

**STORM WATER RUNOFF  
&  
Detention Volume Calculations**

for

**Valley Junction  
Site Plan  
Rev. 08/20/15  
4795 E. 2600 N.  
Eden, UT**

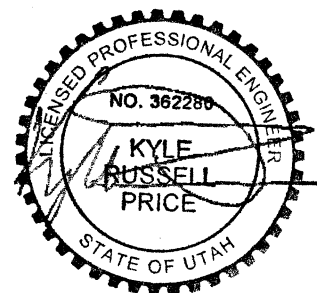
*Criteria & Conclusions*

**Return Period: 100 year  
Duration: 24 hr  
Total Required Storage: 2,185 cu. ft. Max @ 1 hr  
Orifice Size: 3" Dia. (Min)**

Date: 12/16/15



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DEC 16 2015

# Valley Junction Eden

Eden 100-Year Duration=60 min, Inten=2.02 in/hr

Prepared by Price Engineering, Inc.

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## Summary for Pond 2P: Detention Pond

Inflow Area = 0.865 ac, 0.00% Impervious, Inflow Depth = 1.02" for 100-Year event  
 Inflow = 0.88 cfs @ 0.00 hrs, Volume= 0.074 af  
 Outflow = 0.36 cfs @ 1.01 hrs, Volume= 0.074 af, Atten= 59%, Lag= 60.4 min  
 Primary = 0.36 cfs @ 1.01 hrs, Volume= 0.074 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
 Peak Elev= 96.49' @ 1.01 hrs Surf.Area= 1,497 sf Storage= 2,185 cf

Plug-Flow detention time=64.3 min calculated for 0.073 af (99% of inflow)  
 Center-of-Mass det. time=63.8 min ( 93.8 - 30.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	94.00'	3,953 cf	Custom Stage Data (Prismatic) listed below (Recalc)

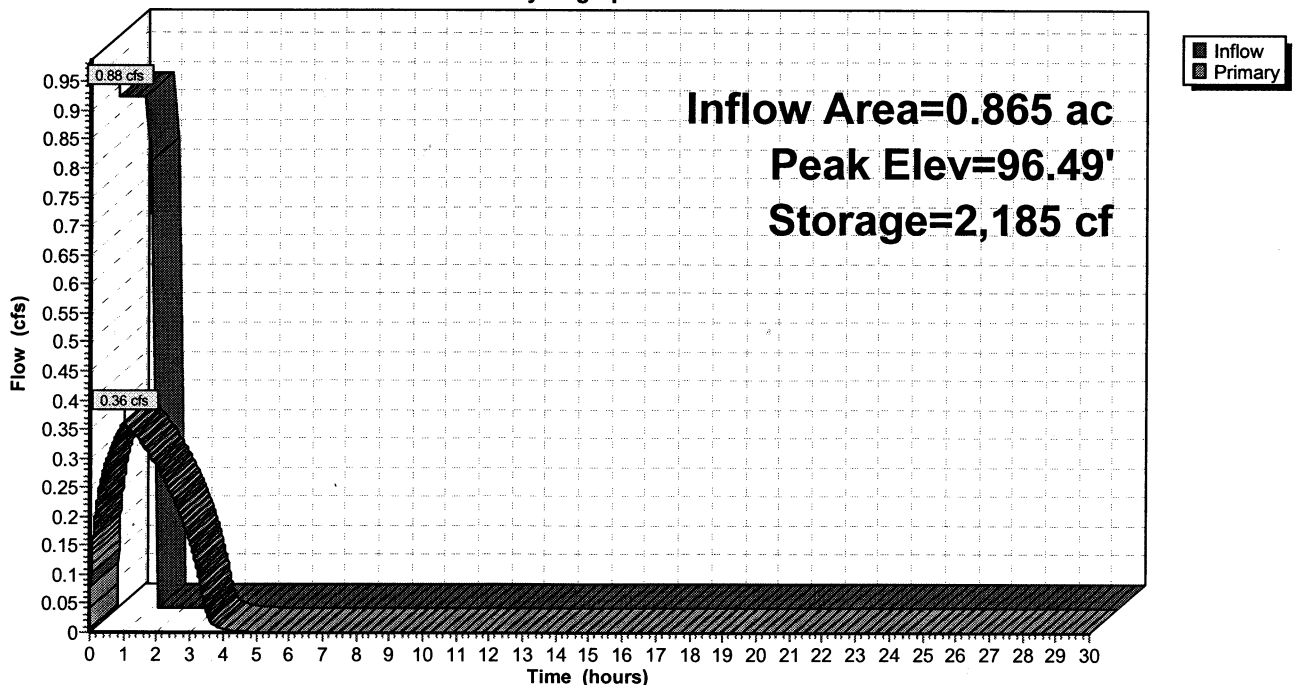
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
94.00	259	0	0
97.50	2,000	3,953	3,953

