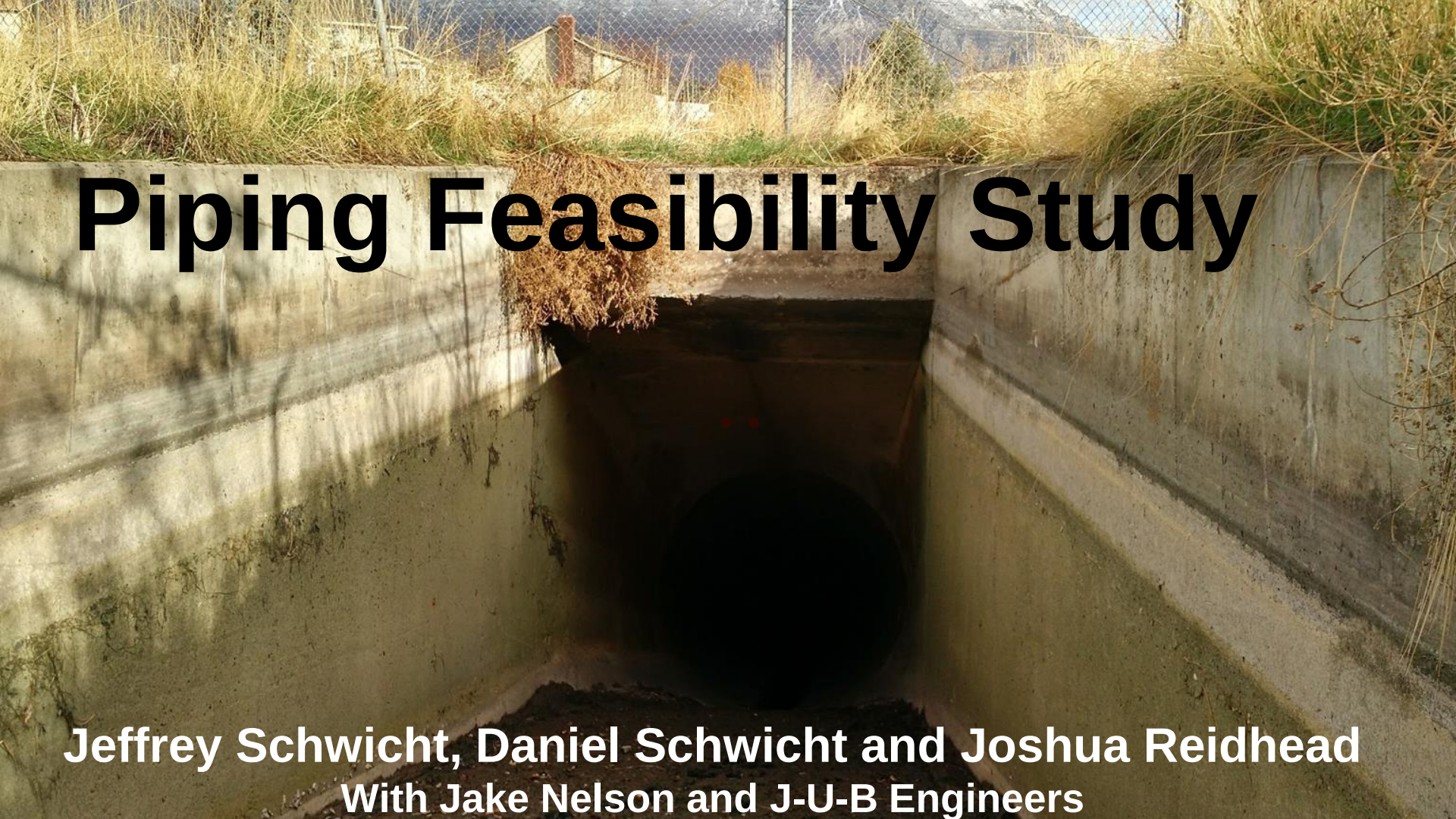
