Storm Water Report

Powder Mountain – Shelter Hill

Eden, Utah

Prepared for:

Powder Mountain

Prepared by:
Talisman Civil Consultants, LLC
1588 South Main Street, Suite 200
Salt Lake City, Utah 84115

November 13, 2024

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1.0 INTRODUCTION

The purpose of this report is to outline the basis for the stormwater system design for the proposed Shelter Hill development and provide supporting calculations demonstrating the adequacy of the design. The project site is located southeast of Powder Mountain Summit Village in Eden, UT, 84310.

2.0 METHODOLOGY

The criteria for the storm drain system design are based on Weber County's stormwater runoff design standards summarized below:

STORM WATER RUNOFF DESIGN

Condition	Requirement
Small watersheds of 30 acres or less	Rational Method
Small or large watersheds	SCS Curve number method and SCS Unit Hydrograph method (1)
Precipitation return periods initial collection and conveyance	10 year(2)
Major collection of multiple initial systems	100 year(2)
Conveyance of rivers, streams, or any large drainage	100 year or maximum
Maximum post development runoff	0.1 cfs/acre(1)

WATER RUNOFF FOOTNOTES:

- 1. Or as approved by the county engineer
- 2. Precipitation estimates may be found on the NOAA website. You may also want to visit the USGS Site for a very useful tool.

On October 3, 2024, Talisman Civil Consultants (TCC) petitioned Weber County to set the maximum runoff at Powder Mountain to **0.2 cfs per acre**. County engineer Gary Myers granted a discharge rate variance for the Shelter Hill design only, subject to reassessment in the next design/construction phase.

The software used to perform the drainage calculations is Bentley Haestad's SewerGEMS, utilizing physical attributes derived from traditional and topographic LiDAR survey, and proposed storm drain design. NOAA Atlas 14 precipitation intensity tables with a latitude and longitude corresponding to Powder Mountain was used as the basis of storm data within the hydraulic model. See Table 1 below & the Appendix.

Table 1 – NOAA Atlas 14 Powder Mountain Precipitation Data

Storm Event	10 Year 24-Hour	100 Year 24-Hour
Rainfall (in)	3.97	5.76

The storm water model utilizes the Soil Conservation Service Method (commonly known as SCS or TR-55 Method) to analyze the hydrology of the site. The SCS method is briefly summarized below:

- The basis of the curve number method is the empirical relationship between the retention (rainfall not converted into runoff), hydrologic properties of the watershed, and rainfall intensity/distribution. It accounts for most runoff producing watershed characteristics e.g.: soil type, land use/treatment, surface condition, and antecedent moisture condition.
- Composite Curve Numbers (CN Values) were developed by reviewing impervious, and pervious areas.
- The NOAA Atlas 14 precipitation data was used to create SCS Type II & storm distribution hydrograph curves.

3.0 ANALYSIS & RESULTS

Existing Conditions

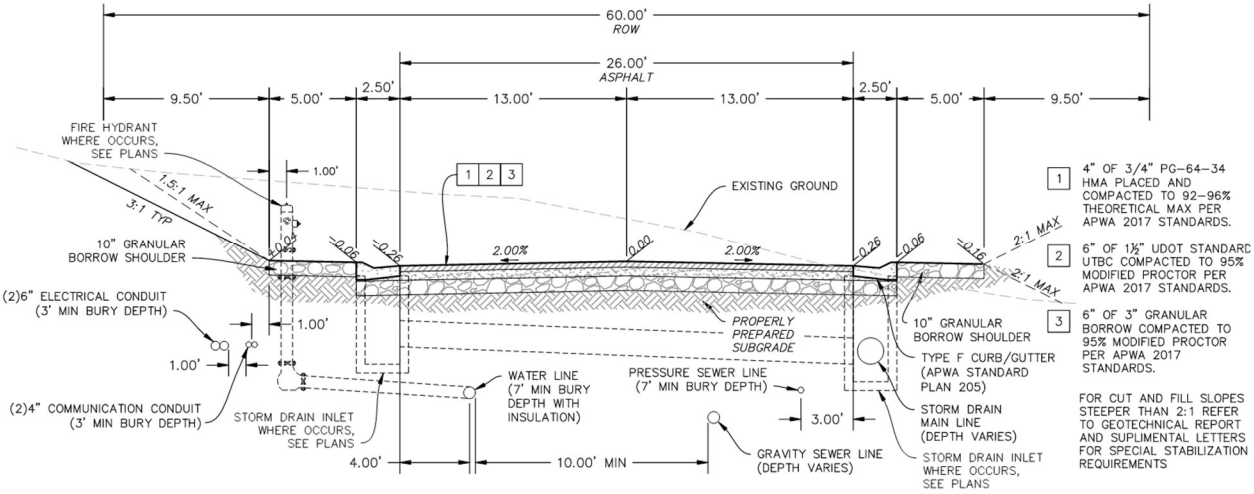
The proposed project site follows a northwest-southeast ridge line. The area is currently undeveloped, except for Shelby John Way, a dirt road running parallel to the ridge line to the southwest. Vegetation consists mainly of mountain brush to the southwest of Shelby John Way, with pockets of oak brush, aspen trees, and other brush to the northeast.

The underlying soils are primarily classified as Hydrologic Soil Group C, consisting of clay loams to the southwest of Shelby John Way, and Hydrologic Soil Group b, consisting of gravel loams to the northeast. A soils map is provided in the Appendix.

Proposed Conditions: Catchment Areas

A new paved road (hereafter in this report called the Shelter Hill Road) is proposed to replace the existing Shelby John Way dirt road. See Figure 1 below.

Figure 1 – 60' Right of Way Road Section (w/ Curb & Gutter)



39 development lots are planned on both the southwest and northeast of the proposed road. The road is crowned with Type F curb and gutter on either side. Primary catch basins will be located on the uphill side of the road crown defining the various catchment areas. Secondary catch basins will be located on the downhill side of the road crown and connected to the primary basins.

The site is broken down into 22 catchment areas separated into two sub-networks:

- **Shelter Hill Sub-Network 1 (Northwest)** – Catchments 1 through 16
- **Shelter Hill Sub-Network 2 (Southeast)** – Catchments 17 through 22

Each catchment area is delineated based on existing topography, as well as proposed grading and drainage plans. Catchment areas are characterized by an SCS curve number, with higher numbers indicating more impervious surfaces and/or soils, resulting in increased storm runoff. Lower curve numbers reflect reduced runoff, as water either infiltrates into the ground or is absorbed by vegetation such as grasses and shrubbery.

Impervious areas, such as roadways and rooftops, were assigned a curve number of 98. Surrounding landscapes were assigned curve numbers of 56 and 70, corresponding to Type B and C soils with a natural brush/weed/grass mixture in fair condition. Consistent with the Powder Mountain Master Plan, each parcel lot was assumed to have 3,600 square feet of impervious area, accounting for roof and driveway surfaces. A time of concentration of 10 minutes was used for each catchment.

See the Catchment Tables in the Appendix for a summary of each catchment area, including total area, SCS curve number, and time of concentration.

Proposed Conditions: Conveyance

The storm drainpipes were designed per Weber County's standards, using HDPE material with slopes ranging from 0.5% to 8.0% and mainline sizes from 18" to 30".

Sub-Network 1 covers two-thirds of the site, discharging storm flows downstream of the "Loop Road" into a 4' wide x 1' deep rip-rapped V-ditch leading to Pond 1. Sub-Network 2 directs the remaining runoff to a similar V-ditch at the cul-de-sac at the end of the road, eventually discharging into Pond 2.

The hydraulic model confirms the designed pipe diameters can adequately handle the 100-year, 24-hour storm, exceeding Weber County’s requirements. Details such as length, slope, velocity, flow, and capacity are provided in the Conduit Tables in the Appendix.

Proposed Conditions: Stormwater Detention and Retention

The proposed Shelter Hill stormwater design includes two ponds, one for each sub-network. Discharge is controlled by appropriately sized orifices, limiting the discharge rate to no more than 0.2 cfs per acre. Each pond is designed with a rip-rapped emergency overflow spillway at the 100-year storm highwater elevation, plus 1' of freeboard.

Additionally, the Utah Division of Water Quality requires the retention and infiltration of the 80th percentile storm event, which at Powder Mountain equates to 0.65" per square foot. The required retention volume for each pond is calculated using the Hydrologic Soil Group Method from the Utah Low Impact Development Manual (2018). Pond details are provided in Table 2. Further information, including LID calculations and pond model exports, can be found in the Appendix.

Table 2 – Detention/Retention Pond Summary

Pond	Contributing Tributary Area (Acres)	Allowable Discharge Rate (CFS)	Maximum Discharge Rate (CFS)	Orifice Size (in)	Required Detention Volume (Total Pond Volume) (CF)	Required Retenion Volume (CF)
1	14.81	2.96	2.94	8.00	83,529	15,344
2	9.95	1.99	1.89	6.50	34,926	3,404

4.0 Summary

In summary, results from the hydraulic model show the proposed Shelter Hill stormwater meets or exceeds the Weber County's stormwater runoff design standards.

