Snowbasin Resort

Canyon Rim & Maples Parking Improvements
Storm Drain Report

Prepared for

Weber County

Prepared by

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

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1.0 INTRODUCTION

Talisman Civil Consultants, LLC, was tasked by Snowbasin Resort Company to provide a storm drain design and supporting drainage calculations for the proposed Canyon Rim and Maples Parking Improvements. The project site is located at Snowbasin Resort, Huntsville, Utah. This document is intended to show that the proposed storm drain design complies with the stormwater standards of Weber County.

2.0 METHODOLOGY

The criteria used to evaluate the storm drain design are identified by the Weber County Storm Water Runoff Design Standards. Significant elements from this document include, but are not limited to:

- Drainage design of small watersheds, 30 acres or less, shall use the Rational Method, SCS Curve Number Method or SCS Unit Hydrograph Method.
- Initial collection shall be designed to sufficiently convey storm flows generated by the 10-year, 24-hour storm.
- Major collection systems shall be designed to sufficiently detain or retain storm flows generated by the 100-year, 24-hour storm.

The SCS Curve Number Method was used to perform the drainage calculations to compare the pre & post development runoff volumes. Composite curve numbers were used from a previously approved drainage report by Horrocks Engineers entitled Stormwater and Detention-Storage Calculations for the Snowbasin Resort Canyon Rim Parking Lot Improvement Project dated September 11, 2017. See Appendix or Table 2 below. NOAA Atlas 14 precipitation intensity tables with a latitude and longitude corresponding to the project site were used as the basis for storm data for analysis. See page 9 in the Appendix or Table 1 Below:

Table 1 – NOAA Atlas 14 Precipitation Data

100 Year 24 Hour Storm	
Duration (min)	***Intensity (in/hr)***
15	5.37
30	3.62
60	2.24
120	1.32
180	0.913
360	0.527
720	0.347
1440	0.217

Table 2 – Composite Curve Numbers (CN)*

Pre & Post Development Composite Curve Numbers*	
Pre-Development	88.6
Post Development	90.6

**Composite Curve Numbers from previous approved project used, see Appendix*

SCS curve number methodology was used to calculate volumes.

- The Soil Conservation Service Method (commonly known as SCS or TR-55 Method) was used to analyze the hydrology of the site.
- The basis of the curve number method is the empirical relationship between the retention (rainfall not converted into runoff) and runoff properties of the watershed and the rainfall. It accounts for most runoff producing watershed characteristics: soil type, land use/treatment, surface condition, and antecedent moisture condition.
- Composite Curve Numbers (CN Values) were developed by reviewing impervious, and pervious areas by Horrocks Engineers.
- The NOAA Atlas 14 precipitation data was used to model the 100 Year 24 Hour runoff volumes.

3.0 Canyon Rim Analysis & Findings

The pre and post development conditions of the Canyon Rim parking lot expansion were calculated and compared to determine additional stormwater runoff volume produced. To begin this analysis, the catchment area of the proposed parking lot footprint was used. For post development conditions, the same catchment area was used according to proposed grading plans and existing topography. The Canyon Rim portion of the project is approximately 24,531 sq-ft (0.563 acres). The existing topography of the site slopes steeply from north to south at approximately 10.0% grade (+/-). The proposed topography slopes north to south at approximately 5.0% grade (+/-) and slightly from west to east at approximately 2.0% grade (+/-). Stormwater will convey to an existing detention pond directly south of the new parking lot.

Using both pre and post development conditions for the 100-year storm show that the runoff volume is approximately 8,054 cf and 8,466 cf respectively.

Table 3 – Pre & Post Stormwater Runoff Volumes

Conditions	**Runoff Volume** *(cf)*	**Additional Runoff** *(cf)*
Pre-Development	8,054	412
Post Development	8,466	

The original detention pond was designed by Horrocks Engineers to detain the volume of the previous Canyon Rim parking lot project. The tributary area was 6.79 acres, and the pond was designed to detain 22,695 cf (0.521 acre-feet). The volume of the existing detention pond was analyzed using survey topography and Civil 3D software, and found to be 21,445 cf (0.492 ac-ft). The pond shall be excavated to clear accumulated sediment as part of the proposed project to meet the original design volume and additional volume produced by this project. After the pond is excavated the volume calculates to be 24,624 cf (0.565 acre-feet).

4.0 Maples Analysis & Findings

The pre and post development conditions of the Maples parking lot expansion were calculated and compared to determine additional stormwater runoff volume produced. To begin this analysis, the catchment area of the proposed parking lot footprint was used. For post development conditions, the same catchment area was used according to proposed grading plans and existing topography. The Maples portion of the project is approximately 79,552 sq-ft (1.83 acres). The existing topography of the site slopes gradually from south to north approximately 5.0% grade (+/-). The proposed topography slopes south-east to north-west at an average of 4.75% grade (+/-).

Stormwater from the proposed parking lot will sheet flow to four (4) existing catch basins along the existing road to the north. The stormwater will ultimately convey to the existing detention pond north of all Maples Parking Lots via connecting proposed to existing storm drain infrastructure. A proposed swale along the east end of the proposed parking lot will direct overland flow to an existing catch basin & 48" storm drain pipe directly south of the proposed parking lot.

Using both pre and post development conditions for the 100-year storm show that the runoff volume is approximately 26,049 cf and 27,454 cf respectively.

Table 3 – Pre & Post Stormwater Runoff Volumes

Conditions	Runoff Volume	Additional Runoff
Pre-Development	26,049 *CF*	1,405 *CF*
Post Development	27,454 *CF*	

In February, 2020 Talisman produced a Master Plan Report of Area A, which encompasses the Maples parking lot area. Stormwater from the proposed Maples Parking Lot expansion will convey to Pond PO-A11, which is the ultimate catchment for Drainage Areas DA5-DA15. The proposed project falls within DA12,DA13 & DA15; please see the Master Plan Schematic in Appendix C. According to the master plan Pond PO-A11 would require a total volume of 33,925 cf post development. Existing Pond PO-A11 has a storage volume of 36,577 cf (0.840 acre-feet), determined by Civil 3D software and topography surveyed by Talisman Civil Consultants on April 28th, 2021. Existing Pond PO-A11 has sufficient volume to accommodate flows produced by this project and future development in the area.

Appendix A
STORM DRAIN CALCLUATIONS

PRE-DEVELOPMENT VOLUME

STORM DRAINAGE CALCULATIONS

Snowbasin - Canyon Rim Parking Lot

PRE DEVELOPMENT VOLUME - SCS CURVE NUMBER METHOD

Tributary Drainage Area (A)	**sf**	**CN**		**CN*A**
Landscaping/Natural Ground	24,531	88.7		2175900 S.F.
Sum:	24531 S.F.		Sum:	2175900 S.F.

NOAA ATLAS 14 (100 YEAR STORM)				**Allowable Discharge =**	.00cfs/acre
Storm Duration *(min)*	Intensity *(in/hr)*	Rainfall *(inches)*	Rainfall Excess *(cu.ft.)*	Allowed Discharge *(cu.ft)*	Volume to Detain *(cu.ft)*
15	5.37	1.343	1024	0	1024
30	3.62	1.810	1748	0	1748
60	2.24	2.240	2472	0	2472
120	1.32	2.640	3178	0	3178
180	0.91	2.739	3357	0	3357
360	0.53	3.162	4132	0	4132
720	0.35	4.164	6027	0	6027
1440	0.22	5.208	8054	0	**8054**

STORM DRAINAGE CALCULATIONS

Snowbasin - Maples Parking Lot

PRE DEVELOPMENT VOLUME - SCS CURVE NUMBER METHOD

Tributary Drainage Area (A)	**sf**	**CN**		**CN*A**
Landscaping/Natural Ground	79,552	88.6		7048283 S.F.
Sum:	79552 S.F.		Sum:	7048283 S.F.

NOAA ATLAS 14 (100 YEAR STORM)				**Allowable Discharge =**	.00cfs/acre
Storm Duration *(min)*	Intensity *(in/hr)*	Rainfall *(inches)*	Rainfall Excess *(cu.ft.)*	Allowed Discharge *(cu.ft)*	Volume to Detain *(cu.ft)*
15	5.37	1.343	3291	0	3291
30	3.62	1.810	5629	0	5629
60	2.24	2.240	7971	0	7971
120	1.32	2.640	10257	0	10257
180	0.91	2.739	10834	0	10834
360	0.53	3.162	13345	0	13345
720	0.35	4.164	19482	0	19482
1440	0.22	5.208	26049	0	**26049**

POST-DEVELOPMENT VOLUME

STORM DRAINAGE CALCULATIONS

Snowbasin - Canyon Rim Parking Lot

POST DEVELOPMENT VOLUME - SCS CURVE NUMBER METHOD

Tributary Drainage Area (A)	**sf**	**CN**		**CN*A**
Asphalt Pavment =	24,531	90.6		2222509 S.F.
Sum:	24531 S.F.		Sum:	2222509 S.F.