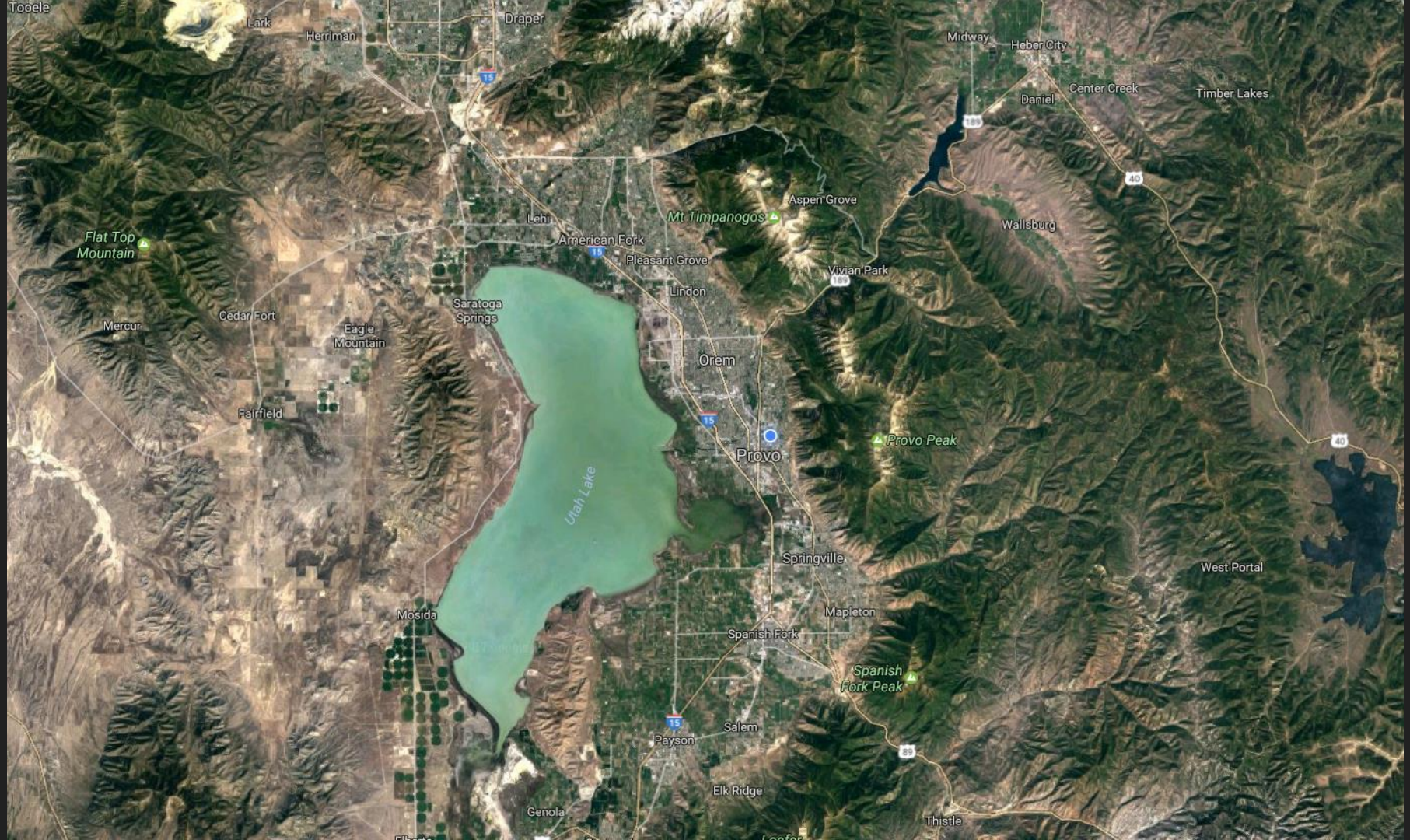
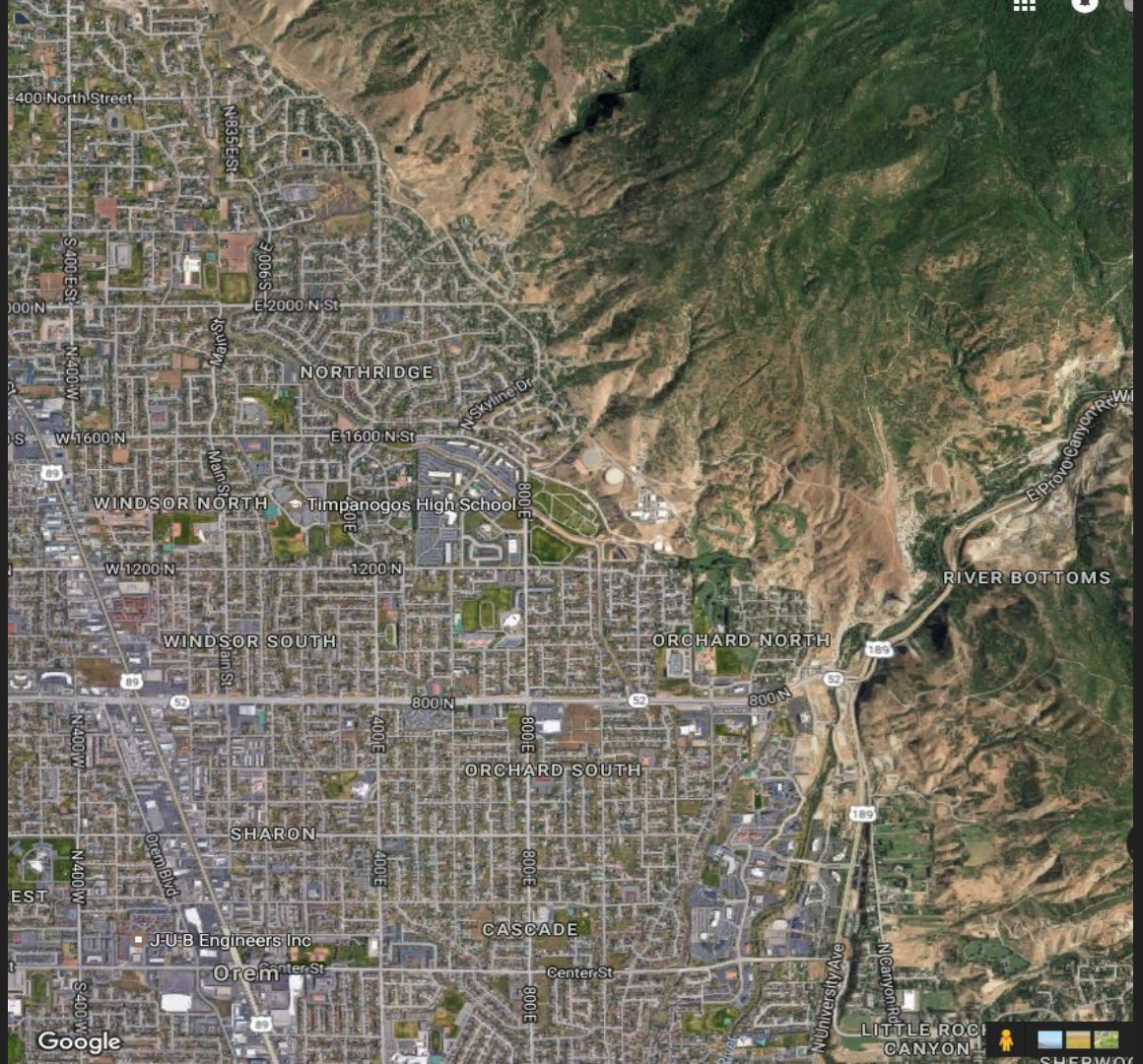