Appendix

DATE: 11/8/2024 12:37 AM

PATH: N:\SLB0793\Cadd\24-210-01 - Shelter Hill\Cadd\Vs\C200 SITE PLAN.dwg

SMHG LANDCO LLC
23-012-0181

SMHG PMDP PHASE II LLC
23-012-0170

SMHG PMDP PHASE II LLC
23-012-0172

SMHG LANDCO
23-012-0033

SMHG LANDCO LLC
23-012-0181

SHELTER HILL RD

LOOP RD

LOT 1
LOT 2
LOT 3
LOT 4
LOT 5
LOT 6
LOT 7
LOT 8
LOT 9
LOT 10
LOT 11
LOT 12
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LOT 38
LOT 39

OPEN SPACE "A"
PARCEL -A
OPEN SPACE "B"
DEVELOPMENT PARCEL D1
OPEN SPACE "C"

TALISMAN
CIVIL CONSULTANTS
1588 SOUTH MAIN STREET
SUITE 200
SALT LAKE CITY, UT 84115
801.743.1300

NO.	BY	DATE	REVISIONS

POWDER MOUNTAIN
SHELTER HILL
OVERALL SITE PLAN

DATE: 11.08.2024

TCC JOB NUMBER: 24-210-01

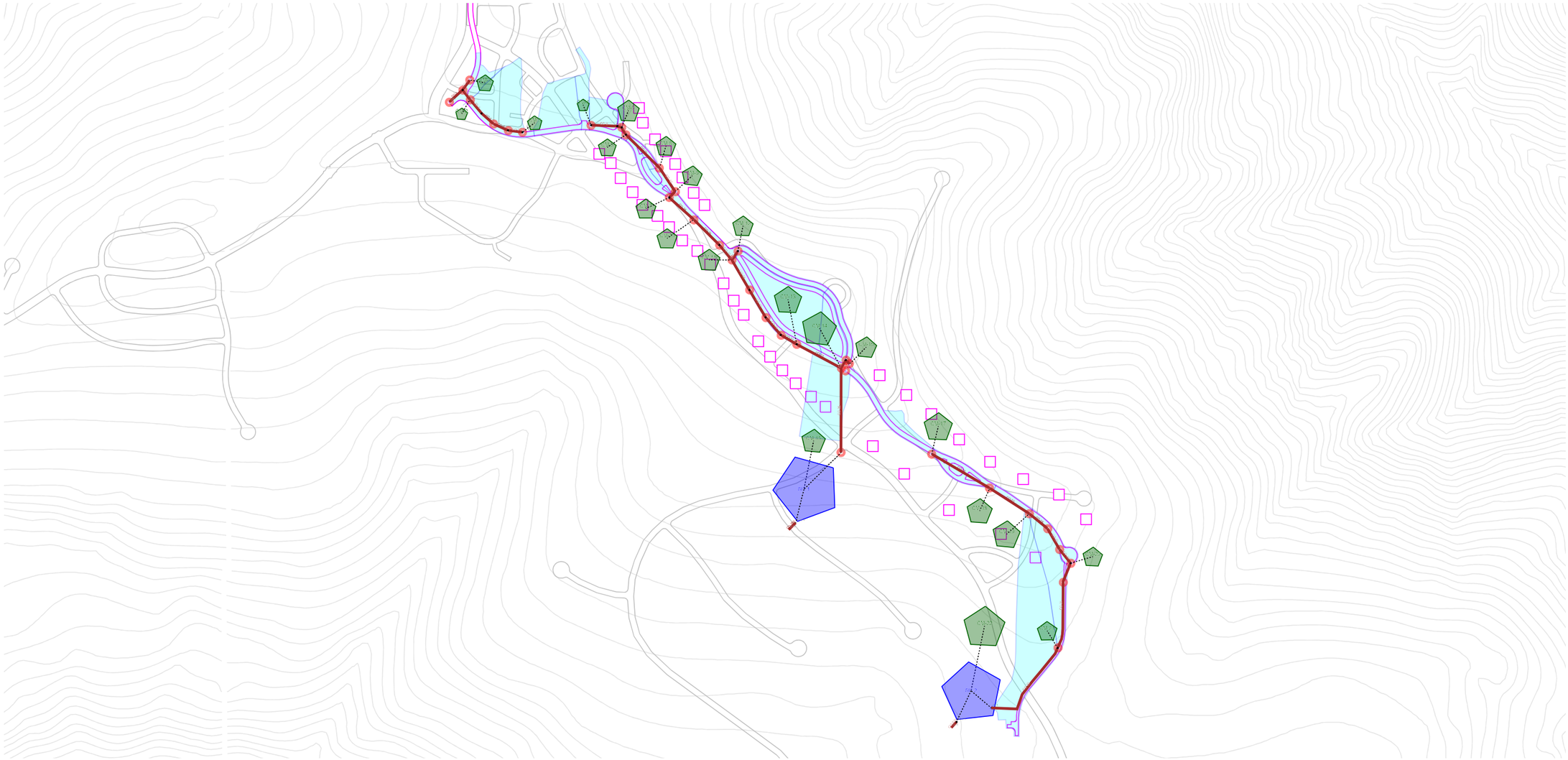
REGISTERED PROFESSIONAL ENGINEER
No. 7899506
RYAN W. CATHEY
11/08/2024
STATE OF UTAH

SCALE
HORIZONTAL: 1" = 250'
0 62.5' 125' 250' 375'

SHEET NUMBER
C200
3 OF 31

CALL811 BEFORE YOU DIG
811
SAFE DIGGING PARTNER

Model Schematic



Storm Data Detailed Report: 10 Year Storm

Element Details			
ID	449	Notes	
Label	10 Year Storm		

10 year Storm			
Label	10 year Storm	End Time	1,440.000 min
Return Event	10 years	Depth	4.0 in
Start Time	0.000 min	Storm Event Depth Type	Cumulative
Increment	6.000 min		

