APPENDIX G

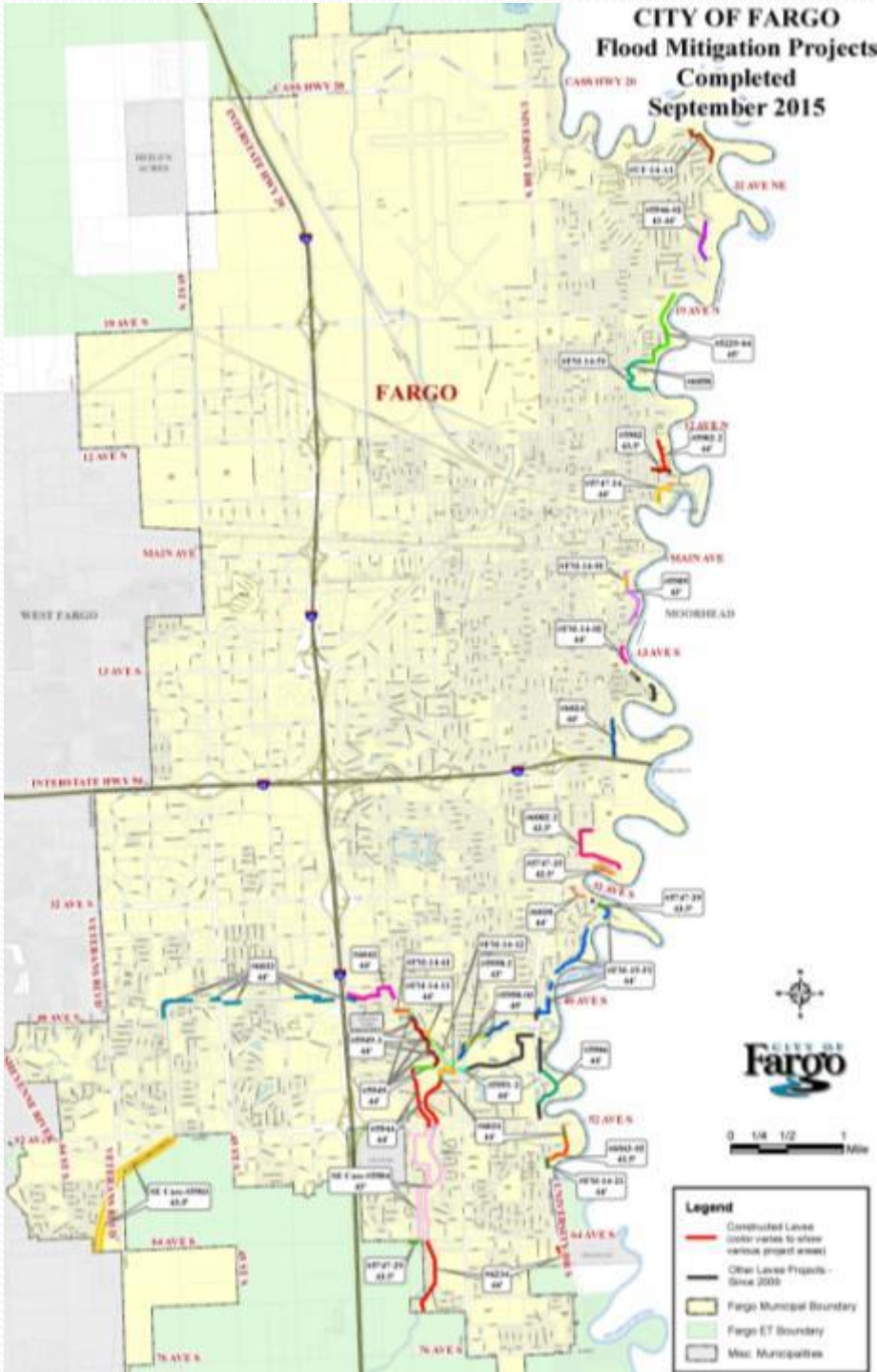
NDSWC

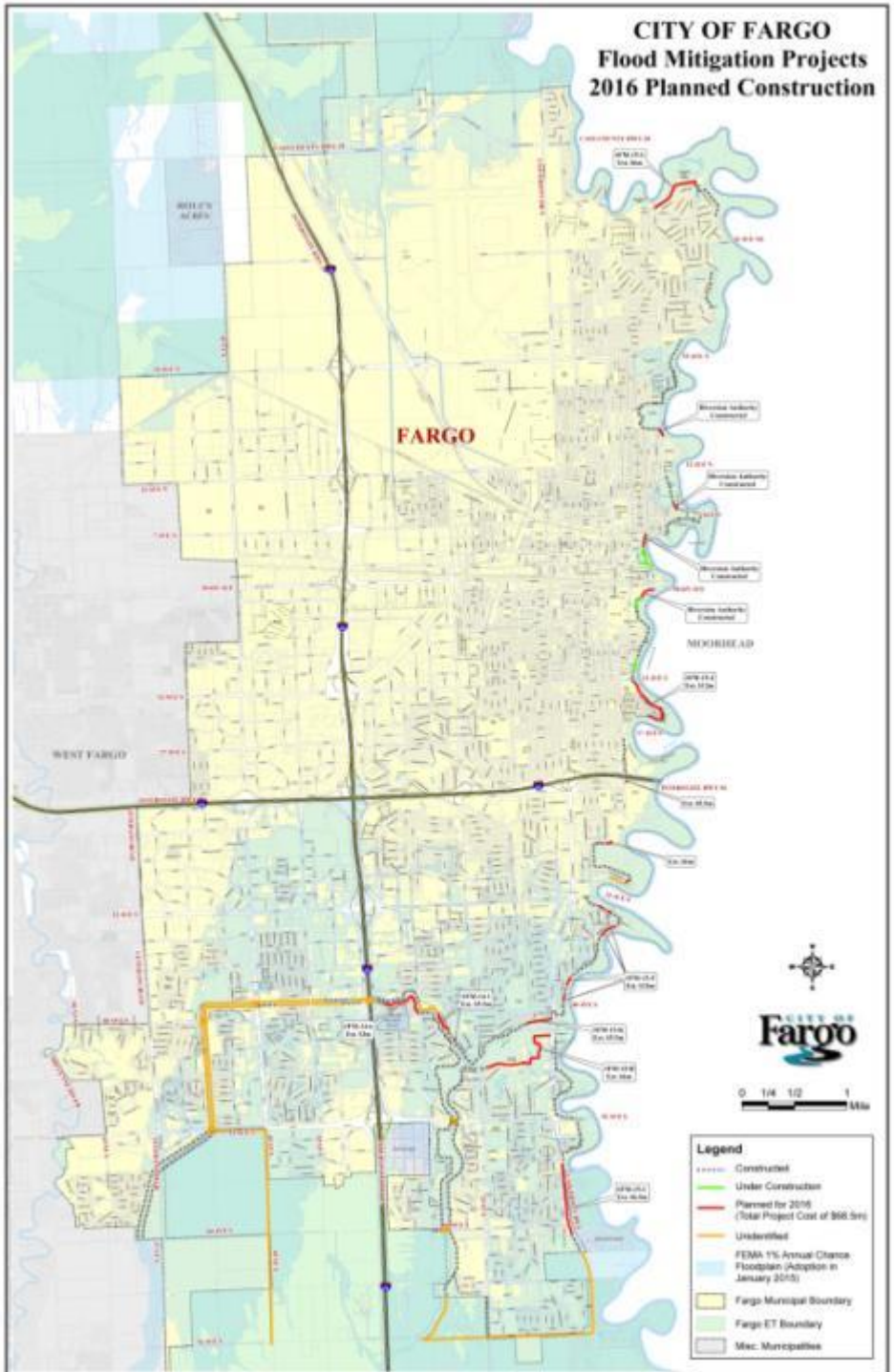
City of Fargo Update

November 4, 2015

Completed Projects (Since 2009)

- Close to 19 miles constructed
  - *47 miles of emergency levees constructed by the City in 2009
- Project Cost ≈ $125 million
- Reduces required sandbags by approximately 4.5 million
- 50% of the Comprehensive Plan Completed