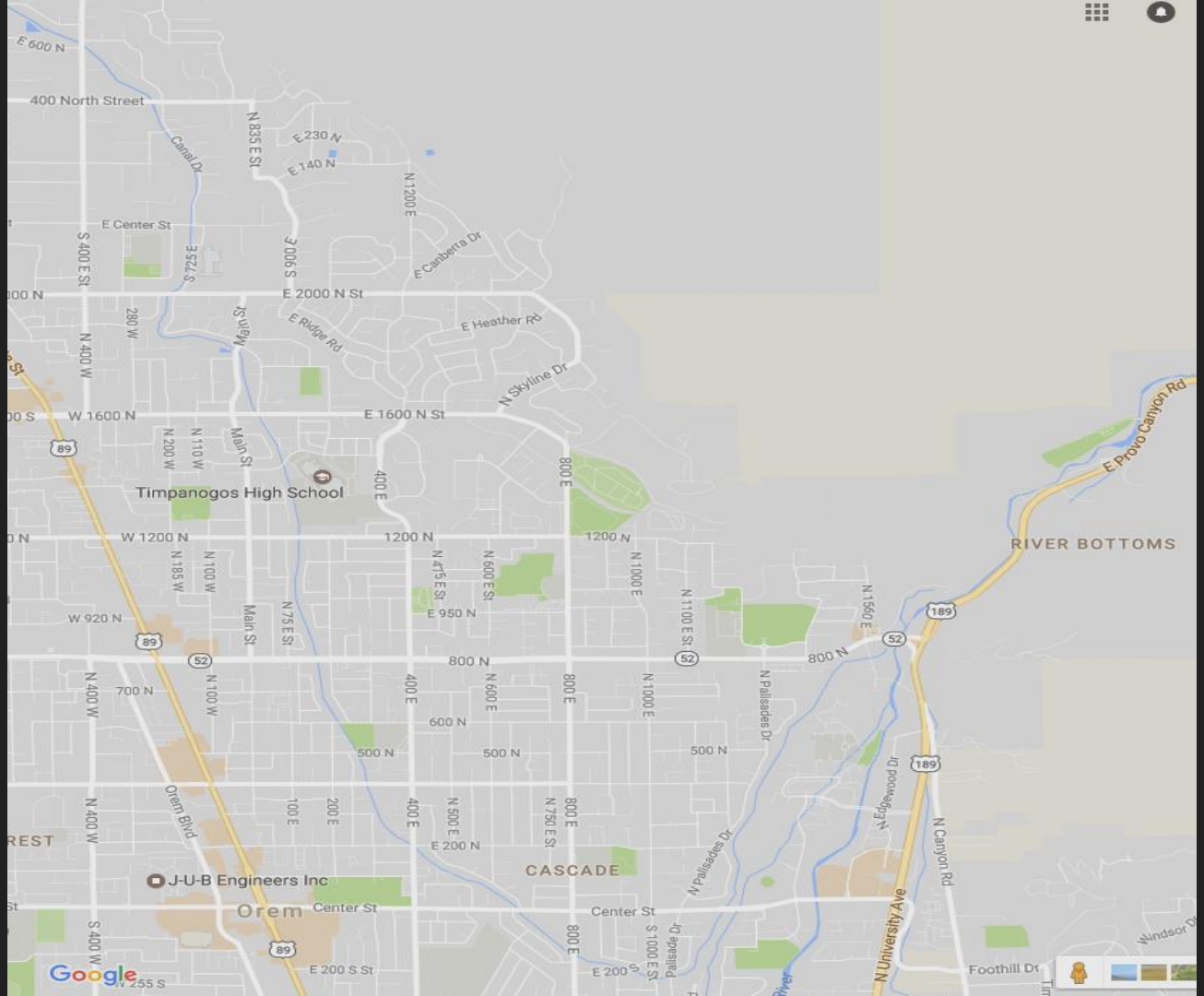


