☐	☐	Are permanent stormwater control measures implemented?	
19.	☐	☐	☐	Was there a discharge into the receiving water on the day of inspection?	
20.	☐	☐	☐	Are receiving waters free of there evidence of turbidity, sedimentation, or oil ? (If no , complete Page 2)	

Overall Inspection Rating: ❑ Satisfactory ❑ Marginal ❑ Unsatisfactory	
Name/Agency of Lead Inspector:	**Signature of Lead Inspector:**
Names/Agencies of Other Inspectors:	

Water Quality Observations

Describe the discharge(s) [source(s), impact on receiving water(s), etc.] _____

_____

_____

_____

_____

Describe the quality of the receiving water(s) both upstream and downstream of the discharge_____

_____

_____

_____

_____

Describe any other water quality standards or permit violations _____

_____

_____

Additional Comments:_____

_____

_____

_____

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_____

☐ Photographs attached

ATTACHMENT 2

**** NOTICE ****

On March 10, 2003, provisions of the Federal Clean Water Act went into effect that apply to many construction operations.

If your construction operations result in the disturbance of one acre or greater and stormwater runoff from your site reaches surface waters (i.e., lake, stream, road side ditch, swale, storm sewer system, etc.), the stormwater runoff from your site must be covered by a State Pollutant Discharge Elimination System (SPDES) Permit issued by the New York State Department of Environmental Conservation (NYSDEC).

To facilitate your compliance with the law, NYSDEC has issued a General Permit which may be applicable to your project. To obtain coverage under this General Permit, you need to prepare a Stormwater Pollution Prevention Plan (SWPPP) and then file a Notice of Intent (NOI) to the NYSDEC headquarters in Albany. The NOI form is available on the DEC website. You may also obtain a copy of the NOI form at the nearest NYSDEC regional offices.

When you file your NOI you are certifying that you have developed a SWPPP and that it will be implemented prior to commencing construction. When you submit the NOI you need to indicate if your SWPPP is in conformance with published NYSDEC technical standards; if it is, your SPDES permit coverage will be effective in as few as five business days. If your SWPPP does not conform to the DEC technical standards, coverage will not be available for at least 60 business days.

Failure to have the required permit can result in legal actions which include Stop Work Orders and/or monetary penalties of up to $37,500/day

If your construction operations are already in progress and you are not covered by an appropriate NYSDEC permit contact the NYSDEC Regional Water Engineer as soon as possible. If your construction field operations have not yet commenced, review the NOI and the General Permit on the DEC's website or at the DEC regional office for your area. When you are comfortable that you understand and comply with the requirements, file your NOI.

The requirement to file an NOI does not replace any local requirements. Developers/Contractors are directed to contact the Local Code Enforcement Officer or Stormwater Management Officer for local requirements.

ATTACHMENT 3

<< Date >>

Mr. John Smith
123 Main Street
Ferracane, NY 12345

Re: Stormwater Inspection
SPDES Permit Identification No. NYR10Z000 (through SPDES No. GP-02-01)
Blowing Leaves Subdivision
Gasper (T), Eaton (Co.)

Dear Mr. Smith:

On the afternoon of << date >> I conducted an inspection of the construction activities associated with the Blowing Leaves Subdivision located on County Route 1 in the town of Gasper, Eaton County. The inspection was conducted in the presence of you and Mr. Samuel Siltfence of Acme Excavating Co., Inc. The purpose of the inspection was to verify compliance with the *State Pollutant Discharge Elimination System (SPDES) General Permit for Storm Water Discharges from Construction Activity* ("the general permit").

The overall rating for the project at the time of the inspection was ***unsatisfactory***. A copy of my inspection report is attached for your information. In addition to the report, I would like to elaborate on the following:

SPDES Authority

- In accordance with subdivision 750-2.1 (a) of Title 6 of the Official Compilation of Codes, Rules, and Regulations of the State of New York (6 NYCRR), a copy of your permit must be retained at the construction site. You did not have a copy of the general permit at the site. **Your failure to retain a copy of the general permit at the construction site is a violation of 6 NYCRR Part 750-2.1 (a).** Please retain a copy of the general permit at the site from this point forward.

SWPPP Content

- In accordance with Part III.E.2. of the general permit, contractors and subcontractors must certify that they understand the terms and conditions of the general permit and the SWPPP before undertaking any construction activity at the site. Your SWPPP does not include a certification statement from Acme Excavating Co., Inc. **The failure of your contractor to sign this certification before undertaking construction activity at the site is a violation of Part III.E.2. of the general permit.** Please obtain copies of all necessary certifications and provide copies of them to each party who holds a copy of your SWPPP.

- In accordance with Part V.H.2. of the general permit, SWPPP's must be certified by the permittee. Your SWPPP was not certified by you. **Your failure to certify your SWPPP is a**

violation of Part V.H.2. of the general permit. Please certify your SWPPP.

Recordkeeping

- In accordance with Parts III.D.3.a. and III.D.3.b. of the general permit, permittees must have a qualified professional conduct site inspections within 24 hours of the end of 0.5" or greater rain events and at least once per week. A review of your records revealed that your "self-inspections" are only being conducted about two or three times per month. **Your failure to have a qualified professional conduct inspections at the required frequency is a violation of Part III.D.3.b. of the general permit.** Please immediately direct your qualified professional to conduct your site inspections at the required frequency.

- Although the frequency of self-inspections does not meet rquirements, the quality of them is very good. Your qualified professional has accurately noted the same SWPPP deficiencies and necessary maintenance activities that I also observed, and prepared thorough sketches on the self-inspection site maps.

- In accordance with Part V.H.2. of the general permit, the permittee must certify all reports required by the permit. A review of your records showed that your self-inspection reports were not certified. **Your failure to certify your self-inspection reports is a violation of Part V.H.2. of the general permit.** Please sign and certify any and all existing and future self-inspection reports.

<u>Visual Observations</u>

- In accordance with Parts III.A.2. and III.A.3. of the general permit, all erosion and sediment controls (E&SC) measures must be installed (as detailed in the SWPPP) prior to the initiation of construction. During the inspection, I noted all of your E&SC measures have been correctly installed at the right times and locations.

- In accordance with Part V.L. of the general permit, all of the E&SC measures at your site must be maintained properly. While on site I observed that, among other things, the section of silt fence in place parallel to County Route 1 is in various stages of disrepair. **The failure of your contractor to adequately maintain the E&SC measures currently in place at your site is a violation of Part V.L of the general permit.** Please direct your contractor to repair this silt fence immediately and to diligently maintain all of the other required E&SC measures as they are brought to his attention by your qualified professional.

- This inspection was conducted during a rain event which resulted in a stormwater discharge to the municipal separate storm sewer system (MS4) being operated by the Eaton County Department of Public Works. Your discharge was visibly turbid whereas upstream water MS4 was clear. As a result, the discharge from the MS4 outfall into Karimipour Creek was causing

Mr. John Smith << Date >>
Re: SPDES Inspection
Blowing Leaves Subdivision
Gasper (T), Eaton (Co.)

slight turbidity. Please be advised that the narrative water quality standard for turbidity in Karimipour Creek is "no increase that will cause a substantial visible contrast to natural conditions." I attribute the lack of maintenance of your E&SC measures to be the primary cause of the turbid discharge. Please be reminded that the general permit does not authorize you cause or contribute to a condition in contravention of any water quality standards.

If you have any questions or comments, please feel free to contact me at (999) 456-5432.

Sincerely,

Hector D. Inspector, CPESC
Environmental Program Specialist 2

HDI:ms
Attachment

cc w/att.: Chester Checkdam, (T) Gasper Code Enforcement Officer
Samuel Siltfence, Acme Excavating Co., Inc.

APPENDIX G
EROSION AND SEDIMENT CONTROL
PLAN REVIEW CHECKLIST

Project Name _____ Site Location _____

Applicant's Name & Address _____
_____

General

A narrative statement shall be provided that describes the proposed project nature and purpose; the existing site conditions including topography, vegetation and drainage; adjacent and off-site areas affected by the project; description of the soils on the site and key properties; notations of critical areas such as steep slopes, channels or wetlands; the overall phasing, sequencing and stabilization plan; total disturbed area and those not to be disturbed.

