



2nd Avenue Bridge Overbank Culvert Design Option

Presented by
Alex Ariniello, Kyle Hamilton
& Dave Skuodas



April 14, 2014
Town Board Meeting

Coal Creek Upstream of McCaslin Milestones

Milestone	Date
Project initiated between Town of Superior & Urban Drainage & Flood Control District	2011 - 2012
Town Board gives approval to focus on 2 nd Avenue bridge replacement first. 3 rd Avenue bridge replacement could be budgeted in the future.	February 11, 2013
Community Meeting 1 held at Town Hall	April 4, 2013
Town Board gives approval to move project into preliminary design.	April 22, 2013
Town Board approves additional funding for preliminary design.	August 26, 2013
Community Meeting 2 held at Town Hall. Focused on September flood event.	October 1, 2013
Presentation of 2 nd Avenue Bridge replacement alternatives analysis.	February 10, 2014
Presentation of Overbank Culvert design option	April 14, 2014



Summary of Public Comment

- ◆ Sidewalks along the 2nd Avenue structure are not preferred
- ◆ A center pier/support structure is not preferred due to debris blockage concerns
- ◆ Aesthetics – some residents prefer to keep the 2nd Avenue structure simple (less cost) while some prefer more aesthetically pleasing features, such as matching the McCaslin Boulevard aesthetics
- ◆ Limiting impact to private property is important
- ◆ Discussion with impacted property owners is important
- ◆ Save mature trees
- ◆ Cost of construction could come at a premium due to flood recovery work



Town Board Comments

Additional Info Requested

- ◆ Bridge Replacement vs. Channel Improvements scheduling
- ◆ Could Existing Structure be left in place (deepen channel)
 - No additional depth available.
- ◆ Cost of Superbox with 500-year capacity
 - Could add at least 50% to cost of structure. Channel not designed for 500-year capacity.
- ◆ No consensus on sidewalks
- ◆ Can road surface elevation be raised
 - Not without additional impacts to surrounding properties.



Existing Structure

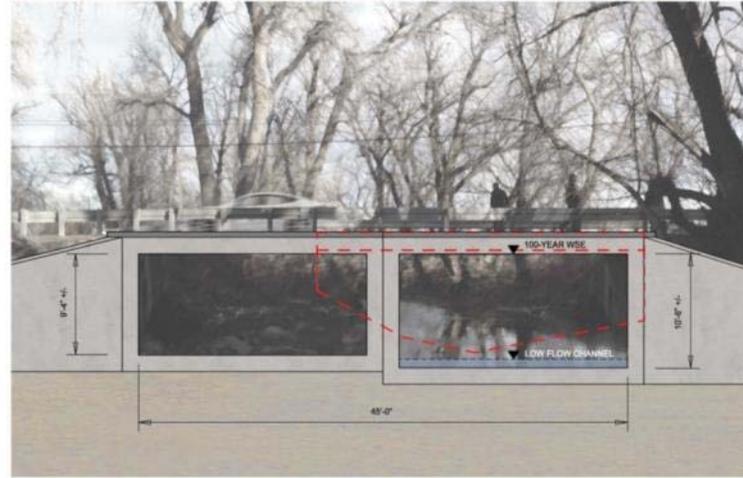
- ◆ Capacity: 1,650 CFS – will accommodate 25-year storm
- ◆ As-builts found, constructed in 1991 (23 years old)
- ◆ Channel invert cannot be lowered
 - Top of footings are only 1 foot below design channel invert
 - Scour hole found near footings after September Flood



