SUMMIT POWDER MOUNTAIN
HORIZON VILLAGE PRUD
SUPPLEMENT TO MAY 2013 DRAINAGE SUMMARY

POWDER MOUNTAIN RESORT
EDEN, UTAH

AUGUST 2017

TALISMAN CIVIL CONSULTANTS, LLC
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TALISMAN
CIVIL CONSULTANTS

Site Description

The proposed Horizon Village Planned Residential Unit Development (PRUD) at Summit Powder Mountain Development east of Eden Utah is an extension of the planned communities that branch off of Summit Pass. This PRUD includes 25 cabin units that are 648-1,683 square feet per unit. There are four driveways and four garage buildings that service the PRUD with boardwalk pathways throughout the site for access to each unit. In addition, the development includes an approximately 1,350 square foot lodge. Final design for the lodge is in process and will be submitted in the future. The PRUD is in place of the previously platted lots 19-23 of Phase 1A, Horizon Run Plat and all portions of the development are accessed from Horizon Run roadway. The plat is currently being amended to reconfigure lots 19-23 from Phase 1A, Horizon Run plat. The majority of storm drainage for the site has historically been conveyed overland in the southwesterly directing into Lefty's Canyon. With the usage of roadside ditches and swales drainage will be conveyed through the site.

Drainage Analysis

Analysis of the proposed developments has been carried out with the same method as was used for the Summit Pass and Spring Park Study dated May 2013. This analysis is intended as a supplement and update to that study. Hydrology for the proposed development was calculated using the SCS Method. This methodology was input into Haestad Method's PondPack to calculate storm discharge rates. Landuse consists of pavement, grass, brush, and buildings. Time of Concentration is assumed to be 5 minutes due to the size of the site. Rainfall depths were determined using the National Oceanic and Atmospheric Administration (NOAA) website. Weber County requires drainage infrastructure to convey 10-year 2-hour storm events and discharge stormwater at a release rate such that post development discharge is less than pre-development discharge. Soil maps for SCS Methodology have been provided by the *United States Department of Agriculture (USDA) Natural Resources Conservation Service (NCRC) Web Soil Survey.*

For the purposes of the drainage analysis the PRUD is split into two distinct drainage basins. The basins are labeled as West and East. They are split by Horizon Run roadway and have been calculated to have the following characteristics:

	Area (ac)	Time of Concentration (hr)	Predevelopment Curve Number	Predevelopment 10-yr 2-hr Peak Flow Rate (CFS)	Post Development Curve Number	Post Development 10-yr 2-hr Peak Flow Rate (cfs)
West	2.91	0.083	69	.38	74.46	0.90
East	3.40	0.083	69	.44	73.17	0.90

Haestad PondPack modeling has been completed to identify required detention volumes. See attached appendix for PondPack results for pre and post development scenarios. The required detention volumes for the development have been calculated to be:

	Minimum Detention Volume (cubic feet)
West	846
East	796

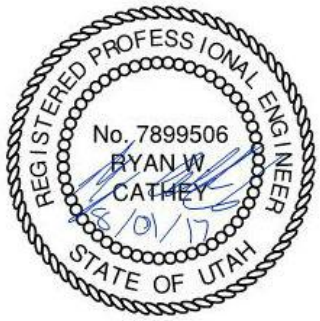
Due to the steep existing topography throughout the PRUD a typical dry detention pond is infeasible. Therefore, detention for the development will be provided in swales that cutoff runoff as it flows down the mountainside. These cutoff ditches will include check dams that cause flow restriction in large events. All check dams on the east side have a 4" PVC pipe through the dam that will allow low flows to pass through the check dam while restricting large storm events to the pre-development peak flow rate. All cutoff swales are routed to an open channel that directs flow down the mountainside through the PRUD and discharges flows to a riprap apron for energy dissipation prior to free discharge. Riprap apron calculations for the swale was conducted using *Plate 3.18-4 of the USDA-SCS RIPRAP STD & SPEC 3.19* as shown in the appendix. See the attached appendix for FlowMaster calculations for the swales and the orifice calculations for the 4" pipe.

In the Summit Pass and Spring Park Analysis, Haestad Method's FlowMaster was used to calculate the capacity of the roadside ditches for the development. Since this development is at the end of Horizon Run there is no other upstream flows contributing to the roadside ditches. Therefore, the ditches can be utilized to provide detention for the west side of the Horizon Village. Check dams have been designed along Horizon Run in front of the PRUD. All check dams on the west side have a 3" PVC pipe through the dam that allows low flows to pass through the check dam while restricting large storm events to the pre-development peak flow rate. The top of all check dams will be at least 6" below the roadway surface elevation. This will allow flows beyond the 10-year event to overtop the check dams and remain in the roadside ditch. See the attached appendix for FlowMaster calculations for the existing roadside ditch and the orifice calculations for the 3" pipe.

Implementation of these techniques will manage stormwater to current Weber County design standards for Horizon Village PRUD and the future Lodge for the development.