I. Construction Drawings

Are the following items shown on the construction drawings:	Yes	No
1. Vicinity Map with scale and north arrow	____	____
2. Legend, scales, N arrow on plan view	____	____
3. Existing and proposed topography shown with contours labeled with spots elevations in critical areas	____	____
4. Scope of the plan noted in the Title Block	____	____
5. Limits of clearing and grading shown	____	____
6. Existing vegetation delineated	____	____
7. Soil boundaries shown on the plan view	____	____
8. Existing drainage patterns, 100 year floodplain and sub-areas shown	____	____
9. Existing and proposed development facilities/ improvements shown	____	____
10. Location of Erosion and Sediment control practices as phased with construction	____	____
11. Phasing plan with 5 acre threshold limits shown	____	____
12. Stockpile locations, staging areas and access points clearly defined	____	____
13. Street profiles, utility locations, property boundaries and, easement delineations shown	____	____

II. Construction Notes & Details

	Yes	No
1. Specific sequence of operation given for each phase	____	____
2. Inspection and maintenance schedule shown for the specific practices	____	____
3. Design details show all dimensions and installation details necessary for construction	____	____
4. Implementation schedule for E&S practices is provided with removal criteria stated	____	____
5. Construction waste management plan incorporated in the notes	____	____
6. Site Inspections during construction are noted on the drawings and is in accordance with the General Permit for Stormwater Discharges from Construction Activities	____	____

III. Erosion & Sediment Control Practices

A. General

	Yes	No
1. Practice meets purpose and design criteria	____	____
2. Standard details and construction notes are provided	____	____
3. Special timing of practice noted if applicable	____	____
4. Provisions for traffic crossings shown on the drawings where necessary	____	____

B. Practices Controlling Runoff

	Yes	No
1. Positive drainage is maintained with contributing drainage area shown	____	____
2. Flow grades properly stabilized	____	____
3. Adequate outlet or discharge condition stabilized	____	____
4. Necessary dimensions, gradations, calculations, and materials shown	____	____

C. Practices Stabilizing Soil

	Yes	No
1. Seeding rates and areas properly shown on the drawings	____	____
2. Mulch materials and rates specified on the drawings	____	____
3. Sequencing and timing provisions limit soil exposure to 14 days	____	____

C. Practices Stabilizing Soil (cont'd)	Yes	No
4. Rolled Erosion Control Products (RECP's) used are specified to location and appropriate weight/tie down	____	____
5. All soil seed bed preparation and amendments are specified on the drawings or in the specifications	____	____
6. The seeding dates are specified to cover the entire year for both temporary and permanent seedings	____	____
7. Maximum created slope is no steeper than 2 foot horizontal to 1 foot vertical with Cut and Fill slopes shown	____	____

D. Practices Controlling Sediment	Yes	No
1. Sediment traps/basins are sized in accordance with criteria	____	____
2. The contributing drainage area is shown on the grading plan	____	____
3. All scaled dimensions and volumes are shown on the plan	____	____
4. Maintenance requirements and clean out elevations established for all sediment control practices (50% capacity)	____	____
5. All access points of the project are shown to be stabilized	____	____
6. Storm drain inlets adequately protected	____	____
7. Silt fences are shown on the contour lines with no more than one quarter acre per 100 foot drainage to it	____	____
8. Temporary sediment traps being used at locations of future stormwater infiltration facilities	____	____

Additional Comments

Plan Reviewed By: _____ Date: _____

APPENDIX H

STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM FOR CONSTRUCTION ACTIVITIES

CONSTRUCTION SITE LOG BOOK

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I. Pre-Construction Meeting Documents
   a. Preamble to Site Assessment and Inspections
   b. Operator's Certification
   c. Qualified Professional's Credentials & Certification
   d. Pre-Construction Site Assessment Checklist

II. Construction Duration Inspections
   a. Directions
   b. Modification to the SWPPP

III. Monthly Summary Reports

IV. Monitoring, Reporting, and Three-Month Status Reports
   a. Operator's Compliance Response Form

Properly completing forms such as those contained in Appendix H meet the inspection requirement of NYS-DEC SPDES GP for Construction Activities. Completed forms shall be kept on site at all times and made available to authorities upon request.

I. PRE-CONSTRUCTION MEETING DOCUMENTS
Project Name _____
Permit No. _____ **Date of Authorization** _____
Name of Operator _____
Prime Contractor _____

a. Preamble to Site Assessment and Inspections
The Following Information To Be Read By All Person's Involved in The Construction of Stormwater Related Activities:

The Operator agrees to have a qualified professional[1] conduct an assessment of the site prior to the commencement of construction[2] and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Operator shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements.

When construction starts, site inspections shall be conducted by the qualified professional at least every 7 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater (Construction Duration Inspections). The Operator shall maintain a record of all inspection reports in this site logbook. The site logbook shall be maintained on site and be made available to the permitting authorities upon request. The Operator shall post at the site, in a publicly accessible location, a summary of the site inspection activities on a monthly basis (Monthly Summary Report).

The operator shall also prepare a written summary of compliance with this general permit at a minimum frequency of every three months (Operator's Compliance Response Form), while coverage exists. The summary should address the status of achieving each component of the SWPPP.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified professional perform a final site inspection. The qualified professional shall certify that the site has undergone final stabilization[3] using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, the Operator must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

1 "Qualified Professional means a person knowledgeable in the principles and practice of erosion and sediment controls, such as a Certified Professional in Erosion and Sediment Control (CPESC), soil scientist, licensed engineer or someone working under the direction and supervision of a licensed engineer (person must have experience in the principles and practices of erosion and sediment control).
2 "Commencement of construction" means the initial removal of vegetation and disturbance of soils associated with clearing, grading or excavating activities or other construction activities.
3 "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

b. Operators Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. Further, I hereby certify that the SWPPP meets all Federal, State, and local erosion and sediment control requirements. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law.

Name (please print): _____

Title _____ **Date:** _____

Address: _____

Phone: _____ **Email:** _____

Signature: _____

c. Qualified Professional's Credentials & Certification

"I hereby certify that I meet the criteria set forth in the General Permit to conduct site inspections for this project and that the appropriate erosion and sediment controls described in the SWPPP and as described in the following Pre-construction Site Assessment Checklist have been adequately installed or implemented, ensuring the overall preparedness of this site for the commencement of construction."

Name (please print): _____

Title _____ **Date:**_____

Address: _____

Phone: _____ **Email:** _____

Signature: _____

d. Pre-construction Site Assessment Checklist
(NOTE: Provide comments below as necessary)

1. Notice of Intent, SWPPP, and Contractors Certification:

Yes No NA

[ ] [ ] [ ] Has a Notice of Intent been filed with the NYS Department of Conservation?
[ ] [ ] [ ] Is the SWPPP on-site? Where?_____
[ ] [ ] [ ] Is the Plan current? What is the latest revision date?_____
[ ] [ ] [ ] Is a copy of the NOI (with brief description) onsite? Where?_____
[ ] [ ] [ ] Have all contractors involved with stormwater related activities signed a contractor's certification?

2. Resource Protection

Yes No NA

[ ] [ ] [ ] Are construction limits clearly flagged or fenced?
[ ] [ ] [ ] Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.
[ ] [ ] [ ] Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection

Yes No NA

[ ] [ ] [ ] Clean stormwater runoff has been diverted from areas to be disturbed.
[ ] [ ] [ ] Bodies of water located either on site or in the vicinity of the site have been identified and protected.
[ ] [ ] [ ] Appropriate practices to protect on-site or downstream surface water are installed.
[ ] [ ] [ ] Are clearing and grading operations divided into areas <5 acres?

4. Stabilized Construction Entrance

Yes No NA

[ ] [ ] [ ] A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.
[ ] [ ] [ ] Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.
[ ] [ ] [ ] Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Perimeter Sediment Controls

Yes No NA

[ ] [ ] [ ] Silt fence material and installation comply with the standard drawing and specifications.
[ ] [ ] [ ] Silt fences are installed at appropriate spacing intervals
[ ] [ ] [ ] Sediment/detention basin was installed as first land disturbing activity.
[ ] [ ] [ ] Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials

Yes No NA

[ ] [ ] [ ] The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.
[ ] [ ] [ ] The plan is contained in the SWPPP on page _____
[ ] [ ] [ ] Appropriate materials to control spills are onsite. Where? _____

II. CONSTRUCTION DURATION INSPECTIONS

a. Directions:
Inspection Forms will be filled out during the entire construction phase of the project.
Required Elements:

(1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;

(2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;

(3) Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;

(4) Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);

(5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and

(6) Immediately report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

SITE PLAN/SKETCH

_____	_____
Inspector (print name)	**Date of Inspection**
_____	_____
Qualified Professional (print name)	**Qualified Professional Signature**

The above signed acknowledges that, to the best of his/her knowledge, all information provided on the forms is accurate and complete.

Maintaining Water Quality

Yes No NA
[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions?
[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease?
[ ] [ ] [ ] All disturbance is within the limits of the approved plans.
[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

Housekeeping

1. General Site Conditions
Yes No NA
[ ] [ ] [ ] Is construction site litter and debris appropriately managed?
[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?
[ ] [ ] [ ] Is construction impacting the adjacent property?
[ ] [ ] [ ] Is dust adequately controlled?

2. Temporary Stream Crossing
Yes No NA
[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.
[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.
[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?
[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

Runoff Control Practices

1. Excavation Dewatering
Yes No NA
[ ] [ ] [ ] Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.
[ ] [ ] [ ] Clean water from upstream pool is being pumped to the downstream pool.
[ ] [ ] [ ] Sediment laden water from work area is being discharged to a silt-trapping device.
[ ] [ ] [ ] Constructed upstream berm with one-foot minimum freeboard.

2. Level Spreader
Yes No NA
[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.
[ ] [ ] [ ] Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales
Yes No NA
[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.
[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.
[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

Runoff Control Practices (continued)

4. Stone Check Dam

Yes No NA

[ ] [ ] [ ] Is channel stable? (flow is not eroding soil underneath or around the structure).
[ ] [ ] [ ] Check is in good condition (rocks in place and no permanent pools behind the structure).
[ ] [ ] [ ] Has accumulated sediment been removed?.

5. Rock Outlet Protection

Yes No NA

[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles

Yes No NA

[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.
[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation

Yes No NA

[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.
[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

Sediment Control Practices

1. Stabilized Construction Entrance

Yes No NA

[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

2. Silt Fence

Yes No NA

[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
Sediment accumulation is ___% of design capacity.

