



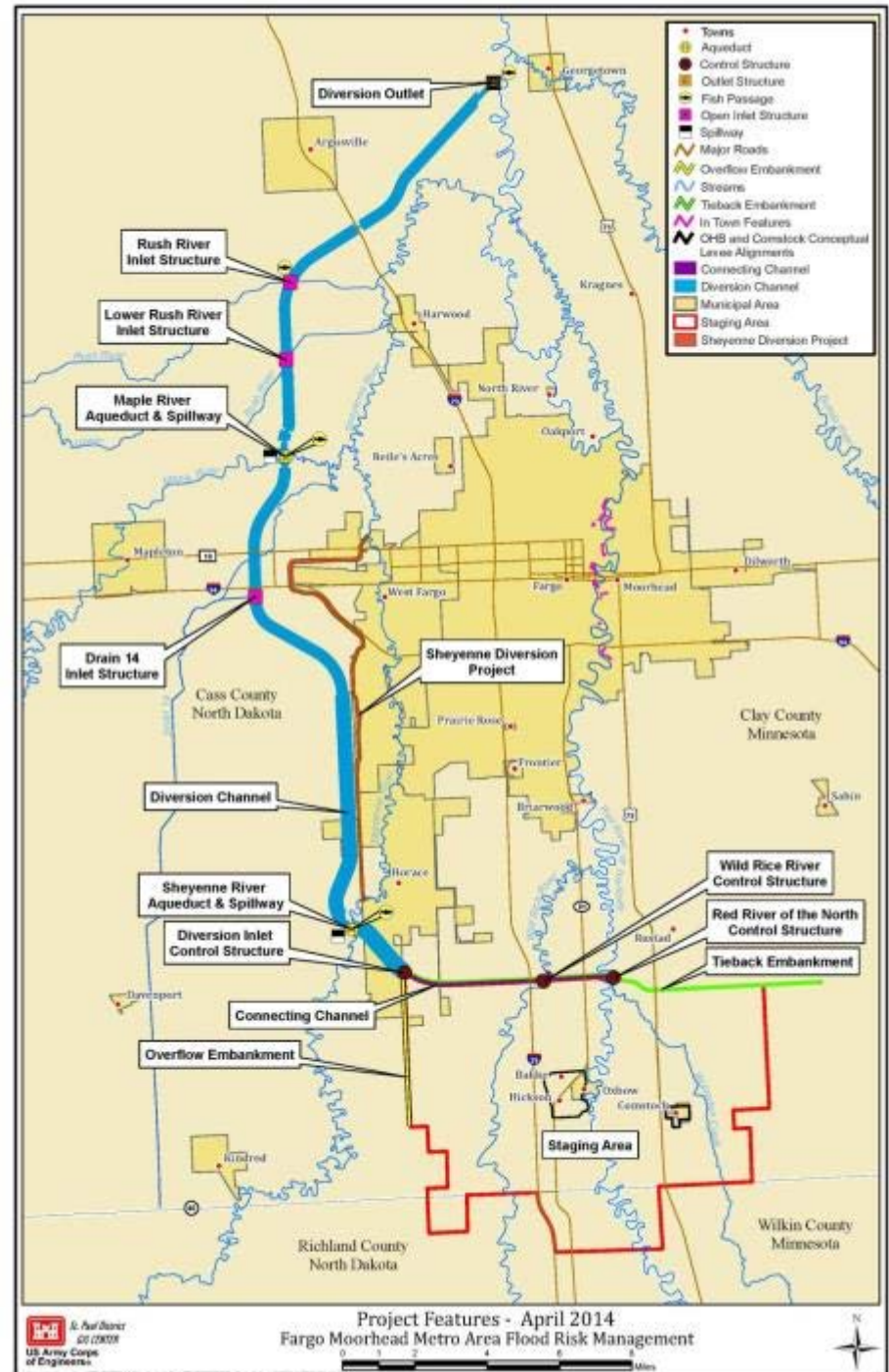
Finding the Right Project

Presented To: ND Association of County Engineers

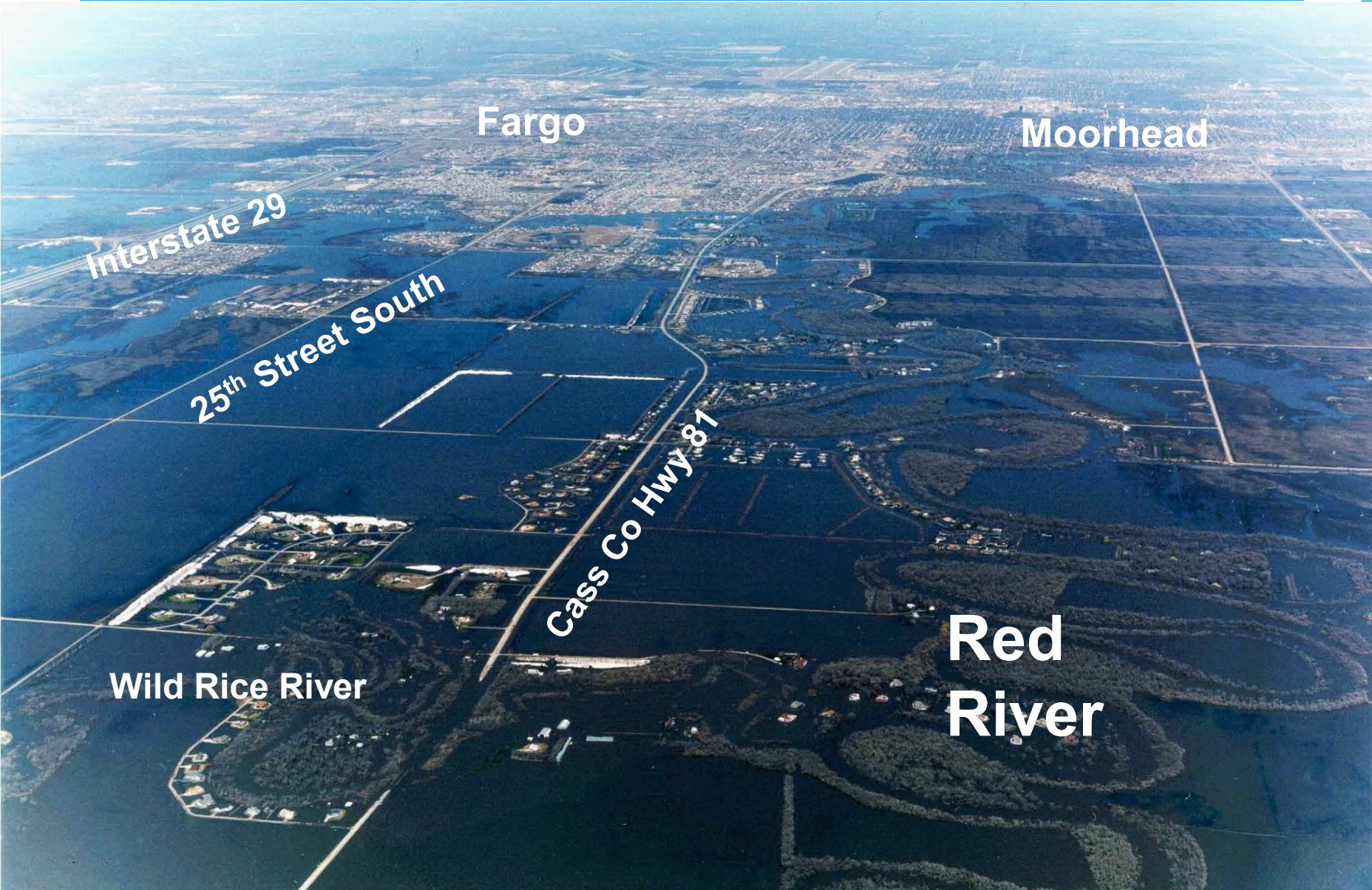
Presented By: Jason Benson, Cass County Engineer

Fargo-Moorhead Area Diversion Project

- ▶ Federally Authorized Project
- ▶ Completed Environmental Impact Statement of all alternatives
- ▶ 1,600 ft wide Diversion Channel in ND with 150,000 acre-feet of Upstream Staging
- ▶ Outlet near Georgetown, MN
- ▶ Inlet SE of Horace, ND
- ▶ Provides 100-year Flood Risk Reduction
- ▶ Extreme Events are Flood-Fightable