Sincerely,

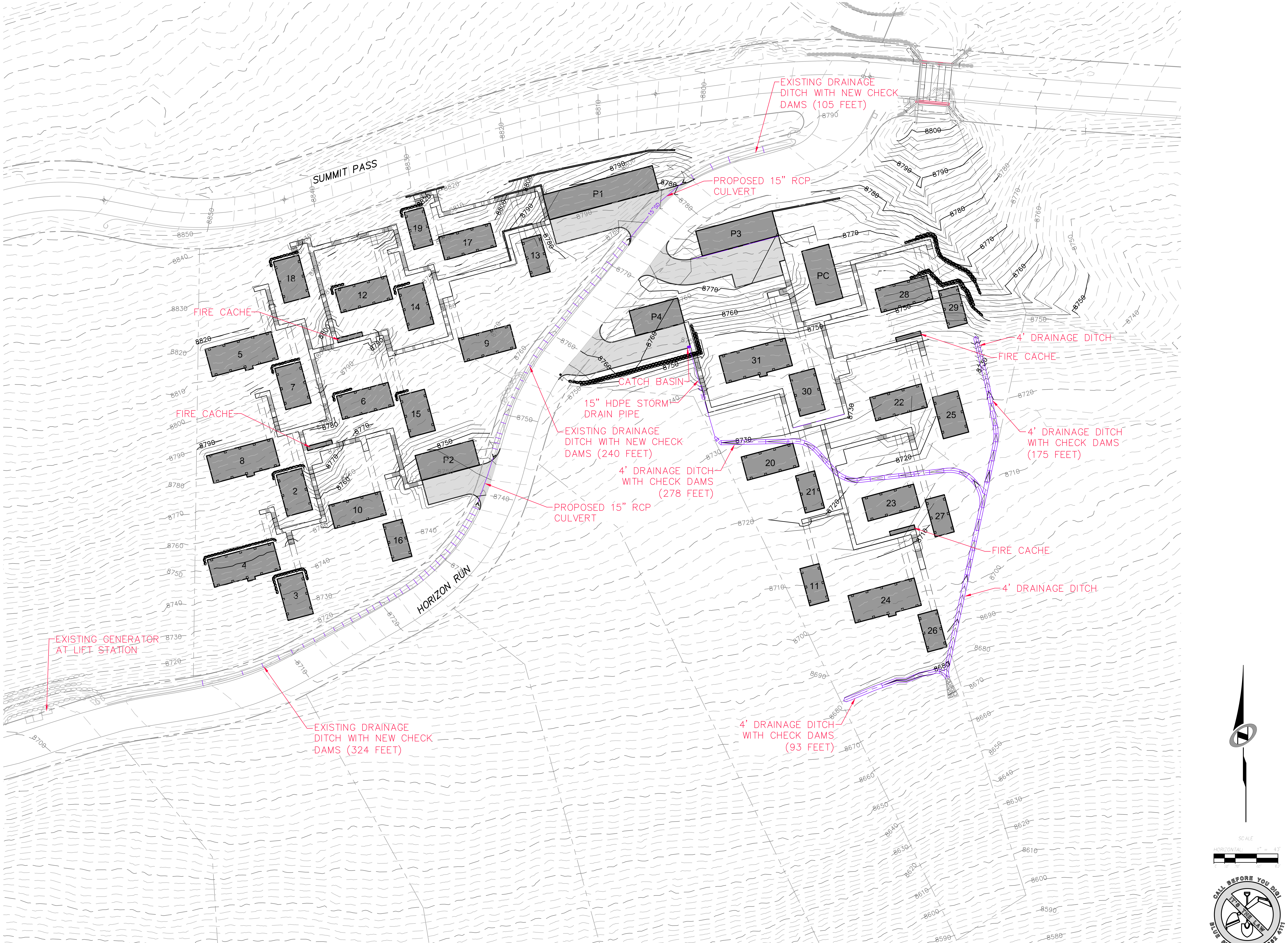
Ryan Cathey, PE
Talisman Civil Consultants, LLC



APPENDICES

1. **Horizon Village PRUD and Lodge – Detention Analysis Calculations**

    a. **Horizon Village - Overall Grading and Drainage Exhibit**
    b. **Hydrology Calculations**
    c. **Haestad Method's PondPack Results – Pre-development**
    d. **Haestad Method's PondPack Results – Post-development**
    e. **Haestad Method's FlowMaster – 3" Orifice Calculation**
    f. **Haestad Method's FlowMaster – 4" Orifice Calculation**
    g. **Haestad Method's FlowMaster – Horizon Run Roadside Ditch Calculations**
    h. **Haestad Method's FlowMaster – East Side Swale Calculations**
    i. **USDA NRCS Riprap Calculations (From May 2013 Report)**



HORIZON NEIGHBORHOOD PRUD

OVERALL DRAINAGE MAP

PREPARED FOR: SUMMIT POWDER MOUNTAIN

DATE SUBMITTED: 08.02.2017

NO.	BY	DATE	REVISIONS:

CAUTION: The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

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801.743.1300 TEL 801.743.0300 FAX

SHEET NUMBER
ET07

SCALE
VERTICAL: 1"= N/A
HORIZONTAL: 1"= 40'

JOB NUMBER
SLB0793

Horizon Village PRUD Hydrologic Calculations
Tuesday, August 01, 2017
Ryan Cathey, PE
Talisman Civil Consultants, LLC

Pre-Development Conditions

Pre-development Area	**Square Feet**	**Acres**
West Side	126,599	2.91
East Side	148,301	3.40
Total Area	274,900	6.31
Pre-Development CNs		
West Side	69	From May 2013 Report
East Side	69	From May 2013 Report

Horizon Village PRUD Hydrologic Calculations
Tuesday, August 01, 2017
Ryan Cathey, PE
Talisman Civil Consultants, LLC

Post Development Conditions

West Side Impervious Areas		
P1 Garage (With Driveway)	5298	
P2 Garage (With Driveway)	2971	
Unit 1	-	
Unit 2	960	
Unit 3	960	
Unit 4	1683	
Unit 5	1683	
Unit 6	1100	
Unit 7	960	
Unit 8	1683	
Unit 9	1100	
Unit 10	1100	
Unit 12	1100	
Unit 13	648	
Unit 14	960	
Unit 15	960	
Unit 16	648	
Unit 17	1100	
Unit 18	960	
Unit 19	648	
West Side Total Impervious	**26522**	square feet
East Side Impervious Areas		
Lodge	1350	
P3 Garage (With Driveway)	5325	
P4 Garage (With Driveway)	3910	
Unit 11	665	
Unit 20	1125	
Unit 21	665	
Unit 22	1125	
Unit 23	1125	
Unit 24	1715	
Unit 25	986	
Unit 26	665	
Unit 27	665	
Unit 28	1125	
Unit 29	665	
Unit 30	980	
Unit 31	1715	
East Side Total Impervious	**23806**	square feet
Post-Development CNs (Area Weighted)		
West Side	74.45	Area Weighted Average
East Side	73.17	Area Weighted Average

Horizon Village PRUD Hydrologic Calculations
Tuesday, August 01, 2017
Ryan Cathey, PE
Talisman Civil Consultants, LLC

SCS Method Results

Pre-Development Peak Flow (CFS)	**10 YR - 2 HR**	
West Side	0.38	(Results from Pondpack)
East Side	0.44	(Results from Pondpack)
Total	0.82	(Results from Pondpack)
Post-Development Peak Flow (CFS)	**10 YR - 2 HR**	
West Side	0.9	(Results from Pondpack)
East Side	0.9	(Results from Pondpack)
Total	1.8	(Results from Pondpack)

Detention Requirements

Area	**Required Volume (CF)**	**Channel Area (SF)**	**Channel Length**	**Oriface Size**
West Side	846	3	282.00	3
East Side	796	2	398	4

Project Summary	
Title	Horizon Village at Summit Powder Mountain
Engineer	Ryan Cathey, PE
Company	NV5, Inc.
Date	9/22/2016

Notes	Stormwater detention analysis for the predevelopment conditions at the Horizon Village developemtn at Summit Powder Moutain. Anaysis requires post development peak flow rate at or below predevelopment for the 10 year 2 hour event per Weber County requirements.

