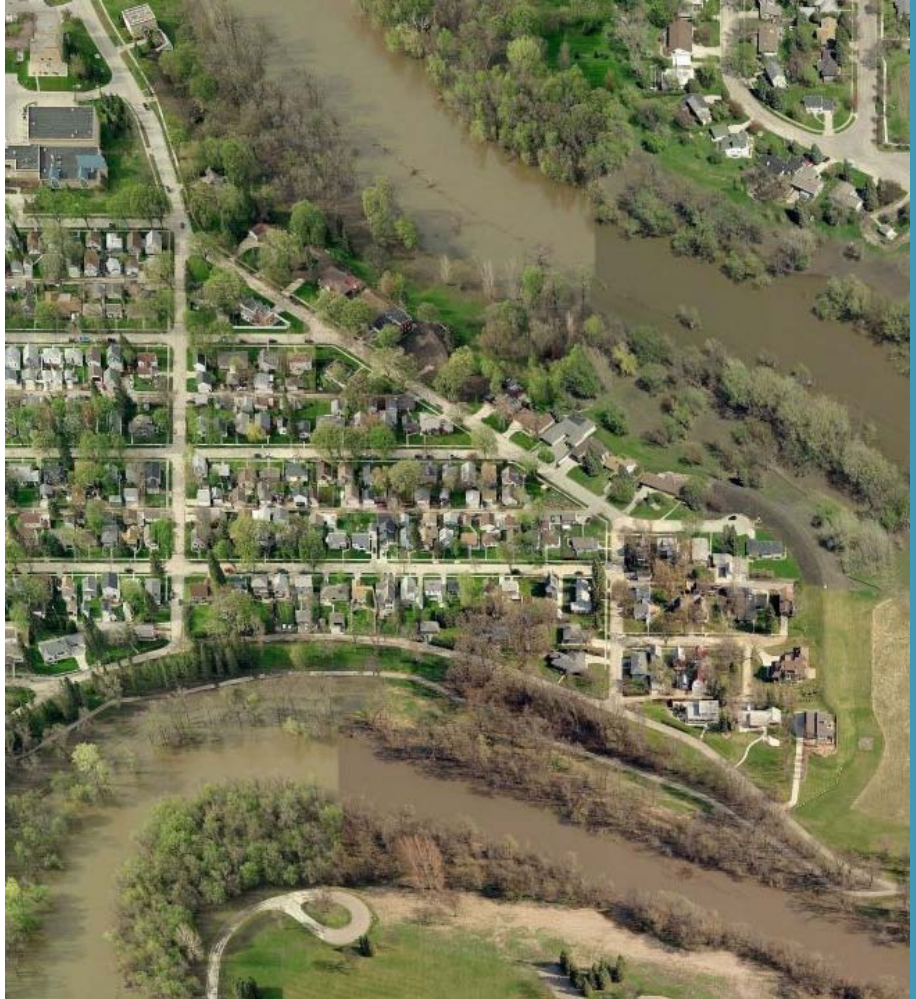
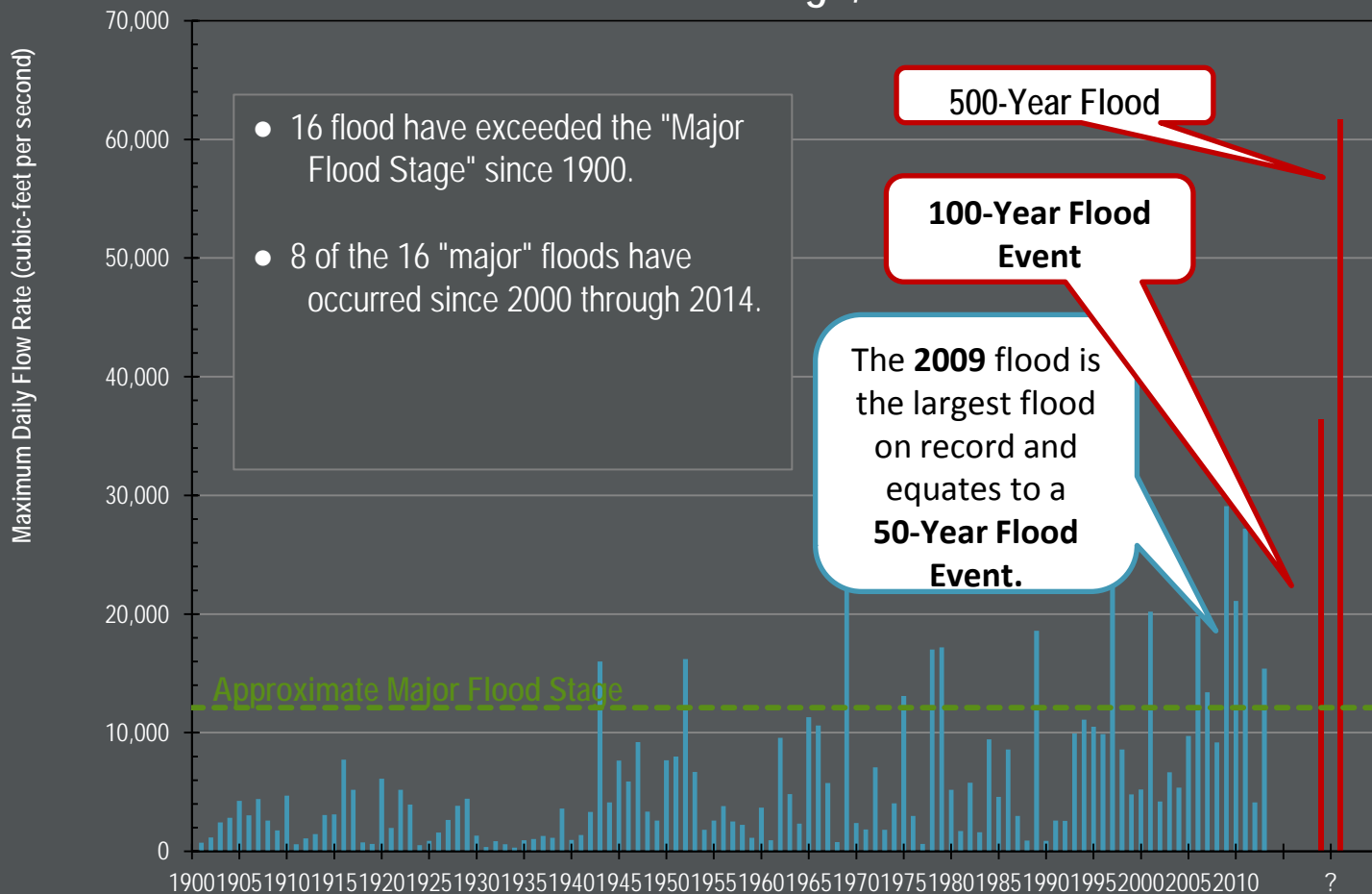


Belmont Park Area (South River Road & 3rd Street South)



