

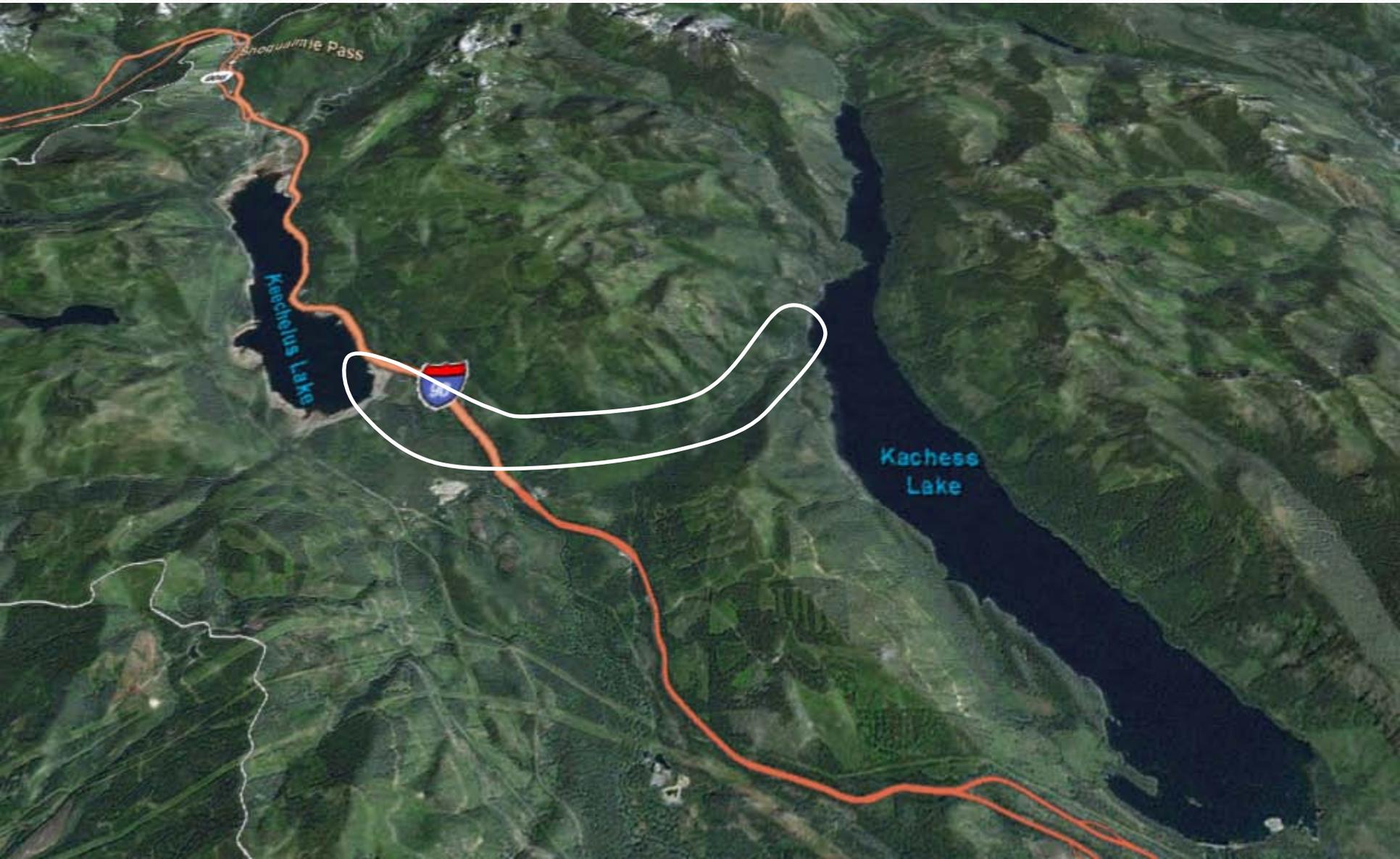
Validation of Previous Studies – Conceptual Engineering Results for Water Supply Structural Projects