Sediment Control Practices (continued)

3. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated practices)

Yes No NA

[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2" x 4" frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.

Sediment accumulation ___% of design capacity.

4. Temporary Sediment Trap

Yes No NA

[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.

Sediment accumulation is ___% of design capacity.

5. Temporary Sediment Basin

Yes No NA

[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch.
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.

Sediment accumulation is ___% of design capacity.

Note: Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design.
Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.

CONSTRUCTION DURATION INSPECTIONS

b. Modifications to the SWPPP (To be completed as described below)

The Operator shall amend the SWPPP whenever:

1. There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not otherwise been addressed in the SWPPP; or
2. The SWPPP proves to be ineffective in:
   a. Eliminating or significantly minimizing pollutants from sources identified in the SWPPP and as required by this permit; or
   b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

Modification & Reason:

III. Monthly Summary of Site Inspection Activities

Name of Permitted Facility:	**Today's Date:**	**Reporting Month:**
Location:	**Permit Identification #:**	
Name and Telephone Number of Site Inspector:		

Date of Inspection	Regular / Rainfall based Inspection	Name of Inspector	Items of Concern

Owner/Operator Certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law."

Signature of Permittee or Duly Authorized Representative

Name of Permittee or Duly Authorized Representative Date

Duly authorized representatives must have written authorization, submitted to DEC, to sign any permit documents.

Belleayre Mountain Ski Center

Unit Management Plan

DRAFT

Appendix E

Stormwater Pollution Prevention Plan (SWPPP)

SWPPP Binder 2 - Construction Phase Erosion and Sediment Control Plan

prepared by

NYSDEC Bureau of Design & Construction

DRAFT

Belleayre Mountain Ski Center

Construction Phase Erosion and Sediment Control Plan

March, 2011

New York State

Department of Environmental Conservation

Division of Operations

Bureau of Design and Construction

Prepared by:

James Meurs

Belleayre Mountain Ski Center

Construction Phase Erosion and Sediment Control Plan

2011

VOLUME II

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BACKGROUND INFORMATION

1. ABBREVIATIONS, ANCRONYMS, AND TERMINOLOGY

Terms particular to this project and report are as follows:

Blue Book The most current version of the New York Standards and Specifications for Erosion Control

CPE&SCPs construction phase erosion and sediment control plans.

Subcatchment Area, A watershed area, Drainage Basin or part thereof, often associated with a single outlet point

DDB Dry Detention Basin

SSF Surface Sand Filter Stormwater Quality Treatment System

BRF Bioretention Filter Stormwater Quality Treatment System

DSW Dry Swale Stormwater Quality Treatment System

Tc Time of concentration for modeling Purposes

OCS Outlet Control Structure

TSB Temporary Sediment Basin

For consistency, the areas where construction will occur will be referred to as follows:

Proposed Upper Discovery Parking
Existing Discovery Bus Parking
Existing Lower Discovery Parking Lots
Proposed North Parking
Proposed East Parking
Proposed Snowmaking Pond Area
Proposed Skier Bridge Area
Tomahawk Reception Lodge

2. OVERALL PROJECT DESCRIPTION

2.1. Belleayre Mountain General Description

Belleayre Mountain Ski Center is a State owned recreation facility, located in the Town of Shandaken, Ulster County, NY. Operated by the New York State Department of

Environmental Conservation, it provides year-round recreation opportunity. The facility is predominately on Forest Preserve land which has been classified as an Intensive Use Area in the Catskill Park State Land Master Plan. The Belleayre Mountain Intensive Use Area (excluding day use area) is located on 2,165.28 acres of state lands acquired as Forest Preserve (2,107.25 acres), special use (15.03 acres), and approximately 43 acres of Non-Forest Preserve.

For the purposes of this CPE&SC the Owner/Operator name, legal address and phone number are as follows: (Insert narrative to meet DOP SWPPP Appendix A-3 Checklist).

Figure G4, titled "Overall Project Master Plan" is a Vicinity map showing the overall project boundaries.

SHPO documentation "that the project has no effect on property on or eligible historic registers" can be found in the UMP/DEIS Document "(Insert reference to meet DOP SWPPP Appendix A-3 Checklist)."

2.2. Project Features General Description

As part of this project a land area of approximately 78 acres, comprising the former Highmount ski resort is being considered as added to Belleayre. Plans for the construction of ski lifts, ski trails and their supporting infrastructure in this area, in addition to the traditional facility area are included within the scope of this project. The individual Belleayre Ski Center "site areas" are encompassed within the boundaries of the overall property as described above.

The numerous Site Areas, which are being considered and discussed in this SWPPP, where construction with various associated levels of site disturbance is proposed, include:

- Parking lot areas and access drives
- Ski trails, ski lifts, terminals, and snowmaking equipment
- Snowmaking water pond with associated infrastructure, including pumping and water transmission lines
- Skier bridge crossing Overlook Road
- Seasonal amphitheatre style seating area
- Enclosed parking area deicing materials storage facility

3. PURPOSE AND SCOPE

The intent of the Construction Phase Erosion and Sediment Control Plan (CPE&SCP) is to enable contractors to plan and execute construction activities with no impact to surrounding water bodies and adjacent properties.

The Belleayre Expansion Project is expected to be constructed over an approximately ten year period. This document includes specific CPE&SC plans for each "project". This document will be used by contractors and inspectors throughout the life of the project.

Changes to the document are expected over the time frame of the project and will be addressed as is required.

II. EXISTING SITE CHARACTERIZATION

The site is located a short distance from the intersection of State Route 28 and County Route 49a in the Town of Shandaken, Ulster County, New York. Proposed construction will occur in several distinct areas on the larger overall state property comprising the Ski Center Facility. The areas of proposed construction can separated into areas of intense construction and areas of what could be considered lesser scale in terms of site disturbance and impervious areas constructed.

The existing site conditions are described in detail in the SWPPP in Section II, Existing Site Characterization. This section covers the following; topography, culvert inventories, receiving waters, watershed boundaries, stream system classifications, indentified wetlands, soil descriptions, and subsurface investigations.

The existing site characterization information has been used to develop site specific construction phase erosion and sediment control plans covered in this document.

III. APPLICABLE REGULATIONS AND PERMIT REQUIREMENTS

Stormwater discharges require a State Pollutant Discharge Elimination System (SPDES) General Permit. The CPE&SC design is in accordance with Stormwater Discharges from Construction Activities (GP-0-10-001). The GP-0-10-001 SWPPP check list was completed in preparing this document and is provided in Appendix F.

Additional permits required from other agencies will be defined during the UMP public review process.

IV. CPE&SC General Description

The CPE&SC plan will follow the methodology and guidelines of New York State Standards and Specifications for Erosion and Sediment Control, “Bluebook” and with Stormwater Discharges from Construction Activities (GP-0-10-001).

The intent of the CPE&SC is to minimize the impact to surrounding water bodies and adjacent properties. This goal will be met using the following Construction Phase Erosion Sediment Control practices and principles.

- Phasing of construction is provided to control the size of areas actively disturbed by site work.
- Construction sequencing is defined to make sure CPE&SC practices are implemented prior to site disturbance. Sequencing considerations also include

excavation/transportation of fill material and service driveway construction in order to limit the time frame of construction.

- Perimeter CPE&SC practices will divert clean up slope storm water runoff around disturbed areas where possible.
- Down slope CPE&SC practices include use of temporary swales, sediment basins and silt fence. Permanent SWPPP practices, such as, detention basins, swales and culverts will be used where possible.
- Soil stabilization will occur within specified timeframes and use defined methods.
- A construction inspection and maintenance program will be implemented. Specific water quality discharge points will be identified for water quality monitoring.

Site areas where grading and re-vegetation will occur are included in CPE&SC as are areas where small isolated impervious areas will be created. Some components of site construction will occur in numerous non-contiguous areas. Each area will have individual design attention given to construction phase erosion and sediment controls.

Site specific narrative descriptions are shown in Section VII, Proposed Site Conditions and Site Specific Erosion & Sediment Control Plan General Description. Specific details of CPE&SC practices are discussed in Section VIII, CPE&SC Practices. Pollution Prevention narrative is found in Section IX, Pollution Prevention Measures for Litter, Construction, Chemicals and Debris. Inspection and maintenance procedures and requirements are described in Section X, Construction Inspection and Maintenance. The Owners Inspector Site Log found in Appendix G provides inspection forms to document the implementation of CPE&SC measures and construction progress.

V. PLANNED SITE CONSTRUCTION AND SITE SPECIFIC EROSION & SEDIMENT CONTROL PLAN GENERAL DESCRIPTION

1. SKI LIFTS AND TRAILS

1.1. Ski Trail Construction

Ski trail clearing operations will include the construction of fall line and cross slope ski trails. The majority of the ski trails will be fall line ski trails. Connector trails are constructed on cross slopes and will require cut & fill operations. Site specific E&SC plans showing the locations of erosion control practices have been created for connector trails. CPE&SC plans are shown on drawing number PK-9&10.

Erosion and sediment control practices for trail construction will be conducted similarly as it has been done in previous trail construction projects with much success. Belleayre staff are experienced in ski trail and lift construction including erosion control techniques. They will use the following measures to mitigate the potential impacts of the lift and trail clearing operations.

