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The Heartland Engineers

Responsive

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Presentation
to the

CIVIL WORKS REVIEW BOARD

Review of Completed Project, Kansas Citys Levees, Missouri and Kansas

by
Colonel Michael A. Rossi
Commander, Kansas City District
Northwestern Division

20 September 2006

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Briefing Purpose

Obtain Civil Works Review Board Approval:

- To Release of the Feasibility Report and EIS for Final State and Agency Review

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Project Authorization

Project Authorization

Flood Control Acts of 1936, 1944, 1946, 1954 & 1962.

Study conducted under 216 Authority

"The Secretary of the Army, acting through the Chief of Engineers, is authorized to review the operation of projects, the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to the significantly changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying structures or their operation, and for improving the quality of the environment in the overall public interest."

System Approach

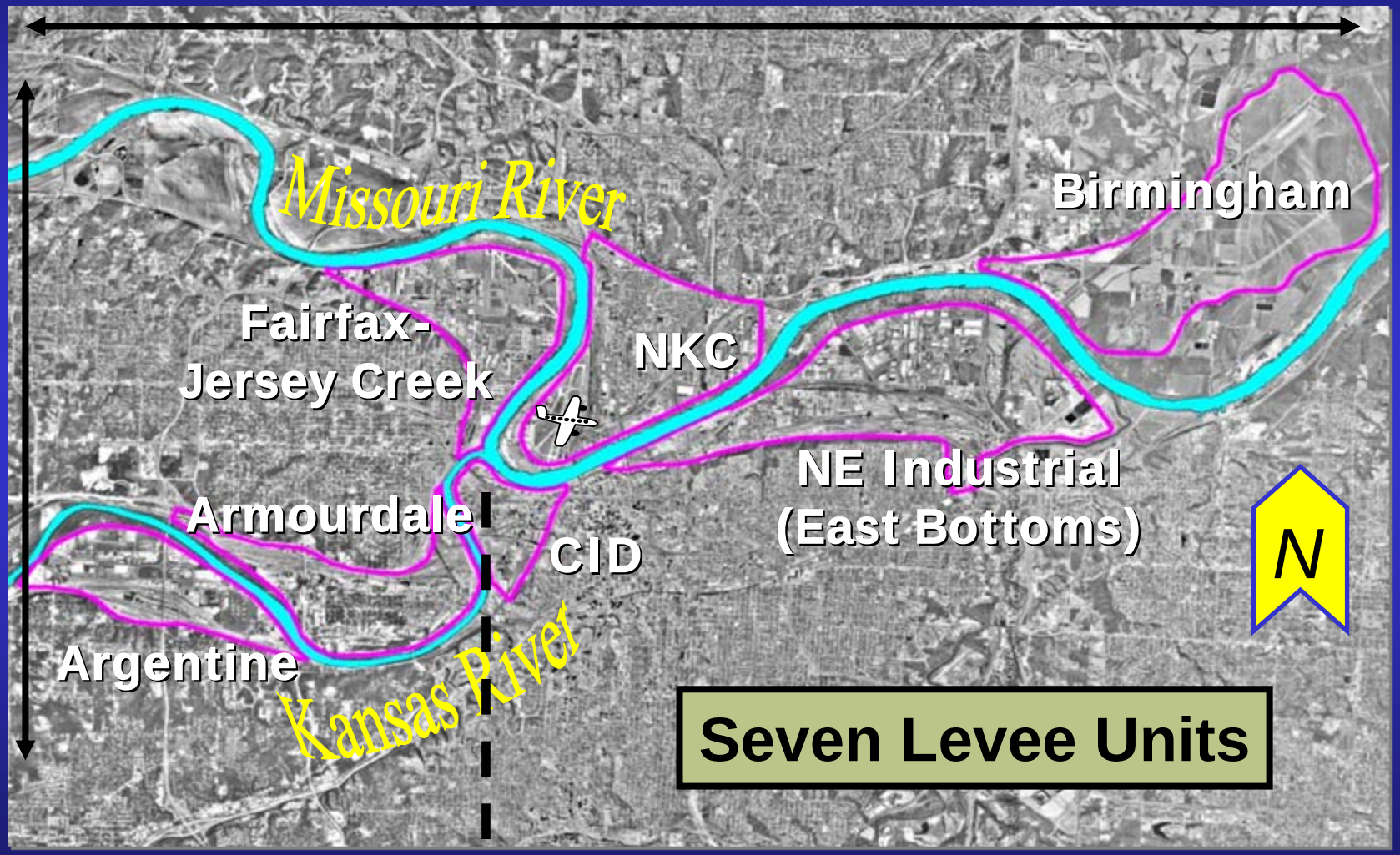
1936 Flood Control Act & HR 342, 78th Congress, Oct 1943, coordinated system in authorization and implementation.