Flood History

Red River of the North at Fargo, North Dakota



Changing Flood Risk

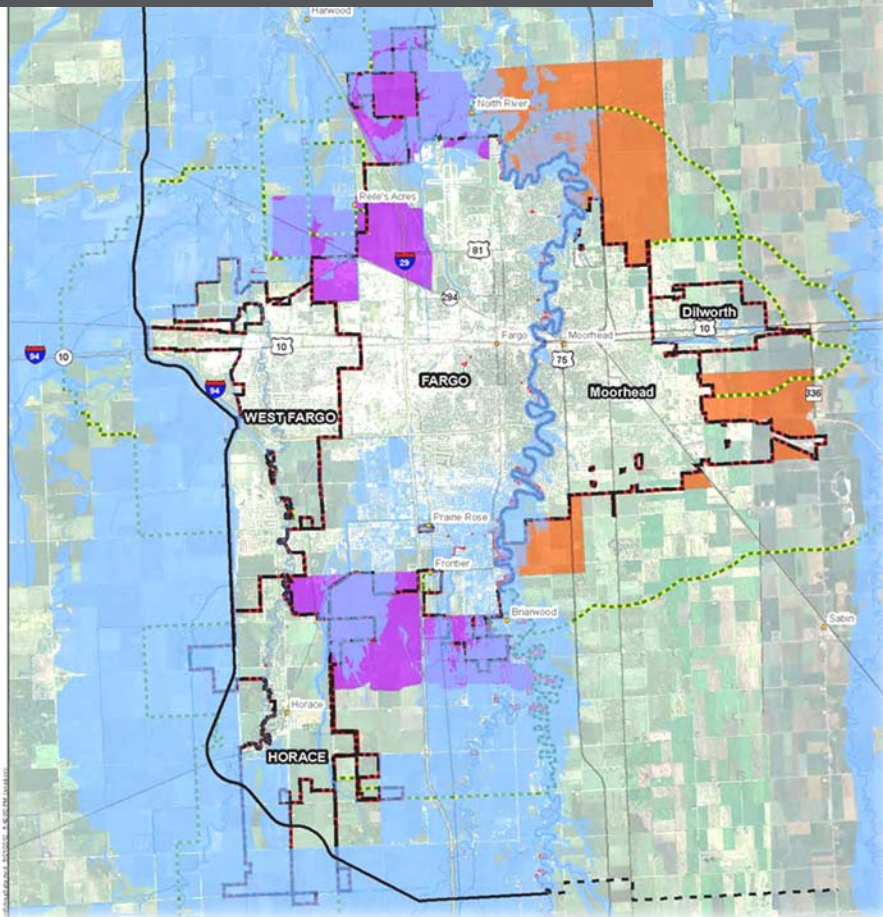
- Now Effective Floodplain
 - 39.4 Feet River Gage (29,300 cfs)
 - Approx. 2,051 Impacted Structures
 - Approx. 7,500 Impacted properties
 - 27,600 Acres Impacted
 - After Diversion – This elevation will be close to 500-year flood levels
- Flood of Record
 - 40.8 Feet River Gage
 - \$70M expended to flood fight
- Future of the Floodplain
 - USACE 41.1 River Gage (34,700 cfs)
 - Approx. 19,400 Impacted Structures
 - 36,430 Acres Impacted



"If I am in a community that we come back five years down the road and they are still talking about a project, I am probably going to change the map then," said Federal Emergency Management Agency's (FEMA) Deputy Associate Administrator for Mitigation, Roy Wright. (April, 2015)

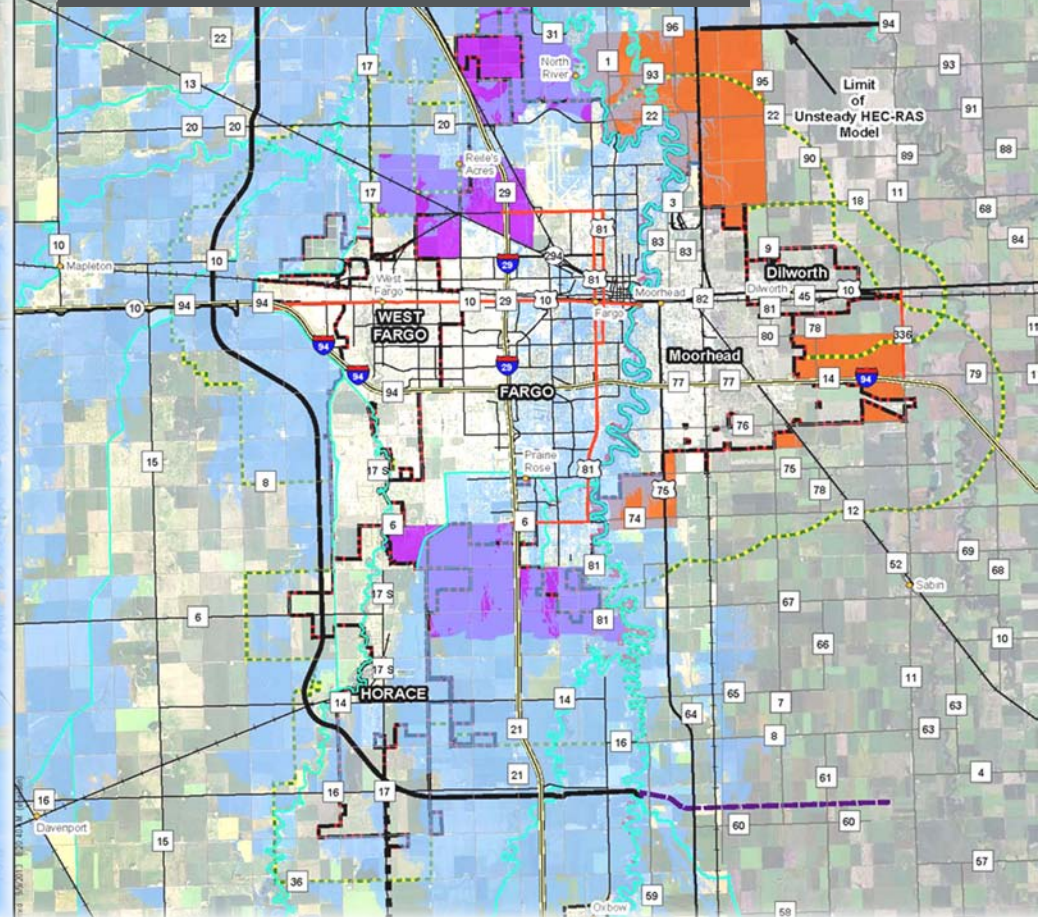
Effective 39.4 RG

2,051 Structures Affected



USACE 100 year no Diversion (41.1 RG)

