

STRUCTURAL CALCULATIONS

for

**Landmark Old Blacksmith Shop Site
Storm Runoff Volume Calculations
Parcel #22-047-0040
Eden, Utah**

for

**Landmark Surveying
Tyler Knight, PLS
801-731-4075**

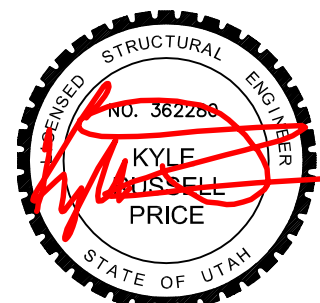
**Retention Pond
10 yr, 24hr Criteria
Calculated Storage Req'd: 8,964 cu. Ft.**

Date: 9/28/2018



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09/28/2018

Project: Site Plan Rev 06/26/18, Old Blacksmith Shop (Horseshoe LLC) Project Design: K. Price Date: 28-Sep-18
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RETENTION VOLUME CALCULATIONS

Design Criteria: Weber County, 10 year, 24 Hour

Area Calculations		Area Coefficients	
Landscaping	0.25 acres	Cl	0.30
Hard Surface	0.67 acres	Cr	0.90
Building	0.32 acres	Cg	0.60
Total Area	1.24 acres		

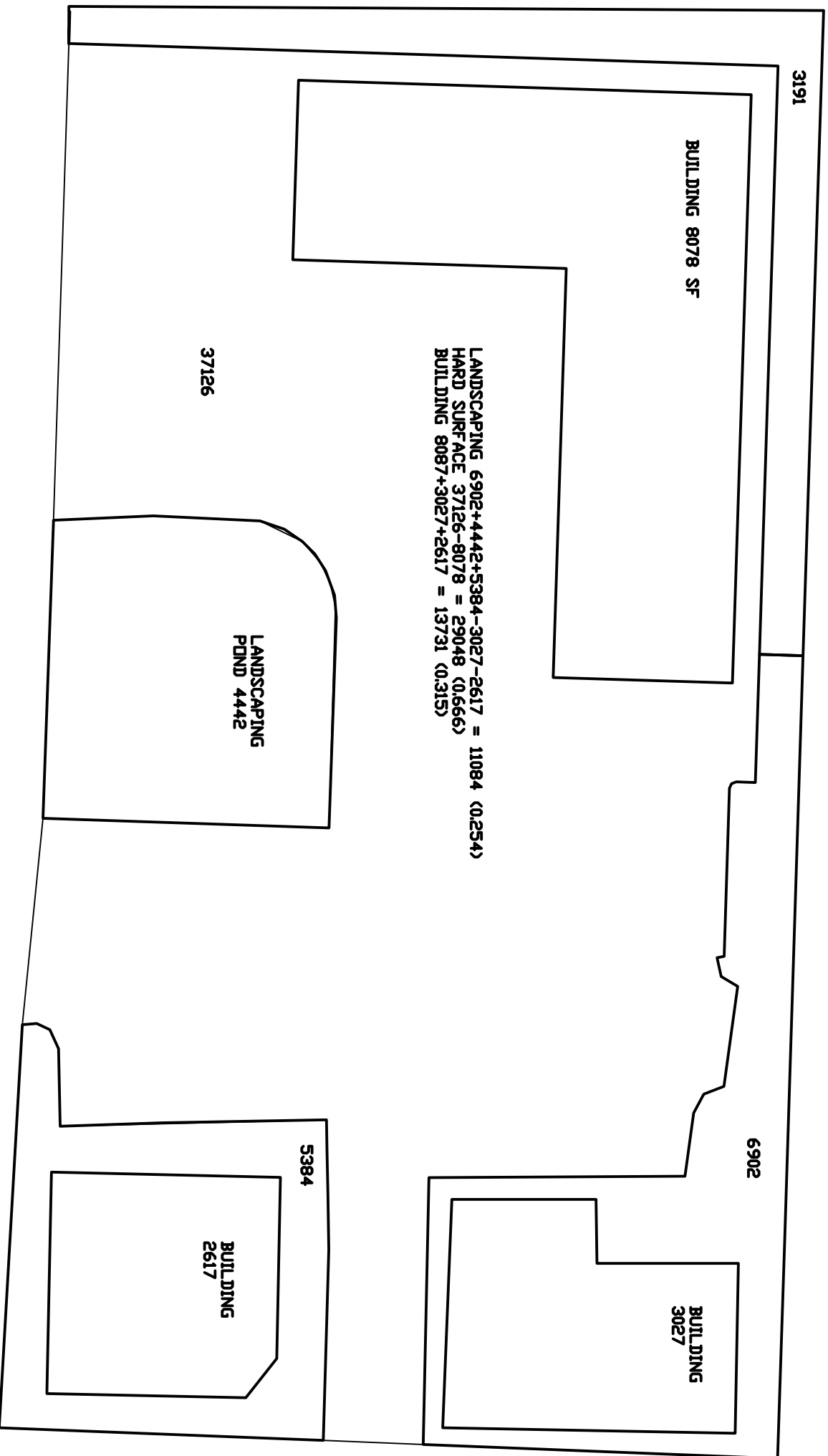
$$C = (Al \times Cl + Ar \times Cr + Ag \times Cg) / A = \mathbf{0.70}$$