Device	Routing	Invert	Outlet Devices
#1	Primary	94.00'	3.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=0.36 cfs @ 1.01 hrs HW=96.49' (Free Discharge)  
 1=Orifice/Grate (Orifice Controls 0.36 cfs @ 7.40 fps)

## Pond 2P: Detention Pond

Hydrograph



**Project: Landmark Surveying Site Plan Valley Junction**

Design: K. Price  
Date: 12/16/15

Uniform Flow

Mannings Equation

**Single Pipe Segments**

**Pipe 1**

y= 0.8 ft.  
dia.= 1 ft.  
slope= 0.2 %  
n= 0.011  
L= 270 ft.

**Pipe Flow**

A= 0.67 ft.^2  
P= 2.21 ft.  
Rh= 0.30 ft.  
 $\beta$ = 2.21 rad.  
T= 0.80 ft.  
Velocity= 2.73 ft./sec.  
**Q (flow)= 1.84 cfs**

Fr= 0.52 Subcritical  
Segment is Outlet Controlled

**Pipe 1**

**Inlet Flow**

h= 2 ft.  
Cd= 0.6  
dia= 1 ft.  
**Q (flow)= 5.35 cfs**



**NOAA Atlas 14, Volume 1, Version 5**  
**Location name: Eden, Utah, US\***  
**Latitude: 41.3050°, Longitude: -111.8270°**  
**Elevation: 4963 ft\***  
 \* source: Google Maps



