

Reclamation District 799

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Board of Trustees:

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August 26, 2010

DISTRICT ENGINEER MEMO

Subject: Bulkheads Construction utilizing Deadman Anchor Piles Embedded into the Waterside Levee Slope

The purpose of this memo is to explain how piles interact with the supporting soil when subject to horizontal loads. The technical name for this engineering subject is referred to as the “mechanics of laterally loaded piles.”

Bulkheads are walls constructed in water to retain (support) earthen fill. A fancy name for a retaining wall built in water. Bulkheads commonly rely on “piles” embedded into the soil for support. The load transfer details for the design of pile supported bulkheads vary. Some use wood lagging as the facing system supported by timber whalers, others use steel sheet pile as the facing with steel whalers. But the mechanics of how the piles function in the soil is the same regardless of the pile material or the details of the facing system used to transfer retained earth loads to the piles.

In the attached graphic, figure 1 depicts a cross-section of what is referred to as a “normal wall” with no deadman anchor pile. The word normal is not used here to mean that walls that use deadman anchor piles are not common. Bulkheads using deadman anchor piles are common. The phrase “normal wall” is used here for the author’s convenience.

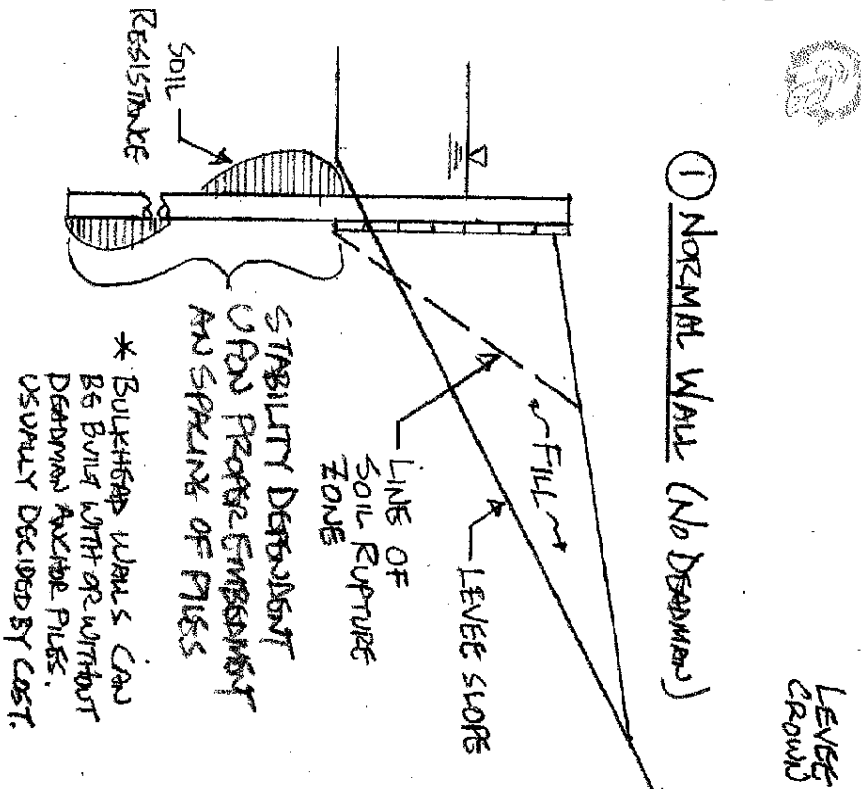
The wall shown in figure 1 depicts the “soil rupture zone” supported by the bulkhead. This soil wedge zone is the horizontal load on the wall. The soil resistance distribution on the pile is also shown.

Figure 2 contains a schematic of a “failed bulkhead” by pile rotation. One common way to repair failed bulkhead’s is to push the front pile back into place which creates a temporary void area of loose soil that cannot be relied on for support in the near term. This area of loose soil if not corrected during construction would take a significant amount of time for natural correction to occur. And even then, from an engineering

