Submitted 9/4/14

Reeve & Associates, Inc.

August 29, 2014

Project: ***Nordic Valley***
Re: ***Stream Crossing w/ Culvert Design***

Reeve and Associates has been contracted by Skyline Mountain Base LLC to provide culvert designs for two stream crossings associated with the Nordic Valley Mountain Improvements. The Rational Method was used for both streams to determine an estimated flow being conveyed by each stream. The equation used was the following:

$$Q = CIA$$

Where,
C = Runoff Coefficient
I = Rainfall Intensity (inches/hour)
A = Contributory Area (acres)

The calculation for each stream are found in the table below.

Stream	Runoff Coefficient	Rainfall Intensity	Contributory Area	Runoff	Culvert Size
Pine Creek	0.2	2.2*	320	141	36" RCP
Raspberry Creek	0.2	2.2*	57	25	24" RCP

*Rainfall Intensity obtained from NOAA Atlas 14 for the Eden, UT Area assuming a 100-year, 1 hr. storm event.

If you have any questions, or we can be of further assistance, please let us know.

Sincerely,
REEVE & ASSOCIATES, INC.

Nate Reeve, P.E.
Principal Engineer
nreeve@reeve-assoc.com

PINE CREEK

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.03900	ft/ft
Diameter	3.00	ft
Discharge	141.00	ft^3/s

Results

Normal Depth	2.73	ft
Flow Area	6.76	ft^2
Wetted Perimeter	7.61	ft
Hydraulic Radius	0.89	ft
Top Width	1.71	ft
Critical Depth	2.97	ft
Percent Full	91.1	%
Critical Slope	0.04131	ft/ft
Velocity	20.86	ft/s
Velocity Head	6.76	ft
Specific Energy	9.50	ft
Froude Number	1.85	
Maximum Discharge	141.68	ft^3/s
Discharge Full	131.71	ft^3/s
Slope Full	0.04469	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	91.11	%
Downstream Velocity	Infinity	ft/s

PINE CREEK

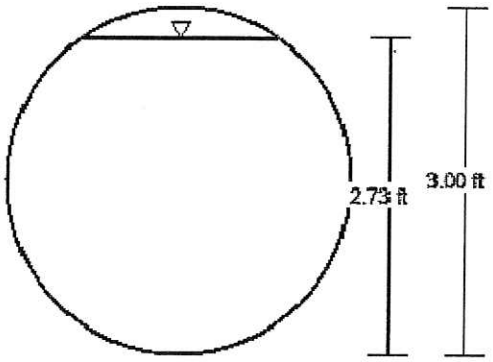
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.03900	ft/ft
Normal Depth	2.73	ft
Diameter	3.00	ft
Discharge	141.00	ft³/s

Cross Section Image



V: 1
H: 1

RASPBERRY CREEK

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01100	ft/ft
Diameter	2.00	ft
Discharge	25.00	ft^3/s

Results

Normal Depth	1.76	ft
Flow Area	2.93	ft^2
Wetted Perimeter	4.86	ft
Hydraulic Radius	0.60	ft
Top Width	1.30	ft
Critical Depth	1.76	ft
Percent Full	87.9	%
Critical Slope	0.01098	ft/ft
Velocity	8.54	ft/s
Velocity Head	1.13	ft
Specific Energy	2.89	ft
Froude Number	1.01	
Maximum Discharge	25.52	ft^3/s
Discharge Full	23.73	ft^3/s
Slope Full	0.01221	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	87.92	%
Downstream Velocity	Infinity	ft/s

RASPBERRY CREEK

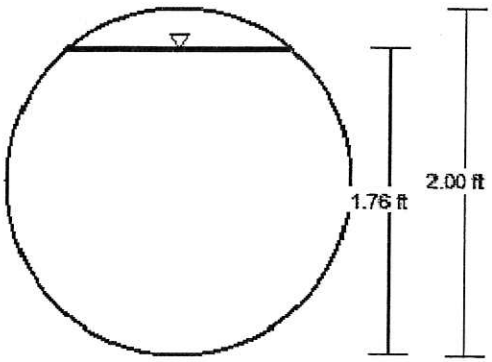
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01100	ft/ft
Normal Depth	1.76	ft
Diameter	2.00	ft
Discharge	25.00	ft^3/s

