

# City of Bellevue Iowa Stormwater Management

Brendan Swanson, Andrew Van Sickle, Jack Gorman, Keishanique Moton-Tyler  
Civil and Environmental Engineering  
H2Pros Engineering



## Updated Floodplain Maps of Bellevue, IA

The City of Bellevue floodplain maps are currently undergoing review by FEMA, who has released a draft of their findings. Although these are preliminary updates, it has been observed that several residences along the main branch of Dutel Hollow and the Dutel Hollow second branch have now been identified to be in the 100-yr. floodplain and at risk for flooding. This project seeks to evaluate the impacts of floodplain changes and explore ways to mitigate the new risks that have been identified.

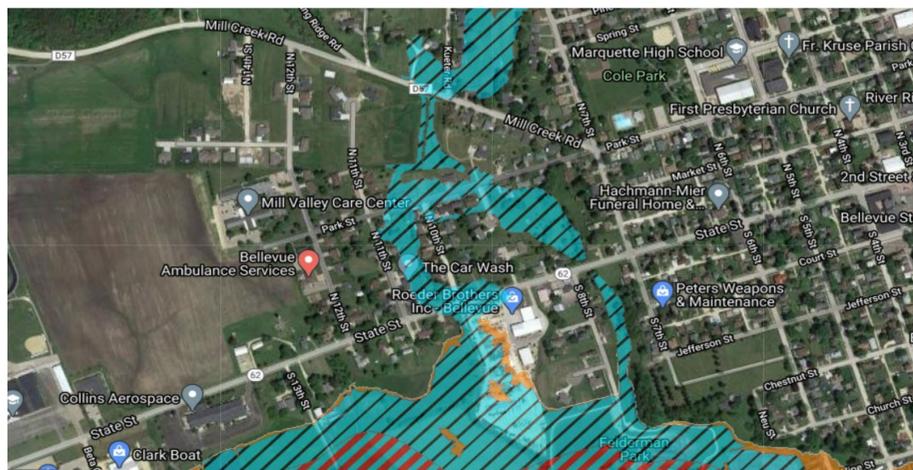
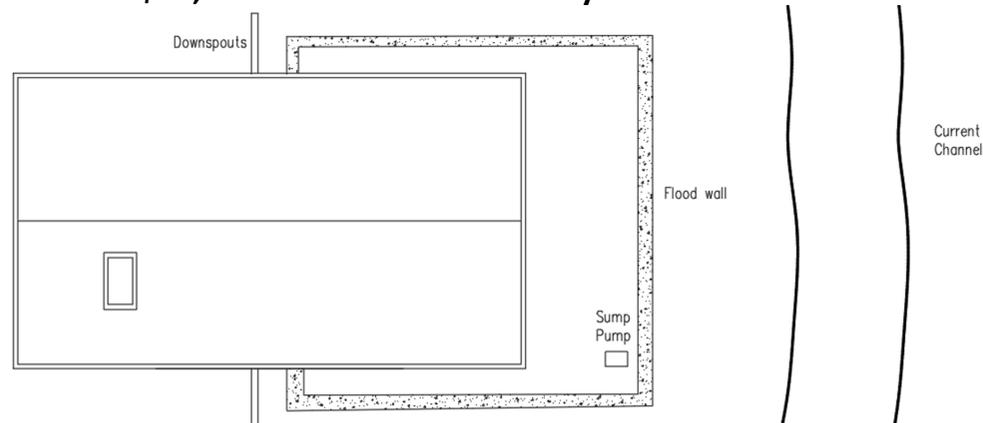


Figure 1. FEMA flood map of Dutel Hollow main and second branches for the 100-year flood.

## Construction of flood walls around impacted homes as a substitute to insurance.

A flood wall could provide a way to mitigate the risk of the expanding floodplain. A properly constructed flood wall will eliminate the need for insurance and provide a nice landscape feature to the back patio. The design of a flood wall is shown in Figure 2. In this example, the present worth of flood insurance is \$78,500 and the cost of flood wall construction was estimated at \$22,000. Actual values will vary from home to home.



