

# Yolo Bypass Salmonid Habitat Restoration & Fish Passage

Environmental Impact Statement  
Environmental Impact Report

October 20, 2016



State of California  
Department of Water Resources



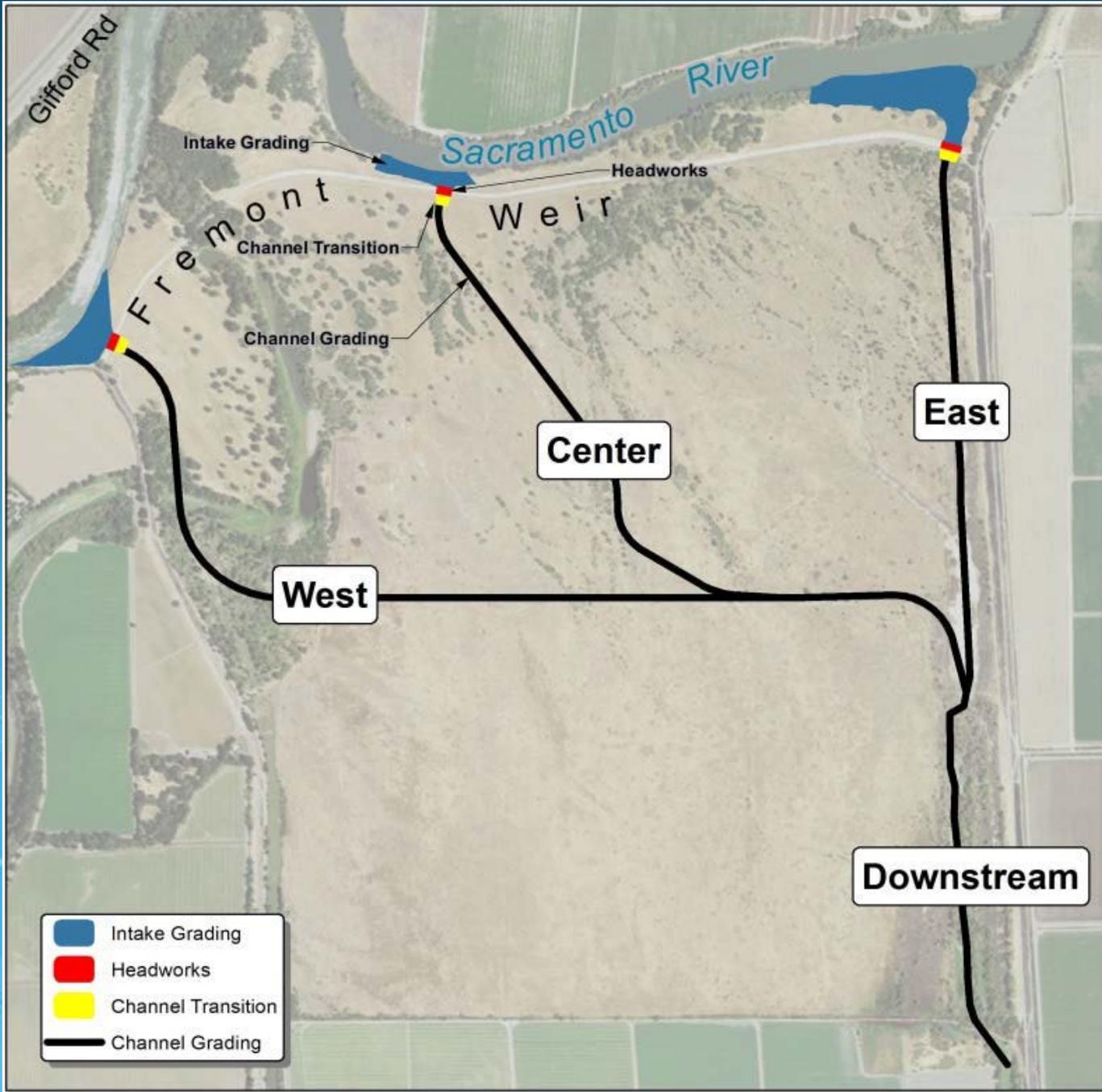
U.S. Department of the Interior  
Bureau of Reclamation

# EIS/EIR Alternatives

- **Alternative 1 – East Side Small Gated Notch**
  - **Alternative 2 – Central Small Gated Notch**
  - **Alternative 3 – West Side Small Gated Notch**
  - **Alternative 4 – Managed Flow**
  - **Alternative 5 – Multiple Gates**
  - **Alternative 6 – Large Gated Notch**
- 
- **10% design across alternatives**
  - **Except Ag Crossing #1 and Water Control Structure with bypasses on Alt 4 & 5.**

# Range of Alternatives

| Feature                            | Alternative 1         | Alternative 2         | Alternative 3         | Alternative 4         | Alternative 5                               | Alternative 6   |
|------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---|-----------------|
| Notch Location                     | Eastern Fremont       | Central Fremont       | Western Fremont       | Western Fremont       | Central Fremont (Multiple)                  | Western Fremont |
| Maximum Notch Flow                 | 6,000 cfs             | 6,000 cfs             | 6,000 cfs             | 3,000 cfs             | 3,000 cfs                                   | 12,000 cfs      |
| Notch Invert Elevation             | 14                    | 14.8                  | 16.1                  | 16.1                  | Multiple                                    | 16.1            |
| Channel Bottom Widths              | 30' bottom, 30' bench | 50' bottom, 30' bench | 50' bottom, 30' bench | 50' bottom, 30' bench | West: 40' 30' bench; Center: 90'; East: 90' | 200' bottom     |
| N. Bypass Water Control Structure? | No                    | No                    | No                    | Yes                   | Swanston 2° channels (program level)        | No              |
| Tertiary Fish Passage              | West                  | West                  | East                  | East                  | West  | East            |



# Yolo Bypass Alternatives



# Alternatives 1, 2, and 3

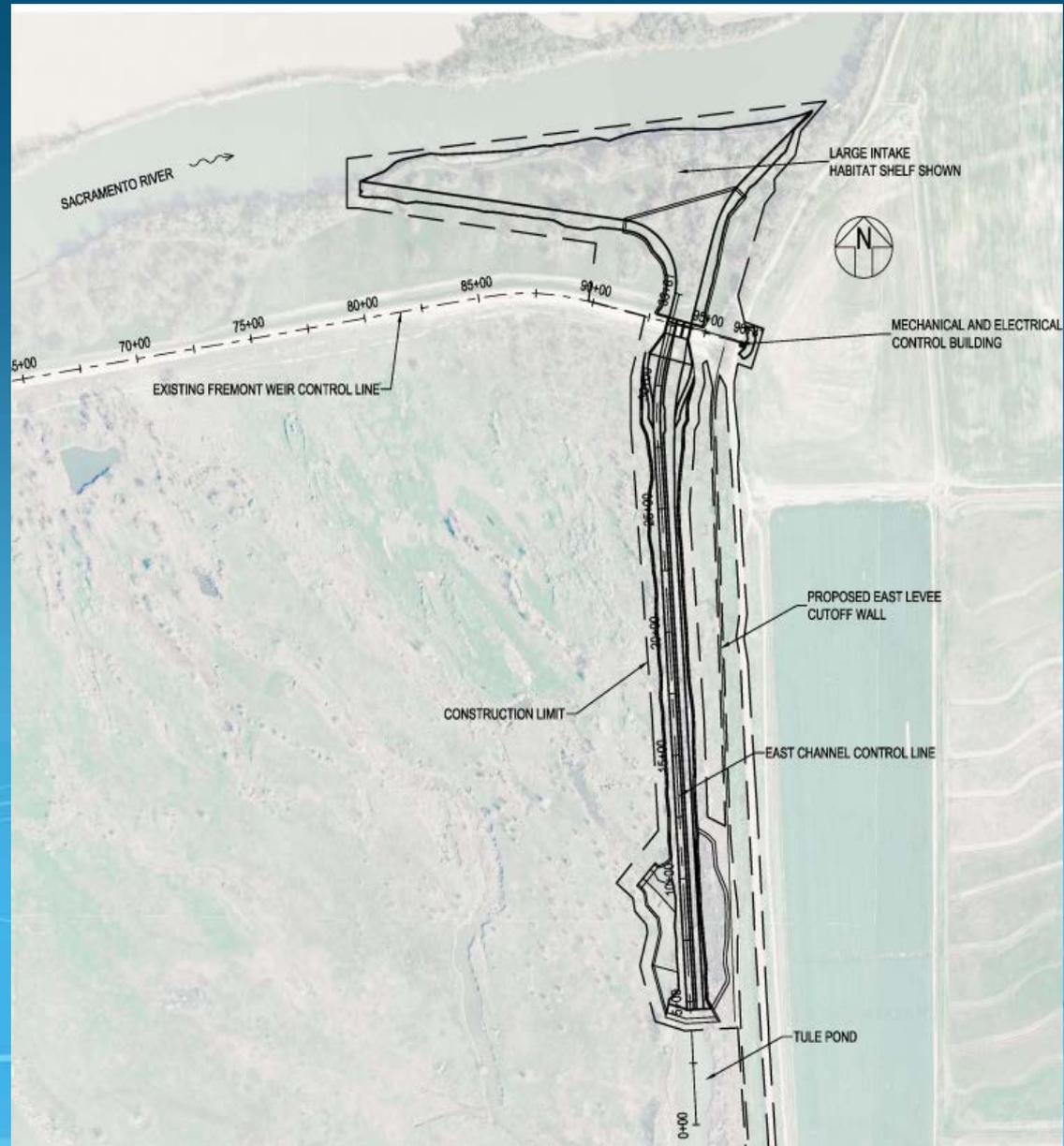
- **“Small” gated notch in different locations**
- **Allow flow up to 6,000 cfs through gated notch**
- **Provide open-channel flow for adult fish passage**
- **Supplemental fish passage facility to allow fish passage in areas not near the other two facilities**
- **Agricultural Crossing 1 improvements: siphon or crossing removal**

# Operations

## Alternatives 1, 2, and 3

- Try to capture winter-run outmigration (typically move downstream during the first wet season event in November/December)
- Rising river levels – notch opens when river level exceeds 17' at eastern location
  - Provides 3' depth for passage
- Falling river levels – notch closes when river level falls below 14' invert