Table of Contents

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
CM-EAST	10 yr 2 hr	10	0.021	0.700	0.44
CM-WEST	10 yr 2 hr	10	0.018	0.700	0.38

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
O-1	10 yr 2 hr	10	0.018	0.700	0.38
O-2	10 yr 2 hr	10	0.021	0.700	0.44

Subsection: Time-Depth Curve
Label: Time-Depth - 1

Return Event: 10 years
Storm Event: 10 yr 2 hr

Time-Depth Curve: 10 yr 2 hr	
Label	10 yr 2 hr
Start Time	0.000 hours
Increment	0.167 hours
End Time	2.000 hours
Return Event	10 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.167 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.000	0.029	0.056	0.920	1.186
0.833	1.289	1.350	1.379	1.408	1.435
1.667	1.464	1.491	1.520	(N/A)	(N/A)

Subsection: Unit Hydrograph Equations

Unit Hydrograph Method (Computational Notes)
Definition of Terms

At	Total area (acres): At = Ai+Ap
Ai	Impervious area (acres)
Ap	Pervious area (acres)
CNi	Runoff curve number for impervious area
CNp	Runoff curve number for pervious area
fLoss	f loss constant infiltration (depth/time)
gKs	Saturated Hydraulic Conductivity (depth/time)
Md	Volumetric Moisture Deficit
Psi	Capillary Suction (length)
hK	Horton Infiltration Decay Rate (time^-1)
fo	Initial Infiltration Rate (depth/time)
fc	Ultimate(capacity)Infiltration Rate (depth/time)
Ia	Initial Abstraction (length)
dt	Computational increment (duration of unit excess rainfall) Default dt is smallest value of 0.1333Tc, rtm, and th (Smallest dt is then adjusted to match up with Tp)
UDdt	User specified override computational main time increment (only used if UDdt is => .1333Tc)
D(t)	Point on distribution curve (fraction of P) for time step t
K	2 / (1 + (Tr/Tp)): default K = 0.75: (for Tr/Tp = 1.67)
Ks	Hydrograph shape factor = Unit Conversions * K: = ((1hr/3600sec) * (1ft/12in) * ((5280ft)**2/sq.mi)) * K Default Ks = 645.333 * 0.75 = 484
Lag	Lag time from center of excess runoff (dt) to Tp: Lag = 0.6Tc
P	Total precipitation depth, inches
Pa(t)	Accumulated rainfall at time step t
Pi(t)	Incremental rainfall at time step t
qp	Peak discharge (cfs) for 1in. runoff, for 1hr, for 1 sq.mi. = (Ks * A * Q) / Tp (where Q = 1in. runoff, A=sq.mi.)
Qu(t)	Unit hydrograph ordinate (cfs) at time step t
Q(t)	Final hydrograph ordinate (cfs) at time step t
Rai(t)	Accumulated runoff (inches) at time step t for impervious area
Rap(t)	Accumulated runoff (inches) at time step t for pervious area
Rii(t)	Incremental runoff (inches) at time step t for impervious area
Rip(t)	Incremental runoff (inches) at time step t for pervious area
R(t)	Incremental weighted total runoff (inches)
Rtm	Time increment for rainfall table
Si	S for impervious area: Si = (1000/CNi) - 10
Sp	S for pervious area: Sp = (1000/CNp) - 10
t	Time step (row) number
Tc	Time of concentration
Tb	Time (hrs) of entire unit hydrograph: Tb = Tp + Tr
Tp	Time (hrs) to peak of a unit hydrograph: Tp = (dt/2) + Lag
Tr	Time (hrs) of receding limb of unit hydrograph: Tr = ratio of Tp

Subsection: Unit Hydrograph Equations

Unit Hydrograph Method
Computational Notes
Precipitation

Column (1)	Time for time step t
Column (2)	D(t) = Point on distribution curve for time step t
Column (3)	Pi(t) = Pa(t) - Pa(t-1): Col.(4) - Preceding Col.(4)
Column (4)	Pa(t) = D(t) x P: Col.(2) x P

Pervious Area Runoff (using SCS Runoff CN Method)

Column (5)	Rap(t) = Accumulated pervious runoff for time step t
	If (Pa(t) is <= 0.2Sp) then use: Rap(t) = 0.0
	If (Pa(t) is > 0.2Sp) then use:
	
	Rap(t) = (Col.(4)-0.2Sp)**2 / (Col.(4)+0.8Sp)

Column (6)	Rip(t) = Incremental pervious runoff for time step t Rip(t) = Rap(t) - Rap(t-1) Rip(t) = Col.(5) for current row - Col.(5) for preceding row.

Impervious Area Runoff

Column (7 & 8)...	Did not specify to use impervious areas.

Incremental Weighted Runoff

Column (9)	R(t) = (Ap/At) x Rip(t) + (Ai/At) x Rii(t) R(t) = (Ap/At) x Col.(6) + (Ai/At) x Col.(8)

SCS Unit Hydrograph Method

Column (10)	Q(t) is computed with the SCS unit hydrograph method using R(t) and Qu(t).

Storm Event	10 yr 2 hr
Return Event	10 years
Duration	2.000 hours
Depth	1.520 in
Time of Concentration (Composite)	0.097 hours
Area (User Defined)	3.400 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	0.698 hours
Flow (Peak, Computed)	0.44 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	0.700 hours
Flow (Peak Interpolated Output)	0.44 ft³/s

Drainage Area	
SCS CN (Composite)	69.000
Area (User Defined)	3.400 acres
Maximum Retention (Pervious)	4.493 in
Maximum Retention (Pervious, 20 percent)	0.899 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.076 in
Runoff Volume (Pervious)	0.021 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.021 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.097 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	39.71 ft³/s
Unit peak time, Tp	0.065 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.259 hours
Total unit time, Tb	0.323 hours

Storm Event	10 yr 2 hr
Return Event	10 years
Duration	2.000 hours
Depth	1.520 in
Time of Concentration (Composite)	0.097 hours
Area (User Defined)	3.400 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.500	0.00	0.04	0.16	0.32	0.44
0.750	0.35	0.30	0.30	0.26	0.22
1.000	0.21	0.18	0.13	0.11	0.11
1.250	0.11	0.11	0.11	0.11	0.11
1.500	0.11	0.11	0.12	0.12	0.12
1.750	0.12	0.12	0.12	0.13	0.13
2.000	0.13	(N/A)	(N/A)	(N/A)	(N/A)

Storm Event	10 yr 2 hr
Return Event	10 years
Duration	2.000 hours
Depth	1.520 in
Time of Concentration (Composite)	0.099 hours
Area (User Defined)	2.910 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	0.700 hours
Flow (Peak, Computed)	0.38 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	0.700 hours
Flow (Peak Interpolated Output)	0.38 ft³/s