Finding the Right Project



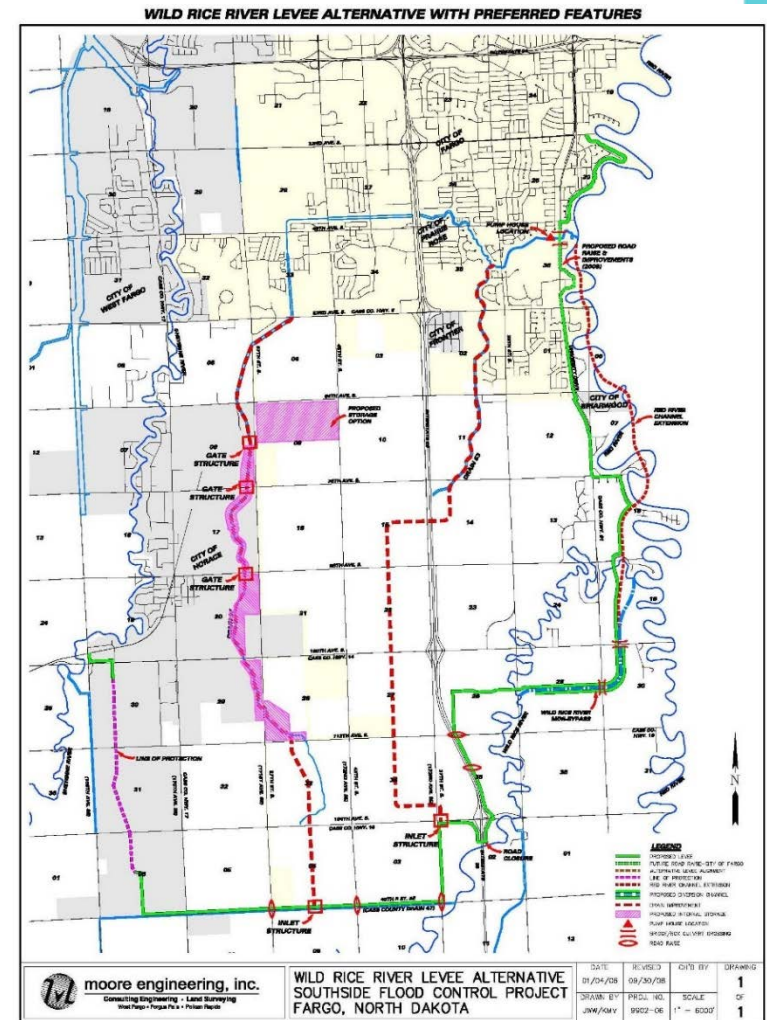
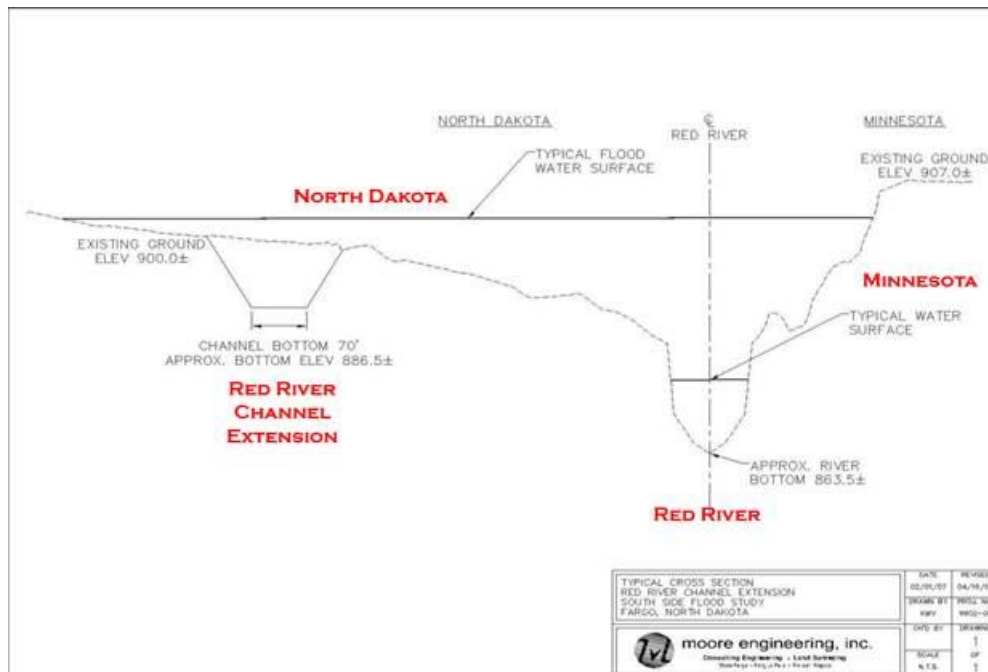
Starting the Search Locally

- 1997** Cass County initiates Flood Mitigation Study
- 2001** Study recommends Southside Flood Protection Project
Receives \$9.5 Million FEMA Grant
- 2002** Project/Funds transferred to City of Fargo
- 2006** 4 alternatives presented to public
- 2008** 5 alternatives presented to public
60+ small group meetings
Public meeting about the plan



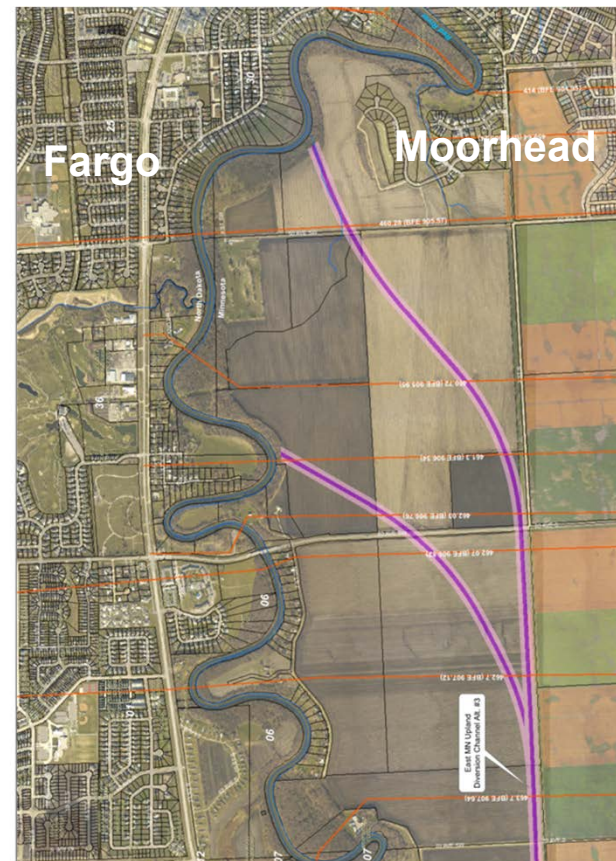
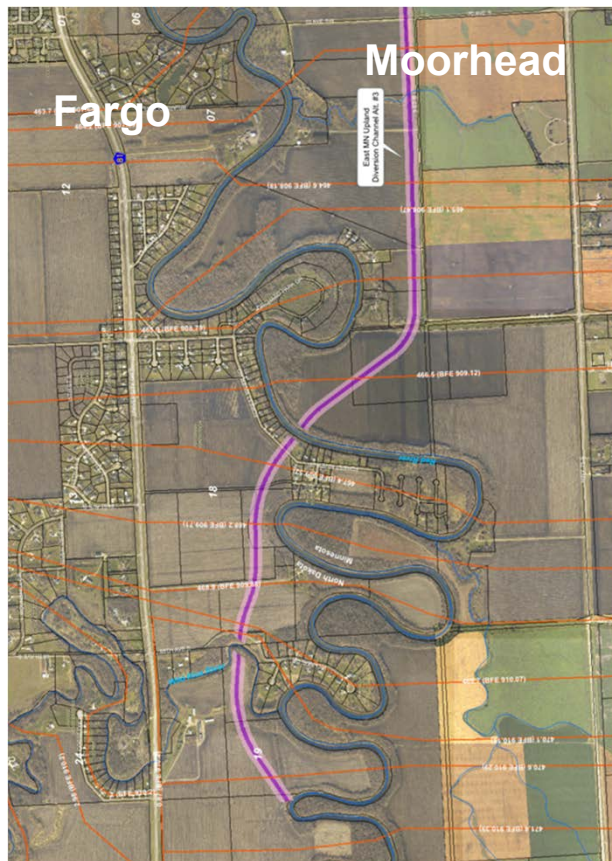
Southside Flood Protection Plan

- ▶ Wild Rice River levee
- ▶ Drain extensions
- ▶ Internal storage areas
- ▶ A small diversion
- ▶ Channel extensions (in North Dakota and Minnesota)



Trying to Solve the Solution Locally

- ▶ Multiple local alternatives considered
 - ▶ Levees with channel extension in North Dakota and Minnesota with supplemental storage