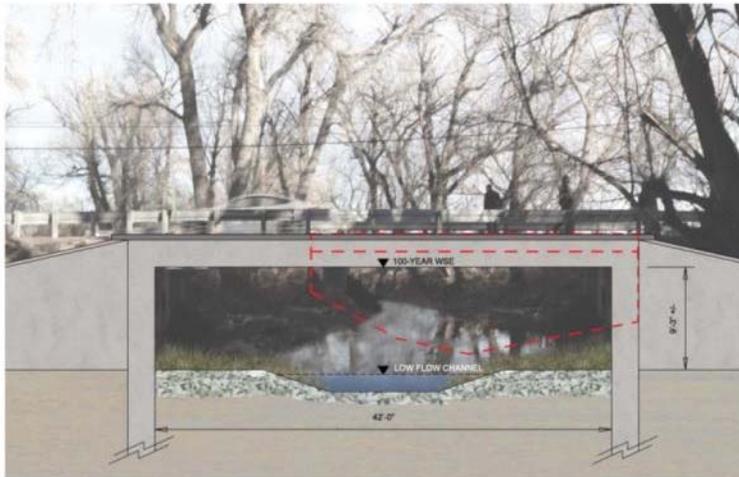
2nd Avenue Structure Options Overview



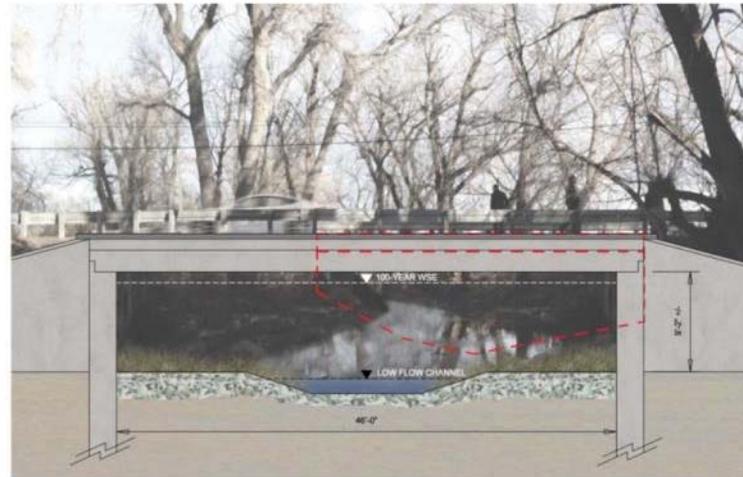
EXISTING STRUCTURE CROSS SECTION



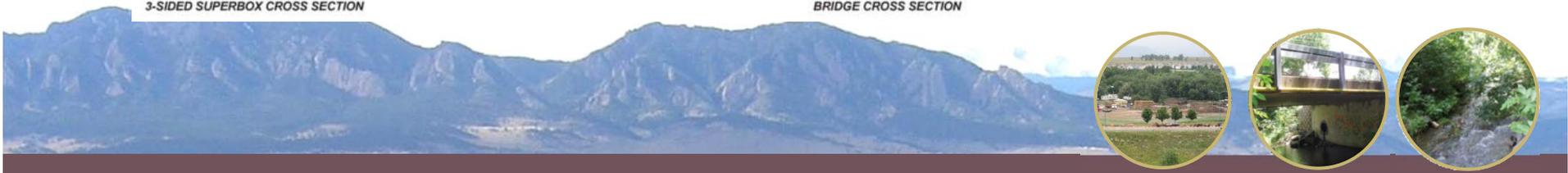
MULTI-CELL BOX CULVERT CROSS SECTION



3-SIDED SUPERBOX CROSS SECTION



BRIDGE CROSS SECTION



2nd Avenue Structure Comparison

Structure Type	Approx. Cost	Flow Capacity	Pros	Cons
Multi-cell box culvert	\$960,000	4,150 cfs *	<ul style="list-style-type: none"> • Fastest construction time (pre-cast) 	<ul style="list-style-type: none"> • Center support • Concrete bottom
3-sided super box culvert	\$920,000	5,100 cfs *	<ul style="list-style-type: none"> • Least expensive • No center support • Natural stream bottom 	<ul style="list-style-type: none"> • Cast-in-place concrete will take longer
Bridge	\$1,050,000	5,750 cfs **	<ul style="list-style-type: none"> • No center support • Natural stream bottom 	<ul style="list-style-type: none"> • Most expensive • Design criteria requires freeboard

