ALA WAI CANAL PROJECT

US ARMY CORPS OF ENGINEERS
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by
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- PROJECT AREA
- PROJECT PURPOSES
- PROJECT OBJECTIVES
- SPECIFICALLY AUTHORIZED PROCESS
- FEASIBILITY STUDY
- FLOOD CONTROL CONCEPTS
- RESTORATION CONCEPTS
- FEASIBILITY ALTERNATIVES
- HYDRAULIC MODELING
- ALTERNATIVE RESULTS
- NED PLAN

PROJECT AREA

- State of Hawaii
- Island of Oahu
- City & County of Honolulu

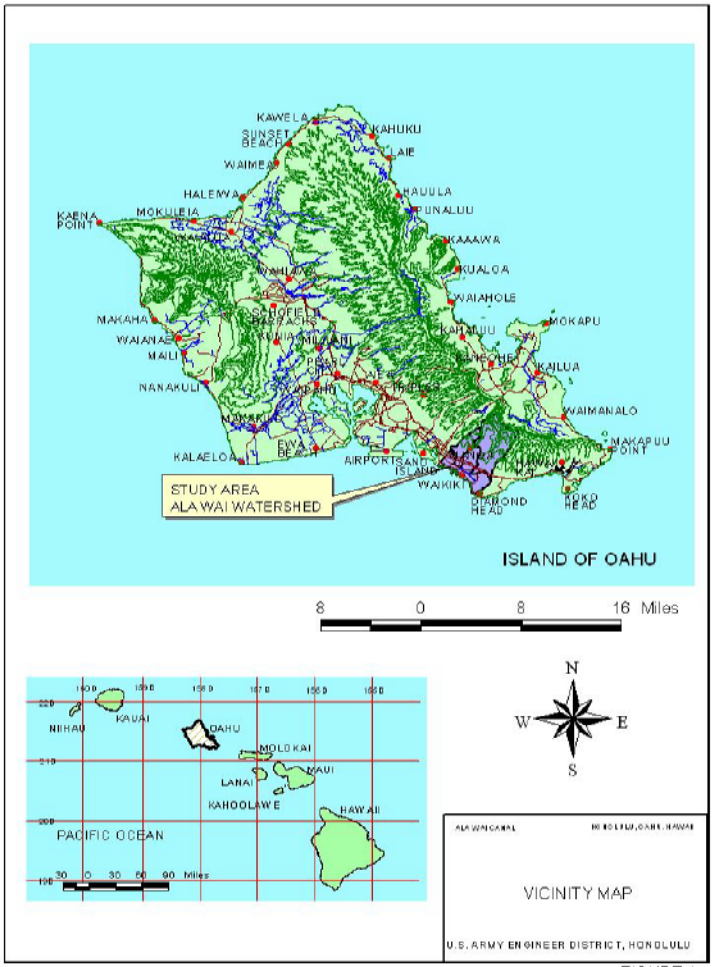
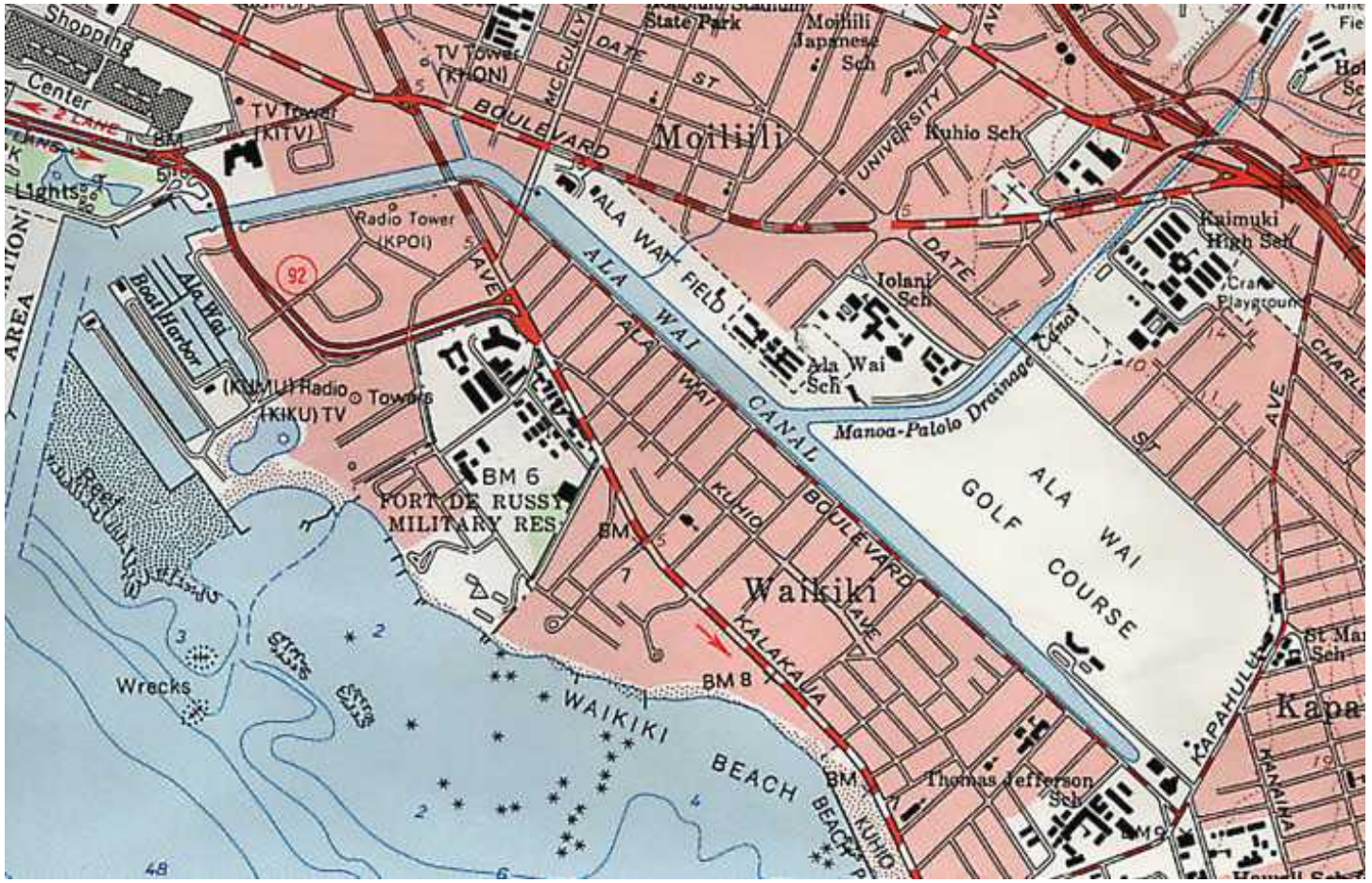


