

Pioneer Special Service District

Pressure Irrigation Feasibility Study June 2009



J-U-B Engineers, Inc.
466 North 900 West
Kaysville, Utah 84037
Phone: (801) 547-0393
Fax (801) 547-0394



Engineers • Surveyors • Planners



J-U-B ENGINEERS, Inc.
ENGINEERS • SURVEYORS • PLANNERS

466 North 900 West
Kaysville, Utah 84037

801-547-0393
Fax: 801-547-0397
www.jub.com

Pressure Irrigation Report

The Pioneer Special Service District, created by Marriott-Slaterville City has contracted with JUB Engineers to perform a pressurized secondary irrigation study. Mulligan's/ Toad's golf course has offered the sale of a Conservation Easement providing for the use of their ponds as a storage facility for the irrigation system. The scope of this study includes the following:

1. Map the service area of the golf course ponds
2. GPS survey
3. Investigate canal source options
4. Conduct pipe hydraulic analysis
5. Compile capital facilities plan

Service Area Map

A map of the service area was created using GIS. This service area included the areas that would be served by the pressurized irrigation system. The areas that were inundated during the 100 year flood event were excluded from the model. This map shows the roads, canals, an aerial, and the service area. This map is shown in Fig. 1.

GPS Survey

A GPS survey of the area was performed to assist in determining the best option for supplying water to the golf course reservoir. There were four possible alignments that were surveyed.

Irrigation Source Options

The GPS survey provided the elevation data needed to determine if any of the irrigation ditch options would allow the water to be supplied to the golf course reservoir by gravity flow. There are several irrigation companies capable of servicing the service area. They include:

- 1- Smout-Holley;
- 2- Perry;

3- North Slaterville (in part); and

4- Richardson-Cowen.

Some components of the plan have several options that may be determined by the City as development progresses.

This survey data, however, determined a few options for providing water from the east end of the service area, to be supplied by gravity. One option (Source Option 1) would divert water from the Perry Canal and discharge into the Smout-Holley Ditch just upstream of the Four-Mile creek diversion. The Smout-Holley Ditch would be used to transport the water to the golf course reservoir. This option is shown in Fig. 2.

The Business Depot Ogden (BDO) has offered to contribute money to the project if the Perry Ditch could be rerouted so it didn't run through their property. Two more source options were identified by rerouting the Perry ditch through Mill Creek to 1200 W. The second source option (Source Option 2) would be to build a small cistern near Mill Creek and 1200 W and pressurize the Perry Ditch along 1200 W with turn outs at the current turnout locations. This pressurized line would also discharge into the Smout-Holley Ditch which would then supply water to the reservoir at the golf course. This option is also shown in Fig 2.

The third source option (Source Option 3) would also involve rerouting the Perry Ditch through Mill Creek to 1200 W. A storage reservoir and pump house would be built and supply pressure directly into the distribution system. This would create an additional pressure source to the system. This option 3, is shown in Fig. 3.

A fourth source option (Source Option 4) includes the pipe of the Perry ditch in option 1, but also includes a pump at Mill creek to lift the water and allow it to gravity flow in the exiting Perry Ditch to Smout-Holley. The major advantage of this option is that it would allow the BDO to abandon the ditches through their property and keep everything on the outer fringe of the Depot. The BDO has mentioned that they would be willing to participate with this option. This would also allow for gravity turn outs off the ditch until all parcels are converted to pressurized flow.

Pipe Hydraulic Analysis

The pipe hydraulic analysis for this project was conducted in MWHsoft's product called InfoWATER. The District and City have outlined the service area for the project as well as the build out density which was 1 lot/acre. The system demands were calculated using 11.4 gpm/acre. It was also assumed that 50% of an acre would be irrigated. The Peak Instantaneous flow was used to size the pipes with the velocity in the transmission lines being limited to 6 ft/s.

The standards used for the Pioneer Special Service District specify 4 ft/s as the maximum velocity. The velocity specified in the city's standards are used for smaller intermittent designs, where as this model is looking at the build-out scenario. The maximum velocity

used in the study is within the design standards of pipe manufacturers. We agree that smaller, localized sites should maintain the 4 ft/s standard.

A pump house will need to be constructed near a source of water. Several locations were evaluated. One, being at the golf course using water from the ponds supplied by the Smout-Holley Ditch. A second, at Mill Creek being supplied by the Perry Ditch (Transferred to this point). A third at the Central Weber Sewer Improvement Districts treatment plant which may have the potential of supplying reuse water into the system. For this reason a 24" pipe was used to connect the treatment plant and the supply line at the golf course reservoir and to Mill Creek.

Another pump option has been discussed above is to pump or "lift" from Mill Creek into a ditch that would gravity flow to the Smout-Holley Ditch (Source Option 4). This would need a small cistern, but would allow for the point of diversion on the BDO to be relocated, satisfying one of the BDO concerns with the ditches.