Allowable Runoff 0.00 cfs

Minutes	C*A	I	T(sec)	Cumulative Runoff	Allowable Runoff	Storage (cu.ft.)
5	0.86	3.95	300	1,025	0	1,025
10	0.86	3.00	600	1,556	0	1,556
15	0.86	2.48	900	1,930	0	1,930
30	0.86	1.67	1,800	2,599	0	2,599
60	0.86	1.03	3,600	3,206	0	3,206
120	0.86	0.63	7,200	3,909	0	3,909
360	0.86	0.29	21,600	5,416	0	5,416
720	0.86	0.19	43,200	7,022	0	7,022
1440	0.86	0.12	86,400	8,964	0	8,964

Storage Required @ 24 Hrs 8,964 cu.ft.

BLACKSMITH SHOP PROPOSED 09/28/18





NOAA Atlas 14, Volume 1, Version 5
Location name: Eden, Utah, USA*
Latitude: 41.3°, Longitude: -111.81°
Elevation: 4943.82 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 & aeriels](#)

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	1.86 (1.62-2.14)	2.35 (2.08-2.71)	3.18 (2.80-3.67)	3.95 (3.43-4.55)	5.15 (4.38-5.98)	6.25 (5.17-7.33)	7.57 (6.06-8.98)	9.12 (7.04-11.0)	11.7 (8.48-14.5)	14.0 (9.73-18.0)
10-min	1.42 (1.24-1.63)	1.79 (1.58-2.06)	2.42 (2.13-2.79)	3.00 (2.61-3.46)	3.92 (3.33-4.55)	4.76 (3.94-5.58)	5.76 (4.61-6.83)	6.94 (5.36-8.40)	8.86 (6.46-11.1)	10.7 (7.41-13.7)
15-min	1.17 (1.02-1.34)	1.48 (1.31-1.70)	2.00 (1.76-2.30)	2.48 (2.16-2.86)	3.24 (2.75-3.76)	3.94 (3.26-4.62)	4.76 (3.81-5.64)	5.73 (4.43-6.94)	7.32 (5.34-9.14)	8.82 (6.12-11.3)
30-min	0.786 (0.688-0.906)	0.994 (0.880-1.15)	1.35 (1.18-1.55)	1.67 (1.45-1.92)	2.18 (1.85-2.53)	2.65 (2.19-3.11)	3.20 (2.57-3.80)	3.86 (2.98-4.67)	4.93 (3.60-6.15)	5.94 (4.12-7.61)
60-min	0.487 (0.426-0.560)	0.615 (0.545-0.710)	0.835 (0.732-0.960)	1.03 (0.899-1.19)	1.35 (1.15-1.57)	1.64 (1.36-1.92)	1.98 (1.59-2.35)	2.39 (1.85-2.89)	3.05 (2.23-3.81)	3.67 (2.55-4.71)
2-hr	0.321 (0.286-0.364)	0.402 (0.358-0.456)	0.518 (0.460-0.588)	0.628 (0.551-0.716)	0.807 (0.693-0.926)	0.970 (0.814-1.12)	1.16 (0.947-1.37)	1.39 (1.09-1.67)	1.76 (1.30-2.17)	2.10 (1.49-2.66)
3-hr	0.247 (0.222-0.276)	0.305 (0.275-0.342)	0.381 (0.341-0.427)	0.453 (0.403-0.509)	0.568 (0.495-0.642)	0.674 (0.576-0.770)	0.802 (0.668-0.929)	0.952 (0.769-1.12)	1.20 (0.919-1.45)	1.42 (1.05-1.79)
6-hr	0.171 (0.156-0.187)	0.209 (0.191-0.230)	0.252 (0.230-0.278)	0.291 (0.263-0.322)	0.350 (0.313-0.390)	0.400 (0.352-0.448)	0.456 (0.395-0.518)	0.520 (0.440-0.598)	0.645 (0.529-0.758)	0.758 (0.605-0.912)
12-hr	0.111 (0.101-0.122)	0.135 (0.124-0.149)	0.164 (0.149-0.181)	0.188 (0.170-0.208)	0.226 (0.201-0.251)	0.256 (0.226-0.288)	0.289 (0.251-0.329)	0.325 (0.276-0.374)	0.379 (0.313-0.447)	0.424 (0.340-0.509)
