Oakland International Airport Perimeter Dike Project

MAJOR PROJECT UPDATE

- HISTORY
- PROJECT OVERVIEW
 - NEXT STEPS

September 12, 2019

Airport Perimeter Dike History

- 1927 Original North Field Airport
- 1950's Original "clay" dike installed for South Field
- 1970's Dike lengthened for the extension of Runway 12/30
- 1983 Dike breached during a major storm, reconstructed in 1984
- 2007 First Vulnerability Study for Airport Perimeter Dike (APD) Improvement Project to meet FEMA Levee Certification Standards
- 2015 FEMA issues DRAFT Flood Maps showing significant flood risk at Airport from 100-year flood event
 - South Field "Seclusion" due to ongoing dike improvements

History: 1927 First Airstrip Constructed at North Field

TABLE D

1.27

14 ----

History: 1957 Dike under construction for new South Field Airport

History: 1958 Dike Completed and Airfield under construction

21





Project Overview: Purpose

• Why Improve the Perimeter Dike Now?

- Due to revised FEMA base flood water-levels the existing dike does not meet updated requirements.
- The proposed Dike improvements will allow the Airport to recertify the Dike for flood protection on the South Field.

Periodic major maintenance and upgrades are necessary

• Since construction in the 1950's the Dike requires major upgrades on a roughly 30-year cycle

Climate Change and Adaptation

• More is now known about assets exposed to rising sea levels, this is the first step in adapting to this new reality

Project Overview: Physical Objectives

- Raise the Dike 3-5 feet over its 4.5 mile length
 - Address increased base flood water-level in recently published FEMA maps.
 - Dike fill consists of earthen-clay soils from both on-site and imported sources

• Stabilize the Dike

- Improve and strengthen the outer-face (SF Bay) with riprap to protect from wave action
- Complete installation of stability berms on the inboard side
- Reduce seepage through the Dike
 - Construct seepage control and collection system to prevent erosion

APD Development Constraints

- Wetlands
- Kinder Morgan Fuel Pipelines & Penetrations
- Part 77 surfaces
- Tidal Lagoon & Dike Penetrations
- Vehicle Service Road





Role of Dike in Flood Control

• Wave Attenuation

- o Riprap on outboard face protects dike from erosion
- Crest Structure provides additional protection from wave action
- Protection from surges during storm events
 Ouring storms, low pressure can lead to higher water levels

• Protect low-lying areas from tidal action

- Runway 12/30 is at an elevation of 8'
- o FEMA base flood elevations (BFE's) range from 12-15'
- Infield areas of the airfield are below sea level



Project Objectives

- Phase 1A: Stability Berms Constructed during Runway 12/30 Overlay, September 2017
- Phase 1B: FEMA/Army Corps Accreditation for Flood Protection
 - o 1. Freeboard
 - o 2. Static Stability
 - 3. Seepage
 - o 4. Account for 1-foot of Sea Level Rise
- Phase 2: Seismic Improvements



Phase 1B.1: Freeboard

- Top of Dike minimum elevation to meet SWL+Freeboard+SLR, +13'
- Top of Dike or top of Crest Structure for wave run-up TWL varies from +13' to +17'





Stability Berms

- Simple solution, Partially constructed in 2017 with Runway 30 Overlay
- o Some Permanent wetlands impacts

Phase 1B.3: Seepage

- Seepage predicted in sand dike locations
- Seepage observed in the field no imminent erosion, but seepage contributes to wetlands creation



Phase 1B.4: Sea Level Rise



Additional (1) Foot added to Dike to protect for Sea Level Rise (SLR)

 Incremental approach, adapt to changing conditions over time

Port of Oakland

Sea Level Rise Assessment Plan

Summary

June 28, 2019

Phase 2: Seismic Improvements Stone Columns

• Stone columns construct dense aggregate columns to reinforce and densify granular soils





Dike Elements in the City of San Leandro Airport Fuel Farm SF Bay Trail (Blue) SL Water **Treatment Plant** Pond Dike Improvements (Yellow)

Budget

• Phase 1: \$26.5 Million Budget

- Includes all phasing design, permits, mitigation, construction and soft costs
- The Port has received a grant of \$5 million from the State Levee Repair Program to offset a portion of the Phase 1B work

| Budget Category | Amount |
|-----------------------------------|---------------|
| Construction + Change Order Auth. | \$15.6M |
| Construction Management+Misc. | <u>\$3.0M</u> |
| Environmental | \$2.5M |
| Design Consultant | \$2.2M |
| Port Labor | \$3.3M |
| TOTAL Phase 1B | \$26.5M |

Budget: Phase 2

- Phase 2 : Estimated \$40 Million
 - Seismic Improvements

TOTAL Estimated Budget \$66.5 Million