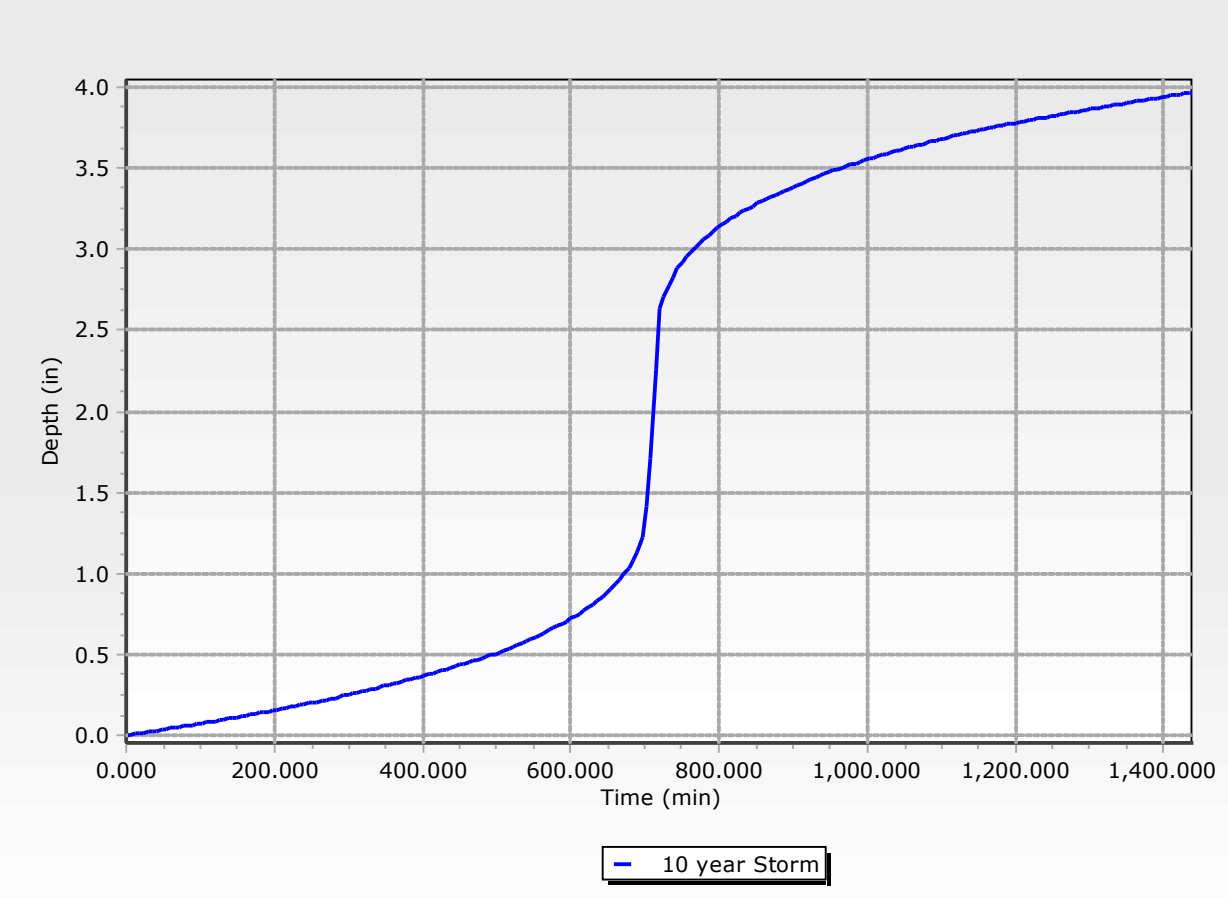
10 year Storm

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
30.000	0.0	0.0	0.0	0.0	0.0
60.000	0.0	0.0	0.1	0.1	0.1
90.000	0.1	0.1	0.1	0.1	0.1
120.000	0.1	0.1	0.1	0.1	0.1
150.000	0.1	0.1	0.1	0.1	0.1
180.000	0.1	0.1	0.1	0.2	0.2
210.000	0.2	0.2	0.2	0.2	0.2
240.000	0.2	0.2	0.2	0.2	0.2
270.000	0.2	0.2	0.2	0.2	0.2
300.000	0.3	0.3	0.3	0.3	0.3
330.000	0.3	0.3	0.3	0.3	0.3
360.000	0.3	0.3	0.3	0.3	0.3
390.000	0.4	0.4	0.4	0.4	0.4
420.000	0.4	0.4	0.4	0.4	0.4
450.000	0.4	0.4	0.5	0.5	0.5
480.000	0.5	0.5	0.5	0.5	0.5
510.000	0.5	0.5	0.5	0.6	0.6
540.000	0.6	0.6	0.6	0.6	0.6
570.000	0.6	0.7	0.7	0.7	0.7
600.000	0.7	0.7	0.8	0.8	0.8
630.000	0.8	0.8	0.9	0.9	0.9
660.000	0.9	1.0	1.0	1.0	1.1
690.000	1.1	1.2	1.4	1.7	2.3
720.000	2.6	2.7	2.8	2.8	2.9
750.000	2.9	3.0	3.0	3.0	3.0
780.000	3.1	3.1	3.1	3.1	3.2
810.000	3.2	3.2	3.2	3.2	3.2
840.000	3.3	3.3	3.3	3.3	3.3
870.000	3.3	3.3	3.4	3.4	3.4
900.000	3.4	3.4	3.4	3.4	3.4
930.000	3.4	3.5	3.5	3.5	3.5
960.000	3.5	3.5	3.5	3.5	3.5
990.000	3.5	3.5	3.6	3.6	3.6
1,020.000	3.6	3.6	3.6	3.6	3.6

Storm Data Detailed Report: 10 Year Storm

10 year Storm

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
1,050.000	3.6	3.6	3.6	3.6	3.6
1,080.000	3.7	3.7	3.7	3.7	3.7
1,110.000	3.7	3.7	3.7	3.7	3.7
1,140.000	3.7	3.7	3.7	3.7	3.7
1,170.000	3.8	3.8	3.8	3.8	3.8
1,200.000	3.8	3.8	3.8	3.8	3.8
1,230.000	3.8	3.8	3.8	3.8	3.8
1,260.000	3.8	3.8	3.8	3.8	3.8
1,290.000	3.9	3.9	3.9	3.9	3.9
1,320.000	3.9	3.9	3.9	3.9	3.9
1,350.000	3.9	3.9	3.9	3.9	3.9
1,380.000	3.9	3.9	3.9	3.9	3.9
1,410.000	3.9	4.0	4.0	4.0	4.0
1,440.000	4.0	(N/A)	(N/A)	(N/A)	(N/A)



Storm Data Detailed Report: 100 Year Storm

Element Details			
ID	450	Notes	
Label	100 Year Storm		

100 Year Storm			
Label	100 Year Storm	End Time	1,440.000 min
Return Event	100 years	Depth	5.8 in
Start Time	0.000 min	Storm Event Depth Type	Cumulative
Increment	6.000 min		

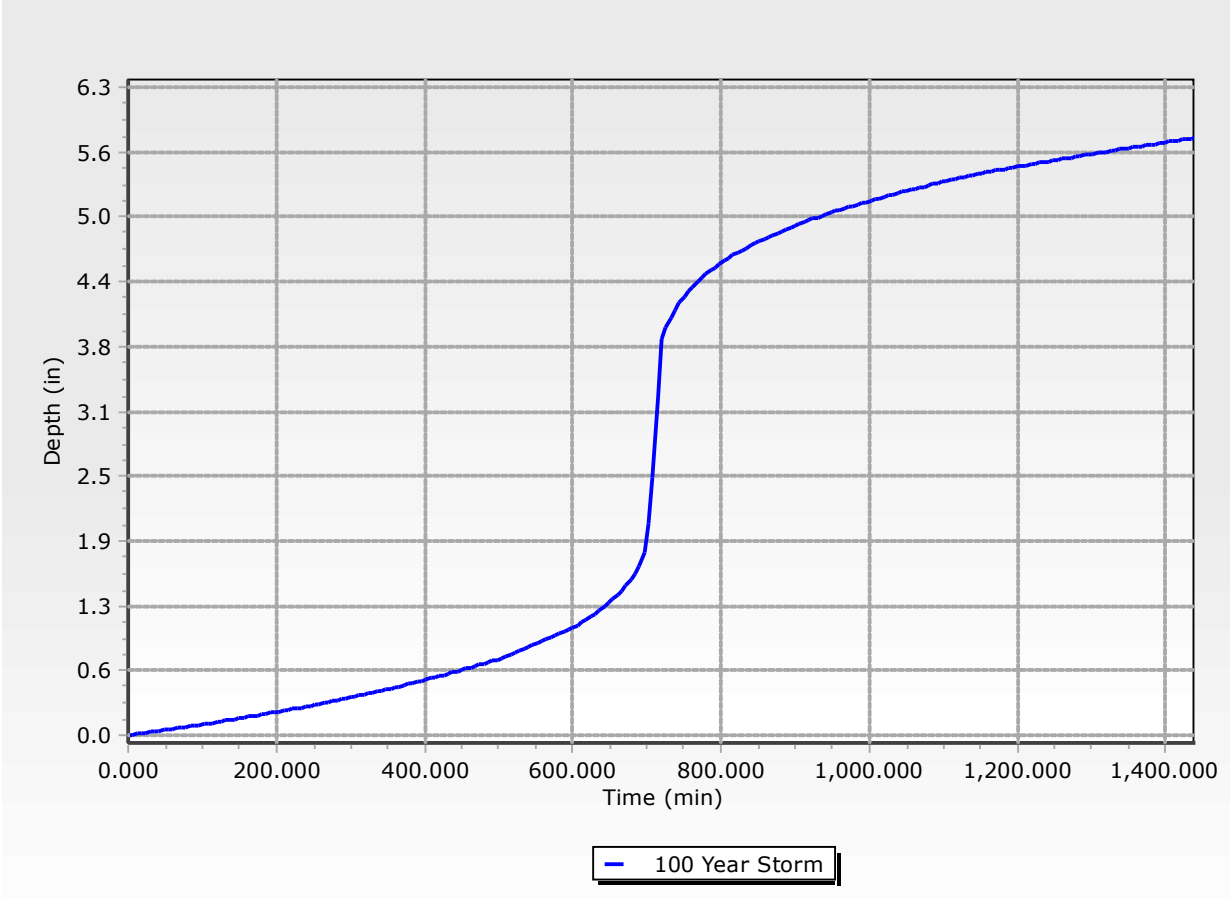
100 Year Storm

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
30.000	0.0	0.0	0.0	0.0	0.1
60.000	0.1	0.1	0.1	0.1	0.1
90.000	0.1	0.1	0.1	0.1	0.1
120.000	0.1	0.1	0.1	0.1	0.2
150.000	0.2	0.2	0.2	0.2	0.2
180.000	0.2	0.2	0.2	0.2	0.2
210.000	0.2	0.2	0.3	0.3	0.3
240.000	0.3	0.3	0.3	0.3	0.3
270.000	0.3	0.3	0.3	0.3	0.4
300.000	0.4	0.4	0.4	0.4	0.4
330.000	0.4	0.4	0.4	0.4	0.5
360.000	0.5	0.5	0.5	0.5	0.5
390.000	0.5	0.5	0.5	0.5	0.6
420.000	0.6	0.6	0.6	0.6	0.6
450.000	0.6	0.6	0.7	0.7	0.7
480.000	0.7	0.7	0.7	0.7	0.7
510.000	0.8	0.8	0.8	0.8	0.8
540.000	0.8	0.9	0.9	0.9	0.9
570.000	0.9	1.0	1.0	1.0	1.0
600.000	1.0	1.1	1.1	1.1	1.1
630.000	1.2	1.2	1.2	1.3	1.3
660.000	1.4	1.4	1.4	1.5	1.6
690.000	1.6	1.8	2.0	2.5	3.3
720.000	3.8	3.9	4.0	4.1	4.2
750.000	4.2	4.3	4.3	4.4	4.4
780.000	4.4	4.5	4.5	4.5	4.6
810.000	4.6	4.6	4.7	4.7	4.7
840.000	4.7	4.7	4.8	4.8	4.8
870.000	4.8	4.8	4.9	4.9	4.9
900.000	4.9	4.9	4.9	5.0	5.0
930.000	5.0	5.0	5.0	5.0	5.1
960.000	5.1	5.1	5.1	5.1	5.1
990.000	5.1	5.1	5.2	5.2	5.2
1,020.000	5.2	5.2	5.2	5.2	5.2