Two separate distribution systems were analyzed. The first distribution system is shown in Fig. 2 and only has one source which is located at the golf course reservoir. The second system is shown in Fig. 3 and shows an added source at Mill Creek and 1200W. The transmission line is upsized to a 24" from the source at Mill Creek to the source at the golf course.

Capital Facilities Plan

This study including the maps and cost estimates will serve as the Capital Facilities Plan for the pressure irrigation system for the Pioneer Special Service District. It will be used for the process of funding and applications to the State and Federal boards. Opinions of Probable Cost are included in Appendix A. The figures indicate the locations and sizes of the waterlines used for the estimates.

Conclusions/Results

Four source options and two distribution options were identified for the Pioneer Special Service District pressurized irrigation system. An opinion of their costs is summarized in Appendix A. These include:

Distribution Option 1; Source 1 (Figure 2)

- Reservoir at Mulligan's Golf Course
- Gravity supply line from the north extent of the Perry Ditch to the Smout-Holley Ditch within the BDO

Distribution Option 1; Source 2 (Figure 2)

- Reservoir at Mulligan's Golf Course

- Reroute Perry Ditch through Mill Creek; Pump from Mill Creek to Smout-Holley Ditch

Distribution Option 2; Source 3 (Figure 3)

- Reservoir at Mulligan's Golf Course
- Reroute Perry Ditch through Mill Creek; Pump from Mill Creek directly into system with turnouts for Perry Ditch
- Upsize pipe along 1200 W and 400 N to 24"

Distribution Option 2; Source 4 (no figure)

- Reservoir at Mulligan's Golf Course
- Reroute Perry Ditch through Mill Creek; "Lift" from Mill Creek directly into system with gravity turnouts for Perry Ditch
- Gravity supply line from the north extent of the Perry Ditch to the Smout-Holley Ditch within the BDO
- No upsizing of 1200 W would be required

The cost summary for these options is included in Appendix A. There are several factors to include with each cost estimate. The later three options include the rerouting of the Perry Ditch which will involve BDO including some financing as they would like the ditch relocated to maximize developable land.

There is a project underway to rebuild 400 N which will go to construction this summer (2009). Installing the transmission line during the re-construction of the road would save on the cost of construction, eliminating the repair costs of the road.

It is important to note that this study did not include any water right analysis, property appraisals, volume surveys of the existing golf course ponds, evaluation of the Smout-Holley Ditch to handle additional flows, or cost estimates for environmental and geotechnical reports. At some point in the process for grant application or construction, any or all of these items may be required.

It will be important before choosing an option from this study to check the capacity of the Smout-Holley ditch as well as the current flows in the Perry Ditch to ensure the viability of the proposed options. A flow of 5 cfs in the Perry Ditch was assumed for this study.

Appendix B includes the pipe sizes and demands assumed for the nodes in the analysis.

APPENDIX A
OPINIONS OF PROBABLE COST

Pioneer Special Service District

Project Summary: Distribution Option 1 and Source Option 1

OPINION OF PROBABLE COSTS

Project Number	Description	Location	Total Price
S-1	Source Perry Canal Div	Perry Canal & 1200 W	\$ 388,000.00
P-1	Golf Course Pump Station	Mulligan's Golf Course	\$ 538,000.00
D-1a	Distribution System	Loop 400N, 1200W, Freeway, 200S	\$ 1,015,000.00
D-2	Distribution System	Inner Looping 400N, 1200W, Freeway, 200S	\$ 406,700.00
D-3	Distribution System	Loop 400N, 1200W, Freeway, 1000N	\$ 523,600.00
D-4	Distribution System	Transmission to Central Weber Sewer	\$ 1,344,100.00
D-5	Distribution System	Transmission West of Central Weber Sewer	\$ 312,400.00
D-6	Distribution System	Transmission 300W to 3650W	\$ 317,000.00
D-7	Distribution System	Transmission 3650W to West	\$ 311,000.00
D-8	Distribution System	Distribution 2800 W to existing homes	\$ 214,400.00
Total Construction Costs			\$ 5,155,800.00

Project Summary: Distribution Option 1 and Source Option 2

OPINION OF PROBABLE COSTS

Project Number	Description	Location	Total Price
S-2	Mill Creek Pump House	Mill Creek & 1200 W	\$ 1,326,000.00
P-1	Golf Course Pump Station	Mulligan's Golf Course	\$ 538,000.00
D-1a	Distribution System	Loop 400N, 1200W, Freeway, 200S	\$ 1,015,000.00
D-2	Distribution System	Inner Looping 400N, 1200W, Freeway, 200S	\$ 406,700.00
D-3	Distribution System	Loop 400N, 1200W, Freeway, 1000N	\$ 523,600.00
D-4	Distribution System	Transmission to Central Weber Sewer	\$ 1,344,100.00
D-5	Distribution System	Transmission West of Central Weber Sewer	\$ 312,400.00
D-6	Distribution System	Transmission 300W to 3650W	\$ 317,000.00
D-7	Distribution System	Transmission 3650W to West	\$ 311,000.00
D-8	Distribution System	Distribution 2800 W to existing homes	\$ 214,400.00
Total Construction Costs			\$ 6,093,800.00