Drainage Area	
SCS CN (Composite)	69.000
Area (User Defined)	2.910 acres
Maximum Retention (Pervious)	4.493 in
Maximum Retention (Pervious, 20 percent)	0.899 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.076 in
Runoff Volume (Pervious)	0.018 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.018 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.099 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.30 ft³/s
Unit peak time, Tp	0.066 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.264 hours
Total unit time, Tb	0.330 hours

Storm Event	10 yr 2 hr
Return Event	10 years
Duration	2.000 hours
Depth	1.520 in
Time of Concentration (Composite)	0.099 hours
Area (User Defined)	2.910 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.500	0.00	0.03	0.13	0.27	0.38
0.750	0.30	0.26	0.26	0.22	0.19
1.000	0.18	0.16	0.11	0.10	0.09
1.250	0.09	0.10	0.10	0.10	0.09
1.500	0.10	0.10	0.10	0.10	0.11
1.750	0.10	0.10	0.10	0.11	0.11
2.000	0.11	(N/A)	(N/A)	(N/A)	(N/A)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-WEST

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	CM-WEST	0.018	0.700	0.38
Flow (In)	O-1	0.018	0.700	0.38

Summary for Hydrograph Addition at 'O-2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-EAST

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	CM-EAST	0.021	0.700	0.44
Flow (In)	O-2	0.021	0.700	0.44

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Horizon Village at Summit Powder Mountain Post Development Analysis

Project Summary	
Title	Horizon Village at Summit Powder Mountain
Engineer	Ryan Cathey, PE
Company	Talisman Civil Consultants, LLC
Date	8/1/2017

Notes	Stormwater detention analysis for the post development conditions at the Horizon Village developemtn at Summit Powder Moutain. Anaysis requires post development peak flow rate at or below predevelopment for the 10 year 2 hour event per Weber County requirements.

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Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
CM-EAST	10 yr 2 hr	10	1,662.000	0.700	0.90
CM-WEST	10 yr 2 hr	10	1,670.000	0.700	0.90

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
O-1	10 yr 2 hr	10	918.000	1.100	0.21
O-2	10 yr 2 hr	10	962.000	1.100	0.22

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
PO-1 (IN)	10 yr 2 hr	10	1,670.000	0.700	0.90	(N/A)	(N/A)
PO-1 (OUT)	10 yr 2 hr	10	918.000	1.100	0.21	0.53	846.000
PO-2 (IN)	10 yr 2 hr	10	1,662.000	0.700	0.90	(N/A)	(N/A)
PO-2 (OUT)	10 yr 2 hr	10	962.000	1.100	0.22	0.50	796.000

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Time-Depth Curve
Label: Time-Depth - 1

Return Event: 10 years
Storm Event: 10 yr 2 hr

Time-Depth Curve: 10 yr 2 hr	
Label	10 yr 2 hr
Start Time	0.000 hours
Increment	0.167 hours
End Time	2.000 hours
Return Event	10 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.167 hours
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Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
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0.833	1.289	1.350	1.379	1.408	1.435
1.667	1.464	1.491	1.520	(N/A)	(N/A)

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Unit Hydrograph Equations

Unit Hydrograph Method (Computational Notes)

Definition of Terms

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CNp	Runoff curve number for pervious area
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gKs	Saturated Hydraulic Conductivity (depth/time)
Md	Volumetric Moisture Deficit
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Lag	Lag time from center of excess runoff (dt) to Tp: Lag = 0.6Tc
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Rap(t)	Accumulated runoff (inches) at time step t for pervious area
Rii(t)	Incremental runoff (inches) at time step t for impervious area
Rip(t)	Incremental runoff (inches) at time step t for pervious area
R(t)	Incremental weighted total runoff (inches)
Rtm	Time increment for rainfall table
Si	S for impervious area: Si = (1000/CNi) - 10
Sp	S for pervious area: Sp = (1000/CNp) - 10
t	Time step (row) number
Tc	Time of concentration
Tb	Time (hrs) of entire unit hydrograph: Tb = Tp + Tr
Tp	Time (hrs) to peak of a unit hydrograph: Tp = (dt/2) + Lag
Tr	Time (hrs) of receding limb of unit hydrograph: Tr = ratio of Tp

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Unit Hydrograph Equations

Unit Hydrograph Method
Computational Notes
Precipitation

Column (1)	Time for time step t
Column (2)	D(t) = Point on distribution curve for time step t
Column (3)	Pi(t) = Pa(t) - Pa(t-1): Col.(4) - Preceding Col.(4)
Column (4)	Pa(t) = D(t) x P: Col.(2) x P

Pervious Area Runoff (using SCS Runoff CN Method)

Column (5)	Rap(t) = Accumulated pervious runoff for time step t
	If (Pa(t) is <= 0.2Sp) then use: Rap(t) = 0.0
	If (Pa(t) is > 0.2Sp) then use:
	
	Rap(t) = (Col.(4)-0.2Sp)**2 / (Col.(4)+0.8Sp)

Column (6)	Rip(t) = Incremental pervious runoff for time step t Rip(t) = Rap(t) - Rap(t-1) Rip(t) = Col.(5) for current row - Col.(5) for preceding row.

Impervious Area Runoff

Column (7 & 8)...	Did not specify to use impervious areas.

Incremental Weighted Runoff

Column (9)	R(t) = (Ap/At) x Rip(t) + (Ai/At) x Rii(t) R(t) = (Ap/At) x Col.(6) + (Ai/At) x Col.(8)

SCS Unit Hydrograph Method

Column (10)	Q(t) is computed with the SCS unit hydrograph method using R(t) and Qu(t).

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Unit Hydrograph Summary
Label: CM-EAST

Return Event: 10 years
Storm Event: 10 yr 2 hr

Storm Event	10 yr 2 hr
Return Event	10 years
Duration	2.000 hours
Depth	1.520 in
Time of Concentration (Composite)	0.097 hours
Area (User Defined)	148,104.000 ft²

Computational Time Increment	0.013 hours
Time to Peak (Computed)	0.685 hours
Flow (Peak, Computed)	0.91 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	0.700 hours
Flow (Peak Interpolated Output)	0.90 ft³/s

Drainage Area	
SCS CN (Composite)	73.170
Area (User Defined)	148,104.000 ft²
Maximum Retention (Pervious)	3.667 in
Maximum Retention (Pervious, 20 percent)	0.733 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.139 in
Runoff Volume (Pervious)	1,714.909 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,662.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.097 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Unit Hydrograph Summary
Label: CM-EAST

Return Event: 10 years
Storm Event: 10 yr 2 hr

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	39.71 ft³/s
Unit peak time, Tp	0.065 hours
Unit receding limb, Tr	0.259 hours
Total unit time, Tb	0.323 hours

