

DALLAS FLOODWAY PROJECT FEASIBILITY STUDY UPDATE

And Recommended Flood Risk Management Plan

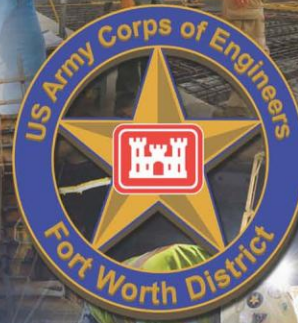
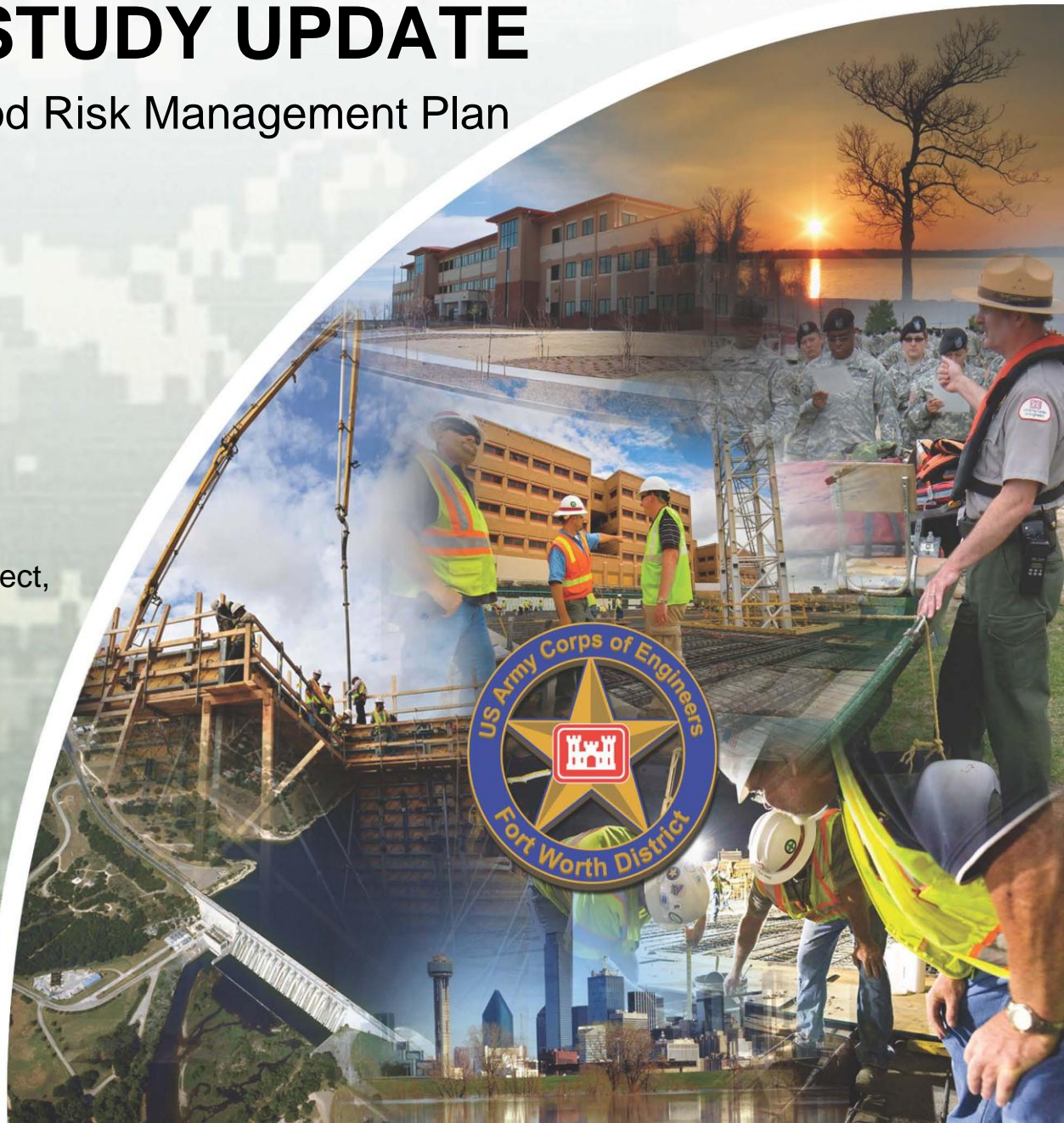
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Jan. 29, 2013