- Trees will be cut and chipped, and the chips will be spread over the trail surface for erosion control. Clearing and grubbing of stumps will then occur with the chips remaining to provide erosion control.
- On constructed trails, which involved cut/fill operations, exposed earth areas will be contained by diverting clean runoff from the uphill side as much as practicable.
- Silt fence and/or chip berms on the downhill side will be utilized to filter the runoff from the raw site.
- Logs will be used on constructed trails to create cribbing to help stabilize the down gradient slope.
- Where possible, tree stumps will be cut flush to the ground to minimize the impact to the existing root systems and to allow the quick establishment of vegetative mat. Emphasis to minimize cutting, filling and grubbing operations on slopes between 25 and 40 percent will be made. During final layout of trails minor adjustments will made by the engineer to minimize these impacts.
- During final grading, water bars will be constructed to intercept and divert water from new trails and lift areas. Water bars will be constructed according to detail 2/EC10. Spacing may be adjusted for field conditions, i.e. before crossing gravel service roads, and top of steep grades. Where new trails, or gravel service roads require the installation of new culvert pipe, stone inlet and outlets will be installed to dissipate velocity and reduce potential erosion.
- Areas where finish grade has been established will be seeded and mulched within 3 days. No areas shall be left with raw earth exposed for more than 7 days.
- Limit individual disturbance areas to less or equal to 1 acre at any time.

1.2. Mountain Bike, Cross Country and Hiking Trails

New trails utilized for hiking, cross country skiing and mountain biking construction are proposed as part of the UMP.

New Cross Country Trails are proposed along the perimeter of the proposed Snowmaking Reservoir to connect existing cross country trails after the construction of the reservoir. The layout of the trails is shown on Drawing TR-8.

1.3. Lift Terminals and Staging Areas

Lift terminal and staging areas are located in flat to low slope areas and are limited to approximately ¼ acre in size. E&SC practices include silt fence, upgradient diversion swales, and vegetative stabilization.

Grading and CPE&SC plans are shown for the Proposed Highmount Lift (LT 2&3), the Proposed West Lift (LT 4&5), Discovery Lift (LT 6&7), and the Novice Lift (LT 8&9).

1.4. Lift Line Construction

The scope of lift line clearing operations is less than most trail clearing operations. Construction of the lift line corridors will involve:

- Cutting trees to provide a 60' wide area with sufficient clearance.
- Stumps are cut flush to the ground.
- Grading operations are limited to areas where ski trails are created or vehicle access is required.
- Ground cover vegetation will be undisturbed to the extent possible.
- Areas requiring site disturbance will be stabilized using practices defined in Section 1.1, Ski Trail Construction.
- Wooded areas which are cut will be allowed to naturally fill in with brushy type growth where no ski trails or service driveways are to be created.
- Limited grading operations will occur in areas where lift towers are installed. In these locations E&SC practices include silt fence, upgradient diversion swales, and vegetative stabilization.

CPE&SC plans are shown on drawing number TR-9 and TR-10.

1.5. Linear Utilities

Linear utilities include underground water pipe, air lines, culvert and electric lines.

Erosion from pipeline construction will be minimized by limiting the length of the open trench to 1200' for a period not to exceed 10 days. Stone check dams will be placed in sloped trenches at a minimum of 300' intervals to slow the velocity of stormwater runoff that may enter the trench.

Areas where finish grade has been established will be seeded and mulched within 3 days. No areas shall be left with raw earth exposed for more than 10 days.

1.6. Stream Crossing Skier Bridge Area

Two ski bridges are proposed over watercourses. The first stream crossing is over an unnamed tributary and is located downhill of the Tomahawk lift loading area. The second stream crossing is over Crystal Brook and is located uphill of the Belleayre Learning Center. The stream crossing locations have an approximate 8' wide normal flow channel width. The top of the stream embankments are approximately 20' in width and have a depth of approximately 4 to 8 feet. The slopes of the streams at the crossings are approximately 10%.

The water flow in these watercourses is historically intermittent during the summer months. Construction of the ski bridges will occur during the summer season. E&SC practices include diverting stream flow around the construction site using pumps if required. Other E&SC practices include upgradient diversion swales, silt fence, and riprap & vegetative embankment stabilization.

Grading and CPE&SC plans are shown for the two stream crossing bridges on TR 13&14.

Applicable permits will be obtained before work commences as is required.

1.7. Road Crossing Skier Bridge

A skier bridge crossing over the Overlook Access Road is proposed. The bridge construction consists of concrete abutments and a concrete bridge surface. Both entrance and exit ramps to the bridge are constructed with fill material. The bridge exit ramp location is on an approximately 25% slope.

E&SC practices include silt fence, upgradient diversion swales, and vegetative stabilization. Vegetative mats will be utilized on fill section slopes over 1:2.

Grading and CPE&SC plans are shown for the skier bridge on TR 16.

2. PARKING LOT AREAS

Three new parking areas are proposed: the Upper Discovery, East and North Parking Areas. The sites are designated as Intensive Development Areas. Site specific CPE&SC plans have been created for each parking area and include site plans, construction sequencing, and CPE&SC practice details.

Generally, the stone surfaced parking lots are constructed in tiers with service driveways connecting each tier. The permanent storm water management practices include treatment in dry swales. The dry swales convey flow to dry detention basins which flow through culvert networks to lower elevation dry detention basins.

The construction phase erosion and sediment control plans use permanent storm water treatment practice locations during construction where possible. Parking tier construction will use lower elevation parking tier locations of dry swales and dry detention basins as CPE&SC perimeter practices. Additionally, runoff from active construction areas will generally flow through multiple sediment basins prior to discharge from the site. Service drives will be constructed prior to parking tier construction to enable transport of excavated cut/fill material. Cut and fill volumes are shown in Appendix B.

Permanent outlet control structures and rockdams used as sediment basins during construction will be modified with temporary dewatering devices. The dewatering device is attached to the permanent underdrain pipe at the Outlet Control Structure (OCS) or rock dam. A typical dewatering device is shown on Detail 3/EC11. The dewatering devices use perforated pipe, pea stone and filter fabric to filter turbid construction site runoff.

The permanent OCS and culverts are installed prior to the dry detention basins use as temporary sediment basins (TSBs). The TSBs are sized to use the capacity of the culverts.

Peak discharge for each phase of construction was determined for 10 year, 24 hour storm events (6") using the SCS-TR-55 Graphical Peak Discharge Method. The construction

phase peak flows were used to calculate TSB volume which attenuates peak flows to less than the permanent culvert capacity.

Table 1 (below) and Appendix A show temporary sediment basin volumes required to attenuate peak flow under the capacity of the drainage culverts. The methodology is discussed in Section XI, Calculations. The minimum required volumes are compared to the available volume of the permanent basins. The available volumes are taken from the SWPPP Hydrocad analysis which is shown in Appendix B of the SWPPP document. The maximum allowable disturbed area for each basin is shown as well. All sediment basins detain greater than 3,600 cubic feet per acre of drainage (required by Bluebook). Volumes of sediment basins using weirovers (not culverts) require 3,600 cubic feet per acre of drainage area and are also shown in Appendix B and Table 1.

Table 1 Temporary Sediment Basins: Required volumes of TSBs compared to volumes of permanent basins

Parking Area	Phase	Basin	Minimum Volume Required	Total Available Vol ft^3	Max Disturbed Area (Ac)
Upper	1a	Drydet G&H	18000*	71,238	5.0
	2	Drydet C	17640*	23570	4.9
	3	Drydet B	14760*	23570	4.1
	4	Drydet A	14873	23590	3.8
	5	Drydet E /DS-SO	8575	37740	1.5
East	1	Bioret 1	4959	7790	0.9
	1	Bioret 2	1800*	12634	0.5
	2a	Drydet 1	25200*	25200	2.4 (plus 4.6 acres phase 2b)
	2b	Drydet A/Swales	28418	33399	4.6
North	1	1	1322*	1350	0.4
	1	2	1455*	1470	0.4
	1	3	926*	930	0.3
	1	4	1983*	1980	0.6
	1	Drydet A/Swales	19804	76809	4.0

*TSB volume calculated as 3,600 ft^3 per acre. Additional capacity to attenuate the peak flow to less than that of the culvert capacity is not required (peak discharge is less than culvert capacity).

The dry swales and dry detention basins used as TSBs will be rough graded to the elevations and layout shown on the SWPPP Proposed Grading and Drainage drawings (PK- 1, 4 & 7). Construction of permanent dry swale and dry detention underdrains will

be performed after other site work is complete in order to prevent contamination of the permeable soil media with turbid construction phase runoff.

Dry swale and dry detention basin permanent construction details are as follows.

1/PK10 Parking Lot – Partial Plan View Showing SW Management Features
1/PK11 Rock dam Detail
4/PK11 Dry Swale System Detail
4/PK 10 Dry Detention Pond Section
5/PK 10 Dry Detention Pond Outlet

2.1. Upper Discovery Parking

General Description

The Upper Discovery Lot is 16 acres in size, consists of four parking tiers for a total of 336 parking spaces. This parking lot is located uphill of the existing Discovery Lodge Parking Lot. The project is divided into six phases; each construction phase is less than five acres. The CPE&SC plan is shown on drawing number PK-4 and PK-5.