Planned for 2016

- Close to 3.5 miles
- Project Cost ≈ $68.5 million

CITY OF Fargo

Location - Meadow Creek

- Previous protection was emergency sandbag levee constructed behind the homes

Location – Meadow Creek

- Project Features – Earth Levee
  - Required shift to Legal Drain 53 channel
  - Clay for levee construction generated on site
  - Reduces sandbag needs by approximately 250k

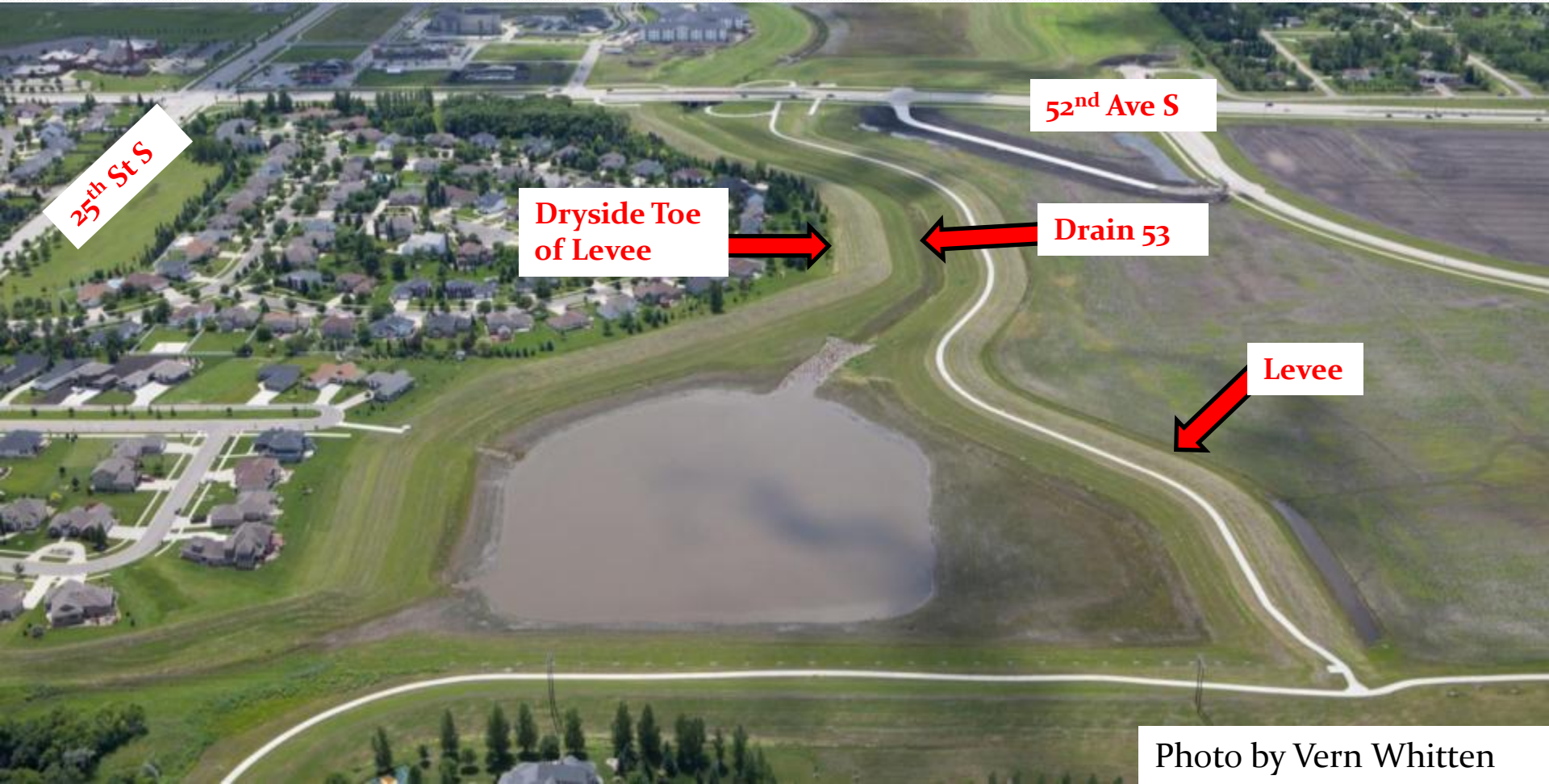


Photo by Vern Whitten

Location - Timberline

- Previous protection was emergency sandbag levee constructed behind the homes

Location - Timberline

- Project Features – Earth Levee & Floodwall
- Reduces sandbag needs by approximately 800k