Project Summary: Distribution Option 2 and Source Option 3

OPINION OF PROBABLE COSTS

Project Number	Description	Location	Total Price
S-3	Mill Creek Pump House	Mill Creek & 1200 W	\$ 1,264,000.00
P-1	Golf Course Pump Station	Mulligan's Golf Course	\$ 538,000.00
D-1b	Distribution System	Loop 400N, 1200W, Freeway, 200S	\$ 1,695,000.00
D-2	Distribution System	Inner Looping 400N, 1200W, Freeway, 200S	\$ 406,700.00
D-3	Distribution System	Loop 400N, 1200W, Freeway, 1000N	\$ 523,600.00
D-4	Distribution System	Transmission to Central Weber Sewer	\$ 1,344,100.00
D-5	Distribution System	Transmission West of Central Weber Sewer	\$ 312,400.00
D-6	Distribution System	Transmission 300W to 3650W	\$ 317,000.00
D-7	Distribution System	Transmission 3650W to West	\$ 311,000.00
D-8	Distribution System	Distribution 2800 W to existing homes	\$ 214,400.00
Total Construction Costs			\$ 6,711,800.00

Project Summary: Distribution Option 1 and Source Option 1 and 4

OPINION OF PROBABLE COSTS

Project Number	Description	Location	Total Price
S-4	Mill Creek Lift Pump	Mill Creek & 1200 W	\$ 335,000.00
S-1	South Perry Canal Div	Perry Canal and 1200 West	\$ 388,000.00
P-1	Golf Course Pump Station	Mulligan's Golf Course	\$ 538,000.00
D-1a	Distribution System	Loop 400N, 1200W, Freeway, 200S	\$ 1,015,000.00
D-2	Distribution System	Inner Looping 400N, 1200W, Freeway, 200S	\$ 406,700.00
D-3	Distribution System	Loop 400N, 1200W, Freeway, 1000N	\$ 523,600.00
D-4	Distribution System	Transmission to Central Weber Sewer	\$ 1,344,100.00
D-5	Distribution System	Transmission West of Central Weber Sewer	\$ 312,400.00
D-6	Distribution System	Transmission 300W to 3650W	\$ 317,000.00
D-7	Distribution System	Transmission 3650W to West	\$ 311,000.00
D-8	Distribution System	Distribution 2800 W to existing homes	\$ 214,400.00
Total Construction Costs			\$ 5,705,200.00

Pioneer Special Service District

Project: S-1

Location: Perry Canal

Description: Source option 1; Perry Canal diversion

OPINION OF PROBABLE COSTS

Description	Unit	Qty.	Unit Price	Total Price
Mobilization	LS	1	\$ 70,000.00	\$ 70,000.00
Traffic Control	LS	1	\$ 6,000.00	\$ 6,000.00
24" Class III RCP	LF	3,500	\$ 50.00	\$ 175,000.00
Diversion Structures	EA	2	\$ 4,000.00	\$ 8,000.00
Sub-Total Construction Costs				\$ 259,000.00
Contingency (30%)				\$ 78,000.00
Total Construction Costs				\$ 337,000.00
Administration and Engineering (15%)				\$ 51,000.00
Total Project Capital Costs				\$ 388,000.00

Pioneer Special Service District

Project: S-2

Location: Perry Canal

Description: Source option 2; Pump Perry Canal

OPINION OF PROBABLE COSTS

Description	Unit	Qty.	Unit Price	Total Price
Mobilization	LS	1	\$ 70,000.00	\$ 70,000.00
Traffic Control	LS	1	\$ 6,000.00	\$ 6,000.00
24" C905 PVC	LF	7,200	\$ 71.00	\$ 511,000.00
Sistern	EA	1	\$ 50,000.00	\$ 50,000.00
Pump and Pump House	EA	1	\$ 150,000.00	\$ 150,000.00
Property	EA	1	\$ 100,000.00	\$ 100,000.00
Sub-Total Construction Costs				\$ 887,000.00
Contingency (30%)				\$ 266,000.00
Total Construction Costs				\$ 1,153,000.00
Administration and Engineering (15%)				\$ 173,000.00
Total Project Capital Costs				\$ 1,326,000.00