Yakima River Basin Study
Workgroup Meeting
July 18, 2010



Keechelus to Kachess (K to K) Conveyance

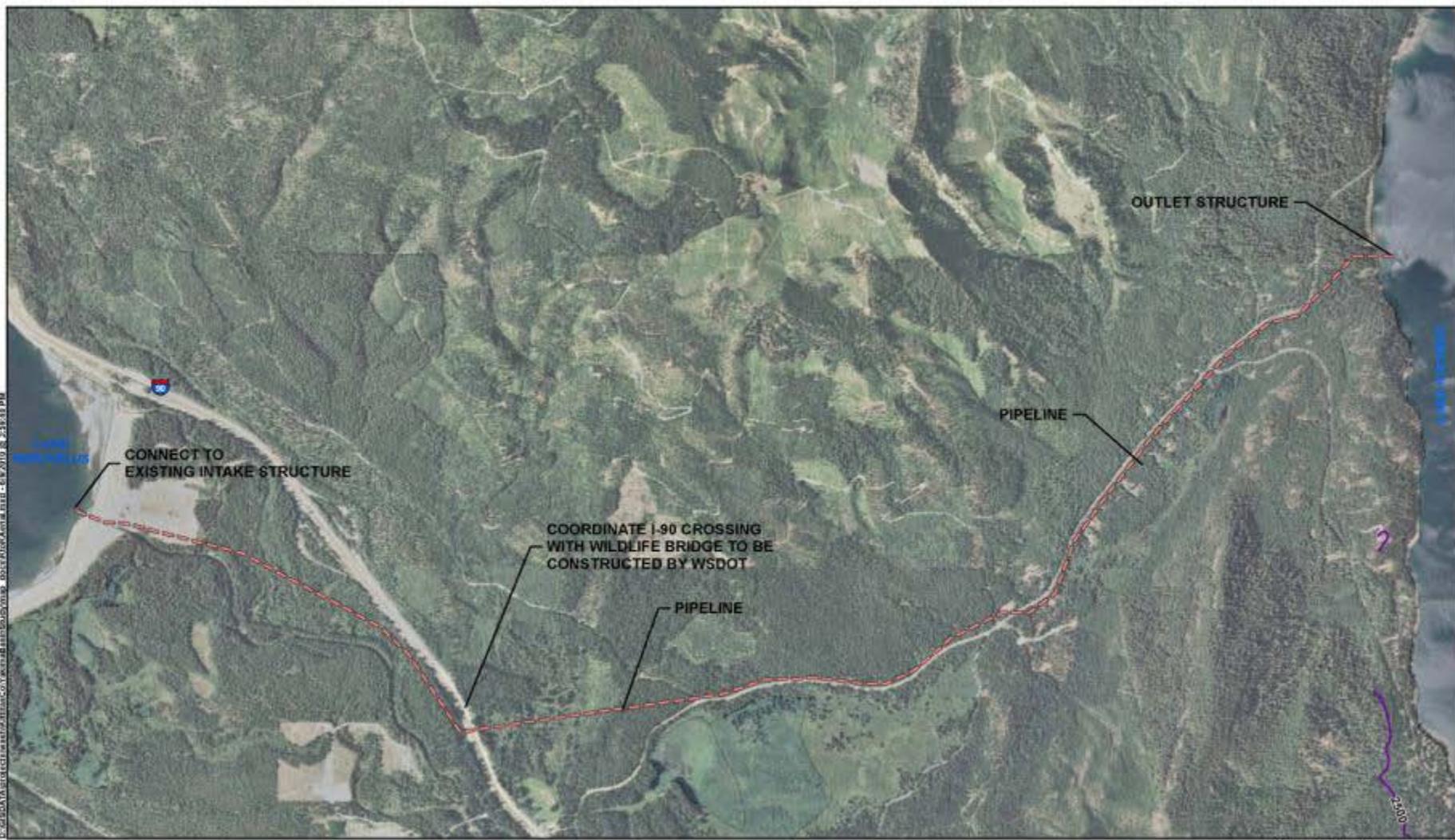
K to K Project Location



K to K Design Criteria

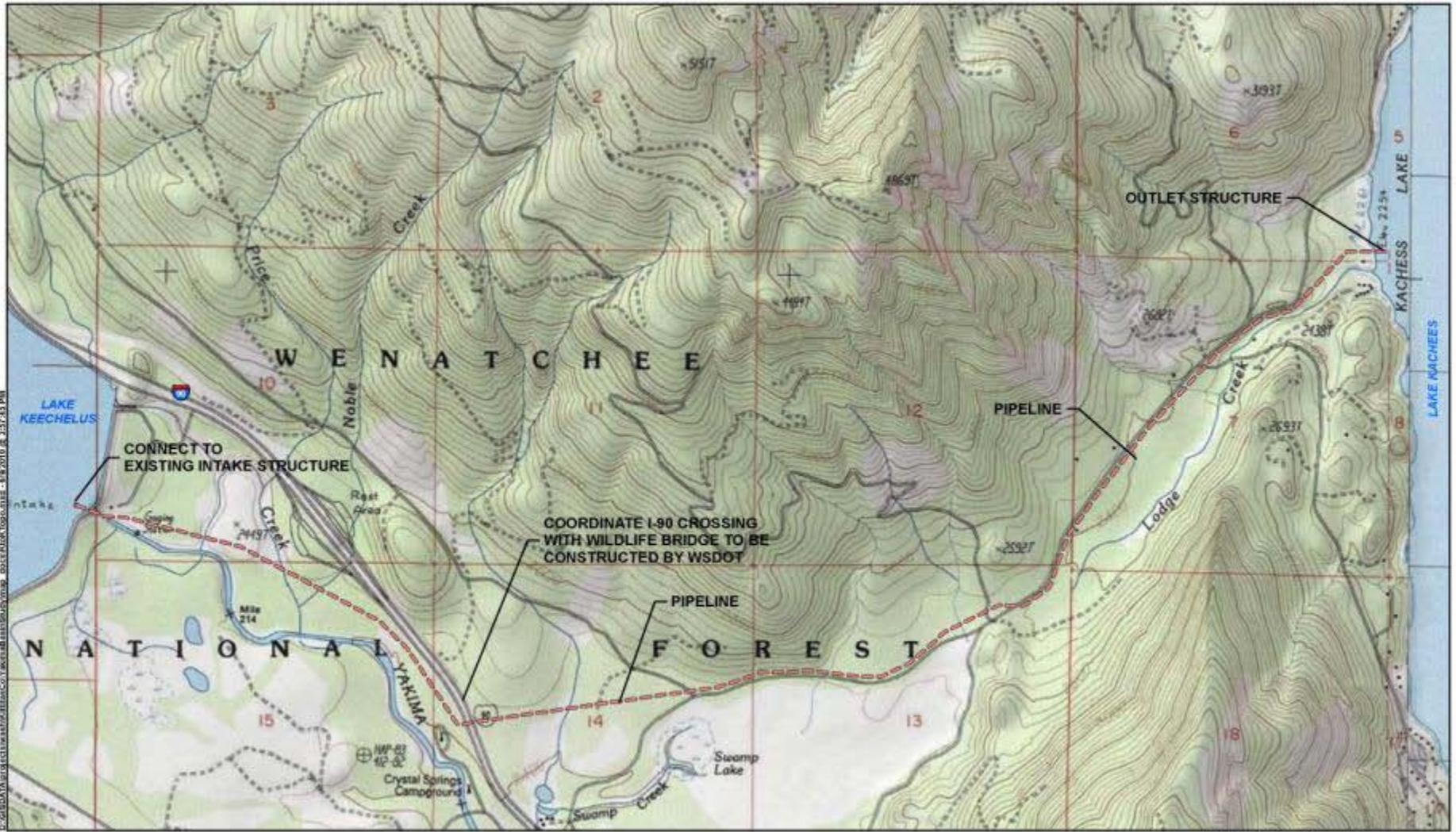
- Transfer water from Lake Keechelus to Lake Kachess for seasonal storage.
- New fish screens and outlet bifurcation will convey flows to a new gravity flow pipeline.
- The 25,000 foot-long up to 86-inch diameter steel pipeline will convey an average of 400 cfs from Lake Keechelus to Lake Kachess.
- The pipe crossing under I-90 could be coordinated with proposed WSDOT I-90 wildlife crossing construction.
- There is the potential for some energy recovery at the Lake Kachess outlet.

