

To Move a River

Saving Loveland's Water Supply

City of Loveland

Ayres Associates

Tetra Tech

CEI (Concrete Express)

Ward Construction

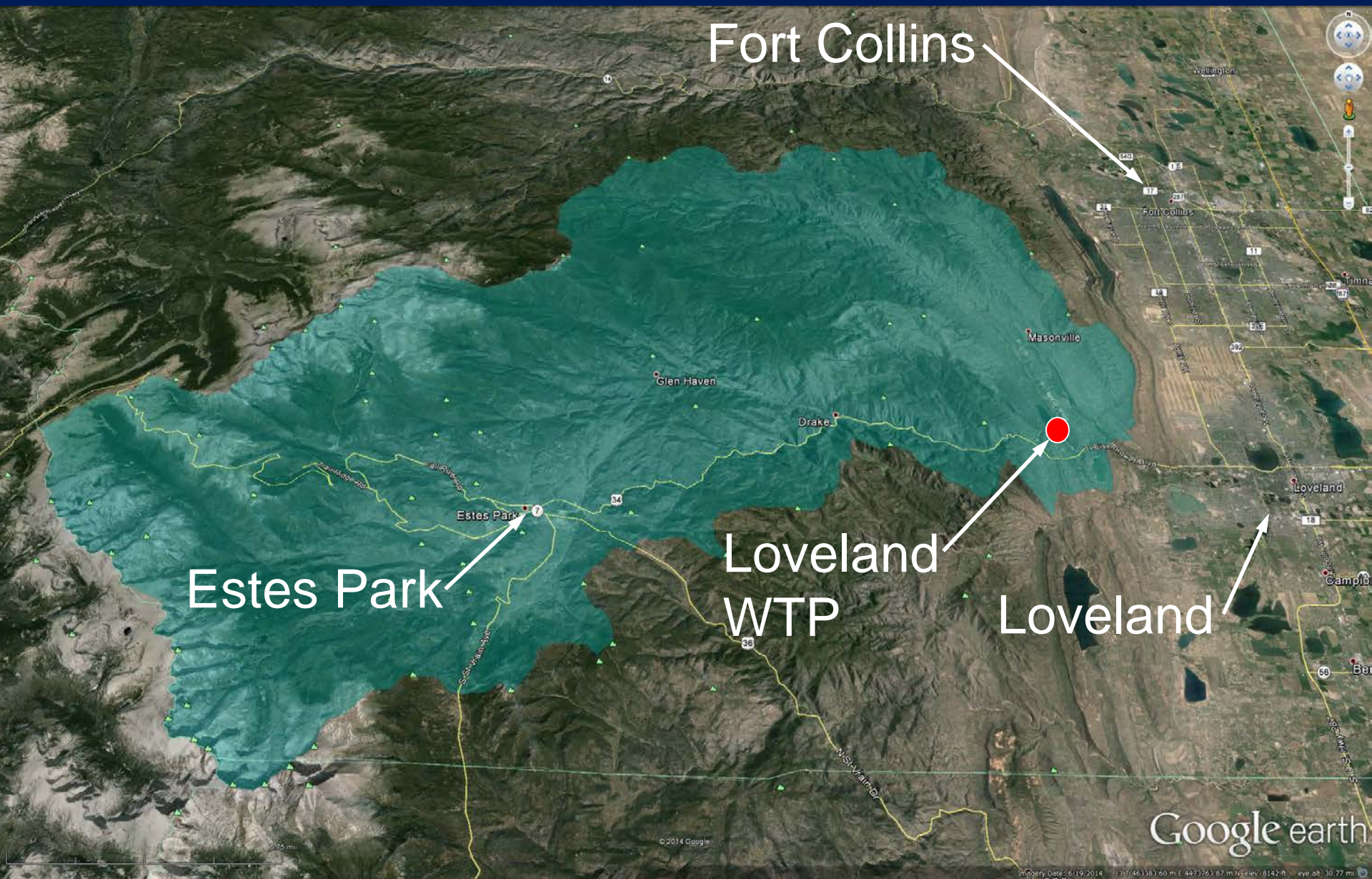




The 2013 Storm

- NWS predicting 2-4 inches of rain in a monsoon like event over 5 days – no worries
- In 3-4 days, between 5 and 19 inches fell across the Front Range!
- 16.7” in Drake; Estes Park >8”
- Entire Big Thompson Watershed floods!
- 15,500 cfs at canyon mouth
- 19,000 cfs in Loveland

The Big Thompson Watershed



What does 19,000 cfs look like?