Project Area Overview

Project Area Overview

20 MILES ACROSS MAPPED AREA

9 MILES ACROSS



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Project Area Overview

- Involves 2 states, 2 major rivers, & 7 levee units in Kansas Citys metro
- 32 sq mi of urban industrial & commercial development
- Operates as a system of levee units providing coordinated protection.
- Over 50 miles of flood protection works:
  - 46 miles earthen levee (typ. over 12 ft high)
  - 6 miles of floodwall w/ heights ranging from 2 ft to over 22 ft
- Over **$16B investment** within protected area
- System protects
  - > 5,000 structures (business and residential)
  - ~ 20,000 residents
  - Employment of ~ 90,000 people
  - Extensive rail & road systems within the protected areas… of regional and national importance
  - Downtown airport & several vital utilities

Project Area Overview

Project History/Federal Involvement

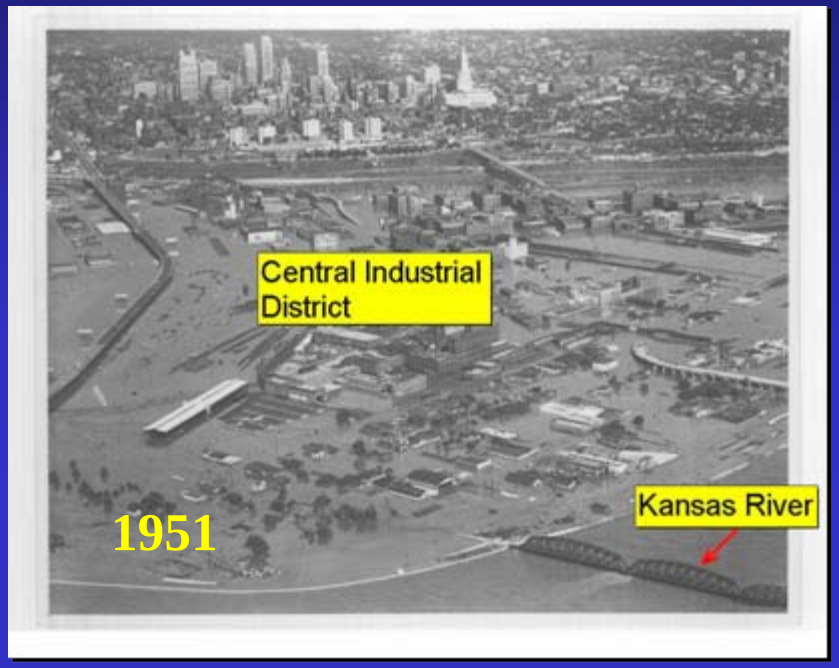
- Federal involvement began with 1936/1944 Congressional authorizations.
- Federal construction began early 1940's – incorporated some local works.
- Major impacts from the 1951 Kansas River Flood resulted in:
  - levee repairs and redesign,
  - levee raises, and
  - completion of the Kansas River Basin lakes
- Project phasing/modifications spread levee construction over several decades: 1940's, 1950s, 1960s, and ending in late 1970s.
- Continued Federal involvement:
  - Ongoing annual levee inspections
  - Review "work by others" in the critical zone
  - PL 84- 99 repairs after 1993 flood
  - This Section 216 feasibility study

