

Vulnerability Analysis



June 2016
Engineering and Construction Division
Paul Danley, Director
Molly Trujillo, Project Manager

What if... South Platte River, 1965



Big Thompson Canyon, 1976



Front Range Flooding, 2013



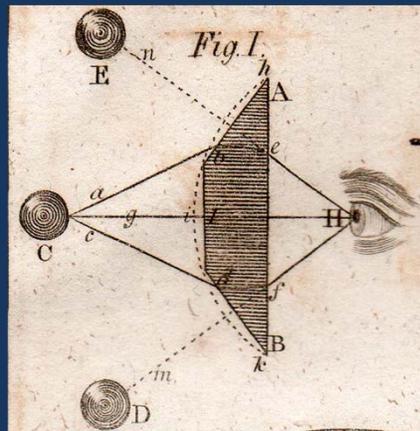
Analysis Goals

- Determine Locations that Pose Significant Risk to Storm Infrastructure
 - Failing or Inadequate
- Homes and Buildings in the Existing Floodplain
- Prioritize Projects
 - Reduce the Risk of Loss
 - Remove Structures From Floodplain



Analysis Sources

- Stream Channel Inventory
- Drainage Basin Master Plans
- Floodplain GIS Analysis
- Staff and Other Observations

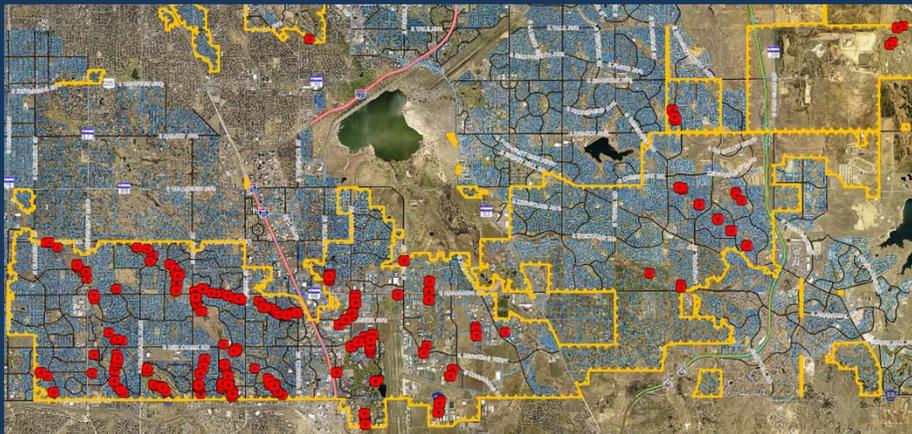


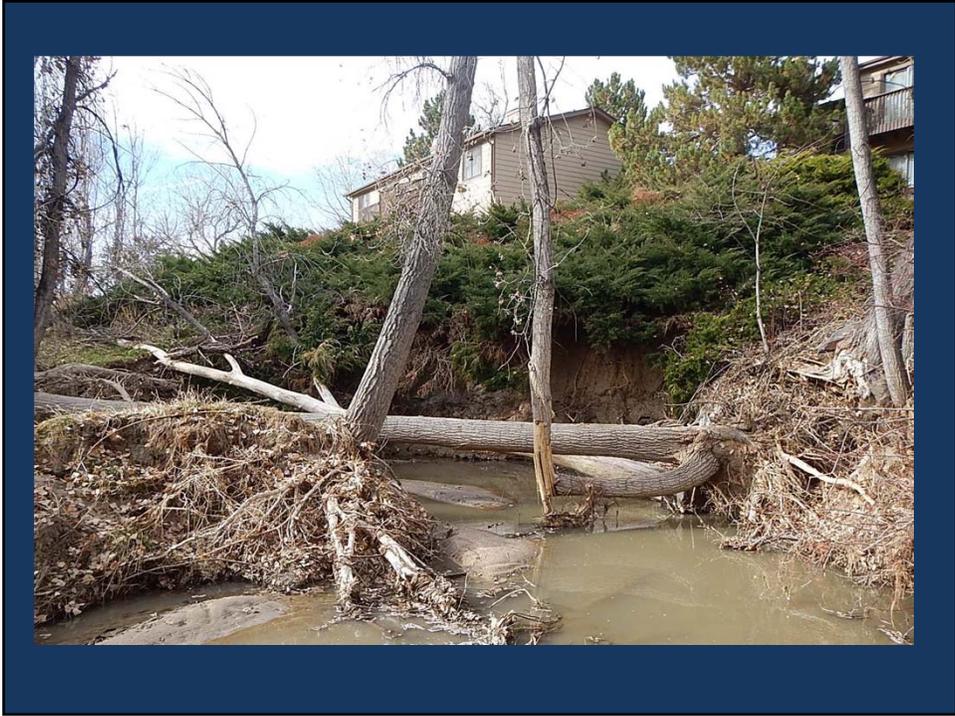
Stream Channel Inventory

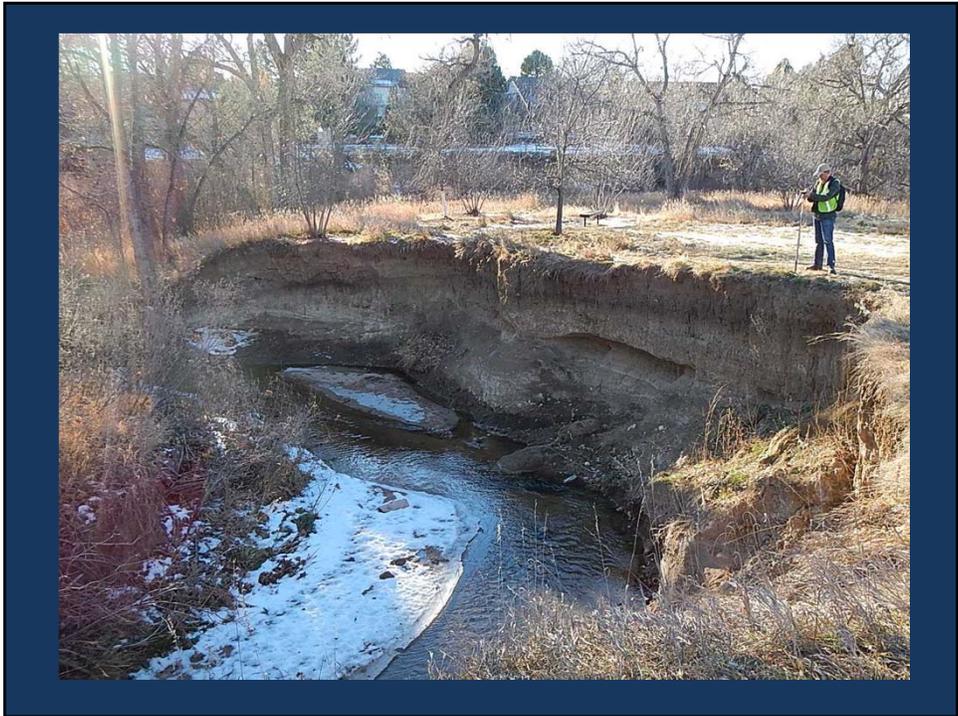
- Consultants Walked and Documented Condition of Channels
- Photo Records Tied to GIS
- Located Problem Areas and Photos of “Erosion Points”



Stream Channel Inventory







Drainage Basin Master Plans

Little's Creek Major Drainageway Plan

A collage of images related to drainage basin master plans. The top left shows the cover page for the "West Toll Gate Creek Major Drainageway Plan" with logos for the City of Evans and Southeast Mass Sewerwater Authority. To the right is a landscape photo of a green field. Below these is a map of the "Big Dry Creek (Downstream of County Line Road) Major Drainageway Plan" showing a street grid and drainage lines. At the bottom is a row of four smaller photos showing different drainage features: a stream in a field, a stream with a bridge, a stream with a culvert, and a stream with a bridge.