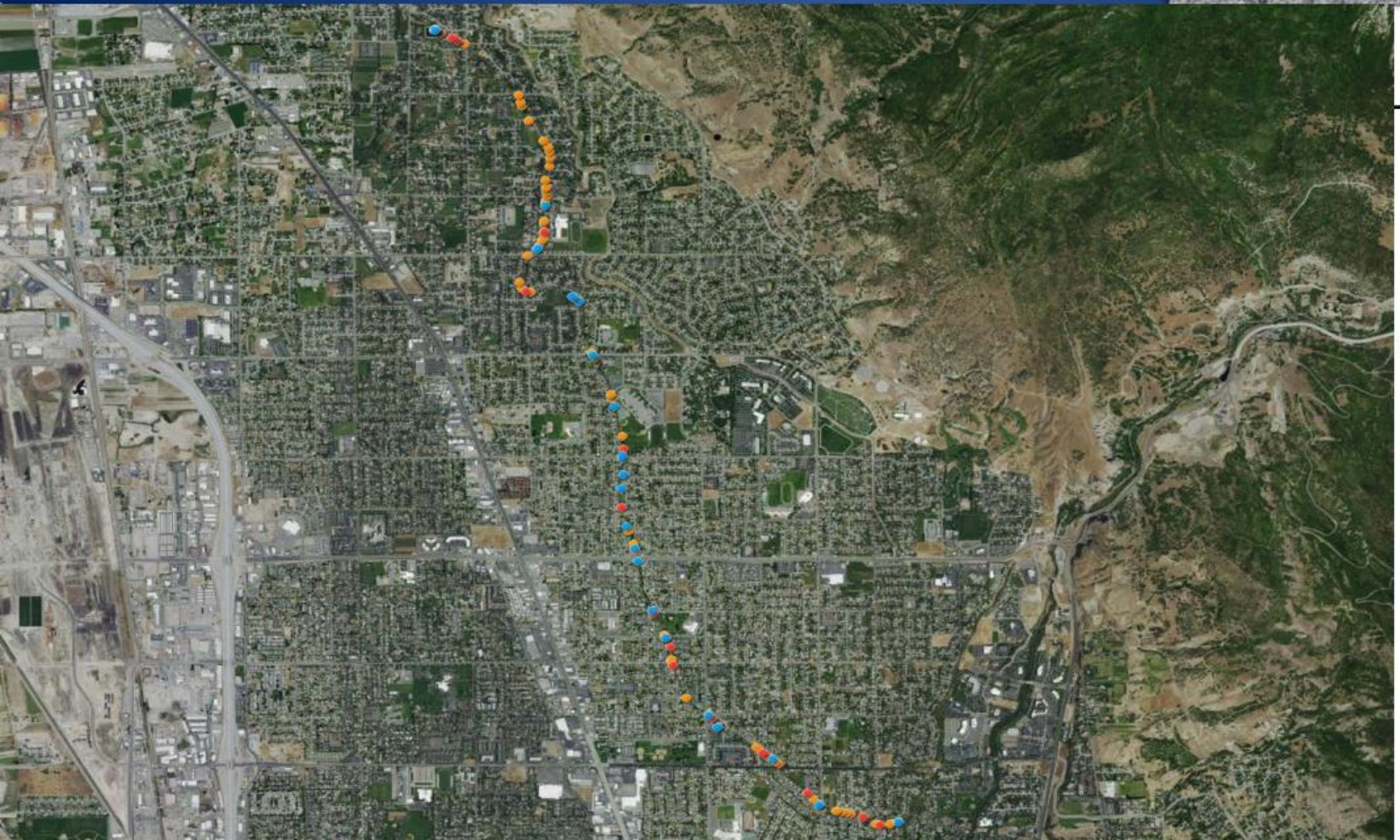
Piping Feasibility Study

Jeffrey Schwicht, Daniel Schwicht and Joshua Reidhead
With Jake Nelson and J-U-B Engineers


Tooele
Lark
Herriman
Draper
Midway
Heber City
Center Creek
Daniel
Timber Lakes
Aspen Grove
Mt Timpanogos
Lehi
American Fork
Pleasant Grove
Vivian Park
Wallsburg
Flat Top Mountain
Lindon
Saratoga Springs
Cedar Fort
Mercur
Eagle Mountain
Orem
Fairfield
Provo
Provo Peak
Utah Lake
Springville
West Portal
Mosida
Mapleton
Spanish Fork
Spanish Fork Peak
Salem
Payson
Elk Ridge
Genola
Thistle


400 North Street
N 835 E St
S 400 E St
S 900 E
E 2000 N St
N 400 W
Main St
NORTHRIDGE
N Skyline Dr
W 1600 N
E 1600 N St
Provo Canyon
WINDSOR NORTH
Timpanogos High School
1000 E
800 E
W 1200 N
1200 N
RIVER BOTTOMS
WINDSOR SOUTH
ORCHARD NORTH
800 N
400 E
ORCHARD SOUTH
SHARON
Orem Blvd
CASCADE
J-U-B Engineers Inc
Orem
Center St
N University Ave
N Canyon Rd
LITTLE ROCK CANYON
Google


E 600 N
400 North Street
N 835 E St
E 230 N
E 140 N
N 1200 E
Canal Dr
E Center St
S 400 E St
S 725 E
S 900 E
E Canberra Dr
E 2000 N St
E Heather Rd
E Ridge Rd
Main St
N Skyline Dr
W 1600 N
E 1600 N St
N 400 W
280 W
N 200 W
N 110 W
Timpanogos High School