NOAA ATLAS 14 (100 YEAR STORM)				**Allowable Discharge =**	.00cfs/acre
Storm Duration	Intensity	Rainfall	Rainfall Excess	Allowed Discharge	Volume to Detain
(min)	*(in/hr)*	*(inches)*	*(cu.ft.)*	*(cu.ft)*	*(cu.ft)*
15	5.37	1.343	1212	0	1212
30	3.62	1.810	1988	0	1988
60	2.24	2.240	2751	0	2751
120	1.32	2.640	3486	0	3486
180	0.91	2.739	3671	0	3671
360	0.53	3.162	4470	0	4470
720	0.35	4.164	6408	0	6408
1440	0.22	5.208	8466	0	**8466**

STORM DRAINAGE CALCULATIONS

Snowbasin - Maples Parking Lot

POST DEVELOPMENT VOLUME - SCS CURVE NUMBER METHOD

Tributary Drainage Area (A)	**sf**	**CN**		**CN*A**
Asphalt Pavment =	79,552	90.6		7207387 S.F.
Sum:	79552 S.F.		Sum:	7207387 S.F.

NOAA ATLAS 14 (100 YEAR STORM)				**Allowable Discharge =**	.00cfs/acre
Storm Duration	Intensity	Rainfall	Rainfall Excess	Allowed Discharge	Volume to Detain
(min)	*(in/hr)*	*(inches)*	*(cu.ft.)*	*(cu.ft)*	*(cu.ft)*
15	5.37	1.343	3931	0	3931
30	3.62	1.810	6448	0	6448
60	2.24	2.240	8920	0	8920
120	1.32	2.640	11304	0	11304
180	0.91	2.739	11903	0	11903
360	0.53	3.162	14496	0	14496
720	0.35	4.164	20780	0	20780
1440	0.22	5.208	27454	0	**27454**

Appendix B
NOAA ATLAS 14 PRECIPITAION DATA

NOAA Atlas 14, Volume 1, Version 5
Location name: Huntsville, Utah, USA*
Latitude: 41.2228°, Longitude: -111.8561°
Elevation: 6301.28 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/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**2.15** (1.87-2.47)	**2.70** (2.40-3.12)	**3.65** (3.19-4.19)	**4.50** (3.91-5.17)	**5.84** (4.97-6.77)	**7.08** (5.84-8.29)	**8.53** (6.84-10.1)	**10.3** (7.92-12.5)	**13.1** (9.53-16.5)	**15.8** (10.9-20.5)
10-min	**1.63** (1.43-1.88)	**2.06** (1.82-2.38)	**2.78** (2.44-3.19)	**3.43** (2.98-3.94)	**4.45** (3.78-5.15)	**5.39** (4.45-6.31)	**6.50** (5.20-7.72)	**7.82** (6.03-9.49)	**9.99** (7.25-12.5)	**12.1** (8.31-15.6)
15-min	**1.35** (1.18-1.55)	**1.70** (1.50-1.96)	**2.30** (2.01-2.64)	**2.83** (2.46-3.26)	**3.68** (3.12-4.26)	**4.45** (3.68-5.22)	**5.37** (4.30-6.38)	**6.46** (4.98-7.84)	**8.26** (6.00-10.4)	**9.96** (6.87-12.9)
30-min	**0.906** (0.794-1.05)	**1.15** (1.01-1.32)	**1.55** (1.35-1.78)	**1.91** (1.65-2.19)	**2.47** (2.10-2.87)	**3.00** (2.48-3.51)	**3.62** (2.89-4.29)	**4.35** (3.36-5.28)	**5.56** (4.04-6.97)	**6.71** (4.63-8.67)
60-min	**0.561** (0.492-0.647)	**0.709** (0.627-0.818)	**0.957** (0.838-1.10)	**1.18** (1.02-1.36)	**1.53** (1.30-1.78)	**1.86** (1.53-2.17)	**2.24** (1.79-2.66)	**2.69** (2.08-3.27)	**3.44** (2.50-4.32)	**4.15** (2.86-5.36)
2-hr	**0.372** (0.331-0.422)	**0.466** (0.415-0.530)	**0.598** (0.528-0.678)	**0.721** (0.631-0.821)	**0.923** (0.792-1.06)	**1.11** (0.928-1.28)	**1.32** (1.08-1.56)	**1.58** (1.24-1.91)	**2.00** (1.48-2.48)	**2.39** (1.69-3.05)
3-hr	**0.287** (0.259-0.320)	**0.354** (0.320-0.396)	**0.438** (0.392-0.490)	**0.518** (0.461-0.581)	**0.646** (0.564-0.731)	**0.768** (0.657-0.877)	**0.913** (0.763-1.06)	**1.08** (0.877-1.28)	**1.36** (1.05-1.66)	**1.62** (1.20-2.05)
6-hr	**0.203** (0.186-0.222)	**0.248** (0.227-0.272)	**0.296** (0.270-0.325)	**0.340** (0.308-0.376)	**0.407** (0.364-0.453)	**0.463** (0.409-0.520)	**0.527** (0.459-0.599)	**0.599** (0.509-0.690)	**0.742** (0.611-0.873)	**0.872** (0.698-1.05)
12-hr	**0.134** (0.123-0.148)	**0.164** (0.150-0.181)	**0.197** (0.179-0.217)	**0.226** (0.205-0.250)	**0.271** (0.242-0.302)	**0.308** (0.271-0.346)	**0.347** (0.300-0.395)	**0.389** (0.330-0.449)	**0.454** (0.374-0.536)	**0.505** (0.406-0.608)
24-hr	**0.090** (0.083-0.098)	**0.110** (0.102-0.120)	**0.132** (0.122-0.145)	**0.151** (0.138-0.165)	**0.176** (0.161-0.192)	**0.196** (0.178-0.214)	**0.217** (0.196-0.237)	**0.238** (0.214-0.260)	**0.266** (0.237-0.292)	**0.289** (0.255-0.318)
2-day	**0.055** (0.051-0.060)	**0.068** (0.063-0.074)	**0.082** (0.075-0.089)	**0.093** (0.086-0.102)	**0.109** (0.100-0.119)	**0.122** (0.111-0.133)	**0.135** (0.122-0.148)	**0.149** (0.133-0.163)	**0.167** (0.148-0.184)	**0.181** (0.160-0.201)
3-day	**0.041** (0.038-0.045)	**0.051** (0.047-0.056)	**0.062** (0.057-0.068)	**0.071** (0.065-0.077)	**0.084** (0.076-0.091)	**0.094** (0.085-0.102)	**0.104** (0.094-0.114)	**0.115** (0.103-0.126)	**0.129** (0.115-0.143)	**0.141** (0.124-0.156)
4-day	**0.035** (0.032-0.038)	**0.043** (0.039-0.047)	**0.052** (0.048-0.057)	**0.060** (0.055-0.065)	**0.071** (0.064-0.077)	**0.079** (0.072-0.087)	**0.088** (0.080-0.097)	**0.098** (0.087-0.107)	**0.111** (0.098-0.122)	**0.121** (0.106-0.134)
7-day	**0.025** (0.023-0.027)	**0.031** (0.028-0.034)	**0.038** (0.034-0.041)	**0.043** (0.039-0.047)	**0.051** (0.046-0.056)	**0.057** (0.052-0.063)	**0.064** (0.057-0.070)	**0.070** (0.063-0.078)	**0.079** (0.070-0.088)	**0.087** (0.076-0.097)
10-day	**0.020** (0.019-0.022)	**0.025** (0.023-0.027)	**0.030** (0.028-0.033)	**0.034** (0.032-0.038)	**0.040** (0.037-0.044)	**0.044** (0.040-0.049)	**0.049** (0.044-0.053)	**0.053** (0.048-0.059)	**0.059** (0.053-0.065)	**0.064** (0.056-0.071)
20-day	**0.014** (0.013-0.015)	**0.017** (0.016-0.018)	**0.020** (0.019-0.022)	**0.023** (0.021-0.025)	**0.026** (0.024-0.028)	**0.029** (0.026-0.031)	**0.031** (0.028-0.034)	**0.033** (0.030-0.036)	**0.036** (0.033-0.040)	**0.039** (0.035-0.043)
30-day	**0.011** (0.011-0.012)	**0.014** (0.013-0.015)	**0.017** (0.015-0.018)	**0.019** (0.017-0.020)	**0.021** (0.020-0.023)	**0.023** (0.021-0.025)	**0.025** (0.023-0.028)	**0.027** (0.025-0.030)	**0.030** (0.027-0.033)	**0.032** (0.028-0.035)
45-day	**0.010** (0.009-0.010)	**0.012** (0.011-0.013)	**0.014** (0.013-0.015)	**0.016** (0.015-0.017)	**0.018** (0.017-0.020)	**0.020** (0.018-0.022)	**0.022** (0.020-0.023)	**0.023** (0.021-0.025)	**0.026** (0.023-0.028)	**0.027** (0.024-0.030)
60-day	**0.009** (0.008-0.009)	**0.011** (0.010-0.011)	**0.013** (0.012-0.014)	**0.014** (0.013-0.015)	**0.016** (0.015-0.017)	**0.017** (0.016-0.019)	**0.019** (0.017-0.020)	**0.020** (0.018-0.022)	**0.022** (0.020-0.024)	**0.023** (0.021-0.026)