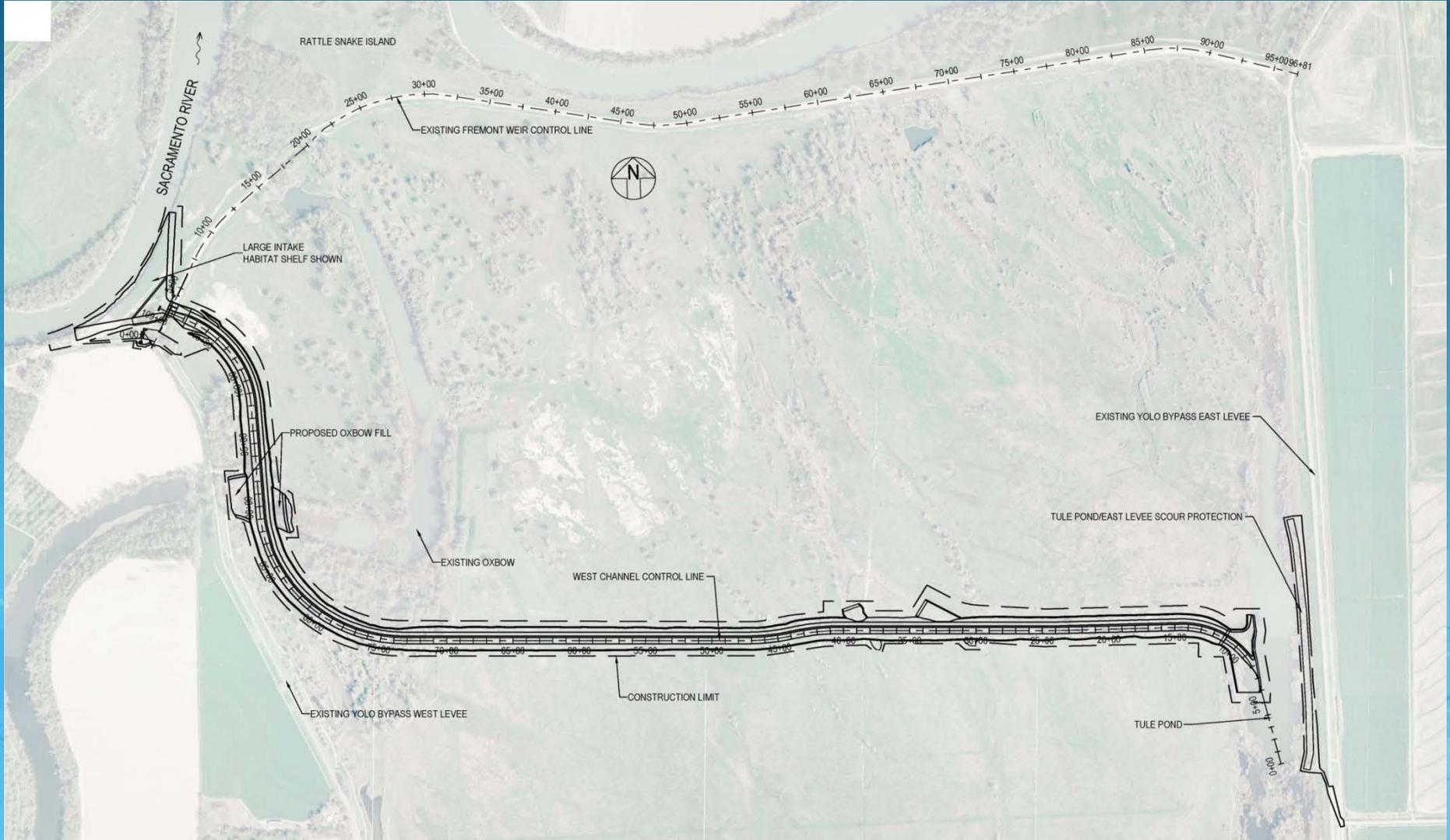
# Alternative 1 - East



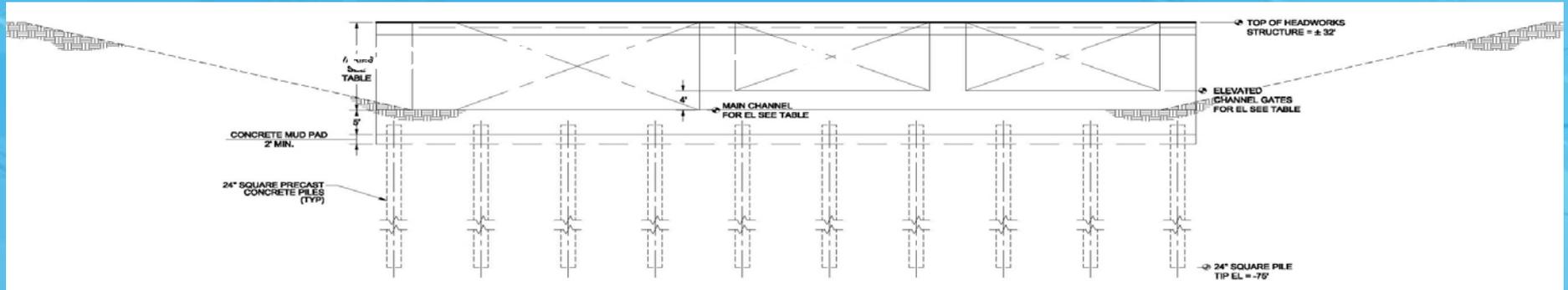
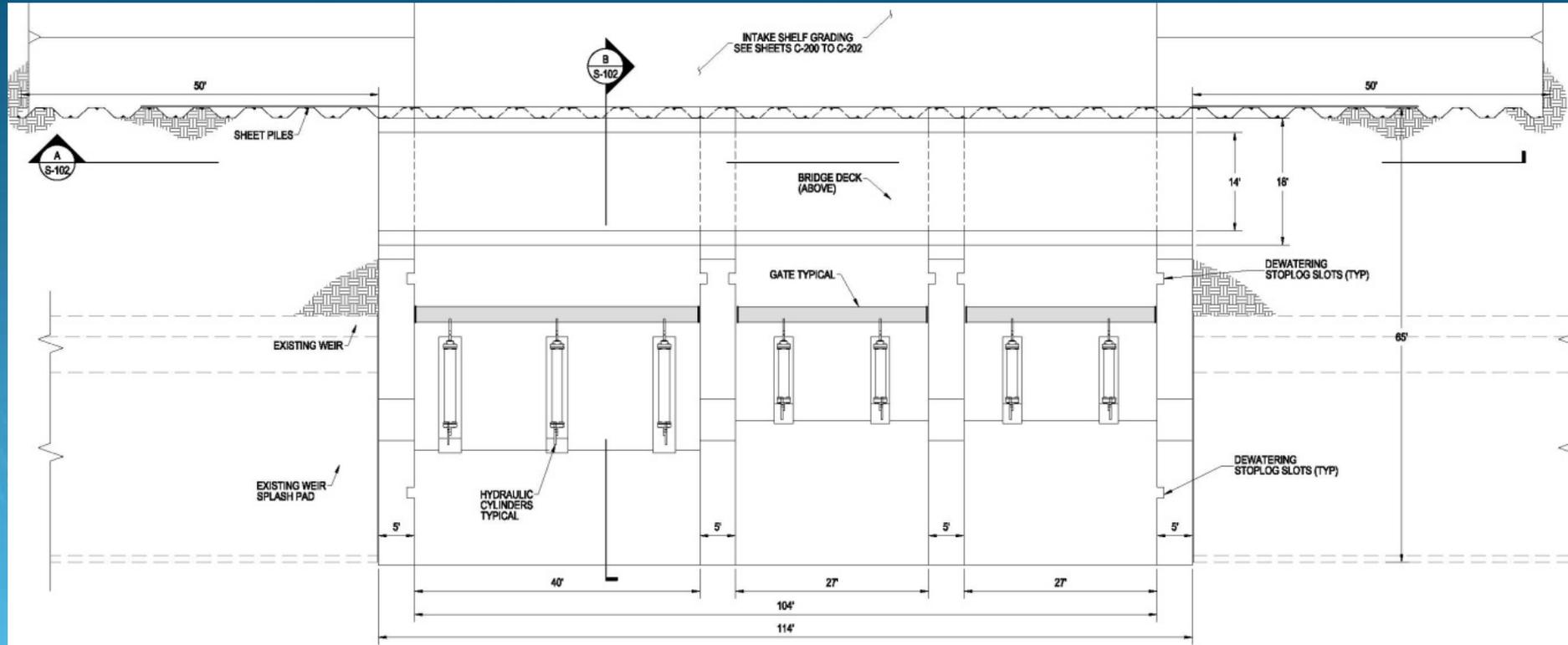
# Alternative 2 - Center