Generally, the permanent detention basins and culvert will be installed from the bottom to the top of the site initially. Both loop service drives will also be constructed to allow transportation of fill material throughout the site. The parking tiers are finally constructed after perimeter erosion control devices and service drives are in place.

Construction phasing is planned to obtain cut material required for use in fill areas. The Upper Discovery Parking area construction will create approximately 1860 cubic yards of extra cut material. Approximately 3250 CY is required for completion of the east service drive. Approximately 2800 CY of fill material is available from construction of the lower elevation storm water basins Drydet G, H, F, E, and SSF1. Approximately 2500 cubic yards of fill material will be obtained from the construction of the west road and the highest elevation parking tier, UD-D. Enough fill will be available from the lower elevation sediment basins and the west service drive to complete construction of the east service drive during phase 1A and 1B. However, in order to minimize transportation of fill material the east service drive may be completed using fill from Parking Tier D during phase 2.

Phase 1A construction proceeds as follows. Perimeter erosion control practices including silt fence, the upper elevation diversion swales, and the lower elevation Drydet G&H basins will be installed initially. Drydet G&H provide over 50,000 cubic feet of storage. The Drydet G&H stepped weir outlet structures will be modified to filter storm water through filter fabric and peastone during construction. Higher elevation detention basins Drydet E&F, SSF1, FBSSF1, and the entrance road (0+00 to 4+00) will be constructed next. These above mentioned basins will treat construction stormwater runoff for the duration of the construction project.

Phase 1B entails construction of dry detention basins C, B, and A, culvert and the east & west service drives. The dry detention outlet control structures will utilize temporary dewatering devices during construction. See detail 3/EC11.

Phases 2 through 5 entails construction of parking tiers from the top of the site (UD-D) to lower elevation tiers (UD-C, B, A). Prior to construction of each parking tier, lower elevation temporary swales will be constructed at the dry swale locations. For instance, temporary swales will be constructed to the UD-C dry detention basin prior to the higher elevation UD-D parking tier construction. Parking tiers UD-C, B and A are constructed in similar fashion. The permanent under drains (soil media and perforated underdrain pipe) for both the dry swales and dry detention basins are installed after site work is complete.

Runoff from each phase of construction flows through multiple lower elevation storm water basins before flowing offsite. The additional detention time provided by the lower elevation storm water basins will benefit construction phase storm water treatment.

Construction Sequence

PHASE 1A

1. Install silt fence as shown on plans.
2. Clear and grub (C&G) and construct stabilized construction entrance.
3. C&G and construct diversion swales located above the construction site as shown on plans.
4. C&G and construct the lower elevation DRYDET G&H and install permanent slotted v-notched weirs.
   - Pump water around the construction site to location shown on plans during construction.
   - Place peastone gravel in front of slotted v-notch (to bottom of v-notch) during construction to filter construction phase storm water. Remove peastone during Phase 5.
5. C&G and construct the stone lined conveyance channel which discharges to Drydet G&H.
6. C&G and construct SSF1, FB-SSF1
   - Rough grade SSF1 and FG-SSF1 to create one temporary sediment basin. Grade basin to elevation and layout shown on drawing PK-4.
   - Install SSF1 OCS and attach temporary dewatering device to SSF1 OCS underdrain pipe. See detail 3/EC11 and drawings PK 24, PK 2.
   - The rock dam/weir for pretreatment basin FG-SSF1 and the sand filter for SSF1are constructed at the end of Phase 5.
7. C&G and construct Drydet E & F, DS-S0, and the entrance road (0+00 TO 4+00).
   - Install DS-S0 rock dam and attach temporary dewatering device to rock dam underdrain pipe.
   - The DS-SO dry swale underdrain (perforated pipe and soil media) will be constructed in Phase 5.

PHASE 1B

1. C&G and construct the west service drive (0+00 TO 11+00) and the east service drive (19+00 TO 30+00).
   - The east service drive requires approximately 3,250 CY of fill material. Enough fill is available from phase 1A and from the west service drive construction to complete the east service drive. However, completion of the upper section of the east service drive may occur during phase 2 in order to use fill from Parking Tier D construction.
   - Construct waterbars and level spreaders during service drive construction as shown on plans or as required per field conditions. Discharge to buffer areas. See detail 2/EC11 and 4/EC10
2. C&G and construct Drydet- A,B,C&D
   - Install OCS, and OCS culvert.
   - Attach temporary dewater devices to dry detention basin OCS underdrain pipe in Drydet A, B, C. See detail 3/EC11.
   - Underdrain (perforated pipe and soil media) of each Drydet basin will be constructed after Parking Tiers associated with each Drydet basin is completed.

PHASE 2

1. C&G and construct UD-D Parking Area, service drives and dry swales.
   - Construct temporary swale to Drydet C prior to Tier UD-D construction.

PHASE 3

1. C&G and construct UD-C Parking Area, service drives and dry swales.
   - Construct temporary swale to Drydet B prior to Tier UD-C construction.

PHASE 4

1. C&G and construct UD-B Parking Area, service drives and dry swales.
   - Construct temporary swale to Drydet A prior to Tier UD-B construction.

PHASE 5

1. C&G and construct UD-A Parking, service drives and dry swales.
2. Construct DS-S0 dryswale underdrain (perforated pipe and soil media) after Parking Tier A is complete. Remove temporary dewatering device.
3. Construct FB-SSF1 Overflow Checkdam with notched weir.
4. Construct SSF1 sandfilter (underdrain and soil media). Remove temporary dewatering device.

2.2. North Discovery Parking

General Description

The North Discovery Parking Lot is 6 acres in size and consists of two tiers for a total of 184 parking spaces. The parking lot is located along CR 49a (Galli Curci Road) below the Discovery Lodge Bus Parking Lot. The CPE&SC plan is shown on drawing number PK-10.

Construction phasing is structured to obtain cut material required for use in fill areas. The North Discovery Parking area will require approximately 1700 CY of fill material from off site. Cut material is available from the west service drive (2900CY), the west side of the lower Parking Tier A (2500 CY) and the drydetention basin underdrains (750CY). Fill is required at the eastern lower elevation Parking Tier A (-4700CY), the upper elevation Parking Tier B (-2000CY), and the East Service drive (-1600CY). The source of the extra fill material will be decided before construction begins. Specific cut and fill volumes are shown in Appendix B.

Construction will be performed in two phases.

Phase one entails the construction of perimeter erosion control devices. Silt fence, perimeter temporary swales, and riprap outlet sediment traps are initially constructed down gradient of the construction site to treat runoff from Parking Tier A construction. Rough graded Drydet A and dry swales with rock dams are constructed next to serve as sediment basins for the higher elevation Parking Tier B construction. Temporary dewatering devices will be attached to the Drydet A OCS and dry swale stone dam underdrain pipe.

Phase two entails construction of Service drive and Parking Tier A&B construction. Fill obtained from cut areas at the eastern service drive and dryswale/drydetention basins will be utilized in areas requiring fill.

Construction Sequence

PHASE ONE

1. Install silt fence as shown on plans.
2. Clear and Grub (C&G) and construct stabilized construction entrance.
3. C&G and construct riprap outlet temporary sediment traps 1, 2, 3&4 as shown on plans. See detail 3/EC9.
    - Construct temporary swales draining to TSBs as shown on plans. See detail 1/EC10.
4. C&G and construct temporary roads to allow transport of fill from the western area of the site to the eastern area of the site.
5. C&G and construct rough graded Drydet A, dry swales, and rock dams. Use cut material to complete the eastern Tier A dry swale (which requires fill material) and begin Tier A parking area construction.

- Attach temporary dewatering devices to Tier A OCS and rock dam underdrain pipe. See detail 3/EC11.
- Tier A dry swale underdrain (perforated pipe and soil media) will be constructed in Phase 2.

6. Install culvert from Drydet A to the discharge location at Crystal Brook.

PHASE TWO

7. Complete construction of Parking Tier A. Construct the west service drive (0+00 to 5+00) and use cut material to construct Parking Tier A.
8. C&G and construct the higher elevation Parking Tier B.
9. Install Tier A& B dry swale underdrains (perforated pipe and soil media). Remove temporary dewatering devices.
    - Approximately 750 CY of cut material will be created from installation of the underdrains. Use material to complete construction of Parking Tier B.

2.3. East Parking and Adjacent Information Bldg Parking

General Description

The East Discovery Parking Lot is 7 acres in size and consists of three tiers of parking for a total of 164 parking spaces. This parking area is located in between U&D, Galli Curci and Van Loan Roads. Additionally, a proposed information kiosk parking area is located between Rt 28 and Van Loan Road. The CPE&SC plan is shown on drawing number PK 13.

The first phase entails construction of the lower elevation EP-D parking, the information kiosk and the East Discovery Parking Area service drive (0+00 to 2+50). Perimeter erosion control practices consisting of silt fence, rough graded Biorention basins 1&2, drainage culverts, catch basins and culvert are constructed prior to performing Parking Area EP-D and serivice drive site work.

Phase 2 entails construction of EP-A, B, C parking tiers, loop roads and permanent storm water basins. Phase two is divided into phase 2A and phase 2B.