[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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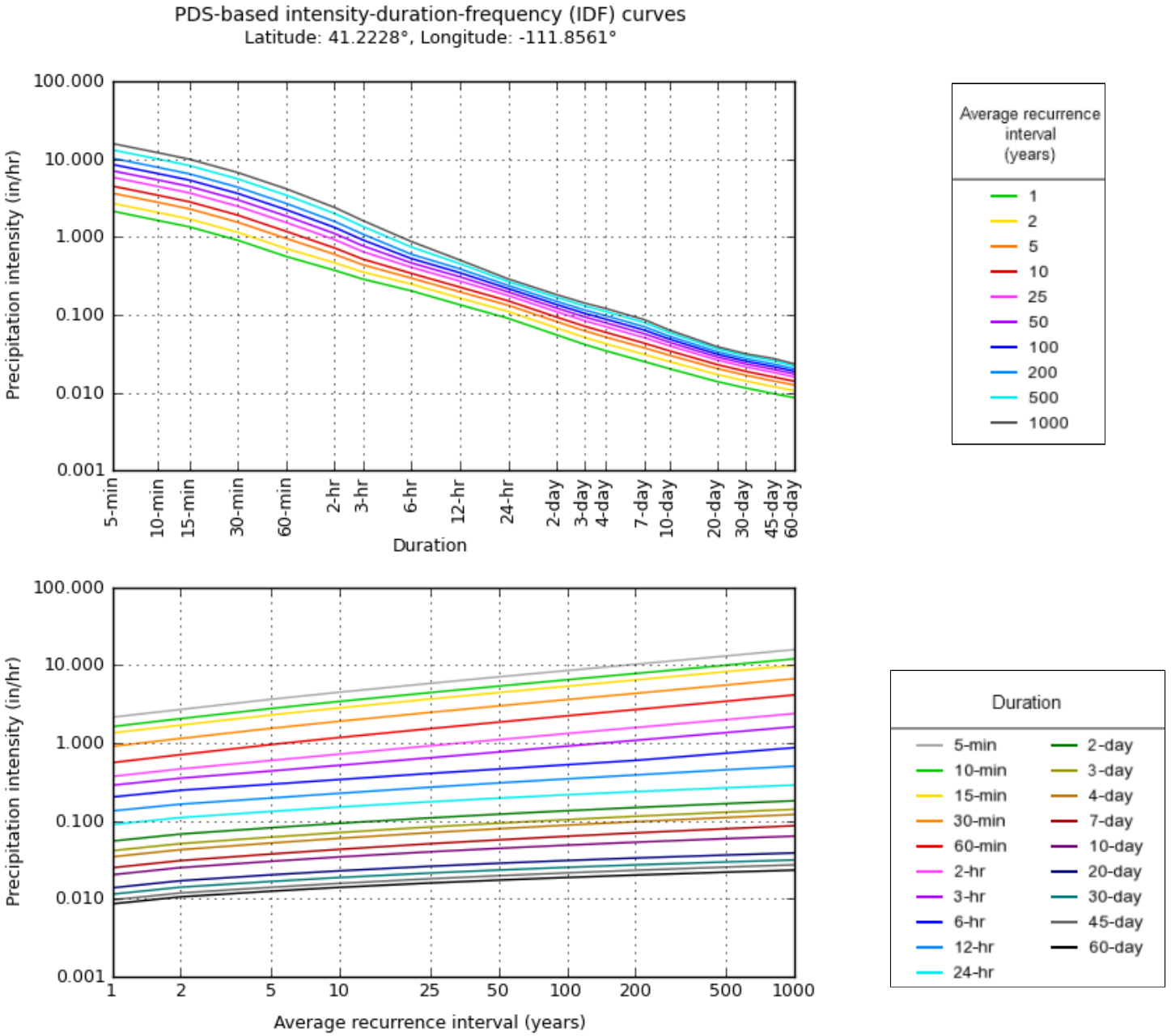
PF graphical



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Created (GMT): Wed Apr 21 23:53:42 2021

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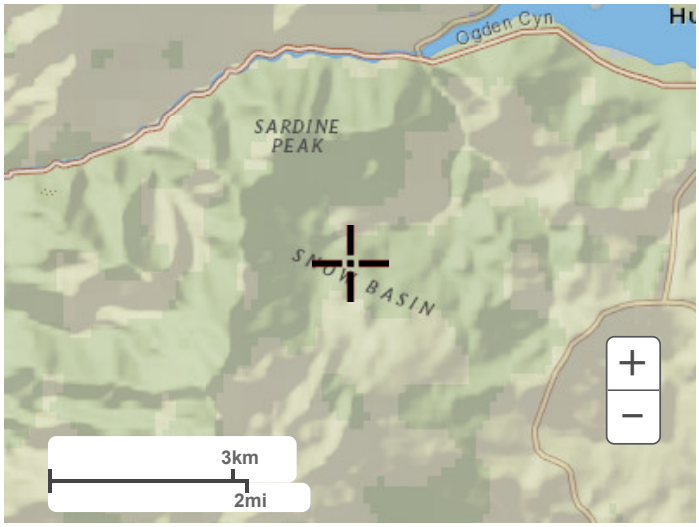
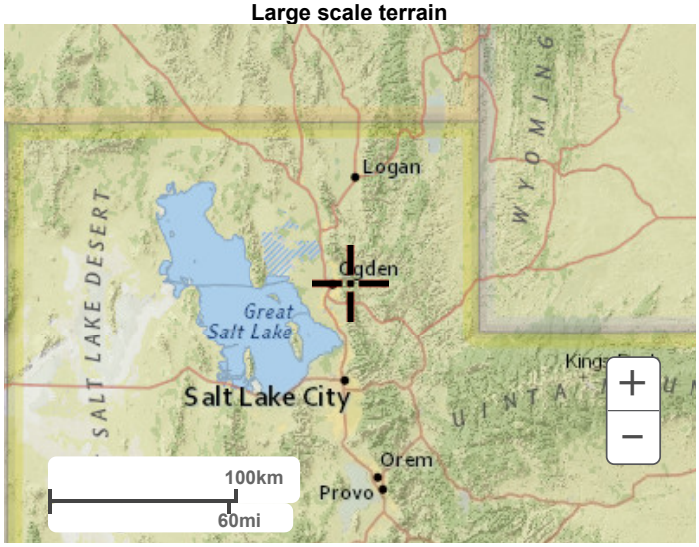
Maps & aerials

