

Piney Creek Stream Stabilization, Bridge Crossing, and Storm Sewer Project

Colorado Association of Stormwater and Floodplain Managers

Grand Award Winner for 2011

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Introduction

The Piney Creek Stream Stabilization, Bridge Crossing, and Storm Sewer Outfall project is located in the City of Centennial north of Arapahoe Road and west of Liverpool Street near the intersection of Caley Drive and Euclid Drive in the Piney Creek Ranches subdivision. The project improves the safety, reduces the loss of property, stabilizes the channel, and enhances water quality. The project won the Colorado Association of Stormwater and Floodplain Managers (CASFM) Grand Award for 2011.

Piney Creek is a sand bed channel that is confined by residential development along the majority of its banks. The continuous development and loss of pervious area in the watershed keeps changing the nature of the stream. Piney Creek went from an ephemeral to a perennial stream. The result of these changes has caused an imbalance in sediment load, incising of the channel, and severe bank erosion. The residents were experiencing property loss, and adjacent structures were being threatened. An even more apparent problem in this area was the street crossing of Piney Creek to get into the residential area. This street-channel crossing was at-grade and became dangerous to cross even in more frequent rainfall and runoff events. When the creek rose from storms or iced over during the winter months it caused unsafe travel conditions. The pond on the south side of Arapahoe Road collected storm runoff from the Estancia development. This pond was a retention pond and collects storm flows where they would become stagnant, evaporate, and infiltrate. The concern was whether the pond would overtop or breach and flows would cross Arapahoe Road in the next storm, since there was no drain or outfall.



Piney Creek and Caley Drive - Before



Piney Creek and Caley Drive - Before

The Southeast Metro Stormwater Authority (SEMSWA), Arapahoe County (County), the City of Centennial (City), and the Urban Drainage and Flood Control District (UDFCD) teamed up and pooled resources to address these challenges through the Piney Creek Stream Stabilization, Bridge Crossing, and Storm Sewer Outfall project.

Description of Project

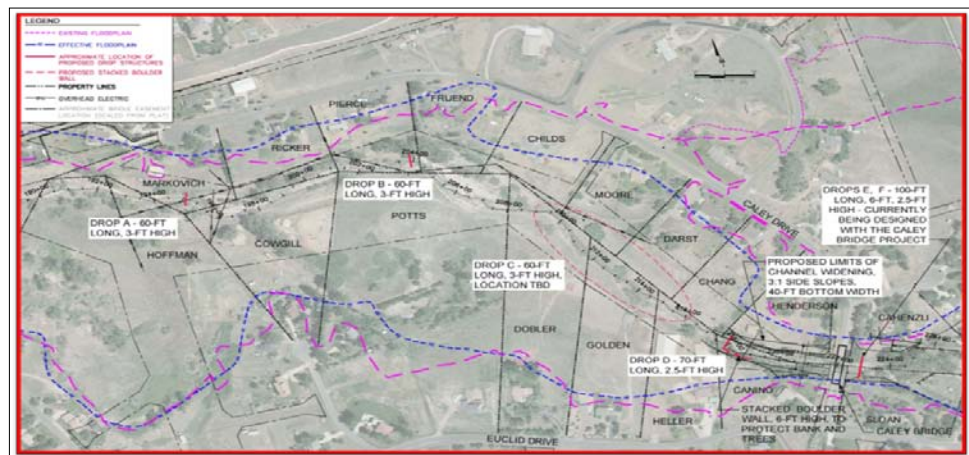


Piney Creek - Before

The project started with the ideas and concepts developed in the Stream Stabilization and Crossing Study completed in October 1989. The project stakeholders, design team, and residents all worked together to make this a successful project. The goals of the project were to stabilize the channel, improve the water quality, improve the Caley Drive crossing of Piney Creek, and provide a storm sewer system and outfall to the Estancia Subdivision pond and local drainage basin to the south.

The UDFCD contracted with Ayres Associates for the design of the stream stabilization on Piney Creek and the Caley Drive crossing improvements. The County contracted with Stantec for the design of the storm sewer Outfall C project. The project successfully combined two plan sets that were designed by different engineers and awarded as one large project to a single contractor. The benefits to the public were a shortened construction schedule with a reduction of traffic detour and road closure days. The combined project’s total construction cost was lower because it was larger; attracting more competition in the bidding process and avoiding duplicate items such as mobilization, water control, and traffic control.

The public relations were critical in the design of the project. A partnership approach was adopted that proved vital to being able to complete the



Piney Creek – Overall Plan used in Public Relations

design and build the project. The public involvement included both an educational and directional component. An overall plan was drafted that identified the problems and solutions in this stretch of Piney Creek; each were identified and described to the residents. The residents then worked together to establish the priorities based on the benefits and funding available for the project. The result of the partnership approach was public support of the project.

The land acquisition utilized a series of negotiations in combination with property owner meetings. This approach helped to identify all of the benefits and detriments to each property owner. The project acquired all the easements needed for construction.

The stream stabilization consists of channel grade control, a low flow channel, and bank protection. Both the stream stabilization and removing the vehicles from direct contact with flows improve the water quality in the creek. The old at grade crossing of Caley Drive was improved to a bridge that safely passes flood flows under Caley Drive instead of over it. The storm sewer was added to the south and connected to the pond in the Estancia subdivision. The retention pond was converted to a detention pond with water quality capture volume. The storm sewer provides for the future expansion of Arapahoe Road and the associated increased flows.

Construction Elements:

- Caley Drive Bridge consists of a concrete box girder that spans 125-feet long and is 27-feet wide that accommodates a 100-year flow of 8,600 cubic feet per second.
- Stream Stabilization includes an 8.5-foot tall grouted boulder drop structure, sheet pile check structure, 200 linear feet of grouted boulder bank protection, and 500 linear feet of low flow channel.
- 1800 linear feet of 36 inch to 54 inch storm sewer.

American Civil Constructors (ACC) was the successful bidder and constructed the project. The project involved multiple disciplines (channel, road, bridge, pipe, etc.) in close quarters. These disciplines converged on top of each other at the intersection of Caley Drive and Piney Creek. The construction schedule along with the diversity of disciplines in the project often required that two to three different crews work simultaneously. Coordination between trades and categories of work were crucial to keep the project moving along on schedule and budget.

The total project costs \$2,323,000. The bid construction cost was \$1,496,000 which was well under the engineer's estimate of \$1,991,000. The project was constructed from January to August 2010.

Conclusion

The Piney Creek Stream Stabilization, Bridge Crossing and Storm Sewer Outfall project successfully met the project goals to stabilize channel, improve the water quality, improve the Caley Drive crossing, and provide a storm sewer system to the south. The project provides safer access for the residents and reduces the risk of damage to private property and threats to adjacent structures.

The project successfully enhanced the public health, safety, and welfare; enhanced the surrounding environment; used unique and innovative solutions; and managed multiple-objectives.

We thank all the project stakeholders and participants for their hard work, perseverance, and creativity.



Piney Creek - After



Caley Drive - After