Purpose of Today's Briefing

- Provide an update to the public on the ongoing Dallas Floodway Project feasibility study
- Outline proposed levee system improvements

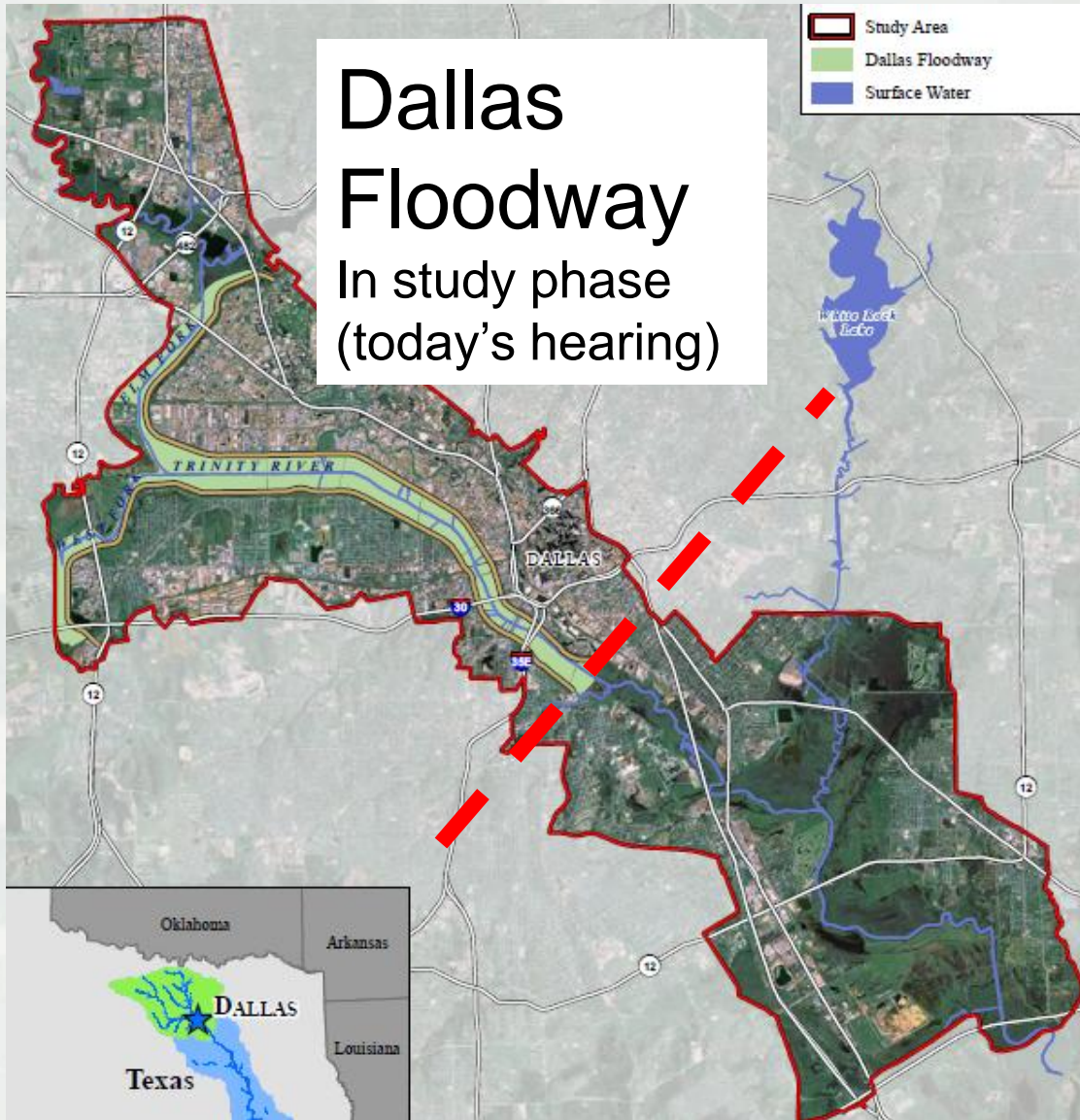


Outline of today's briefing

- Map of two federal projects in the Floodway
- Background
- Flood risk management plan process
- Flood risk management tentatively selected plan identified
- Path forward