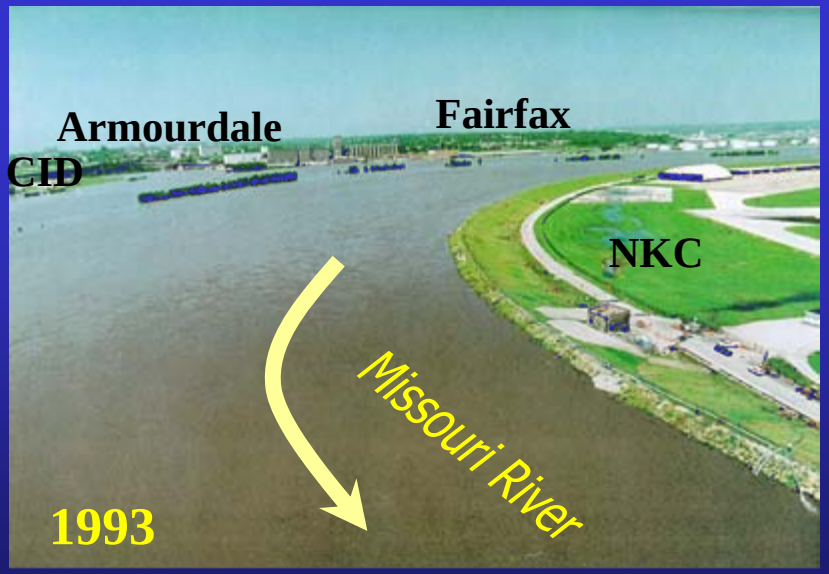
Project Area Overview

Project History/Federal Involvement

The Great Flood of 1951

- Kansas River Event
- All 3 Kansas River Units Overtopped
- Peak Flow ~ est. 573,000 cfs
- 15,000 people evacuated, 5 deaths
- $870M damages ($9B adjusted 2004)





The Great Flood of 1993

- Missouri River Event
- Tested Levee System
- Passed Peak Flow ~ 543,000 cfs
- $4.5 B in damages prevented

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Project Area Overview

Levee Unit Owner/Operators (Study Sponsors)

- Fairfax Drainage District
- Kaw Valley Drainage District
- City of Kansas City, MO -- Levee Committee
- North Kansas City Levee District
- Birmingham Drainage District – KCMO acting as sponsor

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Feasibility Report Overview

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Feasibility Report Overview

Problem and Needs

Even though the levee system withstood The Great Flood of 1993 – questions were raised about the project's performance… leading to the current feasibility study.

- Are we still achieving the original project objectives?
- The system is roughly 40 to 60 years old. Are the features still working as intended?
- Are sponsors aware of problems we need to look at?
- How did the levees perform in 1993 flood event?
- Would project modifications increase economic benefits?

- Problems identified in the 1993 flood need to be addressed.
- Problems identified through risk analysis need to be addressed.

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Feasibility Report Overview
Planning Objectives

Objectives

1) Update and verify data on reliability of existing flood protection project
2) Develop alternative plans (to include a review of "No Federal Action") for increasing the overall reliability of the existing levee system consistent with the original authorizations, and provide a final recommended plan for implementation that is technically sound, economically feasible & environmentally acceptable.

Interim *(today)* and Final Feasibility Reports *(2008)*

- Total feasibility study will generate two sets of recommendations.
- Current recommendations are intended for authorization & implementation as soon as appropriate approvals are gained.
- Final feasibility report generates second set of complementary recommendations.
- Phasing is better adapted to funding, prompt implementation, and risk reduction.

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Feasibility Report Overview
Existing Conditions

Overtopping Analysis

- From a hydraulic overtopping standpoint, all of the 7 levees passed the 1993 event.
- Existing Missouri River units in general comply with the original design intent.
- The three Kansas river units need increased overtopping protection based on new hydraulic modeling & current channel conditions.

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Feasibility Report Overview
Existing Conditions

Underseepage Analysis

Existing underseepage reliability generally found acceptable with following exceptions… recommend improved underseepage control at:

- Harlem Area and National Starch Area on the Lower Section of the NKC Levee Unit.
- East Bottoms Levee Section near Confluence of the Blue River and the Missouri River.

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Feasibility Report Overview
Existing Conditions

Floodwall/Retaining Wall Analysis

- Fairfax/BPU Floodwall: Risk of floodwall failure under extreme flood conditions.
  - Recommend strengthening pile foundation and buttressing the main stem wall.
- Fairfax-Jersey Creek Sheetpile Wall: Risk of failure under flood conditions results from combination of geotechnical & structural factors.
  - Recommend reconstruction using a driven open-cell sheetpile wall.