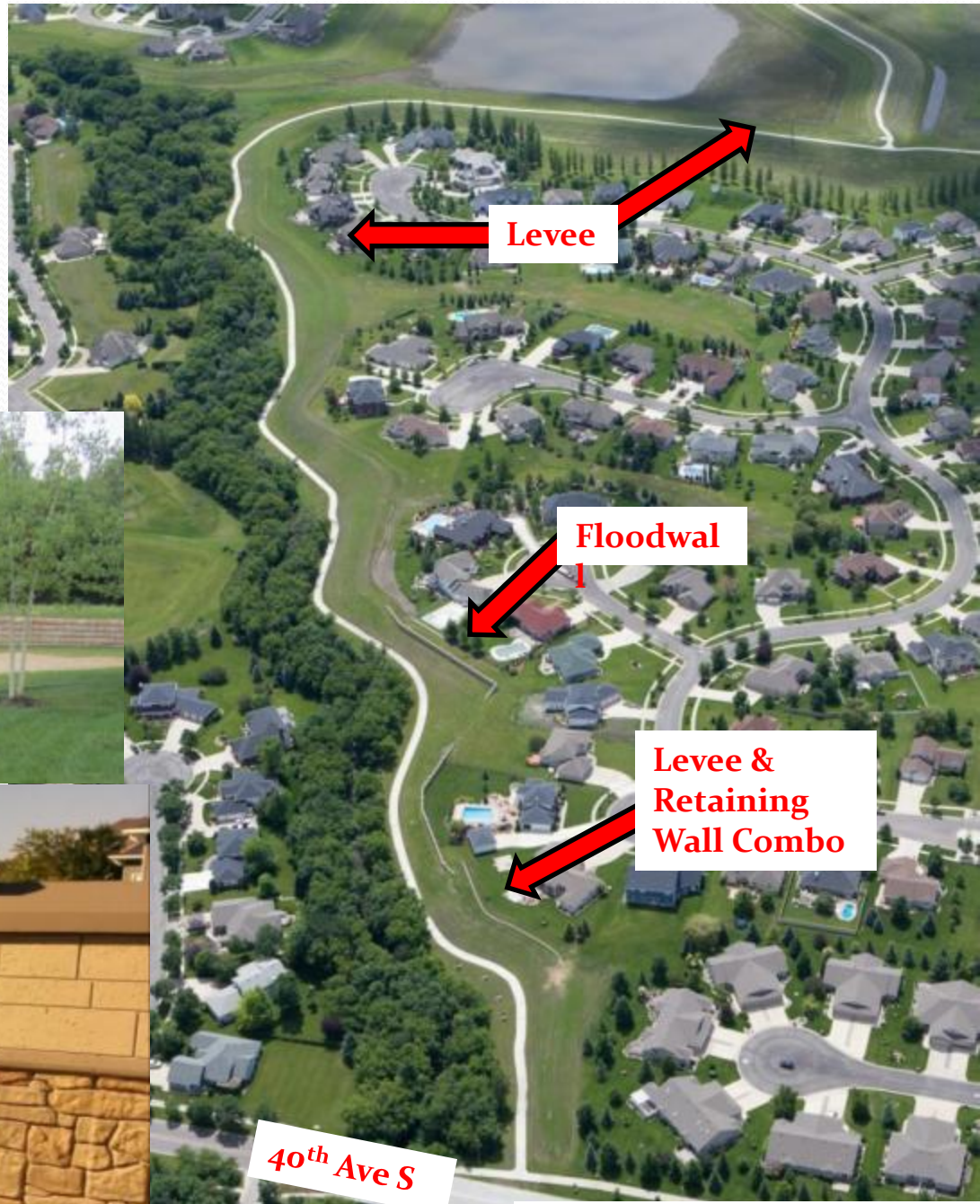


Photo by Vern Whitten

Location – Harwood, Hackberry & River Dr

- Previous protection was emergency sandbag levee constructed behind the homes

Location – Harwood, Hackberry & River Dr

- Project Features – Earth Levee & Storm Sewer Lift Station
  - 59 Property Acquisitions
  - Will eliminate need of 1.3 million sandbags once completed