Pioneer Special Service District

Project: S-3

Location: Mill Creek & 1200 W

Description: Source Option 3; Pump House at Mill Creek

OPINION OF PROBABLE COSTS

Description	Unit	Qty.	Unit Price	Total Price
Mobilization	LS	1	\$ 70,000.00	\$ 70,000.00
Reservoir	LS	1	\$ 250,000.00	\$ 250,000.00
Pump House	LS	1	\$ 200,000.00	\$ 200,000.00
Pumps and Fittings	LS	1	\$ 75,000.00	\$ 75,000.00
Property	LS	1	\$ 250,000.00	\$ 250,000.00
Sub-Total Construction Costs				\$ 845,000.00
Contingency (30%)				\$ 254,000.00
Total Construction Costs				\$ 1,099,000.00
Administration and Engineering (15%)				\$ 165,000.00
Total Project Capital Costs				\$ 1,264,000.00

Pioneer Special Service District

Project: S-4

Location: Mill Creek

Description: Source option 4; Lift Pump to Perry Canal

OPINION OF PROBABLE COSTS

Description	Unit	Qty.	Unit Price	Total Price
Mobilization	LS	1	\$ 20,000.00	\$ 20,000.00
12" C900 PVC	LF	550	\$ 27.00	\$ 15,000.00
Pump and Pump House	EA	1	\$ 150,000.00	\$ 150,000.00
Property (1/4 acre)	EA	1	\$ 20,000.00	\$ 20,000.00
30' Easment	LS	1	\$ 17,000.00	\$ 17,000.00
Change application for point of diversion	LS	1	\$ 1,500.00	\$ 2,000.00
Sub-Total Construction Costs				\$ 224,000.00
Contingency (30%)				\$ 67,000.00
Total Construction Costs				\$ 291,000.00
Administration and Engineering (15%)				\$ 44,000.00
Total Project Capital Costs				\$ 335,000.00

Note:

Abandonment of old Perry Ditch not included

Pioneer Special Service District

Project: P-1

Location: Mulligan's golf course pond

Description: Pump House

OPINION OF PROBABLE COSTS

Description	Unit	Qty.	Unit Price	Total Price
Mobilization	LS	1	\$ 70,000.00	\$ 70,000.00
Site Work	LS	1	\$ 15,000.00	\$ 15,000.00
Pump House	LS	1	\$ 200,000.00	\$ 200,000.00
Pumps and Fittings	LS	1	\$ 75,000.00	\$ 75,000.00
Sub-Total Construction Costs				\$ 360,000.00
Contingency (30%)				\$ 108,000.00
Total Construction Costs				\$ 468,000.00
Administration and Engineering (15%)				\$ 70,000.00
Total Project Capital Costs				\$ 538,000.00

Pioneer Special Service District

Project: D-1a

Location: South of 400 N, East of freeway, West of BDO

Description: Distribution lines

OPINION OF PROBABLE COSTS

Description	Unit	Qty.	Unit Price	Total Price
Mobilization	LS	1	\$ 70,000.00	\$ 70,000.00
Traffic Control	LS	1	\$ 6,000.00	\$ 6,000.00
6" C-900 PVC	LF	11,551	\$ 9.50	\$ 110,000.00
8" C-900 PVC	LF	1,316	\$ 12.00	\$ 16,000.00
12" Ductile Iron	LF	1,360	\$ 27.00	\$ 37,000.00
24" C905 PVC	LF	1,946	\$ 71.00	\$ 138,000.00
Fittings	LS	1	\$ 6,000.00	\$ 6,000.00
Service Connections	EA	50	\$ 60.00	\$ 3,000.00
Asphalt Surface Course (4" thick)	SY	7,188	\$ 40.00	\$ 288,000.00
Connect to Existing pipe	EA	1	\$ 5,000.00	\$ 5,000.00
Sub-Total Construction Costs				\$ 679,000.00
Contingency (30%)				\$ 204,000.00
Total Construction Costs				\$ 883,000.00
Administration and Engineering (15%)				\$ 132,000.00
Total Project Capital Costs				\$ 1,015,000.00

Four Foot wide trench, assumed that all of alignment is in roadway

Pioneer Special Service District

Project: D-1b

Location: South of 400 N, East of freeway, West of BDO

Description: Distribution lines w/upgrade for Source 3

OPINION OF PROBABLE COSTS

Description	Unit	Qty.	Unit Price	Total Price
Mobilization	LS	1	\$ 70,000.00	\$ 70,000.00
Traffic Control	LS	1	\$ 6,000.00	\$ 6,000.00
6" C-900 PVC	LF	7,190	\$ 9.50	\$ 68,000.00
24" C-900 PVC	LF	8,985	\$ 71.00	\$ 638,000.00
Canal Turnouts	EA	2	\$ 25,000.00	\$ 50,000.00
Fittings	LS	1	\$ 6,000.00	\$ 6,000.00
Service Connections	EA	50	\$ 60.00	\$ 3,000.00
Asphalt Surface Course (4" thick)	SY	7,189	\$ 40.00	\$ 288,000.00
Connect to Existing pipe	EA	1	\$ 5,000.00	\$ 5,000.00
Sub-Total Construction Costs				\$ 1,134,000.00
Contingency (30%)				\$ 340,000.00
Total Construction Costs				\$ 1,474,000.00
Administration and Engineering (15%)				\$ 221,000.00
Total Project Capital Costs				\$ 1,695,000.00