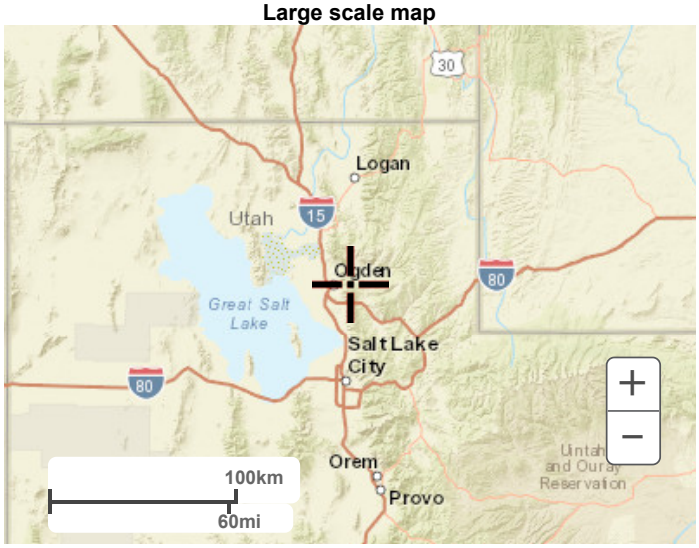
Small scale terrain



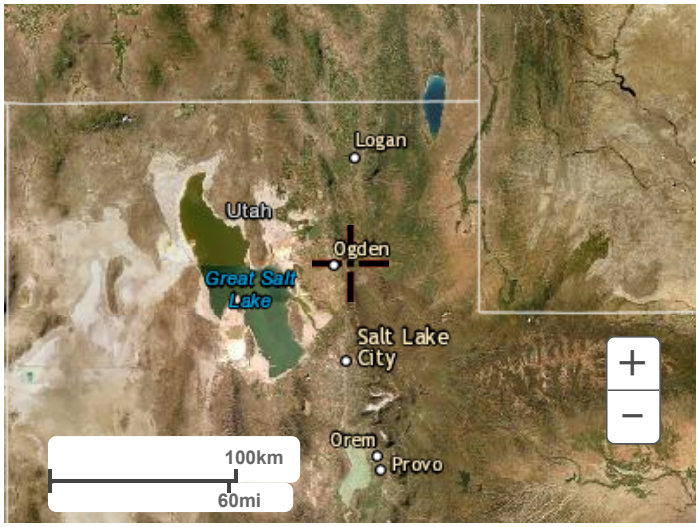
Large scale terrain



Large scale map



Large scale aerial



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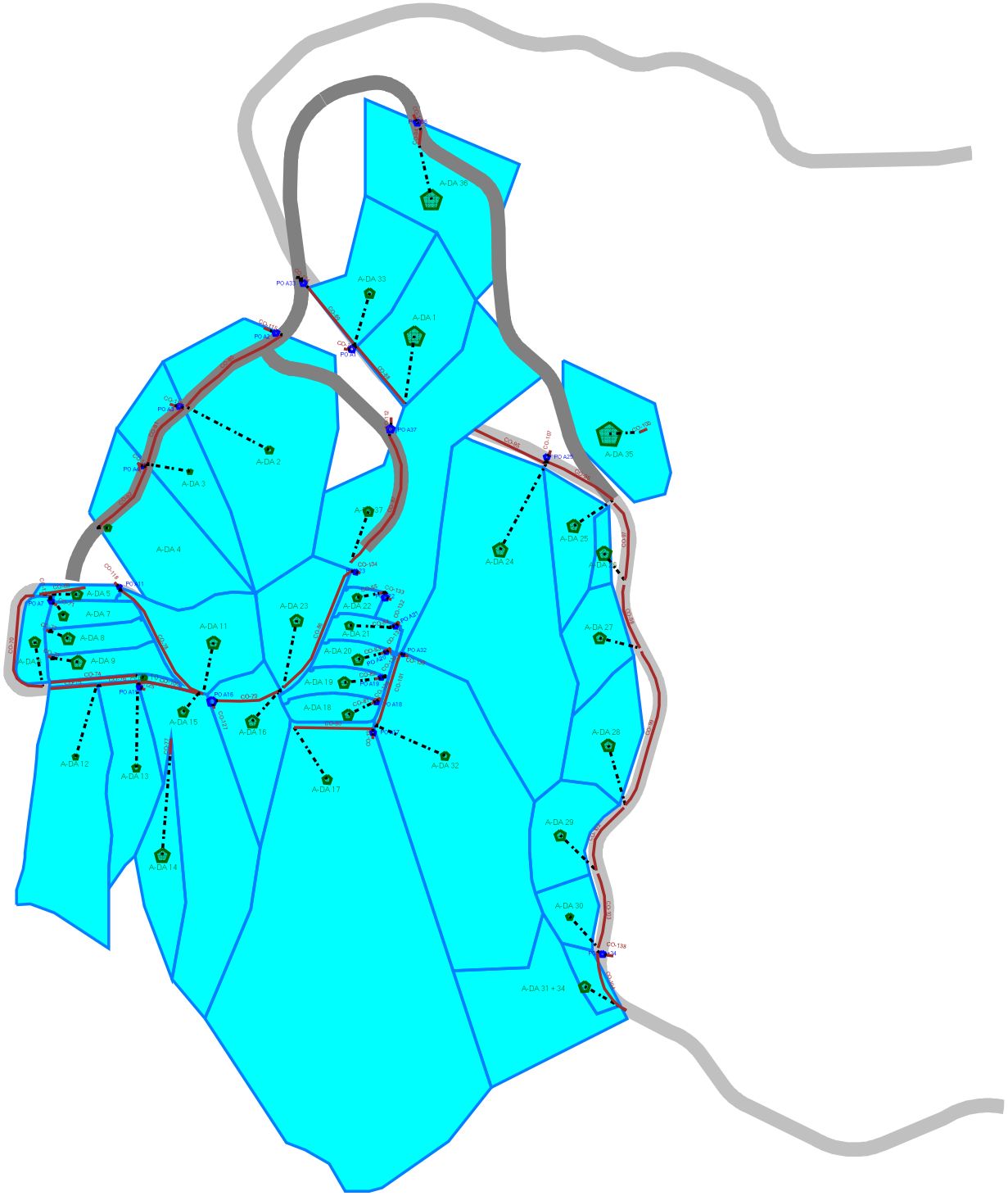
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix C
SNOWBASIN STORM DRAIN MASTER PLAN SCHEMATIC

Area A: Storm Drain Model Schematic



Storm Drain Conduit Table - 10 Year Storm

Current Time: 12.00 hours

Label	Rise (ft)	Span (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Section Type	Manning's n	Flow (Maximum) (cfs)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)
CO-69	1.5	3.0	241.9	0.041	Triangular Channel	0.013	0.66	34.26	1.9
CO-70	1.5	3.0	640.0	0.042	Triangular Channel	0.013	0.44	34.61	1.0
CO-71	1.5	3.0	18.7	0.213	Triangular Channel	0.013	4.58	77.83	5.8
CO-72	1.5	3.0	23.7	0.127	Triangular Channel	0.013	0.62	59.99	1.0
CO-73	1.5	3.0	27.8	0.108	Triangular Channel	0.013	0.63	55.36	1.1
CO-74	1.5	3.0	445.0	0.022	Triangular Channel	0.013	0.16	25.26	0.5
CO-75	1.5	3.0	249.6	0.012	Triangular Channel	0.013	3.45	18.47	16.3
CO-76	1.5	3.0	203.8	0.034	Triangular Channel	0.013	1.52	31.22	4.3
CO-77	1.5	3.0	82.2	0.036	Triangular Channel	0.013	1.16	32.18	3.2
CO-78	1.5	3.0	719.0	0.085	Triangular Channel	0.013	13.42	49.08	27.3
CO-79	1.5	3.0	393.1	0.056	Triangular Channel	0.013	13.00	39.86	32.6
CO-80	2.0	4.0	414.9	0.002	Triangular Channel	0.013	16.64	17.82	93.4
CO-81	1.5	3.0	34.3	0.146	Triangular Channel	0.013	4.87	64.37	7.4
CO-82	1.5	3.0	29.0	0.103	Triangular Channel	0.013	5.05	54.18	9.2
CO-83	1.5	3.0	31.7	0.095	Triangular Channel	0.013	4.15	51.87	7.9
CO-84	1.5	3.0	33.3	0.090	Triangular Channel	0.013	3.85	50.57	7.5
CO-85	1.5	3.0	27.8	0.108	Triangular Channel	0.013	2.28	55.37	4.0
CO-86	1.5	3.0	722.5	0.042	Triangular Channel	0.013	13.37	34.34	38.9
CO-87	1.5	3.0	1,423.0	0.067	Triangular Channel	0.013	33.49	43.54	76.9
CO-88	1.5	3.0	392.8	0.013	Triangular Channel	0.013	17.65	19.01	92.8
CO-89	1.5	3.0	379.0	0.055	Triangular Channel	0.013	14.17	39.67	35.7
CO-90	1.5	3.0	608.9	0.039	Triangular Channel	0.013	31.71	33.45	94.8
CO-91	1.5	3.0	360.5	0.050	Triangular Channel	0.013	10.21	37.65	27.1
CO-92	1.5	3.0	570.5	0.033	Triangular Channel	0.013	13.15	30.75	42.8
CO-94	1.5	3.0	77.5	0.039	Triangular Channel	0.013	12.74	33.15	38.4
CO-95	1.5	3.0	416.9	0.034	Triangular Channel	0.013	6.86	30.88	19.3
CO-96	1.5	3.0	429.1	0.051	Triangular Channel	0.013	1.58	38.15	4.0
CO-97	1.5	3.0	459.8	0.104	Triangular Channel	0.013	0.24	54.44	0.4
CO-98	1.5	3.0	374.0	0.029	Triangular Channel	0.013	1.01	28.90	3.0
CO-99	1.5	3.0	859.4	0.071	Triangular Channel	0.013	1.39	44.89	2.9
CO-100	1.5	3.0	317.5	0.072	Triangular Channel	0.013	10.89	45.35	24.0