Phase 2A entails construction of the east service drive (2+50 to 9+00), EP-A service drive, and sections of Parking Tiers C&B. The area defined in phase 2A drains to Drydet1/SSB1, which are rough graded to create one temporary sediment basin. Treated storm water runoff from phase 2B also drains to Drydet 1/SSF1 from Drydet A. Permanent storm water basins Drydet 1, SSF1, SFFB1, and SFFB2 will be completed after phase 2 site work is completed.

Phase 2B entails the construction of the Parking Tiers A, B, & C and the west service drive. The EP-A parking tier will be constructed prior to the balance of phase 2B site work. Rough graded Drydet A and dryswales with rock dams will be utilized as sediment basins during Parking Tier B&C construction. The dryswale rock dams and dry detention

basins will utilize temporary dewatering devices during construction to filter turbid runoff.

Approximately 5,000 cubic yards of extra fill material will be created. The extra cut material will be stockpiled in a location to be determined before construction commences. The west service drive, the entrance road (Van Loan Road), and Parking Tiers EP-C and EP-A are cut areas. Parking Tier EP-B and east EP-A&B parking tier service drives are fill areas. Perimeter service drives will be constructed before parking areas to allow movement of excavated material throughout the site. Cut and fill volumes are shown in Appendix B.

Construction Sequence

PHASE 1

1. Install silt fence as shown on plans.
2. Clear and Grub (C&G) and construct stabilized construction entrance at parking area EP-D.
3. Clear and grub (C&G) and construct rough graded Bioretention basins 1&2.
    - Install outlet control structures and attach temporary dewatering devices to the solid underdrain pipe. See detail 3/EC11.
4. Install catch basins and culverts which convey runoff to Bioretention Basin 1.
    - Plug overflow culvert at OCS adjacent to Bioret 1 to divert all construction phase runoff to Bioret 1. See Drawing PK 13.
5. C&G and construct Van Loan service drive to 2+50 and EP-D Parking.
    - Construct stabilized construction entrance.
6. Install permanent bioretention underdrain collectors (perforated pipe and soil media) after all other phase 1 site work has been completed.

PHASE 2A

1. Install silt fence as shown on plans.
2. Clear and Grub (C&G) and construct stabilized construction entrance near the BMSC Maintenance Center located off of U&D Road.
3. Construct diversion swales as shown on plans to divert clean runoff around construction area.
4. C&G and construct side conveyance channel which drains Drydet 1.
5. C&G and construct rough graded Drydet1/SSB1 to elevations and layout shown on PK 13 to create one temporary sediment basin.
    - Install Drydet 1 OCS and attach temporary dewatering device to underdrain pipe. See detail 3/EC11.
    - Permanent basins Drydet 1, SFF1, SFFB2 and SFFB1 will be constructed after all other phase 2 sitework is complete. SFF1, SFFB2 and SFFB1 culverts are shown on EC 6 and are to be installed during permanent construction as well.

- Install SSF1 culvert under roadway to conveyance channel and plug until permanent basin is constructed.

6. Construct temporary swales draining to TSB Drydet1/SSF1.
7. C&G and construct EP-A service drive (20+00 TO 22+75) and east service drive (2+50 TO 9+00).
    - Use fill from service drive (0+00 to 2+50) and Drydet/SSF1 excavation.

PHASE 2B

1. Construct Parking Tier A.
    - Install Drydet A OCS with temporary dewatering device attached to underdrain pipe. (3/EC11).
    - Install culvert from Drydet A to Drydet 1.
    - Rough grade dryswales and construct permanent rock dams with temporary dewatering devices attached to rock dam underdrain pipe. (3/EC11)
    - Dry swale and dry detention basin underdrain (perforated pipe and soil media) to be installed after phase 2 site work is completed.
2. Construct temporary swales draining to Drydet A.
3. C&G and construct the west service drive.
4. C&G and construct Drydet B&C.
    - Install OCS, and culverts.
5. C&G and construct parking tiers B&C.
    - Dry swale underdrains (perforated pipe and soil media) are installed after higher elevation parking tiers are completed.

3. BUILDINGS

A variety of renovation, expansion and new construction building projects are proposed in the unit management plan. The Discovery and Sunset Lodges will be renovated and expanded and an amphitheatre will be added onto the Overlook Lodge. New construction projects include the Tomahawk Lodge, a salt shed building, a compressor building, and an information building. A description of each site and of the erosion control practices to be implemented is summarized below.

3.1. Discovery Lodge

The Discovery Lodge is to be expanded and renovated. In addition, parking and service drive improvements, permanent stormwater practices and sanitary system infrastructure improvements are proposed. The Discovery Lodge site is approximately 5 acres in size. Construction will be performed in two phases. The first phase entails construction of parking, roadway, an underground fuel oil and propane storage tanks. The second phase of construction entails the partial demolition and reconstruction of the existing Discovery Lodge.

The CPE&SC practices for this site include a temporary sediment trap, and silt fence. Steeper slopes, which are noted on the plans, will be stabilized with erosion control blankets. The noted slopes are approximately 30 to 40 foot long and greater than 1:2 grade.

Grading and CPE&SC plans are shown on BS 6&7. The CPE&SC plan was designed by Shumaker Consulting Engineering and Land Surveying, P.C.. The consultants design documentation is shown in Appendix G.

3.2. Sunset Lodge Expansion

A 3,500 square foot addition to the existing Sunset (Summit) Lodge is proposed. The lodge is located on a flat area at the summit of Belleayre Mountain. E&SC practices include perimeter silt fence and soil stabilization (seed and mulch).

Grading and CPE&SC plans are shown on drawing number BS 10.

3.3. Tomahawk Lodge

The proposed Tomahawk Lodge is an approximately 3,500 sq ft structure to be utilized as a rest and bathroom facility. The proposed location is adjacent to the base of the Tomahawk lift. The site is gently sloped.

E&SC practices include use of diversion swales, silt fence, and soil stabilization.

Grading and CP E&SC plans are shown on drawing number TR-16.

3.4. Overlook Lodge Amphitheatre Area

The proposed location of the Overlook Lodge Amphitheatre is uphill of the Overlook Lodge. The amphitheatre covers a total area of 29,740 square feet. The 3,130 sq ft stage will have a permanent roof system. The 5,210 sq ft primary seating area will be covered with a cable and membrane roof system. The 21,400 sq ft terraced/lawn open air seating will be constructed into the sloped area uphill of the stage.

Existing catch basins located in front of the Overlook Lodge will used during construction to drain storm water from the site. The existing catch basins will be converted to Catch Basin Sediment Traps as shown on detail 1/ EC12. The volume of the Catch Basin Sediment Traps totals 2,200 cubic feet to treat 0.6 acre drainage area. The existing 6” culvert discharges approximately 250’ below the Overlook Lodge to a vegetated location. A diversion swale will be constructed upland of the uncovered seating area.

The grading and CP E&SC plan is shown on drawing number BS13.

3.5. Salt Shed Building

The 2560 square foot proposed salt shed building is located adjacent to the existing Belleayre Maintenance Center. The building layout is shown on drawing number BA26.

The site location is gently sloping. CPE&SC practices include silt fence and soil stabilization.

The grading and CP E&SC plan is shown on drawing number BS16.

3.6. Compressor Building

The proposed 5756 square foot main compressor building is located adjacent to the upper Tomahawk parking area. The building layout is shown on drawing number BA20&21.

The structure is located in the upper corner of the Tomahawk Parking Area. Storm water is diverted around the construction area in existing ditches. The foundation excavation will be pumped to a wooded area as is required. Structures located behind the compressor building are on sonotube foundations and minimal excavation will occur during this construction.

The grading and CP E&SC plan is shown on drawing number BS 15.

3.7. Information Building

The proposed 1,056 square foot Information building is located near the intersection of Route 28 and CR 49a (Galli Curci Road). The structure will contain bathroom facilities, an office and reception area. E&SC practices will include an upland diversion swale, silt fence and soil stabilization.

Grading and CPE&SC plans are shown on drawing number BS 11.

4. Snowmaking Pond

The proposed snowmaking pond is located south of the new Maintenance Center. The earthen dam pond has an overall volume of 29.5 million gallons and an area of 14.5 acres. A full CPE&SC plan is included in Appendix C.

VI. CPE&SC Practices

Specific construction phase E&SC practices are provided on the CPE&SC maps and detail sheets. The following narrative summarizes the E&SC practices to be implemented. This narrative is primarily taken from the NYSDEC publication, DEC Instruction Manual for Stormwater Construction Permit Toolbox, Chapter: “Basics of a Stormwater Pollution Prevention Plan”.

Step 1 Pre-Construction Actions

Protect existing vegetated areas suitable for filter strips, especially in perimeter areas.

Divert the offsite clean runoff from entering the disturbed areas.

Stabilize Construction Entrance

Establish a temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway.

Stabilize bare areas (entrances, construction routes, equipment parking areas) immediately as work takes place. Top these areas with gravel or maintain vegetative cover.

Sediment tracked onto public streets should be removed or cleaned on a daily basis.

Perimeter Sediment Controls

Silt fence material and installation comply with the standard drawing and specifications

Install silt fences based on appropriate spacing intervals. Decrease this interval as the slope increases. Silt fence should be placed on or parallel to contours where there is no concentration of water flowing to the silt fence and where erosion occurs in the form of sheet erosion. The area below the silt fence should be undisturbed ground.