24-hr	0.072 (0.066-0.079)	0.088 (0.080-0.097)	0.105 (0.096-0.116)	0.120 (0.109-0.132)	0.140 (0.127-0.154)	0.155 (0.140-0.171)	0.171 (0.154-0.188)	0.187 (0.168-0.206)	0.209 (0.186-0.231)	0.226 (0.200-0.258)
2-day	0.043 (0.039-0.047)	0.053 (0.048-0.058)	0.063 (0.058-0.070)	0.072 (0.065-0.079)	0.083 (0.076-0.092)	0.092 (0.083-0.102)	0.102 (0.092-0.112)	0.111 (0.099-0.122)	0.123 (0.110-0.136)	0.133 (0.117-0.147)
3-day	0.032 (0.029-0.035)	0.040 (0.036-0.043)	0.047 (0.043-0.052)	0.054 (0.049-0.059)	0.063 (0.057-0.069)	0.070 (0.063-0.077)	0.077 (0.069-0.085)	0.084 (0.075-0.093)	0.094 (0.084-0.104)	0.102 (0.090-0.113)
4-day	0.027 (0.024-0.029)	0.033 (0.030-0.036)	0.039 (0.036-0.043)	0.045 (0.041-0.049)	0.053 (0.048-0.058)	0.059 (0.053-0.064)	0.065 (0.058-0.071)	0.071 (0.064-0.078)	0.080 (0.071-0.088)	0.086 (0.076-0.096)
7-day	0.019 (0.017-0.021)	0.023 (0.021-0.026)	0.028 (0.025-0.031)	0.032 (0.029-0.035)	0.037 (0.033-0.041)	0.041 (0.037-0.046)	0.045 (0.041-0.050)	0.050 (0.044-0.055)	0.056 (0.049-0.062)	0.060 (0.053-0.067)
10-day	0.015 (0.014-0.017)	0.019 (0.017-0.021)	0.022 (0.020-0.025)	0.025 (0.023-0.028)	0.029 (0.026-0.032)	0.032 (0.029-0.035)	0.035 (0.031-0.039)	0.038 (0.034-0.042)	0.041 (0.037-0.046)	0.044 (0.039-0.049)
20-day	0.010 (0.009-0.011)	0.012 (0.011-0.014)	0.015 (0.013-0.016)	0.016 (0.015-0.018)	0.019 (0.017-0.020)	0.020 (0.018-0.022)	0.022 (0.020-0.024)	0.023 (0.021-0.026)	0.025 (0.023-0.028)	0.027 (0.024-0.030)
30-day	0.008 (0.008-0.009)	0.010 (0.009-0.011)	0.012 (0.011-0.013)	0.013 (0.012-0.015)	0.015 (0.014-0.017)	0.016 (0.015-0.018)	0.018 (0.016-0.019)	0.019 (0.017-0.021)	0.020 (0.018-0.022)	0.021 (0.019-0.024)
45-day	0.007 (0.006-0.008)	0.008 (0.008-0.009)	0.010 (0.009-0.011)	0.011 (0.010-0.012)	0.013 (0.011-0.014)	0.014 (0.012-0.015)	0.015 (0.013-0.016)	0.016 (0.014-0.017)	0.017 (0.015-0.019)	0.018 (0.016-0.020)
60-day	0.006 (0.006-0.007)	0.007 (0.007-0.008)	0.009 (0.008-0.010)	0.010 (0.009-0.011)	0.011 (0.010-0.012)	0.012 (0.011-0.013)	0.013 (0.012-0.014)	0.014 (0.012-0.015)	0.015 (0.013-0.016)	0.015 (0.014-0.017)

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

Project: Site Plan Rev 06/26/18, Old Blacksmith Shop (Horseshoe LLC) Project Design: K. Price Date: 28-Sep-18
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Total Area	1.24 acres		

Total Area Coefficient
 $C = (A_l \times C_l + A_r \times C_r + A_g \times C_g) / A = 0.70$

Allowable Runoff 0.00 cfs

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1440	0.86	0.17	86,400	12,774	0	12,774

Storage Required @ 24 Hrs 12,774 cu.ft.