Four Foot wide trench, assumed that all of alignment is in roadway

Pioneer Special Service District

Project: D-2

Location: 400 N, 1200 W, Freeway, and 200 S

Description: Distribution inner looping

OPINION OF PROBABLE COSTS

Description	Unit	Qty.	Unit Price	Total Price
Mobilization	LS	1	\$ 70,000.00	\$ 70,000.00
Traffic Control	LS	1	\$ 6,000.00	\$ 6,000.00
6" C-900 PVC	LF	5,015	\$ 9.50	\$ 48,000.00
10" C-900 PVC	LF	1,417	\$ 16.00	\$ 23,000.00
Fittings	EA	1	\$ 3,000.00	\$ 3,000.00
Service Connections	EA	45	\$ 60.00	\$ 2,700.00
Asphalt Surface Course (4" thick)	SY	2,859	\$ 40.00	\$ 114,000.00
Connect to Existing pipe	EA	1	\$ 5,000.00	\$ 5,000.00
Sub-Total Construction Costs				\$ 271,700.00
Contingency (30%)				\$ 82,000.00
Total Construction Costs				\$ 353,700.00
Administration and Engineering (15%)				\$ 53,000.00
Total Project Capital Costs				\$ 406,700.00

Four Foot wide trench, assumed that all of alignment is in roadway

Pioneer Special Service District

Project: D-3

Location: North of 400 N, East of freeway, West of BDO

Description: Distribution lines

OPINION OF PROBABLE COSTS

Description	Unit	Qty.	Unit Price	Total Price
Mobilization	LS	1	\$ 70,000.00	\$ 70,000.00
Traffic Control	LS	1	\$ 6,000.00	\$ 6,000.00
6" C-900 PVC	LF	2,691	\$ 9.50	\$ 26,000.00
8" C-900 PVC	LF	8,074	\$ 12.00	\$ 97,000.00
Fittings	LS	1	\$ 2,000.00	\$ 2,000.00
Service Connections	EA	10	\$ 60.00	\$ 600.00
Asphalt Surface Course (4" thick)	SY	3,588	\$ 40.00	\$ 144,000.00
Connect to Existing pipe	EA	1	\$ 5,000.00	\$ 5,000.00
Sub-Total Construction Costs				\$ 350,600.00
Contingency (30%)				\$ 105,000.00
Total Construction Costs				\$ 455,600.00
Administration and Engineering (15%)				\$ 68,000.00
Total Project Capital Costs				\$ 523,600.00

Four Foot wide trench, assumed that all of alignment is in roadway

Pioneer Special Service District

Project: D-4

Location: 400 N from golf course to Central Weber Sewer Plant

Description: Transmission line

OPINION OF PROBABLE COSTS

Description	Unit	Qty.	Unit Price	Total Price
Mobilization	LS	1	\$ 70,000.00	\$ 70,000.00
Traffic Control	LS	1	\$ 6,000.00	\$ 6,000.00
24" C905 PVC	LF	6,344	\$ 71.00	\$ 450,000.00
Fittings	EA	1	\$ 3,000.00	\$ 3,000.00
Service Connections	EA	35	\$ 60.00	\$ 2,100.00
Asphalt Surface Course (4" thick)	SY	2,820	\$ 40.00	\$ 113,000.00
Crossing Freeway	LS	1	\$ 250,000.00	\$ 250,000.00
Connect to Existing pipe	EA	1	\$ 5,000.00	\$ 5,000.00
Sub-Total Construction Costs				\$ 899,100.00
Contingency (30%)				\$ 270,000.00
Total Construction Costs				\$ 1,169,100.00
Administration and Engineering (15%)				\$ 175,000.00
Total Project Capital Costs				\$ 1,344,100.00

Four Foot wide trench, assumed that all of alignment is in roadway

Pioneer Special Service District

Project: D-5

Location: West of Central Weber Sewer Plant

Description: Transmission line

OPINION OF PROBABLE COSTS

Description	Unit	Qty.	Unit Price	Total Price
Mobilization	LS	1	\$ 70,000.00	\$ 70,000.00
Traffic Control	LS	1	\$ 6,000.00	\$ 6,000.00
6" C-900 PVC	LF	1,193	\$ 9.50	\$ 11,000.00
14" C-900 PVC	LF	1,733	\$ 34.00	\$ 59,000.00
Fittings	LS	1	\$ 3,000.00	\$ 3,000.00
Service Connections	EA	40	\$ 60.00	\$ 2,400.00
Asphalt Surface Course (4" thick)	SY	1,300	\$ 40.00	\$ 52,000.00
Connect to Existing pipe	EA	1	\$ 5,000.00	\$ 5,000.00
Sub-Total Construction Costs				\$ 208,400.00
Contingency (30%)				\$ 63,000.00
Total Construction Costs				\$ 271,400.00
Administration and Engineering (15%)				\$ 41,000.00
Total Project Capital Costs				\$ 312,400.00

