

# Union Pacific Railroad Culvert Closure & Bridge Construction Project, Great Salt Lake Causeway

Great Salt Lake Advisory Council  
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**BUILDING STRONG**<sup>®</sup>



# Clean Water Act

- Section 404
  - Requires that a permit be obtained from the Corps prior to discharging dredged or fill material into “waters of the United States, including wetlands.”
  - Great Salt Lake is a navigable water of the United States per Federal Court decisions.

# Types of Section 404 Permits

- General Permits – Minimal Impacts
  - GP 40s
  - Nationwide Permits – Specific Activities
  - 45-60 Days
- Standard Permits – More than Minimal Impacts
  - Letter of Permission
  - Individual Permit
  - 120 Days – Includes Public Comment

# UPRR Application

- Applied under Nationwide permit procedures
  - Total permanent impacts under ½-acre threshold
  - Temporary impacts to be entirely removed
  - Most NWPs do not require external agency coordination
    - Pre-application Meeting in Feb 2011
    - August 2011 Application Meeting

# East and West Culverts

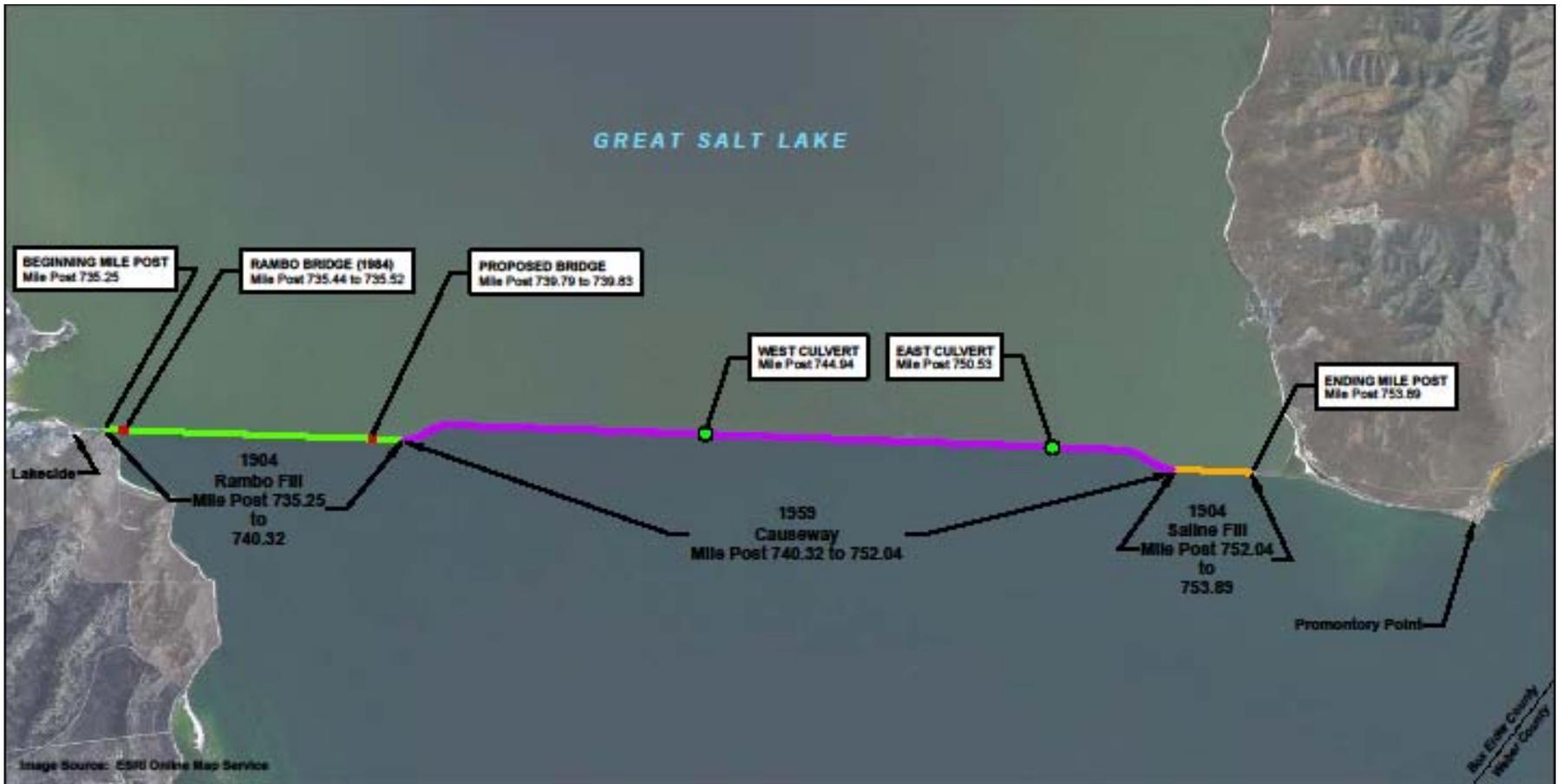
- Culverts constructed as part of 13-mile 1959 Causeway section replacing Trestle
  - Culverts 15 feet wide by 21-22 feet deep
  - Placed to allow flow and boat traffic
  - Now almost totally submerged
  - Culverts deteriorating, cracks first observed 2005, continue to enlarge