K to K Pipeline Routing



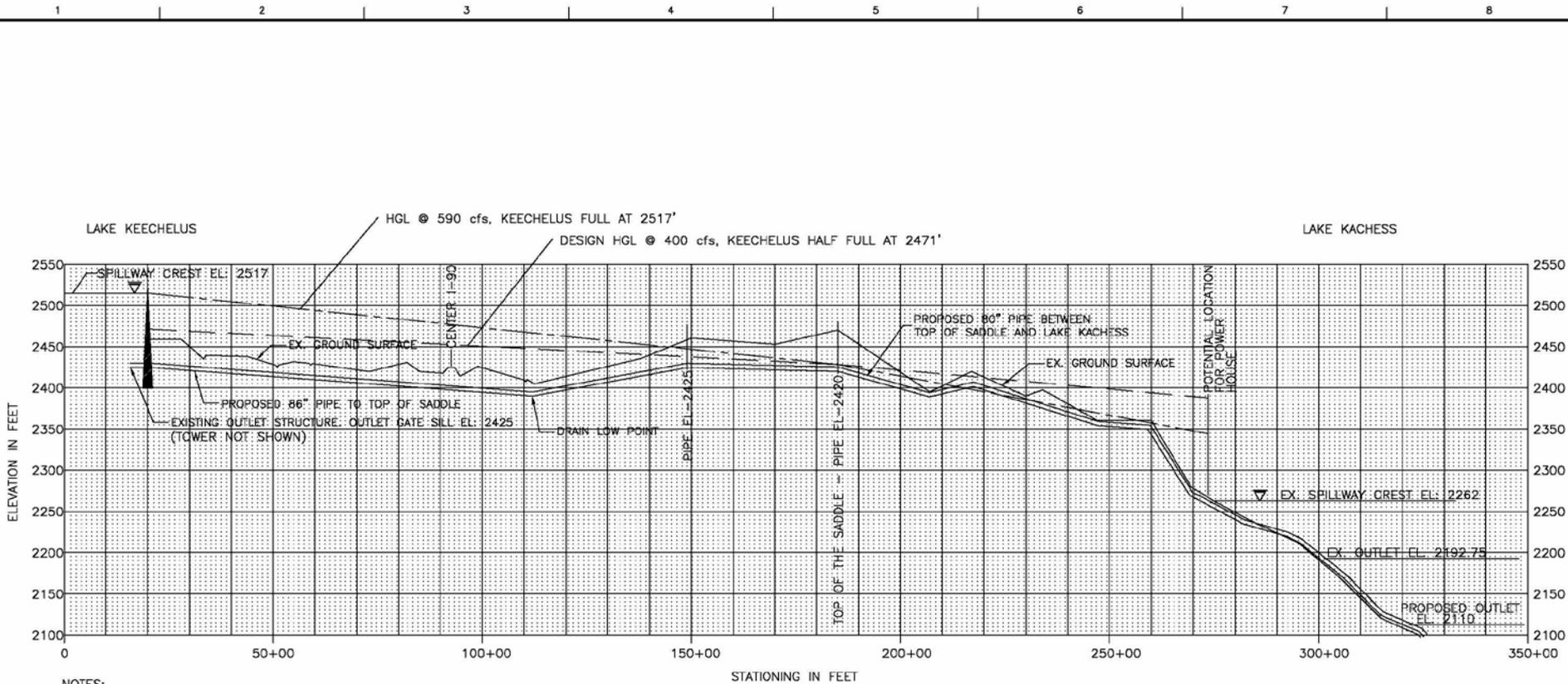
K to K Pipeline - Aerial
FIGURE 2

K to K Pipeline Routing



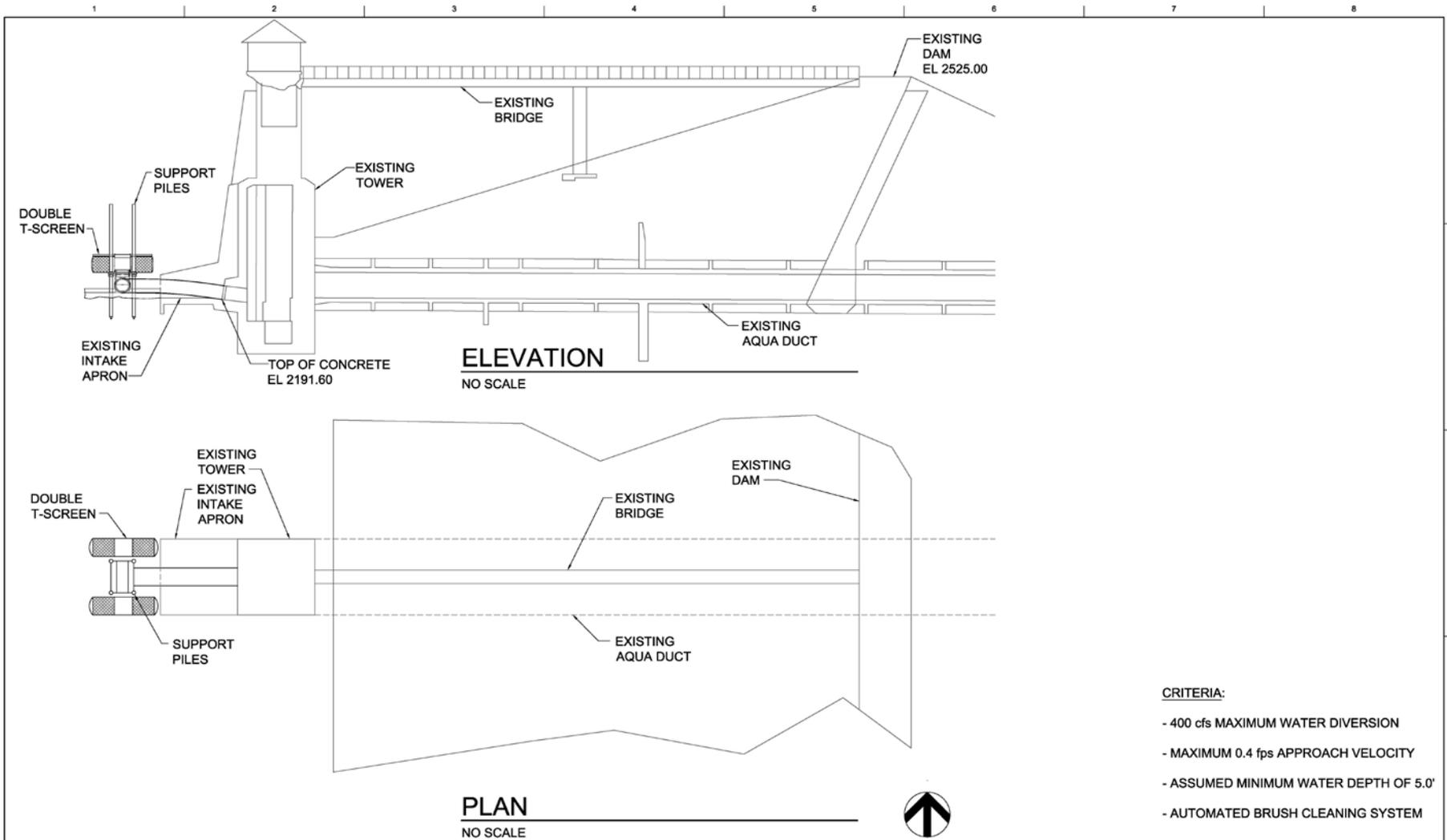
K to K Pipeline - Topography
FIGURE 1

K to K Pipeline Profile



- NOTES:
- 1) LAKE KEECHELUS STORAGE VOLUME BETWEEN SPILLWAY CREST AND OUTLET GATE SILL = 157,800 ac.ft.
 - 2) STORAGE VOLUME OF LAKE KEECHELUS:
 BETWEEN SPILLWAY CREST AND EXISTING OUTLET = 239,000 ac.ft.
 BETWEEN EXISTING OUTLET AND PROPOSED OUTLET = 200,000 ac.ft.

Keechelus Outlet Fish Screens



CRITERIA:

- 400 cfs MAXIMUM WATER DIVERSION
- MAXIMUM 0.4 fps APPROACH VELOCITY
- ASSUMED MINIMUM WATER DEPTH OF 5.0'
- AUTOMATED BRUSH CLEANING SYSTEM

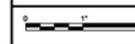


HDR Engineering, Inc.