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 10 years
Label: CM-EAST Storm Event: 10 yr 2 hr

Storm Event	10 yr 2 hr
Return Event	10 years
Duration	2.000 hours
Depth	1.520 in
Time of Concentration (Composite)	0.097 hours
Area (User Defined)	148,104.000 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.450	0.00	0.08	0.50	0.66	0.81
0.700	0.90	0.65	0.53	0.50	0.42
0.950	0.35	0.33	0.28	0.20	0.17
1.200	0.17	0.17	0.17	0.17	0.17
1.450	0.16	0.16	0.17	0.17	0.18
1.700	0.18	0.17	0.17	0.18	0.18
1.950	0.19	0.19	(N/A)	(N/A)	(N/A)

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Unit Hydrograph Summary
Label: CM-WEST

Return Event: 10 years
Storm Event: 10 yr 2 hr

Storm Event	10 yr 2 hr
Return Event	10 years
Duration	2.000 hours
Depth	1.520 in
Time of Concentration (Composite)	0.099 hours
Area (User Defined)	126,759.600 ft²

Computational Time Increment	0.013 hours
Time to Peak (Computed)	0.686 hours
Flow (Peak, Computed)	0.92 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	0.700 hours
Flow (Peak Interpolated Output)	0.90 ft³/s

Drainage Area	
SCS CN (Composite)	74.450
Area (User Defined)	126,759.600 ft²
Maximum Retention (Pervious)	3.432 in
Maximum Retention (Pervious, 20 percent)	0.686 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.163 in
Runoff Volume (Pervious)	1,721.009 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,670.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.099 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Unit Hydrograph Summary
Label: CM-WEST

Return Event: 10 years
Storm Event: 10 yr 2 hr

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.30 ft³/s
Unit peak time, Tp	0.066 hours
Unit receding limb, Tr	0.264 hours
Total unit time, Tb	0.330 hours

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 10 years
Label: CM-WEST Storm Event: 10 yr 2 hr

Storm Event	10 yr 2 hr
Return Event	10 years
Duration	2.000 hours
Depth	1.520 in
Time of Concentration (Composite)	0.099 hours
Area (User Defined)	126,759.600 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.450	0.00	0.14	0.63	0.73	0.84
0.700	0.90	0.65	0.52	0.49	0.41
0.950	0.33	0.32	0.27	0.19	0.17
1.200	0.16	0.16	0.16	0.16	0.16
1.450	0.16	0.16	0.16	0.16	0.17
1.700	0.17	0.16	0.16	0.16	0.17
1.950	0.17	0.18	(N/A)	(N/A)	(N/A)

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Addition Summary
Label: O-1

Return Event: 10 years
Storm Event: 10 yr 2 hr

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
Outlet-1	PO-1

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Outlet-1	917.958	1.100	0.21
Flow (In)	O-1	917.958	1.100	0.21

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Addition Summary
Label: O-2

Return Event: 10 years
Storm Event: 10 yr 2 hr

Summary for Hydrograph Addition at 'O-2'

Upstream Link	Upstream Node
Outlet-2	PO-2

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Outlet-2	961.895	1.100	0.22
Flow (In)	O-2	961.895	1.100	0.22

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Time vs. Elevation
Label: PO-1 (OUT)

Return Event: 10 years
Storm Event: 10 yr 2 hr

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	0.00	0.00	0.00	0.00	0.00
0.250	0.00	0.00	0.00	0.00	0.00
0.500	0.01	0.05	0.12	0.20	0.29
0.750	0.36	0.41	0.45	0.48	0.50
1.000	0.52	0.53	0.53	0.53	0.52
1.250	0.52	0.51	0.51	0.50	0.50
1.500	0.49	0.49	0.49	0.48	0.48
1.750	0.48	0.48	0.47	0.47	0.47
2.000	0.47	(N/A)	(N/A)	(N/A)	(N/A)

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Time vs. Elevation
Label: PO-2 (OUT)

Return Event: 10 years
Storm Event: 10 yr 2 hr

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	0.00	0.00	0.00	0.00	0.00
0.250	0.00	0.00	0.00	0.00	0.00
0.500	0.00	0.04	0.10	0.17	0.26
0.750	0.33	0.38	0.42	0.45	0.47
1.000	0.48	0.49	0.50	0.49	0.49
1.250	0.48	0.48	0.47	0.47	0.46
1.500	0.46	0.46	0.45	0.45	0.45
1.750	0.45	0.44	0.44	0.44	0.44
2.000	0.44	(N/A)	(N/A)	(N/A)	(N/A)

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Time vs. Volume
Label: PO-1

Return Event: 10 years
Storm Event: 10 yr 2 hr

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
0.000	0.000	0.000	0.000	0.000	0.000
0.250	0.000	0.000	0.000	0.000	0.000
0.500	12.000	79.000	196.000	326.000	466.000
0.750	583.000	661.000	722.000	769.000	802.000
1.000	824.000	841.000	846.000	841.000	833.000
1.250	825.000	818.000	810.000	803.000	796.000
1.500	790.000	783.000	778.000	774.000	770.000
1.750	767.000	763.000	759.000	756.000	753.000
2.000	752.000	(N/A)	(N/A)	(N/A)	(N/A)

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Time vs. Volume
Label: PO-2

Return Event: 10 years
Storm Event: 10 yr 2 hr

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
0.000	0.000	0.000	0.000	0.000	0.000
0.250	0.000	0.000	0.000	0.000	0.000
0.500	7.000	58.000	158.000	280.000	416.000
0.750	533.000	611.000	672.000	720.000	752.000
1.000	775.000	792.000	796.000	790.000	782.000
1.250	773.000	765.000	757.000	750.000	743.000
1.500	735.000	729.000	724.000	720.000	716.000
1.750	713.000	709.000	705.000	703.000	701.000
2.000	700.000	(N/A)	(N/A)	(N/A)	(N/A)

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Elevation-Area Volume Curve
Label: PO-1

Return Event: 10 years
Storm Event: 10 yr 2 hr

Elevation (ft)	Planimeter (ft²)	Area (ft²)	A1+A2+sqr (A1*A2) (ft²)	Volume (ft³)	Volume (Total) (ft³)
0.00	0.0	1,600.000	0.000	0.000	0.000
1.00	0.0	1,600.000	4,800.000	1,600.000	1,600.000
5.00	0.0	1,600.000	4,800.000	6,400.000	8,000.000
10.00	0.0	1,600.000	4,800.000	8,000.000	16,000.000

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Volume Equations | Return Event: 10 years
Label: PO-1 | Storm Event: 10 yr 2 hr

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

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(Area1 * Area2))

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

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Elevation-Area Volume Curve
Label: PO-2