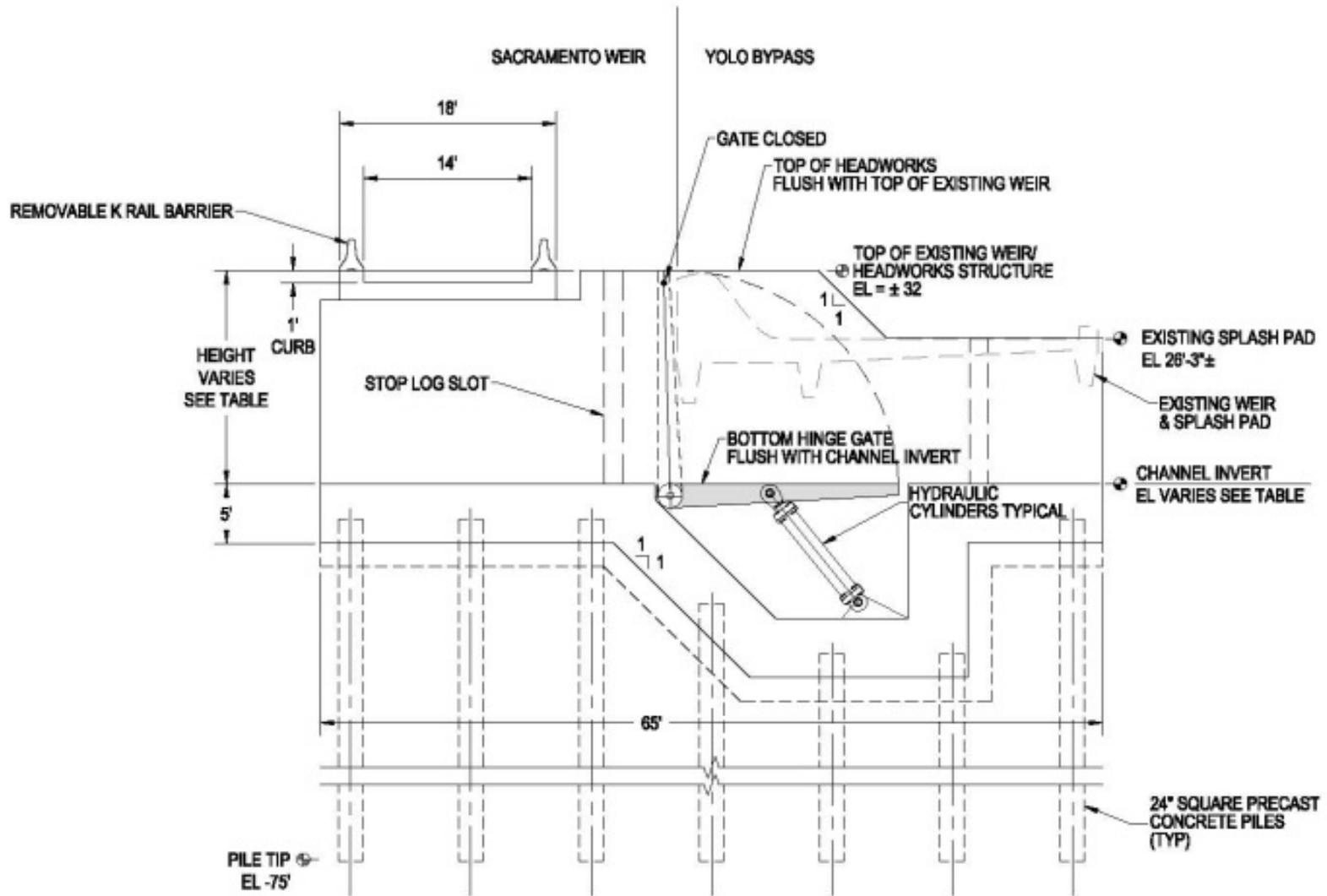
# Alternatives 3 & 4



# Headworks – Alts 1, 2, 3, & 4

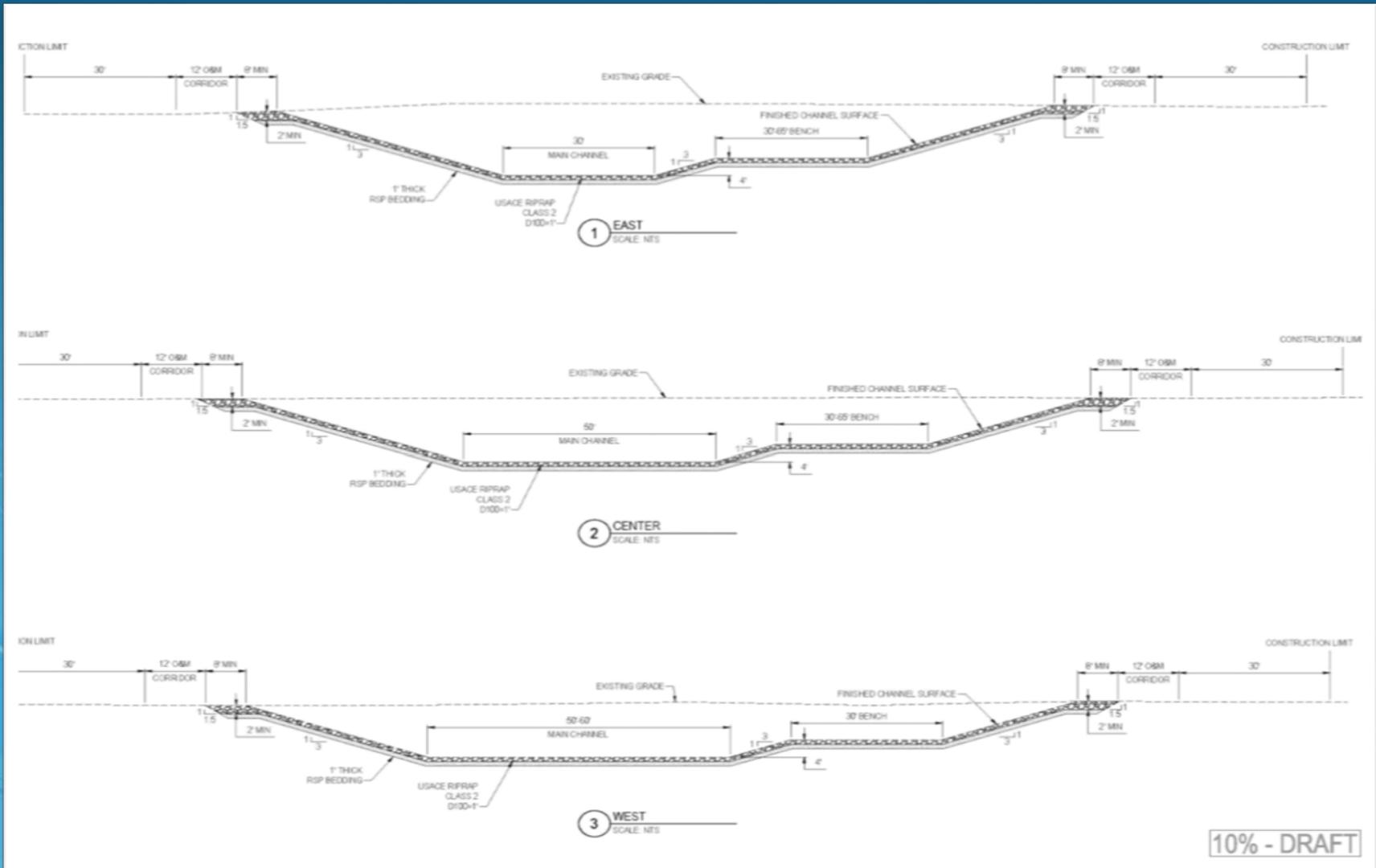


# Headworks – Alts 1, 2, 3, & 4



**B** HEADWORKS SECTION LOOKING EAST  
SCALE: 1/8" = 1'-0"

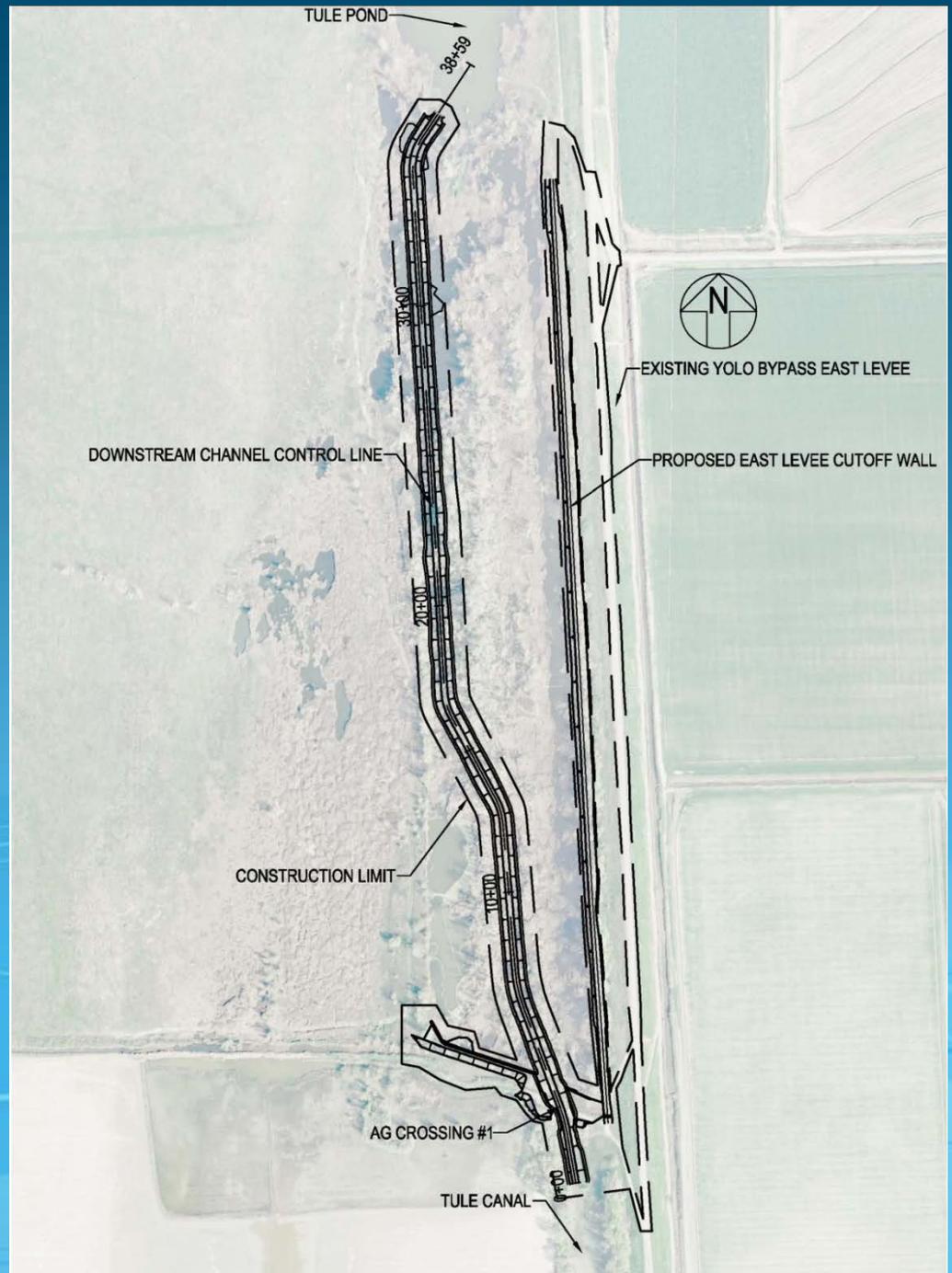
# Typical Cross Section



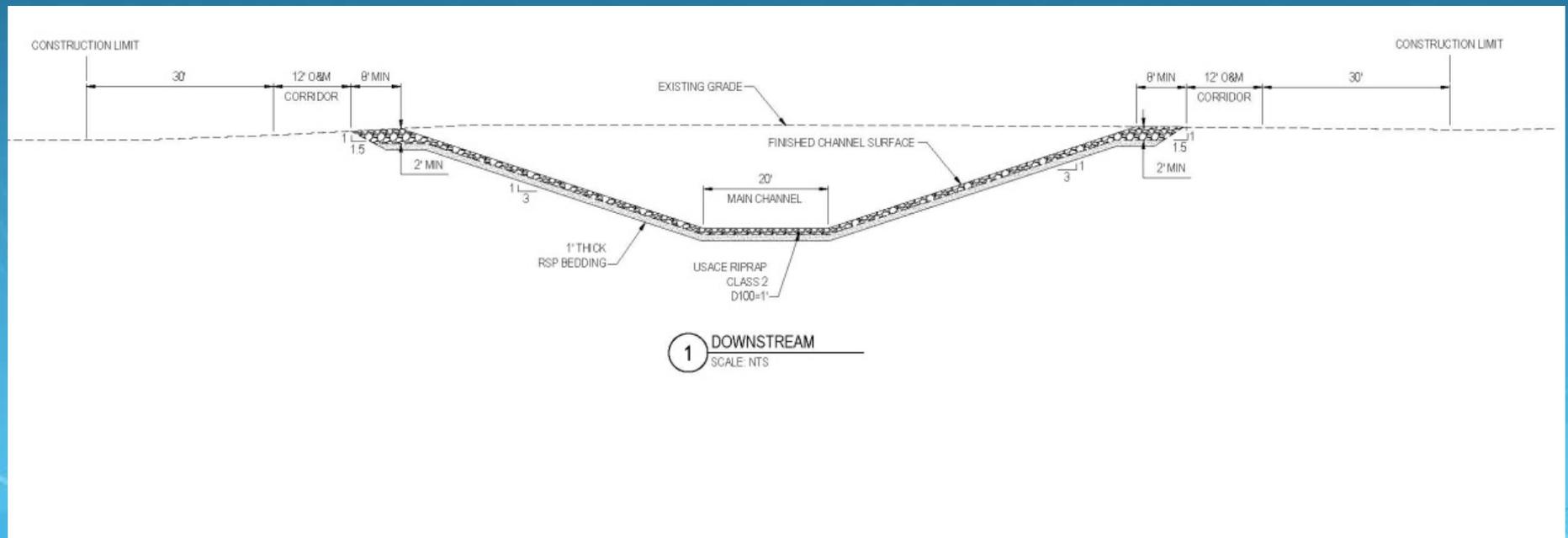