69 Miles of Emergency Measures

42 Miles of Temporary Levee

8 Miles of Hesco

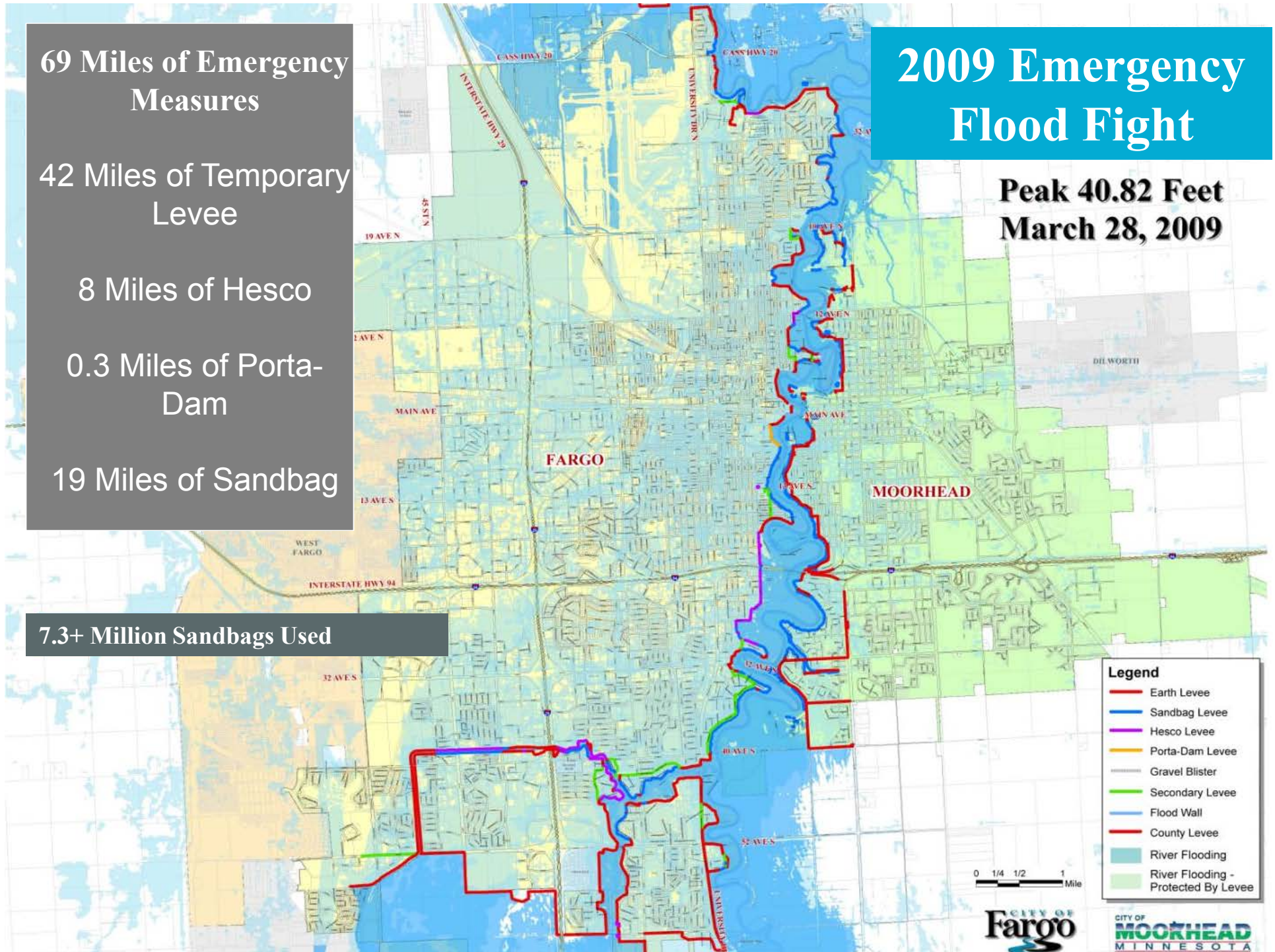
0.3 Miles of Porta-Dam

19 Miles of Sandbag

2009 Emergency Flood Fight

**Peak 40.82 Feet
March 28, 2009**

7.3+ Million Sandbags Used



Legend

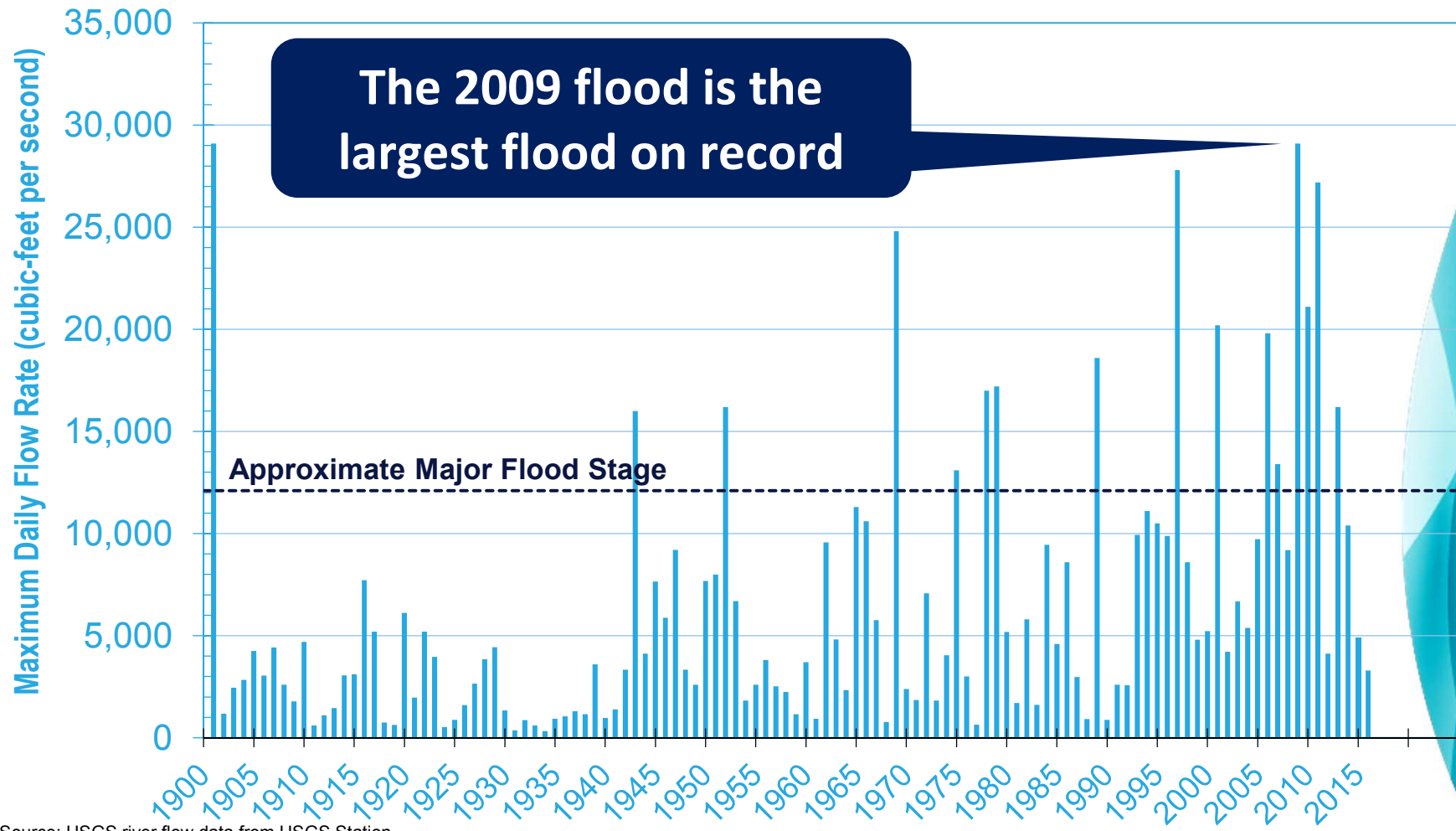
- Earth Levee
- Sandbag Levee
- Hesco Levee
- Porta-Dam Levee
- Gravel Blister
- Secondary Levee
- Flood Wall
- County Levee
- River Flooding
- River Flooding - Protected By Levee

0 1/4 1/2 1
Mile

CITY OF
Fargo

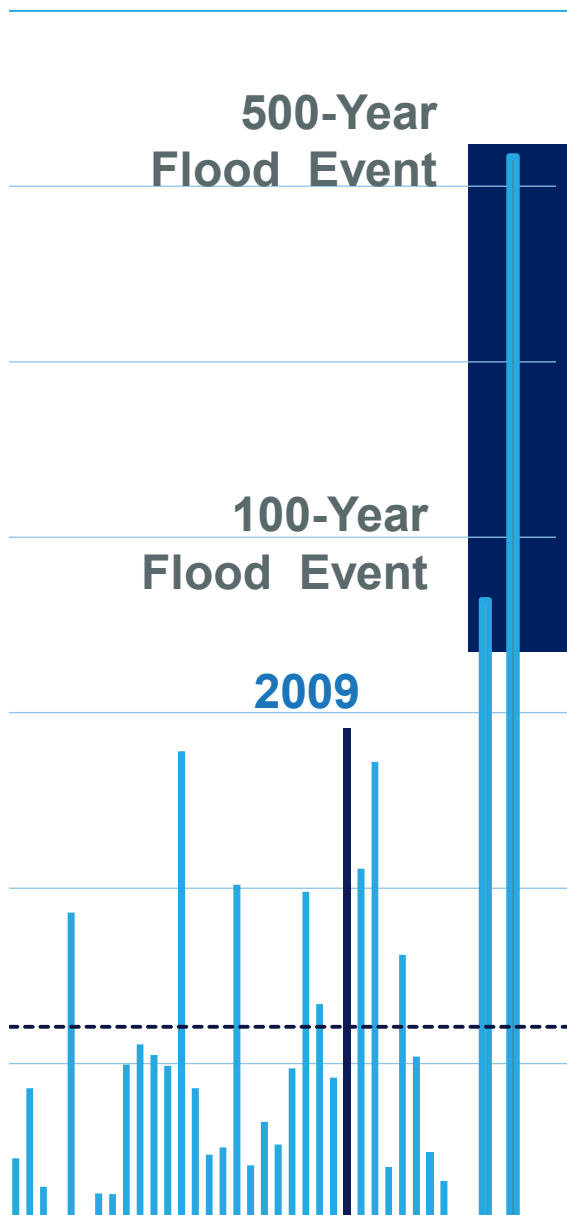
CITY OF
MOORHEAD
MINNESOTA

Do you plan for past or future floods?



Source: USGS river flow data from USGS Station

Understanding the flood threat



The real threat

A 100 year or 500 year event, the size of which we have never seen before

Minot 2011

~450-year event

Grand Forks 1997

~250-year event

Moorhead Floodplain Risk

- Pre-2012 FEMA Floodplain
 - 38.5 ft river gage (29,300 cfs)
 - 256 impacted structures (prior to post-2009 acquisitions)
- 2012 FEMA Floodplain
 - 39.4 ft river gage (29,300 cfs)
 - 178 impacted structures (after post-2009 acquisitions)
 - 129 removed by LOMRs
- Future FEMA Floodplain
 - 41.1 ft river gage (34,700 cfs)
 - Existing levees lose FEMA accreditation
 - 820 impacted structures

Fargo Floodplain Risk

- Pre-2015 FEMA Floodplain
 - 38.5 Feet River Gage (29,300 cfs)
 - 475 Impacted Structures
- 2015 FEMA Floodplain
 - 39.4 Feet River Gage (29,300 cfs)
 - Approx. 2,300 Impacted Structures
- Future FEMA Floodplain
 - 41.1 River Gage (34,700 cfs)
 - Approx. 11,000 Primary Structures
 - 16,000 total structures



By the numbers: Flood Insurance

11,000
homes

impacted by future
FEMA floodplain

**\$3,000-
\$5,000**
per family

Average annual flood
insurance premium per home

**~\$30
to \$50**
million

In total, annual flood
insurance premiums

More than 100-Year Protection Needed!