FIGURE 1

PROJECT AREA

- **Ala Wai Watershed**
  - Makiki
  - Mānoa
  - Pālolo
  - Waikīkī
  - Kapahulu
  - McCully
  - Moʻiliʻili



Ala Wai Canal, Honolulu, O‘ahu, Hawai‘i

PROJECT PURPOSES

- Flood Damage Reduction

- Insufficient channel capacity
- Prevent $130M Flood Damages to Structures (2001 Study)

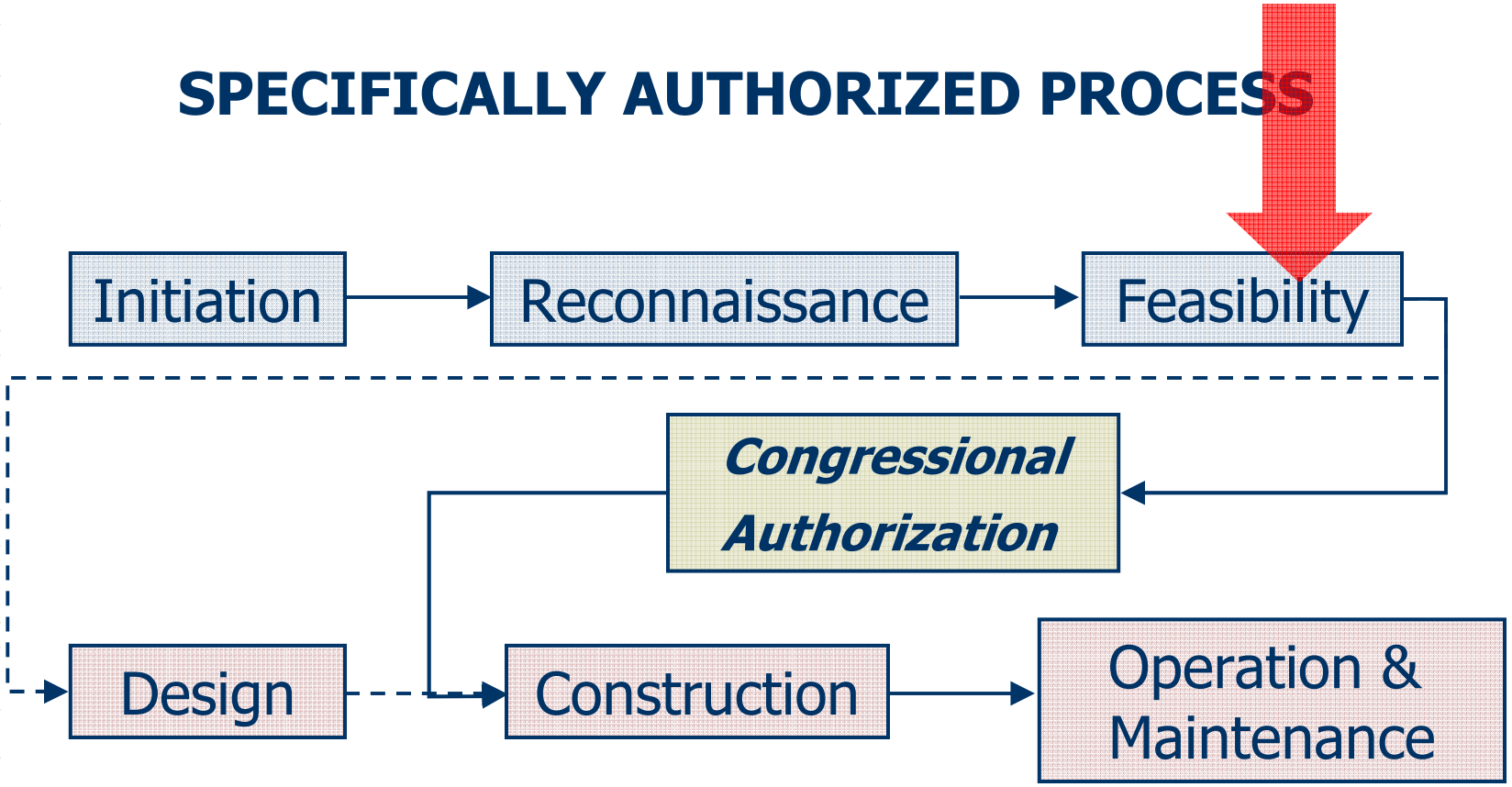
- Ecosystem Restoration

- poor habitat for native species; prevalence of alien species; poor water quality; contaminated materials; excessive sedimentation

PROJECT OBJECTIVES

- Flood Control – Protect Waikīkī and surrounding areas from 100-year storm event
- Restoration – Improve watershed health through reversal of environmental degradation