10% - DRAFT

# DOWNSTREAM CHANNEL IMPROVEMENT

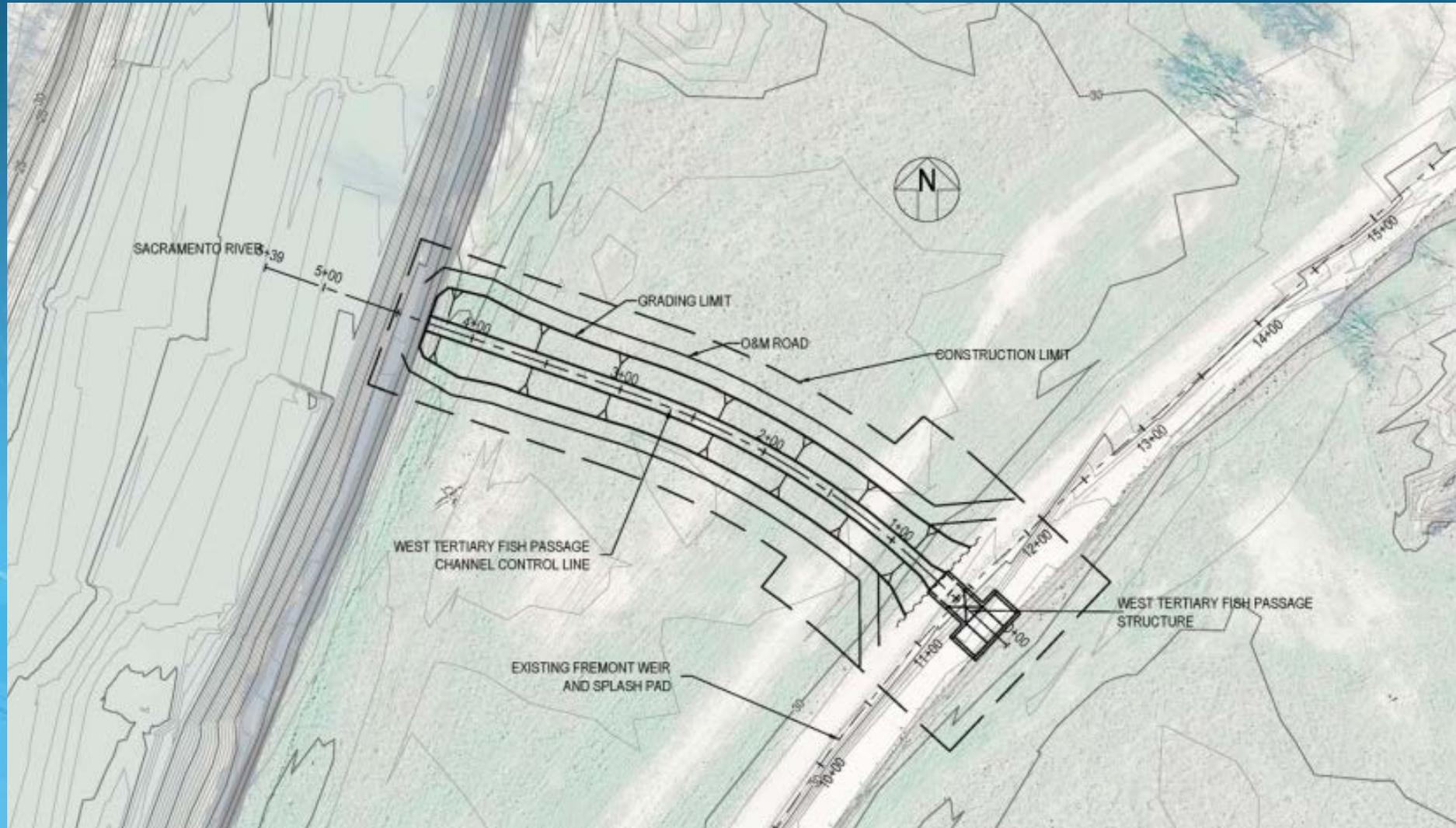
- Ag Crossing #1
- COMMON COMPONENT FOR ALTERNATIVES 1-4 & 6



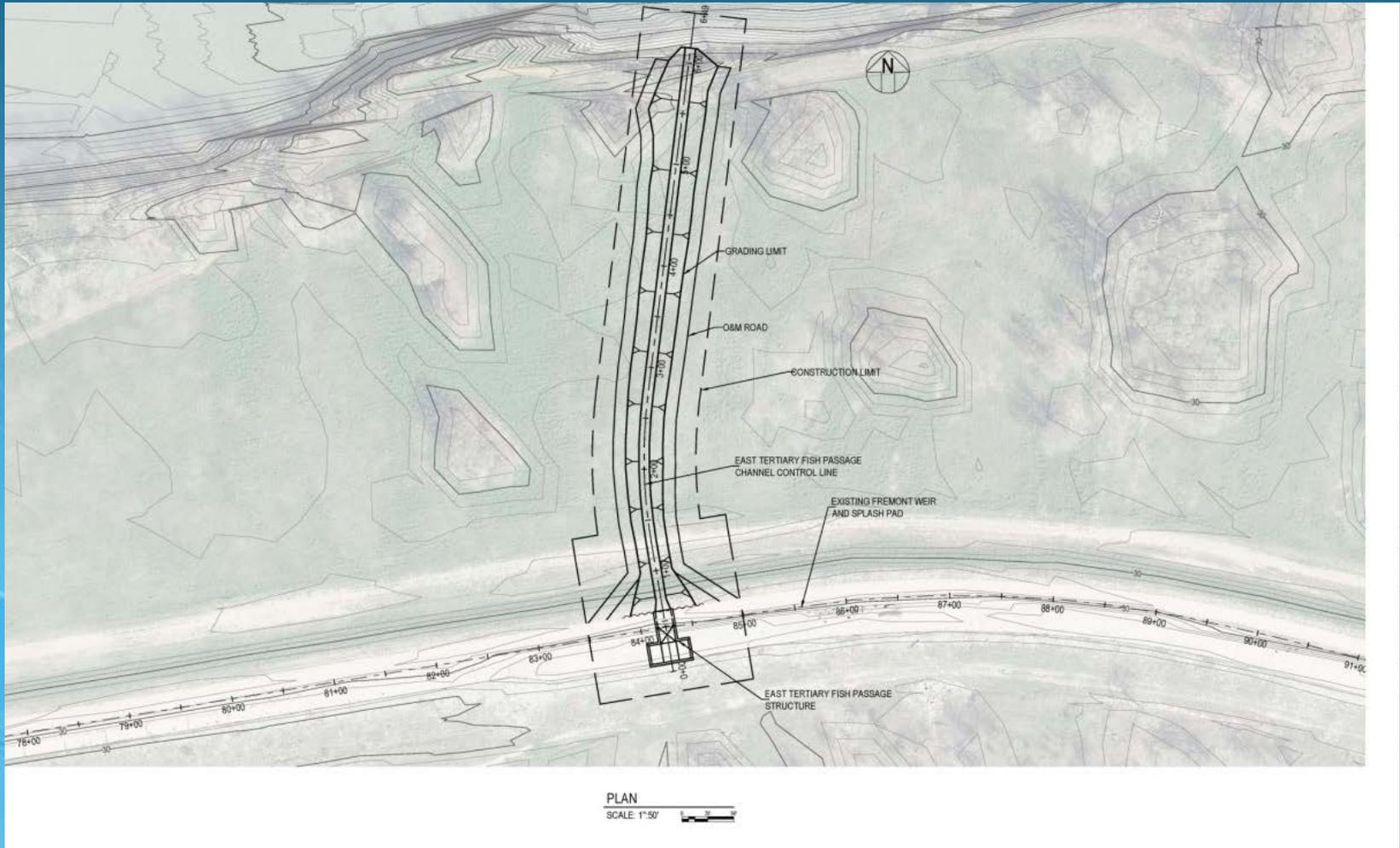
# Cross section of downstream channel improvement



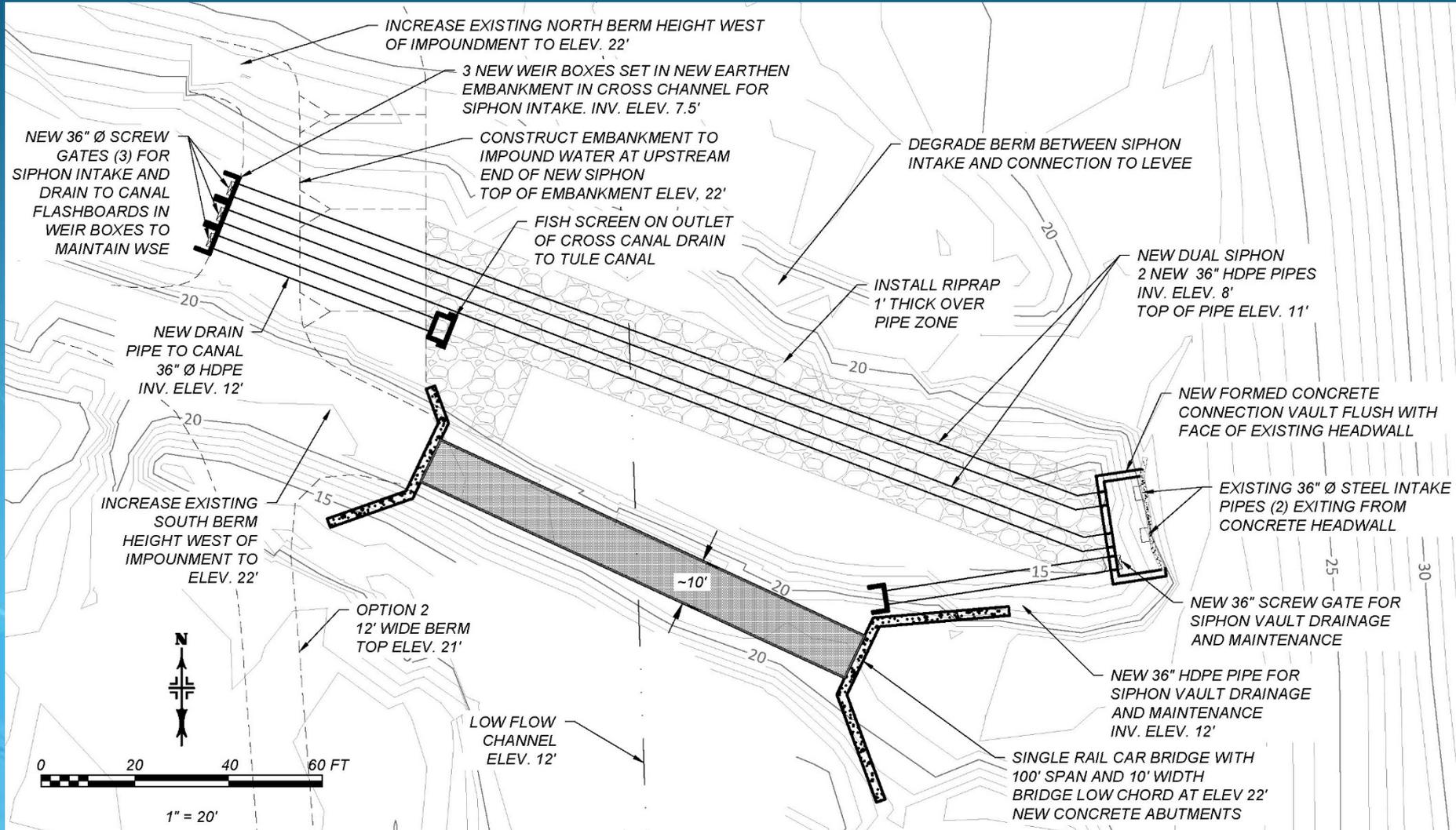
# WESTERN TERTIARY FISH PASSAGE (Alternatives 1, 2 & 5)