Install additional sediment traps and barriers as needed during grading.

Step 2: Runoff and Drainage Control

Runoff Control

Install practices after sediment traps are installed and before land grading starts.

Control the runoff in each small drainage area before flow reaches runoff from entire site.

Divert offsite or clean runoff from disturbed areas.

Convey surface flows from highly erodible soil and steep slopes to more suitable stable areas.

Runoff from existing or proposed cut and fill slopes should be redirected to lower water velocity without causing erosion.

Runoff Conveyance System

Stabilize conveyance system.

Install check dams to slow down the velocity of concentrated flow.

Protect existing natural drainage systems and streams by maintaining vegetative buffers and by implementing other appropriate practices.

Outlet stabilization

Install practices to prevent erosion at discharge points.

Step 3: Grading

Limit the initial clearing and earth disturbance to that necessary to install sediment control measures. Excavation for footings, clearing, or other earth disturbance may only take place after the sediment and erosion controls are installed.

Stockpile the topsoil removed from the site. The topsoil should be protected, stabilized and sited in a location away from the storm drains and waterbodies.

Changes in grade or removal of vegetation should not disturb established buffers and are not allowed within any regulated distance from wetlands.

Step 4: Erosion Control (Stabilization)

Implement erosion control practices to keep the soil in place.

Stabilization should be completed immediately for the surface of all perimeter controls and perimeter slopes.

When activities temporarily cease during construction, soil stockpiles and exposed soil should be stabilized by seed, mulch or other appropriate measures as soon as possible, but in no case more than 7 days after construction activity has ceased.

Following initial soil disturbance or re-disturbance, permanent or temporary, stabilization should be completed within 7 days or as soon as possible.

Apply temporary or permanent stabilization measures immediately on all disturbed areas where work is delayed or completed.

Step 5: Sediment Control

At any location where surface runoff from disturbed or graded areas may flow off the construction area, sediment control measures must be installed to prevent sediment from being transported off site.

No grading, filling or other disturbance is allowed within existing drainage swales.

Swales or other areas that transport concentrated flow should be appropriately stabilized.

Downspout or sump pump discharges must have acceptable outfalls that are protected by splash blocks, sod, or piping as required by site conditions (i.e., no concentrated flow directed over fill slopes).

Step 6: Maintenance and Inspection

Inspection must be performed twice every 7 calendar days and immediately after periods of rainfalls greater than 0.5 inch.

Inspection, must verify that all practices are adequately operational, maintained properly and that sediment is removed from all control structures.

Inspection, must look for evidence of the soil erosion on the site, potential of pollutants entering drainage systems, problems at discharge points (such as turbidity in receiving water), and signs of soil and mud transport from the site to the public road at the entrance.

Routine maintenance items are identified are to be maintenance is to be performed on a regular basis and as soon as a problem is identified.

The person or entities responsible for conducting the maintenance actions during construction will be identified by the subcontractor. Post-construction construction maintenance will be performed by Department personnel.

Copies of the inspection and quarterly reports will be retained on-site with the SWPPP.

Step 7: Finalize Grading & Landscaping

All open areas, including borrow and spoil areas must be stabilized.

Top soil, seed, sod, mulch, riprap or other stabilization practices in the remaining disturbed areas. Specifications for topsoil and seed are shown in **Appendix H**. This information will be included in Division 2, Site Work, of the Construction Specifications.

Stabilization must be undertaken no later than 7 days after construction activity has ceased.

Remove the temporary control measures.

VII. POLLUTION PREVENTIONS MEASURES FOR LITTER, CONSTRUCTION CHEMICALS AND DEBRIS

1. FUELS

Fuel for construction equipment shall either be obtained from a licensed distributor of petroleum products or from an approved above ground storage tank on site. A distributor

may be contracted to arrive on site periodically and fill all equipment as necessary. All distributors of petroleum products must have adequate liability insurance to mitigate and clean up any spills that occur on site as well as obtain appropriate permits and licenses from the NYSDEC. All above ground storage tanks with a combined capacity of 1,100 gallons shall be installed pursuant to 6 NYCRR Part 614 Standards for New and Substantially Modified Petroleum Storage Facilities.

Fuel from construction vehicles may come into contact with storm water when vehicles are stored outside. Good housekeeping and preventative maintenance procedures shall be implemented to ensure fuel spills and leaks are minimized during refueling and storage. Any small-scale fuel or oil spills must be remedied immediately and contaminated soils shall be disposed of appropriately. The designated spill prevention and response team shall handle large-scale gasoline spills.

Oil and other petroleum products may be stored on site in limited quantities to ensure the continued operation of construction equipment in the event a scheduled delivery is unavailable. Items shall be stored in their original containers within temporary structures and shall not be exposed to stormwater. Used oil and petroleum products shall be stored in approved containers until recycled or disposed of at an approved disposal facility.

2. DUST CONTROL

Construction traffic must enter and exit the site at the stabilized construction entrance. The purpose is to trap dust and mud that would otherwise be carried off-site by construction traffic. Water trucks will be used as needed during construction to reduce dust generated on the site. Dust control must be provided by the General Contractor to a degree that is acceptable to NYSDEC, and in compliance with applicable local and state dust control regulations.

3. TEMPORARY FACILITIES

Temporary sanitary facilities may be located on site for construction workers. This facility shall be located in an accessible and visible location. Such a facility shall be leak and tip proof. A waste management company may be contracted to arrive on site and provide the routine pumping and sanitization of the facility. Such a company shall have adequate liability insurance to mitigate and clean up any spills that occur on site as well as appropriate permits and licenses from the NYSDEC.

4. SOLID WASTE

No solid materials, including building materials, are allowed to be discharged from the site with storm water. All solid waste, including disposable materials incidental to the major construction activities, must be collected and placed in containers. The containers will be emptied periodically by a contract trash disposal service and hauled away from the site.

5. GOOD HOUSE KEEPING

Good housekeeping is essential to reducing the risk of contaminating runoff waters during every stage of construction. The General Contractor shall ensure supervisors train each employee in good housekeeping practices as they pertain to the implementation of this SWPPP.

6. PREVENTATIVE MAINTENANCE

All on-site vehicles must be inspected regularly for oil and grease leaks. All leaks shall be repaired immediately upon obtaining the appropriate equipment. If the leak cannot be fixed immediately, it shall be temporarily mitigated to prevent the flow of contaminants onto the soil and potentially into the storm water. If necessary, the reservoir will be drained to stop the flow of contaminants or the vehicle will be moved under cover. Drip pans shall be used when performing any maintenance or cleaning on construction vehicles.

7. SPILL AND PREVENTION RESPONSE

The safety of employees and neighbors shall be of utmost concern when hazardous or toxic chemicals are stored or utilized on-site. Materials Safety Data Sheets (MSDS) shall be obtained for all toxic or hazardous substances that are stored on-site to provide employees with a valuable database in assessing risk in the event of a spill.

Any above ground storage tanks on site shall be installed pursuant to 6 NYCRR Part 614. According to the New York State "Minimum Standards for New and Substantially Modified Above Ground Storage Facilities", all tanks installed must meet or exceed the design criteria in one or more of the following design or manufacturing standards: UL No. 142, UL No. 58, API Standard No. 650, API Standard No. 620, CAN4-S601-M84 or CAN4-S630-M84. Tanks constructed of wood, concrete, aluminum, fiberglass reinforced plastic as well as riveted or bolted steel tanks are not permitted. All tanks must have installed leak detection systems, secondary containment, corrosion protection, and undergo periodic monitoring pursuant to all Part 614 requirements.

Should a spill occur, trained individuals shall be on-call at all times to mitigate the potential negative effects of a spill. The General Contractor shall have trained employees knowledgeable in the location of sorbent, brooms, rags and mops in the event of a small-scale spill. If the General Contractor does not have Hazardous Materials trained employees on site, a firm that specializes in handling spills, soil and water contamination shall be called.

After a spill occurs, all personnel not trained in hazardous materials spill response shall be asked to evacuate the immediate area. The New York State NYSDEC of Environmental Conservation (NYSDEC) Spill Response Team shall be called to investigate the spill and determine if additional actions should be taken to ensure the

safety of personnel and nearby residents. Should any employee have a suspected injury, a local emergency squad must be contacted.

8. CONSTRUCTION MATERIAL STORAGE

The following construction materials can be expected to be stored on site at an upland location: culvert, geosynthetic fabric, light and heavy stone, #1 and #3 stone, select gravel, excavated material, embankment material, and topsoil. It is the contractor's responsibility to assure that the construction materials are stored properly in accordance with the locations and details shown on the site plan.

9. DISPOSAL OF SURPLUS EARTHWORK MATERIALS

The location of the disposal site for excavated materials is designated on each site specific E&SC plan. This will consist stone and earth spoil from excavation activities.

VIII. CONSTRUCTION INSPECTION AND MAINTENANCE PLAN

1. Inspectors Qualifications

The qualified inspector shall be a person that is knowledgeable in the principles and practices of erosion and sediment control, such as licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), licensed Landscape Architect, or qualified Soil Scientist. It also may be someone working under the direct supervision of the licensed Professional Engineer, or licensed Landscape Architect, provided that person has training in the principles and practices of erosion and sediment control. Knowledgeable in the principles and practices of erosion and sediment control means that an individual performing a site inspection has received eight (8) hours of training, endorsed by the Department, from a Soil and Water Conservation District, CPESC, Inc. or other the Department endorsed entity in proper erosion and sediment control principals in the last three (3) years. Inspections of any post-construction stormwater management practices that require structural components, such as a dam for an impoundment, shall be performed by a licensed Professional Engineer.