Location – Harwood, Hackberry & River Dr

Photos by Vern Whitten Oct 2015

CITY OF Fargo

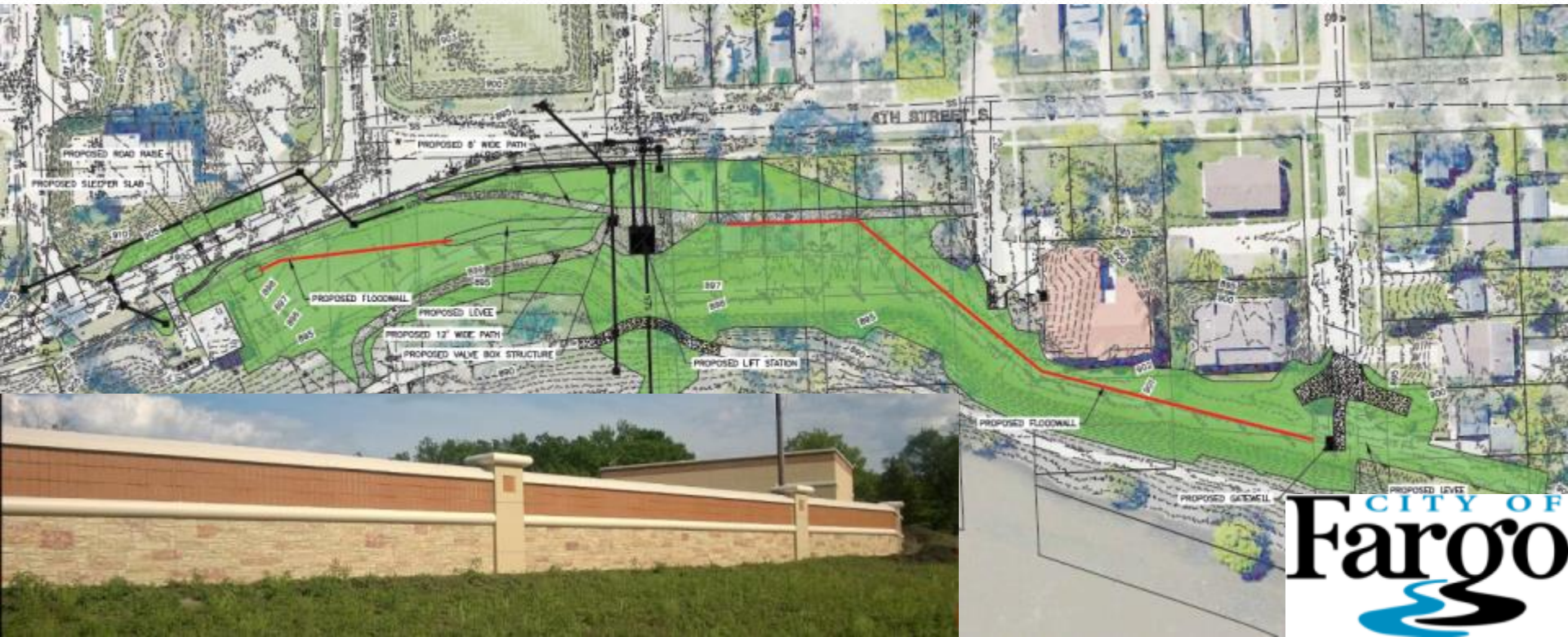
Location – Harwood Drive

- Areas of Neighborhood Outside of Primary Line of Protection
  - Structures are above 100-year floodplain elevation
- Assistance is still available to properties to construct levee on their own under the Flood Protection Incentive Program.
  - City will cost share up to 60% depending on protection level of levee.
  - City share capped at up to $12,000
  - Elevation easement must be granted to City to ensure levee stays in place.
  - Property owner owns and maintains levee.