400 E
800 E
E Provo Canyon Rd
W 1200 N
1200 N
N 185 W
N 100 W
N 475 E St
N 600 E St
N 1000 E
N 1100 E St
N 1560 E
RIVER BOTTOMS
W 920 N
E 950 N
N 75 E St
800 N
700 N
600 N
500 N
N 400 W
N 600 E
N Palisades Dr
N Edgewood Dr
N Canyon Rd
Orem Blvd
100 E
200 E
N 500 E
N 750 E St
E 200 N
CASCADE
J-U-B Engineers Inc
Orem
Center St
S 400 W
S 1000 E St
Palisade Dr
N University Ave
Foothill Dr
E 200 S St
E 255 S
Google
89
52
189



Data points along the canal are color coded according to type of data mapped.

Table 2. Flowrate measurements, July 14, 2016 (Q – Cubic feet per second, width and area in feet and square feet)

Location	Total Q	Top Q	Meas. Q	Bottom Q	Left Q	Right Q	Width	Total Area	Q/ Area
Palisades	15.72	8.43	2.78	3.81	0.32	0.37	12.60	9.91	1.59
800 N (Orem)	10.54	5.34	2.25	2.50	0.29	0.15	9.90	8.26	1.28
203 S (Lindon)	9.69	4.60	2.10	2.33	0.33	0.33	6.26	4.84	2.01
Center - Canal Dr (Lindon)	9.58	3.34	3.49	2.25	0.25	0.26	5.75	6.10	1.57
200 N - Canal Dr (Lindon)	8.84	3.43	2.91	2.19	0.15	0.15	5.17	4.69	1.89
400 E (Lindon)	8.68	3.05	3.44	2.19	0.00	0.00	5.00	4.93	1.76
Above Pond 400 E (Lindon)	6.67	2.90	2.07	1.70	0.00	0.00	4.56	3.40	1.96
Downstream of Pond	1.20								