Four Foot wide trench, assumed that all of alignment is in roadway

Pioneer Special Service District

Project: D-6

Location: West of Central Weber Sewer Plant

Description: Transmission line

OPINION OF PROBABLE COSTS

Description	Unit	Qty.	Unit Price	Total Price
Mobilization	LS	1	\$ 70,000.00	\$ 70,000.00
Traffic Control	LS	1	\$ 6,000.00	\$ 6,000.00
10" C-900 PVC	LF	2,465	\$ 16.00	\$ 39,000.00
12" C-900 PVC	LF	1,612	\$ 27.00	\$ 44,000.00
Fittings	LS	1	\$ 2,500.00	\$ 2,500.00
Service Connections	EA	25	\$ 60.00	\$ 1,500.00
Asphalt Surface Course (4" thick)	SY	1,096	\$ 40.00	\$ 44,000.00
Connect to Existing pipe	EA	1	\$ 5,000.00	\$ 5,000.00
Sub-Total Construction Costs				\$ 212,000.00
Contingency (30%)				\$ 64,000.00
Total Construction Costs				\$ 276,000.00
Administration and Engineering (15%)				\$ 41,000.00
Total Project Capital Costs				\$ 317,000.00

Four Foot wide trench, assumed that all of alignment is in roadway

Pioneer Special Service District

Project: D-7

Location: Farthest West of city

Description: End of transmission line

OPINION OF PROBABLE COSTS

Description	Unit	Qty.	Unit Price	Total Price
Mobilization	LS	1	\$ 70,000.00	\$ 70,000.00
Traffic Control	LS	1	\$ 6,000.00	\$ 6,000.00
6" C-900 PVC	LF	4,514	\$ 9.50	\$ 43,000.00
Fittings	LS	1	\$ 2,500.00	\$ 2,500.00
Service Connections	EA	25	\$ 60.00	\$ 1,500.00
Asphalt Surface Course (4" thick)	SY	2,006	\$ 40.00	\$ 80,000.00
Connect to Existing pipe	EA	1	\$ 5,000.00	\$ 5,000.00
Sub-Total Construction Costs				\$ 208,000.00
Contingency (30%)				\$ 62,000.00
Total Construction Costs				\$ 270,000.00
Administration and Engineering (15%)				\$ 41,000.00
Total Project Capital Costs				\$ 311,000.00

Four Foot wide trench, assumed that all of alignment is in roadway

Pioneer Special Service District

Project: D-8

Location: 2800 S to existing homes

Description: Distribution line

OPINION OF PROBABLE COSTS

Description	Unit	Qty.	Unit Price	Total Price
Mobilization	LS	1	\$ 70,000.00	\$ 70,000.00
Traffic Control	LS	1	\$ 6,000.00	\$ 6,000.00
6" C-900 PVC	LF	2,161	\$ 9.50	\$ 21,000.00
Fittings	LS	1	\$ 2,500.00	\$ 2,500.00
Service Connections	EA	15	\$ 60.00	\$ 900.00
Asphalt Surface Course (4" thick)	SY	960	\$ 40.00	\$ 38,000.00
Connect to Existing pipe	EA	1	\$ 5,000.00	\$ 5,000.00
Sub-Total Construction Costs				\$ 143,400.00
Contingency (30%)				\$ 43,000.00
Total Construction Costs				\$ 186,400.00
Administration and Engineering (15%)				\$ 28,000.00
Total Project Capital Costs				\$ 214,400.00