# Photo of East Culvert – July 2011



# Proposed Project

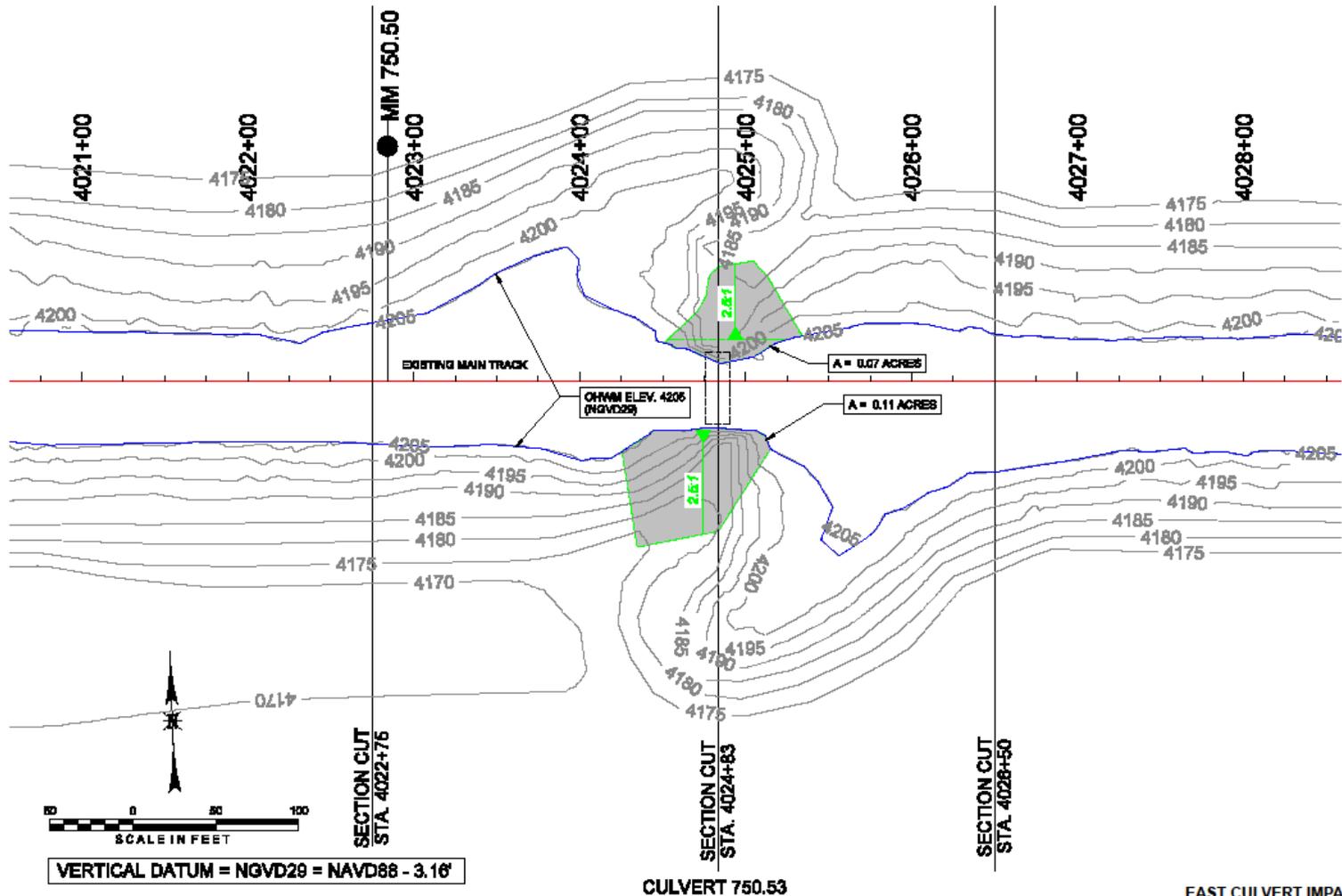
- Close Failing Culverts, rather than replace
- Replace Culverts with Construction of 180-foot-long concrete pile-supported bridge
- Construct temporary shoofly track segment to allow continued train traffic
- Permanently fill culverts after new bridge in place
- Removal of temporary shoofly fill