Storm Data Detailed Report: 100 Year Storm

100 Year Storm

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
1,050.000	5.3	5.3	5.3	5.3	5.3
1,080.000	5.3	5.3	5.3	5.3	5.3
1,110.000	5.4	5.4	5.4	5.4	5.4
1,140.000	5.4	5.4	5.4	5.4	5.4
1,170.000	5.4	5.5	5.5	5.5	5.5
1,200.000	5.5	5.5	5.5	5.5	5.5
1,230.000	5.5	5.5	5.5	5.5	5.5
1,260.000	5.6	5.6	5.6	5.6	5.6
1,290.000	5.6	5.6	5.6	5.6	5.6
1,320.000	5.6	5.6	5.6	5.6	5.7
1,350.000	5.7	5.7	5.7	5.7	5.7
1,380.000	5.7	5.7	5.7	5.7	5.7
1,410.000	5.7	5.7	5.7	5.7	5.8
1,440.000	5.8	(N/A)	(N/A)	(N/A)	(N/A)



Catchment Table - Postdevelopment Conditions (100 Year, 24 Hour Storm)

Current Time: 0.00 min

Label	Area (User Defined) (ft²)	SCS CN	Time of Concentration (min)	Volume (Total Runoff) (ft³)	Flow (Maximum) (cfs)
CM-1	30,769.100	85	10.000	6,472.0	2.42
CM-2	110,146.000	75	10.000	15,810.0	5.97
CM-3	80,633.240	74	10.000	11,093.0	4.18
CM-4	126,320.000	89	10.000	30,450.0	11.14
CM-5	38,593.930	71	10.000	4,648.0	1.73
CM-6	14,223.900	94	10.000	4,027.0	1.40
CM-7	22,208.940	87	10.000	5,006.0	1.86
CM-8	11,949.360	86	10.000	2,602.0	0.97
CM-9	10,086.810	87	10.000	2,273.0	0.84
CM-10	9,756.410	93	10.000	2,676.0	0.94
CM-11	13,215.020	97	10.000	4,102.0	1.36
CM-12	25,835.880	91	10.000	6,649.0	2.39
CM-13	176,957.540	91	10.000	45,541.0	16.40
CM-14	54,309.520	89	10.000	13,092.0	4.79
CM-15	20,516.420	91	10.000	5,280.0	1.90
CM-16	121,218.300	67	10.000	12,027.0	4.36
CM-17	46,679.800	83	10.000	9,144.0	3.44
CM-18	37,816.200	88	10.000	8,817.0	3.25
CM-19	11,531.090	92	10.000	3,064.0	1.09
CM-20	23,227.110	94	10.000	6,575.0	2.29
CM-21	81,721.210	73	10.000	10,766.0	4.05
CM-22	232,412.200	72	10.000	29,289.0	10.97

Catchbasin Table - Postdevelopment Conditions (100 Year, 24 Hour Storm)

Current Time: 0.00 min

ID	Label	Elevation (Rim) (ft)	Hydraulic Grade (Maximum) (ft)	Elevation (Invert) (ft)	Flow (Captured Maximum) (cfs)	Is Ever Overflowing?	Structure Type	Length (ft)	Width (ft)	Elevation (Ground) (ft)
920	CB-2	8,597.92	8,593.66	8,592.50	5.90	False	Box Structure	4.00	2.00	8,597.92
965	CB-3	8,600.60	8,595.21	8,594.50	4.14	False	Box Structure	4.00	2.00	8,600.60
904	CB-4	8,601.08	8,592.38	8,591.33	10.95	False	Box Structure	4.00	2.00	8,601.08
922	CB-5	8,595.26	8,591.37	8,590.09	1.72	False	Box Structure	4.00	2.00	8,595.26
921	CB-6	8,595.56	8,591.59	8,590.36	1.39	False	Box Structure	4.00	2.00	8,595.56
908	CB-7	8,581.99	8,576.50	8,575.27	1.82	False	Box Structure	4.00	2.00	8,581.99
906	CB-8	8,587.45	8,583.34	8,582.45	0.95	False	Box Structure	4.00	2.00	8,587.45
907	CB-9	8,581.90	8,577.82	8,576.86	0.83	False	Box Structure	4.00	2.00	8,581.90
909	CB-10	8,576.57	8,572.60	8,571.43	0.93	False	Box Structure	4.00	2.00	8,576.57
911	CB-11	8,566.33	8,561.44	8,560.30	1.36	False	Box Structure	4.00	2.00	8,566.33
910	CB-12	8,565.83	8,561.71	8,561.32	2.36	False	Box Structure	4.00	2.00	8,565.83
912	CB-13	8,545.96	8,539.77	8,537.69	16.16	False	Box Structure	4.00	2.00	8,545.96
914	CB-14	8,548.00	8,538.15	8,535.93	4.71	False	Box Structure	4.00	2.00	8,548.00
913	CB-15	8,546.78	8,543.17	8,542.78	1.87	False	Box Structure	4.00	2.00	8,546.78
915	CB-17	8,493.55	8,485.85	8,485.51	3.39	False	Box Structure	4.00	2.00	8,493.55
916	CB-18	8,473.15	8,465.62	8,465.05	3.19	False	Box Structure	4.00	2.00	8,473.15
917	CB-19	8,462.97	8,458.40	8,457.82	1.08	False	Box Structure	4.00	2.00	8,462.97
918	CB-20	8,428.99	8,424.49	8,423.96	2.27	False	Box Structure	4.00	2.00	8,428.99
919	CB-21	8,396.30	8,392.95	8,392.30	4.00	False	Box Structure	4.00	2.00	8,396.30
968	CB-253	8,600.07	8,592.76	8,591.93	0.00	False	Box Structure	4.00	2.00	8,600.07
971	CB-254	8,599.33	8,594.33	8,593.55	0.00	False	Box Structure	4.00	2.00	8,599.33
972	CB-255	8,600.01	8,594.84	8,594.05	0.00	False	Box Structure	4.00	2.00	8,600.01
973	CB-256	8,595.59	8,591.70	8,590.50	0.00	False	Box Structure	4.00	2.00	8,595.59
974	CB-257	8,568.36	8,564.20	8,563.00	0.00	False	Box Structure	4.00	2.00	8,568.36
975	CB-258	8,560.51	8,556.48	8,555.47	0.00	False	Box Structure	4.00	2.00	8,560.51
976	CB-259	8,548.36	8,544.05	8,543.10	0.00	False	Box Structure	4.00	2.00	8,548.36
977	CB-260	8,544.49	8,539.85	8,538.26	0.00	False	Box Structure	4.00	2.00	8,544.49
978	CB-261	8,546.95	8,542.83	8,542.45	0.00	False	Box Structure	4.00	2.00	8,546.95
979	CB-262	8,451.01	8,446.39	8,445.94	0.00	False	Box Structure	4.00	2.00	8,451.01
980	CB-263	8,435.24	8,429.73	8,429.20	0.00	False	Box Structure	4.00	2.00	8,435.24
1012	CB-265	8,595.64	8,593.83	8,593.06	0.00	False	Box Structure	4.00	2.00	8,595.64
708	CB-509	8,604.13	8,598.41	8,598.15	2.38	False	Box Structure	4.00	2.00	8,604.13

Conduit Table - Postdevelopment Conditions (100 Year, 24 Hour Storm)