SPECIFICALLY AUTHORIZED PROCESS



ALA WAI CANAL PROJECT FEASIBILITY STUDY

- Section 209 of the FCA 1962
- Sponsor = State of Hawai‘i, DLNR
- Multipurpose project
- Watershed project; ‘Ahupua‘a concept
- Holistic approach; coordinating all actions
- Joint EIS and Feasibility Report
- Draft EIS in late 2005
- Study completion in 2006
- Construction start estimated for 2008
- Cost estimated between $80M - $120M

PUBLIC INVOLVEMENT

- Public information meeting in June 2001 & June 2004
- Technical Advisory Group (TAG)
- Agency Support Group (ASG)
- Biologists/scientists workshop
- Stakeholders workshop
- Agency workshops
- Various individual meetings
- AWWA meetings
- EIS Scoping meeting

COMMUNITY WATER RESOURCES INITIATIVES

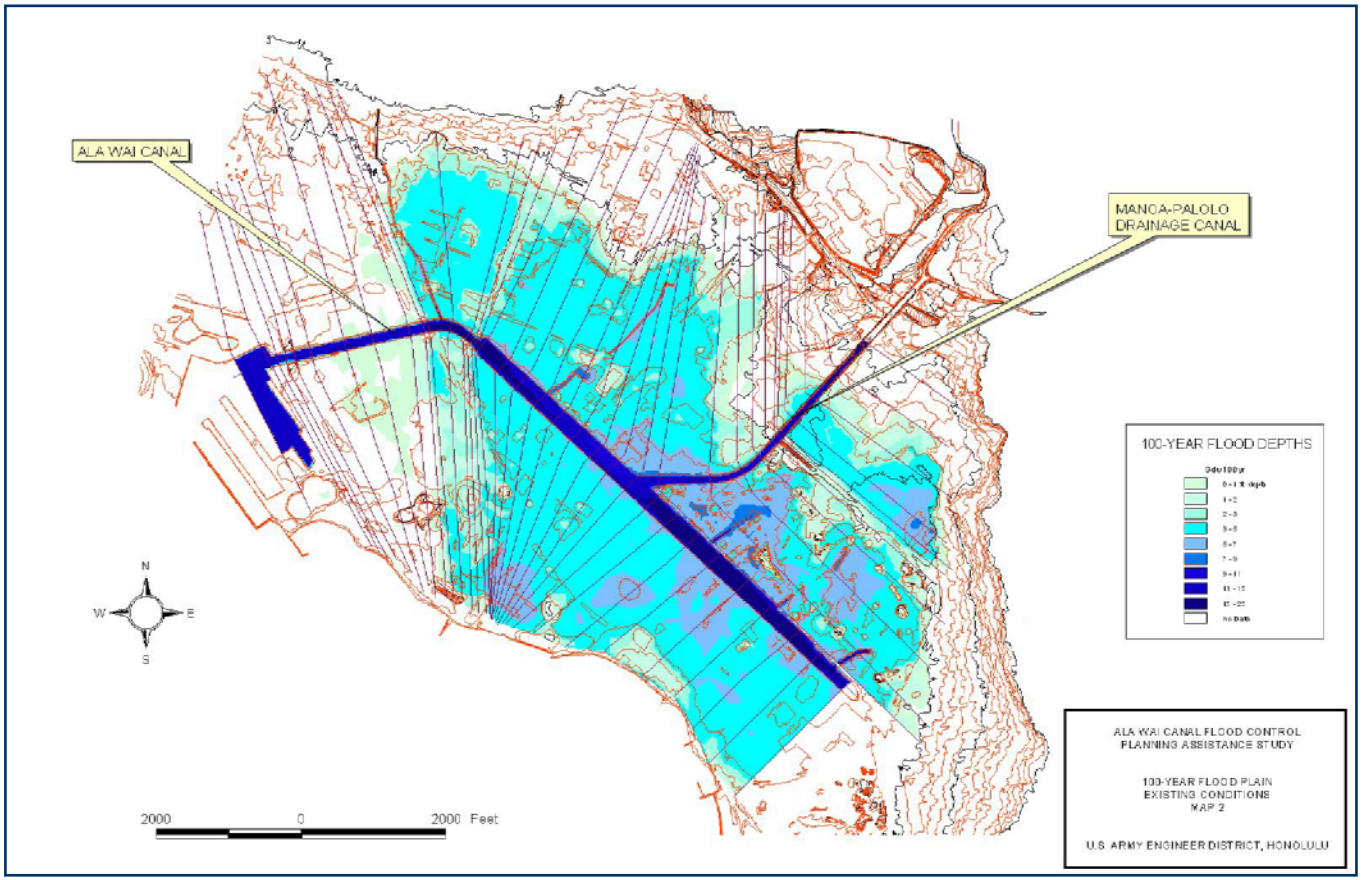
- Ala Wai Watershed Association
- Hawai‘i Nature Center
- Mālama ‘O Mānoa
- Makiki Stream Stewards
- Pālolo Pride
- Ko‘olau Mountain Watershed Partnership
- Waikīkī Aquarium
- Canoe clubs
- Public and Private Schools
- Hawai‘i Trails Organization
- Tantalus Association
- Kapi‘olani Park Advisory Council

GOVERNMENT WATER RESOURCE PROGRAMS

- Federal
- State of Hawaii
- City & County of Honolulu
- Honolulu Board of Water Supply

100-YEAR FLOOD INUNDATION AREA

- $130M Flood Damage Reduction Benefits (2001)



*2001 study focused on Canal area; 100-year storm will produce flooding in streams.