Flood wall plan view

Figure 2: Flood wall design for an affected home.

## Expansion of the Channel from Mill Creek to Highway 62 and Related Drainage Structure Expansion.

Due to the complexity of this drainage system, we have selected to use a phased approach. The first phase is to replace the Highway 62 culvert with a 6 ft x 16 ft culvert and to clear the downstream section of channel. Each additional phase will work its way upstream and will consist of channel and culvert improvements. The estimated cost of replacing the highway 62 is \$387,000. Our HEC-RAS model results showing a reduction in the water surface elevation with the improved culvert is shown in Figure 3.

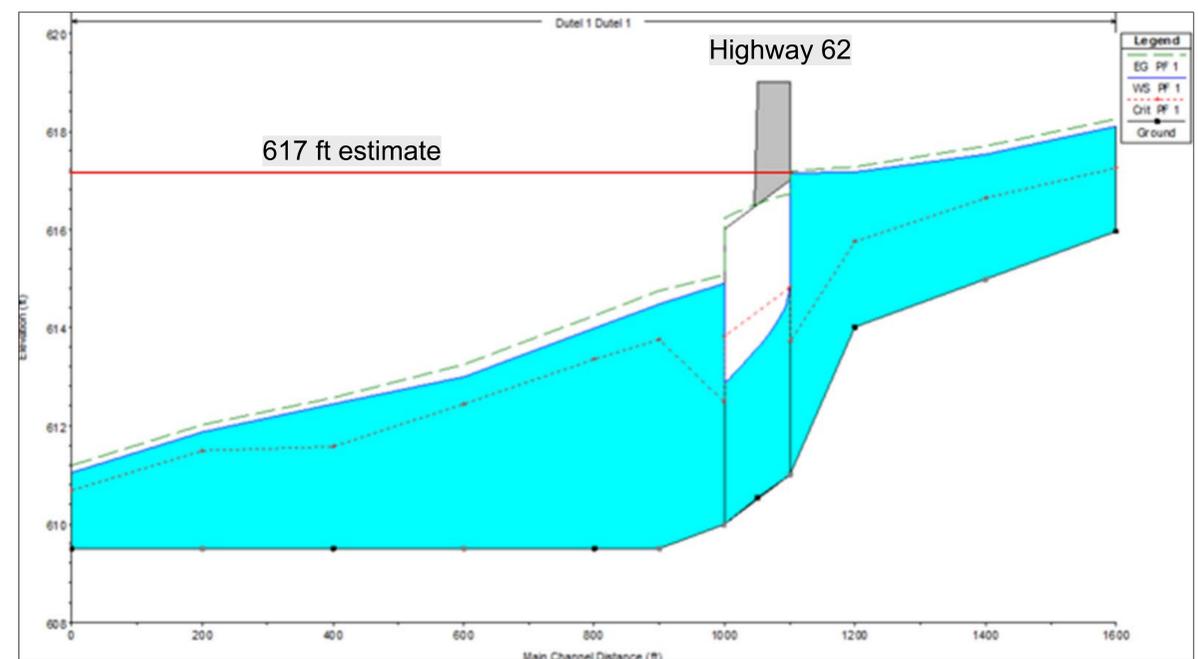


Figure 3. HEC-RAS model water surface profile of the area from Mill Creek to park street with the 6x16 ft culvert.

## Recommendations and conclusions

This study has identified three approaches for mitigating flood risk. The first two options are at the discretion of each property owner and the third represents a significant investment by the city. Before moving forward with a culvert and channel improvement, an accurate land survey should be conducted to be used in a hydraulic model on the area and some fundamental questions about flood insurance requirements need to be resolved.

## References

FEMA Flood report, Iowa SUDAS, NRCS 654, FEMA Homeowners Guide to Flood Retrofitting, Iowa DOT Culvert Design manual.