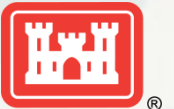


2 Federal Projects in the Floodway



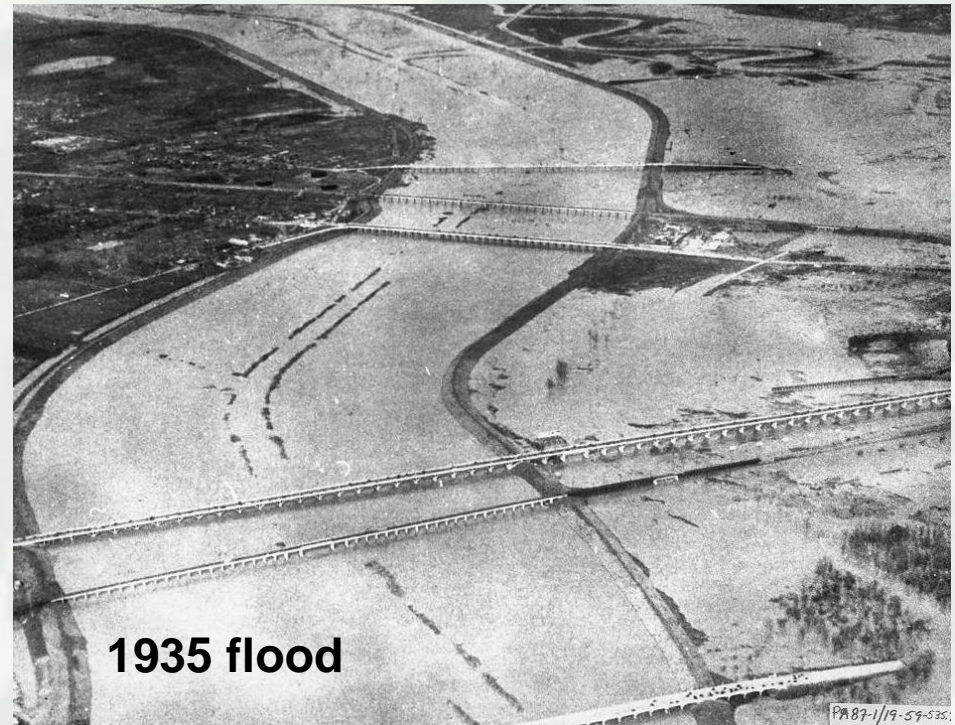
Dallas
Floodway
In study phase
(today's hearing)