ISSUE	DATE	DESCRIPTION

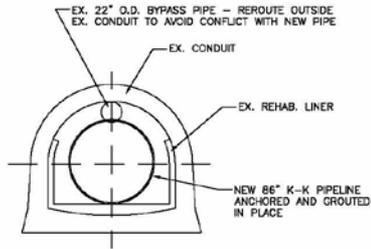
PROJECT MANAGER

PROJECT NUMBER



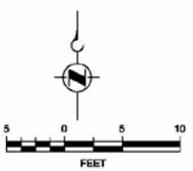
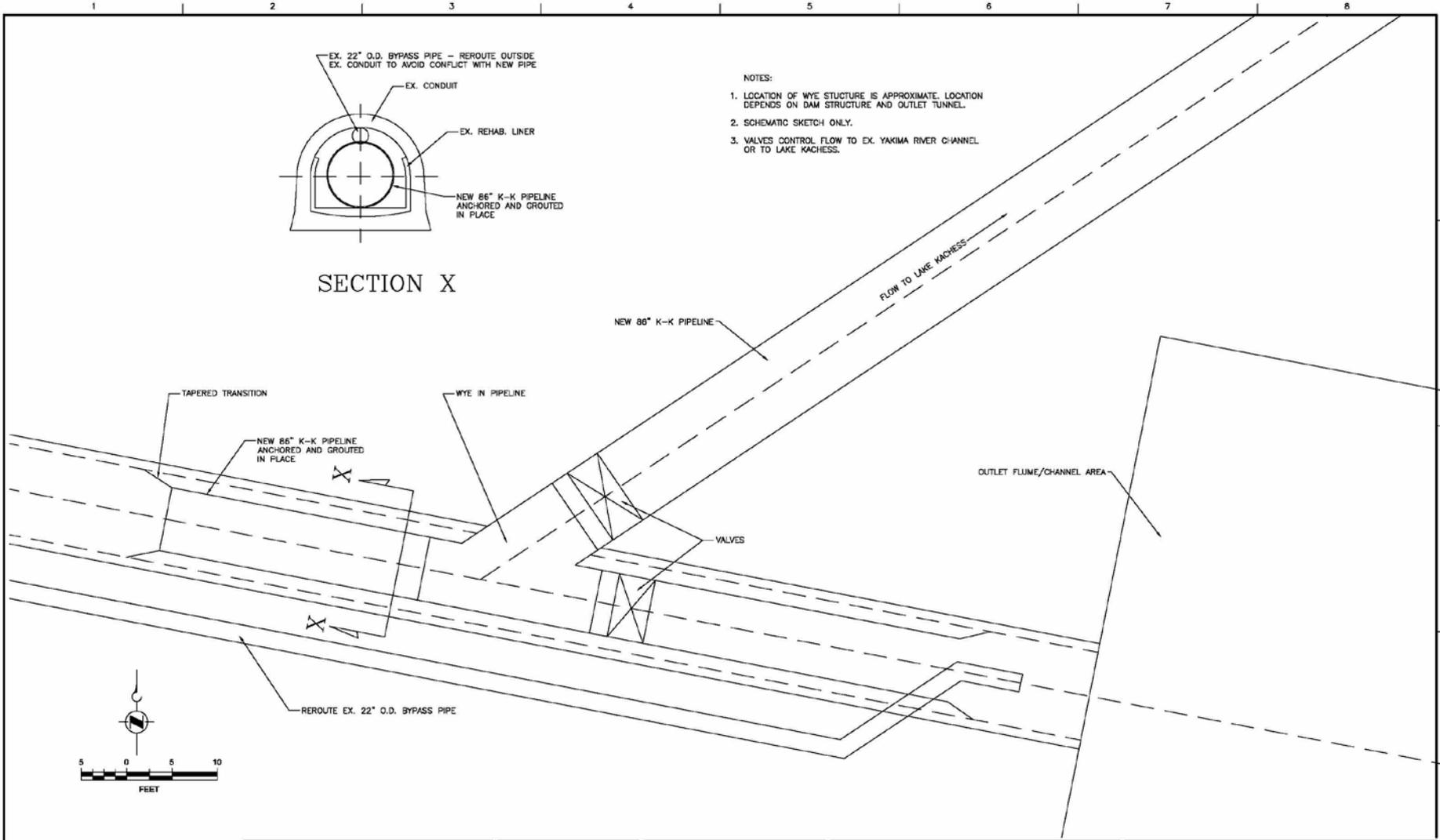
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Keechelus Outlet Bifurcation



SECTION X

- NOTES:
1. LOCATION OF WYE STRUCTURE IS APPROXIMATE. LOCATION DEPENDS ON DAM STRUCTURE AND OUTLET TUNNEL.
 2. SCHEMATIC SKETCH ONLY.
 3. VALVES CONTROL FLOW TO EX. YAKIMA RIVER CHANNEL OR TO LAKE KACHESS.



ISSUE	DATE	DESCRIPTION

PROJECT MANAGER	
PROJECT NUMBER	

YAKIMA RIVER BASIN STUDY
 U.S. BUREAU OF RECLAMATION
 Contract No. 08CA10677A ID/IQ

KEECHELUS TO KACHESS PIPELINE
 DETAIL A
 FIGURE ____

FILENAME	
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0 1" 2'

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Project Challenges

- Fish screening existing outlet tower while maintaining operations
- Connecting wye branch to existing outlet tunnel
- Pipeline routing to avoid wetlands and minimize property impacts
- Crossing under I-90 and coordinating with other I-90 projects
- Outfall design with varying lake elevation of more than 150 feet

Next Steps

- Refine concepts & prepare cost estimates
- Additional results presented at the 9/22 Workgroup mtg. and also summarized in a Technical Memorandum for Workgroup review