

## MEMO

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**To:** Oregon Department of Aviation  
**CC:** Jim Pex, Greg Reince, Matt Rogers  
**From:** Century West Engineering  
**Date:** January 6, 2016  
**Re:** **Mulino State Airport Water Improvements**

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The purpose of this memo is to describe the existing waterline conditions at the Mulino State Airport and provide potential solutions to increase fire flow for future development.

### Water Constraints at the Airport

It has been noted by the Fire Marshal<sup>1</sup>, the airport has limited hydrant flow. Notably, the hydrant flows are below state standards for capacity of 1,500 gallons per minutes at 20 PSI. The only possible development is the replacement of the T-hangars that were previously demolished. No additional future development is currently permitted. Expansion of the airport facilities would further strain the fire flow capacity and would not be supported by the state Fire Marshal if no improvements were proposed to the water system.

#### EXISTING CONDITIONS

An overview of existing conditions at the Airport is shown in Figure 2-2 for reference.

After review of the existing water system maps and a technical memorandum (attached) prepared by Pietrok Engineering and Resources, LLC to update the Mulino Water District's water master plan, Century West Engineering (CWE) has compiled a short list of projects that would be needed to provide adequate fire protection for growth at the airport. Notably, the proposed projects by CWE were also identified within the technical memorandum prepared by Pietrok Engineering. Construction costs have been updated by CWE to reflect current market values.

The Mulino Water District's inventory map (see attached Drawing Sheet 1) showed a specific constraint on both sides of the airport waterline loop. On the north end starting at the intersection of Mulino Road and Highway 213, an 8" waterline is stubbed to the west (along Mulino Road) that is then downsized to 6"

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<sup>1</sup> M. Penunuri (personal communication, October 26, 2015)

and eventually 4” at the intersection of Landing Way. This 4” line feeds the north end of the Airport facilities and several fire hydrants in the vicinity.

The waterline transitions from a 4” line to and 8” on airport property, travels south, and eventually ties back into a 4” waterline at Darnell Road. This 4” section then ties back into the main 8-inch line located in Highway 213.

## REVIEW OF IMPROVEMENTS

Upon review, it is evident that the issues with the existing fire flows are a direct result of constrained smaller pipe diameters that make up the loop in the water system at the Airport. The larger 8” water lines on Airport property are fed by 4” water lines at the north and south end of the loop. The 4” water lines do not have the capacity to provide adequate fire protection to meet minimum state standards. The minimum pipe size to supply fire flow is 6” in most cases but should be standardized to an 8” pipe to provide capacity for future growth.

The three options presented below have been identified to improve the fire flow capacity at the Airport. Refer to Figure 1 for a depiction of each of the options.

### Project Option 1 – Replace Pipe along Mulino Road and Land Way

This option would install approximately 2,400’ of undersize waterline pipe along Mulino Road and Land Way with a minimum 8” pipe. The existing pipe varies between 6” and 4”. Because the waterline appears to be located outside of the existing pavement, the cost of replacement would be reduced significantly compared to if the water line was within the pavement section. The project would create an immediate improvement in water flow and fire suppression capability for the Airport due compared with the current pipe configuration.

This option is similar to Pipe Upgrade 3 of the Capital Improvement Projects described in the technical memorandum prepared by Pietrok Engineering. However, the project described in the technical memorandum only takes into account domestic use and fire suppression without consideration of growth at the Airport. The proposed Option 1, however, will install 8” pipe from Highway 213 to the existing 8” line on the north end of the Airport near valve M21 shown on Drawing Sheet 1.

- Pro: Solves an immediate need with flow restrictions in the 4” and 6” waterlines that feed the north end of the Airport. The Airport would not maintain the waterline in the future.
- Con: Does not complete the loop in the 4” section that ties to Darnell Road. Because the waterline is looped, it will continue to have reduced flow ability due to the 4” line connection at Darnell Road.

However, the losses would be minimal in comparison to Option 2 alone described below. The ideal situation would be to replace both locations of 4”.

- **Estimated project cost: \$250,000-\$350,000**

#### Project Option 2 – Replace Pipe along Darnell Road

This option would install approximately 1,400’ of undersize waterline pipe along Darnell Road with a minimum 8” pipe. The existing pipe is only 4”. The majority of the waterline is located outside of the roadway pavement, thus reducing costs to replace it with an 8” waterline.

This option is similar to Pipe Upgrade 4 of the Capital Improvements Project described in the technical memorandum prepared by Pietrok Engineering. However, the project described in the technical memorandum only takes into account upgrading the pipe in Darnell Road and not the extension onto Airport property. The proposed Option 2, however, will install 8” pipe from Highway 213 to the existing 8” line on the south end of the Airport.

- Pro: Helps increase the fire flows for the southern portion of the Airport. The Airport would not maintain the waterline in the future.
- Con: Does not solve the restricted fire flows at the north end of the Airport and hangar facilities. Replacement of the section on Darnell Road in Option 2 would minimally increase fire flow for the Airport due to the current configuration.
- **Estimated project cost: \$150,000-\$250,000**

#### Project Option 3 – Construct a New Well on Airport Property

This option would install a new well on Airport Property capable of supplying water for domestic use and fire suppression. The location of the well would be determined at a later date if the option was selected. This project would also need to place new pipe for the Airport to use because the water district will not allow cross-connection to their facilities from a private source.

This option is similar to Item 5 of the Capital Improvement Projects described in the technical memorandum prepared by Pietrok Engineering. However, the project described in the technical memorandum accounts for installing a new well for water district use only and does not include additional pipe for airport needs if the

well was placed on Airport property. The proposed Option 3, however, will install a new well capable of supplying water for Airport needs.

- Pro: This would solve the water supply because the well could be sized to provide as much water as required.
- Con: Providing wells that supply both domestic and fire flow are expensive and must be maintained continuously. Per code, fire flow pumps must be redundant. As a result, at least (2)-20hp variable frequency pumps would be required to provide adequate fire suppression. An additional 3 hp domestic pump would be required, and the costs would further increase. The supply line would also need to be separate from the existing facility because the water district will not allow a private source to be combined to their system due to cross-contamination concerns. Maintenance costs will also be recurring for the pumps, well, and piping in the future.
- **Estimated project cost: \$450,000-\$500,000**

## Recommendation

Combining Option 1 and Option 2 would completely solve any issues in the future growth of the Airport and could be phased as separate projects in the future as demand requires.

Option 1 presents to be the best alternative to the immediate issues of fire flow at the Airport. The project cost is medium-high in relation to Options 2 and 3; however, no further maintenance would be required once the project is complete. The existing pipe configuration would provide 8" piping for over 75% of the Airport region. The upgrade would increase capacity at or near the minimum state requirements. Option 2 could be constructed as funding is available.