NOVEMBER 1965

- 25-year level event

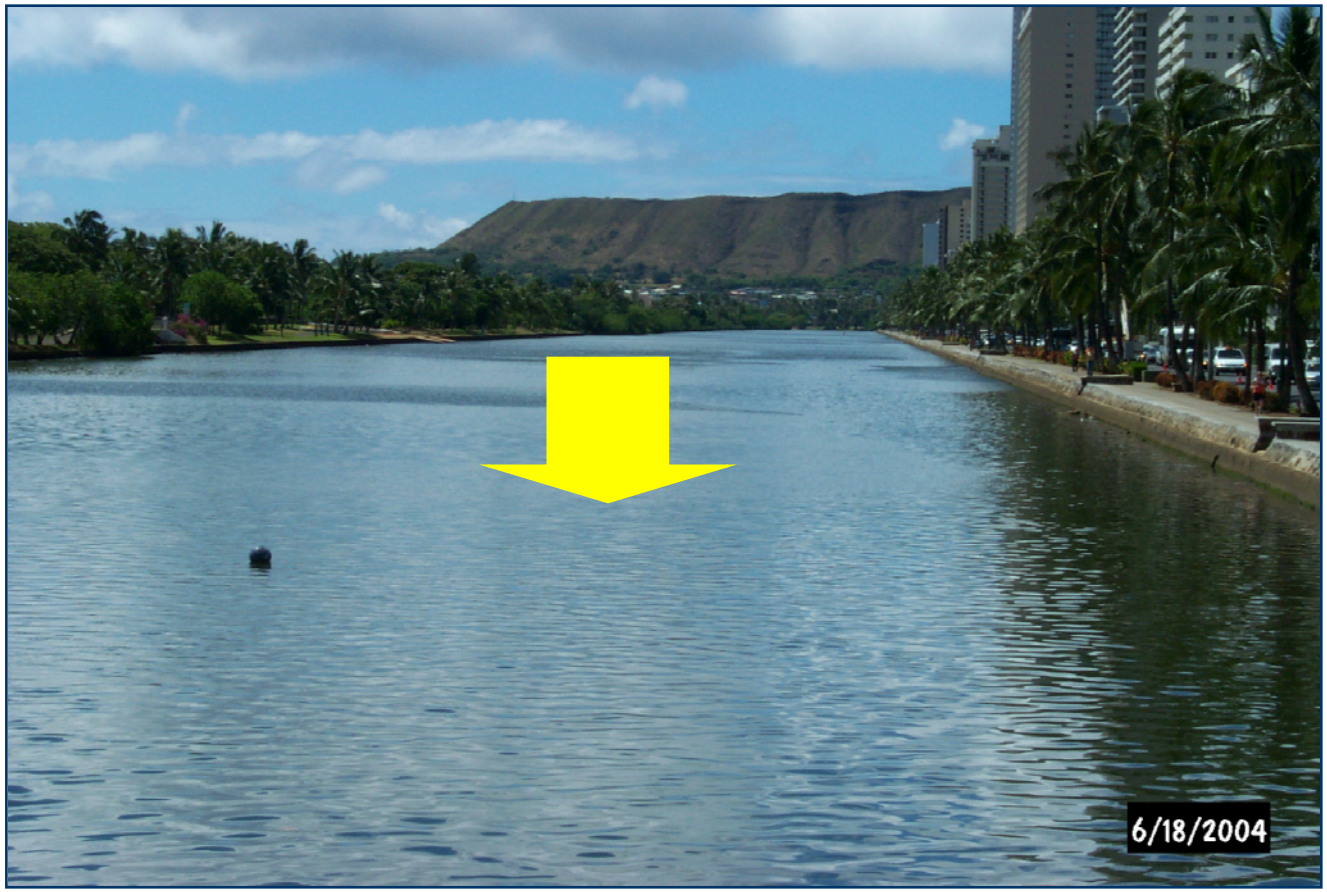
Honolulu Advertiser, Nov 1965

FLOOD CONTROL CONCEPTS

- Dredging
- Flood Walls
- Widen Canal
- Bridge Modifications
- Storage (golf course & other areas)

