



# Technical Memorandum

March 2, 2021

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To: Hank Seemann, Humboldt County Public Works      Ref. No.: 11218356

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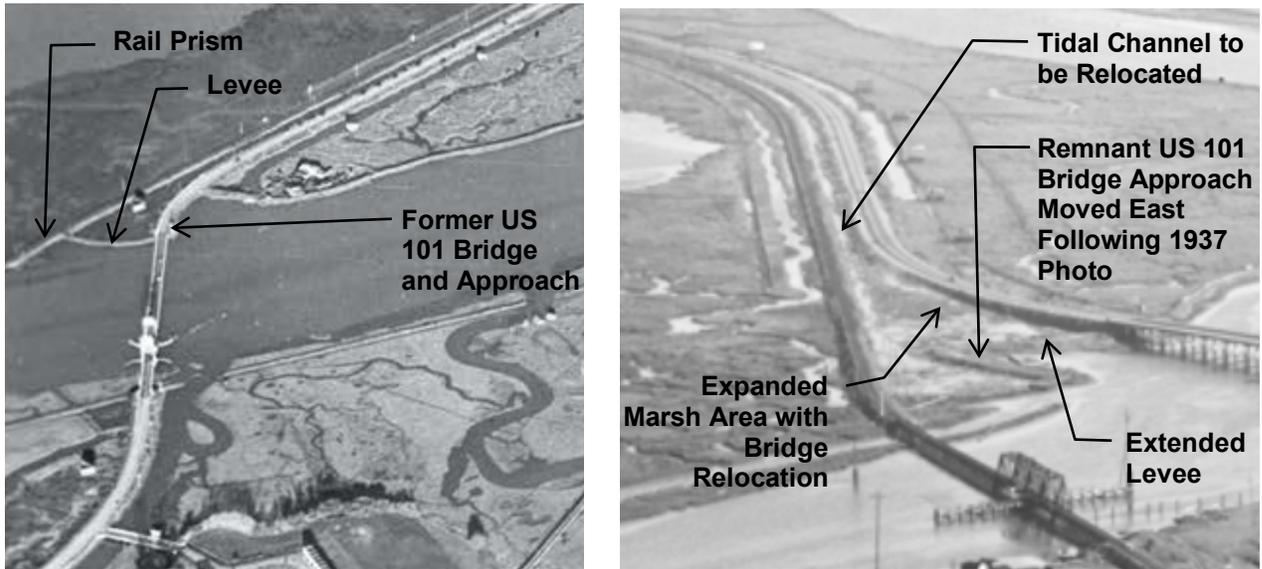
**Subject: Segment 3 Tidal Channel Relocation**

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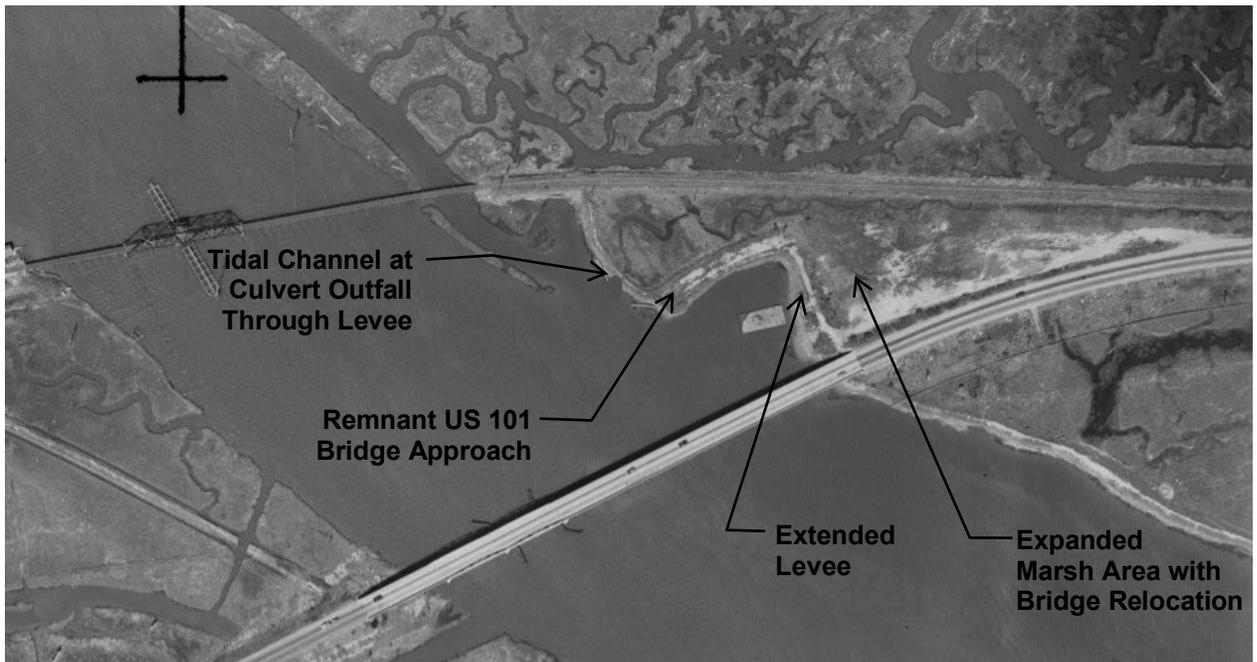
The purpose of this memo is to describe the basis of design for the relocation of an existing tidal channel to accommodate Segment 3 of the proposed Humboldt Bay Trail South (HBTS). This memo provides a brief summary of historic interventions that have altered this area, description of current hydraulic conditions and the basis for the proposed relocation design.