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Feasibility Report Overview

Future Without Project Conditions

Annualized Damages (x$1000)

(Oct 2005 Prices, 5.125% Interest, 50 Year Period of Analysis)

Levee Unit	Physical Damages	Other Costs of Flooding	Total Annual Damages
Argentine	$19,221.0	$3,105.0	$22,326.0
Birmingham	$486.0	$67.0	$553.0
East Bottoms	$6,505.0	$840.0	$7,345.0
North Kansas City	$10,021.0	$1,759.0	$11,780.0
Fairfax- Jersey Creek	$14,552.0	$2,011.0	$16,563.0
Study Area Totals	$50,785.0	$7,782.0	**$58,567.0**
% of Total	87%	13%	100%

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Feasibility Report Overview
Alternatives Summary

- No Federal Action
- Structural & Non-structural evaluated
- Formulated for each of six sites in the Interim Feas Report
- 35 early alternatives screened down to 19 analyzed
  - Argentine Unit: three levee raises, channel mods, levee strengthening
  - Fairfax/Jersey Creek Unit: various wall mods versus new wall
  - North Kansas City Unit: three underseepage control measures evaluated
  - East Bottoms Unit: three underseepage control measures evaluated

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Feasibility Report Overview
Recommended Plan

- The NED plan is the Recommended Plan (Overall & in each Unit)
- Recommended Plan - combination of remedial measures for 6 sites w/in 4 levee units reviewed
- Overall Project B/C ratio = 8.0 to 1
- Separable measures in each Unit are incrementally justified
- B/C ratios for individual units range from 35.9:1 to 5.1:1
- NED plan is economically viable, provides continued national economic development, consistent with COE economic regulations and Administration economic polices.
- Recommended plan is fully endorsed by the sponsors

Feasibility Report Overview

Interim Feasibility Report Recommendations

Kansas River Levee Unit Recommendations:

- Argentine Unit: Levee Raise recommended for the Argentine unit. NED Plan is approx. 5 ft levee raise.
- Argentine levee raise is concurrent with geotechnical, structural and pump station reliability improvements.
- Categorized: New Work
- Armourdale & CID-KS will be addressed in Final Report (Phase 2) aiming at an overall uniform (system) level of protection on the 3 Kansas units.

Feasibility Report Overview

Interim Feasibility Report Recommendations

Missouri River Levee Unit Recommendations:

- Fairfax Unit: Structural improvements at 2 sites
  - Fairfax-Jersey Creek site - Sheetpile Wall replacement; Categorized: Reconstruction
  - Fairfax/BPU site - Floodwall Strengthening; Categorized: Design Deficiency Correction
- East Bottoms Unit: Underseepage control improvement at 1 site; Categorized: New Work
- North Kansas City Unit: Underseepage control improvement at 2 sites
  - Harlem site – Categorized: Design Deficiency Correction
  - National Starch site – Categorized: Design Deficiency Correction

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Feasibility Report Overview
Recommended Plan Cost

Levee Unit & Site	Total By Unit	Federal (65%)	Sponsor (35%)
OCT 2005 PRICE LEVEL ESTIMATE ($1000)			
Argentine (nom500+3) raise & pump sta	52,873	34,367	18,506
Fairfax/BPU floodwall modification	7,879	5,121	2,758
East Bottoms pressure relief wells	1,644	1,069	575
NKC-Harlem buried collector	1,549	1,007	542
NKC National Starch area wells & pump sta	6,621	4,304	2,317
Fairfax-Jersey Creek sheetpile wall reconstruct	4,984	3,240	1,744
Totals	75,550	49,107	26,443
FULLY FUNDED ESTIMATE	84,709	55,060	29,649

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Feasibility Report Overview
Recommended Plan Accomplishments

- Risk reduction for the three major aspects of levee performance
  - overtopping (hydraulic)
  - geotechnical (underseepage)
  - structural (floodwalls, sheetpile walls, & pump stations)
- Significant decrease in the flood risk for each unit addressed
- Increased protection of significant economic, social & transportation infrastructure
- Increased protection to local residents/industry employees
- Annual benefits of over $41M versus annual cost of $5.2M
- Cost effective project w/ B/C ratio of 8.0 to 1
- Recommended Plan (NED) promotes, protects, and contributes to national economic development