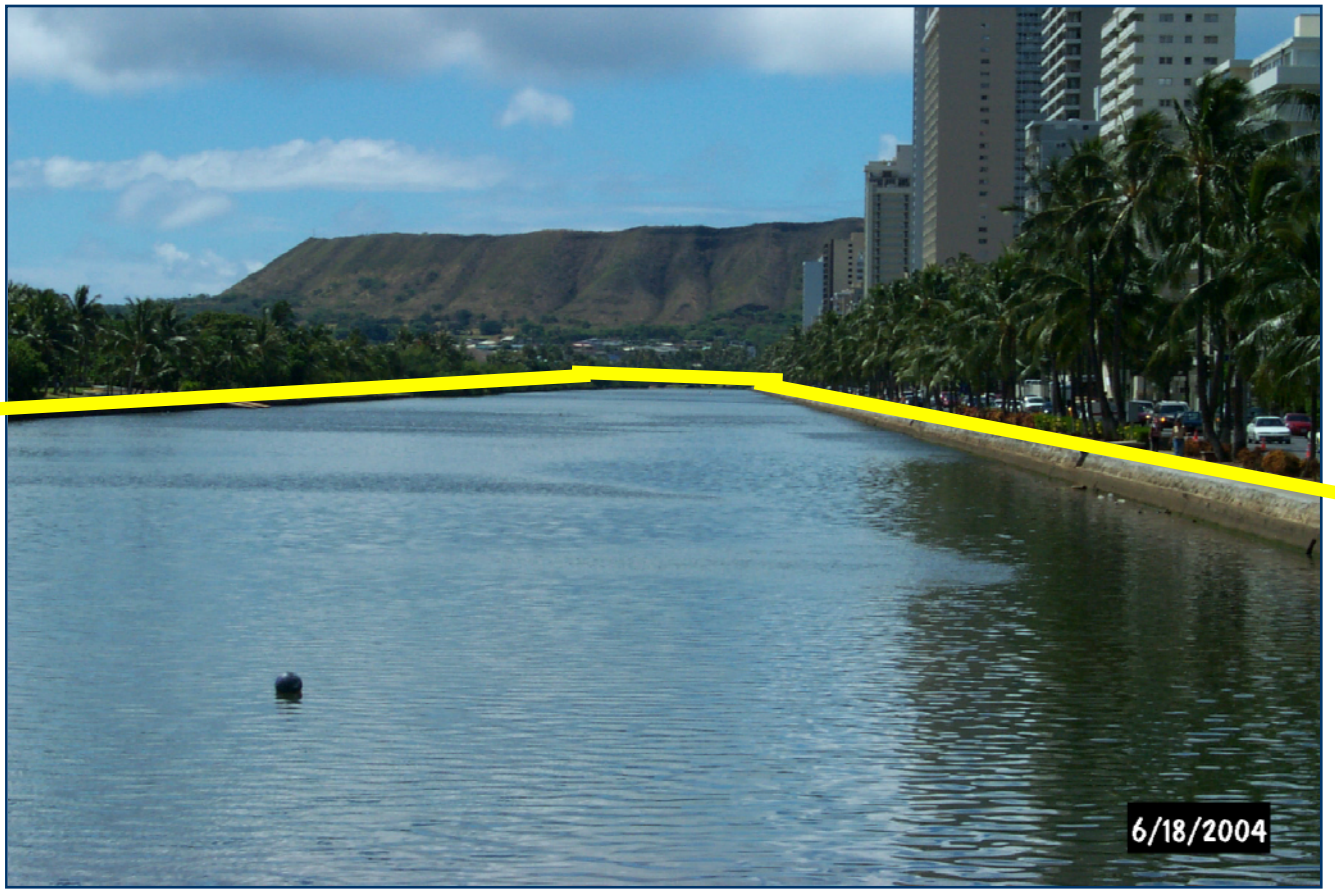
FLOOD CONTROL CONCEPTS

- Dredging



FLOOD CONTROL CONCEPTS

- Flood Walls



FLOOD CONTROL CONCEPTS

- Widen Canal

FLOOD CONTROL CONCEPTS

- Reconstruct Bridges

FLOOD CONTROL CONCEPTS

- Storage

RESTORATION CONCEPTS

- Restore stream habitat
- Stabilize stream bed and bank
- Restore stream cover/shade
- Re-create wetlands
- Reduce trash & sediment loads
- Construct check dams

FEASIBILITY ALTERNATIVES (initial)

- Existing Conditions Alternative- The do nothing alternative
- Alternative A- Dredging
- Alternative B- Floodwalls
- Alternative C- Dredging and Floodwalls

FEASIBILITY ALTERNATIVES (current)

- Alternative D- Dredging + widen canal at Convention Center + bridge modification + golf course storage
- Alternative E- Floodwalls + widen canal + bridge modification + golf course storage
- Alternative F- Dredging + floodwalls + golf course storage
- Alternative G- Dredging + widen canal + golf course storage
- Alternative H- ??

HYDRAULIC MODELING

- HEC-RAS (steady), initial
- FLO-2D, 2-dimensional, unsteady flow
- HEC-RAS (unsteady) calibrated to FLO-2D
- HEC-RAS output needed for input into HEC-FDA

EXISTING CONDITIONS

- Provide ~10-year level of protection
- Interior drainage problems in Waikiki area
- Canal acts as a sedimentation basin
- Recent dredging in Ala Wai Canal, $7.5M, 185,800 cubic yards removed of trash, debris & muck
- Ala Wai Golf Course, highly used municipal 18-hole course, 167,000 rounds/yr, 250,000 buckets at driving range/yr

ALTERNATIVES A, B & C - RESULTS

- Does not provide 100-year level of protection (LOP)
- Community resistance to floodwalls
- Eliminated as alternatives
- Look to a combination of flood control concepts in other alternatives

ALTERNATIVE D – RESULTS

Alternative D: Dredging + widen canal + bridge modification + golf course storage

- Provides a 10-year level of protection
- Channel cannot contain flow with modifications
- Dredging has little effect on WSE
- Widening does not change the WSE used for better flow transitions
- Bridge modification to the Kalakaua Bridge only, McCully bridge raising has little effect on WSE
- Golf course used as storage area