**POINT PRECIPITATION FREQUENCY ESTIMATES**

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**PF tabular**

<b>PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)<sup>1</sup></b>										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	1.90 (1.67-2.18)	2.40 (2.12-2.77)	3.25 (2.86-3.73)	4.03 (3.50-4.63)	5.26 (4.46-6.08)	6.37 (5.28-7.46)	7.69 (6.18-9.12)	9.28 (7.18-11.2)	11.8 (8.64-14.8)	14.3 (9.90-18.3)
10-min	1.45 (1.27-1.66)	1.82 (1.62-2.11)	2.47 (2.17-2.84)	3.07 (2.66-3.53)	4.00 (3.40-4.63)	4.85 (4.01-5.68)	5.86 (4.70-6.94)	7.06 (5.46-8.53)	9.01 (6.58-11.2)	10.8 (7.54-13.9)
15-min	1.19 (1.04-1.37)	1.51 (1.34-1.74)	2.04 (1.80-2.35)	2.53 (2.20-2.91)	3.30 (2.81-3.83)	4.01 (3.32-4.69)	4.84 (3.89-5.74)	5.83 (4.51-7.05)	7.44 (5.43-9.29)	8.96 (6.22-11.5)
30-min	0.804 (0.704-0.924)	1.02 (0.900-1.17)	1.38 (1.21-1.58)	1.71 (1.48-1.96)	2.22 (1.89-2.58)	2.70 (2.23-3.16)	3.26 (2.62-3.86)	3.93 (3.04-4.75)	5.01 (3.66-6.25)	6.04 (4.19-7.73)
60-min	0.497 (0.435-0.572)	0.629 (0.557-0.726)	0.852 (0.748-0.980)	1.05 (0.918-1.21)	1.38 (1.17-1.59)	1.67 (1.38-1.96)	2.02 (1.62-2.39)	2.43 (1.88-2.94)	3.10 (2.26-3.87)	3.73 (2.59-4.79)
2-hr	0.326 (0.290-0.370)	0.409 (0.364-0.464)	0.528 (0.467-0.598)	0.638 (0.560-0.726)	0.819 (0.704-0.940)	0.984 (0.826-1.14)	1.18 (0.960-1.38)	1.41 (1.11-1.69)	1.78 (1.32-2.20)	2.13 (1.51-2.70)
3-hr	0.250 (0.226-0.280)	0.310 (0.280-0.347)	0.387 (0.346-0.433)	0.460 (0.408-0.515)	0.575 (0.502-0.650)	0.683 (0.584-0.780)	0.813 (0.677-0.941)	0.964 (0.779-1.14)	1.21 (0.931-1.47)	1.44 (1.06-1.81)
6-hr	0.173 (0.159-0.190)	0.212 (0.194-0.234)	0.256 (0.233-0.282)	0.296 (0.267-0.327)	0.356 (0.317-0.396)	0.406 (0.357-0.455)	0.463 (0.401-0.525)	0.527 (0.447-0.606)	0.654 (0.536-0.768)	0.769 (0.613-0.924)
12-hr	0.113 (0.103-0.124)	0.138 (0.126-0.152)	0.166 (0.151-0.183)	0.191 (0.173-0.212)	0.229 (0.205-0.255)	0.260 (0.229-0.292)	0.294 (0.254-0.334)	0.330 (0.280-0.380)	0.385 (0.317-0.453)	0.430 (0.345-0.516)
24-hr	0.073 (0.067-0.081)	0.090 (0.082-0.099)	0.107 (0.098-0.118)	0.122 (0.111-0.134)	0.142 (0.129-0.157)	0.158 (0.143-0.174)	0.174 (0.157-0.192)	0.191 (0.171-0.210)	0.213 (0.189-0.235)	0.230 (0.203-0.262)
2-day	0.044 (0.040-0.049)	0.054 (0.049-0.060)	0.064 (0.059-0.071)	0.073 (0.066-0.081)	0.085 (0.077-0.094)	0.094 (0.085-0.104)	0.104 (0.093-0.115)	0.113 (0.101-0.126)	0.126 (0.112-0.140)	0.136 (0.119-0.151)
3-day	0.033 (0.030-0.036)	0.040 (0.037-0.045)	0.048 (0.044-0.053)	0.055 (0.050-0.061)	0.064 (0.058-0.071)	0.072 (0.064-0.079)	0.079 (0.071-0.087)	0.087 (0.077-0.096)	0.097 (0.085-0.107)	0.105 (0.092-0.116)
4-day	0.027 (0.025-0.030)	0.034 (0.031-0.037)	0.040 (0.037-0.044)	0.046 (0.042-0.051)	0.054 (0.049-0.059)	0.060 (0.054-0.066)	0.067 (0.060-0.073)	0.073 (0.065-0.081)	0.082 (0.072-0.091)	0.089 (0.078-0.099)
7-day	0.019 (0.018-0.022)	0.024 (0.022-0.026)	0.029 (0.026-0.032)	0.033 (0.029-0.036)	0.038 (0.034-0.042)	0.042 (0.038-0.047)	0.047 (0.042-0.052)	0.051 (0.045-0.057)	0.057 (0.050-0.064)	0.062 (0.054-0.070)
10-day	0.016 (0.014-0.017)	0.019 (0.017-0.021)	0.023 (0.021-0.025)	0.026 (0.023-0.029)	0.030 (0.027-0.033)	0.033 (0.030-0.036)	0.036 (0.032-0.040)	0.039 (0.035-0.043)	0.043 (0.038-0.048)	0.046 (0.040-0.051)
20-day	0.010 (0.009-0.011)	0.013 (0.012-0.014)	0.015 (0.014-0.017)	0.017 (0.015-0.018)	0.019 (0.017-0.021)	0.021 (0.019-0.023)	0.022 (0.020-0.025)	0.024 (0.022-0.026)	0.026 (0.023-0.029)	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)	0.014 (0.012-0.015)	0.015 (0.014-0.017)	0.017 (0.015-0.018)	0.018 (0.016-0.020)	0.019 (0.017-0.021)	0.021 (0.019-0.023)	0.022 (0.020-0.024)
45-day	0.007 (0.006-0.008)	0.009 (0.008-0.009)	0.010 (0.009-0.011)	0.011 (0.010-0.012)	0.013 (0.012-0.014)	0.014 (0.013-0.015)	0.015 (0.014-0.017)	0.016 (0.015-0.018)	0.018 (0.016-0.019)	0.018 (0.017-0.020)
60-day	0.006 (0.006-0.007)	0.008 (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 (0.013-0.015)	0.015 (0.014-0.017)	0.016 (0.014-0.017)

<sup>1</sup> 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**