

LEVEE SYSTEM FORM 1

Levee System Name: Peninsula No. 1

Drainage District Name: Peninsula DD No. 1

USACE District: NWP

NLD Status: Federally Constructed, Locally Operated, Active

River: Columbia

River Mile: 105.6 to 106.5

Type of Structure: Earthen Levee, flood walls and Closure Structures

Design Flood Elevation (NAVD88 in feet): 35.5

Protection Area (acres): 940

System Length (miles): 3.83

Last Inspection (date): 2010

Overall Rating: MA (rating not yet finalized)

Organization's Capability: A

Summary: The Peninsula Drainage District No.1 is located along the left bank of the Columbia River, approximately 5 miles northeast of the city center of Portland. The system includes embankments of the Union Pacific Railroad and Burlington Northern Railroad along its western boundary. Initial construction of the existing levee system was completed in 1918, however older levees were present prior to 1918. Since 1939 the Corps of Engineers has participated in several levee improvements and emergency repair projects to maintain and upgrade the district's flood protection system. The Denver Avenue embankment along the east side of the district is the common boundary between Peninsula #1 and #2. For the purposes of this study, the Denver Avenue embankment has been assigned to the Peninsula #2 system.

Past Performance: 1948 Flood History – June 1948 – with Flood Fighting

LOCATION Stations	DESCRIPTION
85+25 to 91+75 Railroad Embankment Failure – May 30, 1948 4:00 – 4:30 PM	An embankment was formed by dumping of construction excavation materials from other railroad tunnel work and made up the Union Pacific Railroad (formerly the Northern Pacific Railroad) and the Spokane, Portland and Seattle Railway fill on the western side of the district. This was not an engineered fill, and materials were dumped and the wooden

<p>Post-flood emergency repairs</p>	<p>trestle timbers and piling were incorporated into the fill. The embankment constructed from 1907 to 1918, when the last portion of the embankment was constructed, had served since 1918 as the western portion of the levee district. The Government operated Vanport Housing Project was constructed during 1942-43 in Vanport City and had a population of about 18,000 in 1948 when the failure occurred. A member of the community recounts that the backslope was wet and muddy in the days prior to the break. Water level at the time of the break was about 36.3 ft NAVD88 as the flood had not crested. Seepage was observed as a boil 250 north of the failure prior to the failure and was being ringed. Train movement was normal during this period as no concerns had been raised over the stability of the embankment. At the site of the failure, a crack was observed by a railroad official on the embankment of 1 inch width and about 100 feet long. A small seepage area of 10 feet by 4 feet was noted by a railroad guard at the toe of the slope where the failure started. The railroad was in the process of dumping a carload of rock on the water side of the seepage area when the guard heard a crack and saw a stream of water flowing into the bottom portion of the levee. The guard and two other men on top of the embankment then ran in opposite directions from the area as the embankment began to collapse and the break began to widen. A railroad official and a Corps of Engineers' representative who had been at the boil site had just left after inspection the crack area and both happened to look backed, as they walked back to the boil, and saw the embankment behind them crumbling and disintegrating and watched the toppling of a railroad signal house and signal poles into the collapse. Water then broke through the embankment and the breach rapidly widened. Cause of the failure was not certain but an investigation concluded that because of the unknown composition of materials in the embankment, debris in the fill, the method of construction, no boils or excessive seepage seen – that “The magnitude of the failure zone and the rapidity of failure suggest the possibility that the failure may have caused by foundation liquefaction.”</p>
<p>1972 Pre-Flood Actions</p>	<p>A temporary trestle over the breach area was installed by the railroads and was used until dredge material was placed to repair the breach. Emergency work by the Corps after the repair included construction of filter and drain covered by an earth blanket with a top slope of 1 on 20 against the restored railroad embankment between stations 86+25 and 91+25.</p> <p>In 1972 as a pre-flood emergency measure, the Corps constructed a sand reinforcement berm with toe drain along stations 75+00 to 87+00 and 91+00 to 113+00. Laterals from toe drain to a new drainage ditch were installed under a reinforcement berm with top at elevation 23 feet MSL (26.5 feet NAVD88) and berm top width of 25 feet (75+00 – 87+00) to 15 feet (91+00 – 113+00) and back slope of 1V on 5H.</p>

2000 – Section 205 construction	Section 205 stations 93+00 to 113+00 improvements to the previous reinforcement berm with a raise to top elevation 30.8 feet NAVD88, a 12 wide top, and a 1V on 5H slope to the toe or with a bench in specified areas. Reduction of flood risks for this portion of the levee was the basis for the improvements.
Other areas affected by the 1948 Flood	Corps of Engineers function – advisory only in Pen1 and Pen2. Prior to the breach, there areas – not specified where seepage was found, but both the Drainage District had manpower and the Fire Department were on hand to take care of seepage and to patrol the levees. The fire department personnel were on the Columbia Slough portion of the levee.
Columbia Slough Segment – 24 th and 29 th of May 1948 (no specific locations noted)	Areas of seepage, blisters, and boils along the Columbia Slough levee, even before the maximum flood stage was reached, with”...a little seep water appearing at some spots approximately 150 feet landward of the levee...” and then “...seepage increased as the river continued to rise...”. Some of these areas of concern were sandbagged.
Oregon Slough Segment – 24 th and 29 th of May 1948	Because of some safety concerns for the flood wall in front of the Swift and Company plant (26+00 – 27+00?) and some areas along the Oregon Slough segment, these were sandbagged (locations not specified).
Oregon Slough – 1964 Improvements	4,178 linear feet of riprap placed as bank protection.

1956, 1964, and 1996 Flood History with flood fighting

LOCATION Stations	DESCRIPTION
Columbia Slough (no locations cited)	1956 (32.9 feet NAVD88) and 1964 (33 feet NAVD88)– 2 boils running clear water
Railroad Embankment (no locations cited)	1956 and 1964 Flood Events – 1 boil running clear water
Columbia Slough – in and around 145+00 1996 Flood	During the 1996 flood event (32.7 feet NAVD88) a reach of 200 feet downstream of the pump station on the landward slope and toe experienced a rotational failure, and then had additional movements and extended the affected area to 350 feet total during January 1997 high water while the initial PL 84-99 repairs were underway. The failure resulted in a weakened levee section and further disrupted interior drainage by closing off drainage leading to the pump canal. With the increased damage, the repair area was enlarged and new interior drainage required CMPs and a manhole structure to direct drainage.

	Final repairs were completed in early 1997.
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