Return Event: 10 years
Storm Event: 10 yr 2 hr

Elevation (ft)	Planimeter (ft²)	Area (ft²)	A1+A2+sqr (A1*A2) (ft²)	Volume (ft³)	Volume (Total) (ft³)
0.00	0.0	1,600.000	0.000	0.000	0.000
1.00	0.0	1,600.000	4,800.000	1,600.000	1,600.000
5.00	0.0	1,600.000	4,800.000	6,400.000	8,000.000
10.00	0.0	1,600.000	4,800.000	8,000.000	16,000.000

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Volume Equations | Return Event: 10 years
Label: PO-2 | Storm Event: 10 yr 2 hr

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

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(Area1 * Area2))

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

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1

Return Event: 10 years
Storm Event: 10 yr 2 hr

Requested Pond Water Surface Elevations	
Minimum (Headwater)	0.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	10.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
User Defined Table	User Defined Rating Table - 1	Forward	TW	0.00	10.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1

Return Event: 10 years
Storm Event: 10 yr 2 hr

Structure ID: User Defined Rating Table - 1
Structure Type: User Defined Table

Elevation (ft)	Flow (ft³/s)
0.00	0.00
1.00	0.39
5.00	0.39
10.00	0.39

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

Return Event: 10 years
Storm Event: 10 yr 2 hr

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = User Defined Rating Table - 1 (User Defined Table)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.20	(N/A)	0.00
1.00	0.39	(N/A)	0.00
1.50	0.39	(N/A)	0.00
2.00	0.39	(N/A)	0.00
2.50	0.39	(N/A)	0.00
3.00	0.39	(N/A)	0.00
3.50	0.39	(N/A)	0.00
4.00	0.39	(N/A)	0.00
4.50	0.39	(N/A)	0.00
5.00	0.39	(N/A)	0.00
5.50	0.39	(N/A)	0.00
6.00	0.39	(N/A)	0.00
6.50	0.39	(N/A)	0.00
7.00	0.39	(N/A)	0.00
7.50	0.39	(N/A)	0.00
8.00	0.39	(N/A)	0.00
8.50	0.39	(N/A)	0.00
9.00	0.39	(N/A)	0.00
9.50	0.39	(N/A)	0.00
10.00	0.39	(N/A)	0.00

Computation Messages
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

Return Event: 10 years
Storm Event: 10 yr 2 hr

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = User Defined Rating Table - 1 (User Defined Table)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Computation Messages
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Composite Rating Curve
Label: Composite Outlet Structure - 1

Return Event: 10 years
Storm Event: 10 yr 2 hr

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.20	(N/A)	0.00
1.00	0.39	(N/A)	0.00
1.50	0.39	(N/A)	0.00
2.00	0.39	(N/A)	0.00
2.50	0.39	(N/A)	0.00
3.00	0.39	(N/A)	0.00
3.50	0.39	(N/A)	0.00
4.00	0.39	(N/A)	0.00
4.50	0.39	(N/A)	0.00
5.00	0.39	(N/A)	0.00
5.50	0.39	(N/A)	0.00
6.00	0.39	(N/A)	0.00
6.50	0.39	(N/A)	0.00
7.00	0.39	(N/A)	0.00
7.50	0.39	(N/A)	0.00
8.00	0.39	(N/A)	0.00
8.50	0.39	(N/A)	0.00
9.00	0.39	(N/A)	0.00
9.50	0.39	(N/A)	0.00
10.00	0.39	(N/A)	0.00

Contributing Structures
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Composite Rating Curve
Label: Composite Outlet Structure - 1

Return Event: 10 years
Storm Event: 10 yr 2 hr

Composite Outflow Summary

Contributing Structures
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1
User Defined Rating Table - 1

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 2

Return Event: 10 years
Storm Event: 10 yr 2 hr

Requested Pond Water Surface Elevations	
Minimum (Headwater)	0.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	10.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
User Defined Table	User Defined Rating Table - 2	Forward	TW	0.00	10.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 2

Return Event: 10 years
Storm Event: 10 yr 2 hr

Structure ID: User Defined Rating Table - 2
Structure Type: User Defined Table

Elevation (ft)	Flow (ft³/s)
0.00	0.00
1.00	0.44
10.00	0.44

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 2

Return Event: 10 years
Storm Event: 10 yr 2 hr

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = User Defined Rating Table - 2 (User Defined Table)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.22	(N/A)	0.00
1.00	0.44	(N/A)	0.00
1.50	0.44	(N/A)	0.00
2.00	0.44	(N/A)	0.00
2.50	0.44	(N/A)	0.00
3.00	0.44	(N/A)	0.00
3.50	0.44	(N/A)	0.00
4.00	0.44	(N/A)	0.00
4.50	0.44	(N/A)	0.00
5.00	0.44	(N/A)	0.00
5.50	0.44	(N/A)	0.00
6.00	0.44	(N/A)	0.00
6.50	0.44	(N/A)	0.00
7.00	0.44	(N/A)	0.00
7.50	0.44	(N/A)	0.00
8.00	0.44	(N/A)	0.00
8.50	0.44	(N/A)	0.00
9.00	0.44	(N/A)	0.00
9.50	0.44	(N/A)	0.00
10.00	0.44	(N/A)	0.00

Computation Messages
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 2

Return Event: 10 years
Storm Event: 10 yr 2 hr

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = User Defined Rating Table - 2 (User Defined Table)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Computation Messages
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table
Interpolated from input table

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Composite Rating Curve
Label: Composite Outlet Structure - 2

Return Event: 10 years
Storm Event: 10 yr 2 hr

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.22	(N/A)	0.00
1.00	0.44	(N/A)	0.00
1.50	0.44	(N/A)	0.00
2.00	0.44	(N/A)	0.00
2.50	0.44	(N/A)	0.00
3.00	0.44	(N/A)	0.00
3.50	0.44	(N/A)	0.00
4.00	0.44	(N/A)	0.00
4.50	0.44	(N/A)	0.00
5.00	0.44	(N/A)	0.00
5.50	0.44	(N/A)	0.00
6.00	0.44	(N/A)	0.00
6.50	0.44	(N/A)	0.00
7.00	0.44	(N/A)	0.00
7.50	0.44	(N/A)	0.00
8.00	0.44	(N/A)	0.00
8.50	0.44	(N/A)	0.00
9.00	0.44	(N/A)	0.00
9.50	0.44	(N/A)	0.00
10.00	0.44	(N/A)	0.00

Contributing Structures
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Composite Rating Curve
Label: Composite Outlet Structure - 2

Return Event: 10 years
Storm Event: 10 yr 2 hr

Composite Outflow Summary

Contributing Structures
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2
User Defined Rating Table - 2