Red River Basin Commission Long-term Flood Solution Goals

- ▶ 500-year protection recommended for large metro areas
- ▶ Only Winnipeg meets this recommendation
 - ▶ Red River Floodway
- ▶ Bigger floods have happened
 - ▶ Minot, Grand Forks
- ▶ FM Area Diversion Project goals
 - ▶ 100-year protection
 - ▶ Ability to fight larger floods



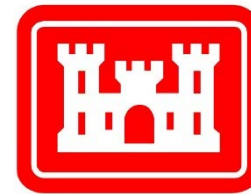
Red River Floodway near Winnipeg

Federal Involvement



The need for a Federal Partner

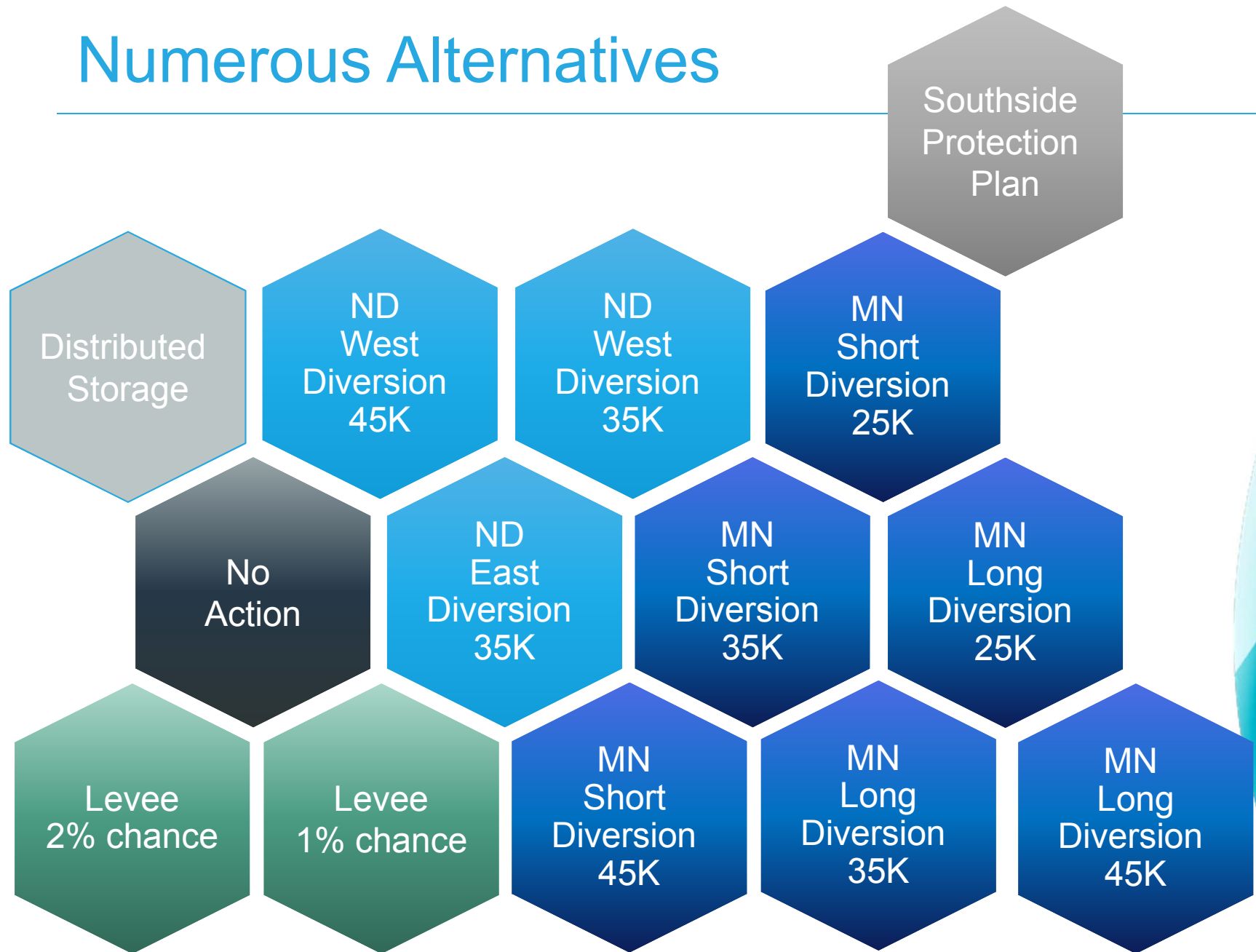
- ▶ **Comprehensive look at alternatives**
 - ▶ No Action (Continued emergency measures)
 - ▶ Non-structural (Example: Restoring wetlands)
 - ▶ Levees / Floodwalls
 - ▶ Diversion channels
 - ▶ Upstream storage / Retention
 - ▶ Combination of options
- ▶ **Cost share**
- ▶ **Technical Expertise**