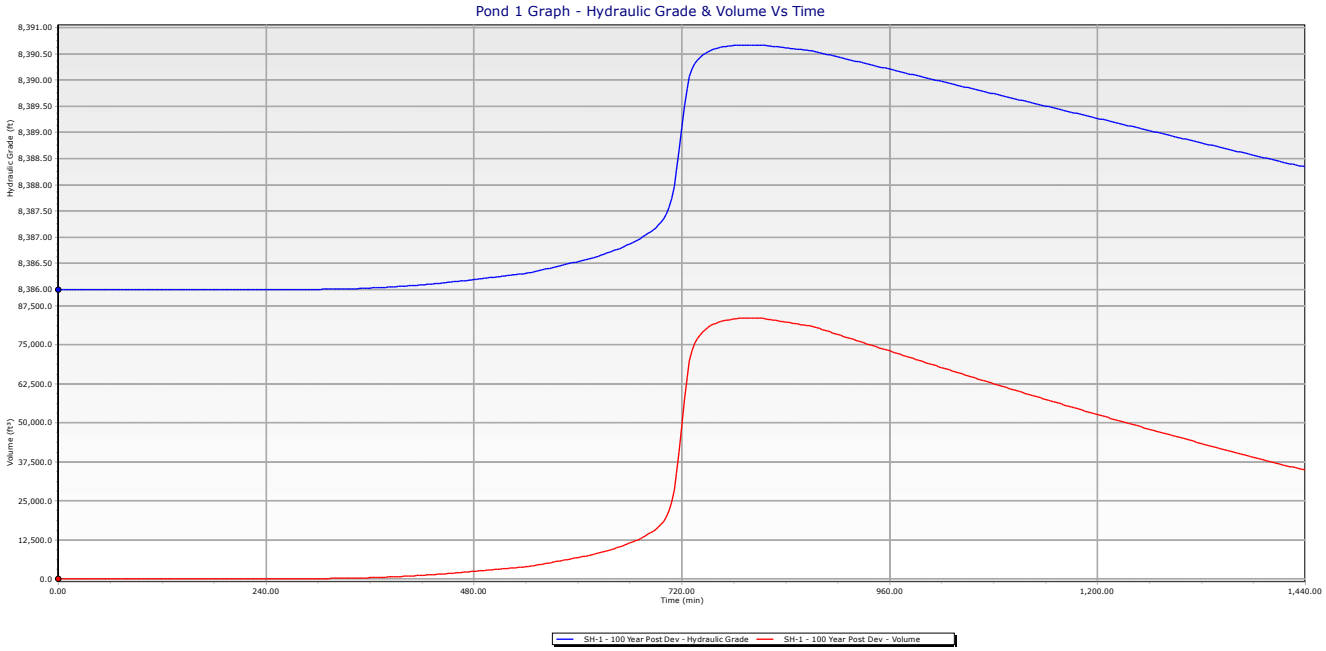
Current Time: 0.00 min

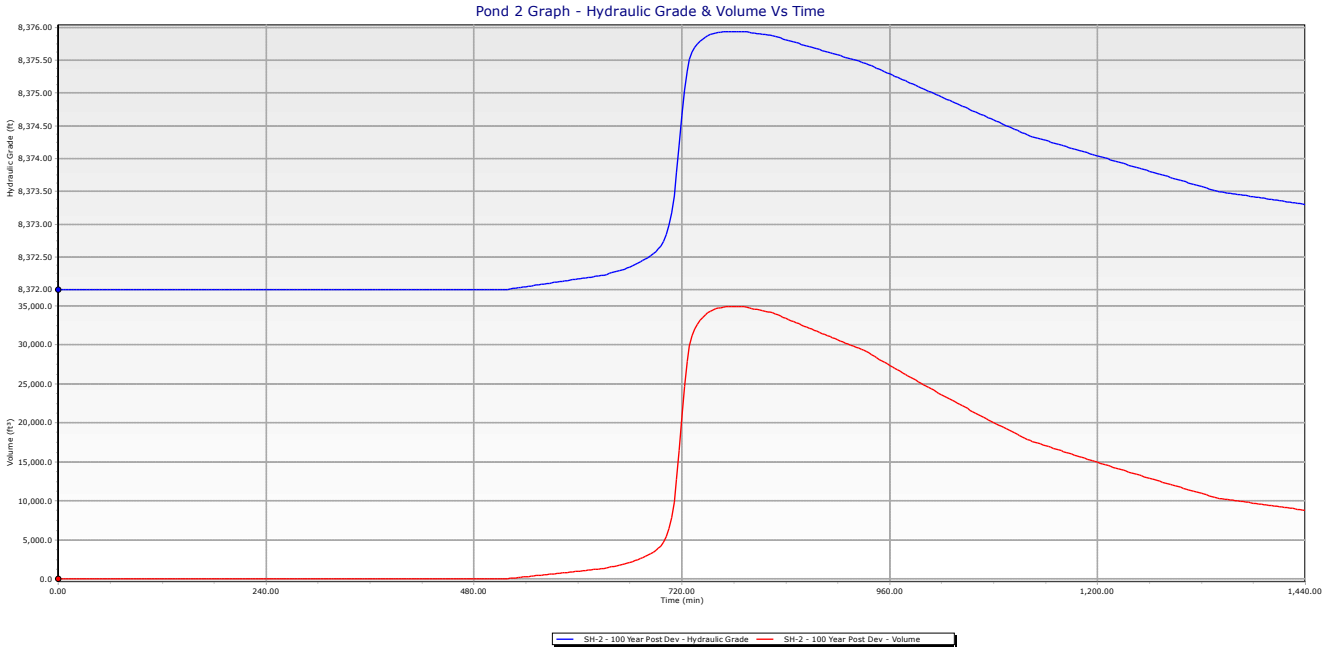
Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Velocity (Maximum Calculated) (ft/s)	Flow (Maximum) (cfs)	Capacity (Full Flow) (cfs)
CO-1	CB-253	8,591.93	CB-1	8,589.06	113.0	0.025	18.0	0.010	12.67	12.27	21.78
CO-2	CB-509	8,598.15	CB-253	8,591.93	77.2	0.081	18.0	0.010	12.19	2.40	38.78
CO-3	CB-2	8,592.50	CB-253	8,591.93	75.9	0.007	18.0	0.010	6.65	10.00	11.80
CO-4	CB-265	8,593.06	CB-2	8,592.50	113.1	0.005	18.0	0.010	3.78	4.09	9.62
CO-5	CB-254	8,593.55	CB-265	8,593.06	99.9	0.005	18.0	0.010	4.91	4.12	9.59
CO-6	CB-255	8,594.05	CB-254	8,593.55	99.9	0.005	18.0	0.010	4.93	4.14	9.66
CO-7	CB-3	8,594.50	CB-255	8,594.05	92.9	0.005	18.0	0.010	4.86	4.15	9.49
CO-8	CB-4	8,591.33	CB-256	8,590.50	165.2	0.005	24.0	0.010	6.32	11.07	20.89
CO-9	CB-256	8,590.50	CB-6	8,590.36	28.8	0.005	24.0	0.010	5.80	11.08	20.73
CO-10	CB-6	8,590.36	CB-5	8,590.09	53.0	0.005	24.0	0.010	6.13	12.47	20.71
CO-11	CB-5	8,590.09	CB-8	8,582.45	297.4	0.026	18.0	0.010	13.14	14.19	21.89
CO-12	CB-8	8,582.45	CB-9	8,576.86	177.9	0.031	18.0	0.010	14.45	15.15	24.20
CO-13	CB-9	8,576.86	CB-7	8,575.27	53.1	0.030	18.0	0.010	14.31	15.98	23.66
CO-14	CB-7	8,575.27	CB-10	8,571.43	207.8	0.018	18.0	0.010	11.95	17.80	18.57
CO-15	CB-10	8,571.43	CB-257	8,563.00	226.5	0.037	18.0	0.010	16.18	18.71	26.35
CO-16	CB-257	8,563.00	CB-11	8,560.30	123.7	0.022	18.0	0.010	12.93	18.68	20.16
CO-17	CB-12	8,561.32	CB-11	8,560.30	68.6	0.015	18.0	0.010	3.76	2.38	16.66
CO-18	CB-11	8,560.30	CB-258	8,555.47	217.1	0.022	24.0	0.010	14.03	22.39	43.87
CO-19	CB-258	8,555.47	CB-259	8,543.10	200.4	0.062	24.0	0.010	20.52	22.36	73.05
CO-20	CB-259	8,543.10	CB-260	8,538.26	145.6	0.033	24.0	0.010	15.40	22.34	53.65
CO-21	CB-260	8,538.26	CB-13	8,537.69	116.3	0.005	30.0	0.010	5.81	22.28	37.46
CO-22	CB-13	8,537.69	CB-14	8,535.93	317.0	0.006	30.0	0.010	8.73	38.41	39.65
CO-23	CB-15	8,542.78	CB-261	8,542.45	35.5	0.009	18.0	0.010	5.24	1.89	13.31
CO-24	CB-261	8,542.45	CB-14	8,535.93	57.9	0.113	18.0	0.010	10.98	1.89	45.81
CO-25	CB-14	8,535.93	O-34	8,390.00	531.9	0.274	24.0	0.010	42.79	44.84	154.03
CO-26	CB-17	8,485.51	CB-18	8,465.05	424.0	0.048	18.0	0.010	11.23	3.39	30.00
CO-27	CB-18	8,465.05	CB-19	8,457.82	296.8	0.024	18.0	0.010	10.65	6.58	21.31
CO-28	CB-19	8,457.82	CB-262	8,445.94	147.0	0.081	18.0	0.010	17.00	7.66	38.83
CO-29	CB-262	8,445.94	CB-263	8,429.20	149.7	0.112	18.0	0.010	19.09	7.66	45.65
CO-30	CB-263	8,429.20	CB-20	8,423.96	113.2	0.046	18.0	0.010	13.98	7.66	29.37
CO-31	CB-20	8,423.96	CB-21	8,392.30	547.5	0.058	36.0	0.010	15.46	9.90	208.52
CO-32	CB-21	8,392.30	O-28	8,376.00	628.4	0.026	36.0	0.010	12.72	13.91	139.64
CO-279	POS-5	8,372.75	O-30	8,362.00	49.1	0.108	18.0	0.010	11.02	1.89	44.77
CO-280	POS-4	8,387.25	O-29	8,378.00	61.4	0.093	18.0	0.010	13.78	2.94	41.53