Loveland Water Treatment Plant

- Serves > 25,000 taps
- 6.4 MGD winter; 19.1 MGD summer average
- 28 MGD peak demand
- 2 intakes
- 3 water transmission pipelines:
 - 20" Cast Iron Pipe (1941)
 - 36" Steel Pipe (1961)
 - 48" Steel Pipe (1981)
- WTP sits above 500-year floodplain
- Not damaged in 1976 Big Thompson Flood

Signs of Trouble!

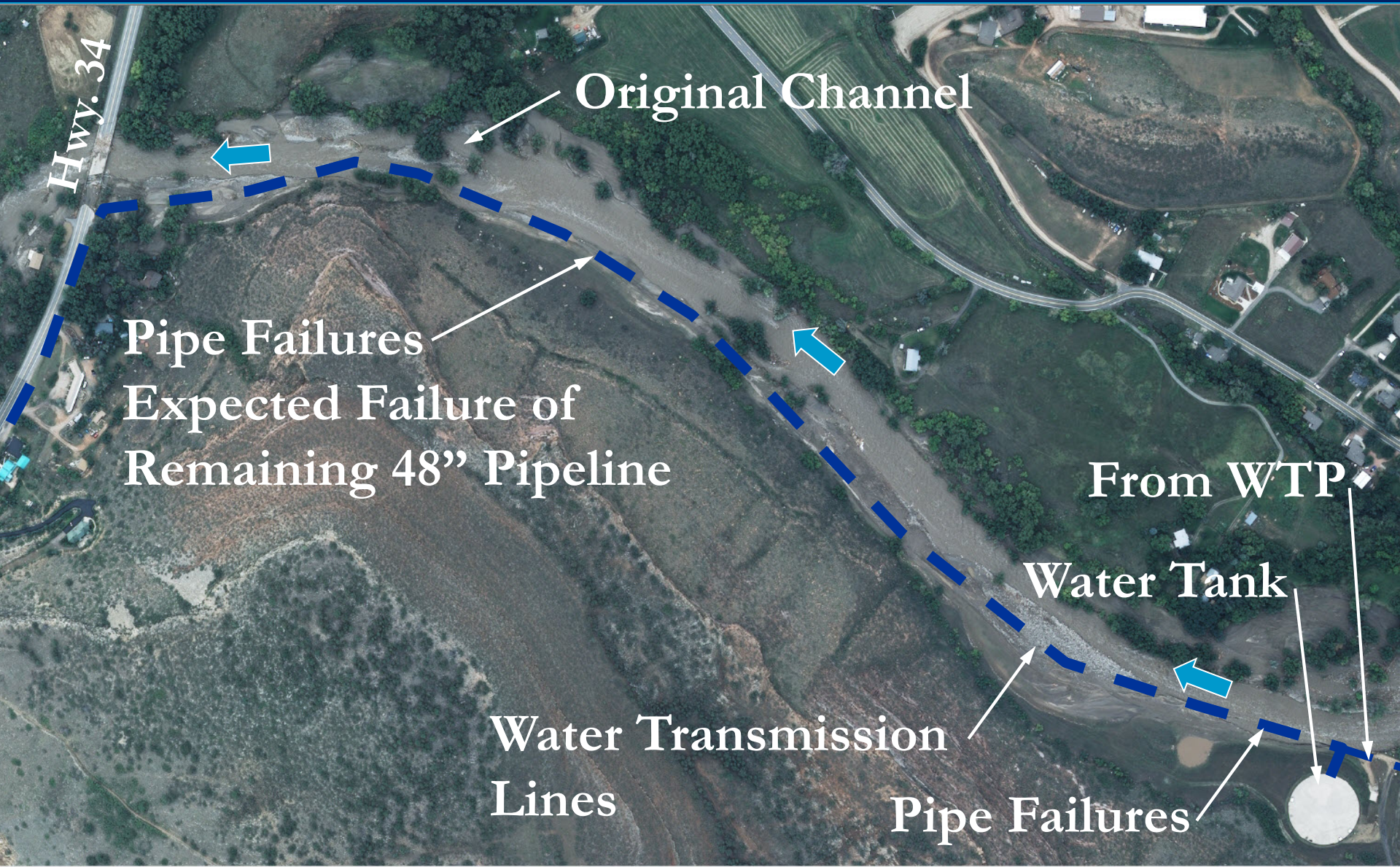
- Lost power to the WTP
- LCR-29 & Hwy. 34 wash out
- All communication lines & internet lost
- Stream gages destroyed
- Loveland split in half
- WTP intake heavily damaged – shut down
- 20-inch & 36-inch water transmission lines destroyed
- Remaining 48-inch line in great danger!