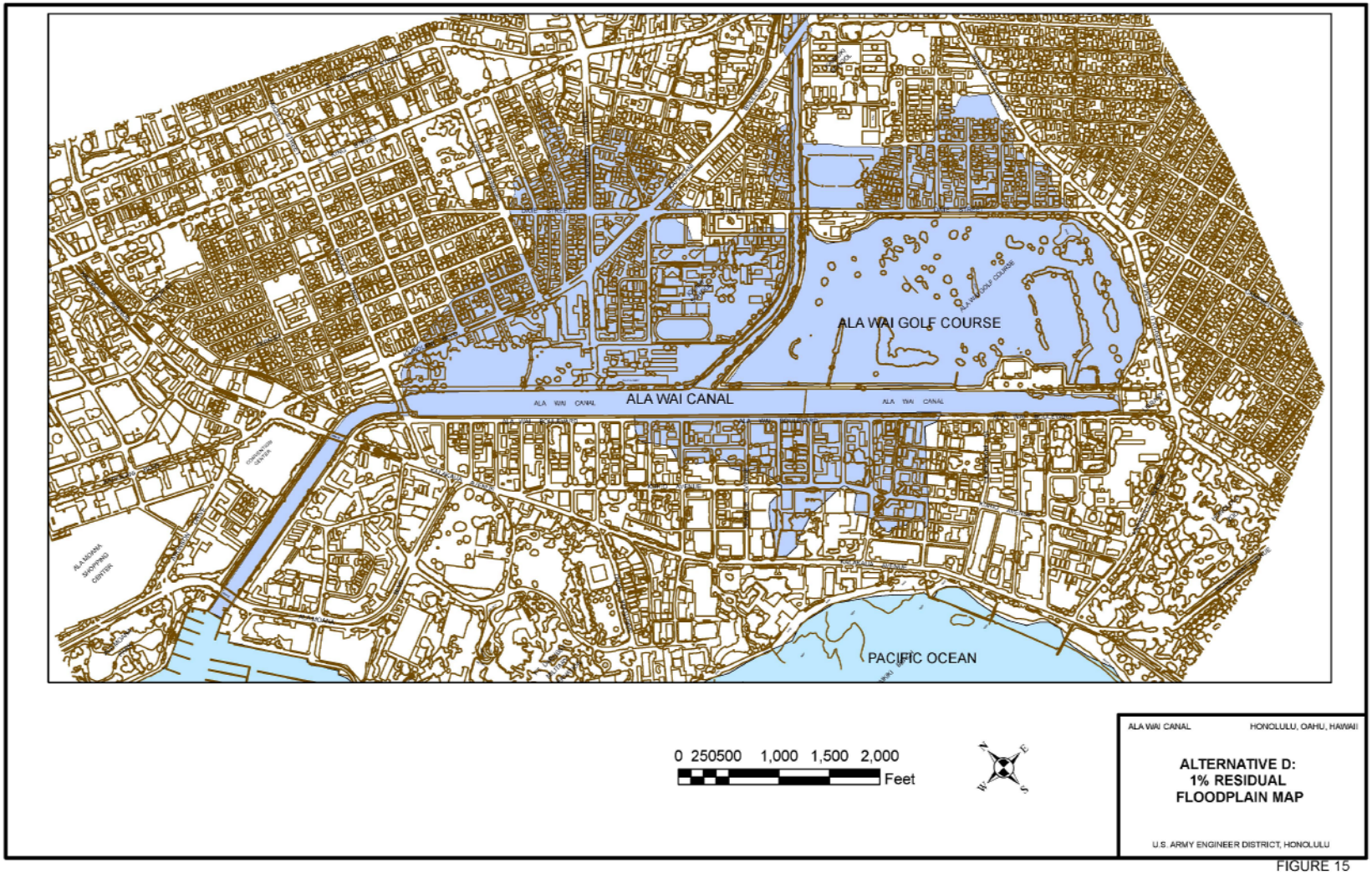
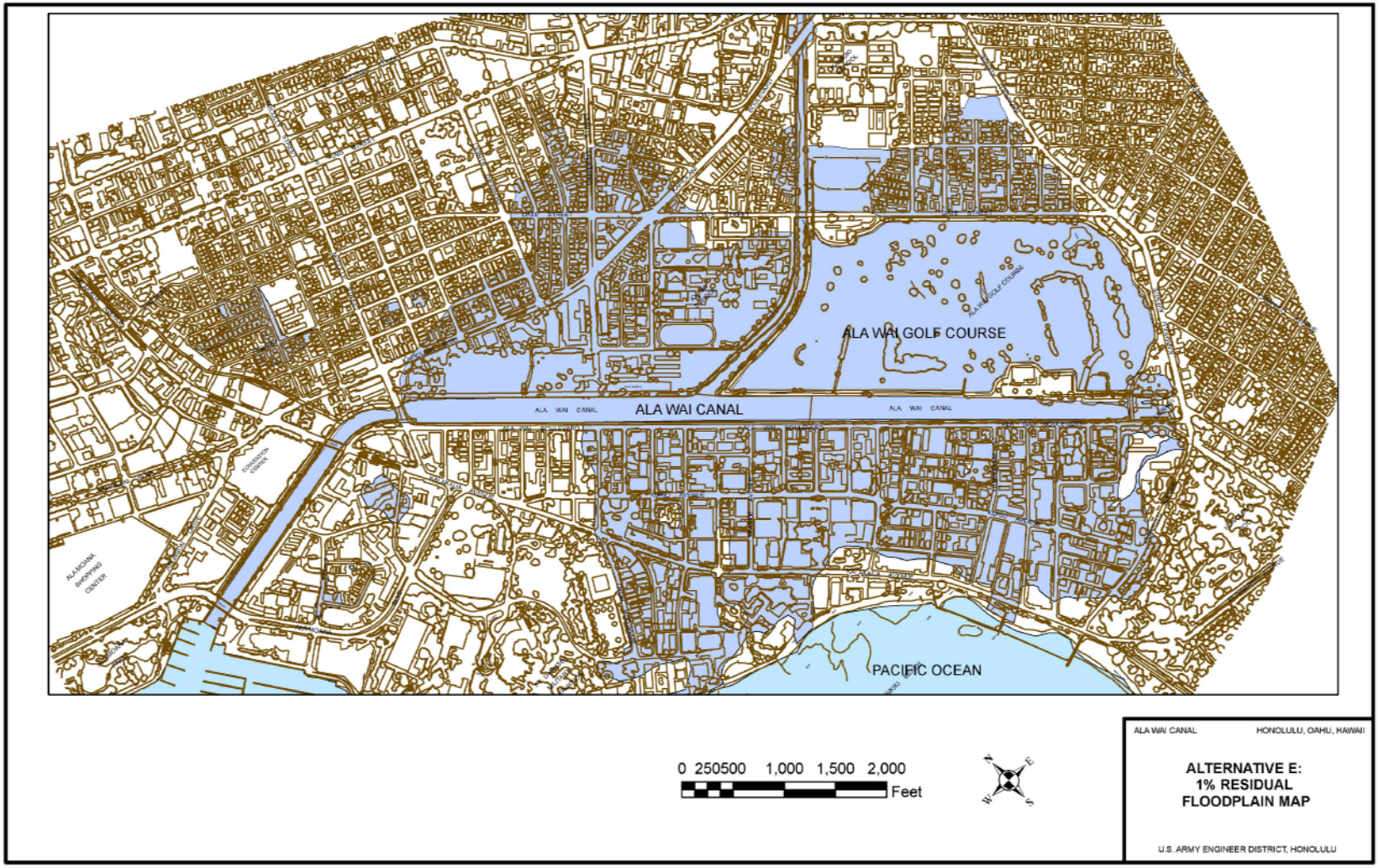