# EAST TERTIARY FISH PASSAGE (Alternatives 3, 4 & 6)



# Agricultural Crossing #1



# Alternative 4 – Managed Flow

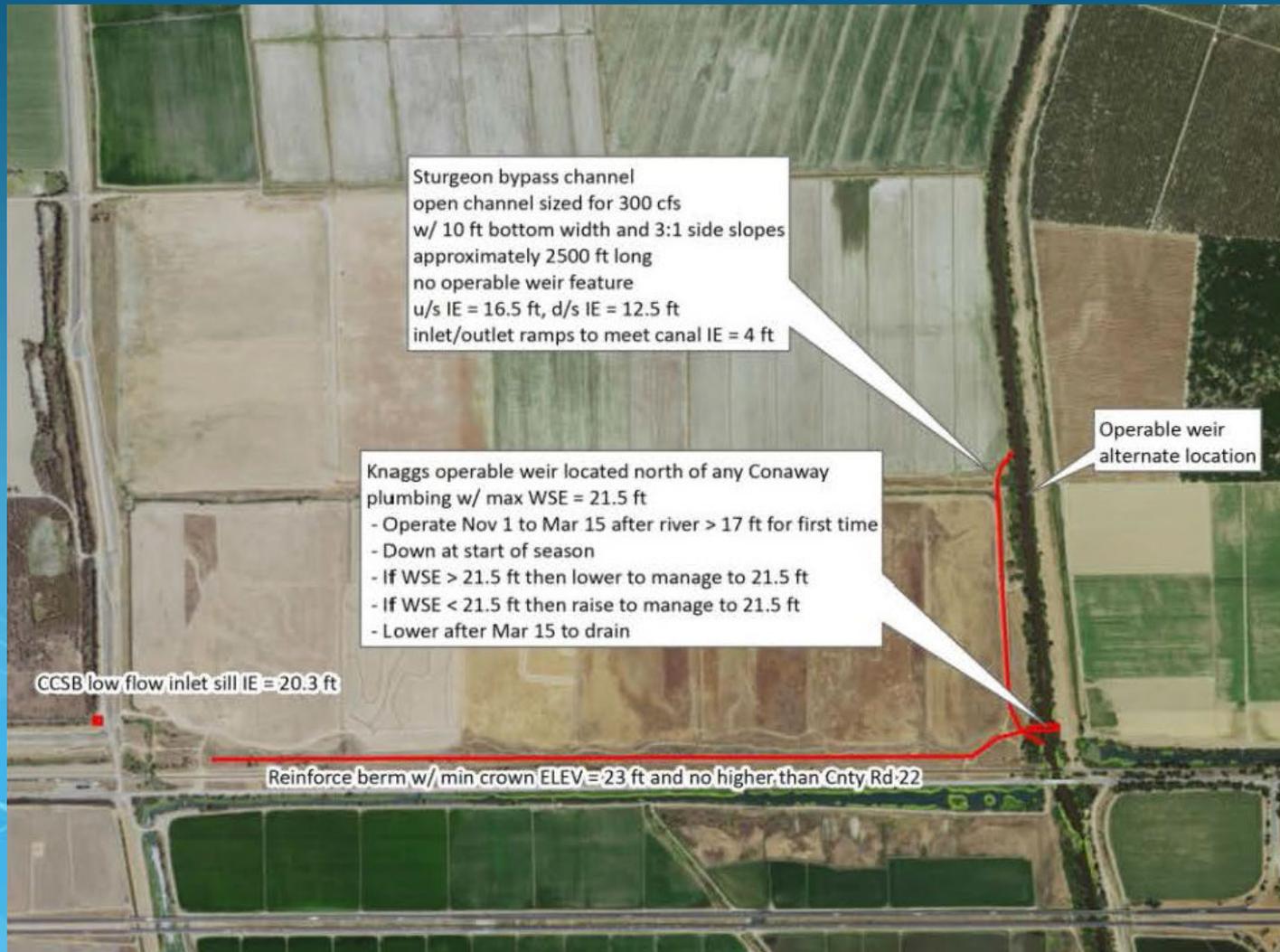
- “Small” gated notch (same layout as in Alternatives 1-3) in western location
- Allow flow up to 3,000 cfs through gated notch
- Extend periods of inundation through installation of water control structures on the Tule Canal
- Bypass facilities allow fish passage at water control structures when Tule Canal passage is obstructed
- Supplemental fish passage facility to allow fish passage on eastern side of Fremont Weir
- Agricultural Crossing 1 improvements: siphon or crossing removal

# Operations

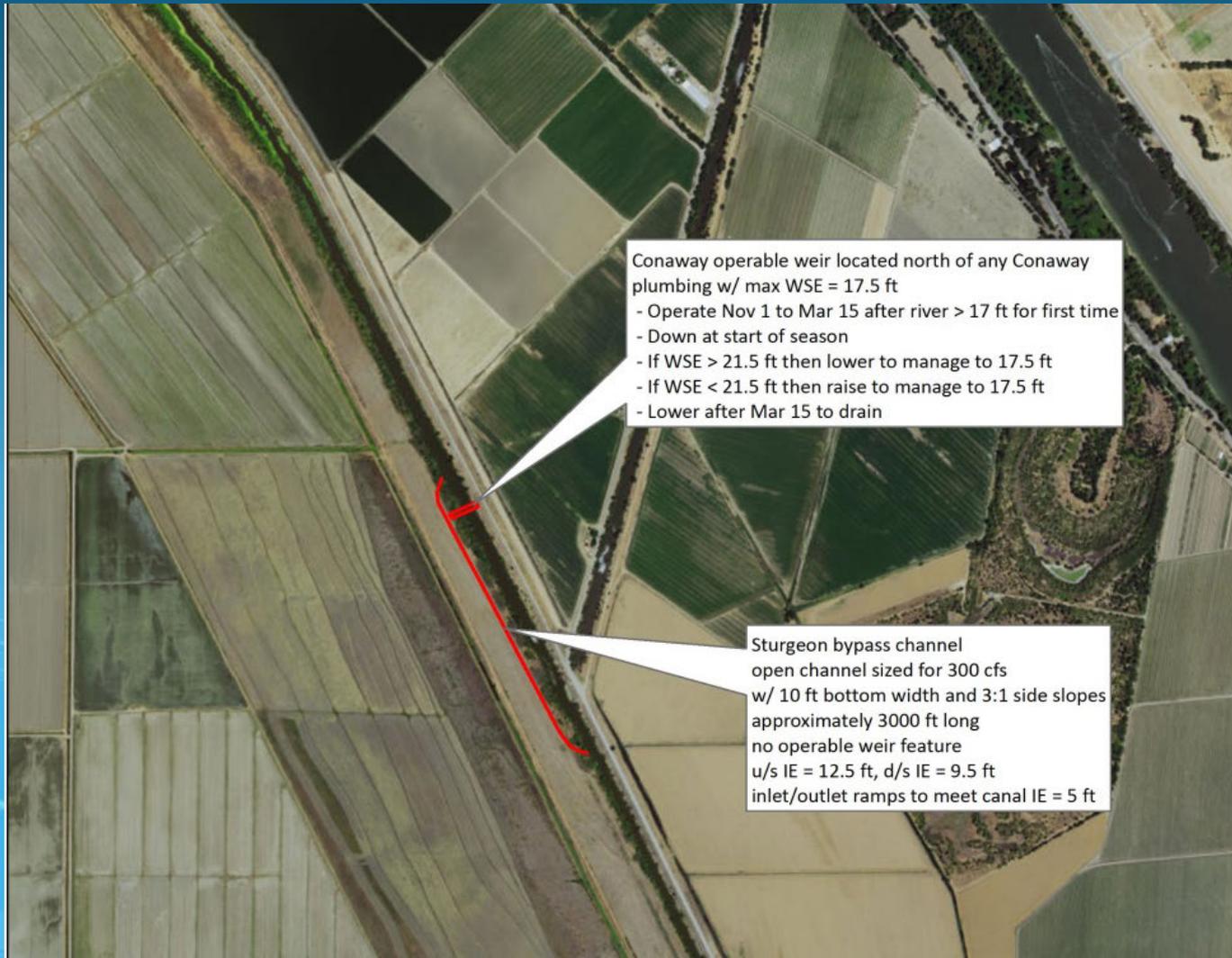
## Alternative 4

- Operate notch to limit flow to 3,000 cfs
- Rising river levels – notch opens when river level exceeds 17' at eastern location
  - Provides 3' depth for passage
- Falling river levels – notch closes when river level falls below 14' invert
- Water control structures in the Tule Canal are raised when the notch is open
- Water control structures manage water to an elevation of 21.5 feet in the Knaggs and Conaway areas
- Water control structures lowered after March 15

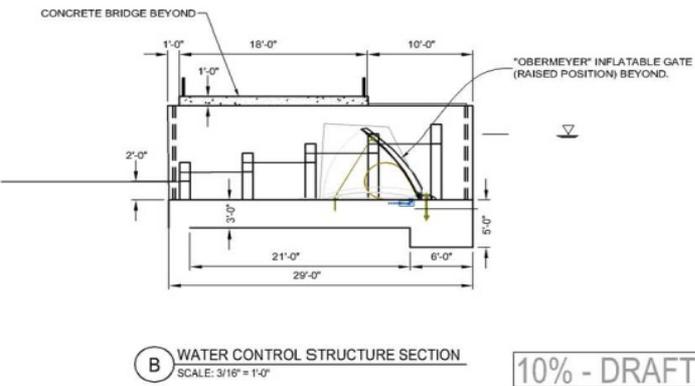
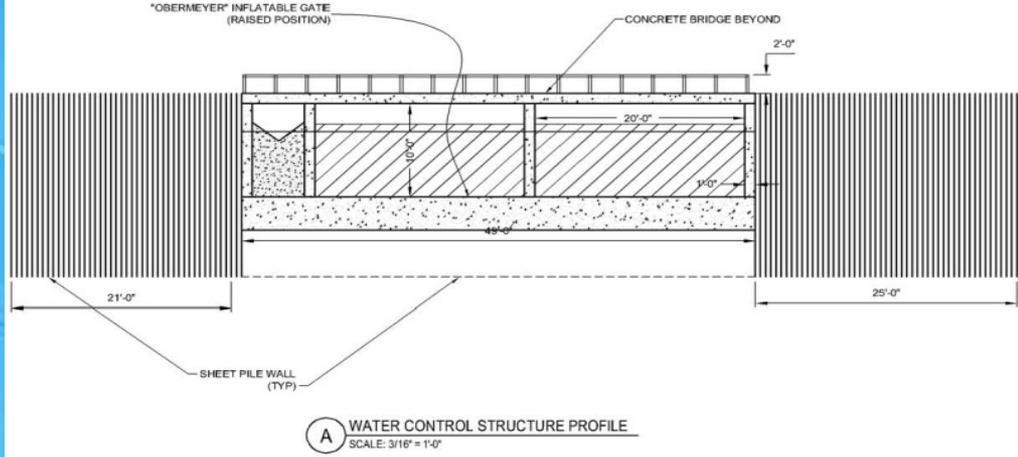
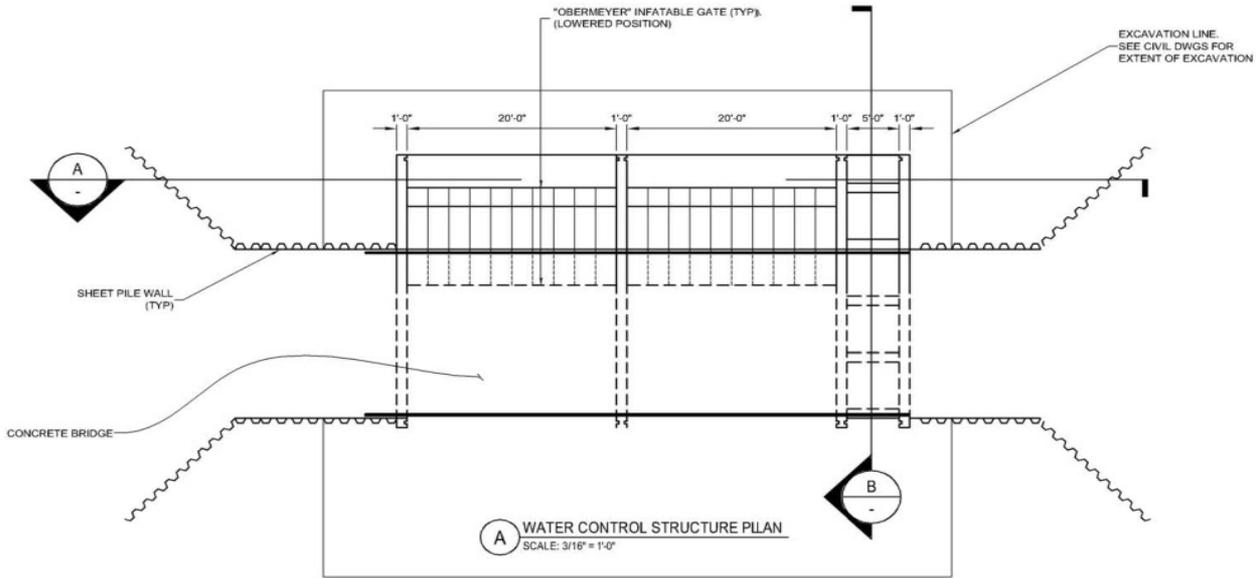
# Alternative 4 – Managed Flows