Dallas
Floodway
Extension
In construction
phase



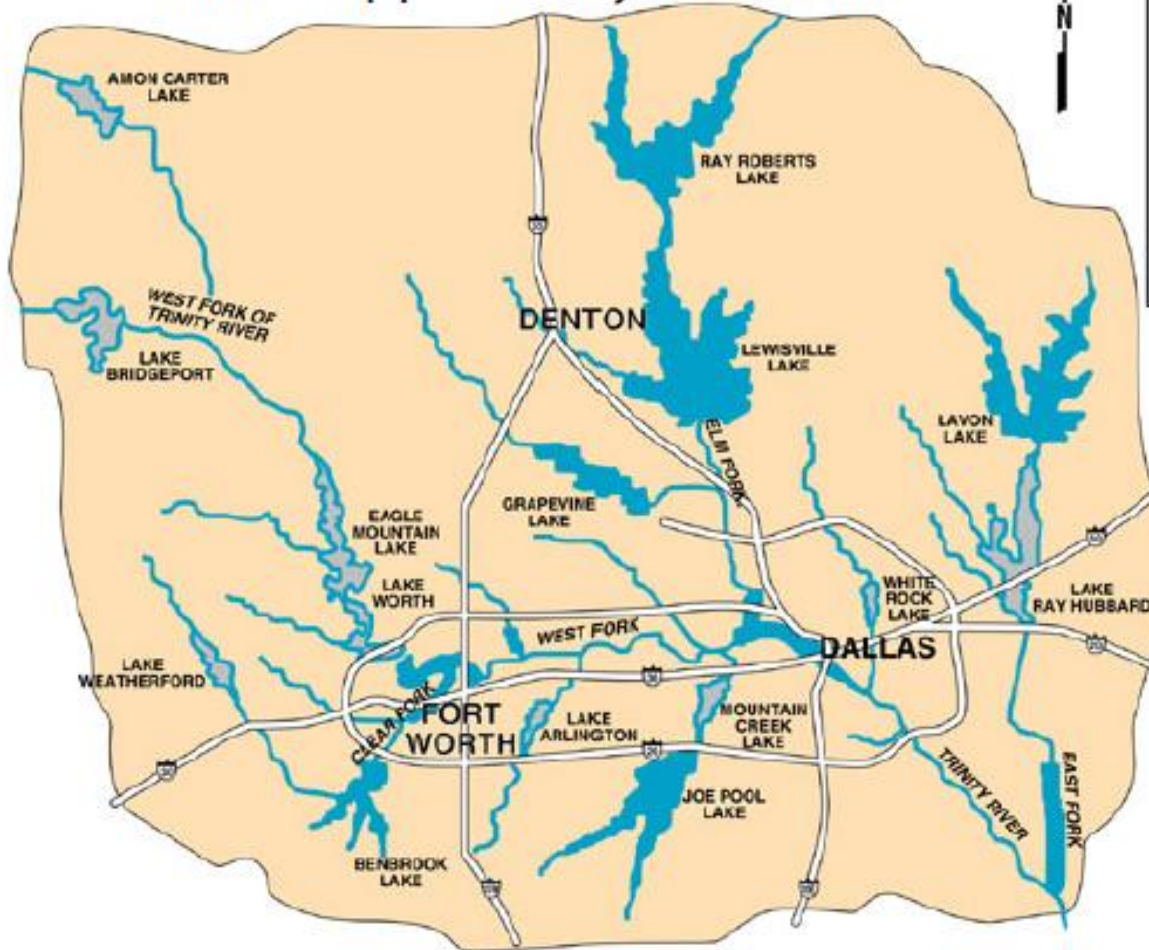
Background

- **1908 – Dallas flood** killed 5, left 4,000 homeless, left city without power for days, massive property damage
- **1928 – First levee system** – Civic leaders marshal public support to finance and build first Dallas Floodway System
- **1949 – Flood kills 11** in Fort Worth; Corps initiates effort to create new Fort Worth District and fix levees
- **1958 – Corps completes** major Dallas Floodway upgrade



Background

Location of major water resources
in the Upper Trinity River Basin



1940s-1980s

Corps constructs
upstream
reservoirs that
reduce flood risk
for Dallas by
holding back
water

Corps lakes provide flood
control, water supply and
recreation

- Benbrook
- Grapevine
- Lewisville
- Joe Pool
- Ray Roberts
- Lavon (below Dallas)

Background

- **1989-1991 – Worst floods since 1908.** Lives lost. Major damage to homes, businesses. Rochester Park Levee construction begins.



- **1998** – Dallas voters authorize largest bond package in city history at that time – \$246 million – to fund flood control, transportation and recreation projects in the Trinity River Corridor.



Background

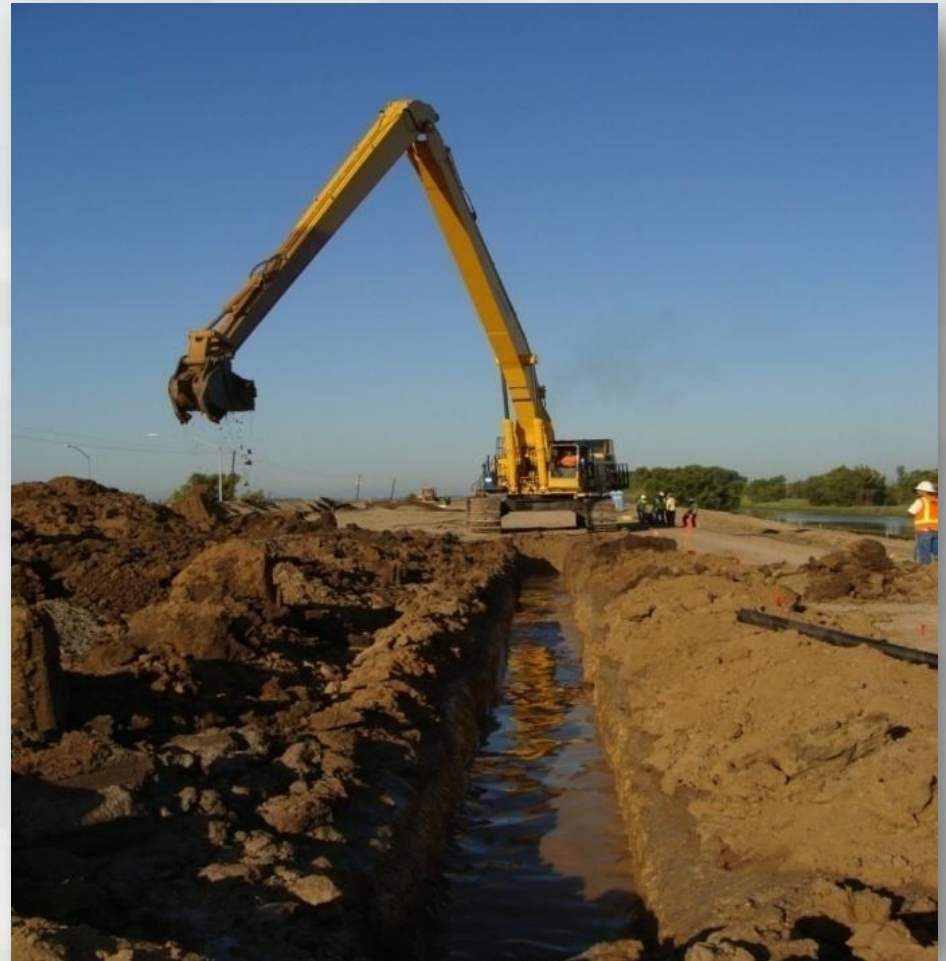
- 1998 – Corps and city began a feasibility study to raise the levee system
- 2007 – Water Resources Development Act (WRDA) Section 5141 was authorized to raise the levees up to 2 feet, provide recreation and improve pump stations
- 2009 – Corps Periodic Inspection rates levees unacceptable; Federal Emergency Management Agency de-accredits levees for National Flood Insurance Program
- 2009 – Corps hosts public feasibility study scoping meeting at Dallas Convention Center