Storm Drain Conduit Table - 10 Year Storm

Current Time: 12.00 hours

Label	Rise (ft)	Span (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Section Type	Manning's n	Flow (Maximum) (cfs)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)
CO-101	1.5	3.0	398.8	0.073	Triangular Channel	0.013	6.42	45.44	12.4
CO-102	1.5	3.0	390.8	0.079	Triangular Channel	0.013	1.23	47.46	2.5
CO-103	1.5	3.0	399.2	0.083	Triangular Channel	0.013	5.51	48.45	10.9
CO-104	1.5	3.0	365.3	0.085	Triangular Channel	0.013	26.20	49.09	53.4
CO-105	1.5	3.0	70.4	0.170	Triangular Channel	0.013	3.66	69.58	5.1
CO-107	1.5	3.0	22.4	0.045	Triangular Channel	0.013	0.34	35.60	1.0
CO-112	1.5	3.0	22.5	0.044	Triangular Channel	0.013	1.67	35.54	4.7
CO-113	1.5	3.0	22.3	0.045	Triangular Channel	0.013	0.65	35.64	1.8
CO-114	1.5	3.0	21.6	0.046	Triangular Channel	0.013	0.55	36.27	1.5
CO-115	1.5	3.0	23.2	0.043	Triangular Channel	0.013	1.84	35.01	5.3
CO-116	1.5	3.0	28.9	0.035	Triangular Channel	0.013	0.59	31.34	1.9
CO-117	1.5	3.0	19.5	0.051	Triangular Channel	0.013	0.85	38.16	2.2
CO-118	1.5	3.0	19.4	0.051	Triangular Channel	0.013	0.56	38.24	1.5
CO-121	1.5	3.0	19.5	0.051	Triangular Channel	0.013	0.14	38.20	0.4
CO-125	1.5	3.0	17.8	0.056	Triangular Channel	0.013	1.30	39.98	3.3
CO-127	1.5	3.0	13.9	0.072	Triangular Channel	0.013	0.51	45.13	1.1
CO-128	1.5	3.0	17.5	0.057	Triangular Channel	0.013	5.18	40.27	12.9
CO-129	1.5	3.0	16.1	0.062	Triangular Channel	0.013	0.15	41.97	0.4
CO-130	1.5	3.0	13.9	0.072	Triangular Channel	0.013	0.16	45.13	0.4
CO-131	1.5	3.0	18.3	0.055	Triangular Channel	0.013	0.13	39.34	0.3
CO-132	1.5	3.0	20.2	0.050	Triangular Channel	0.013	0.12	37.52	0.3
CO-133	1.5	3.0	15.8	0.063	Triangular Channel	0.013	0.10	42.44	0.2
CO-134	1.5	3.0	10.9	0.092	Triangular Channel	0.013	0.48	51.09	0.9
CO-136	1.5	3.0	26.8	0.037	Triangular Channel	0.013	1.02	32.54	3.1
CO-138	1.5	3.0	35.0	0.029	Triangular Channel	0.013	0.95	28.47	3.3
CO-139	1.5	3.0	17.4	0.057	Triangular Channel	0.013	2.11	40.36	5.2

Storm Drain Catchment Table - 100 Year Storm

Current Time: 12.00 hours

Label	Outflow Element	Area (User Defined) (ft^2)	Time of Concentration (min)	SCS CN	Flow (Maximum) (cfs)	Volume (Total Runoff) (ft^3)
A-DA 1	CB-62	278,360.000	10.000	90.000	28.21	77,959.0
A-DA 2	CB-59	799,999.000	10.000	79.000	59.19	156,391.0
A-DA 3	CB-58	257,750.000	10.000	79.000	19.07	50,387.0
A-DA 4	CB-57	369,222.000	10.000	77.000	25.43	67,106.0
A-DA 5	CB-86	34,051.200	10.000	68.000	1.59	4,279.0
A-DA 6	CB-85	62,813.900	10.000	59.000	1.68	4,934.0
A-DA 7	CB-84	60,221.200	10.000	96.000	6.83	20,072.0
A-DA 8	CB-83	75,405.100	10.000	60.000	2.17	6,285.0
A-DA 9	CB-82	89,601.500	10.000	59.000	2.40	7,038.0
A-DA 10	CB-80	23,270.100	10.000	59.000	0.62	1,828.0
A-DA 11	CB-87	245,754.000	10.000	86.000	22.53	60,816.0
A-DA 12	CB-79	494,719.000	10.000	59.000	13.25	38,860.0
A-DA 13	CB-78	218,004.000	10.000	59.000	5.84	17,124.0
A-DA 14	CB-81	166,455.000	10.000	59.000	4.46	13,075.0
A-DA 15	CB-91	561,380.000	10.000	68.000	26.14	70,539.0
A-DA 16	CB-55	220,461.000	10.000	88.000	21.27	58,090.0
A-DA 17	CB-88	225,964.000	10.000	95.000	25.26	73,224.0
A-DA 18	CB-72	65,641.800	10.000	95.000	7.34	21,271.0
A-DA 19	CB-73	68,061.900	10.000	95.000	7.61	22,055.0
A-DA 20	CB-74	55,889.600	10.000	95.000	6.25	18,111.0
A-DA 21	CB-75	53,274.500	10.000	94.000	5.86	16,779.0
A-DA 22	CB-76	30,615.400	10.000	95.000	3.42	9,921.0
A-DA 23	CB-77	210,381.000	10.000	90.000	21.32	58,921.0
A-DA 24	CB-64	981,822.000	10.000	59.000	26.30	77,122.0
A-DA 25	CB-65	149,439.000	10.000	62.000	4.92	13,937.0
A-DA 26	CB-66	33,956.800	10.000	59.000	0.91	2,667.0
A-DA 27	CB-67	144,357.000	10.000	59.000	3.87	11,339.0
A-DA 28	CB-68	196,690.000	10.000	59.000	5.27	15,450.0
A-DA 29	CB-69	174,810.000	10.000	59.000	4.68	13,731.0
A-DA 30	CB-70	85,811.700	10.000	90.000	8.70	24,033.0
A-DA 31 + 34	CB-71	414,173.000	10.000	90.000	41.97	115,996.0
A-DA 32	CB-92	917,912.000	10.000	59.000	24.59	72,102.0

Storm Drain Catchment Table - 100 Year Storm

Current Time: 12.00 hours

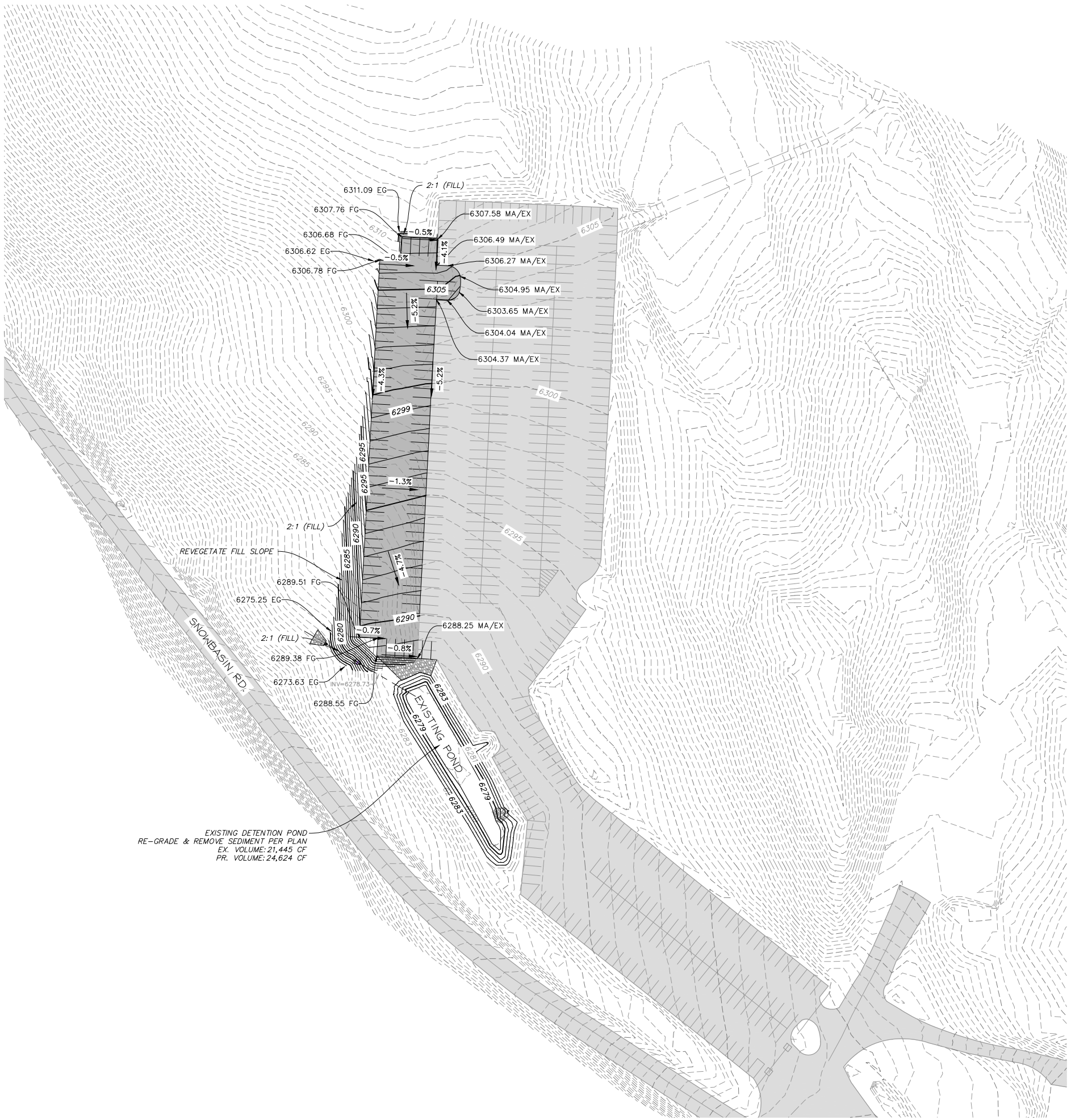
Label	Outflow Element	Area (User Defined) (ft^2)	Time of Concentration (min)	SCS CN	Flow (Maximum) (cfs)	Volume (Total Runoff) (ft^3)
A-DA 33	CB-61	240,356.000	10.000	88.000	23.19	63,332.0
A-DA 35	CB-93	443,503.000	10.000	60.000	12.78	36,963.0
A-DA 36	CB-90	254,417.000	10.000	84.000	22.06	59,019.0
A-DA 37	CB-89	729,119.000	10.000	82.000	59.53	158,224.0