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Summary of Overall Plan

Average Annual Benefits and Residual Damages					
	Overall Plan	Argentine	Fairfax- JC	North KC	East Bottoms
Residual Damages With Project	$16,610,000	$4,160,000	$4,549,000	$4,915,000	$2,986,000
Residual Damages as a % of Future Without Proj Damages	28.8%	18.6%	27.5%	41.7%	40.7%
Average Annual Flood Damage Reduction Benefits (and Costs)	$41,404,000 ($5,176,000)	$18,165,000 ($3,569,000)	$12,014,000 ($970,000)	$6,866,000 ($516,000)	$4,358,000 ($121,000)
Net Annual Benefits	$36,228,000	$14,596,000	$11,044,000	$6,350,000	$4,237,000
BC Ratio at 5.125%	*8.0*	*5.1*	*12.4*	*13.3*	*35.9*
BC Ratio at 7.0% (EO 12893)	*6.0*	*3.8*	*9.4*	*10.3*	*28.9*

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Feasibility Report Overview
P&G Accounts Summary

- Implementation Impacts (of Recommended Plan)
  - Plan effectively reduces damages for all units in Interim Report.
  - Relatively few real estate impacts except in the Argentine unit.
- NED
  - Recommended plan is the NED Plan.
  - Positive net benefits accrue across all units under study
- Regional Economic Development
  - Minor short term increase in construction employment & sales tax increase.
  - Recommended plan contributes significantly to economic stability across the region as opposed to highly disruptive flooding.
- Environmental Quality
  - Minor adverse impacts for low-quality wetlands. Essentially no major adverse impacts.
- Other Social Effects
  - Recommended Plan provides for major improvements and/or stability to future community cohesion, life-safety risks, and socio-economic conditions.
- Plan Evaluation
  - Recommended Plan accomplishes the Planning Objectives and complies with Planning Constraints. Stakeholders and Institutions endorse the plan.

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NEPA
&
Public Involvement

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NEPA Compliance

Environmental Impact Findings

- Habitat limited environment
- No significant impacts - permanent or temporary
- Temporary impacts due to construction
- Permanent impacts identified for:
  - Three wetlands (0.2 acres) w/in Argentine Levee Unit
- Wetland Mitigation Requirements:
  - Collaborated w/ USFWS and State Agencies
  - 2 emergent wetlands mitigated at 1.5:1
  - 1 farmed wetland (borrow area) mitigated at 1:1
  - 0.21 acre mitigation site in Argentine Unit

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Agency & Public Involvement

Public Involvement Activities:

- Project Web Site Developed
- August 2003 Preliminary Scoping Meetings with Public & Agencies
- June 2006 Release of Draft EIS & Feasibility Rpt – Public Notification
- July 2006 Public Meeting - Draft Report/EIS – Public Notification

Agency/Public Comments:

- Agencies acknowledged minimal impacts/expressed cooperation
- Public comments were limited & supportive
  - Public recognized the need for reliable flood protection & endorsed the Recommended Plan
  - Comments generally addressed lack of river access & trails on levees

- EIS recommends a cost shared study to determine appropriate & compatible trail/recreation needs with levee purpose

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Environmental Operating Principles

- Recommended Plan sought sustainability of existing environment
- Balanced flood reduction needs of the community & the needs of the natural environment
- Avoided & minimized impacts where possible
- Sustained the continuity & value of riparian habitat adjacent to the Missouri River/Kansas River within the metropolitan area
- Proposed mitigation & improvement of those limited habitat losses

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Project Delivery Team & Independent Technical Review

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CENWK Project Delivery Team

Musgrave	Economics
Loehr	Geotechnical Design
Bolte & Wright	Structural
Miramontez	Cost Engineering
Skinker & Meade	Environmental / NEPA / Cultural
Shumate	H&H Engineer
McKissack	Project Manager/Planning
Mildenberger	Civil / Utilities
Jansen	Pump Stations
Rosewicz	HTRW
Vacca	Real Estate
Atkinson	GIS Mapping
Kraft	Construction
Sponsorship Group	Local Sponsor Representatives