19,400 Structures Affected



FARGO

**52 MILES OF
PROTECTION**

29 MILES OF LEVEE
(Fargo)

5 MILES OF LEVEE
(Cass)

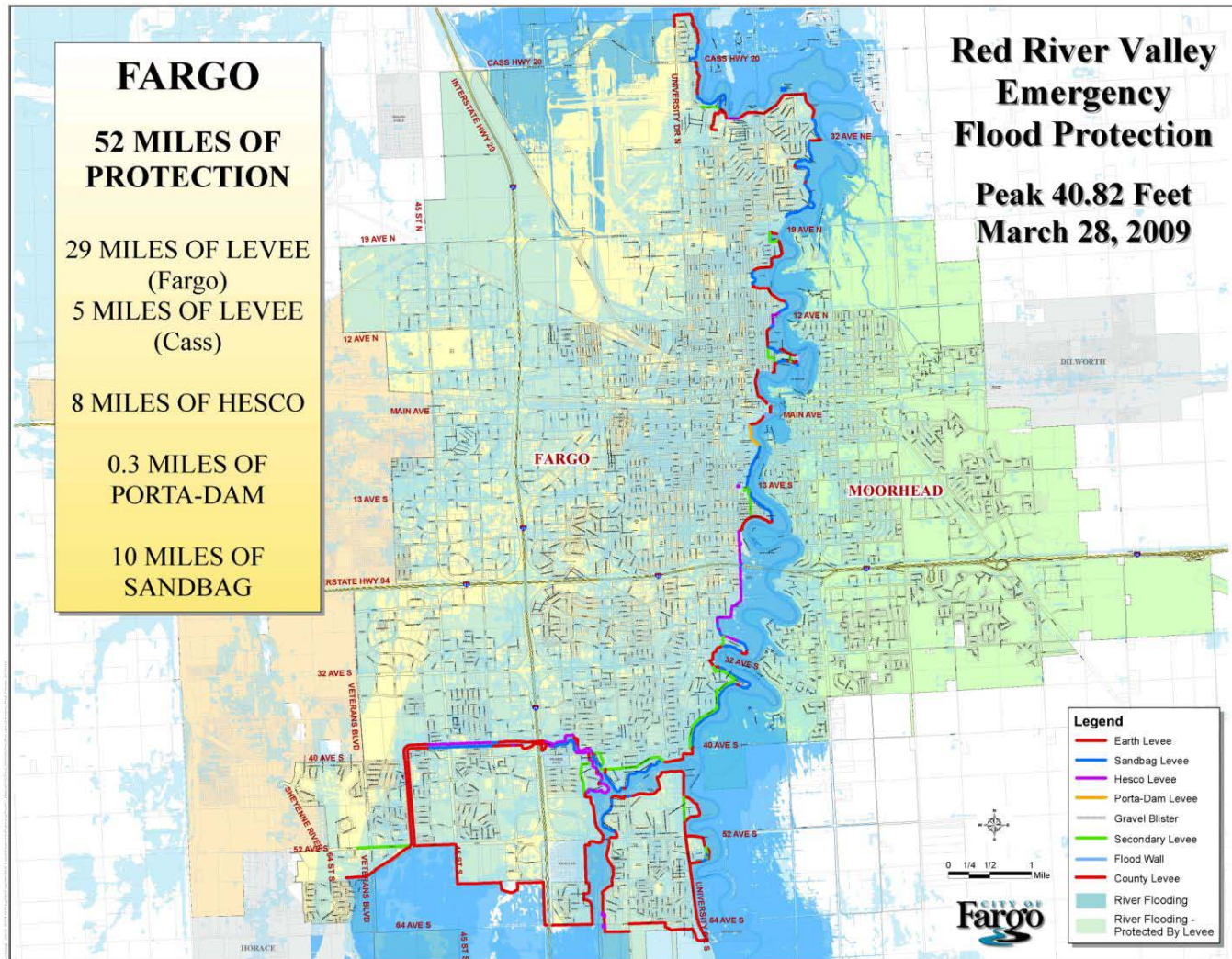
8 MILES OF HESCO

0.3 MILES OF
PORTA-DAM

10 MILES OF
SANDBAG

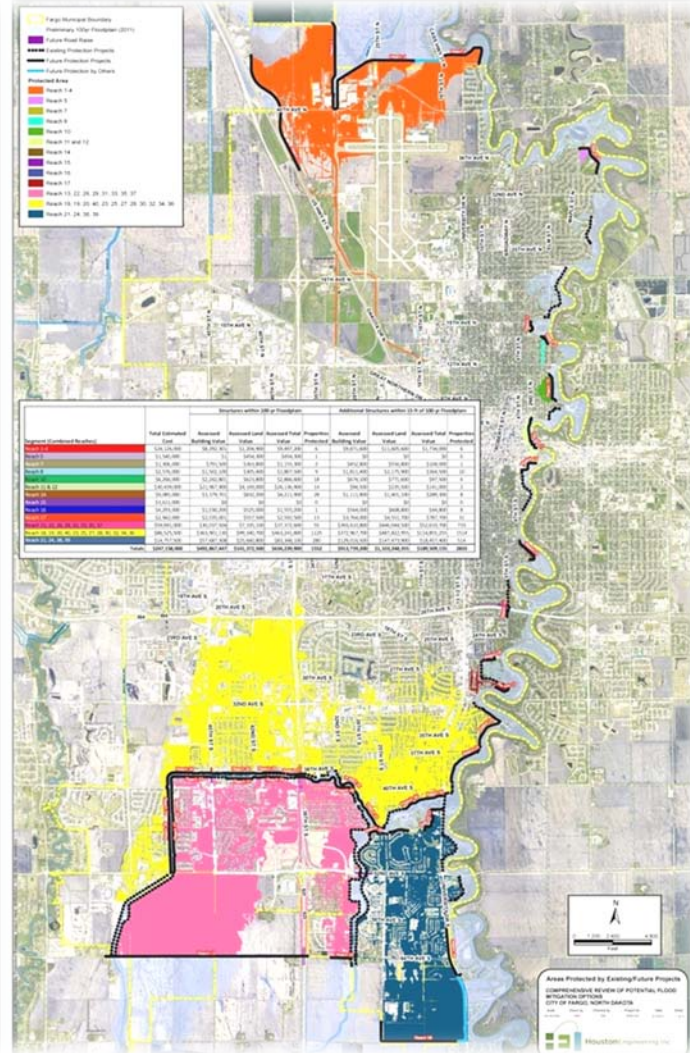
Red River Valley Emergency Flood Protection