Aerial of East Culvert at MP 750.50



# East Culvert Impacts



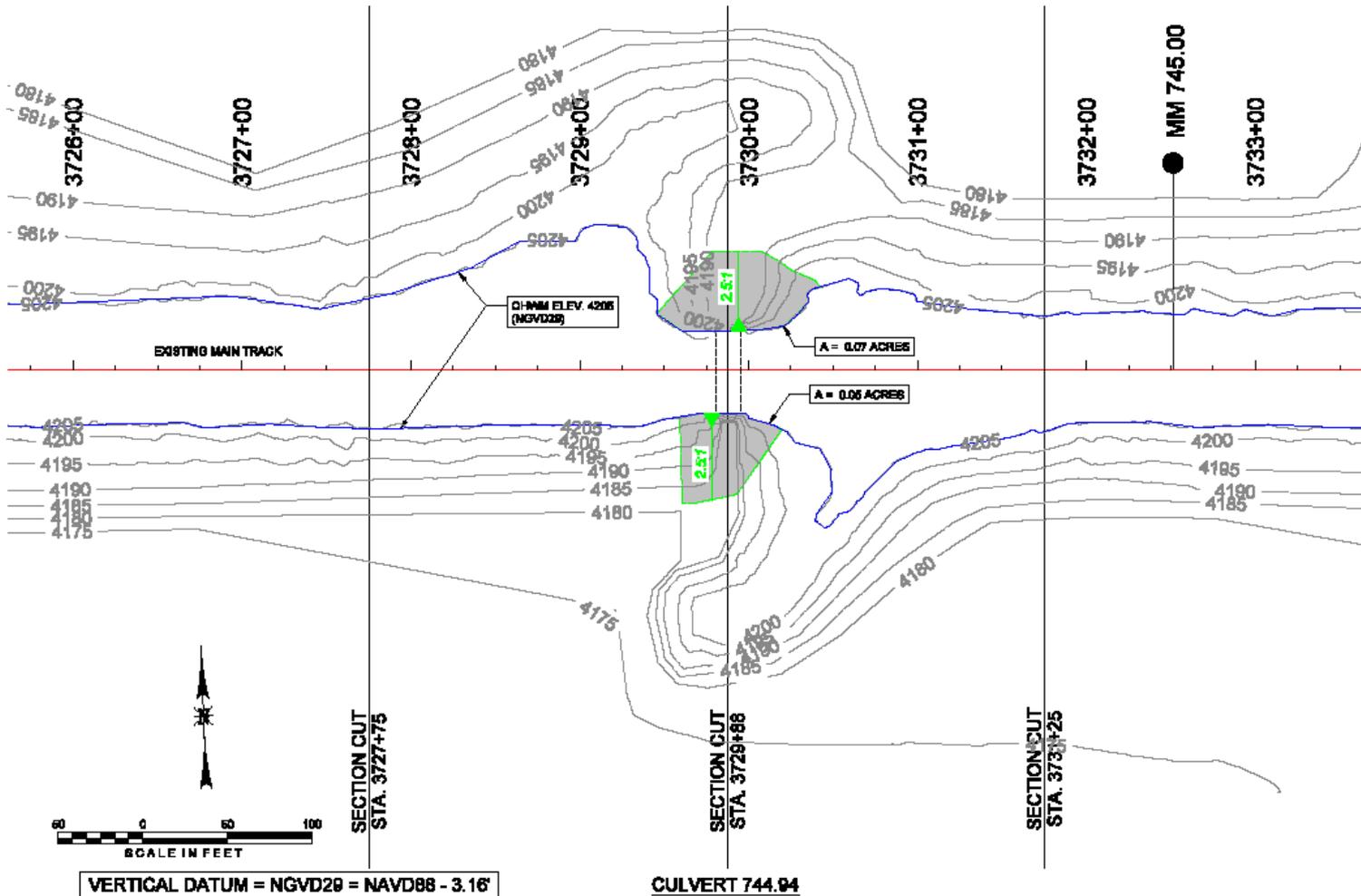
**CULVERT 750.53**

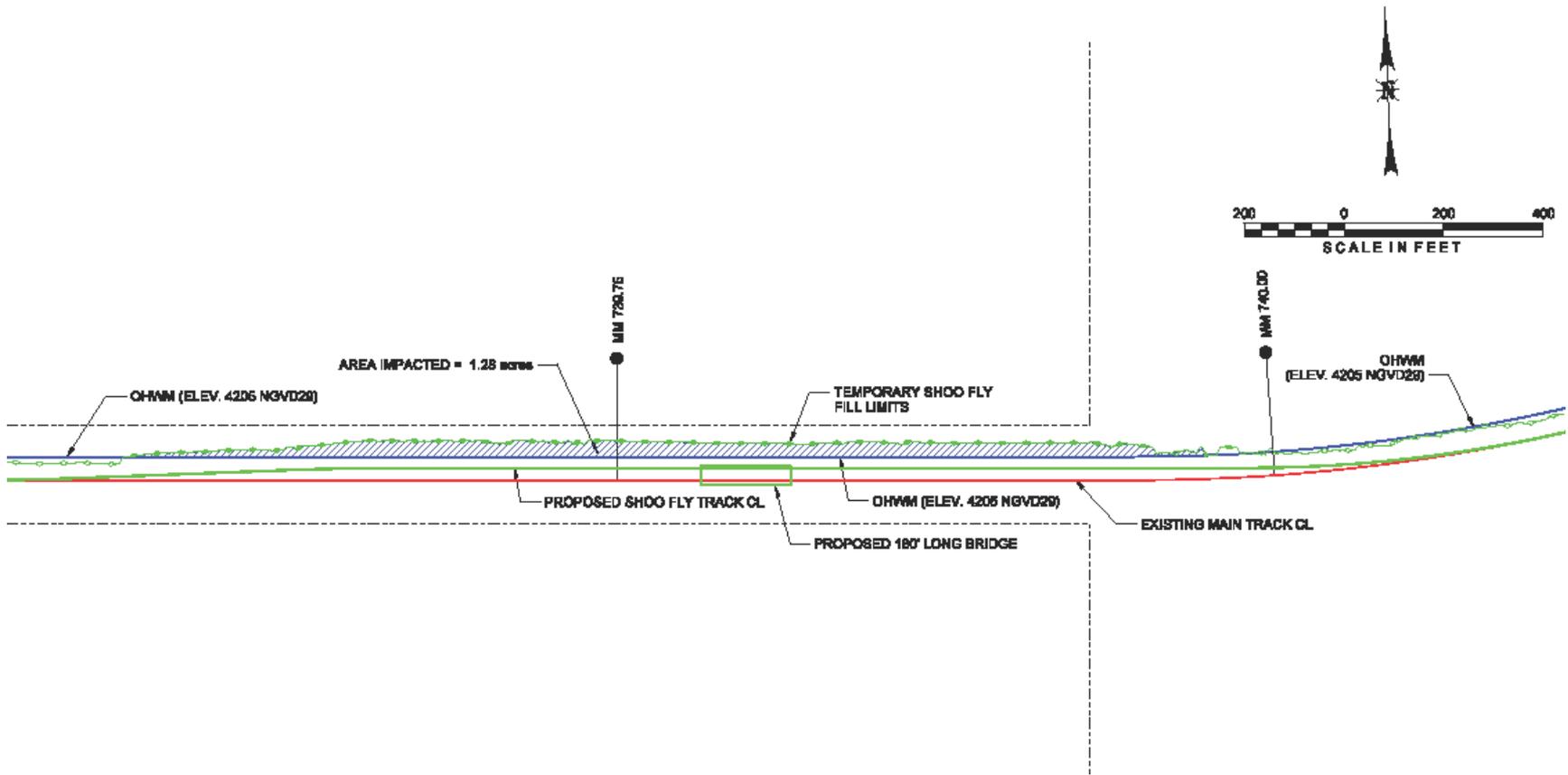
**EAST CULVERT IMPACTS**  
UPRR GSL CAUSEWAY - USACE APPLICATION

# Aerial of West Culvert at MP 744.95



# West Culvert Impact Area





New Bridge and Temporary Shoofly Track Impact Area



# Bridge Construction Sequence

- Construct shoofly north of existing causeway
- Riprap fill from Lakeside Quarry; >2 ft diameter
- Construct bridge in north and south sections, three 30-foot spans each
- Seven pile bents for entire bridge. Seven 24-in steel casings with conical tips in each bent
- After piles driven, will be filled with concrete
- Southern half of bridge to be constructed first
- Will drive piles for south side of bridge