ALA WAI GOLF COURSE
ALA WAI CANAL
PACIFIC OCEAN
0 250500 1,000 1,500 2,000
Feet
ALA WAI CANAL
HONOLULU, OAHU, HAWAII
ALTERNATIVE D:
1% RESIDUAL
FLOODPLAIN MAP
U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE 15

ALTERNATIVE E – RESULTS

Alternative E: Floodwalls + widen canal + bridge modification + golf course storage

- Provides 100-yr flood containment in channel
- Floodwall minimum height, 3.2 feet
- Modifications and floodwalls limit local/interior drainage causing interior flooding
- Widening does not change the WSE in canal
- Bridge modification to the Kalakaua Bridge only
- Golf course used as storage area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ALTERNATIVE E:
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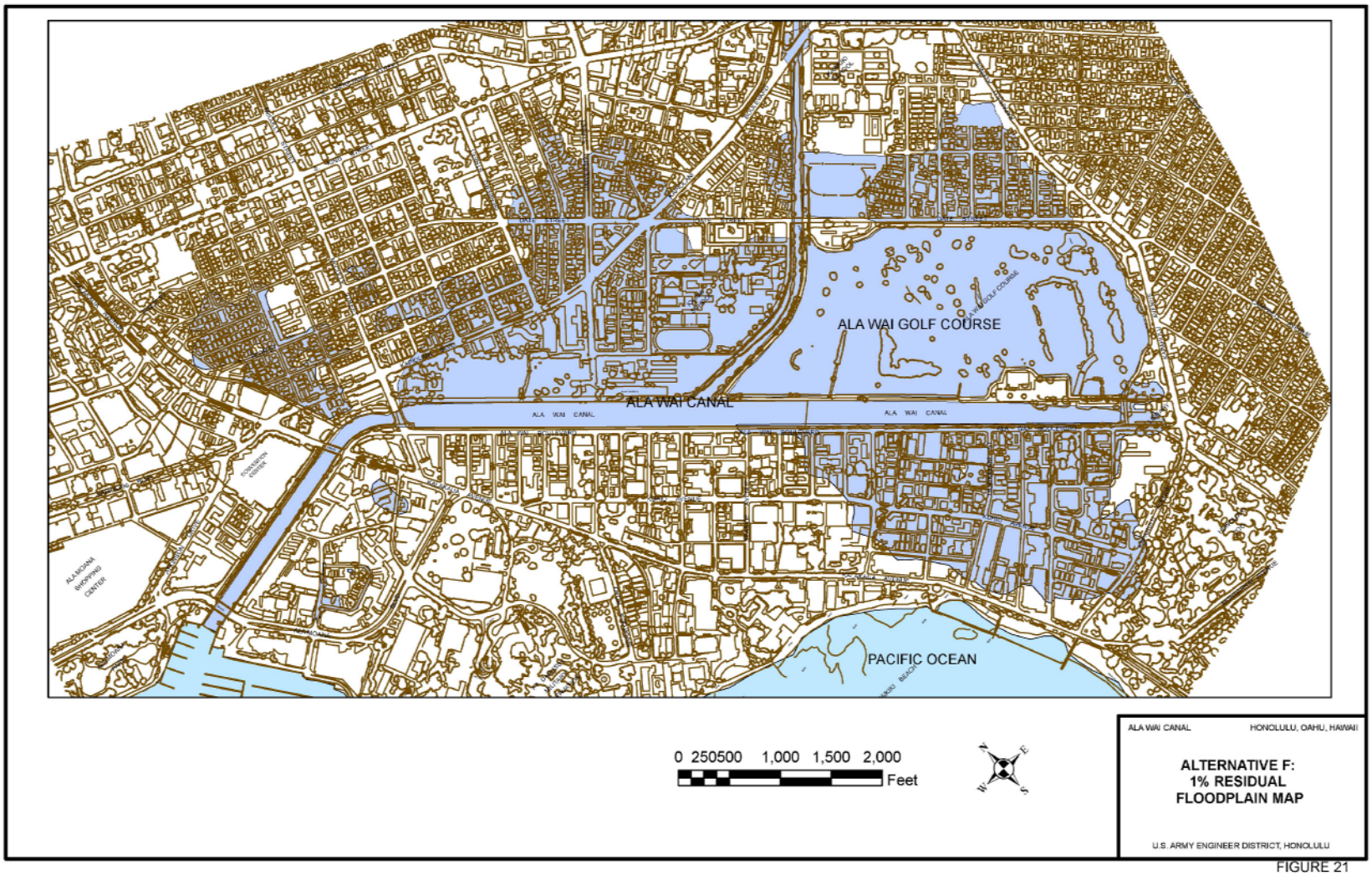
FLOODPLAIN MAP
U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE 18