Background

2010-2012

- City begins 100-year levee improvements to gain levee recertification to win back FEMA accreditation for flood insurance program
- City works with Corps to resolve 198 levee operations and maintenance deficiencies identified in 2009 inspection report



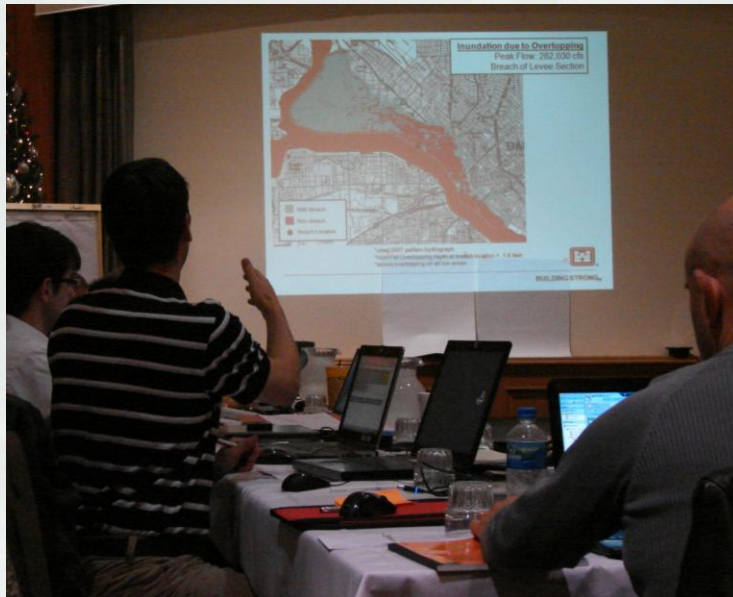
Cut-off wall construction 2012



Background

2010-2012

- City designs, builds new pump stations; new Pavaho Pump Station opened last year in West Dallas



- Corps completes Risk Assessment and explores levee improvements for the full performance of the levee system; results will be presented today



Background

Risk Assessment Process

- Used successfully by the Corps for many years on its Dam Safety Program
- Now being used for Corps' Levee Safety Program; Dallas Floodway Project is a pilot for this effort
- Method for quantifying the risk (likelihood) of various ways a levee can fail (potential failure modes), and the consequences of each failure type
- Identifies most cost-effective ways to reduce risk
- The levee local sponsor, the city of Dallas, was an active partner with Corps in this process