# Alternative 4 – Managed Flows



# Alt 4 – Water Control Structure



10% - DRAFT

# Alternative 5 – Multiple Gates

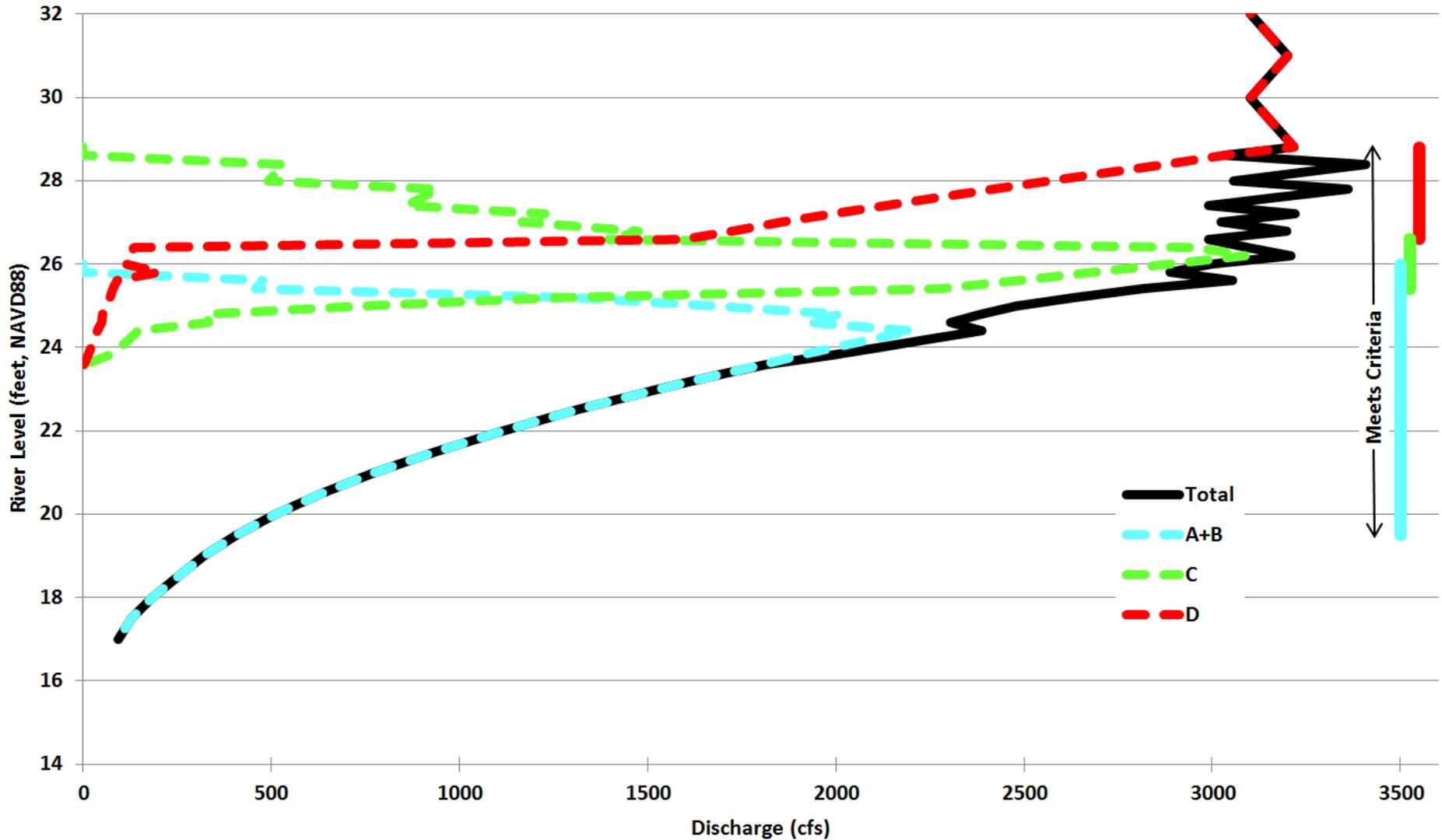
- **Multiple gated notches in central location**
- **Allow flow up to 3,000 cfs (combined) through gated notches**
- **Notches designed to improve capture of flow and fish during winter-run outmigration**
- **Supplemental fish passage facility to allow fish passage on western side of Fremont Weir**
- **Agricultural Crossing 1 improvements: siphon or crossing removal**

# Operations

## Alternative 5

- Operate notch to limit flow to ~3,000 cfs
- Rising river levels – lowest notch opens when river level exceeds 17' at eastern location
  - Provides 3' depth for passage
- Falling river levels – lowest notch closes when river level falls below 14' invert

# Alternative 5 - Rating Curves



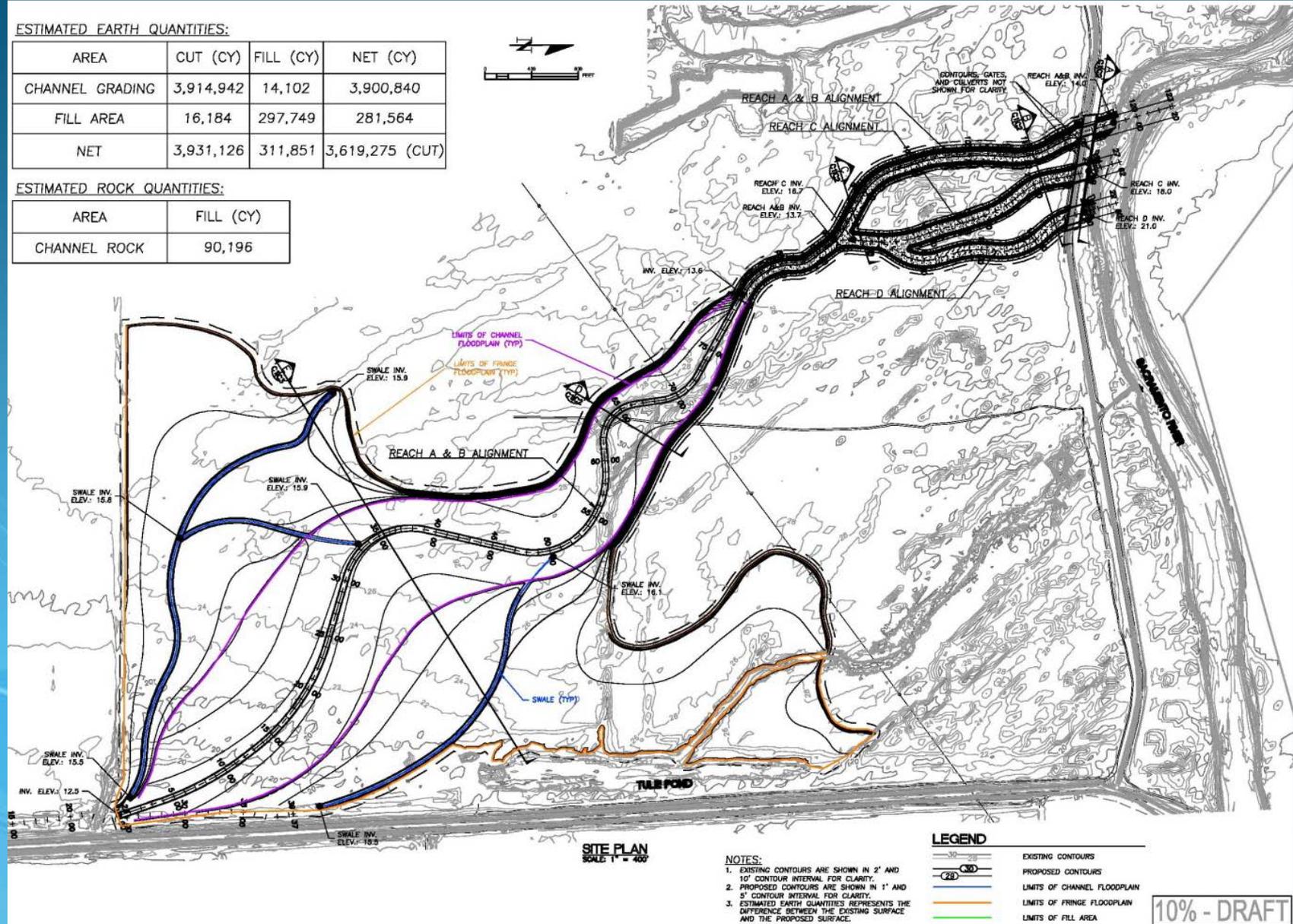
# Alternative 5 - FWFA channels

## ESTIMATED EARTH QUANTITIES:

| AREA            | CUT (CY)  | FILL (CY) | NET (CY)        |
|-----------------|-----------|-----------|-----------------|
| CHANNEL GRADING | 3,914,942 | 14,102    | 3,900,840       |
| FILL AREA       | 16,184    | 297,749   | 281,564         |
| NET             | 3,931,126 | 311,851   | 3,619,275 (CUT) |