72-hours of hope, sweat, and struggle



Destroyed 20- & 36-inch
pipelines

The Plan – Engineering on the Fly



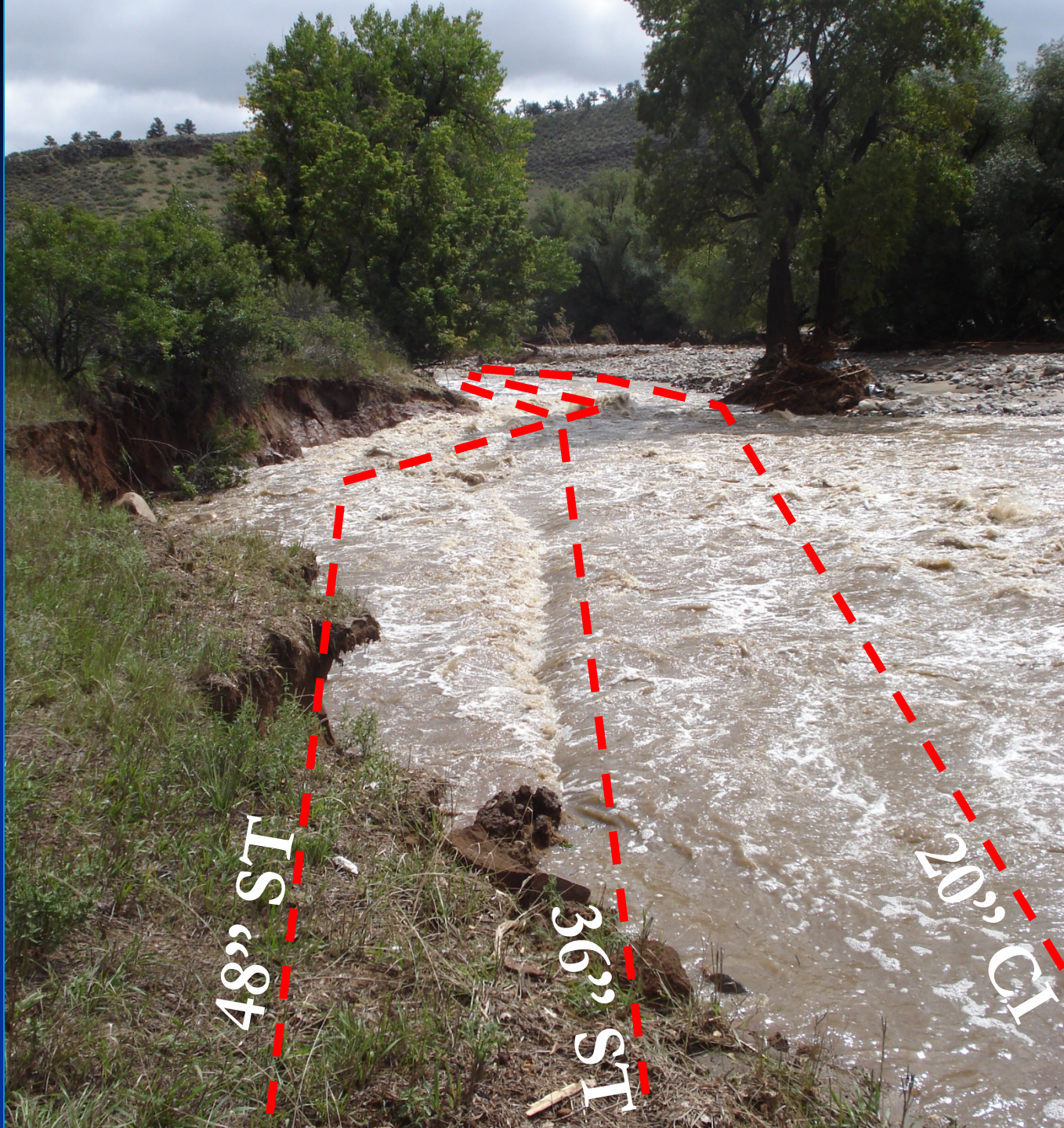


Highway 34

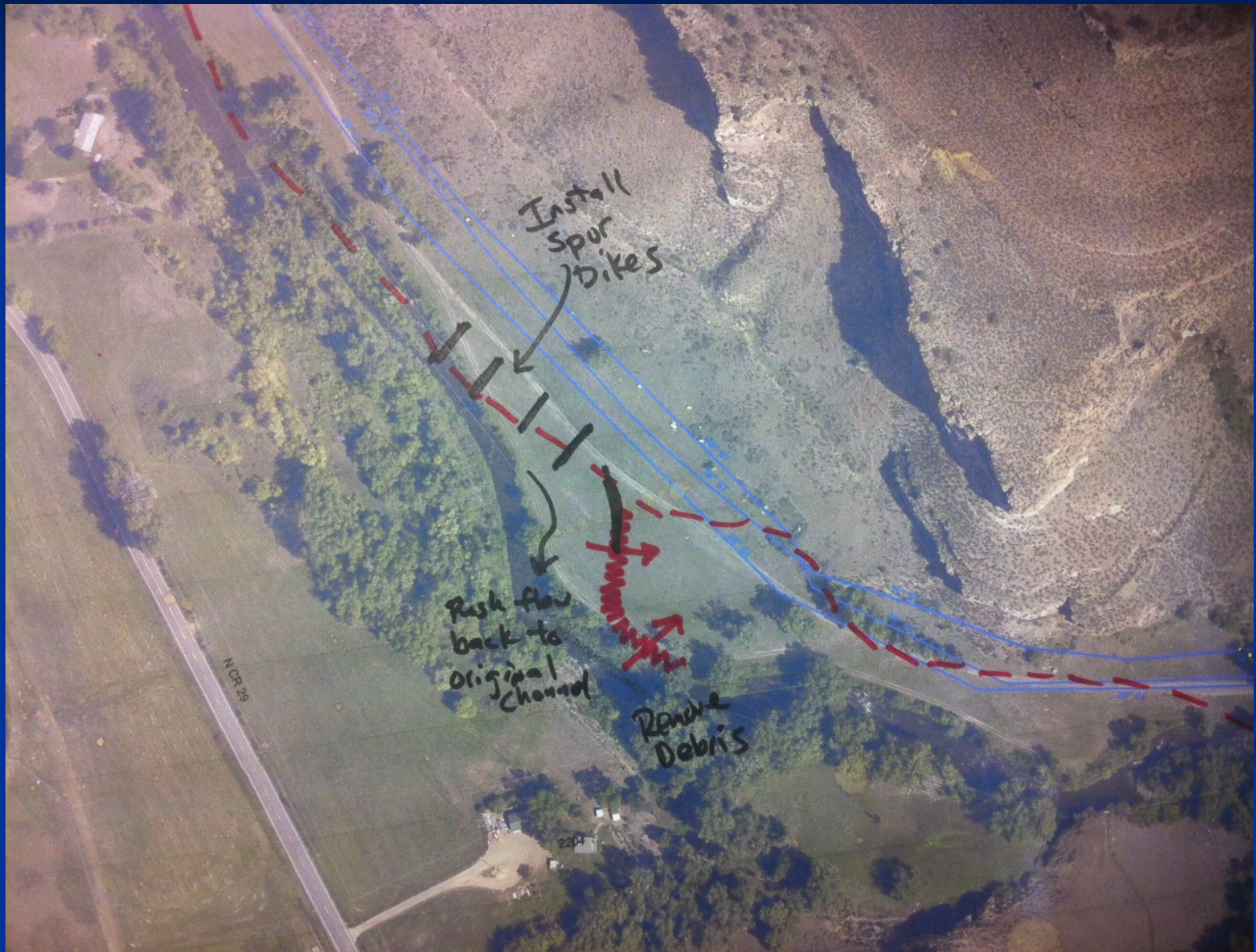
Water Transmission
Lines

Original
Channel

New Channel



Final Design Drawing!



Problems or Opportunities to Innovate?

Build a Road in 24 Hours



Get your own #@%! riprap, man!



Do we need a permit for this?



Construction staking emergency style



Cutting off an
upstream side
channel before
installing spur #1





Bank erosion at
the exposed
waterlines



Historic
Channel

5-6 feet of sediment
filled in the historic
channel



Spur #1 – It begins!



Are you kidding me?





Spur #2 – It keeps disappearing!

















“Beaver Dam” building













SUCCESS!!!













Water in the
cab - Keep
your feet up!





Time Lapse Video



Why this project?

- Absolutely critical to the public's health, safety, and welfare
- Laid the groundwork for permanent repairs
- Full of innovative, unique & creative solutions to overcome enormous obstacles
- Collaborative, team management
- Met a 72-hour schedule with no budget & limited sleep!

Lessons Learned

- Importance of relationships & trust
- Success of a collaborative team & project management
- Never doubt the unexpected
- Enormous stress & pressure – but remember to smile!
- The technical approach worked

To Move a River Saving Loveland's Water Supply Thank you!

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