**US Army Corps
of Engineers®**

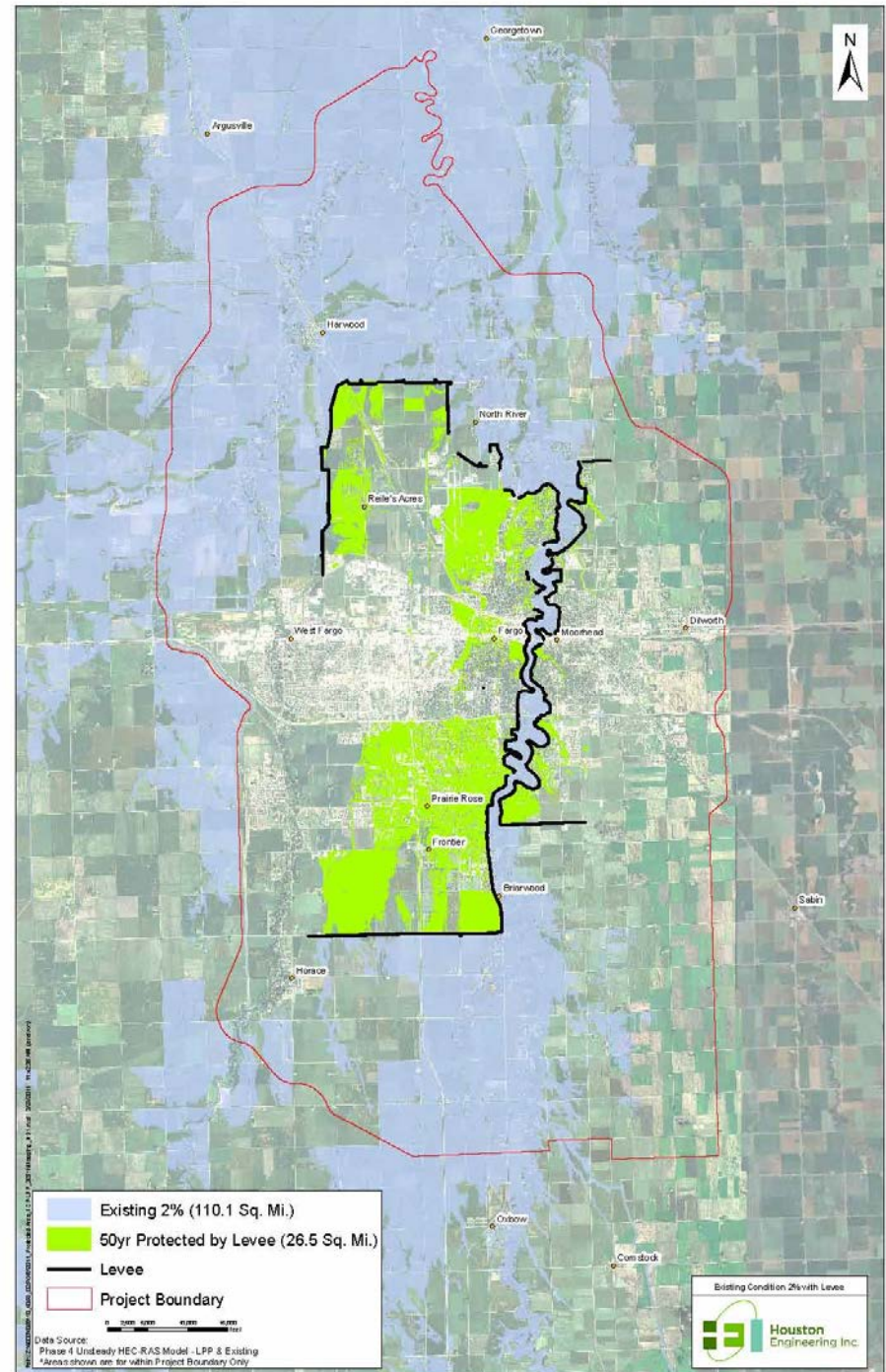


Numerous Alternatives



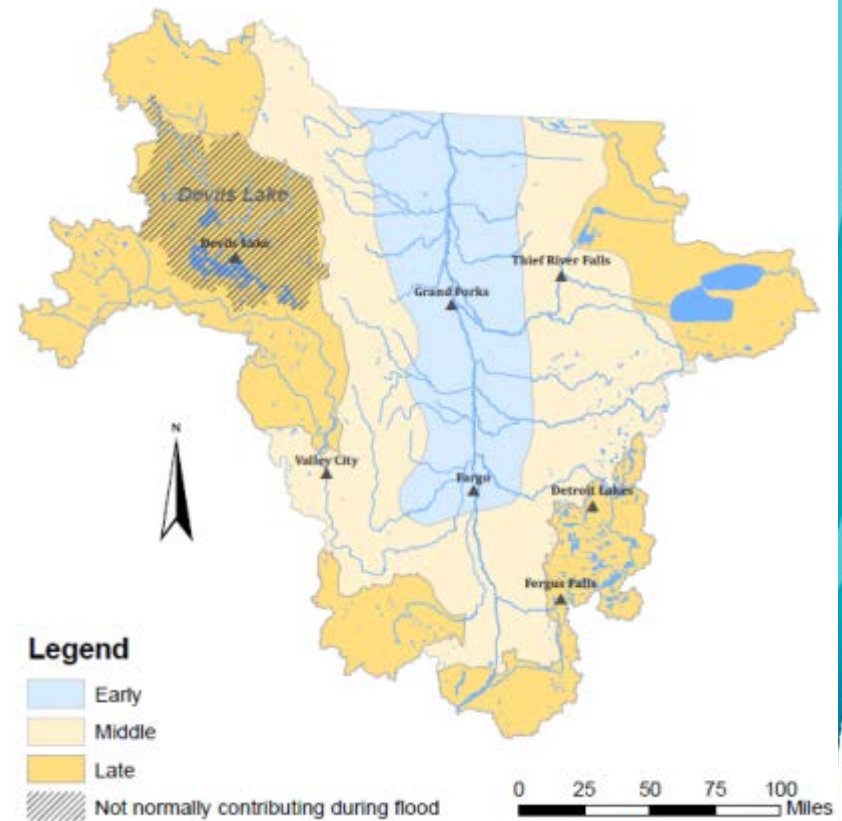
Levee Alternative

- ▶ Cannot alone achieve FEMA certifiable 100-year flood protection
 - ▶ Over \$300M worth of levees completed to date
 - ▶ 50-year level - \$900M
- ▶ No high ground on North Dakota side
- ▶ Levees also have upstream impacts



Why Not Distributed Storage/Retention?

- ▶ Diversion Project includes a retention area (150,000 AF) where it is most effective and efficient
 - ▶ Location of runoff could limit effectiveness
- ▶ 270,000 AF of storage needed to provide 2 ft reduction during 1997 flood (<50-year) (RRBC)
- ▶ Distributed storage alone cannot provide the level of protection needed



Over 8 Years of Study of Permanent Flood Protection for Fargo-Moorhead

- ▶ 2008-2011: Federal Feasibility Study
- ▶ 2012: Post Feasibility Southern Alignment Analysis
- ▶ 2013: Supplemental Environmental Assessment

Project Purpose:

...to reduce flood risk potential on local streams, qualify substantial portions of the F-M urban area for 100-year flood accreditation, and reduce flood risk for floods exceeding the 100-year flood or greater.



Federal NEPA, including Public Involvement



- ▶ During feasibility study, 51 Public meetings held to inform and gather input from Nov 2008 to Jun 2011
- ▶ (4) Scoping meetings
- ▶ (3) Metro Flood Management Committee
- ▶ (5) Public information
- ▶ (11) NEPA public review
- ▶ (1) 404(b) hearing
- ▶ (27) Metro Flood Work Group

- ▶ 430 Agencies and members of the public commented on the Study
- ▶ 1600 pages of comments were responded to

Diversion Projects Work

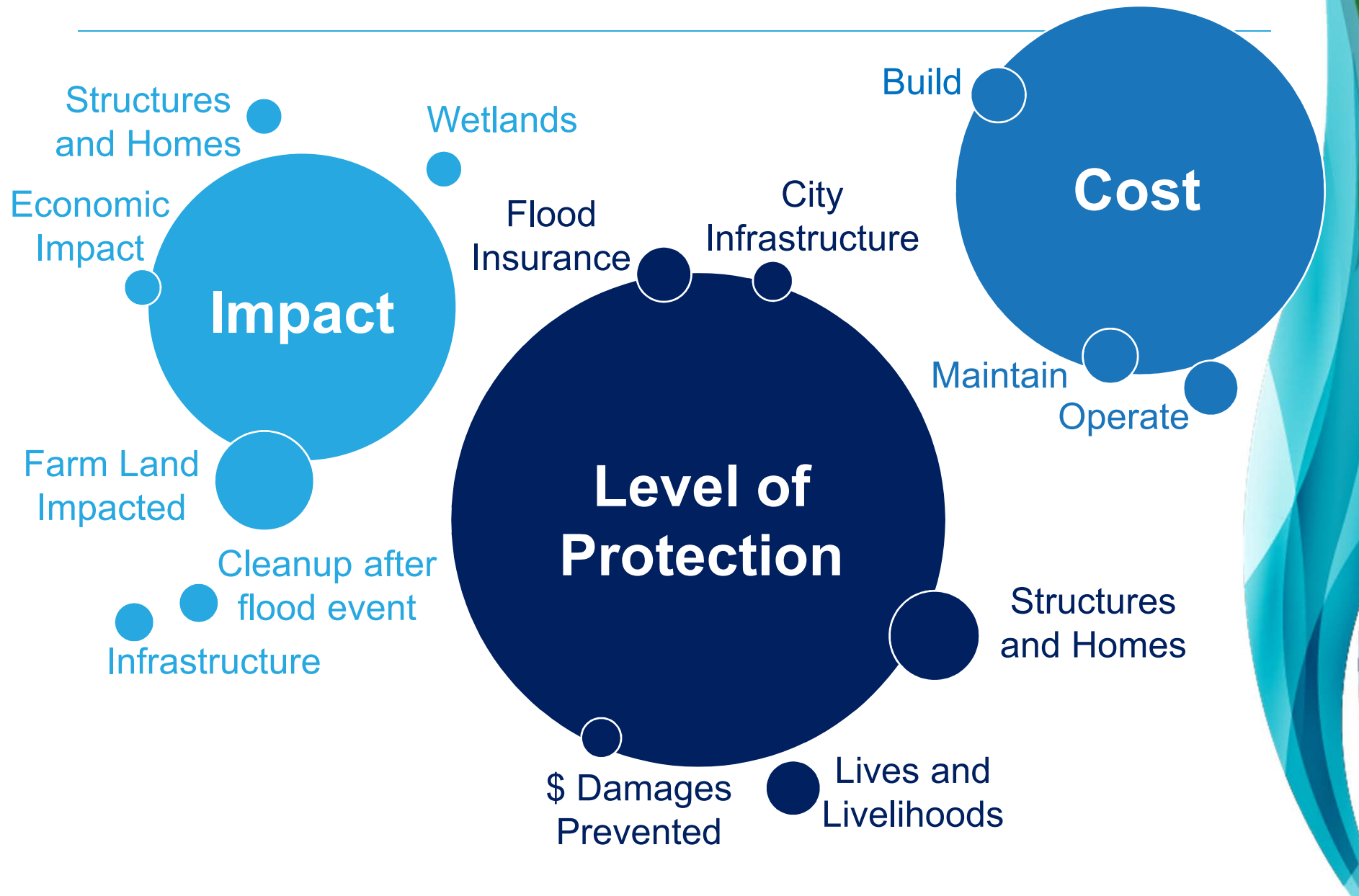
Proven Track Record in the Red River Basin



- ▶ In place since 1969
 - ▶ Expanded from 90-year to 700-year flood protection
- ▶ Has operated more than 20 times
- ▶ Prevented \$32 Billion in flood damages
- ▶ Other Diversions in West Fargo, Wahpeton/Breckenridge, & Grand Forks

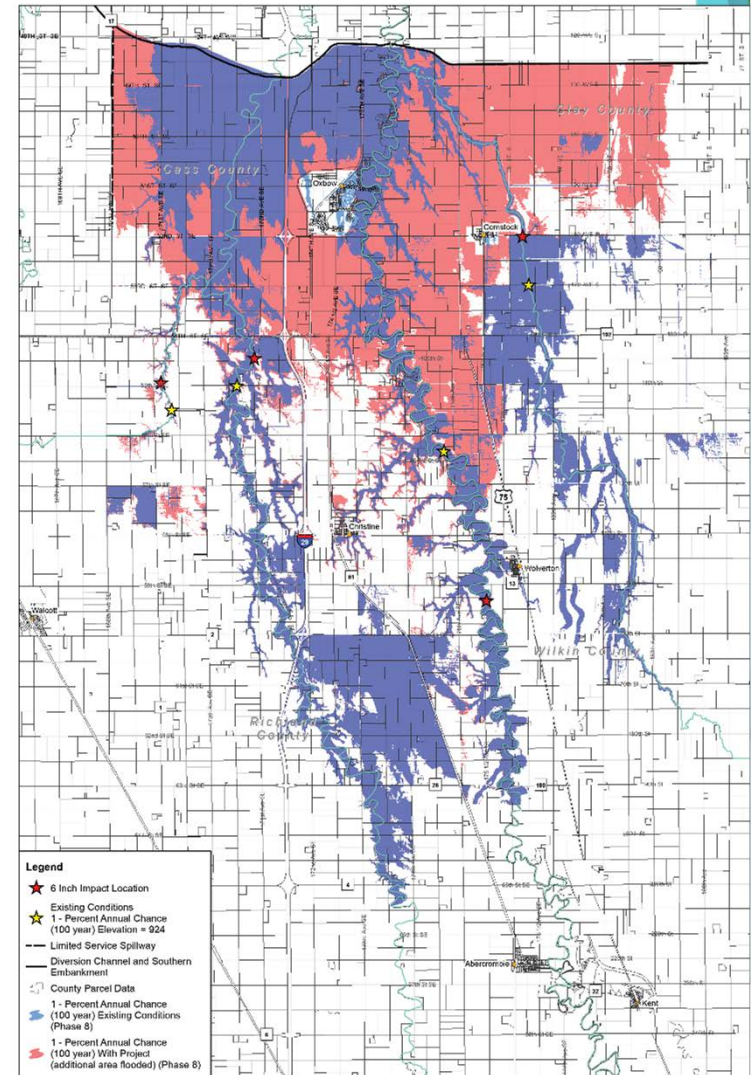


Some Criteria for Evaluating Alternatives



Change to Upstream Storage Resulted in No Negative Impacts Downstream

- ▶ Downstream impacts were eliminated through use of a staging area immediately upstream of the Project
- ▶ Reduced original design's impacts by over 2-feet
- ▶ Original downstream impacts on 4,500 structures
- ▶ Minnesota diversion alternative had downstream impacts of 1', impacts would go to Canada