**Peak 40.82 Feet
March 28, 2009**



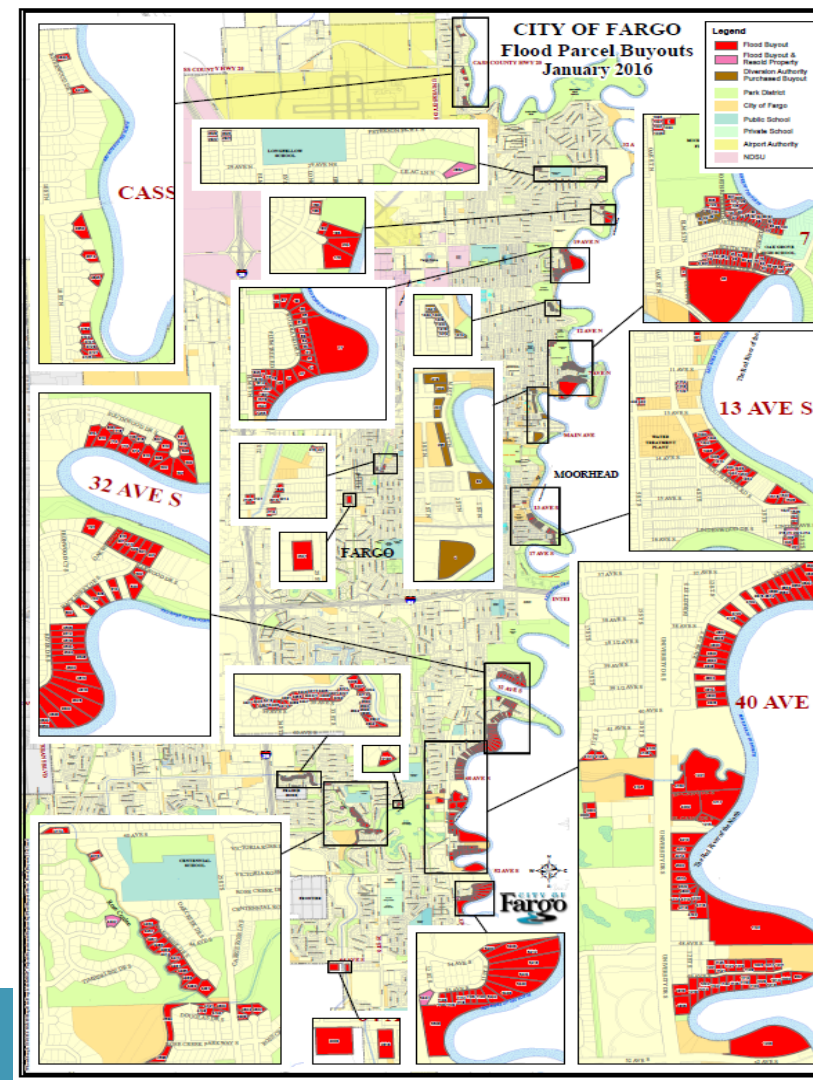
Comprehensive Plan

- Developed in Fall 2011/Winter 2012
- Certifiable Protection From the Effective Floodplain (39.4 Feet)
- Funding limitations require prioritization
- Outstanding Issues
 - With Comprehensive Plan completed would still need:
 - 7.6 miles of emergency clay levees
 - 3.2 miles of sandbag levees
- With a functioning diversion during a 100 year flood event the flow through town would not exceed 35' therefore the comp plan levees would not be necessary
- With a functioning diversion during a 500 year flood event the comp plan levees would be needed to protect against river elevations that exceed 40'



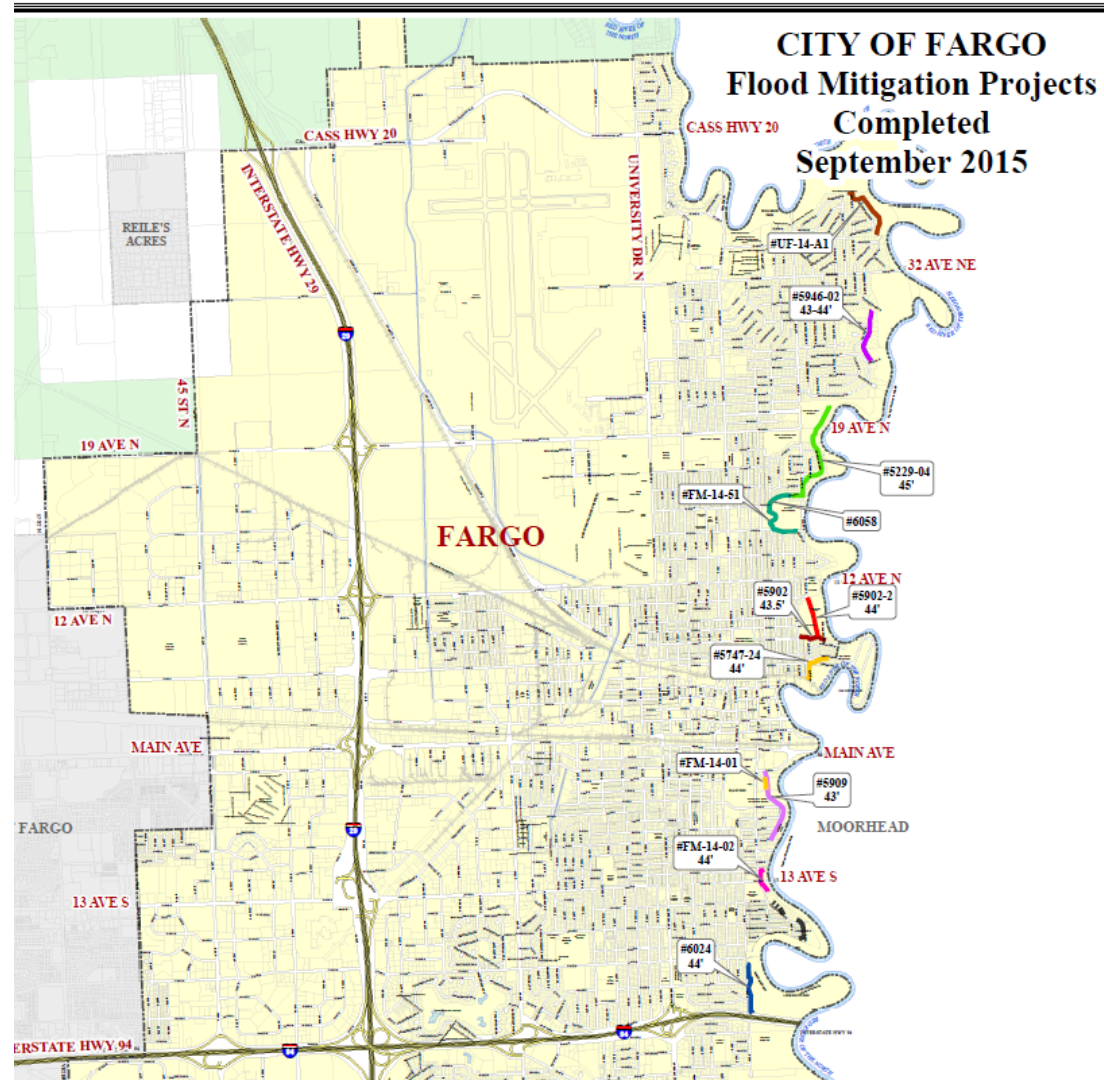
Property Acquisitions (Since 2009)

- 183 Properties Purchased
 - Over 320 since 1990
- At cost of over \$60 million
- Cass County purchased 14 additional homes needed
- Diversion Authority is in process of acquiring 17 additional properties within Fargo
- Remaining Properties Under Comprehensive Plan
 - 121 properties to be acquired
 - Approximately \$36 million