ALTERNATIVE F – RESULTS

Alternative F: Dredging + floodwalls + golf course storage

- Provides 100-yr flood containment in channel
- Floodwall minimum height, 2.5 feet
- Modifications and floodwalls limit local/interior drainage causing interior flooding
- Dredging has little effect on WSE
- Golf course used as storage area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HONOLULU, OAHU, HAWAII
ALTERNATIVE F:
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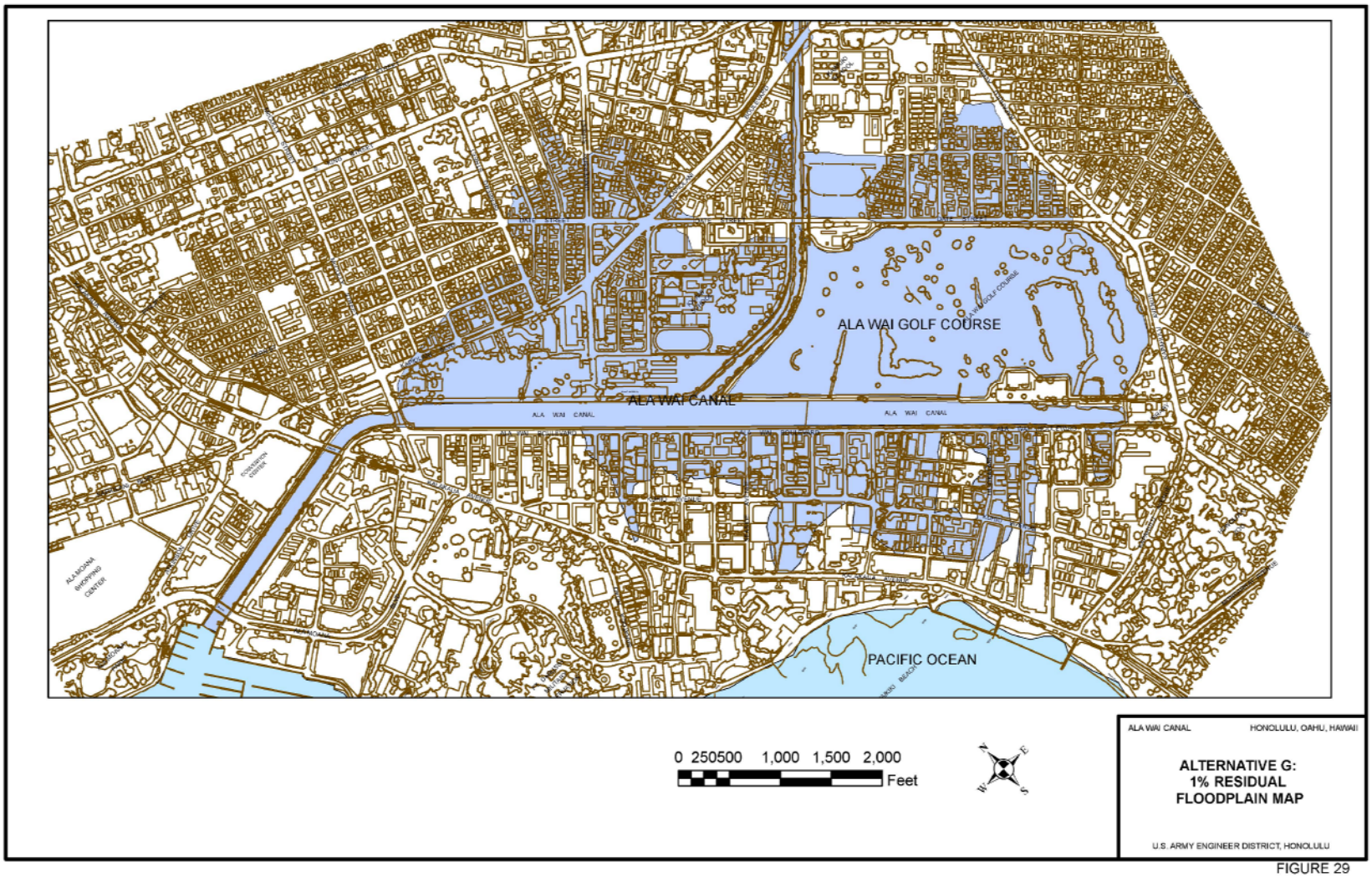
FLOODPLAIN MAP
U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE 21

ALTERNATIVE G – RESULTS

Alternative G: Dredging + widen canal + golf course storage

- Provides a 10-year level of protection
- Widening does not change the WSE in canal
- Bridge modification to the Kalakaua Bridge only
- Golf course used as storage area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0 250500 1,000 1,500 2,000
Feet
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HONOLULU, OAHU, HAWAII
ALTERNATIVE G:
1% RESIDUAL
FLOODPLAIN MAP
U.S. ARMY ENGINEER DISTRICT, HONOLULU

FIGURE 29

ALTERNATIVE H – OPTIMUM PLAN?

Alternative H: Variation of D-G? NED plan?

- Should provide 100-year level of protection
- Minimize floodwall heights
- Should address interior drainage
- Widening to help flow transitions
- Bridge modifications if needed
- Dredging if needed
- Golf course used as storage area
- Utilized additional storage areas

HYDRAULIC RESULTS IN DETERMINING NED PLAN

- NED- National Economic Development, alternative with the most economic benefits, x-year event
- HEC-FDA, Flood Damage reduction Analysis model
- Hydraulic results used in HEC-FDA
- NED Plan tbd

AFTER FEASIBILITY STUDY

- Design Phase
- Anticipate a Design Documentation Report (DDR) as part of the Design Phase
- Will help to refine and study the NED Plan

WHAT IF…

WE GET THE 100-YEAR FLOOD EVENT BEFORE THE PROJECT IS BUILT?

MANOA STREAM
50-YEAR RAINFALL

OCTOBER 30, 2004
25-YEAR RUNOFF

Special Thanks

- Ted Perkins – Seattle District
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- Mike Wong – Honolulu District
- Derek Chow – Honolulu District

For More Information

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Questions?