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Diverted Hydrograph
Label: Outlet-1

Return Event: 10 years
Storm Event: 10 yr 2 hr

Peak Discharge	0.21 ft³/s
Time to Peak	1.100 hours
Hydrograph Volume	917.957 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.450	0.00	0.00	0.02	0.05	0.08
0.700	0.11	0.14	0.16	0.18	0.19
0.950	0.20	0.20	0.20	0.21	0.20
1.200	0.20	0.20	0.20	0.20	0.20
1.450	0.19	0.19	0.19	0.19	0.19
1.700	0.19	0.19	0.19	0.18	0.18
1.950	0.18	0.18	(N/A)	(N/A)	(N/A)

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Diverted Hydrograph
Label: Outlet-2

Return Event: 10 years
Storm Event: 10 yr 2 hr

Peak Discharge	0.22 ft³/s
Time to Peak	1.100 hours
Hydrograph Volume	961.895 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.450	0.00	0.00	0.02	0.04	0.08
0.700	0.11	0.15	0.17	0.18	0.20
0.950	0.21	0.21	0.22	0.22	0.22
1.200	0.21	0.21	0.21	0.21	0.21
1.450	0.20	0.20	0.20	0.20	0.20
1.700	0.20	0.20	0.19	0.19	0.19
1.950	0.19	0.19	(N/A)	(N/A)	(N/A)

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 10 years
Label: PO-1 Storm Event: 10 yr 2 hr

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	0.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
0.00	0.00	0.000	1,600.000	0.00	0.00	0.00
0.50	0.20	800.000	1,600.000	0.00	0.20	9.08
1.00	0.39	1,600.000	1,600.000	0.00	0.39	18.17
1.50	0.39	2,400.000	1,600.000	0.00	0.39	27.06
2.00	0.39	3,200.000	1,600.000	0.00	0.39	35.95
2.50	0.39	4,000.000	1,600.000	0.00	0.39	44.83
3.00	0.39	4,800.000	1,600.000	0.00	0.39	53.72
3.50	0.39	5,600.000	1,600.000	0.00	0.39	62.61
4.00	0.39	6,400.000	1,600.000	0.00	0.39	71.50
4.50	0.39	7,200.000	1,600.000	0.00	0.39	80.39
5.00	0.39	8,000.000	1,600.000	0.00	0.39	89.28
5.50	0.39	8,800.000	1,600.000	0.00	0.39	98.17
6.00	0.39	9,600.000	1,600.000	0.00	0.39	107.06
6.50	0.39	10,400.000	1,600.000	0.00	0.39	115.95
7.00	0.39	11,200.000	1,600.000	0.00	0.39	124.83
7.50	0.39	12,000.000	1,600.000	0.00	0.39	133.72
8.00	0.39	12,800.000	1,600.000	0.00	0.39	142.61
8.50	0.39	13,600.000	1,600.000	0.00	0.39	151.50
9.00	0.39	14,400.000	1,600.000	0.00	0.39	160.39
9.50	0.39	15,200.000	1,600.000	0.00	0.39	169.28
10.00	0.39	16,000.000	1,600.000	0.00	0.39	178.17

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Level Pool Pond Routing Summary
Label: PO-1 (IN)

Return Event: 10 years
Storm Event: 10 yr 2 hr

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	0.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	0.90 ft³/s	Time to Peak (Flow, In)	0.700 hours
Flow (Peak Outlet)	0.21 ft³/s	Time to Peak (Flow, Outlet)	1.100 hours

Elevation (Water Surface, Peak)	0.53 ft
Volume (Peak)	845.575 ft³

Mass Balance (ft³)	
Volume (Initial)	0.000 ft³
Volume (Total Inflow)	1,670.000 ft³
Volume (Total Infiltration)	0.000 ft³
Volume (Total Outlet Outflow)	918.000 ft³
Volume (Retained)	720.000 ft³
Volume (Unrouted)	-32.000 ft³
Error (Mass Balance)	1.9 %

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Pond Routed Hydrograph (total out) Return Event: 10 years
Label: PO-1 (OUT) Storm Event: 10 yr 2 hr

Peak Discharge	0.21 ft³/s
Time to Peak	1.100 hours
Hydrograph Volume	917.957 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.450	0.00	0.00	0.02	0.05	0.08
0.700	0.11	0.14	0.16	0.18	0.19
0.950	0.20	0.20	0.20	0.21	0.20
1.200	0.20	0.20	0.20	0.20	0.20
1.450	0.19	0.19	0.19	0.19	0.19
1.700	0.19	0.19	0.19	0.18	0.18
1.950	0.18	0.18	(N/A)	(N/A)	(N/A)

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Pond Inflow Summary
Label: PO-1 (IN)

Return Event: 10 years
Storm Event: 10 yr 2 hr

Summary for Hydrograph Addition at 'PO-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-WEST

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	CM-WEST	1,669.937	0.700	0.90
Flow (In)	PO-1	1,669.937	0.700	0.90

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Elevation-Volume-Flow Table (Pond) Return Event: 10 years
Label: PO-2 Storm Event: 10 yr 2 hr

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	0.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
0.00	0.00	0.000	1,600.000	0.00	0.00	0.00
0.50	0.22	800.000	1,600.000	0.00	0.22	9.11
1.00	0.44	1,600.000	1,600.000	0.00	0.44	18.22
1.50	0.44	2,400.000	1,600.000	0.00	0.44	27.11
2.00	0.44	3,200.000	1,600.000	0.00	0.44	36.00
2.50	0.44	4,000.000	1,600.000	0.00	0.44	44.88
3.00	0.44	4,800.000	1,600.000	0.00	0.44	53.77
3.50	0.44	5,600.000	1,600.000	0.00	0.44	62.66
4.00	0.44	6,400.000	1,600.000	0.00	0.44	71.55
4.50	0.44	7,200.000	1,600.000	0.00	0.44	80.44
5.00	0.44	8,000.000	1,600.000	0.00	0.44	89.33
5.50	0.44	8,800.000	1,600.000	0.00	0.44	98.22
6.00	0.44	9,600.000	1,600.000	0.00	0.44	107.11
6.50	0.44	10,400.000	1,600.000	0.00	0.44	116.00
7.00	0.44	11,200.000	1,600.000	0.00	0.44	124.88
7.50	0.44	12,000.000	1,600.000	0.00	0.44	133.77
8.00	0.44	12,800.000	1,600.000	0.00	0.44	142.66
8.50	0.44	13,600.000	1,600.000	0.00	0.44	151.55
9.00	0.44	14,400.000	1,600.000	0.00	0.44	160.44
9.50	0.44	15,200.000	1,600.000	0.00	0.44	169.33
10.00	0.44	16,000.000	1,600.000	0.00	0.44	178.22