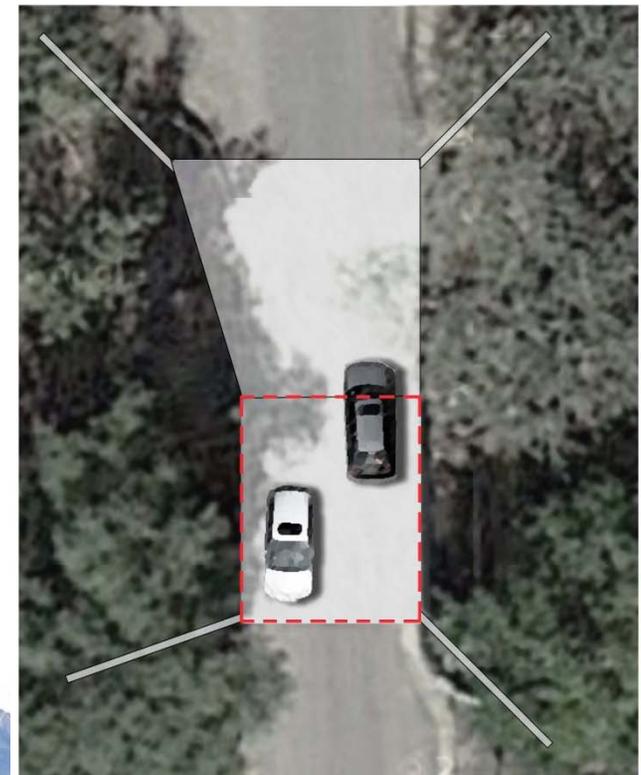
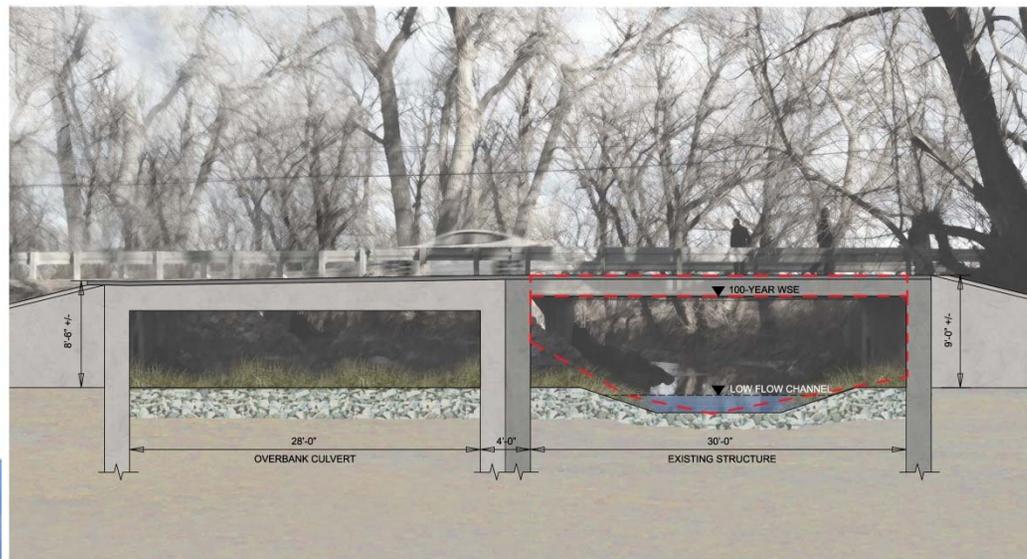
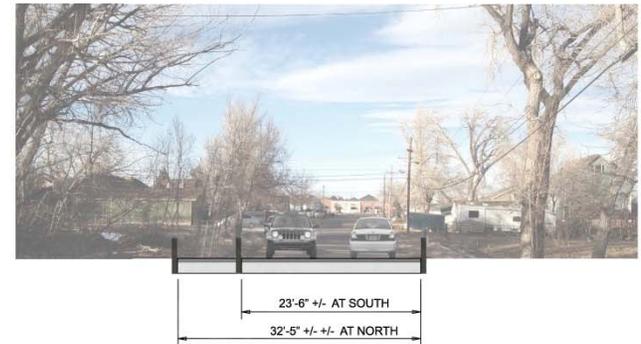
* Structure flow capacity prior to road overtopping in cubic feet per second.

** Bridge flow capacity is with freeboard set to 0 feet in cubic feet per second.



Overbank Culvert Alternative

- ◆ Retain Existing Structure
- ◆ Construct Adjacent Culvert to the north (28 ft x 6.13 ft)
- ◆ Two culverts would have total opening of 420 sq. ft. – same as other options