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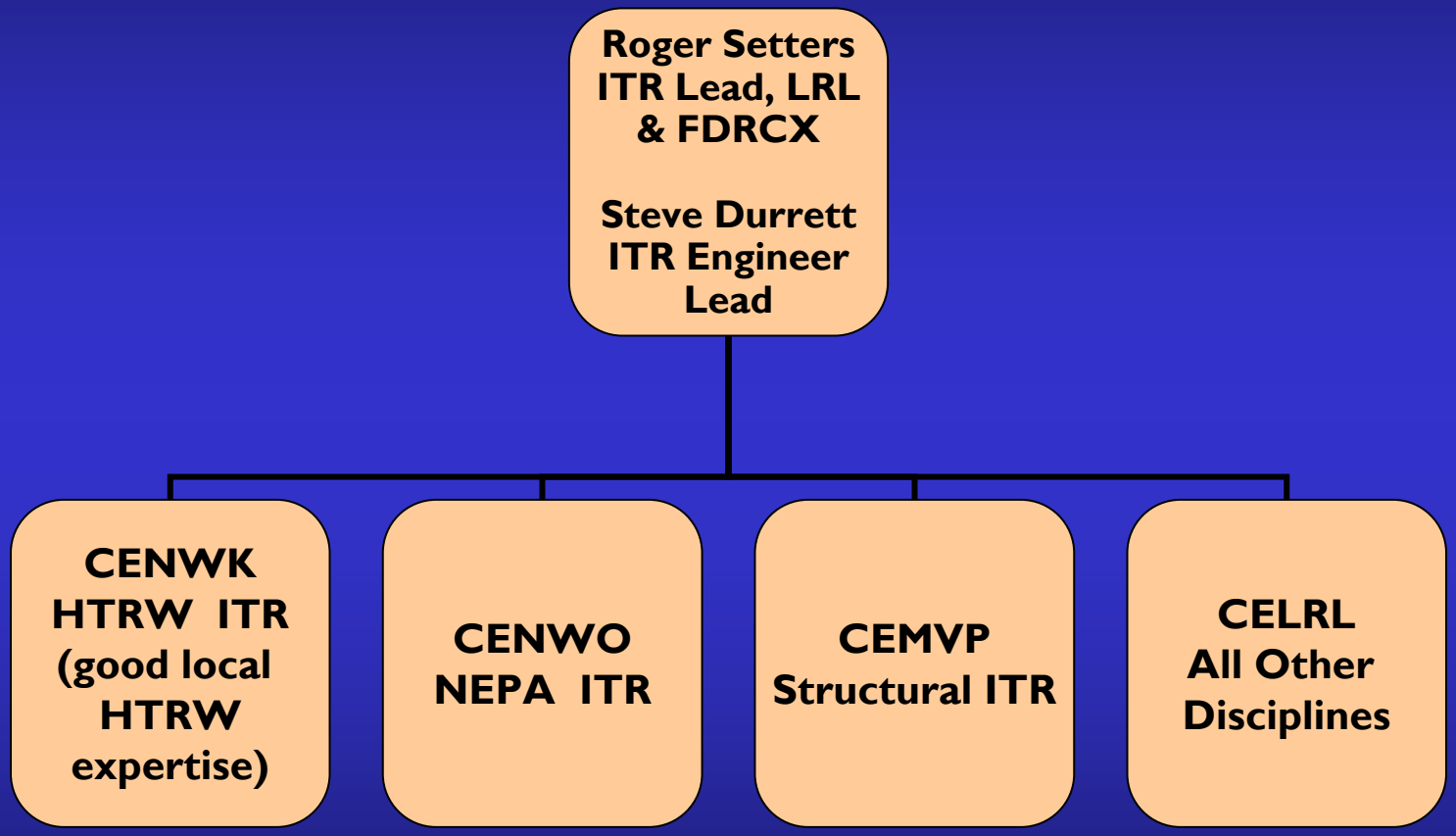
ITR Team Organization



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ITR Coordination/Comments

- Major Issues raised through the ITR process included:
  - Level of detail for economic investment survey – Closed… included an Economics IPR/Summit in Oct 2002.
  - Hydraulic gradient methodology – Closed… local methodology found reasonable given levee service record
  - EIS format – Closed
  - Structural risk and uncertainty analysis – Closed… included discussions at Structural Summit in Dec 2005.
  - Analysis of Kansas River profiles – Closed

- ITR Certification of draft report completed in May 06
- Addendum to ITR certification completed Aug 06
- All ITR certification & documentation completed

