West Sacramento Area Flood Control Agency
December 8, 2011

Update on Current Levee Construction Projects and Preliminary Design Analyses for the Southport Sacramento River Levee Early Implementation Project
Update on Current Levee Construction Projects

- CHP Academy Early Implementation Project
- The Rivers Early Implementation Project
- Sacramento Bank Protection Project in Southport
- Yolo Bypass North Slip Repair Project
- Yolo Bypass South Emergency Slip Repair Project
Design Decision Hierarchy & Sequencing Overview

• What is a design decision hierarchy?
• How is the tool applied to WSAFCA levee projects?
• Five decision stages
  – Each stage is sequential
• Each stage has central question(s) and evaluation and design criteria
• Technical feasibility and refinement is based on engineering studies that determine effective solutions
• Cost-effectiveness is determined after the completion of technical feasibility and engineering studies
Decision Stage 1: Identify Particular Problems

Central Question: What are the levee deficiencies and their causes?

Evaluation and Decision Criteria:
• Geotechnical characteristics
• Erosion conditions
• Hydraulic and hydrologic conditions
• Levee construction and performance standards
Design Decision Hierarchy & Sequencing (cont.)

Decision Stage 2: Test Particular Solutions

Central Question: What remedy will or will not work for each particular levee deficiency?

Evaluation and Decision Criteria:
- Geotechnical characteristics
- Hydraulic and hydrologic conditions
- Levee construction and performance standards
Design Decision Hierarchy & Sequencing (cont.)

Decision Stage 3: Assemble Solutions to Solve Problems

Central Questions:
• How can all of the flood protection problems be solved completely to ensure the greatest public good for the inhabitants of West Sacramento?
• How can all the levee problems be solved completely?
• When can all the levee problems be solved completely?
Decision Stage 3: Assemble Solutions to Solve Problems

Evaluation and Decision Criteria:

- Extent of risk reduction: urgency of risk associated with type of problem, maximum length of levee fixed, time needed to do repair
- Capital cost of repair type
- Repair lifespan and O&M costs
- Available local capital and O&M funding
- Potential partnership capital and O&M funding
- Regulatory hurdles
Design Decision Hierarchy
& Sequencing (cont.)

Decision Stage 4: Minimize Impacts

Central Questions:

• How do the levee repairs and flood protection operations affect the community and private properties?

• How can the levee repairs and flood protection operations be planned and implemented in order to achieve the least private injury to property owners in the project area and in the surrounding community?
Decision Stage 4: Minimize Impacts

Evaluation and Decision Criteria:
- Type and extent of private property purchase
- Type and extent of utility relocation
- Type and extent of infrastructure displacement
- Extent of fiscal impacts
- Type and extent of community development impacts
- Regulatory hurdles
Decision Stage 5: Maximize Benefits

Central Question: How can levee investments deliver other values to the community?

Evaluation and Decision Criteria:
• Types of supplemental benefits
• Compatibility of supplemental benefits with primary flood protection objectives
• Available local capital and O&M funding
• Potential partnership capital and O&M funding
• Regulatory hurdles
What is the Design Team’s Role in WSAFCA Projects (General)

- Provide the WSAFCA Board the most complete and accurate information possible so it can decide how best to improve the levee system protecting West Sacramento
What is the Design Team’s Role in WSAFCA Projects? (Specific)

- Determine which solutions will work
- Refine solutions to meet mandated state and federal design criteria
- Estimate cost of putting solution in place
Typical Levee Deficiencies

- Inadequate Levee Height
- Inadequate Levee Geometry/Unstable Slopes - irregular or overly steep slopes compromise the levee structure
- Inadequate levee height - levee height may be too low relative to predicted water levels
- Non-Compliant Vegetation - can lead to levee instability and hinder levee monitoring and maintenance
- Erosion - water flow, wakes and waves, remove soil material, damaging the levee
- Seepage
Levee Improvement ‘Measures’ and ‘Alternatives’

• A levee improvement ‘measure’ corrects one or more levee deficiencies.

• Examples of measures include seepage berms, cutoff walls, relief wells, adjacent levees, setback levees, and rip rap placement.

• An alternative is a combination of measures. Site-specific conditions control what measures will work.
What Alternatives are Advanced Through the Study and Design Process?

- All measures advanced in the Southport EIP must be technically feasible and correct all known deficiencies to the project levee.
What Does ‘Technical Feasibility’ Mean?

1) It can be built

2) When in place it will solve the problem

3) Meets mandated state and federal design criteria
Correcting Under Seepage Deficiency

- Cutoff Walls
- Seepage Berms
- Relief Wells

- Where they are technically feasible;
  where they are not
Cutoff Wall Works

Low Permeability 'Finish Layer'
Cutoff Wall Does Not Work
Cutoff Wall Does Not Work (cont.)

- Low Permeability ‘Finish Layer’
- Coarse material stops wall placement
Relief Well Works

Discharge to drainage ditch

Low permeability confining layer limits seepage to surface

Relief well

Seepage reports to relief well

200-year Water Surface Elevation
Relief Well Does Not Work

Higher permeability layer allows seepage to surface

Relief well

200-year Water Surface Elevation
How does technical feasibility relate to impacts to residents?

- If in-place measures like cutoff walls and relief wells can work, they may minimize impacts to adjacent property.
- If costs for in-place improvements are disproportionately high they can reduce the total miles of levee the project will improve.
- If in-place measures can work, they are often expensive. Use of these measures, where less expensive measures can work, will reduce the budget available to solve levee problems throughout the reach.
Based on available information, what under seepage solutions are technically feasible along the project reach?
Erosion - Findings from 2008
Draft Problem ID Report

• History of applying rip rap to project reach extends back to 1939

• Approximately 70% of project reach is covered by rip rap (PIR, 2008)

• The size of rock measured at the four locations where rock was sampled are smaller than current Corps requirements
How do we define erosion as a problem?

1) Levee might be compromised during a severe flood

2) Would require repair for the levee to be certified, or

3) Where continued erosion over a few years might cause the levee to be compromised
Case Study

• The Corps recently used an erosion rate of 0.5 ft/yr as part of a justification for setting back the levee near the barge canal
Projected Milestone Overview

- December 2011: Presentation of Task Order No. 3 Analysis
- New—December 16, 2011: 3-5 p.m., Southport Sacramento River EIP Levee Project Open House, City of West Sacramento, City Hall Galleria
- January 2012:
  - Presentation of Task Order No. 3 cost opinions, 15% design of two alternatives, and Task Order No. 4 preview
  - Public Workshop on preferred alternative (January 26)
- February 2012: WSAFCA Board selects preferred alternative, approval of Task Order No. 4, Direction on 60% design and process for refining design features
- March 2012: CHP & Rivers Tree Restoration contract award
Projected Milestone Overview (cont)

• Early 2013: Certify EIR – 100% design completed
• Mid 2013: Federal and state regulatory approvals received
• Late 2013: WSAFCA Board approves construction contract
Public Outreach Opportunities

• Monthly JPA Board Meetings (2nd Thursday of every month at 10:30 a.m.)

• December 16, 2011—3-5 p.m., Southport Sacramento River EIP Levee Project Open House, City of West Sacramento, City Hall Galleria—New

• Public Meeting: January 26, 2012 (evening time TBD)

• One-on-one meetings w/WSAFCA staff on request
Questions?