From Palisades to the Lindon Pond, Approx 18 Acre feet of water lost July 14

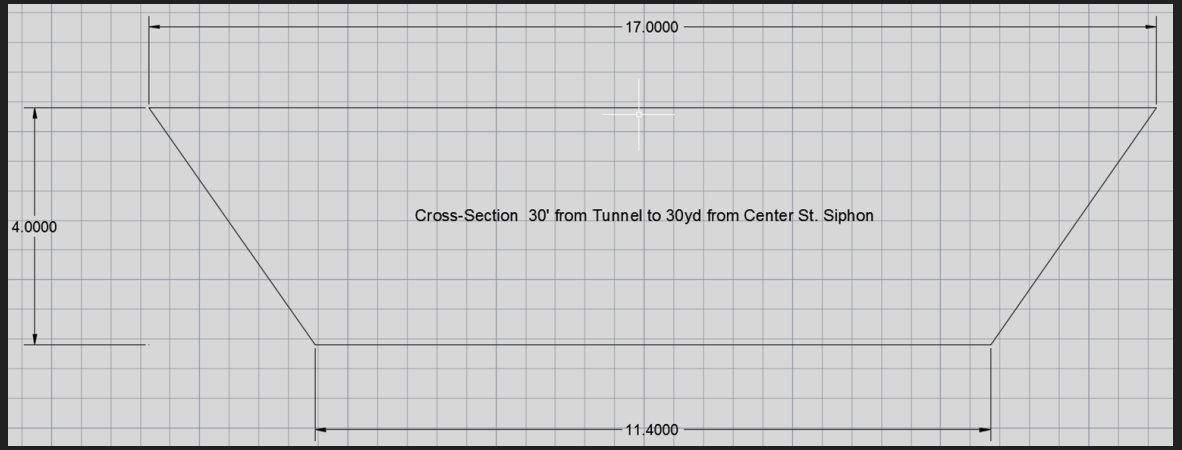
Alternatives...

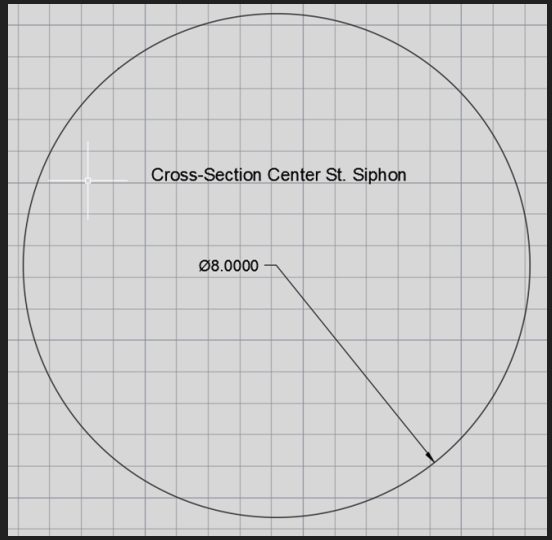
Method of Transport	Cross Section Area (ft^2)	Cost for Canal Demolition ($)	Cost of Change ($/ft)	Cost for Canal Replacement ($/ft)	Cost for Total (3.7 mile) Canal Replacement ($/ft)
Repair Canal	40.6	~70	~80	$150.00	$2,930,400.00
3-24" Round Pipe	9.42	~70	120	$160.00	$3,125,760.00
4'x8' Box Culvert	32	~70	120	$149.00	$2,910,864.00

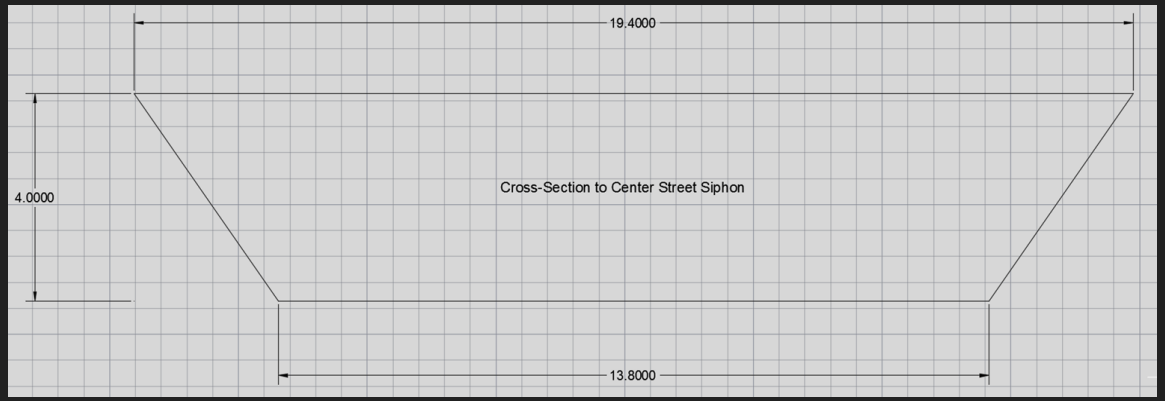
Estimated Losses...