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Level Pool Pond Routing Summary
Label: PO-2 (IN)

Return Event: 10 years
Storm Event: 10 yr 2 hr

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	0.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	0.90 ft³/s	Time to Peak (Flow, In)	0.700 hours
Flow (Peak Outlet)	0.22 ft³/s	Time to Peak (Flow, Outlet)	1.100 hours

Elevation (Water Surface, Peak)	0.50 ft
Volume (Peak)	795.708 ft³

Mass Balance (ft³)	
Volume (Initial)	0.000 ft³
Volume (Total Inflow)	1,662.000 ft³
Volume (Total Infiltration)	0.000 ft³
Volume (Total Outlet Outflow)	962.000 ft³
Volume (Retained)	666.000 ft³
Volume (Unrouted)	-34.000 ft³
Error (Mass Balance)	2.0 %

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Pond Routed Hydrograph (total out) Return Event: 10 years
Label: PO-2 (OUT) Storm Event: 10 yr 2 hr

Peak Discharge	0.22 ft³/s
Time to Peak	1.100 hours
Hydrograph Volume	961.895 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.450	0.00	0.00	0.02	0.04	0.08
0.700	0.11	0.15	0.17	0.18	0.20
0.950	0.21	0.21	0.22	0.22	0.22
1.200	0.21	0.21	0.21	0.21	0.21
1.450	0.20	0.20	0.20	0.20	0.20
1.700	0.20	0.20	0.19	0.19	0.19
1.950	0.19	0.19	(N/A)	(N/A)	(N/A)

Horizon Village at Summit Powder Mountain Post Development Analysis

Subsection: Pond Inflow Summary
Label: PO-2 (IN)

Return Event: 10 years
Storm Event: 10 yr 2 hr

Summary for Hydrograph Addition at 'PO-2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-EAST

Node Inflows

Inflow Type	Element	Volume (ft³)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	CM-EAST	1,661.691	0.700	0.90
Flow (In)	PO-2	1,661.691	0.700	0.90

Horizon Village at Summit Powder Mountain Post Development Analysis

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Horizon Village at Summit Powder Mountain Post Development Analysis

Worksheet for West Side Orifice

Project Description

Solve For	Headwater Elevation

Input Data

Discharge	0.21	cfs
Centroid Elevation	2.50	in
Tailwater Elevation	0.00	ft
Discharge Coefficient	0.60	
Diameter	3.00	in

Results

Headwater Elevation	1.00	ft
Headwater Height Above Centroid	0.79	ft
Tailwater Height Above Centroid	-0.21	ft
Flow Area	0.05	ft^2
Velocity	4.28	ft/s

Worksheet for East Side Orifice

Project Description

Solve For	Headwater Elevation

Input Data

Discharge	0.33	cfs
Centroid Elevation	4.00	in
Tailwater Elevation	0.00	ft
Discharge Coefficient	0.60	
Diameter	4.00	in

Results

Headwater Elevation	0.95	ft
Headwater Height Above Centroid	0.62	ft
Tailwater Height Above Centroid	-0.33	ft
Flow Area	0.09	ft²
Velocity	3.78	ft/s

Worksheet for Horizon Run Ditch

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.078	
Channel Slope	0.10000	ft/ft
Normal Depth	1.00	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)

Results

Discharge	10.95	cfs
Flow Area	3.00	ft²
Wetted Perimeter	6.36	ft
Hydraulic Radius	0.47	ft
Top Width	6.00	ft
Critical Depth	0.96	ft
Critical Slope	0.12222	ft/ft
Velocity	3.65	ft/s
Velocity Head	0.21	ft
Specific Energy	1.21	ft
Froude Number	0.91	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.00	ft
Critical Depth	0.96	ft
Channel Slope	0.10000	ft/ft
Critical Slope	0.12222	ft/ft

Cross Section for Horizon Run Ditch

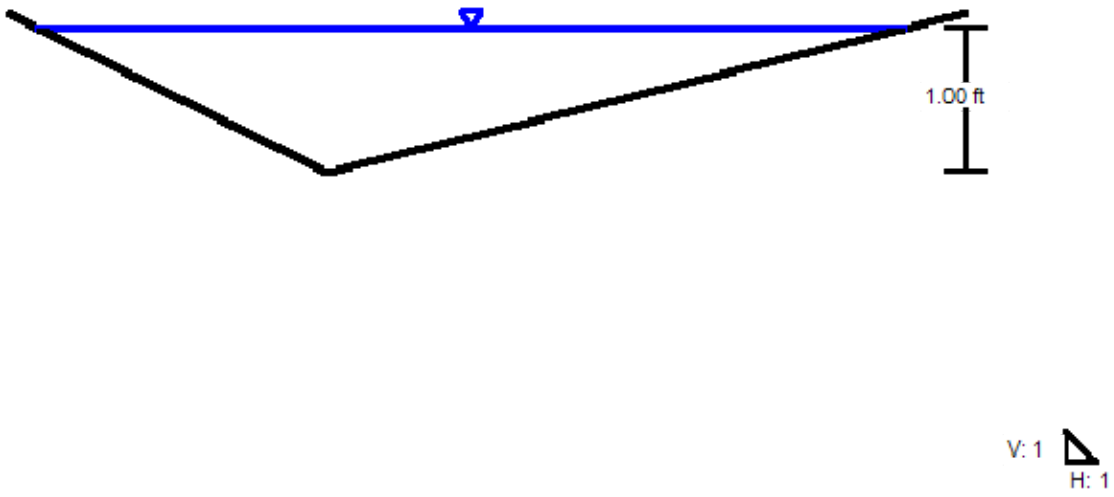
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.078	
Channel Slope	0.10000	ft/ft
Normal Depth	1.00	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	10.95	cfs

Cross Section Image



Worksheet for East Side Swale

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.078	
Channel Slope	0.10000	ft/ft
Normal Depth	1.00	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)

Results

Discharge	7.05	cfs
Flow Area	2.00	ft²
Wetted Perimeter	4.47	ft
Hydraulic Radius	0.45	ft
Top Width	4.00	ft
Critical Depth	0.95	ft
Critical Slope	0.13187	ft/ft
Velocity	3.52	ft/s
Velocity Head	0.19	ft
Specific Energy	1.19	ft
Froude Number	0.88	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.00	ft
Critical Depth	0.95	ft
Channel Slope	0.10000	ft/ft
Critical Slope	0.13187	ft/ft

Cross Section for East Side Swale

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.078	
Channel Slope	0.10000	ft/ft
Normal Depth	1.00	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	7.05	cfs

Cross Section Image