## Historic Conditions

Under current conditions, the existing tidal channel conveys drainage for a portion of southbound US 101 to the Eureka Slough and provides tidal exchange within an existing salt marsh. The channel was likely created when the railroad prism was constructed in the early 1900's, when material from the channel was likely used as borrow and placed as fill for the railroad prism. Following construction of the rail prism, the salt marsh area bounded by the rail and US 101 was subject to various interventions and modifications. The 1937 photo (Figure 1, left) shows a dike that was constructed across the marsh edge that would have limited tidal exchange. Between 1937 and 1948, the US 101 bridge over Eureka Slough was relocated to the east (current southbound US 101 bridge) and the northern approach from the former alignment was left in place (Figure 1, right). Following the highway realignment, a new levee was extended to the current US 101 bridge approach, resulting in a continuous levee with a single channel outfall which is assumed to be a gated culvert (Figure 2). By shifting the highway bridge to the south, the existing marsh area between the highway and railroad was expanded. Following the 1950 photo, the culvert was removed and tidal connectivity was restored to the salt marsh by what now appears to be a stable breach through the levee.



**Figure 1. Historic photos from 1937 (left) and 1948 (right), source Rohde 2020.**



**Figure 2. Historic photo from 1950, source HSU Library**



## **Current and Proposed Conditions**

Under current conditions, the existing tidal channel provides two hydraulic functions 1) it conveys drainage for a portion of southbound US 101 to the Eureka Slough, and 2) it provides tidal exchange for the existing 3-acre salt marsh bounded by US 101 to the south and the rail prism to the north (refer to Exhibit A). The existing tidal channel enters the Northwest Pacific Railroad property, from U.S. Fish & Wildlife property, at approximately station 14+40, where it meanders along the railroad prism. As the trail project will fill the portions of tidal channel proximal to the trail prism, the relocation of the channel will locate the new alignment partially or entirely on USFWS property in some locations. Refer to Exhibit B for typical cross sections, and the plan and profile of the proposed channel realignment.

The tidal channel realignment focuses on the area between HBTS station 14+40 and 23+00. Below station 14+40 the channel meanders away from the proposed trail prism and there is no conflict. Above station 23+00 the channel is confined between the railroad prism and the roadway prism and functions primarily as roadway drainage.

Between station 14+40 and 23+00, the existing channel travels along the railroad prism at a 0.3% slope ( $\pm$ ) for a length of approximately 860 feet, with the thalweg elevation gradually increasing from approximately 2.8' to 5.5' (NAVD88).

The channel realignment is proposed such that the new tidal channel cross sectional width and depth will generally match existing to the extent practical. The existing slough channel profile will also be matched such that there would be no significant changes to overall slope.

Tidal channels are formed by tidal prism exchange with cross-section geometry related to hydraulic shear stress (PWA 2002). Maintaining the existing tidal channel dimensions in the relocated alignment is intended to accommodate the same tidal prism exchange necessary for salt marsh function while also not altering stormwater runoff from Highway 101.

The proposed tidal channel realignment allows for an approximately 4-foot wide salt marsh bench between the edge of the trail prism and the new tidal channel. This bench moves the channel either closer to, or onto USFWS property while providing a buffer between the channel and the trail prism. The distance from the trail prism to the proposed channel is primarily limited by the reach of the construction equipment to be used.

## **Construction Considerations**

Construction will be achieved using heavy track mounted equipment (e.g. excavator) which will be staged from within the trail prism footprint. No heavy equipment will be allowed to enter the channel or on the salt marsh bench. During construction, temporary fiber rolls will be used to prevent sediment from trail construction from entering the wetland area.

## **Conclusions**

The intent of the proposed channel realignment is to have negligible impact on tidal connectivity. The current functionality of the tidal channel will remain as the profile and cross-sectional geometry will be analogous to the existing conditions, and the existing tidal channel network will not be altered.



## **Attachments**

Exhibit A – Current Conditions (G-101)

Exhibit B – Typical Sections & Plan and Profiles (C-103 and C-104)

## **References**

Philip Williams & Associates. 2002. Physical Evolution of Restored Breached Levee Salt Marshes in the San Francisco Bay Estuary, *Restoration Ecology*, Vol. 10, No. 3, pp 527-542, September 2002

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