Storm Drain Catchment Table - 100 Year Storm

Current Time: 15.00 hours

Label	Time to Maximum Storage (min)	Volume (ft^3)	Flow (Total In Maximum) (cfs)	Flow (Out to Links Maximum) (cfs)	Is Ever Overflowing?
PO A17	736.000	0.0	24.68	5.18	False
PO A32	800.000	22,551.3	24.17	2.11	False
PO A25	812.000	5,376.0	4.86	0.34	False
PO A36	818.000	28,601.1	21.66	1.02	False
PO A22	836.000	5,444.3	3.37	0.10	False
PO A15	840.000	33,603.5	25.98	1.30	False
PO A4	894.000	37,309.6	25.15	0.85	False
PO A2	910.000	88,720.7	58.49	1.84	False
PO A3	912.000	28,615.7	18.83	0.59	False
PO A37	924.000	92,187.5	58.92	1.67	False
PO A11	924.000	36,342.8	22.25	0.56	False
PO A16	924.000	34,965.8	20.92	0.51	False
PO A20	928.000	10,961.9	6.15	0.13	False
PO A33	930.000	38,203.1	22.81	0.55	False
PO A21	930.000	10,263.7	5.77	0.12	False
PO A7	932.000	12,104.5	6.73	0.14	False
PO A23	932.000	35,771.5	21.02	0.48	False
PO A19	934.000	13,281.3	7.49	0.16	False
PO A1	936.000	47,124.0	27.73	0.65	False
PO-A31+34	936.000	70,434.6	41.09	0.95	False
PO A18	938.000	12,939.5	7.23	0.15	False

Appendix D
GRADING & DRAINAGE AND UTILITY PLAN



GRADING GENERAL NOTES:

1. *SITE GRADING SHALL BE PERFORMED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND REPLACING ALL SOFT, YIELDING OR UNSUITABLE MATERIALS AND REPLACING THEM WITH SUITABLE MATERIALS. ALL EXCAVATED OR FILLED AREAS SHALL BE COMPACTED TO 95% OF MODIFIED PROCTOR MAXIMUM DENSITY PER ASTM TEST D-1557. MOISTURE CONTENT AT TIME OF PLACEMENT SHALL NOT EXCEED 2% ABOVE NOR 3% BELOW OPTIMUM. CONTRACTOR SHALL SUBMIT A COMPACTION REPORT PREPARED BY A QUALIFIED REGISTERED GEOTECHNICAL ENGINEER, VERIFYING THAT ALL FILLED AREAS AND SUBGRADE AREAS TO BE PAVED HAVE BEEN COMPACTED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS.*
2. *CONTRACTOR SHALL BECOME FAMILIAR WITH EXISTING SOIL CONDITIONS.*
3. *THE CONTRACTOR IS TO USE BEST MANAGEMENT PRACTICES FOR PROVIDING EROSION CONTROL AND DUST SUPPRESSION FOR CONSTRUCTION OF THIS PROJECT.*
4. *EXISTING UNDERGROUND UTILITIES AND IMPROVEMENTS ARE SHOWN IN THEIR APPROXIMATE LOCATIONS BASED UPON RECORD INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF PLANS. LOCATIONS MAY NOT HAVE BEEN VERIFIED IN THE FIELD AND NO GUARANTEE IS MADE AS TO ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE EXISTENCE AND LOCATION OF THOSE UTILITIES SHOWN ON THESE PLANS OR INDICATED IN THE FIELD BY LOCATING SERVICES. ANY ADDITIONAL COSTS INCURRED AS A RESULT OF CONTRACTOR'S FAILURE TO VERIFY LOCATIONS OF EXISTING UTILITIES PRIOR TO BEGINNING OF CONSTRUCTION IN THEIR VICINITY SHALL BE BORNE BY THE CONTRACTOR AND ASSUMED INCLUDED IN THE CONTRACT.*
5. *LOCATIONS OF ALL UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR IS TO VERIFY CONNECTION POINTS WITH EXISTING UTILITIES. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE CAUSED TO EXISTING UTILITIES AND UTILITY STRUCTURES THAT ARE TO REMAIN.*
6. *ALL SURFACE IMPROVEMENTS DISTURBED BY CONSTRUCTION SHALL BE RESTORED OR REPLACED, INCLUDING TREES, DECORATIVE SHRUBS, SOD, FENCES, WALLS AND STRUCTURES, WHETHER OR NOT THEY ARE SPECIFICALLY SHOWN ON THE CONTRACT DOCUMENTS.*
7. *SEE DRAINAGE REPORT FOR STORM DRAIN CALCULATIONS.*

LEGEND:

- *XXXX* — *EXISTING ELEVATION CONTOURS*
- *XXXX* — *PROPOSED ELEVATION CONTOURS*
- *GRADE BREAK*
- *DRAINAGE SWALE*

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

NO.	BY	DATE	REVISIONS

SNOWBASIN RESORT
CANYON RIM PARKING LOT
GRADING PLAN

DATE: 06.07.2021

TCC JOB NUMBER: 19-300.04

REGISTERED PROFESSIONAL ENGINEER
06/07/2021
No. 11397585
GREGORY B BEVACQUA
STATE OF UTAH

SCALE
HORIZONTAL: 1" = 50'
0 12.5' 25' 50' 75'