Pond Table - Postdevelopment Conditions (100 Year, 24 Hour Storm)

Current Time: 0.00 min

Label	Flow (Total In Maximum) (cfs)	Flow (Out to Links Maximum) (cfs)	Storage (Maximum) (ft^3)	Hydraulic Grade (Maximum) (ft)	Is Ever Overflowing?
SH-1	48.87	2.94	83,528.5	8,390.67	False
SH-2	24.76	1.89	34,926.1	8,375.94	False


Pond 1 Graph - Hydraulic Grade & Volume Vs Time
Hydraulic Grade (ft)
8,391.00
8,390.50
8,390.00
8,389.50
8,389.00
8,388.50
8,388.00
8,387.50
8,387.00
8,386.50
8,386.00
Volume (ft³)
87,500.0
75,000.0
62,500.0
50,000.0
37,500.0
25,000.0
12,500.0
0.0
0.00
240.00
480.00
720.00
960.00
1,200.00
1,440.00
Time (min)
SH-1 - 100 Year Post Dev - Hydraulic Grade
SH-1 - 100 Year Post Dev - Volume


Pond 2 Graph - Hydraulic Grade & Volume Vs Time
Hydraulic Grade (ft)
8,376.00
8,375.50
8,375.00
8,374.50
8,374.00
8,373.50
8,373.00
8,372.50
8,372.00
Volume (ft³)
35,000.0
30,000.0
25,000.0
20,000.0
15,000.0
10,000.0
5,000.0
0.0
0.00
240.00
480.00
720.00
960.00
1,200.00
1,440.00
Time (min)
SH-2 - 100 Year Post Dev - Hydraulic Grade
SH-2 - 100 Year Post Dev - Volume

LID RETENTION VOLUME CALCULATIONS

Shelter Hill Pond 1

Inputs		
80th percentile storm depth (in)	d	0.65
80th percentile storm depth (ft)	d	0.054166667
Project Area (ac)	A	14.81157725
Project Area (sf)	A	645,192.30
Impervious (Imp. Area / Total Area)	i	0.57

Calculation Methods			**Results**	Vgoal = Rv*d*A
Hydrologic Soil Group B	Rv	0.439052079	V goal (cf)	15,343.96

Shelter Hill Pond 2

Inputs		
80th percentile storm depth (in)	d	0.65
80th percentile storm depth (ft)	d	0.054166667
Project Area (ac)	A	9.949218804
Project Area (sf)	A	433,387.97
Impervious (Imp. Area / Total Area)	i	0.22

Calculation Methods			**Results**	Vgoal = Rv*d*A
Hydrologic Soil Group B	Rv	0.145004747	V goal (cf)	3,404.01