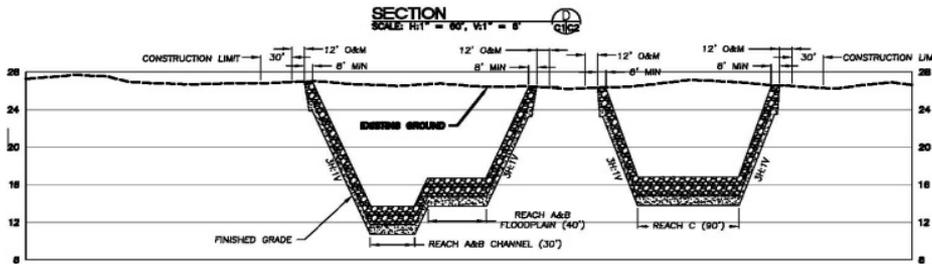
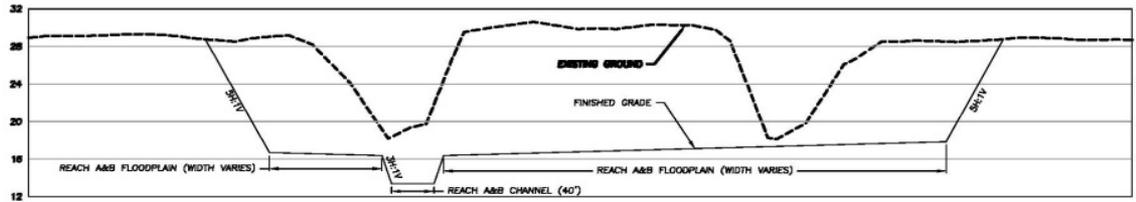
## ESTIMATED ROCK QUANTITIES:

| AREA         | FILL (CY) |
|--------------|-----------|
| CHANNEL ROCK | 90,196    |

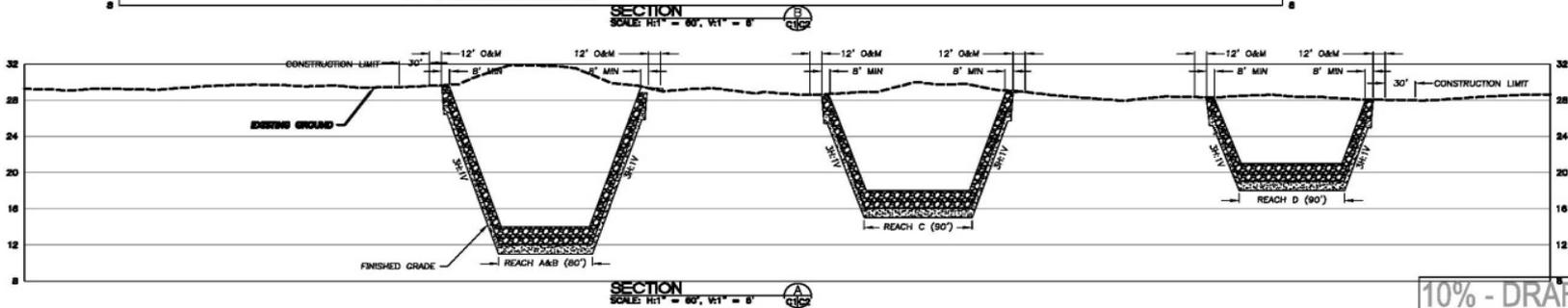
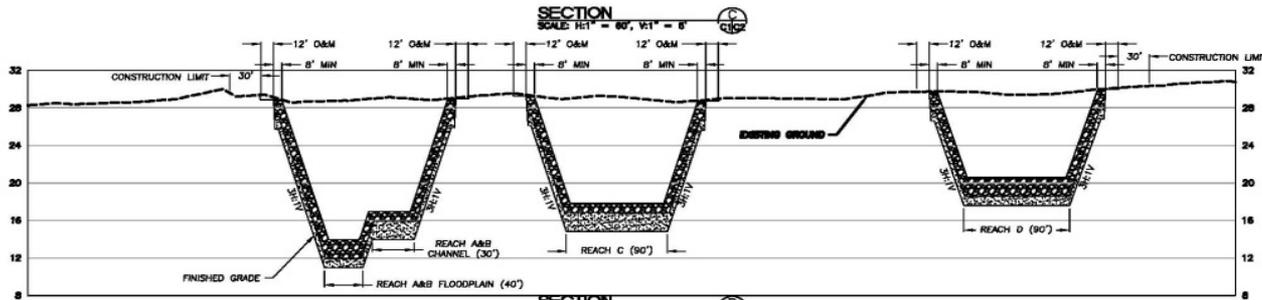


# Alternative 5 – Multiple Gates

## Typical Sections

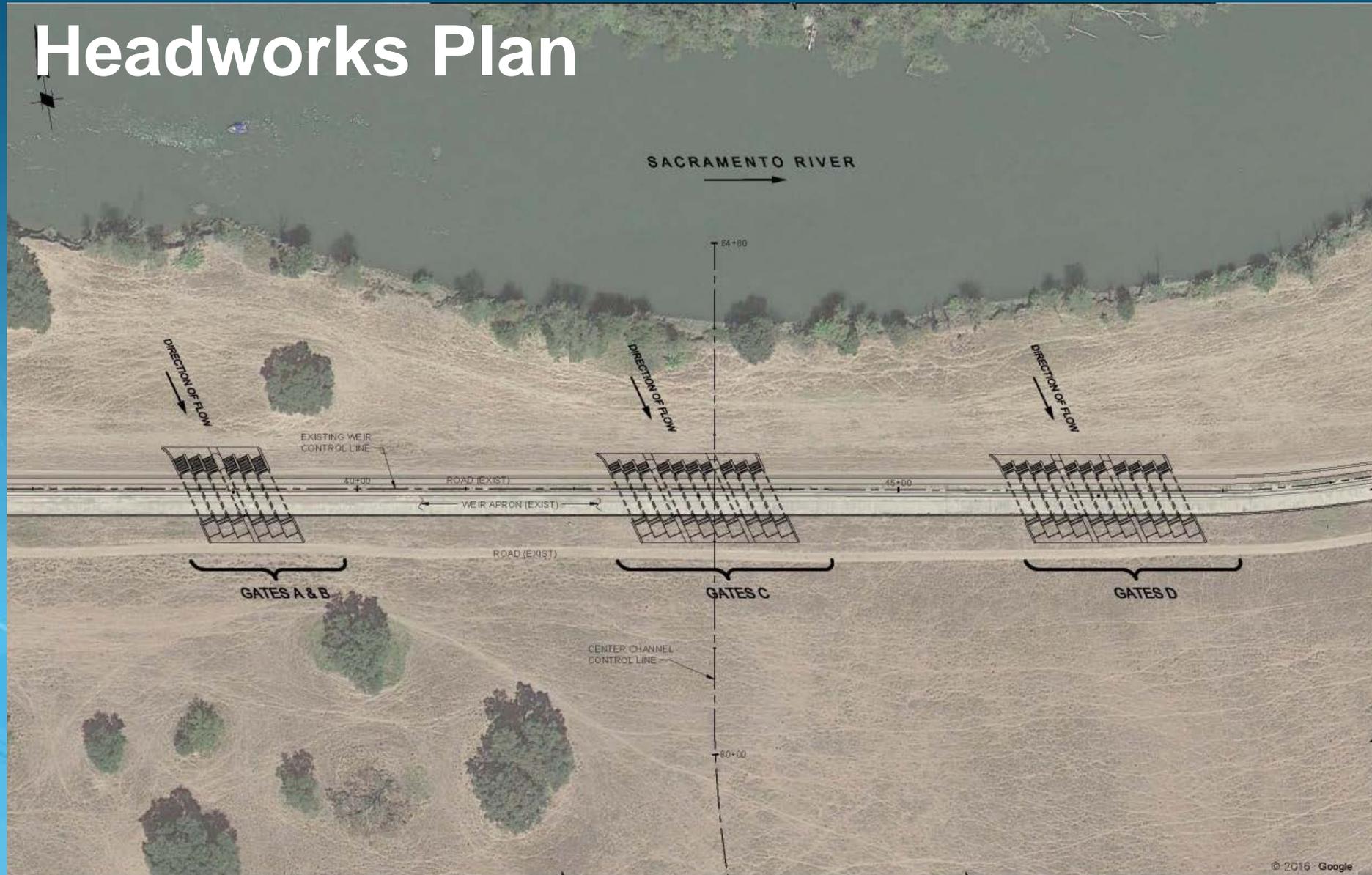


**NOTE:**  
SECTIONS ARE SKEWED.  
DIMENSIONS ARE APPROXIMATE.

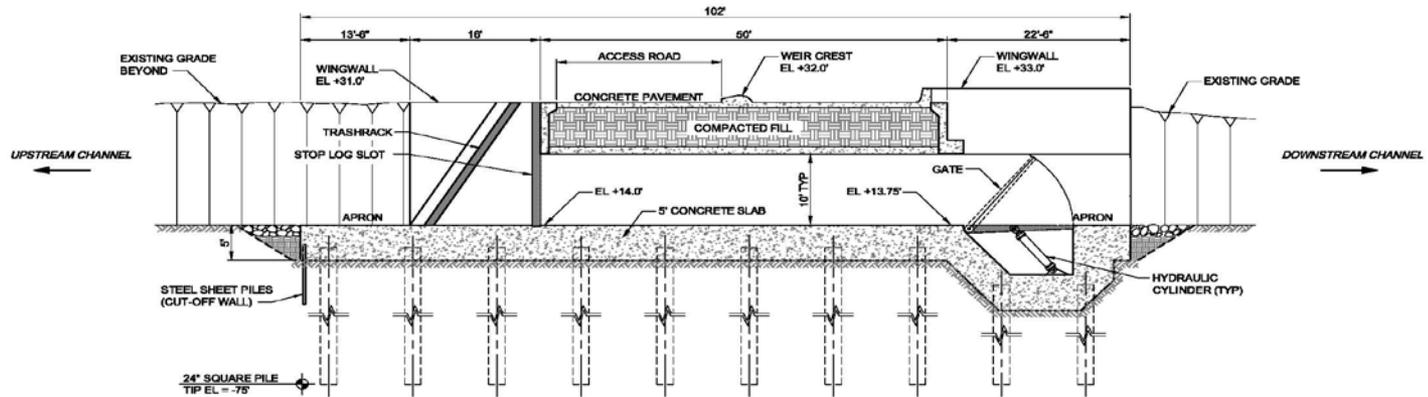


# Alternative 5 – Multiple Gates

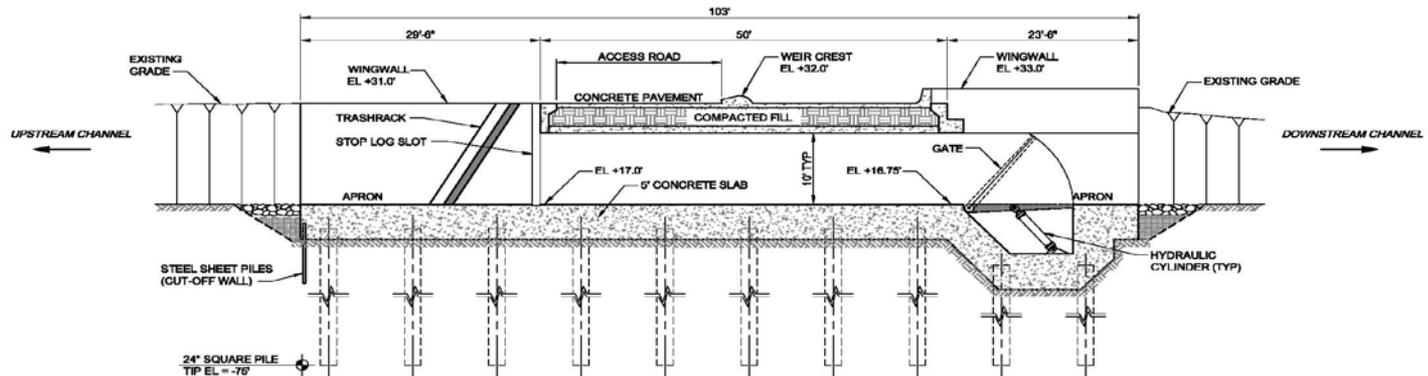
## Headworks Plan



# Alternative 5 – Multiple Gates Headworks Sections



A GATE A - PROFILE  
S-200 SCALE: 1/8" = 1'-0"