Drainage Basin Master Plans

- Master Plans Completed in Partnership with UDFCD
- Identify Condition and Storm Capacity Concerns
- Include Conceptual Design and Costs of Projects

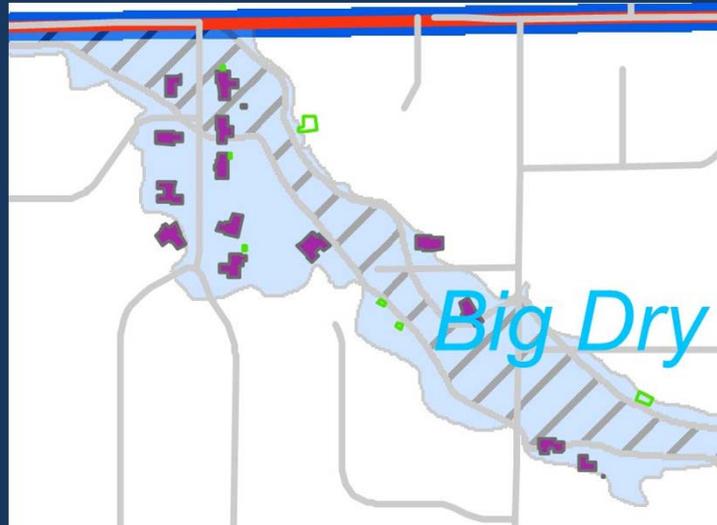


Floodplain Analysis

- Overlaid Mapping of Insurable Structures (Homes and Commercial Buildings) Over the FEMA Floodplain In GIS
- Reviewed Locations where a Project (road crossing, bridge, channel) Could Remove Buildings from the Floodplain
- Feasible Projects Identified



Floodplain Example



Projects Identified

- Projects Identified from All Sources
 - Stream Inventory
 - Master Plans
 - Floodplain Analysis
- Projects Lower the Long Term Risk; Some Remove Buildings from Floodplain



Stream Inventory Project Example



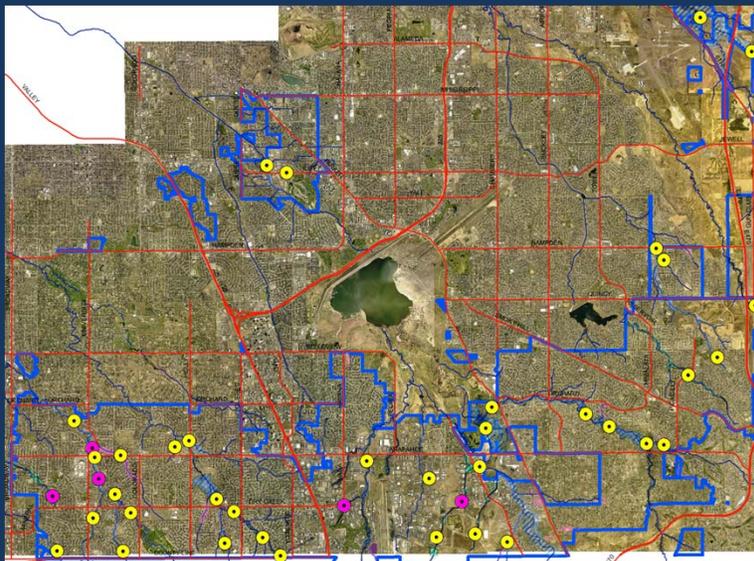
Master Plan Project Example



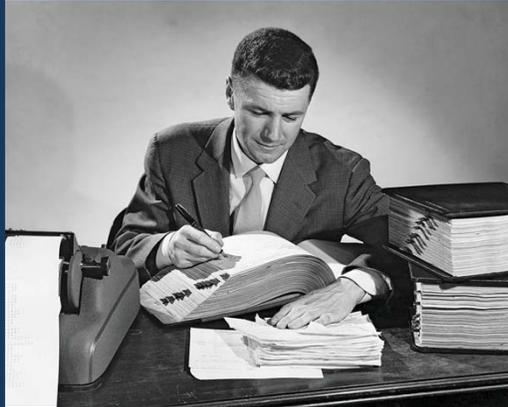
Floodplain Example Project



Priority Projects



Cost Of Projects



Identified Costs From Master Plans

- Recent update of all Master Plan Cost Estimates for use in Basin Fee Updates (SDFs/ECFs)
- Total of Projects Identified in Master Plans **\$160 Million!**



Costs From Stream Inventory

- Costs at Identified Locations Derived From Master Plans
- Overall Costs for All Projects (Not Ranked) From Stream Inventory \$60 Million