2. Inspection Timetable

a. For construction sites where soil disturbance activities are ongoing, the qualified inspector shall conduct a site inspection at least twice every seven (7) calendar days and within 24 hours of the end of a storm in which precipitation is 0.5 inches or greater. Deficiencies, if found , will be corrected within 48 hours.

b. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and temporary stabilization measures have been applied to all disturbed areas, the qualified inspector shall conduct a site inspection at least once every thirty (30) calendar days.

c. The owner or operator shall notify the stormwater contact person in writing prior to reducing the frequency of inspections.

d. For construction sites where soil disturbance activities have been shut down with partial project completion, the qualified inspector can stop conducting inspections if all areas disturbed as of the project shutdown date have achieved final stabilization and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational. The owner or operator shall notify the stormwater contact person in writing prior to the shutdown. If soil disturbance activities are not resumed within 2 years from the date of shutdown, the qualified inspector shall perform a final inspection and certify that all disturbed areas have achieved final stabilization and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP.

3. Inspection Reports

A copy of the inspectors check list is attached in Appendix R. The general inspection check list is as follows.

The qualified inspector shall inspect all erosion and sediment control practices to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved final stabilization, and all stormwater discharge locations, including receiving waters.

The qualified inspector shall prepare an inspection report subsequent to each and every inspection. The inspection report shall include and/or address the following:

a. Date and time of inspection

b. Name and title of person(s) performing inspection

c. A description of the weather and soil conditions (i.e. dry, wet, saturated) at the time of the inspection

d. A description of the condition of the receiving waters at all points of discharge from the construction site. This shall include identification of any discharges of sediment from the construction site. Include discharges from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow

e. Identification of all erosion an sediment control practices that need repair or maintenance

f. Identification of all erosion and sediment control practices that were not installed properly or are not functioning as designed and need to be reinstalled or replaced.

g. Location(s) and description of any petroleum or construction chemical spills.

h. Description and sketch of areas that are disturbed at the time of the inspection and areas that have been stabilized (temporary and/or final) since the last inspection.

i. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards.

j. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices; and to correct deficiencies identified with the construction of the post construction stormwater management practice(s).

k. Within 24 hours of the completion of an inspection, the qualified inspector shall notify the owner or operator and appropriate contractor (or subcontractor) of any corrective actions that need to be taken. The contractor (or subcontractor) shall begin implementing the corrective actions within 24 hours of this notification and shall complete the corrective actions in a reasonable time frame.

l. All inspection reports shall be signed by the qualified inspector, and the inspection reports shall be maintained on site with the SWPPP.

4. Maintenance Details

When soil disturbance activities are ongoing, the qualified inspector shall conduct a site inspection at least twice every seven calendar days. When soil disturbance activities are ongoing and greater than five acres of soil are disturbed at any one time, the qualified inspector shall also conduct at least two site inspections every seven calendar days. When performing just two inspections every seven calendar days, the inspections shall be separated by a minimum of two full calendar days. Inspections will be conducted jointly by the DEC Inspector and the Contractor. Any needed repairs will be initiated within one business day and completed within seven business days for the duration of the project.

Disturbed areas that are completed or anticipated to be inactive for over seven days shall be stabilized and mulched per contract specification section 02930 to establish turf.

Sediments will be removed from behind the silt fence when it reaches a depth of about 0.5 ft at the fence. The silt fence will be repaired as necessary to maintain a barrier.

Sediment deposited in the temporary sediment traps will be removed once the capacity of the traps is reduced by half. Sediments will be spread on site as directed, then seeded and mulched. Sediment traps shall be inspected before and after anticipated rainfall events to ensure adequate storage capacity.

Stone at the construction entrance will be cleaned or replaced when it is no longer capable of removing soil from the tires and tracks of construction traffic. The paved service road will be swept as required to minimize dirt and dust present.

Stabilized construction entrance, silt fence, perimeter dikes and sediment traps will be removed at the completion of construction after final vegetation has reached 80% coverage.

The general contractor shall be responsible for the implementation and maintenance of all erosion control measures.

IX. CALCULATIONS

Construction Phase Peak Discharge of Parking Areas

The SCS-TR-55 Graphical Peak Discharge Method has been used to calculate the peak discharge at the Upper Discovery, North, and East Parking areas during construction. The peak rate of runoff is determined from a number of factors; precipitation, watershed area, soil type, surface cover, and time parameters. The precipitation amount and duration is amount is based upon a 24 hour, ten year event (6”). The soil type is considered type C, which indicate a slow infiltration rate. The surface covers used are Newly Graded with a CN of 91 in the disturbed areas and Wooded, good condition with a CN of 70 in the undisturbed areas.

Worksheets for estimated runoff are taken from USDA Technical Release 55 (TR-55), Chapters 2 to 4. The results are shown in Appendix D. The weighted curve numbers (CN), time of concentrations, flow lengths, slopes, drainage areas, runoff and peak discharge are shown on the worksheets.

Temporary Sediment Basin Volumes Drained with Outlet Control Structures

The parking area permanent OCS and culverts are installed prior to the dry detention basins use as temporary sediment basins (TSBs). The TSBs are sized to use the capacity of the culverts. The construction phase peak flows are used to calculate TSB volume which attenuates peak flows to less than the permanent culvert capacity. The methodology to calculate the storage volume of temporary sediment basins using permanent culverts is taken from TR-55, Chapter 6, Storage Volume for Detention Basins. The required storage volumes are shown in Table 1, Temporary Sediment Basins: Required volumes of TSBs compared to volumes of permanent basins and Appendix A, Storage Volumes for Parking Area Temporary Sediment Basins.

Temporary Sediment Basin Volumes Drained with Outlet Weirs

TSB volumes utilizing outlet weirs are calculated to retain 3,600 cubic feet of water per acre of drainage. Minimum surface areas are calculated the greater of $0.01(Q_p)$ where Q_p is the 10 peak inflow rate for the 10 year storm event or 0.015 (D.A.) where D.A. is the contributing drainage area. Stone outlet sediment basins volumes for various depths and outlet weir widths are shown in Appendix A.

Outlet control structures used in sediment basins will utilize basin 6" perforated drainage riser pipes to allow draining of the sediment basins over a ten hour period. The perforated drainage pipes will be wrapped in filter fabric and surrounded by # 2 stone. See detail 3/EC11.

X. APPENDICES

Appendices	
	TITLE
A	Storage Volumes for Parking Area Temporary Sediment Basins
B	Cut and Fill Volumes
C	Snowmaking Pond CPE&SC
D	TR-55 Construction Phase Estimated Peak Flow Analysis
E	Division of Operations Stormwater Management Procedure
F	Top Soil and Seed Specification
G	Discovery Lodge CPE&SC by Shumaker
See Belleayre Mountain Ski Center 2010 Unit Management Plan Sheet Index UMP drawings that are included under a separate cover	
Drawing Number	Title
TR 9 & 10	Proposed Lifts & Trails E&SCP I&II
TR 11	Proposed Highmount Connect Trail Grading, E&SCP
TR 13	PR Stream Bridge E&SCP
TR 16	Proposed Tomahawk Base Area Grading, Drainage, E&SCP

LT 1 to LT 8	Lift Terminals
EC1 & 2	Proposed Upper Discovery Parking-Construction Phases W/ E&SCP
EC 4	Proposed North Parking-Construction Phases W/ E&SCP
EC6	Proposed East Parking-Construction Phases W/ E&SCP
EC 8 to 11	Parking Erosion and Sediment Control Details I to IV
BS 3, 5, 6 & 7	Discovery Lodge CPE&SC Plan
BA 27	Proposed Information Building CPE&SC Plan
SM 15, 15A & 15B	Snowmaking Pond CPE&SC Plan
PK 20, 21, 22, 23	Erosion and Sediment Control Details

XI. REFERENCES

NYSDEC, 2008. GP-0-08-001 SPDES General Permit for Stormwater Discharges. (pdf)

"NYSSMDM" NYSDEC, 2003. New York State Stormwater Management Design Manual. August 2003. (pdf)

"BlueBook" NYSDEC, 2005. New York State Standards and Specifications for Erosion and Sediment Control, August 2005. (pdf)

USDA, 1986. Technical Release 55 (TR-55). Urban Hydrology for Small Watersheds.

NYSDEC, 2008a. Publication, Better Site Design (April, 2008)

NYSDEC, 2008b. Publication "Unit Management Plan-DEIS, Attachment A-1, Stormwater Protocol"

NYSDEC, 2004a. Publication, Frequently Asked Questions About Technical Requirements of the SPDES General Permit (GP-02-01)for Stormwater Discharges from Construction Activities Version 2.0 - October 7, 2004 (pdf)

NYSDEC, 2004b. Publication, DEC Instruction Manual for Stormwater Construction Permit Toolbox, Chapter: "Basics of a Stormwater Pollution Prevention Plan".

NYSDEC, 1992. "Reducing the Impacts of Stormwater Runoff From New Development", (April, 1992).