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Policy Review Compliance

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Policy Review Compliance

- AFB held 18 & 19 Jan 2006
  - District, HQ, NWD and Sponsors attended
  - Many issues cleared prior to AFB (during 2005 policy comment & resolution)
- PGM issued 2 Feb 2006
  - All but one policy comment was resolved…
  - Proposed work categories (design deficiency or new authorization) needed further District investigation and a joint final conclusion.
  - Information exchanged with HQ over next 2 months
  - Categorization agreement & HQ approval 3 May 06
- HQ issued 19 Jul 06 Comment Memorandum
  - PGM comment required additional information displays & mitigation plan.
  - New policy comments: Real estate / LERRD categorization, EIS (EJ, CAR, and Checklist), NER approach, cost estimate narrative, Items of Local Cooperation.
- Worked through NWD for official response and resolution of comments
  - All comments considered resolved _____(date)

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Review of Completed Project, Kansas Citys Levees, Missouri and Kansas

Questions?

Sponsor and Local Stakeholder Support

Mr. Frank Pogge

Director of Water Services, City of Kansas City, MO

Mr. Larry Brennen

Administrator, Kaw Valley Drainage District

Mr. Leon Staab

Consulting Engineer, North Kansas City Levee District

Mr. Steve Daily

General Manager, Fairfax Drainage District

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Northwestern Division

Presentation
to the

Civil Works Review Board

Kansas Citys, Missouri and Kansas Flood Damage Reduction Study

Final Feasibility Report and Environmental Impact Statement

by

Karen Durham-Aguilera

Director of Programs
Northwestern Division

September 2006

US Army Corps
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Northwestern Division

Briefing Objectives

- The Rationale for Project Support
- Quality Assurance Activities
- Other Observations
- The Expected Response to the draft Report of Chief of Engineers
- NWD's Recommendations

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Rationale for NWD Support

- Report complies with all applicable policy & laws in place at this time.
- Recommended plan is technically sound, economically feasible and environmentally acceptable.
- Plan supported by the sponsors, congressional delegation, and the Public.
- Anticipate favorable response to the draft Chief's Report.
- In the Federal Interest – The Recommended Plan is the National Economic Development (NED) Plan.
- Flood Damage Reduction Projects are supported by the Administration.
- Division Engineer's Transmittal Letter signed 31 August 2006.

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Certification of Legal & Policy Compliance

- Legal certification of the final Feasibility & EIS Report made by NWK District Counsel on 22 August 2006.
- Technical and Policy Compliance:
  - ITR compliance review completed 22 August 06.
  - ITR review team comprised of members from MVP, LRL with oversight by the Flood Damage Reduction PCX - SPD.
  - ITR comments have been resolved.
  - Policy compliance issues have been resolved.

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NWD Quality Assurance Activities

- Continuous involvement throughout development of the Final Report.
- Facilitated issue resolution and dialog among the vertical and horizontal team throughout the study process.
- Review of Policy Compliance Memo: all issues have been adequately addressed.
- Examples of policy issues resolved
  - Work Categorization
  - Induced Damages

Other Observations

- Meets criteria for Contingent Authorization for upcoming WRDA.
- Congressional Support: Bond – MO, Roberts – KS; Moore KS-03, Cleaver – MO-05, and Graves MO-06

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NWD Recommendation

- Approve Final Report
- Release for State and Agency Review
- Complete Chief's Report

Questions

Civil Works Review Board

Significant Policy Review Concerns

Cliff Fitzsimmons, PE

Office of Water Project Review

Policy and Policy Compliance Division

Washington, DC – September 20, 2006

Policy Compliance Review – Areas of Policy Concern

- Report Content
- Work Categorization

Policy Compliance Review – Report Content

Issue: Initial information focused on analyses results with little detail

Reason: Must demonstrate that analyses, particularly plan selection & justification, are appropriate, complete and supportable

Significance: Provide basis for Chief of Engineers & other decision makers to reach same conclusions as District Engineer

Resolution: Expand report text & displays

Resolution Impact: Report adequately supports recommended plan

Policy Compliance Review – Work Categorization

Issue: Type of Work = New, Reconstruction or Design Deficiency?

Reason: Different authority needs and implementation paths

Significance: New work & reconstruction require new authorization

- Correct design deficiencies under existing construction authority

Resolution: 2 new work measures, 1 reconstruction, 3 design deficiency

Resolution Impact: Design deficiency corrections can proceed when funds become available

- New work & reconstruction must be authorized (WRDA 06 candidate)

HQUSACE Policy Compliance Review Team

Recommendation

Release the report/FEIS for S&A Review & file it with EPA