SHEET NUMBER
C300
6 OF 12

CALL 811 BEFORE YOU DIG
BLUE RIDGING PARTNER

DATE: 6/7/2021 1:18 PM

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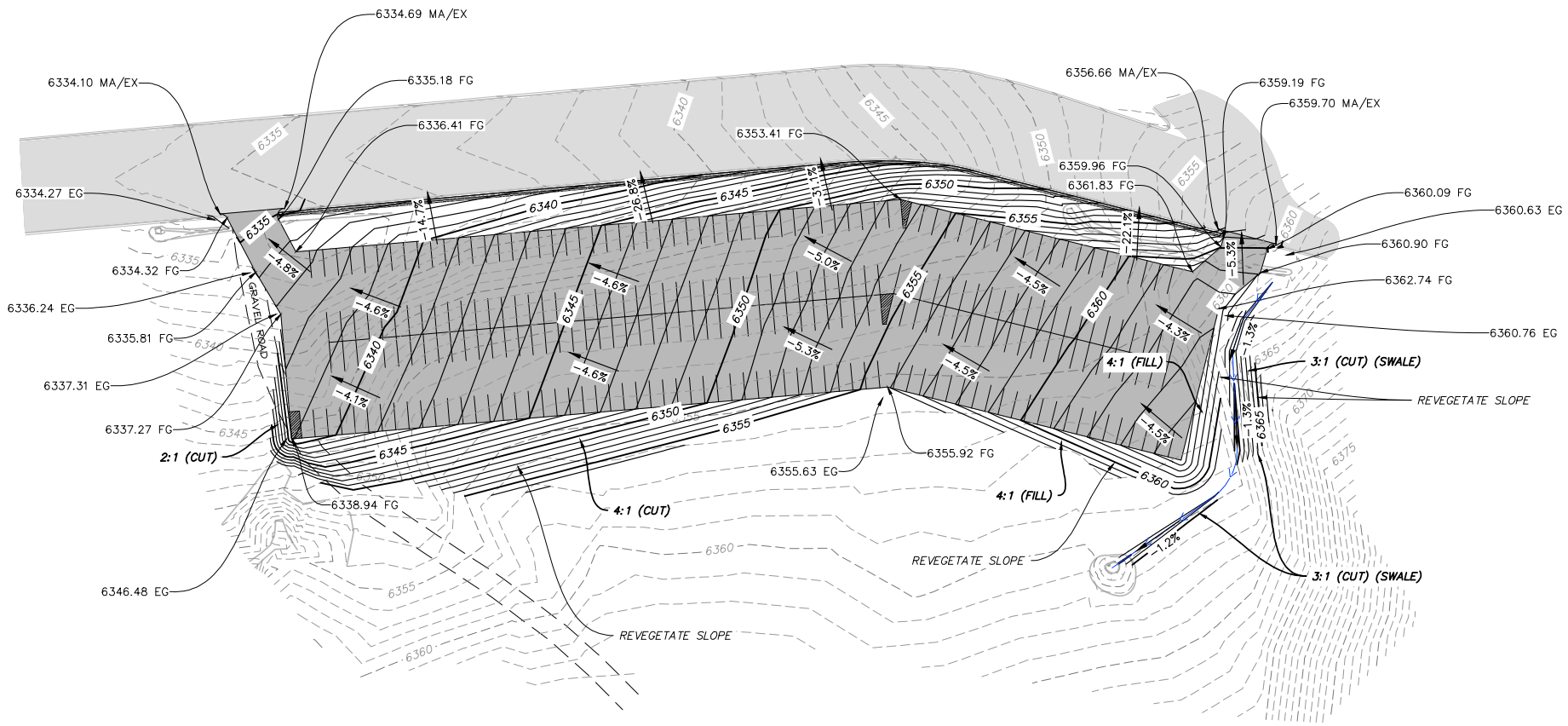

GRADING GENERAL NOTES:

1. SITE GRADING SHALL BE PERFORMED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND REPLACING ALL SOFT, YIELDING OR UNSUITABLE MATERIALS AND REPLACING THEM WITH SUITABLE MATERIALS. ALL EXCAVATED OR FILLED AREAS SHALL BE COMPACTED TO 95% OF MODIFIED PROCTOR MAXIMUM DENSITY PER ASTM TEST D-1557. MOISTURE CONTENT AT TIME OF PLACEMENT SHALL NOT EXCEED 2% ABOVE NOR 3% BELOW OPTIMUM. CONTRACTOR SHALL SUBMIT A COMPACTION REPORT PREPARED BY A QUALIFIED REGISTERED GEOTECHNICAL ENGINEER, VERIFYING THAT ALL FILLED AREAS AND SUBGRADE AREAS TO BE PAVED HAVE BEEN COMPACTED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS.
2. CONTRACTOR SHALL BECOME FAMILIAR WITH EXISTING SOIL CONDITIONS.
3. THE CONTRACTOR IS TO USE BEST MANAGEMENT PRACTICES FOR PROVIDING EROSION CONTROL AND DUST SUPPRESSION FOR CONSTRUCTION OF THIS PROJECT.
4. EXISTING UNDERGROUND UTILITIES AND IMPROVEMENTS ARE SHOWN IN THEIR APPROXIMATE LOCATIONS BASED UPON RECORD INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF PLANS. LOCATIONS MAY NOT HAVE BEEN VERIFIED IN THE FIELD AND NO GUARANTEE IS MADE AS TO ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE EXISTENCE AND LOCATION OF THOSE UTILITIES SHOWN ON THESE PLANS OR INDICATED IN THE FIELD BY LOCATING SERVICES. ANY ADDITIONAL COSTS INCURRED AS A RESULT OF CONTRACTOR'S FAILURE TO VERIFY LOCATIONS OF EXISTING UTILITIES PRIOR TO BEGINNING OF CONSTRUCTION IN THEIR VICINITY SHALL BE BORNE BY THE CONTRACTOR AND ASSUMED INCLUDED IN THE CONTRACT.
5. LOCATIONS OF ALL UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR IS TO VERIFY CONNECTION POINTS WITH EXISTING UTILITIES. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE CAUSED TO EXISTING UTILITIES AND UTILITY STRUCTURES THAT ARE TO REMAIN.
6. ALL SURFACE IMPROVEMENTS DISTURBED BY CONSTRUCTION SHALL BE RESTORED OR REPLACED, INCLUDING TREES, DECORATIVE SHRUBS, SOD, FENCES, WALLS AND STRUCTURES, WHETHER OR NOT THEY ARE SPECIFICALLY SHOWN ON THE CONTRACT DOCUMENTS.
7. SEE DRAINAGE REPORT FOR STORM DRAIN CALCULATIONS.

LEGEND:

- XXXX — EXISTING ELEVATION CONTOURS
- XXXX — PROPOSED ELEVATION CONTOURS
- GRADE BREAK
- DRAINAGE SWALE

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

NO.	BY	DATE	REVISIONS

SNOWBASIN RESORT
MAPLES PARKING LOT
GRADING PLAN

DATE: 06.07.2021

TCC JOB NUMBER: 19-300.04

REGISTERED PROFESSIONAL ENGINEER
06/07/2021
No. 11397585
GREGORY B. BEVACQUA
STATE OF UTAH

SCALE
HORIZONTAL: 1" = 50'
0 12.5' 25' 50' 75'

SHEET NUMBER
C301
7 OF 12

CALL 811 BEFORE YOU DIG
STOP DIGGING PARTNER

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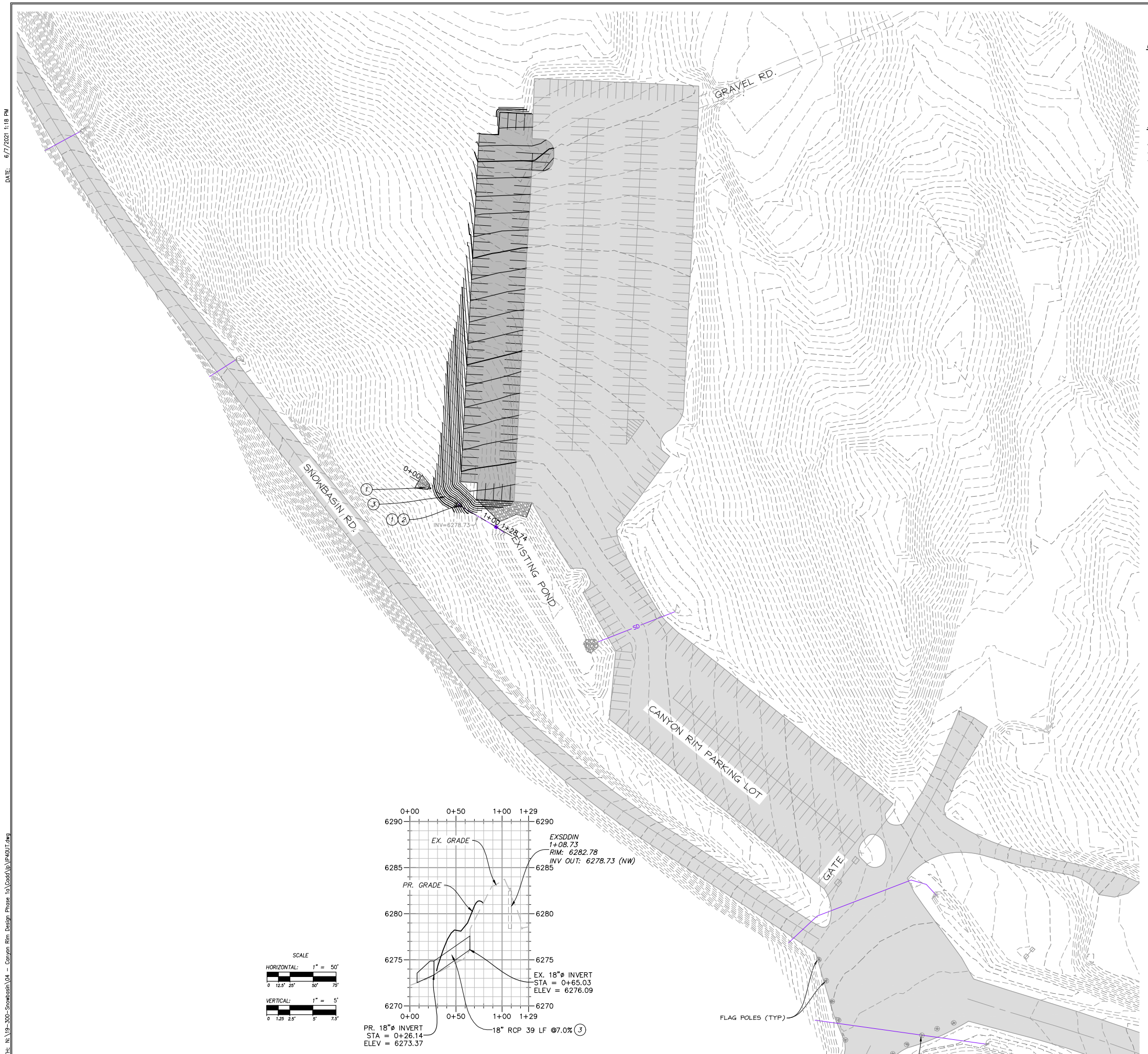