B GATE B - PROFILE  
S-200 SCALE: 1/8" = 1'-0"

# Alternative 6 – Large Gated Notch

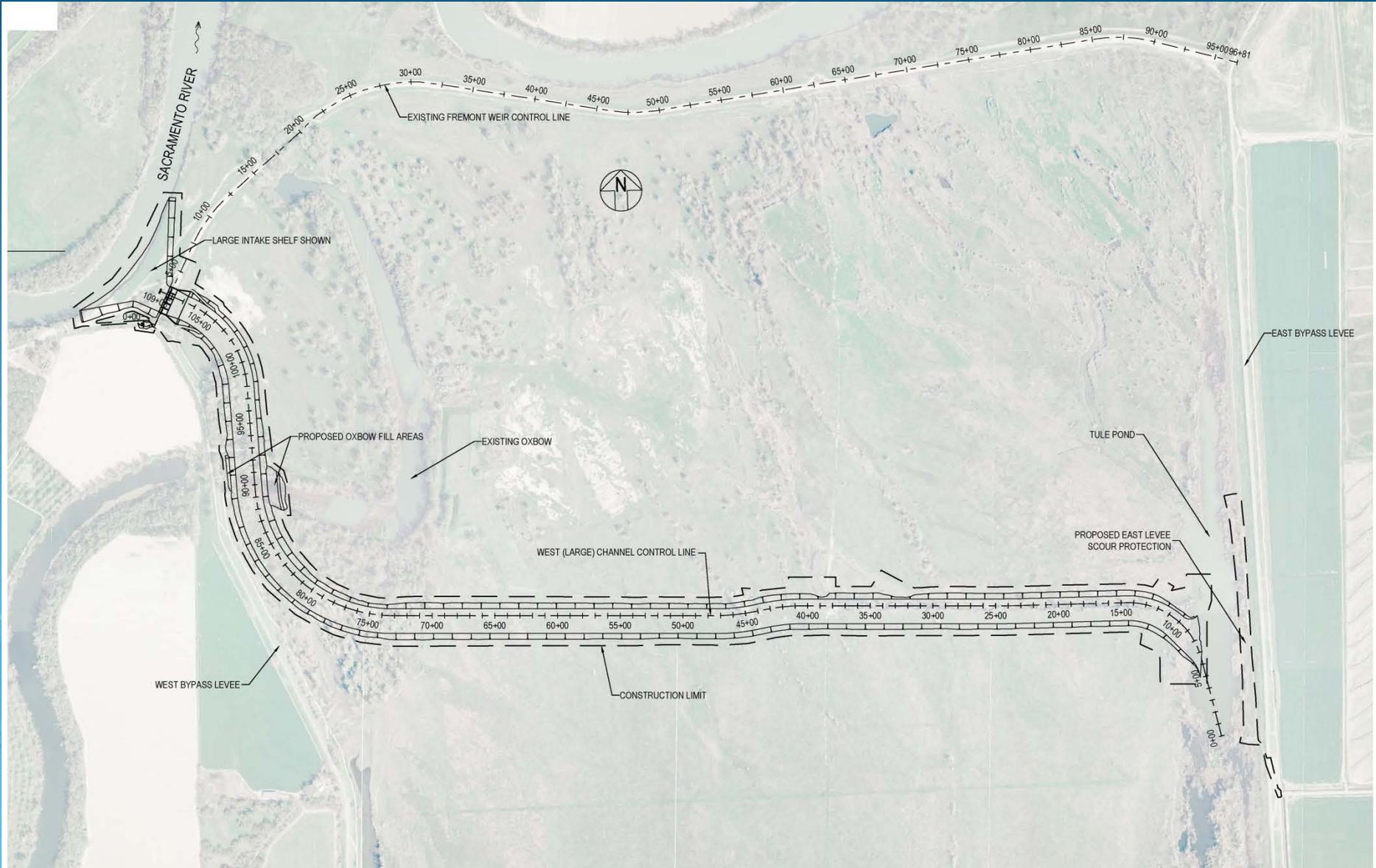
- “Large” gated notch in western location
- Allow flow up to 12,000 cfs through gated notch (immediately before an overtopping event)
- Larger notch allows more flow to enter during winter-run outmigration
- Supplemental fish passage facility to allow fish passage on eastern side of Fremont Weir
- Agricultural Crossing 1 improvements: siphon or crossing removal

# Operations

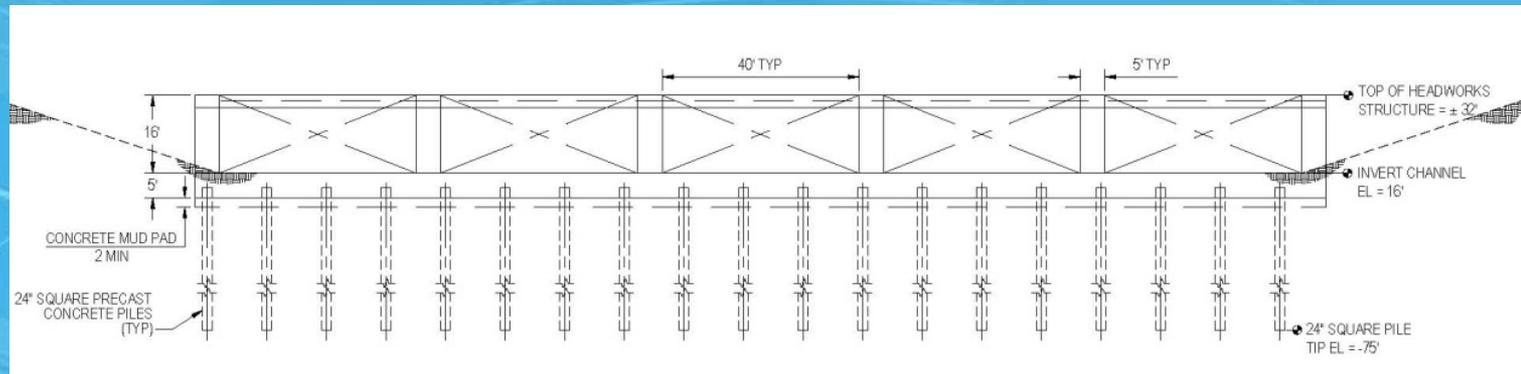
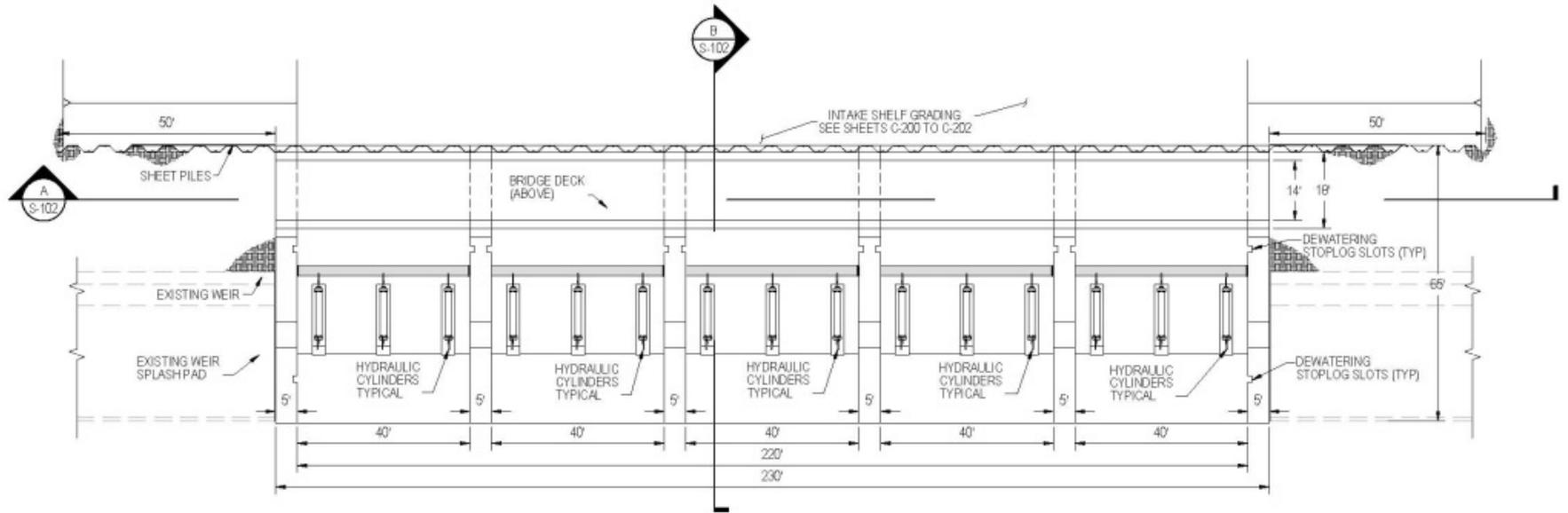
## Alternative 6

- Operate notch to limit flow to 12,000 cfs
- Rising river levels – notch opens when river level exceeds 17' at eastern location
  - Provides 3' depth for passage
- Falling river levels – notch closes when river level falls below 14' invert

# Alternative 6 – West Large



# Alternative 6 - Headworks



# Range of Alternatives

| Feature                            | Alternative 1         | Alternative 2         | Alternative 3         | Alternative 4         | Alternative 5                               | Alternative 6   |
|------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---|-----------------|
| Notch Location                     | Eastern Fremont       | Central Fremont       | Western Fremont       | Western Fremont       | Central Fremont (Multiple)                  | Western Fremont |
| Maximum Notch Flow                 | 6,000 cfs             | 6,000 cfs             | 6,000 cfs             | 3,000 cfs             | 3,000 cfs                                   | 12,000 cfs      |
| Notch Invert Elevation             | 14                    | 14.8                  | 16.1                  | 16.1                  | Multiple                                    | 16.1            |
| Channel Bottom Widths              | 30' bottom, 30' bench | 50' bottom, 30' bench | 50' bottom, 30' bench | 50' bottom, 30' bench | West: 40' 30' bench; Center: 90'; East: 90' | 200' bottom     |
| N. Bypass Water Control Structure? | No                    | No                    | No                    | Yes                   | Swanston 2° channels (program level)        | No              |
| Tertiary Fish Passage              | West                  | West                  | East                  | East                  | West  | East            |

# Schedule



**Permitting activities will begin in 2017 and continue after completion of the EIS/EIR process**