Background

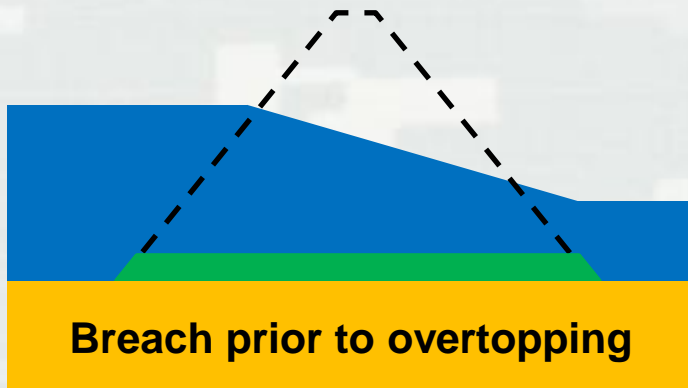
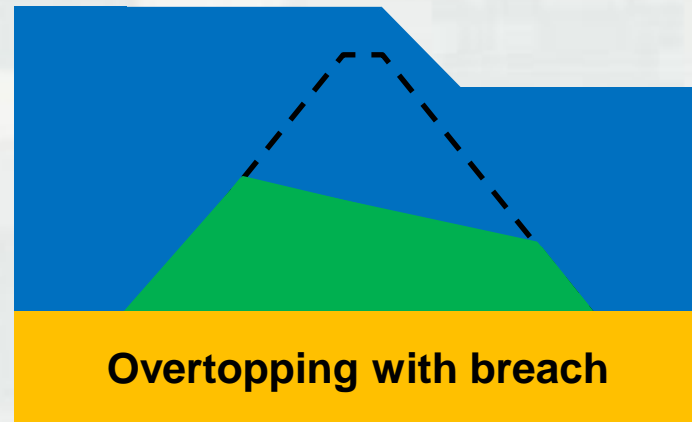
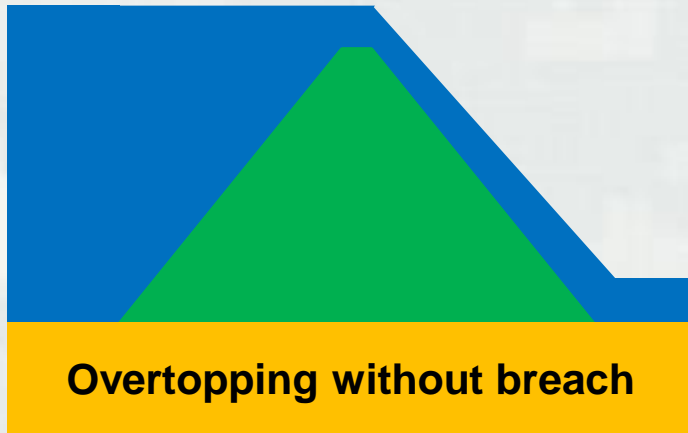
Risk Assessment results

- 13 potential failure modes initially identified for further study by the Risk Assessment team
- After further study, only 2 potential failure modes appeared to be significant
 - Overtopping and breach of the East and West Levees
 - Overtopping of the East Levee floodwall
- One additional potential failure mode was potentially significant
 - Internal erosion through the foundation that breaches the levee



Background

How levees can fail



 **Internal erosion**



Flood Risk Management Plan

How we selected our recommended alternatives to modify the levee system

- 4 planning objectives guide the process
- Planning selection criteria
- Formulating a plan
 - Consider non-structural alternatives
 - Consider structural alternatives



Flood Risk Management Plan

4 planning objectives guide the process

- Reduce risk to life and health, and improve the welfare of the residents in the study area
- Reduce risk of property damage in the study area
- Reduce risk of significant national and regional economic losses in the study area
- Provide greater opportunities for increasing the public awareness of residual risk in the study area



Flood Risk Management Plan

3 criteria for selecting preferred alternatives

- First, an alternative must not increase total risk for the Dallas Floodway System
- Second, the alternative with the most net economic benefit will be the National Economic Development Plan
- Finally, additional alternatives that reduce life safety risk will be considered to see if they are cost effective and can be implemented



Flood Risk Management Plan

Formulating a plan

Consider non-structural management measures

- **Flood Forecasting and Warning**
- **Emergency Response and Public Awareness**
- Floodplain Management
- Flood Proofing
- Raising Structures in Place
- Structural Relocation
- Permanent Evacuation



Flood Risk Management Plan

Formulating a plan

Consider structural management measures

- Channel widening
- Vegetation removal
- Floodwalls
- **Levee height modification**
- **Armoring**
- **Cut-off walls**
- **Controlled overtopping with levee raises**
- **AT&SF Bridge modification**



Flood Risk Management Plan

Plan formulation results

Modification of the ATSF Bridge was recognized as an alternative that should be included in the Risk Management Plan. Other alternatives were studied for how they worked in combination with the bridge changes.