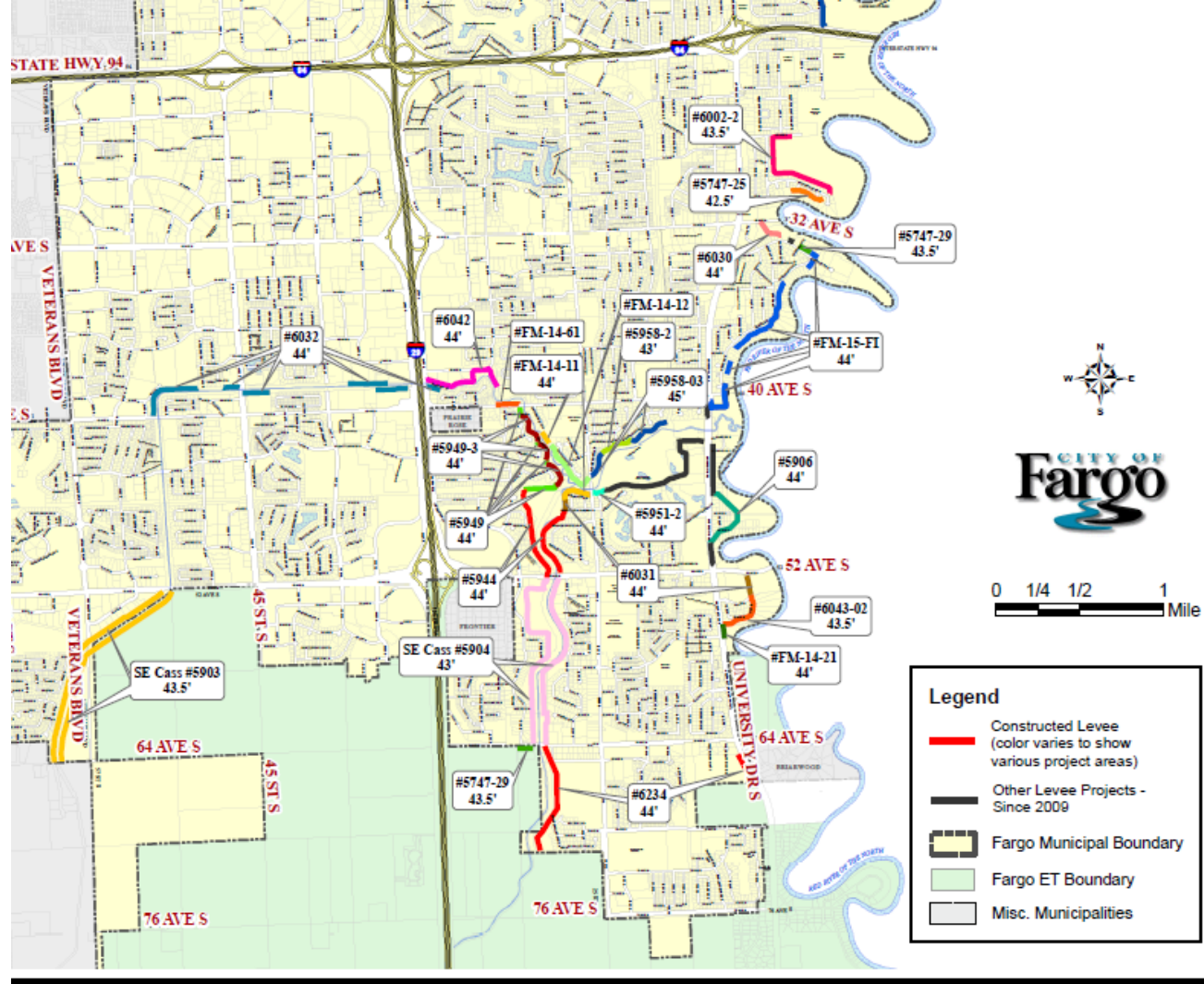
Completed Flood Projects North

- Since 2009 over 19 miles of levees constructed
- Approximate Costs
 - Construction - \$125 million
 - Sand Bags Reduced by approx. 4.5 million
 - 50% of Comprehensive Plan Completed



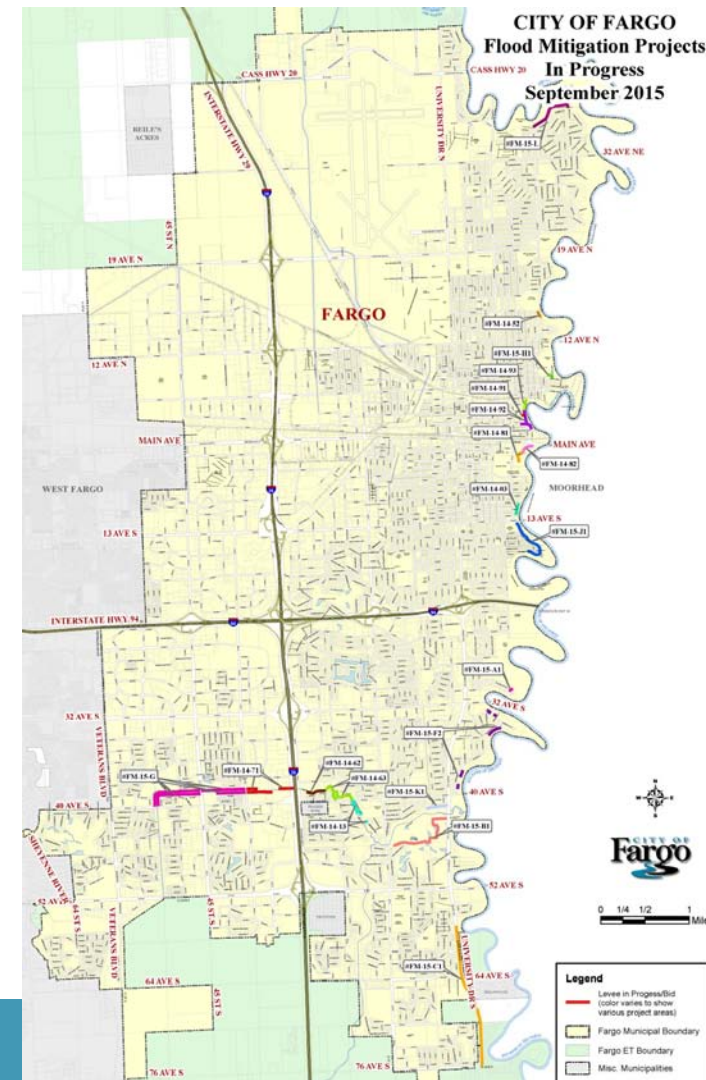
Completed Flood Projects South

- Since 2009 over 19 miles of levees constructed
- Approximate Costs
 - Construction - \$125 million
 - Sand Bags Reduced by approx. 4.5 million
 - 50% of Comprehensive Plan Completed



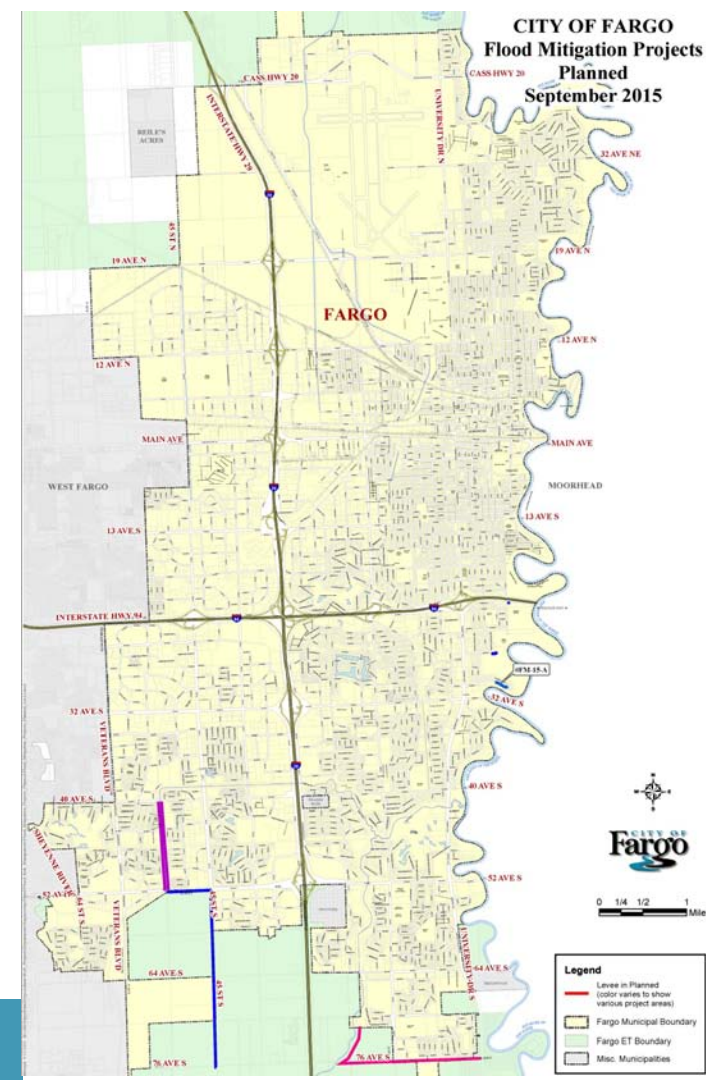
In Progress Projects

- Combination of projects under construction or under design for 2016/2017 construction
 - 12 City of Fargo Led
 - 7 Diversion Authority Led
- Over 3.5 miles in progress
- City Project Cost ≈ \$68.5 million
 - Construction Cost ≈ \$37million
- 65% of the Comprehensive Plan completed once these projects are done