Four Foot wide trench, assumed that all of alignment is in roadway

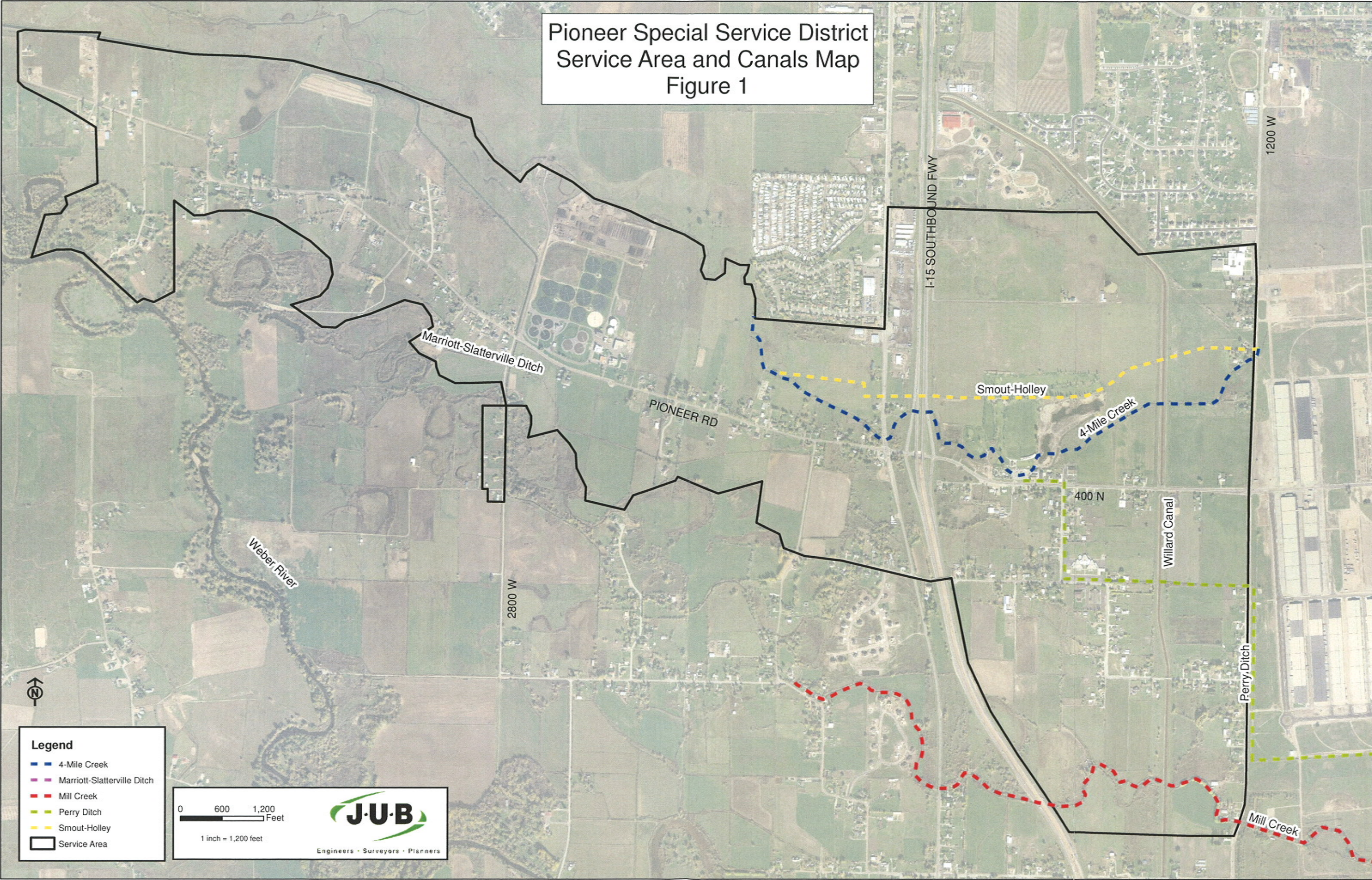
APPENDIX B
NETWORK INFORMATION

PIPE ID	LENGTH	DIAMETER	ROUGHNESS
P11	133.63	24	130
P17	1,416.80	10	130
P19	689.12	6	130
P21	1,347.08	6	130
P23	1,998.70	6	130
P25	2,734.81	6	130
P27	1,315.68	8	130
P35	1,038.33	24	130
P37	2,093.94	24	130
P39	1,132.49	24	130
P41	553.84	24	130
P43	824.75	24	130
P45	878.75	14	130
P47	854.11	14	130
P49	1,202.54	12	130
P51	409.18	12	130
P53	1,020.72	10	130
P55	872.35	10	130
P57	572.22	10	130
P59	887.41	8	130
P61	1,192.56	6	130
P63	1,852.97	6	130
P65	1,773.83	6	130
P67	2,161.48	6	130
P69	1,592.32	6	130
P71	1,816.56	6	130
P73	1,359.42	12	130
P75	2,223.23	8	130
P77	3,234.91	8	130
P79	2,616.08	8	130
P81	1,625.57	6	130
P83	670.51	6	130
P85	1,387.40	6	130
P87	1,188.23	6	130
P89	1,515.47	6	130
P91	701.27	24	130
P93	845.7	24	130
P95	2,691.27	6	130
P97	503.47	24	130
P99	1,946.07	24	130