UTILITY GENERAL NOTES:

1. SEE GRADING DRAWINGS FOR ADDITIONAL DESIGN INFORMATION.
2. ALL SITE IMPROVEMENTS SHALL CONFORM TO THE PUBLIC WORKS STANDARDS OF WEBER COUNTY.
3. CONTRACTOR SHALL SALVAGE EXISTING STORM DRAIN INFRASTRUCTURE FOR RE-USE WITH THIS PROJECT.

SITE SCOPE OF WORK:

PROVIDE, INSTALL AND/OR CONSTRUCT THE FOLLOWING PER THE SPECIFICATIONS GIVEN OR REFERENCED, THE DETAILS NOTED, AND/OR AS SHOWN ON THE CONSTRUCTION DRAWINGS:

(1) REMOVE EXISTING FLARED END SECTION (F.E.S.) FOR REUSE. IF EXISTING F.E.S. NOT SALVAGEABLE-INSTALL 18" FLARED END SECTION PER APWA PLAN #323.1.

(2) CONNECT PROPOSED 18"ø RCP STORM DRAIN TO EXISTING 18"ø STORM DRAIN.

(3) INSTALL 18"ø RCP STORM DRAIN PER APWA NO. 381 & 382.

TALISMAN
CIVIL CONSULTANTS
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SUITE 200
SALT LAKE CITY, UT 84115
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NO.	BY	DATE	REVISIONS

SNOWBASIN RESORT
CANYON RIM PARKING LOT
UTILITY PLAN

DATE: 06.07.2021

TCC JOB NUMBER: 19-300.04

REGISTERED PROFESSIONAL ENGINEER
06/07/2021
No. 11397585
GREGORY B. BEVACQUA
STATE OF UTAH

SCALE
HORIZONTAL: 1" = 50'
0 12.5' 25' 50' 75'

SHEET NUMBER
C400
8 OF 12

CALL 811 BEFORE YOU DIG
SAFE DIGGING PARTNER

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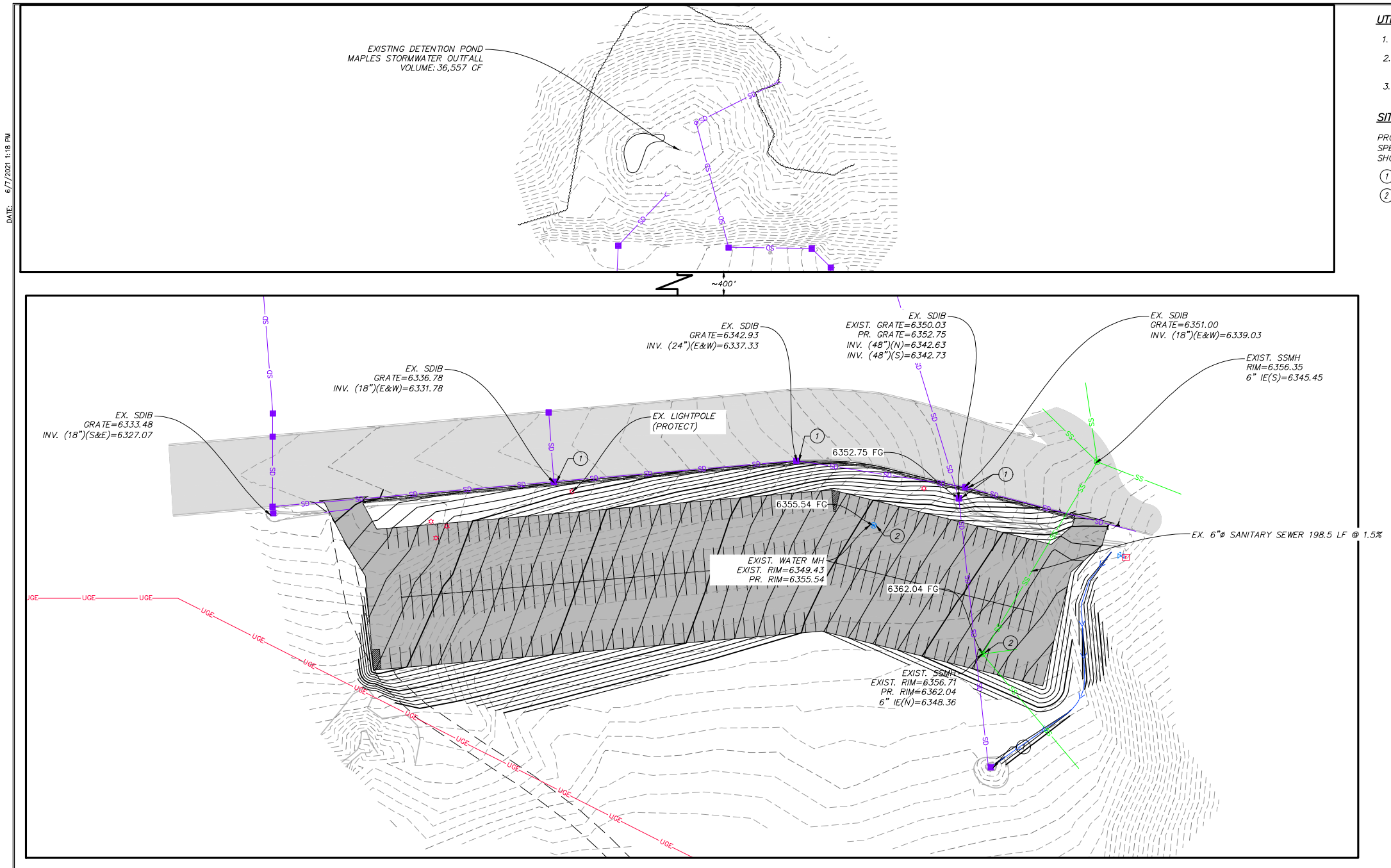

UTILITY GENERAL NOTES:

1. SEE GRADING DRAWINGS FOR ADDITIONAL DESIGN INFORMATION.
2. ALL SITE IMPROVEMENTS SHALL CONFORM TO THE PUBLIC WORKS STANDARDS OF WEBER COUNTY.
3. CONTRACTOR SHALL SALVAGE EXISTING STORM DRAIN INFRASTRUCTURE FOR RE-USE WITH THIS PROJECT.

SITE SCOPE OF WORK:

PROVIDE, INSTALL AND/OR CONSTRUCT THE FOLLOWING PER THE SPECIFICATIONS GIVEN OR REFERENCED, THE DETAILS NOTED, AND/OR AS SHOWN ON THE CONSTRUCTION DRAWINGS:

(1) ADJUST GRATE TO FINISHED GRADE.

(2) ADJUST RIM TO FINISHED GRADE.

SEE DRAINAGE REPORT FOR DRAINAGE CALCULATIONS & DESIGN.

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

NO.	BY	DATE	REVISIONS:

SNOWBASIN RESORT
MAPLES PARKING LOT
UTILITY PLAN

DATE: 06.07.2021

TCC JOB NUMBER: 19-300.04

REGISTERED PROFESSIONAL ENGINEER
06/07/2021
No. 11397585
GREGORY B. BEVACQUA
STATE OF UTAH

SCALE
HORIZONTAL: 1" = 50'
0 12.5' 25' 50' 75'

SHEET NUMBER
C401
9 OF 12

CALL 811 BEFORE YOU DIG
811
BLUE STAKES OF UTAH

DATE: 6/7/2021 1:18 PM

PATH: N:\19-300-Snowbasin\04 - Canyon Rim Design Phase 1a\Cadd\lp\LP41UT.dwg