Stream Name	Project Description	Stationing	Year	Cost 1	Cost 2	Notes
Small Creek			2010			water flowing out
Small Creek	Douglas County - No MP improvements	N/A	2010			scouring from pe
Small Creek	Douglas County - No MP improvements	N/A	2010			erosion caused b
Small Creek	Douglas County - No MP improvements	N/A	2010	\$	\$	detention pond
Small Creek	Douglas County - No MP improvements	N/A	2010			overflow flow from left bank
Toll Gate	Reach 6 - limited channel stabilization and pond	549+00 to 551+00	2012			
Toll Gate	Reach 6 - limited channel stabilization and pond	549+00 to 551+00	2012	\$ 326,140.00	\$ 355,318.93	
Small Creek	Reach 9 - grade control, limited channel stabilization	260+00 to 285+00	2012			headcutting
Small Creek	Reach 9 - grade control, limited channel stabilization	260+00 to 285+00	2012			headcutting
Small Creek	Reach 9 - grade control, limited channel stabilization	260+00 to 285+00	2012	\$ 1,340,502.00	\$ 1,460,433.35	headcutting
Small Creek - Unnamed	grade control and bank stabilization	Reach 2	2014			headcut erosion
Small Creek	grade control and bank stabilization	Reach 2	2014			headcut erosion
Small Creek	grade control and bank stabilization	Reach 2	2014	\$6,541,744	\$ 6,802,943.02	headcut erosion
Small Creek	Str. Channel, (not including box culverts)	Reach 6	2011	\$ 1,153,181.19	\$ 1,302,712.85	vertical erosion
Toll Gate	Check Structures	Reach 1	2011	\$ 541,365.00	\$ 611,563.17	N/A
Toll Gate	Channel Improvements, D/WQ Facilities	Reach 2	2011	\$ 5,096,540.00	\$ 5,757,402.42	N/A
Toll Gate	Channel Improvements	Reach 3-2	2011	\$ 354,395.00	\$ 400,348.99	N/A
Toll Gate	Drop Strs, Channel Imprv.	Reach 4	2011	\$ 2,971,125.00	\$ 3,356,387.32	N/A
Small Creek	Proposed Channel Stabilization	Sta 6850 to 9700	2011	\$ 507,417.00	\$ 573,213.17	SEMSWA Main
Small Creek	Blackhawk Pond	Sta 13300 to 14000	2011	\$ 705,270.00	\$ 796,721.54	Need pond to re flooding issues
				\$ 52,323,863.79	\$ 60,048,623.93	

Cost Of Priority Projects

- Projects From All Sources Reviewed, Selected and Ranked
- Cost Estimate Totals \$43 Million
- Of Which \$5 Million are Floodplain Projects