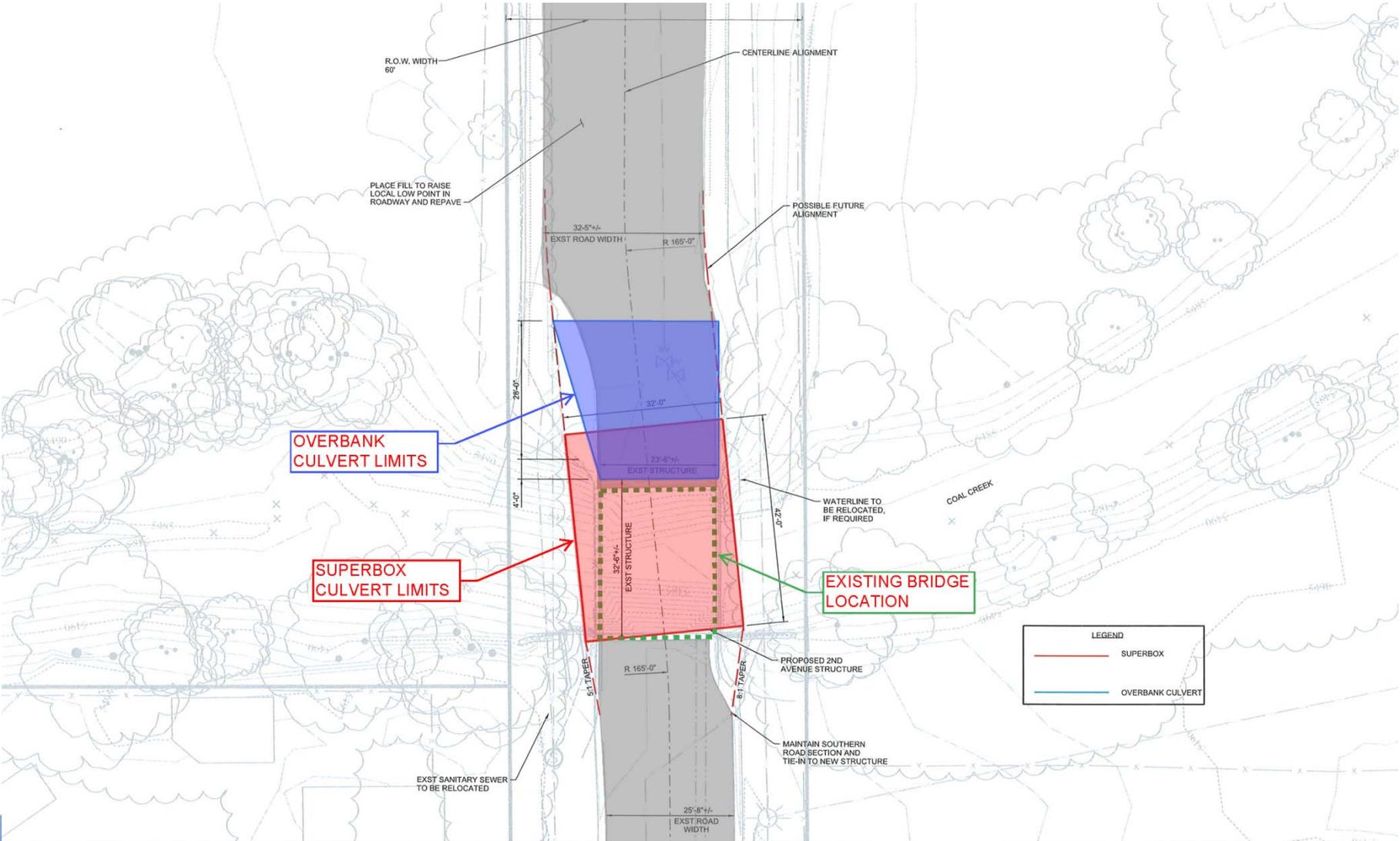
September, 2013 Flood Event



Estimates put the creek flow around 6,000 cubic feet per second, which is between the 100 and 500 year flood event.



Overbank Culvert vs. Superbox



Overbank Culvert Alternative

Pros

- ◆ The existing structure remains in place
- ◆ Significant cost savings compared to other options
 - Allows for additional channel improvements with Phase 1 project
- ◆ Existing channel invert remains largely the same
- ◆ No relocation of existing sanitary sewer & water line
- ◆ Higher invert results in a smaller or no drop structure located upstream (in Phase 1 of this project)
- ◆ No cost for removing the existing structure
- ◆ Faster construction time



Overbank Culvert Alternative

Cons

- ◆ Two openings create center pier and potential debris blockage condition
- ◆ Increased disturbance on the Koprowski property
- ◆ The roadway remains approximately 25 feet wide in the direction of flow, with no bike/pedestrian lanes or sidewalks
- ◆ The skewed roadway alignment would be constrained by the existing structure
- ◆ Two separate structures with different life spans would exist
 - Typical structure life is 50 to 60 years. Existing structure is 23 years old.
- ◆ New guardrail is required for a longer distance



Overbank Culvert Alternative

- ◆ Cost Savings: \$300,000 to \$400,000 construction costs. Additional savings on design and contingency.
- ◆ Cost savings could be applied to additional channel improvements completed with phase 1 project.
- ◆ Recommended by Project Team



Next Steps

- ◆ **Meet with Individual Property Owners, Refine Channel Improvements Concepts**
 - **April and May**
- ◆ **Complete Preliminary Design For All Phases**
 - **April through June**
- ◆ **Final Design/Environmental Clearance**
 - **June through November**
- ◆ **Town Board Approval of 2nd Avenue Structure Construction**
 - **December**
- ◆ **Construction**
 - **January to May, 2015**