Remaining Projects

- Approx. 10 miles remaining
 - *excludes Cass County 20 Area
- Project Cost ≈ \$130 million
 - # Does not include south side line of protection
 - # Does not include 2016 planned projects
 - # Does not include Diversion Authority More Flow Through Town Projects
- Type of Projects:
 - Levees along River & Legal Drains
 - Road Raises
 - Includes Interstate 29 at Drain 27
- 92% of the Comprehensive Plan would be completed



Land Acquisition Overview

- Voluntary Buyouts
- Negotiations

Project Location – Belmont Park Area Flood Mitigation



Project features

- Provide flood protection from FM-14-02 (near WTP) south to Lindenwood Drive/3rd Street South intersection
- Relocation of Lift Station 13 (Phase I)
 - Roger Maris Dr/Lindenwood Dr S
- Earthen Levee/Floodwall - 2,800 feet (Phase II & III)
- Utility relocations
 - Public - Water, storm sewer, sanitary sewer
 - Private - Electric, cable, telephone, gas, etc.
- Storm sewer improvements and gatewell
- Provide protection to 100-year flood elevation (903')



Geotechnical Stability

- Why is it important?
- Earth loads from levee and/or floodwall impact stability of adjacent land
- Corps and certification requirement
- Minimum requirements for design and engineering practices must be met
 - Freeboard
 - Embankment protection and foundation stability
 - Settlement
 - Interior drainage
- Public safety

Geotechnical Stability

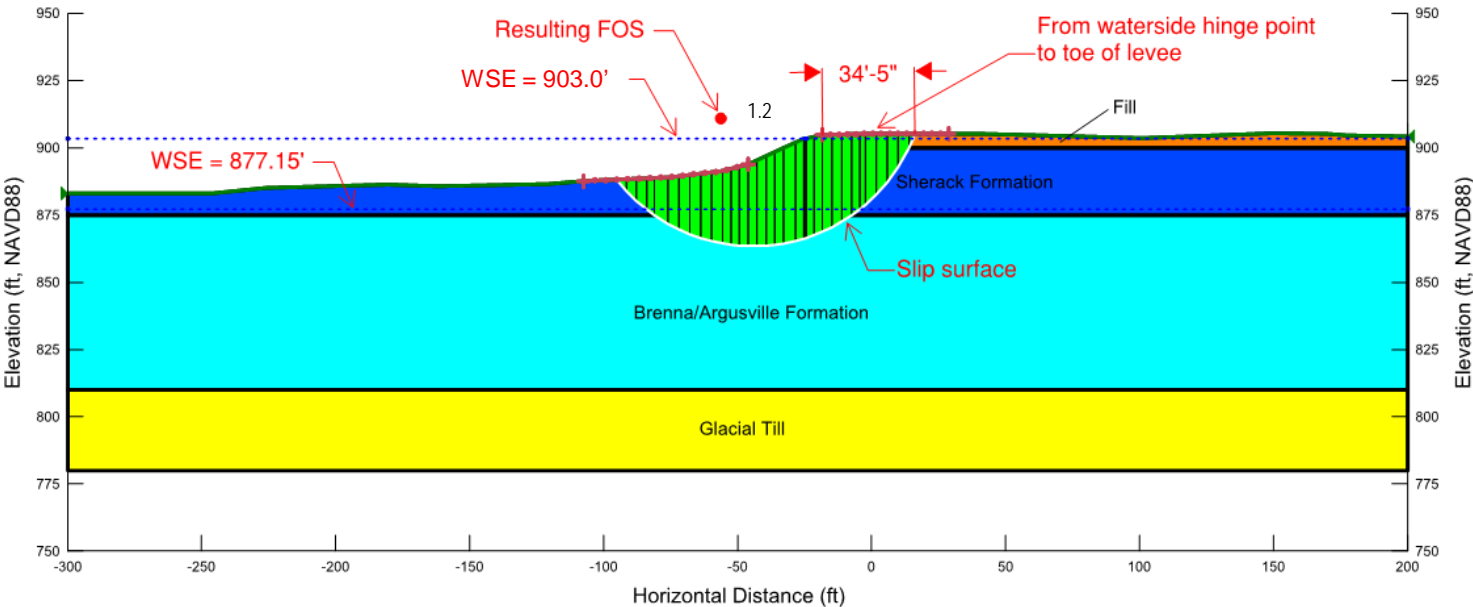


Comprehensive Plan Setback

- Based on limited borings and general assumptions
- Every project must evaluate geotechnical stability
- Project Setback
 - Rapid drawdown along steep slopes controls


Geotechnical Stability

Belmont Levee Rapid Drawdown stability model results



Geotechnical – Rebuild Temporary Levee





LOG OF BORING

Braun Project B1508063

Drilling and Laboratory Testing

City of Fargo Project No. FM-15-J0

South of River Road and 13th Avenue South

Fargo, North Dakota

BORING:

ST-12

LOCATION: See sketch.

DRILLER: K. Miller

METHOD: 3 1/4" HSA, Autohammer

DATE: 12/29/15

SCALE: 1" = 4'

Depth feet	Symbol	Description of Materials (Soil-ASTM D2486 or D2487, Rock-USACE EM1110-1-2008)	BPF	WL %	sp tsf	Tests or Notes
0.0	FILL	FILL: Fat Clay with Sand, trace Gravel and roots, black, moist. -brown at 5 feet.	14	19		
			11	19		OC=3%
			7	28		
			9	24		
			TW*	29		*16 inch recovery. WD=122 pcf, DD=96 pcf LL=70, PL=21, PI=49
11.5	FILL	FILL: Sandy Lean Clay, trace Gravel, black and brown, moist.	13	11		
14.0	CH	FAT CLAY, black, moist. (Buried Topsoil)	13	36		OC=6%
16.5	CH	FAT CLAY, with Silt seams, gray, moist, rather stiff. (Glacial Lake Deposit)	11	30	3	
21.0		END OF BORING. Water not observed with 19 1/2 feet of hollow stem auger in the ground. Water not observed to cave-in depth of 17 feet immediately after withdrawal of auger. Boring then backfilled with bentonite grout.	11	27	3 1/2	