Other Improvements to the Project

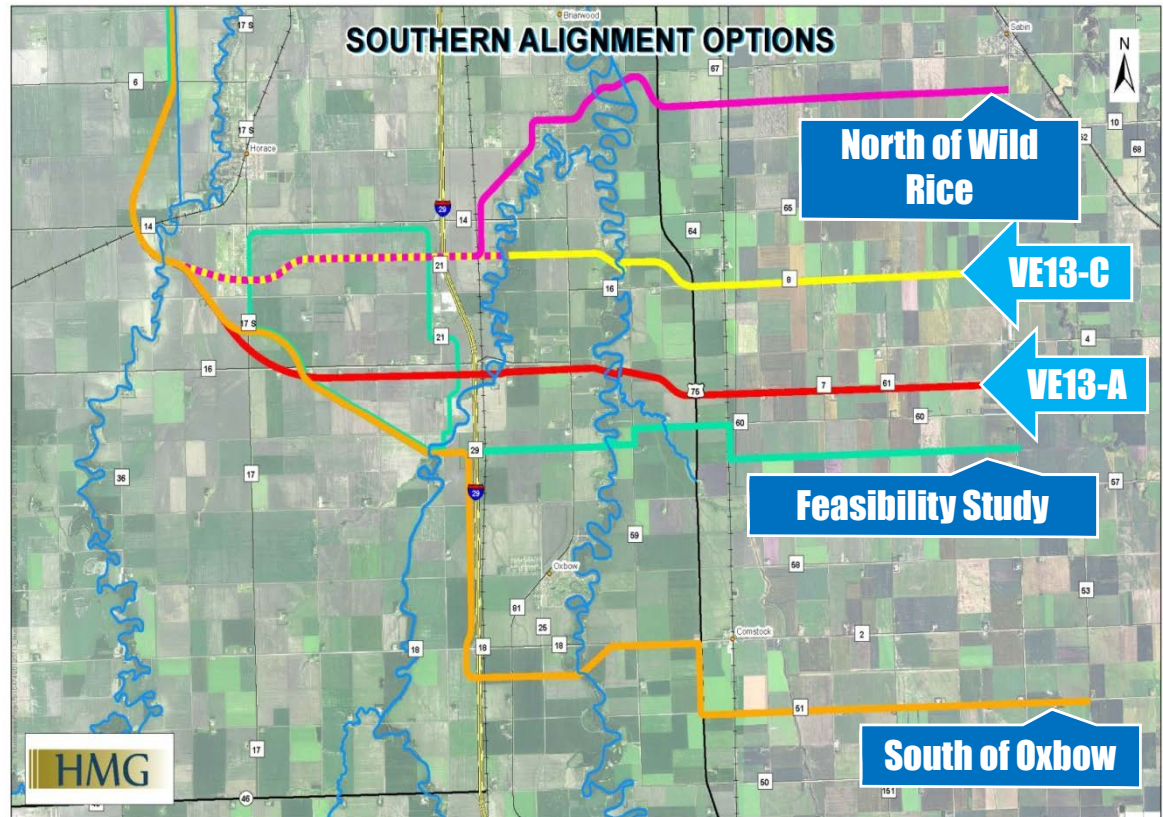
Value Engineering (VE Studies) and Technical Team Discussions

- Southern Alignment Evaluation
- More Flow Through Town/In-Town Levees
- Diversion Inlet Evaluation (Weir vs. Gates)
- Oxbow/Hickson/Bakke Levee
- Channel Realignment



Multiple Southern Alignments Considered

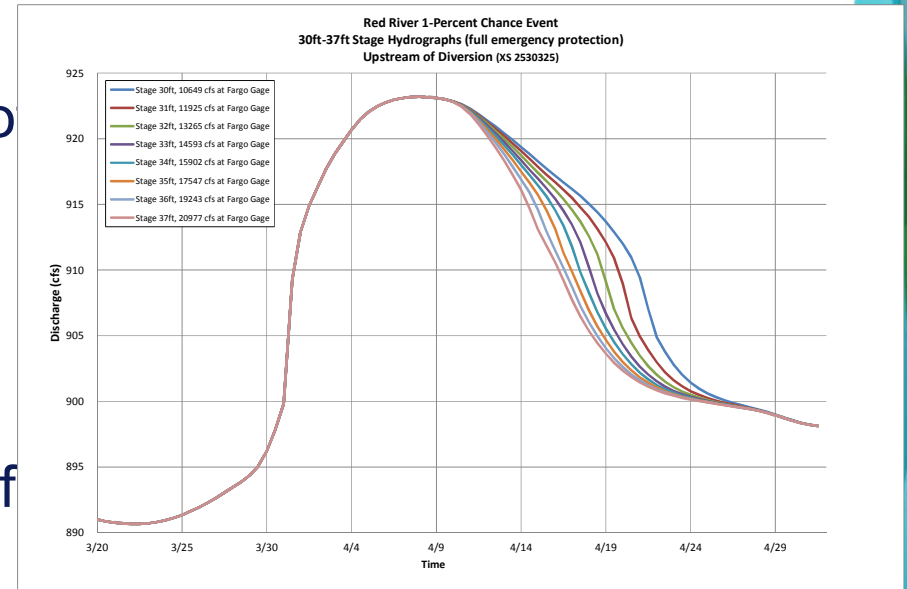
- ▶ The diversion alignment was selected for technical reasons:
 - ▶ No conflict with the Sheyenne Diversion
 - ▶ Horace ND on the benefitted side
 - ▶ Minimize the length and cost of the southern embankment
 - ▶ Least impact to people and structures



More Flow Through Town / In-town Levees

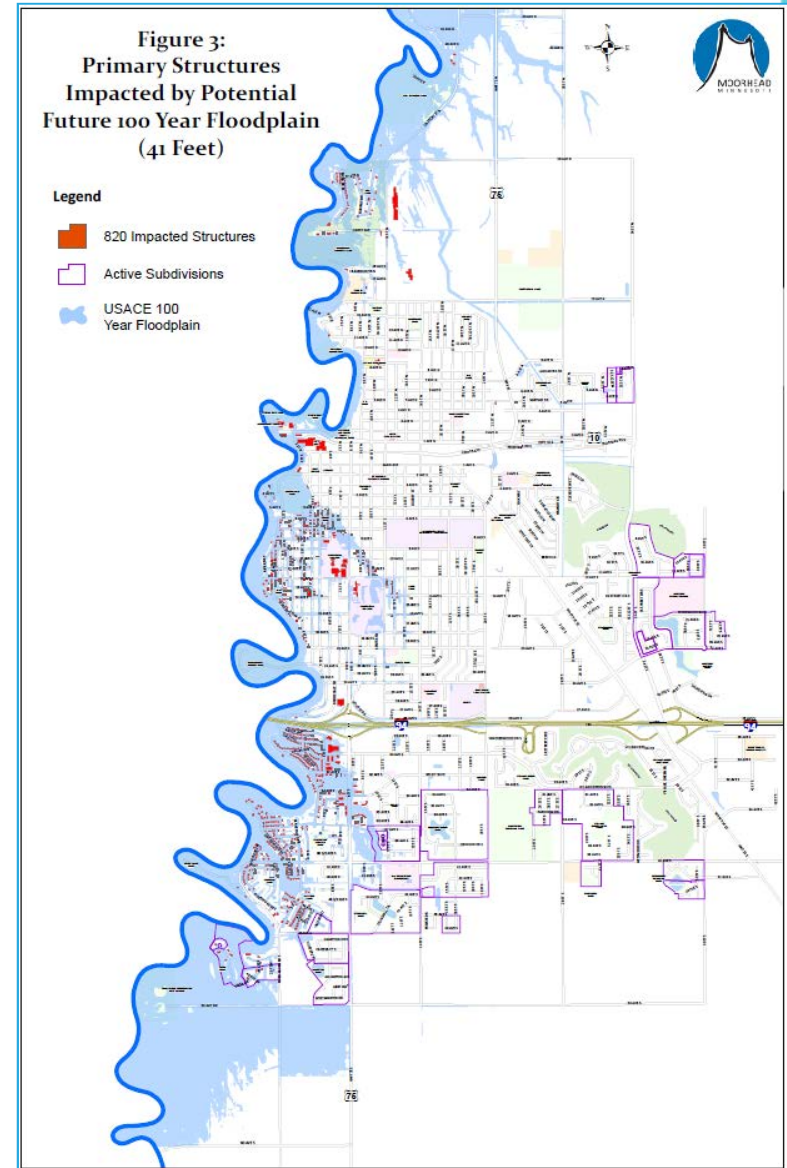
- Purpose:

- Reduced frequency and duration of project operation
- Improves the condition for fish passage on Red and Wild Rice River
- Reduces environmental impacts of project – (connectivity and geomorphology)
- Significantly reduces the probability of summer operation
- Able to achieve 35' through town with a flow of 17,500 cfs (10-year event)



Significant Efforts In-town

- Over 700 homes have been acquired in Fargo-Moorhead
- Fargo has completed over \$200M of in-town levees
- Moorhead has completed over \$100M in-town
- Levees lose accreditation if/when floodplain changes



Minnesota DNR's EIS

DNR's Technical EIS Study 2011-2014:

- ▶ Study included three separate screenings of alternatives to the project
- ▶ EIS “did not result in the identification any additional reasonable alternatives to the Project.”
- ▶ Study received its Determination of Adequacy in June 2016