# Bridge Construction Cont'd

- Install bridge superstructure and backfill
- Install ballast, ties, rail, etc., for track
- Rail traffic restored to new alignment but maintenance road traffic will still use shoofly
- Construct north half of new bridge
- Install sub-ballast for maintenance road
- Open and operate maintenance road
- Remove shoofly and excavate causeway beneath bridge to grade

# Proposed Bridge Geometry

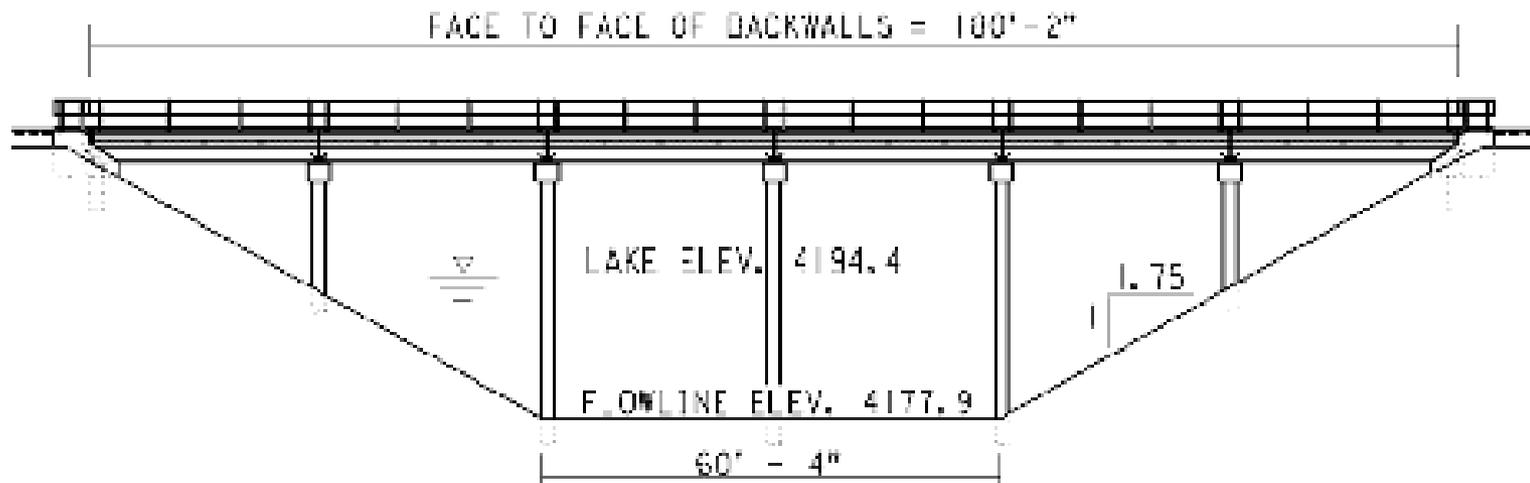


Figure 6 Proposed Bridge Geometry

# Bridge Design Approach

- Different location and opening shape, not possible to match existing bi-directional flows
- Goal to size bridge opening to allow similar north to south bidirectional flow as culverts
- Culverts both have inside width of 15 feet, water depths 20.8 ft West and 22.3 ft East
- Determining existing flows and calculating flows thru proposed structure is complex due to multiple variables, some vary over time

# Design Approach

- Simplified Approach was used to estimate bidirectional flows
- Assumptions made affected calculated flows but consistent assumptions used all locations
- Bernoulli's Theorem used to relate pressure to velocity
- Bridge opening selected to allow N to S flow in lower water column to match existing N to S
- Proposed opening will allow adaptive mods

# Analysis and Flow Modeling

- Our office does not have expertise with flow modeling
- Agencies and Corps met with UPPR in August
- Everyone acknowledges that many unknowns with the modeling and analysis used
- Analysis used lake elevation from Feb 2011, concerns analysis didn't model varying lake levels, that Bernoulli's principle alone not valid predictor of flows
- Post-construction monitoring will be needed to evaluate effects
- All agree with need to implement adaptive management measures to mitigate adverse water quality effects

# Where We Are in Process

- Letters sent to Ute and Shoshone tribes
- Section 106 Consultation Letter to SHPO
- Agency Comments are under review by Corps and Union Pacific Railroad
- Division of Water Quality requested specific additional 401 conditions if NWP to be issued
- Adaptive management and monitoring will be special conditions of our authorization

# Questions

# Thank You

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