Method of Transport	Greatest Wetted Perimeter (in)	Max ASTM Seepage (gal/in-mile-day)	Max Seepage Loss (gal)	Max Seepage Loss (cft)	Percent Loss assuming 52 cfs	
Repaired Canal	248.82	200	184,127	24,614	0.55	%
3-24" Round Pipe	226.19	200	167,384	22,376	0.50	%
4'x8' Box Culvert	384	200	284,160	37,987	0.85	%

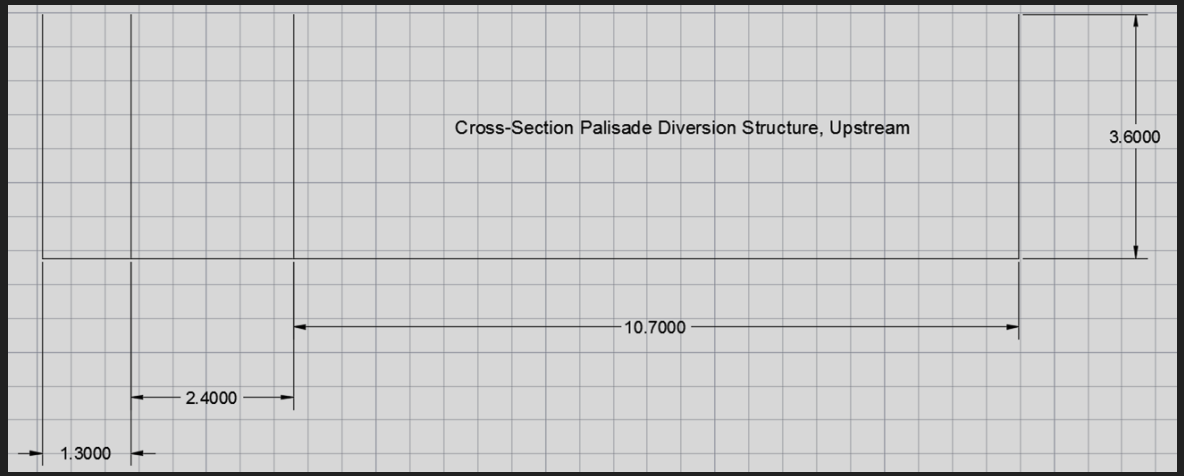