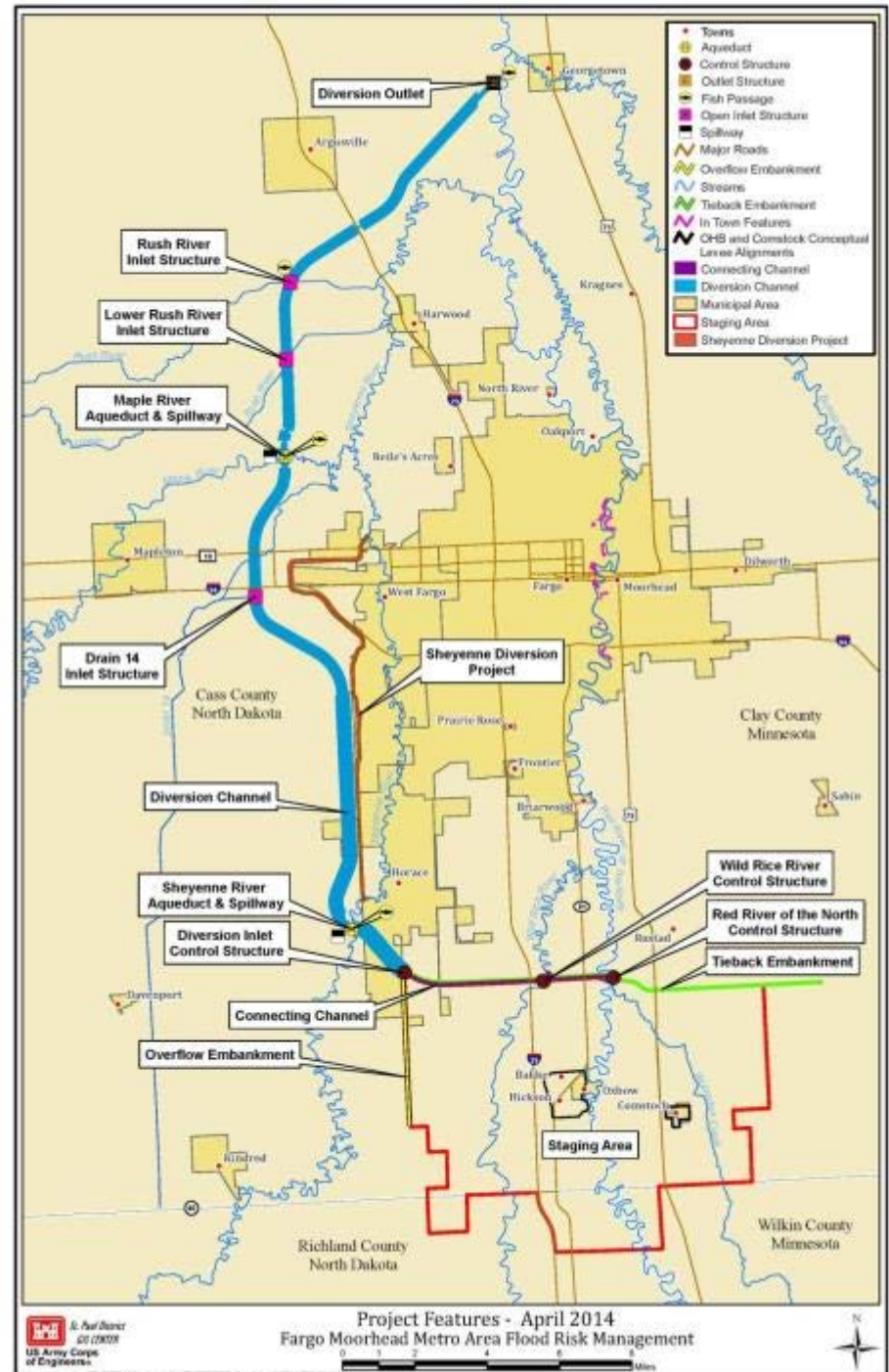


The Federal Project



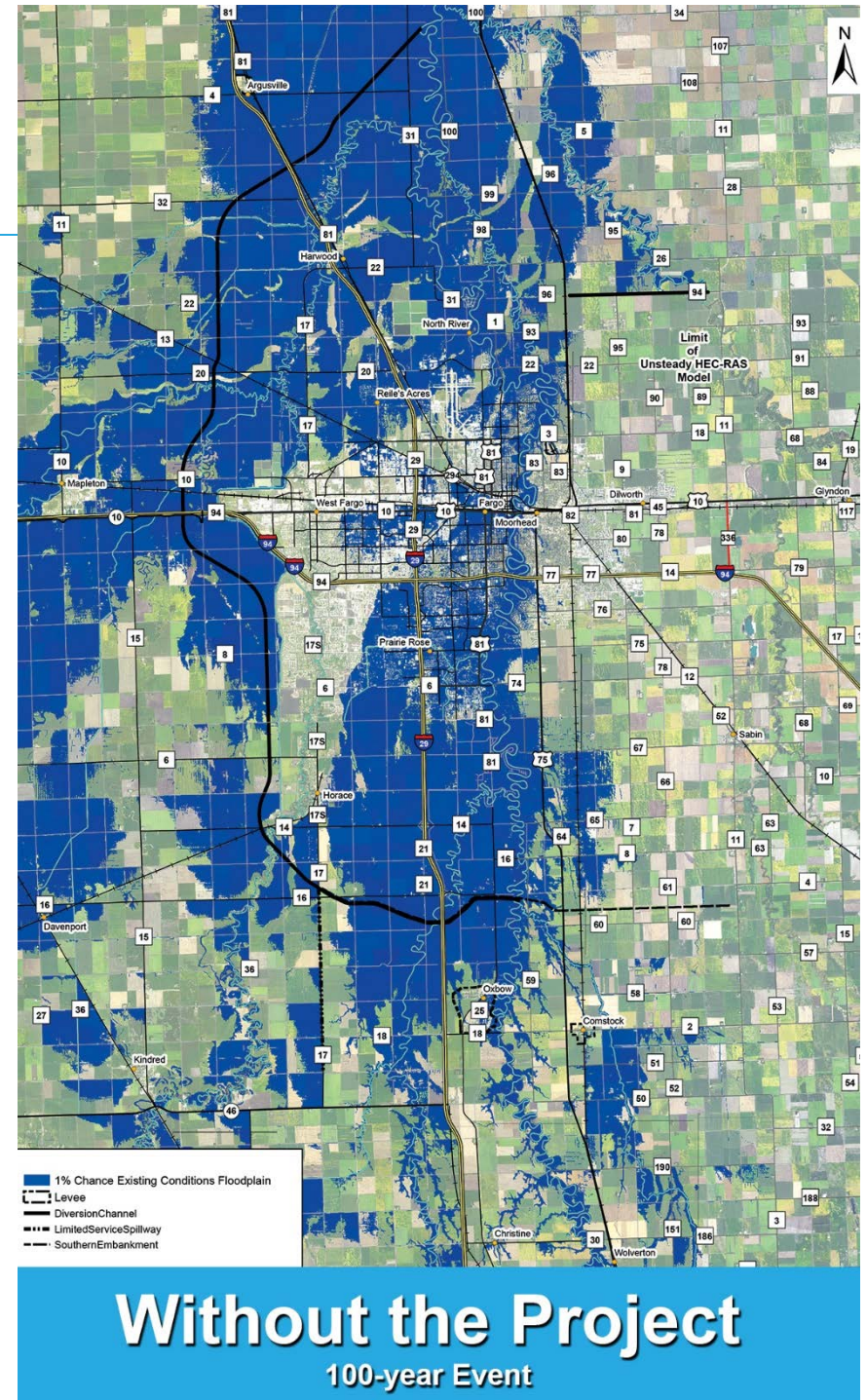
Project Receives Federal Approvals

- ▶ President Obama signed the Water Resources Reform and Development Act (WRRDA) in June 2014
 - ▶ Diversion was 1 of 26 water projects authorized
- ▶ Federal Appropriations for Construction received in 2016 USACE Work Plan
 - ▶ ‘New Start’ Secured as 1 of 6 New Projects in the Country
- ▶ PPA Signed in July 2016



