

Feeder Line 25 Replacement Size Analysis

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Scope

As part of the feeder line replacement program, Feeder Line 25 (FL25) is scheduled to be replaced in 2011. This 12.6 mile long pipe connects with Feeder Line 7 (FL7), feeder line 24 (FL24), and Feeder Line 26 (FL26) to provide a north-south feed between Salt Lake and Utah counties. FL7 is a 12-inch pipe and FL24 is a 10-inch pipe, FL25 resides between the two lines. This analysis determines the appropriate size for the replacement.

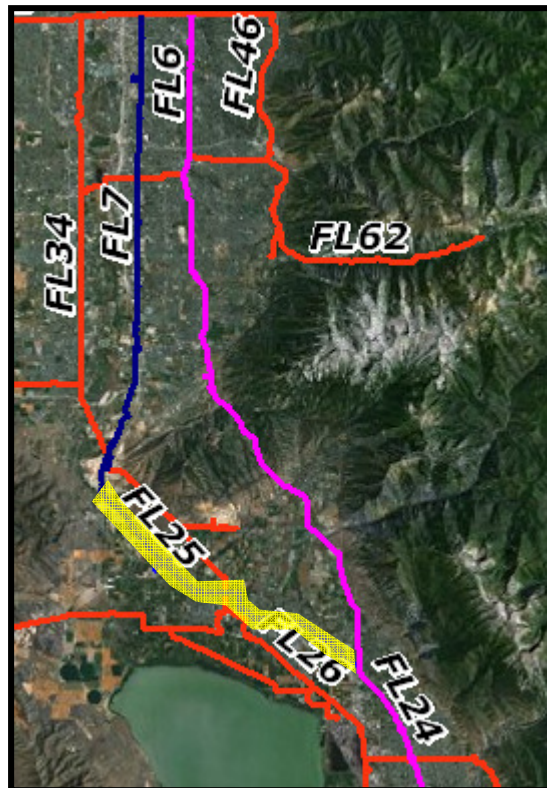


Figure 1: Map of FL25

Analysis

In order to understand the impact the replacement will have on the system, as operated currently, the 2010 peak unsteady-state (USM) model was utilized in the analysis. The key point minimum pressure results of various replacement sizes are displayed in Table 1.

Table 1: 2010 System Minimum Pressure Results (psig)

	2011	6-inch	8-inch	12-inch	16-inch	20-inch	24-inch
West Jordan	199	199	199	199	199	199	200
Payson	306	306	307	307	308	309	309
Snowbird	230	230	231	233	234	234	235
West Desert	284	284	284	284	284	284	285

This replacement will have long term effects on the way the system operates. These effects need to be explored if a solution is to be obtained. Projected models, a 2020 model and a 2030 model, were created to analyze the effects of different pipe diameters. These models utilized the 2010 integrated resource plan's (IRP) projected, long term, annual peak day growth rate of approximately 1% as well as an additional 2% for lost and unaccounted for gas. Consideration was given to the specific growth rates in Salt Lake County and Utah County and the general growth rate assumption is in line with these growth rates.

The model results for these analyses are shown in Tables 2 and 3. The expected pressure differences on a peak day, under normal system conditions, have been shown to be independent of pipe diameter. These results are independent of where future supply enters the connected system. Additional study was done shifting gas sources. The maximum difference in resultant pressure was 0.2 psig which is negligible.

Table 2: 2020 System Minimum Pressure Results (psig)

	2011	6-inch	8-inch	12-inch	16-inch	20-inch	24-inch
West Jordan	172	172	172	172	172	172	173
Payson	291	291	291	292	292	293	294
Snowbird	210	210	211	214	215	215	216
West Desert	275	275	275	275	275	275	275

Table 3: 2030 System Minimum Pressure Results (psig)

	2011	6-inch	8-inch	12-inch	16-inch	20-inch	24-inch
West Jordan	155	155	154	154	154	155	155
Payson	286	286	286	287	287	288	289
Snowbird	197	196	198	201	203	204	204
West Desert	284	284	284	284	284	284	284

System Reliability

Redundant feed is an important aspect of any gas network. There are three feeder lines that run north-south between Salt Lake and Utah County: FL24, FL25, and FL26. FL26 is the largest of the three at 24 inches in diameter. If FL26 were to be out of service during a peak event in 2030, the pressures presented in Table 4 are the expected pressures based on each replacement size. A 6-inch replacement will not support the system through the peak of the day and a 20-inch is not a logical replacement size given that the pipe resides between a 12-inch and a 10-inch pipe, these cases were therefore omitted from the table.

Table 4: 2030 Redundancy Model Minimum Pressures (psig)

	8-Inch	12-Inch	16-Inch
West Jordan	163	158	156
Payson	173	247	269
Snowbird	191	198	201
West Desert	290	286	285

Cost Estimates

Table 5 contains the summary of cost estimates. This shows that the cost difference between 8-inch and 12-inch is approximately \$4 million and the difference between 8-inch and 16-inch is about \$7 million. Regarding the cost per pressure increase at Payson, where the pressures are most influenced by FL25 diameter, it is about \$55,000/psig to install 12-inch over 8-inch and about \$144,000/psig to make the jump to 16-inch from 12-inch (based on the 2030 model results).

Table 5: Cost Estimate Summary

	Total Estimated Cost
8-inch	\$23,529,000
12-inch	\$27,579,000
16-inch	\$30,752,000

Conclusions

Given the results of the reliability analysis, a 12-inch would be the appropriate size for the replacement. At this size, the expected pressures in Payson city will greatly improve when compared to the smaller considered pipe sizes. It is true that the pressures will continue to improve as the size increases, however, the pressure increase at 16-inch does not support the cost difference required to gain that pressure.