B1508063

Braun Intertec Corporation

B1-12 page 1

- Buried topsoil
- High organic material (>3%)
- No inspection trench

Alignment Options



Alignment Options



Alignment Options



Alignment Options



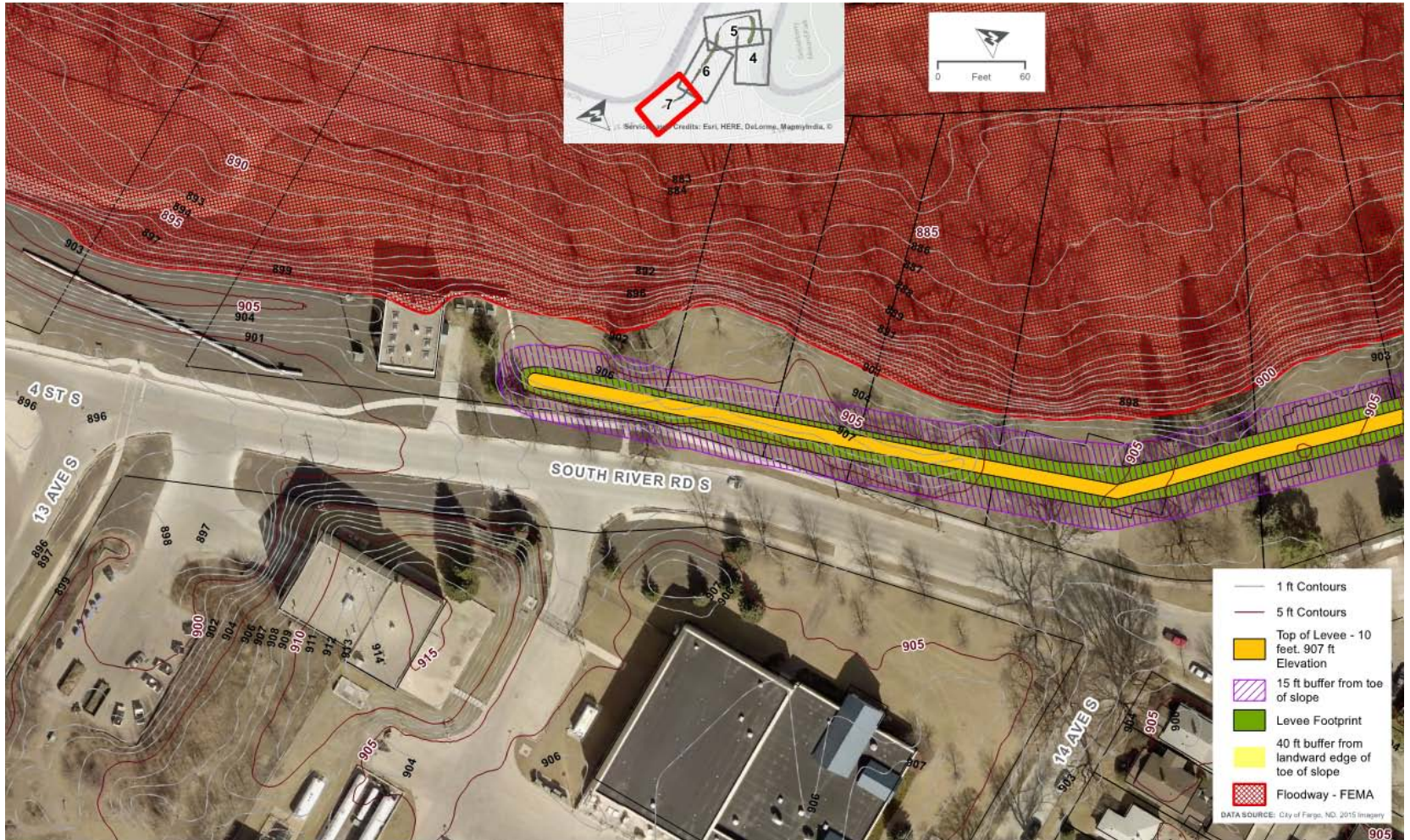
Alignment Options



Alignment Options



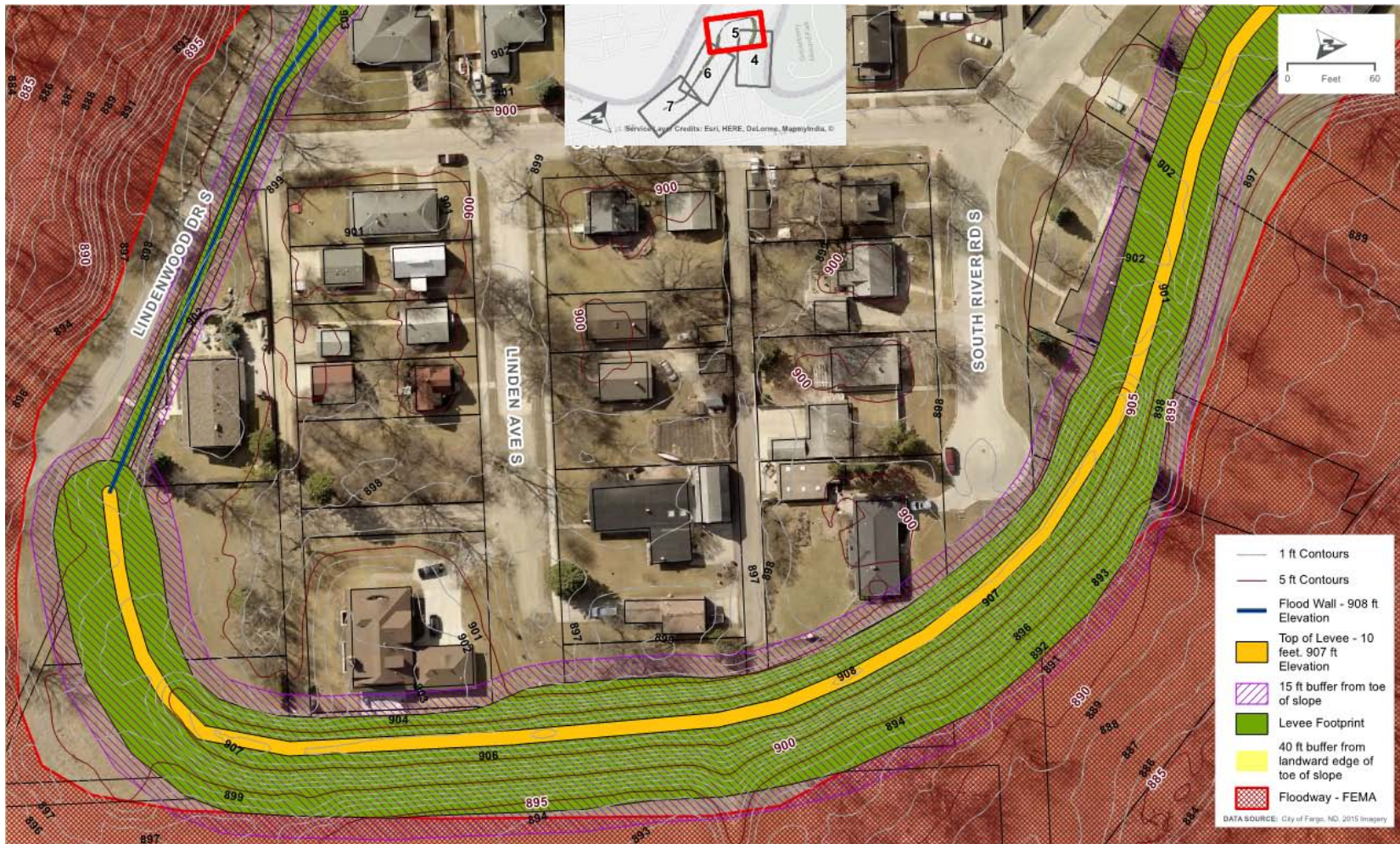
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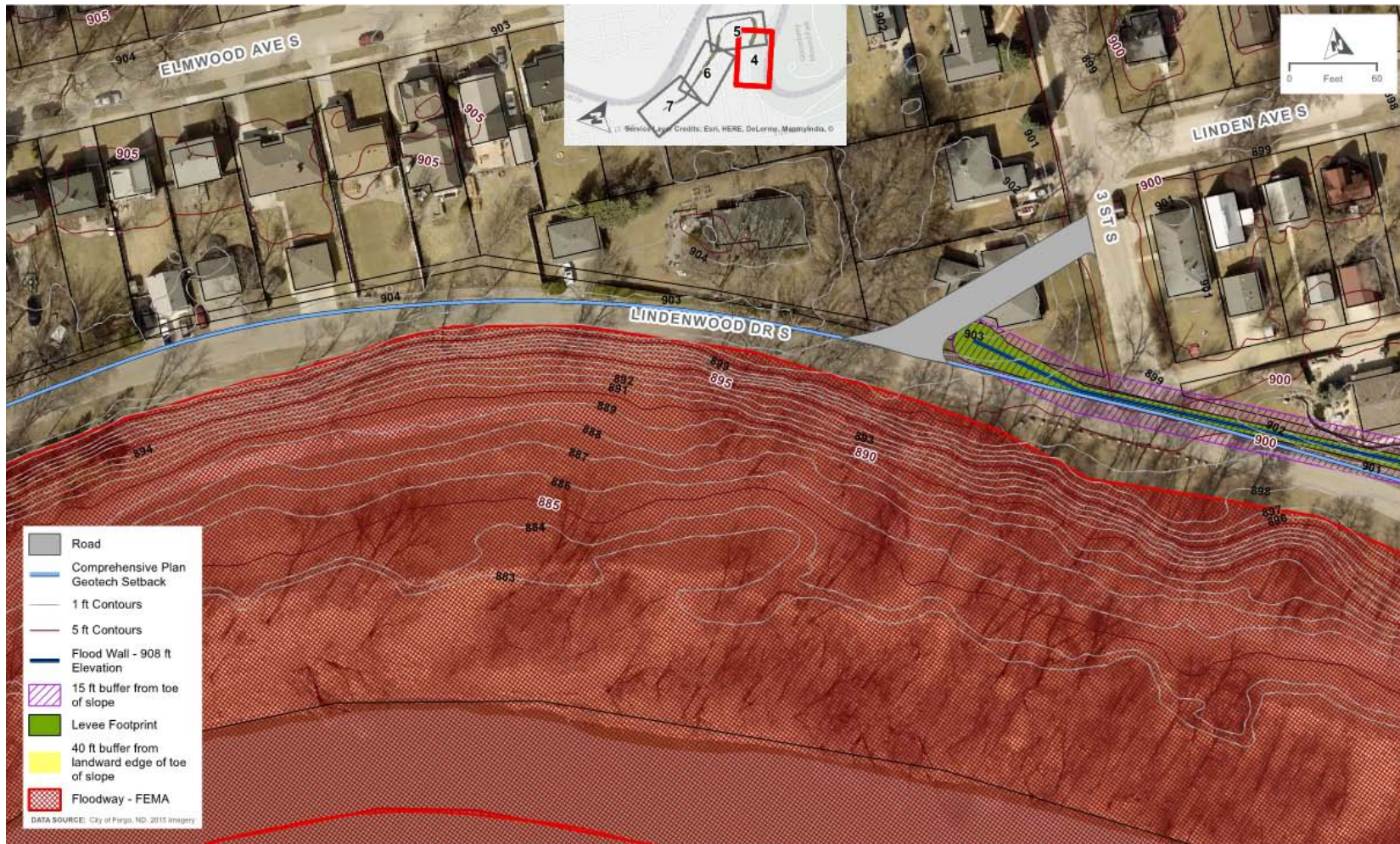
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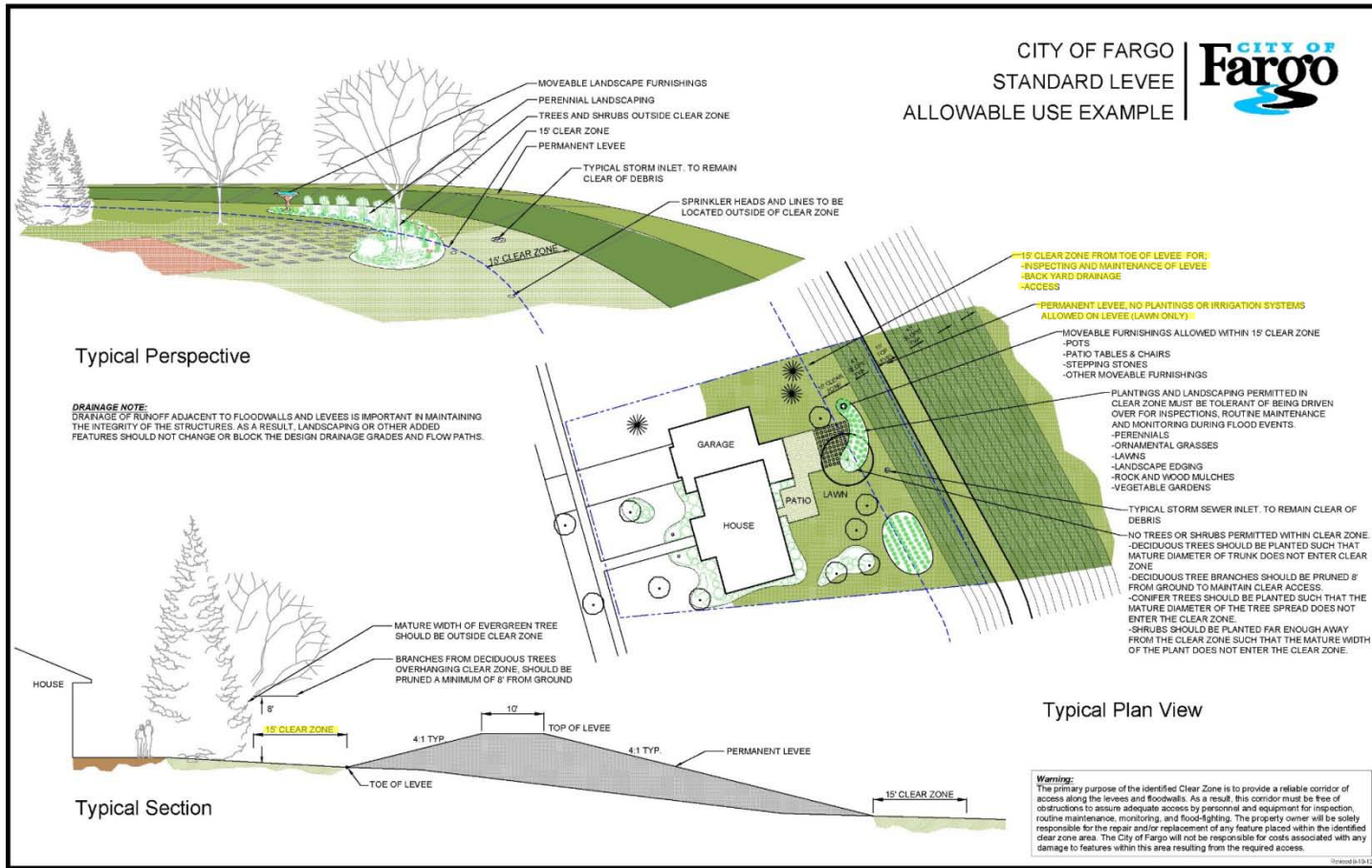
Alignment Options



Alignment Options



Easement Boundaries



Estimated Project Cost

- Estimated project cost*:
 - Levee only - \$2.9M
 - Levee and floodwall - \$3.4M

*Land acquisition not included

Frequently Asked Questions

- Why build levee if Diversion Project is constructed?
 - Levee will provide real/interim flood protection
 - Levee will be compatible with the Diversion Project by providing protection on the greater than 100 year flood events
 - Levee + Diversion = Increased level of flood protection

- Will I be assessed for this levee project?
 - No – levee is being designed and constructed with Fargo Infrastructure Sales Tax Dollars, as well as dollars from the State

Next Steps

- May 12, 2016 – 1st Public Meeting
- Construct Phase I (Lift Station #13) – 2016
- Design/Construct Phase II – 2016/2017
- Construct Phase III - 2018

Questions

Alignment Options