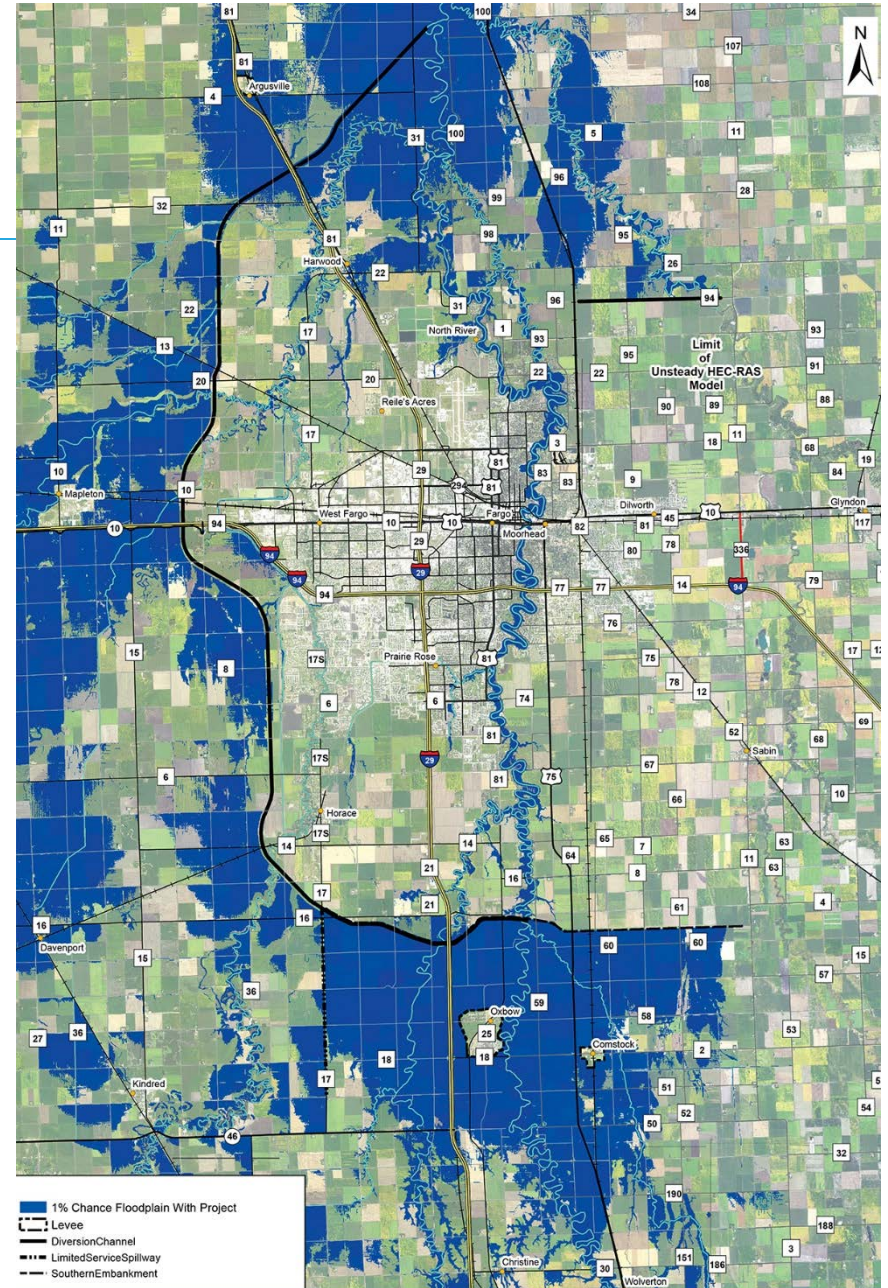
Fargo-Moorhead Flood Impacts

- 230,000 lives
- 150,000 jobs
- \$19 Billion in property value
- \$5.5 Billion in wages
- \$3.5 Billion in annual sales



Fargo-Moorhead Diversion Protects

- 230,000 lives
- 150,000 jobs
- \$19 Billion in property value
- \$5.5 Billion in wages
- \$3.5 Billion in annual sales



With the Project
100-year Event

Corps Construction Award

▶ Diversion Inlet Control Structure

- ▶ ~\$50M Contract Award by USACE to Ames Construction
- ▶ Gated control structure that will control the amount of water that enters the diversion channel from the upstream staging area.
- ▶ Features three 50-foot wide tainter gates
- ▶ Located South of Horace, ND
- ▶ Construction start in Spring 2017
- ▶ Complete in 2020





Transportation Plan



Transportation Master Plan

- ▶ Developed with input from:
 - ▶ County
 - ▶ Township Officials
 - ▶ School Districts
 - ▶ Emergency Services
- ▶ Maintain Crossings at existing County Roads
 - ▶ Spacing varied from 1.5 to 4.5 miles
 - ▶ Average spacing 2.5 to 3.5 miles



Transportation Master Plan

- ▶ Township Roadways will terminate at Diversion ROW
 - ▶ Input from Landowners and Township
 - ▶ Determined During Design
 - ▶ Modifications Part of Project
 - ▶ Ownership and Maintenance with Township
- ▶ Access to all current parcels will be maintained
 - ▶ Modifications may be necessary
- ▶ Project may improve some Township Roadways
 - ▶ Based on Transportation Plan
 - ▶ Ensure similar access as exists today



County Road Bridges

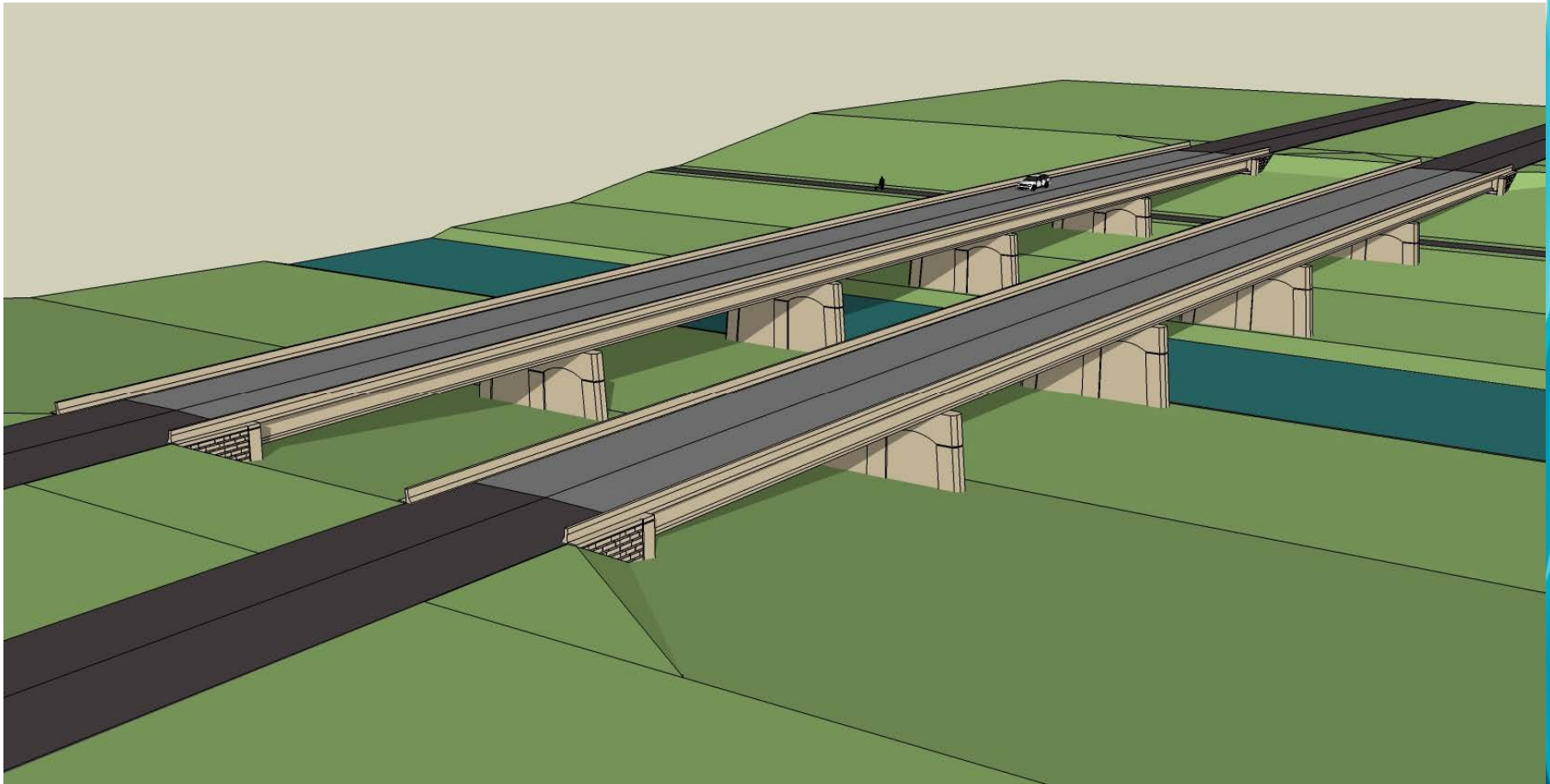
- ▶ **Diversions Authority Responsible for Bridge Maintenance**
 - ▶ 30 Year O&M through the P3 Contractor
- ▶ **County Bridges**
 - ▶ 10 New County Bridges
 - ▶ Average Length: 600 ft
 - ▶ Width of County Bridges: 42 ft

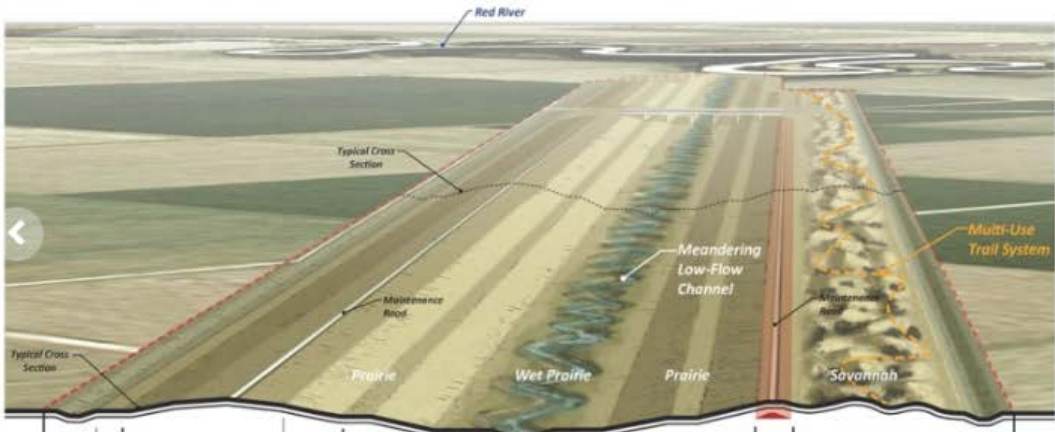


Typical County Bridge Aesthetics



I-29 Rendering





Diversion Authority Shortlists Four P3 Teams Interested in Constructing the Diversion Project

The Metro Flood Diversion Authority (Diversion Authority) has completed its evaluations and...



FM Leaders, Corps: We are committed to building the Diversion



Minnesota DNR Releases Permit Decision Related to Fargo-Moorhead Area Diversion Project



Diversion Leaders Present Progress and Financial Video to North Dakota lawmakers