Technical Memorandum

Date:	August 20, 2021
Project:	Chehalis River Basin Flood Damage Reduction Project
To:	Chehalis Basin Flood Control Zone District
From:	HDR
Subject:	Airport Levee Wetland Avoidance

1.0 Introduction and Purpose

The Draft Environmental Impact Statements (EISs) prepared by the Washington Department of Ecology (Ecology; pursuant to the State Environmental Policy Act) and the U.S. Army Corps of Engineers (USACE; pursuant to the National Environmental Policy Act) identified significant permanent impacts to adjacent wetlands from construction of the Airport Levee assuming it would need to be widened. Using careful design and construction management, the proposed Airport Levee improvements can be constructed within the existing Airport Levee footprint to avoid wetlands and cultural resource impacts. This memo clarifies potential design concepts that would avoid impacts to jurisdictional wetlands.

2.0 Background

The Airport Levee was originally constructed in 1943 by the USACE Seattle District for the U.S. Department of the Navy under *Development of Landing Areas for National Defense* authority. Lewis County is the sponsor of record for the levee system, but maintenance is primarily performed by Chehalis-Centralia Airport staff. The levee is periodically inspected by the USACE as part of the Rehabilitation & Inspection Program under Public Law 84-99, which provides reimbursement for specific damages to levees that result from high-water events. The Airport Levee was most recently inspected by USACE in February 2019 and found to be in acceptable condition (USACE 2019).

The levee starts at a tie into high ground near NW Airport Road at the southeast corner of the airport property (Figure 1). The levee follows a northwest direction and parallels the airport runway, before turning east/northeast and into the Interstate 5 road embankment at the far end. The levee embankment is set back approximately 500 yards from the right bank of the Chehalis River. The Airport Levee protects about 464 acres, most of which is comprised of the Chehalis-Centralia Airport property.

The existing Airport Levee provides protection from smaller (less than 100-year) flood events and was most recently improved in 2014 during Phase 1 (levee base improvement) of the Airport Levee Project. Phase 1 expanded the top width of the existing levee while restoring the top to the original intended design elevation. A vicinity map for the current Airport Levee configuration is provided in Figure 1. The existing 100-year flood inundation zone is shown

affecting the inside of the levee area under the current levee design elevation (Figure 1). The Washington State Office of Financial Management grant for Phase 1 anticipated a possible future levee raise to provide 100-year flood protection. Phase 2 of the Airport Levee Project would build on the work completed during Phase 1.

3.0 Phase 2 Levee Raise

Phase 2 of the Airport Levee Project proposes to raise the existing levee between 1.3 feet to 5.3 feet with most of the levee raise between 3 and 4 feet. The function of the levee is to provide a stable structure that that will resist flow through the levee body and foundation. When designing a levee raise, the existing levee material and foundation needs to be investigated to determine if there is sufficient strength in the existing levee and its foundation to support the raised levee height and increased water pressure during a flood. Standard levee design requires a levee crest width of 10 to 12 feet, depending on local and emergency vehicle access requirements.

To evaluate the Phase 2 concept, HDR reviewed design cross sections for Phase 1 of the Airport Levee Improvement Project provided by the Lewis County Department of Public Works. Where possible, Phase 1 widened the levee crest to between 19 and 30 feet, with most of the finished crest widths between 26 and 28 feet. The side slopes proposed in the Phase 2 design were typically 2H:1V (Horizontal: Vertical) except where restricted by wetlands or right-of-way constraints. Where space allows, a 4-foot levee raise can be achieved with 2H:1V side slopes by reducing the new crest width to 10 feet and regrading side slopes to the recommended 2H:1V. Construction of the levee raise in this manner can be completed within the existing levee footprint.