NOAA Atlas 14, Volume 1, Version 5
Location name: Eden, Utah, USA*
Latitude: 41.3756°, Longitude: -111.7779°
Elevation: 8350.7 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.183** (0.161-0.209)	**0.232** (0.206-0.266)	**0.313** (0.275-0.357)	**0.384** (0.334-0.439)	**0.494** (0.422-0.569)	**0.595** (0.495-0.691)	**0.712** (0.575-0.838)	**0.851** (0.663-1.02)	**1.08** (0.794-1.34)	**1.30** (0.907-1.66)
10-min	**0.278** (0.245-0.318)	**0.353** (0.314-0.405)	**0.476** (0.418-0.543)	**0.584** (0.509-0.668)	**0.753** (0.643-0.867)	**0.905** (0.753-1.05)	**1.08** (0.876-1.28)	**1.30** (1.01-1.56)	**1.64** (1.21-2.04)	**1.97** (1.38-2.52)
15-min	**0.345** (0.304-0.394)	**0.438** (0.389-0.502)	**0.590** (0.519-0.673)	**0.725** (0.631-0.828)	**0.933** (0.797-1.07)	**1.12** (0.933-1.30)	**1.34** (1.09-1.58)	**1.61** (1.25-1.93)	**2.04** (1.50-2.53)	**2.44** (1.71-3.12)
30-min	**0.464** (0.409-0.531)	**0.589** (0.523-0.676)	**0.795** (0.698-0.907)	**0.976** (0.850-1.12)	**1.26** (1.07-1.45)	**1.51** (1.26-1.76)	**1.81** (1.46-2.13)	**2.16** (1.69-2.60)	**2.74** (2.02-3.40)	**3.29** (2.31-4.21)
60-min	**0.575** (0.506-0.657)	**0.729** (0.648-0.836)	**0.984** (0.864-1.12)	**1.21** (1.05-1.38)	**1.56** (1.33-1.79)	**1.87** (1.56-2.17)	**2.24** (1.81-2.64)	**2.68** (2.09-3.22)	**3.39** (2.50-4.21)	**4.08** (2.85-5.21)
2-hr	**0.772** (0.691-0.871)	**0.970** (0.865-1.09)	**1.25** (1.11-1.41)	**1.51** (1.32-1.70)	**1.92** (1.65-2.19)	**2.29** (1.93-2.64)	**2.73** (2.23-3.18)	**3.25** (2.56-3.87)	**4.08** (3.04-5.00)	**4.87** (3.46-6.12)
3-hr	**0.889** (0.805-0.991)	**1.10** (0.999-1.23)	**1.37** (1.23-1.53)	**1.62** (1.45-1.82)	**2.03** (1.78-2.28)	**2.40** (2.06-2.72)	**2.84** (2.38-3.27)	**3.34** (2.72-3.92)	**4.17** (3.23-5.03)	**4.93** (3.67-6.18)
6-hr	**1.26** (1.16-1.38)	**1.54** (1.42-1.69)	**1.86** (1.69-2.04)	**2.14** (1.94-2.36)	**2.57** (2.30-2.84)	**2.92** (2.58-3.26)	**3.32** (2.89-3.75)	**3.77** (3.21-4.31)	**4.63** (3.82-5.40)	**5.40** (4.34-6.45)
12-hr	**1.69** (1.55-1.86)	**2.07** (1.90-2.28)	**2.50** (2.27-2.76)	**2.88** (2.60-3.19)	**3.45** (3.08-3.85)	**3.92** (3.45-4.40)	**4.42** (3.83-5.02)	**4.96** (4.21-5.70)	**5.78** (4.77-6.79)	**6.43** (5.18-7.70)
24-hr	**2.34** (2.09-2.63)	**2.88** (2.57-3.23)	**3.47** (3.10-3.89)	**3.97** (3.53-4.45)	**4.66** (4.13-5.22)	**5.20** (4.59-5.82)	**5.76** (5.07-6.45)	**6.34** (5.55-7.09)	**7.13** (6.19-7.99)	**7.75** (6.67-8.71)
2-day	**2.90** (2.58-3.28)	**3.57** (3.18-4.04)	**4.31** (3.83-4.89)	**4.94** (4.37-5.59)	**5.80** (5.12-6.57)	**6.48** (5.69-7.34)	**7.19** (6.29-8.14)	**7.92** (6.88-8.97)	**8.91** (7.68-10.1)	**9.70** (8.29-11.0)
3-day	**3.39** (3.01-3.83)	**4.18** (3.72-4.73)	**5.08** (4.51-5.75)	**5.83** (5.16-6.60)	**6.88** (6.06-7.78)	**7.71** (6.76-8.72)	**8.57** (7.48-9.69)	**9.46** (8.21-10.7)	**10.7** (9.18-12.1)	**11.7** (9.93-13.3)
4-day	**3.88** (3.45-4.39)	**4.79** (4.26-5.42)	**5.84** (5.18-6.61)	**6.72** (5.95-7.61)	**7.95** (7.00-8.99)	**8.93** (7.82-10.1)	**9.95** (8.67-11.2)	**11.0** (9.53-12.5)	**12.5** (10.7-14.1)	**13.6** (11.6-15.5)
7-day	**4.93** (4.34-5.66)	**6.09** (5.37-7.00)	**7.41** (6.52-8.54)	**8.52** (7.47-9.82)	**10.1** (8.78-11.6)	**11.3** (9.81-13.0)	**12.5** (10.9-14.4)	**13.9** (11.9-16.0)	**15.7** (13.3-18.1)	**17.1** (14.4-19.8)
10-day	**5.71** (5.04-6.55)	**7.05** (6.23-8.08)	**8.52** (7.51-9.79)	**9.71** (8.55-11.2)	**11.3** (9.92-13.0)	**12.5** (11.0-14.4)	**13.8** (12.0-15.9)	**15.1** (13.0-17.3)	**16.7** (14.4-19.3)	**18.0** (15.4-20.9)
20-day	**7.59** (6.75-8.55)	**9.36** (8.32-10.5)	**11.2** (9.92-12.6)	**12.6** (11.2-14.2)	**14.5** (12.8-16.3)	**15.8** (13.9-17.8)	**17.2** (15.1-19.4)	**18.5** (16.2-20.9)	**20.2** (17.6-22.9)	**21.5** (18.6-24.4)
30-day	**9.30** (8.33-10.5)	**11.4** (10.2-12.9)	**13.6** (12.1-15.3)	**15.3** (13.6-17.2)	**17.5** (15.5-19.7)	**19.1** (16.9-21.5)	**20.7** (18.3-23.4)	**22.2** (19.6-25.2)	**24.2** (21.2-27.5)	**25.7** (22.4-29.2)
45-day	**11.8** (10.7-13.1)	**14.5** (13.1-16.1)	**17.2** (15.5-19.1)	**19.4** (17.4-21.5)	**22.1** (19.8-24.6)	**24.2** (21.6-26.9)	**26.3** (23.3-29.2)	**28.3** (25.0-31.5)	**30.9** (27.1-34.6)	**33.0** (28.7-37.0)
60-day	**13.8** (12.5-15.3)	**17.0** (15.3-18.8)	**20.1** (18.1-22.2)	**22.4** (20.2-24.9)	**25.5** (22.9-28.2)	**27.7** (24.8-30.8)	**29.9** (26.7-33.2)	**32.0** (28.5-35.6)	**34.7** (30.7-38.7)	**36.7** (32.3-41.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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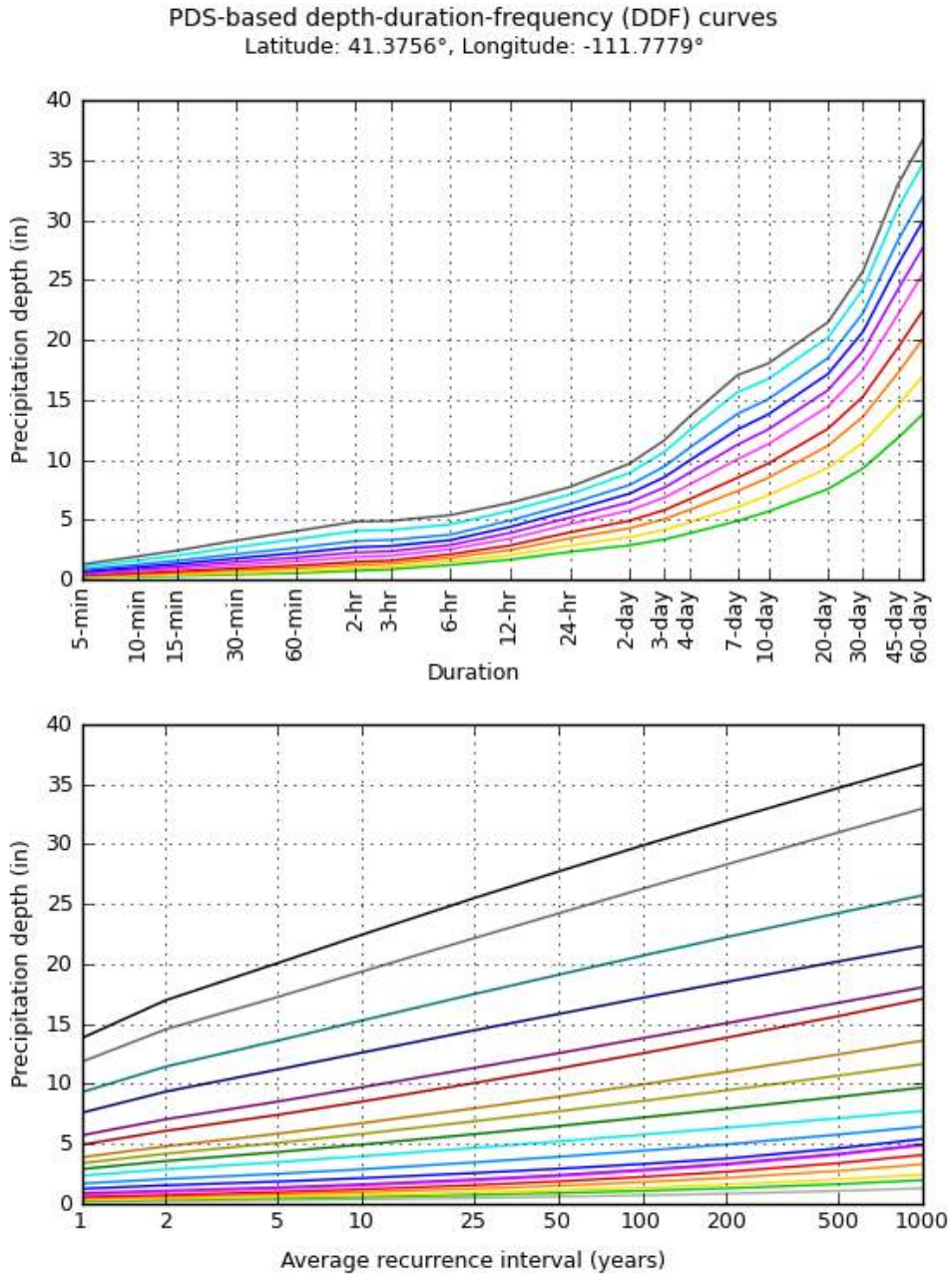
PF graphical



NOAA Atlas 14, Volume 1, Version 5

Created (GMT): Sat Apr 21 18:57:41 2018

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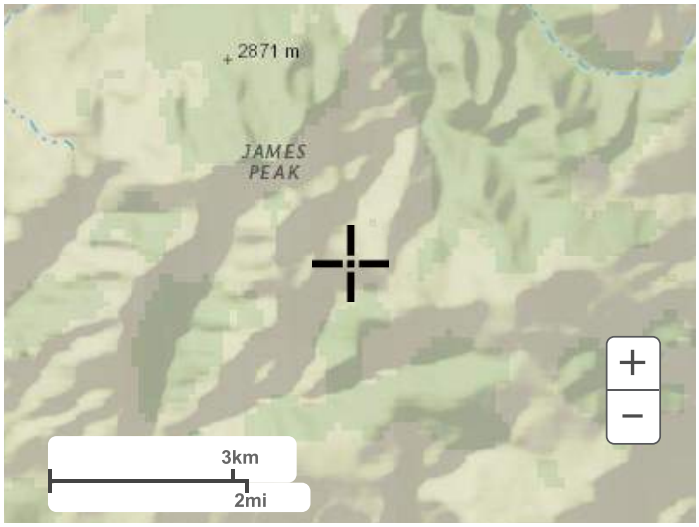
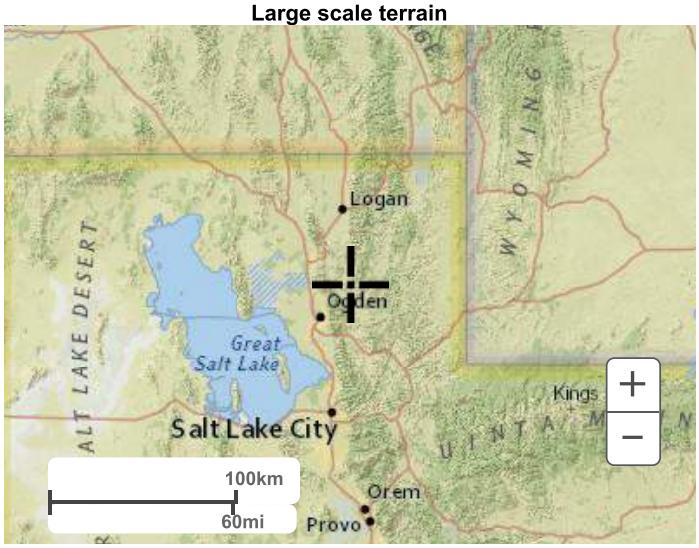
Maps & aerials