Project Name	Quantity	Unit Cost	Total Cost	Notes
Willow Creek Quebec to Dry Creek - Phase 2 (44+00 - 76+00 MDP)	1	\$ 1,200,000.00	\$ 1,200,000.00	
South Tucson Way - missing storm sewer outfall to Lone Tree Creek	1	\$ 500,000.00	\$ 500,000.00	
Green Acres Trib WQ Pond	1	\$ 950,000.00	\$ 950,000.00	Pond required based on Dove Valley Dev
Piney Creek Projects Funding (SEMSWA Funding)	1	\$ 7,000,000.00	\$ 7,000,000.00	SEMSWA's share of \$14M Total Projects f
East Toll Gate Pond at Quincy (to County)	1	\$ 1,200,000.00	\$ 1,200,000.00	
1111 Avenue Storm Drainage (Funding to County)	1	\$ 1,200,000.00	\$ 1,200,000.00	
Cherry Creek Reach 2 (SEMSWA funding)	1	\$ 1,600,000.00	\$ 1,600,000.00	SEMSWA led project to stabilize Cherry C
Unnamed Creek Mesa Park Projects	1	\$ 600,000.00	\$ 600,000.00	
Piney Creek Reach 1 to 2 (at Fresier Ct)	1	\$ 1,000,000.00	\$ 1,000,000.00	Upstream and Downstream of Fresier Ct
809 University Blvd. Bridge Replacement	1	\$ 1,000,000.00	\$ 1,000,000.00	Removes 6 homes from Floodplain
BD11 - Easter Crossing remove trail / channel improvements	1	\$ 600,000.00	\$ 600,000.00	Remove sediment prone trail underpass
Big Dry Creek - Arapahoe Road Bridge	2	\$ 500,000.00	\$ 1,000,000.00	
Unnamed Creek Reach 9 Stabilization	2	\$ 1,500,000.00	\$ 3,000,000.00	U/S Eagle Ridge HS, trail crossing replac
Willow Creek Downstream of Tennis Courts/Park	2	\$ 1,400,000.00	\$ 2,800,000.00	
Willow Creek D/S Countyline Rd	2	\$ 100,000.00	\$ 200,000.00	Beetree - erosion along new SSPR trail
BDC - Fillmore Trib. At East Jamison Ave	2	\$ 2,500,000.00	\$ 5,000,000.00	Reach F3 Exposed Sanitary (MDP) Includi
BDC - Reach BD12 Erosion downstream of Dry Creek Rd	2	\$ 850,000.00	\$ 1,700,000.00	
BDC - Reach BD2 DeLorenso Park bank and channel stabilization	2	\$ 1,100,000.00	\$ 2,200,000.00	
BDC - Nobles Trib @ Arapahoe Road culvert/ storm sewer capacity	2	\$ 600,000.00	\$ 1,200,000.00	
BDC - Otero Trib D3 and Phillips Crossing	2	\$ 1,400,000.00	\$ 2,800,000.00	"Swimming hole" and Phillips Crossing
West Tollgate Creek - Reach 9 channel stabilization (MDP 549+00 to 2)	2	\$ 400,000.00	\$ 800,000.00	Reach 6 - limited channel stabilization a
Liberty Hills Trib to D/S of Arapahoe Rd	2	\$ 750,000.00	\$ 1,500,000.00	Severe bank erosion along S Fairfax Way
Unnamed Creek Hampden Ave EURV Pond Retrofit	2	\$ 1,000,000.00	\$ 2,000,000.00	Pond Retrofit to formalize Detention & V
Willow Creek D/S Dry Creek Rd	2	\$ 400,000.00	\$ 800,000.00	Localized bank stabilization and check s
Lee Gulch - Clarkson sediments / erosion	2	\$ 900,000.00	\$ 1,800,000.00	MDP coming 2015-16
Cottonwood Creek Exposed Bridgehead Stabilization & Pond	2	\$ 500,000.00	\$ 1,000,000.00	Reestablish eroded bank areas
Coal Creek at Picadilly (Road Overtopping)	2	\$ 1,500,000.00	\$ 3,000,000.00	Stream channel imp. and future Cost Par
Coal Creek at Gun Club Rd (Road Overtopping)	2	\$ 800,000.00	\$ 1,600,000.00	Stream channel imp. and future Cost Par
Little Dry Creek Clarkson Pond (Floodplain)	2	\$ 1,200,000.00	\$ 2,400,000.00	15 to 20 houses out of the FF
Spring Creek (East) Bank Stabilization	3	\$ 1,300,000.00	\$ 3,900,000.00	May be higher priority after scoping w/ S
Dove Creek U/S Pond D-1 to Chambers Rd	3	\$ 600,000.00	\$ 1,800,000.00	Start Design
Windmill Creek D/S Airport Runway	3	\$ 500,000.00	\$ 1,500,000.00	D/S of 60" pipe extension (wetlands, tre
Little Dry Creek & Willow Creek Confluence at Holly and S. Forest W	3	\$ 1,000,000.00	\$ 3,000,000.00	Area D/S Holly Dam
Cherry Creek - Hill to County Line (UDPCD Funding)	3	\$ 500,000.00	\$ 1,500,000.00	UDPCD led project to stabilize Cherry Cr
Cherry Creek Reach 3 & 4 (SEMSWA Funding)	3	\$ 2,100,000.00	\$ 6,300,000.00	UDPCD led project to stabilize Cherry Cr
Cottonwood Creek Tributary C (Floodplain)	3	\$ 1,500,000.00	\$ 4,500,000.00	2 commercial buildings in FF, Increase s
Windmill Creek Blackhawk Pond	3	\$ 800,000.00	\$ 2,400,000.00	Needed to alleviate flooding D/S at Fra
			\$ 42,550,000.00	

Next Steps

- Projects will form the Basis for a 10-year CIP Plan
- Use in Budget and Planning Process with UDFCD
- Ongoing Analysis and Revision of Priority Projects List



Questions and Discussion