Cross Section Image



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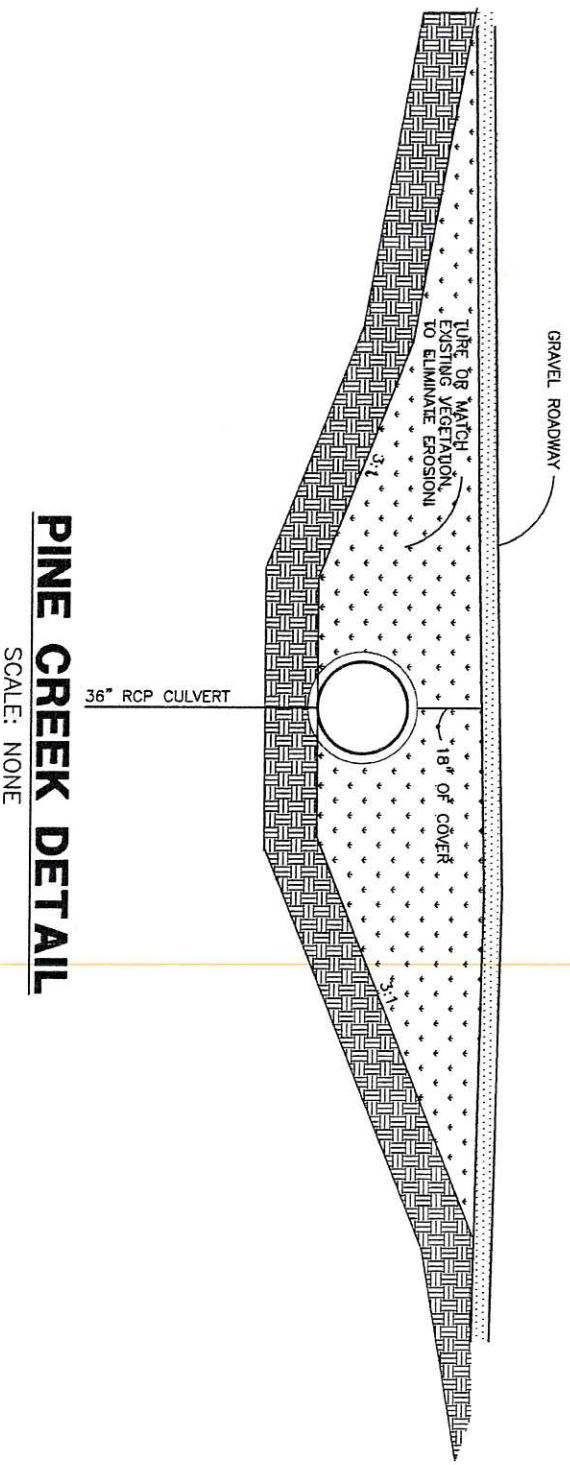

PINE CREEK DETAIL

SCALE: NONE

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Nordic Valley Crossing

EDEN CITY, WEBER COUNTY, UTAH

Date: 8-29-14	Project Number: 6401-01
Engineer: N.REEVE	Drafter: S.TAGGART

Reeve & Associates, Inc.
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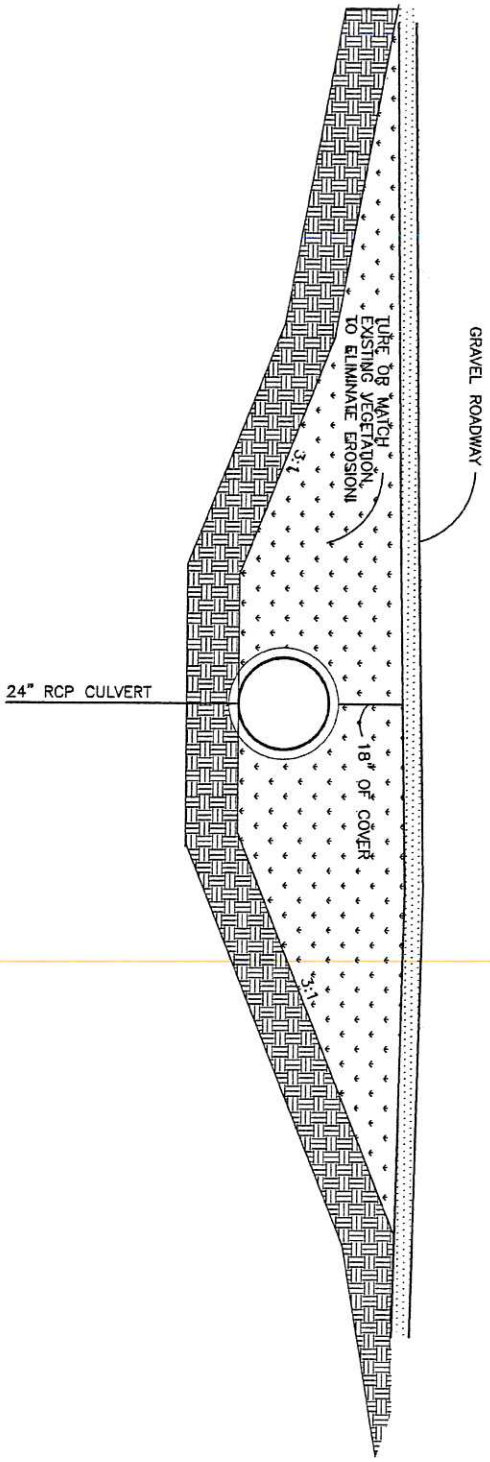
RASPBERRY CREEK DETAIL

SCALE: NONE



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