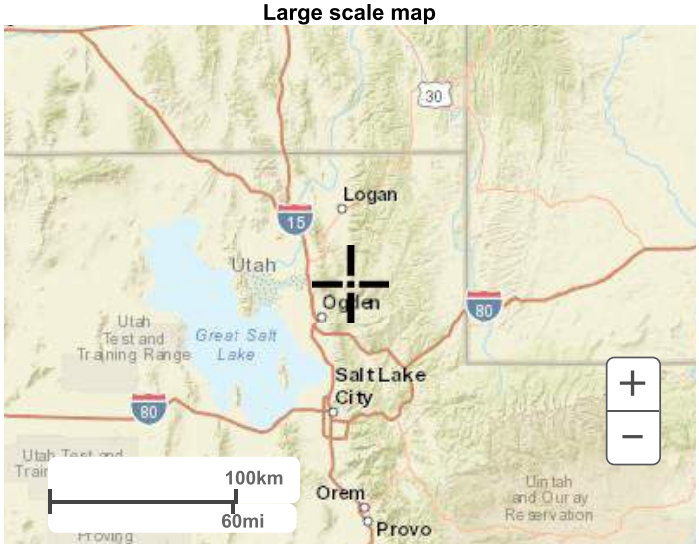
Small scale terrain



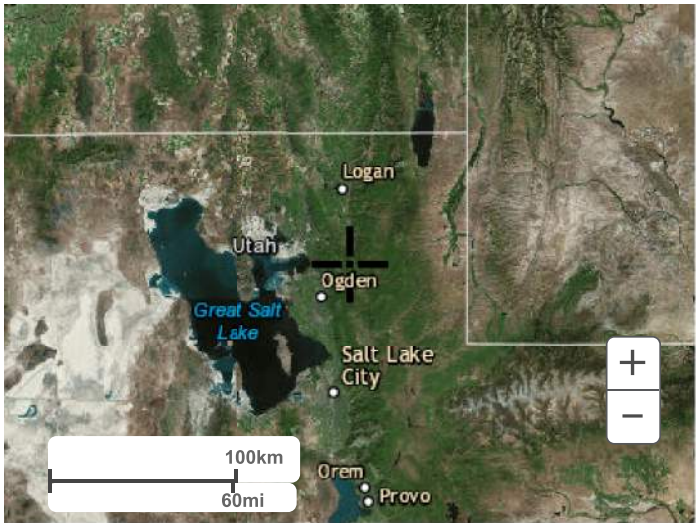
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Soil Map—Morgan Area, Utah - Morgan County and Part of Weber County

Map Scale: 1:7,880 if printed on B landscape (17" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Morgan Area, Utah - Morgan County and Part of Weber County
Survey Area Data: Version 16, Sep 8, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 22, 2022—Jul 11, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
FrG	Foxol-Rock outcrop complex, 40 to 70 percent slopes	0.2	0.0%
HtC	Herd-Yence complex, 3 to 15 percent slopes	198.8	30.3%
LkG	Lucky Star silt loam, 30 to 60 percent slopes	442.8	67.5%
LmG	Lucky Star-Charcol complex, 30 to 60 percent slopes	14.4	2.2%
Totals for Area of Interest		**656.3**	**100.0%**

Morgan Area, Utah - Morgan County and Part of Weber County

LmG—Lucky Star-Charcol complex, 30 to 60 percent slopes

Map Unit Setting

National map unit symbol: k047
Elevation: 6,890 to 8,530 feet
Mean annual precipitation: 18 to 35 inches
Frost-free period: 50 to 90 days
Farmland classification: Not prime farmland

Map Unit Composition

Lucky star and similar soils: 45 percent
Charcol and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lucky Star

Setting

Landform: Mountainsides
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium and/or slope alluvium derived from conglomerate

Typical profile

A11 - 0 to 6 inches: silt loam
A12 - 6 to 19 inches: gravelly silt loam
A21 - 19 to 34 inches: very gravelly loam
A22 - 34 to 47 inches: very gravelly sandy loam
A&B - 47 to 58 inches: extremely gravelly loam
A&B2 - 58 to 74 inches: extremely gravelly sandy loam

Properties and qualities

Slope: 30 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B

Ecological site: F047XA508UT - High Mountain Loam (quaking aspen)
Hydric soil rating: No

Description of Charcol

Setting

Landform: Mountainsides
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium derived from conglomerate

Typical profile

A11, A12 - 0 to 27 inches: gravelly fine sandy loam
A21, A22 - 27 to 40 inches: very gravelly fine sandy loam
B2t - 40 to 58 inches: very gravelly sandy clay loam
C - 58 to 62 inches: clay loam

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: R047XA432UT - Mountain Loam (oak)
Hydric soil rating: No

Minor Components

Condie

Percent of map unit: 4 percent

Hoskin

Percent of map unit: 4 percent

St. marys

Percent of map unit: 4 percent

Moweba
Percent of map unit: 3 percent

Data Source Information

Soil Survey Area: Morgan Area, Utah - Morgan County and Part of Weber County
Survey Area Data: Version 16, Sep 8, 2023

Morgan Area, Utah - Morgan County and Part of Weber County

FrG—Foxol-Rock outcrop complex, 40 to 70 percent slopes

Map Unit Setting

National map unit symbol: k037
Elevation: 5,900 to 8,500 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 50 to 90 days
Farmland classification: Not prime farmland

Map Unit Composition

Foxol and similar soils: 60 percent
Rock outcrop: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Foxol

Setting

Landform: Mountainsides
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium over residuum derived from quartzite

Typical profile

A11, A12 - 0 to 9 inches: very cobbly loam
B2 - 9 to 14 inches: extremely cobbly loam
R - 14 to 18 inches: unweathered bedrock

Properties and qualities

Slope: 40 to 70 percent
Depth to restrictive feature: 14 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R047XA446UT - Mountain Shallow Loam (mountain big sagebrush)
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Mountainsides
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex

Minor Components

Smarts

Percent of map unit: 5 percent

Durst

Percent of map unit: 5 percent

Data Source Information

Soil Survey Area: Morgan Area, Utah - Morgan County and Part of Weber County
Survey Area Data: Version 16, Sep 8, 2023

Morgan Area, Utah - Morgan County and Part of Weber County

HtC—Herd-Yence complex, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: k03p
Elevation: 6,990 to 8,890 feet
Mean annual precipitation: 22 to 35 inches
Farmland classification: Not prime farmland

Map Unit Composition

Herd and similar soils: 40 percent
Yence and similar soils: 35 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Herd

Setting

Landform: Ridges, mountain slopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountainflank, interfluve, crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium and/or slope alluvium derived from conglomerate

Typical profile

A11 - 0 to 3 inches: cobbly clay loam
A12, A13 - 3 to 20 inches: cobbly clay loam
IIB21tIIB22t - 20 to 36 inches: clay
IIB3t - 36 to 50 inches: clay loam
IIC - 50 to 60 inches: very gravelly clay loam

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: C
Ecological site: R047XA504UT - High Mountain Clay (slender wheatgrass)
Hydric soil rating: No

Description of Yence

Setting

Landform: Ridges, mountain slopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountainflank, interfluve, crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Till derived from conglomerate

Typical profile

A11 - 0 to 2 inches: very stony loam
A12 - 2 to 9 inches: very gravelly loam
B1t - 9 to 16 inches: very gravelly sandy clay loam
B21t - 16 to 23 inches: very gravelly clay loam
B22t - 23 to 33 inches: very cobbly clay
B3t - 33 to 42 inches: very cobbly clay loam
R - 42 to 46 inches: weathered bedrock

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 16.0 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: R047XA528UT - High Mountain Stony Clay (slender wheatgrass)
Hydric soil rating: No

Minor Components

Richens

Percent of map unit: 13 percent

Yeljack
Percent of map unit: 12 percent

Data Source Information

Soil Survey Area: Morgan Area, Utah - Morgan County and Part of Weber County
Survey Area Data: Version 16, Sep 8, 2023

Morgan Area, Utah - Morgan County and Part of Weber County

LkG—Lucky Star silt loam, 30 to 60 percent slopes

Map Unit Setting

National map unit symbol: k046
Elevation: 5,990 to 8,500 feet
Mean annual precipitation: 22 to 35 inches
Farmland classification: Not prime farmland

Map Unit Composition

Lucky star and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lucky Star

Setting

Landform: Mountainsides
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium and/or slope alluvium derived from conglomerate

Typical profile

A11 - 0 to 6 inches: silt loam
A12 - 6 to 19 inches: gravelly silt loam
A21 - 19 to 34 inches: very gravelly loam
A22 - 34 to 47 inches: very gravelly sandy loam
A&B - 47 to 58 inches: extremely gravelly loam
A&B2 - 58 to 74 inches: extremely gravelly sandy loam

Properties and qualities

Slope: 30 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F047XA508UT - High Mountain Loam (quaking aspen)

Hydric soil rating: No

Minor Components

Herd
Percent of map unit: 3 percent

Charcol
Percent of map unit: 3 percent

Ercan
Percent of map unit: 2 percent

Yeljack
Percent of map unit: 2 percent

Data Source Information

Soil Survey Area: Morgan Area, Utah - Morgan County and Part of Weber County
Survey Area Data: Version 16, Sep 8, 2023