CITY OF Fargo

Location – 4th Street Levee

- Reconstruction of a previously FEMA accredited earth levee
  - Levee was identified by FEMA as a Provisionally Accredited Levee System during remapping of floodplain.
  - During review it was determined that existing levee was showing movement towards river.
- Project to address deficiencies required 7 property acquisitions and permanent easements
  - Earth levee removed, floodwall reconstructed farther away from river



CITY OF Fargo

Location – 4th Street Levee

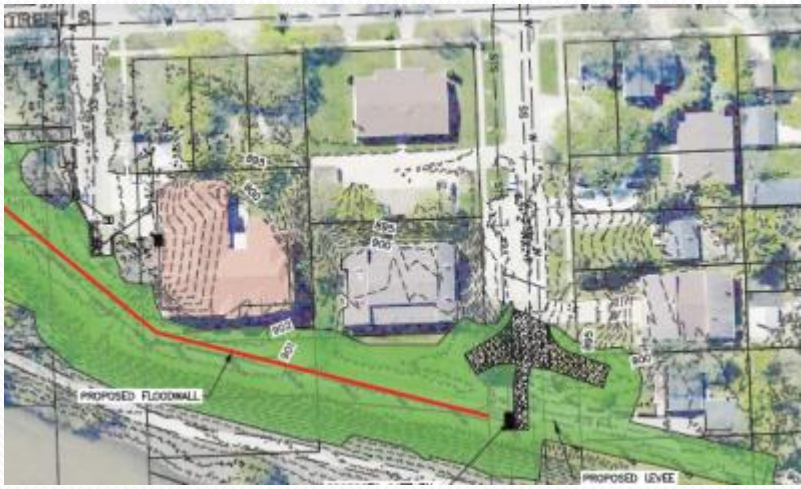


Photo by Vern Whitten Oct 2015

Location - Mickelson Field

- Previous protection was emergency levee constructed on Oak Street.
- Protection height of 44’ required approx. 7,500 CY of clay

Location - Mickelson Field

- Project Features – Earth Levee, Storm Sewer Lift Station
- Lift station funded through FEMA Hazard Mitigation Grant
  - Grant award amount was $3.2 million

Photo by Vern Whitten Oct 2015

Rose Creek

- 2009 Flood Fight

Rose Creek

- Completed Fall 2014
  - Combination of Earth Levee and Floodwall
- Reduces sandbag needs by approximately 400k