Existing Cross Sections I



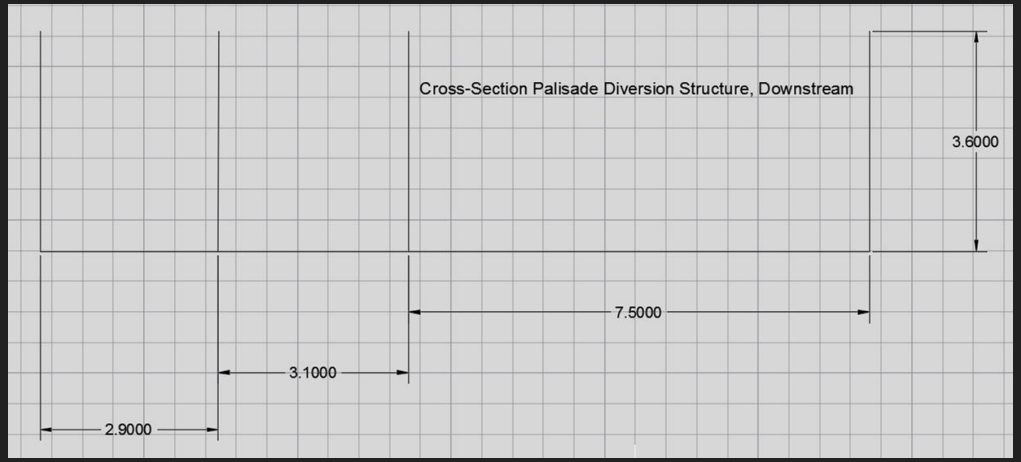


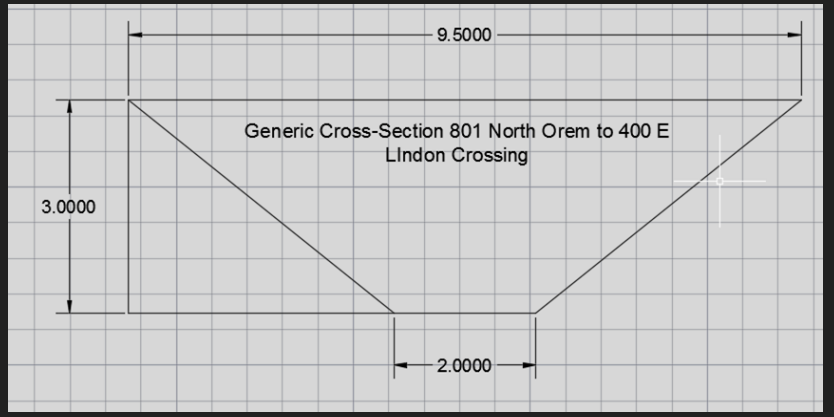


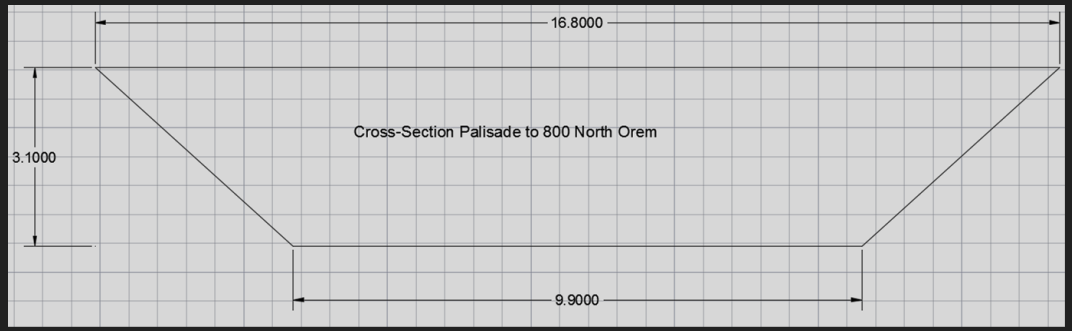
Existing Cross Sections II



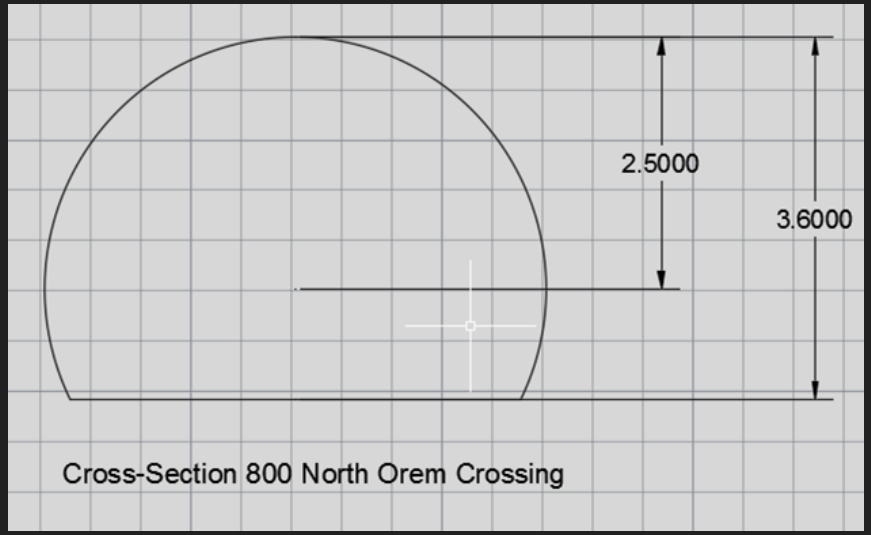
Existing Cross Sections III

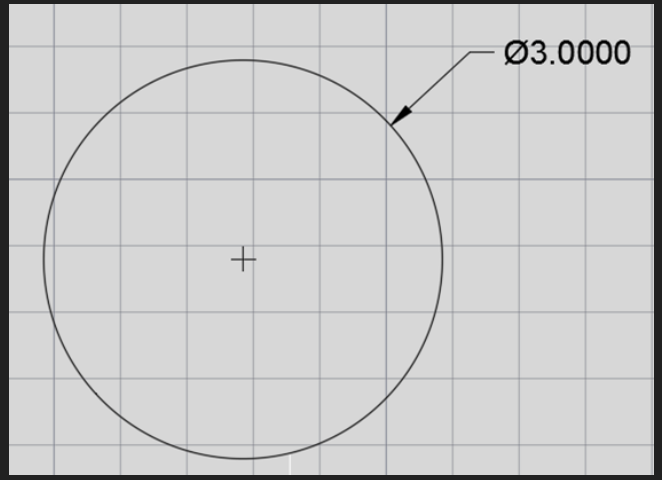






Existing Cross Sections IV





Possible Cross Sections