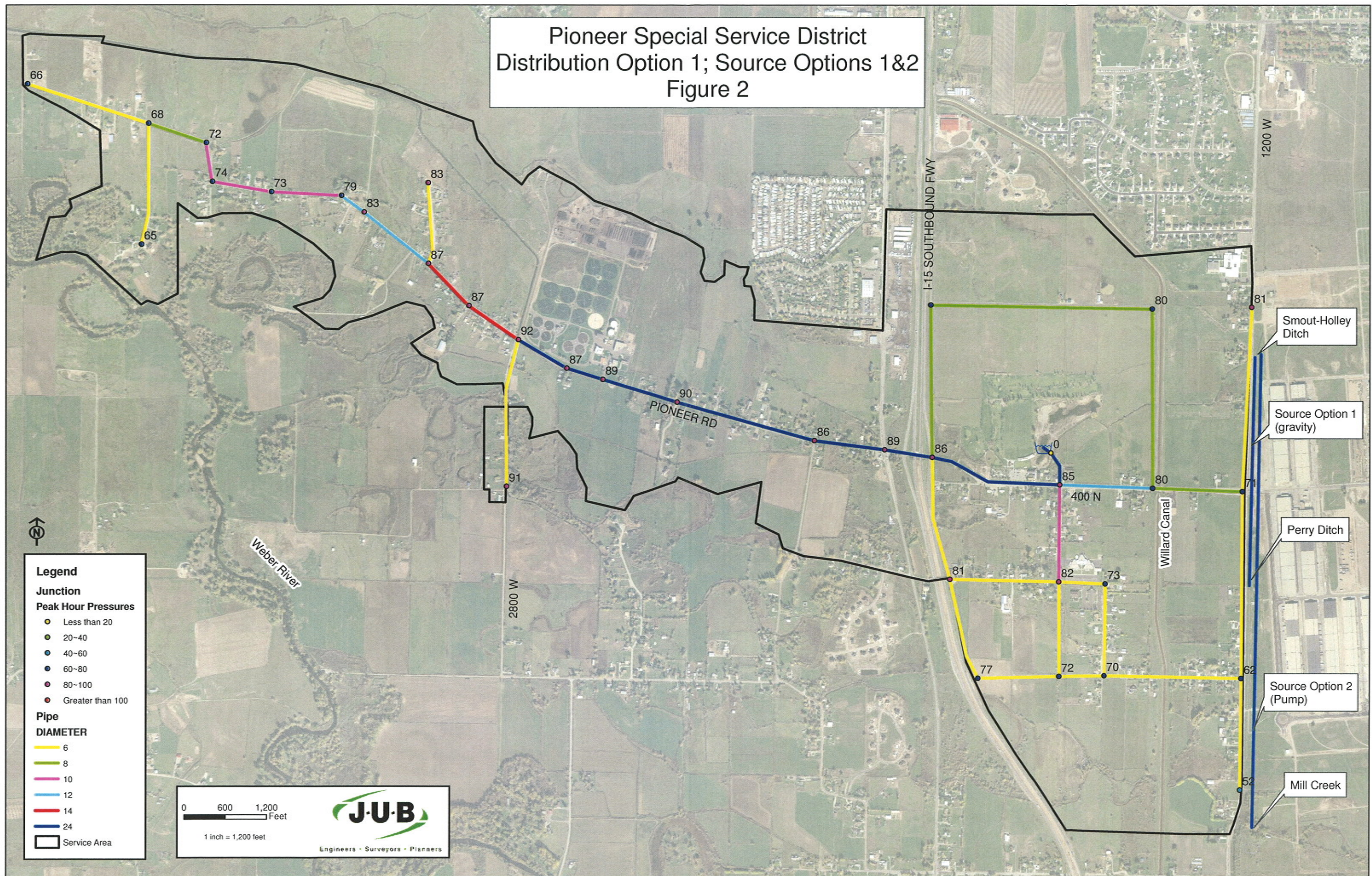
JUNCTION ID	DEMAND	ELEVATION
J10	0.0	4,448.5
J14	211.6	4,249.7
J16	126.6	4,242.5
J18	105.4	4,251.0
J20	374.7	4,245.1
J22	379.8	4,246.4
J24	249.4	4,254.6
J26	151.2	4,242.1
J30	224.7	4,233.6
J32	775.1	4,238.9
J34	414.6	4,228.4
J36	559.7	4,228.7
J38	0.0	4,233.6
J40	135.4	4,222.1
J42	346.4	4,226.4
J44	100.2	4,221.8
J46	489.8	4,221.1
J48	0.0	4,228.4
J50	304.7	4,230.0
J52	91.4	4,219.8
J54	267.0	4,220.1
J56	165.2	4,218.2
J58	296.5	4,220.8
J60	351.0	4,219.5
J62	270.8	4,214.9
J64	58.1	4,223.1
J66	224.5	4,239.2
J68	439.4	4,250.7
J70	706.8	4,239.8
J72	547.2	4,234.9
J74	277.6	4,259.2
J76	224.7	4,246.7
J78	164.9	4,236.9
J80	194.7	4,223.1

APPENDIX C
FIGURES

Pioneer Special Service District
Service Area and Canals Map
Figure 1



Pioneer Special Service District
Distribution Option 1; Source Options 1&2
Figure 2



Pioneer Special Service District
Distribution Option 2; Source Option 3
Figure 3