Flood Risk Management Plan

Plan formulation results

Array of alternatives carried forward for further study

- Levee height modification
- Armoring
- Cut-off walls
- Controlled overtopping with levee raise that controls a flow of 277,000 cubic feet per second



Flood Risk Management Plan

Plan formulation results: Levee height modifications

	260K Raise	265K Raise	269K Raise	273K Raise	277K Raise	289K Raise
ESTIMATED FIRST COST	\$2,360,000	\$2,411,000	\$2,954,000	\$4,205,000	\$6,211,000	\$11,113,000
TOTAL BENEFITS	\$452,000	\$841,000	\$1,133,000	\$1,210,000	\$1,544,000	\$1,772,000
TOTAL ANNUAL CHARGES	\$117,000	\$120,000	\$148,000	\$220,000	\$330,000	\$590,000
NET ANNUAL BENEFITS	\$335,000	\$721,000	\$985,000	\$989,000	\$1,214,000	\$1,182,000



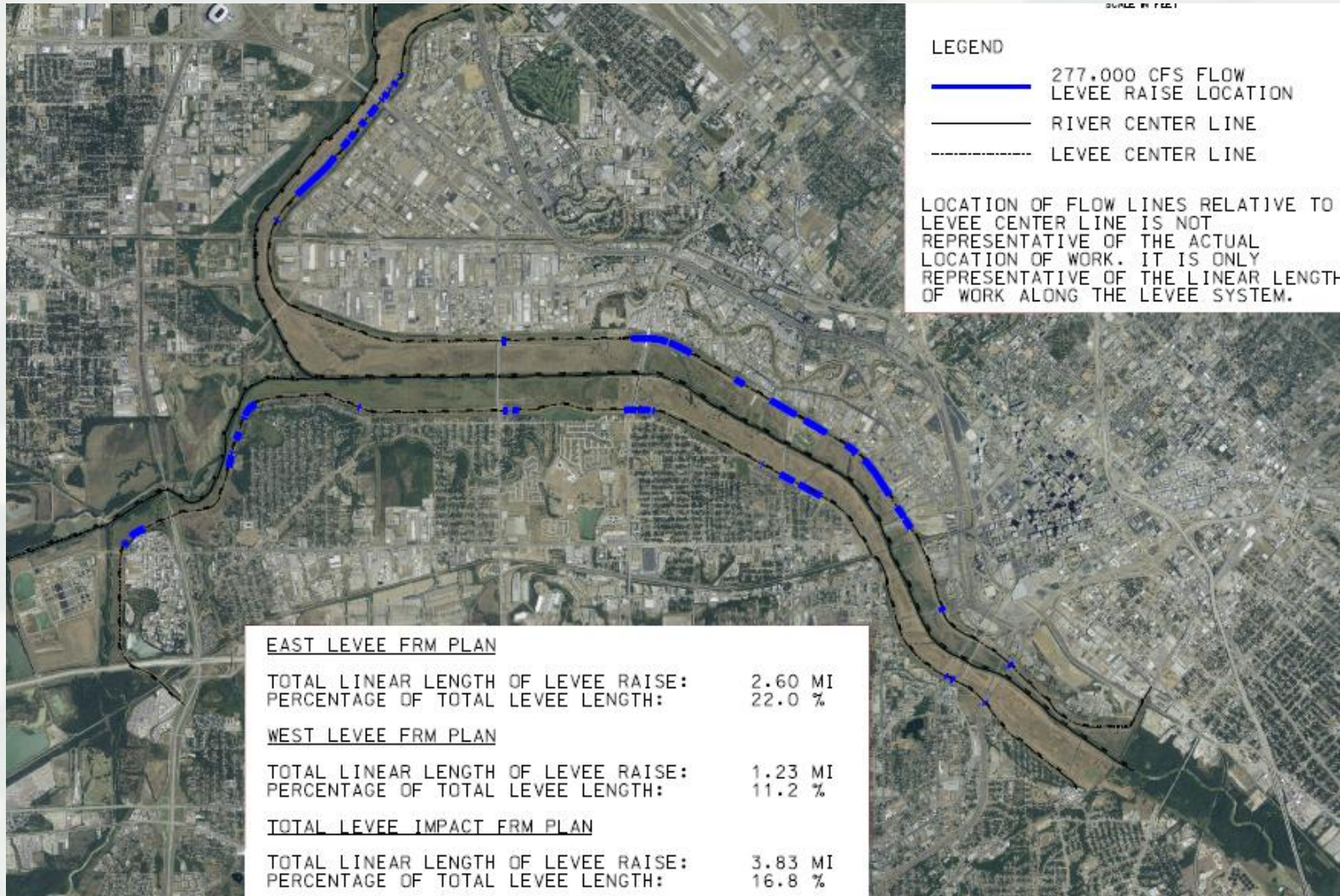
Flood Risk Management Plan

Plan formulation results: Levee height modifications

- 277K (a storm that has a 1/2,500 probability of happening in any given year) has the greatest **net annual benefits at \$1.2 million** with a **first cost of \$6.2 million**
- The 277K levee raise has over a **60% reduction in annualized life loss and failure probability**
- A 277K levee raise was carried forward for consideration in combination with other measures



277K Levee Raise Locations



Flood Risk Management Plan

Plan formulation results: Armoring

	255K Armoring	260K Armoring	265K Armoring	269K Armoring	273K Armoring	277K Armoring	289K Armoring	302K Armoring
ESTIMATED FIRST COST	\$4,317,000	\$4,580,000	\$7,065,000	\$32,743,000	\$53,634,000	\$76,606,000	\$166,148,000	\$211,279,000
TOTAL BENEFITS	\$421,000	\$653,000	\$832,000	\$1,123,000	\$1,503,000	\$2,545,000	\$2,545,000	\$2,545,000
TOTAL ANNUAL CHARGES	\$206,000	\$225,000	\$358,000	\$1,708,000	\$2,798,000	\$3,996,000	\$8,667,000	\$11,021,000
NET ANNUAL BENEFITS	\$215,000	\$428,000	\$474,000	(\$585,000)	(\$1,295,000)	(\$1,451,000)	(\$6,121,000)	(\$8,475,000)



Armoring a levee



Flood Risk Management Plan

Plan formulation results: Armoring

- The 265K has the greater **net annual benefits at \$474,000** with a **first cost of \$7.1 million**
- The 277K levee raise provided greater net benefits than the 265K armoring plan
- This measure was removed from further consideration



Flood Risk Management Plan

Plan formulation results: Cut-Off Walls

- Analyzed cut-off walls in select locations