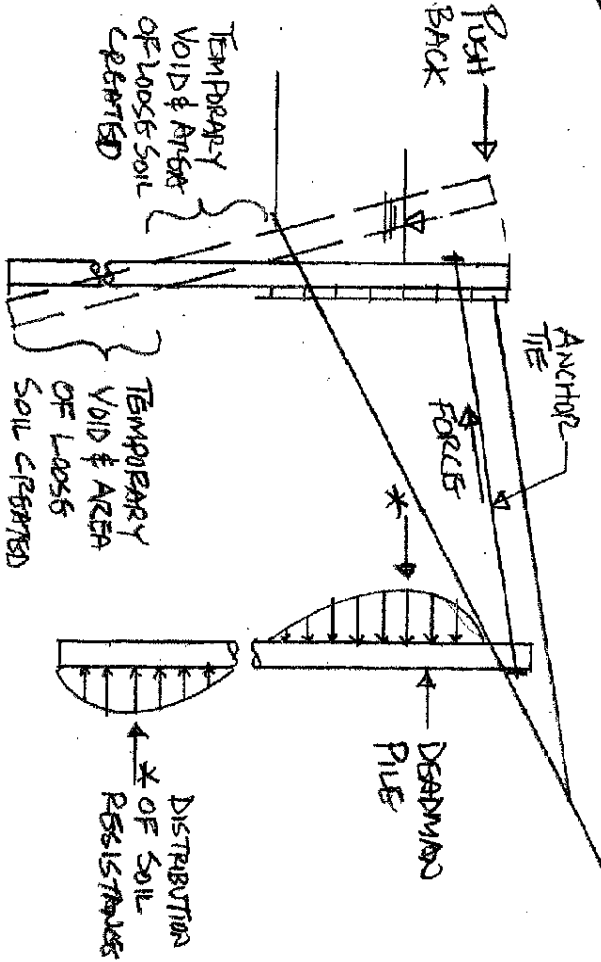
Physical Address: 6325 Bethel Island Rd. Bethel Island, CA 94511



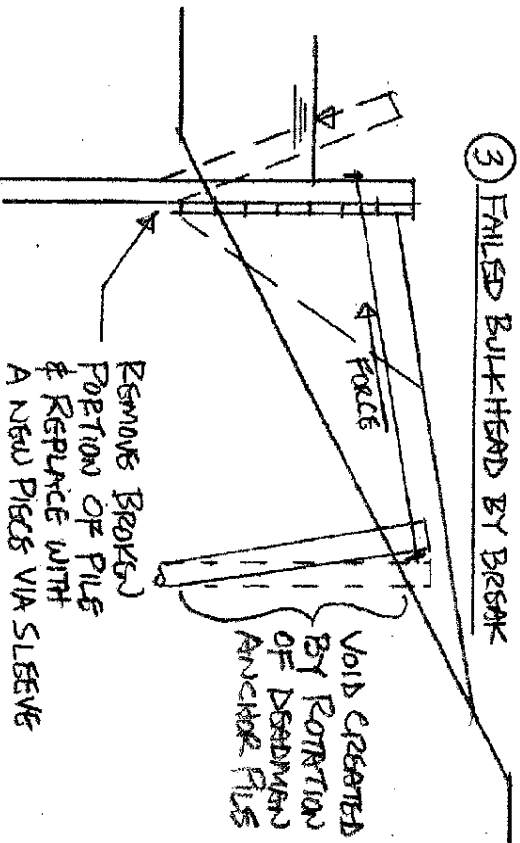
① NORMAL WALL (NO DEADMAN)



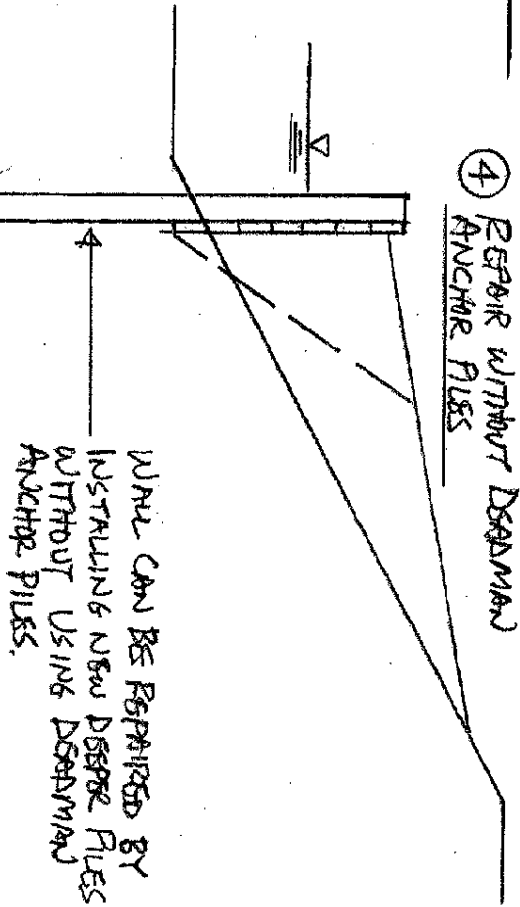
② FAILED BULKHEAD BY ROTATION



③ FAILED BULKHEAD BY BREAK



④ REPAIR WITHOUT DEADMAN ANCHOR PILES



Project: RD 799
 Subject: 4882 SANDMOUND
 Task: DEADMAN ANCHOR PILE
 Job #: _____
 No: _____
 Page: _____
 of: _____
 Checked: _____
 Date: _____
 Computed: KDL
 Date: 8/2010