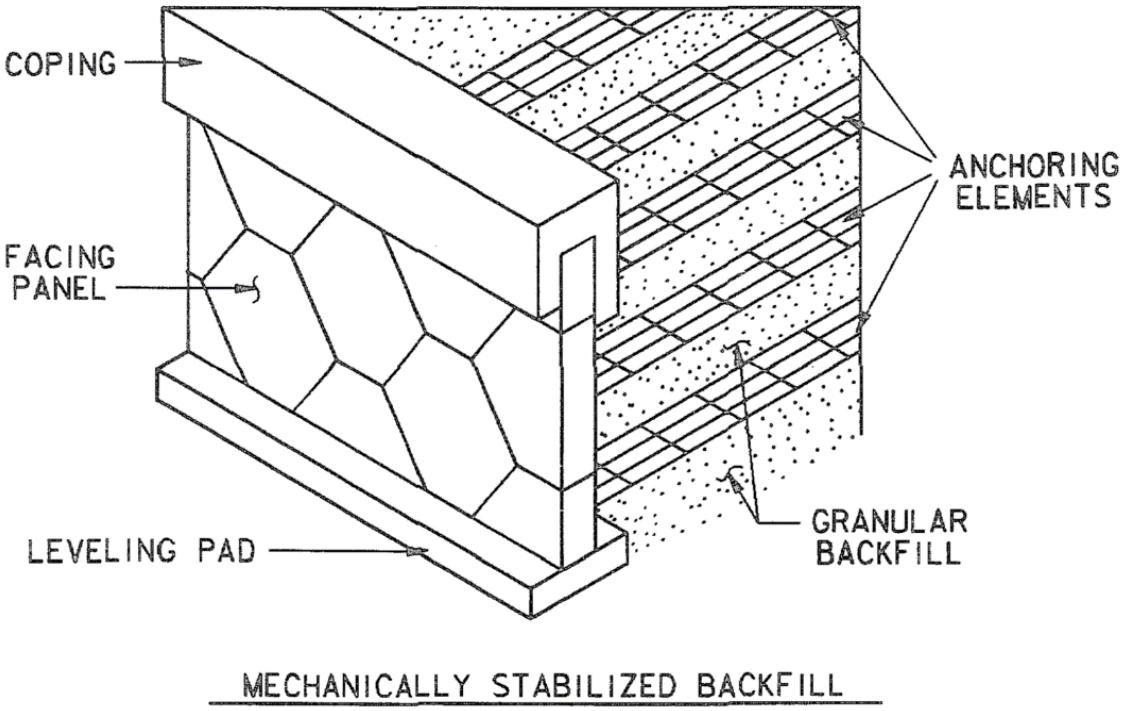
In areas restricted by wetlands or right-of-way constraints, a mechanically stabilized backfill may be utilized to raise the levee while remaining within the existing levee footprint (Figure 2). This type of construction would allow steeper slopes for sections where a trapezoid section could not be accommodated due to width restrictions while meeting the required 10- to 12-foot crest width. The stabilized backfill method utilizes layers of flat reinforcing material (geogrids or welded wire fabric) between the layers of soil to improve the strength and stability of the combined soil and reinforcing that allows vertical construction. Depending on the results of the geotechnical investigations, an impervious cutoff, such as a sheet pile wall, may be required below the mechanically stabilized backfill section to provide a flow gradient sufficient for the raised water level.

If road access is not required over the crest, a concrete flood wall could be a potential levee raise option which could be constructed within the existing levee footprint (Figure 3). This type of wall has a smaller footprint and would more easily be accommodated on top of the existing Phase 1 levee. Depending on the results of the geotechnical investigations, an impervious cutoff, such as a sheet pile wall may be required below the flood wall to provide a flow gradient sufficient for the raised water level.

Limited geotechnical information is available for the existing Phase 1 levee and further investigations are required to design the Phase 2 levee raise to better understand if the foundation soil needs to be improved to accommodate the raised levee and higher water levels.

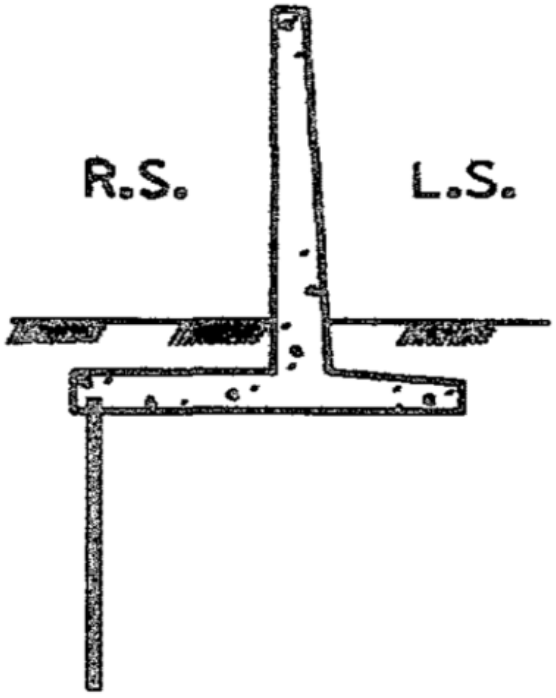
Figure 1. Chehalis Airport Levee Configuration and Wetland Map

Figure 2. Mechanically Stabilized Earth Levee Raise Concept



Source: USACE EM 1110-2-2502

Figure 3. Concrete Inverted "T" Flood Wall Raise Concept (with cutoff wall)



Source: USACE EM 1110-2-2502
R.S – River Side
L.S. – Land Side

4.0 Conclusions

The Phase 2 levee requires additional geotechnical investigations prior to design. Given the limited height of the Phase 2 levee raise and the available space within the footprint of the existing levee, there are multiple options for achieving the Phase 2 levee height within the existing levee footprint. With careful design, construction management including best management practices to protect the wetland, a concept can be developed that would avoid impacts to jurisdictional wetlands.

5.0 Literature Cited

U.S. Army Corps of Engineers (USACE)

1982 Interim Feasibility Report and Environmental Impact Statement, Centralia Washington, Flood Damage Reduction. U.S. Army Corps of Engineers, Seattle District, December 1982.

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