 - 3 miles the city already constructed for the 100-year Section 408
 - 5 additional miles for **8 miles total** for full performance of the levees
- The cut-off walls would provide life safety benefits the **greatest overall reduction in annualized life loss and failure probability at over 90%**
- Due to the low probability of occurrence cut-off walls provided **negative net annual economic benefits of \$1.0 million** with a **first cost of \$36.1 million**
- However, cut-off walls will be considered for their benefits to the Balanced Vision Plan for river relocation features



Flood Risk Management Plan

Planned formulation results: Controlled overtopping combined with 277K levee raise

- 277K flow carries a 1/2,500 chance of occurring in any given year
- Considered an area at the lower end of the levees and near Hampton Pump Station
- Provided a lower level of protection because there would not be any designed freeboard with the 277K levee raise
- Most benefit with a notch 2 feet deep and 3,000 feet long at the Hampton location
- Preliminary Hydrology and Hydraulics analysis indicated minimal change in inundation depths



Flood Risk Management Tentatively Selected Plan Identification

Flood Risk Management National Economic Development (NED) Plan

- AT&SF Bridge modification combined with
- Levee height modification to contain a 277K cfs flow (about 1/2,500 per year event)
- Cost of these two changes: \$6.2 million
 - \$1.2 million in net annual benefits, Benefit to Cost Ratio
 - Over 60% reduction in annualized life loss and failure probability for the overtopping with breach failure mode
- Additional improvements to the Emergency Action Plan will be considered



Path Forward

Next steps identified

- With levee improvement plan determined, use risk assessment process to perform comprehensive analysis of how all other proposed actions work with each other so that the Dallas Floodway can perform as designed; incorporate these results into feasibility study
- Prepare draft report and environmental impact statement (EIS) and update the Dallas City Council's Trinity River Corridor Project Committee in late 2013
- Draft report/EIS 45-day public comment period will include another public meeting – Late 2013
- Complete feasibility study and sign a record of decision (ROD) – July 2014