North Oaks

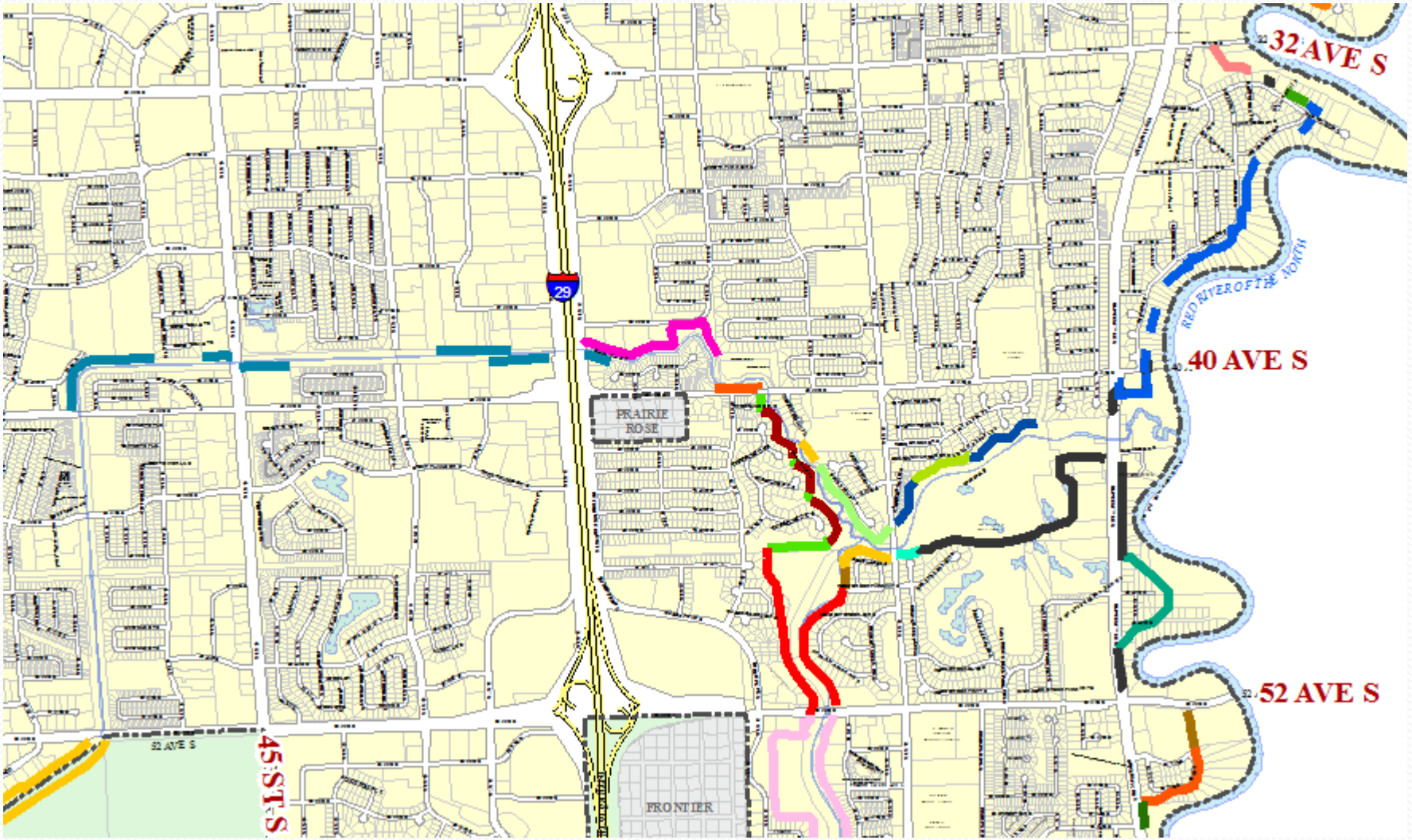
- Project Cost - $2.5 million
- Completed in 2011
- Approximately 2,000-feet of levee
- Project Features
  - Standard earth levee
  - Earth levee with 3-foot modular retaining wall
  - Levees constructed in the rear yards of 14 private properties
  - Storm sewer lift station and levee constructed on Park District property

River Vili – Phase I & II

- University Drive to 52nd Avenue South
- Project Cost - $6.6 Million

Permitting

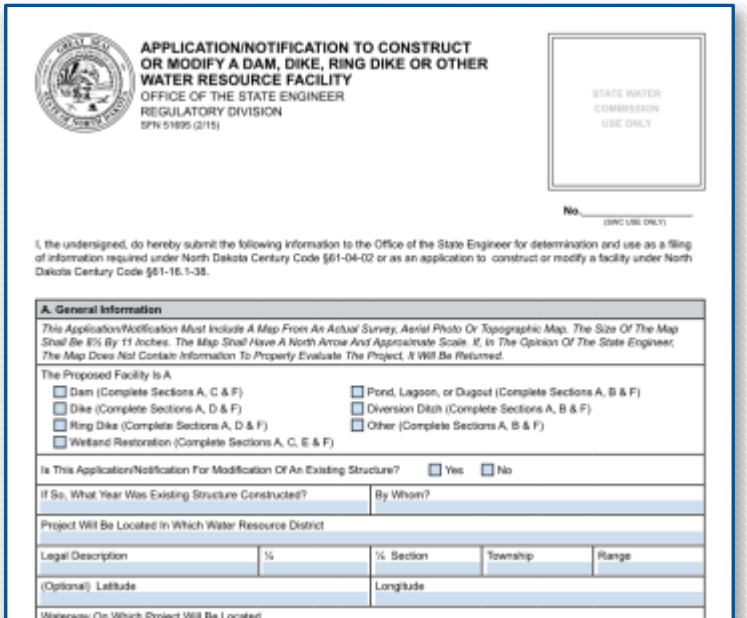
Connecting Reaches → Removes Floodplain → Induce Impacts → Required Mitigation



ND Levee Construction Permit

- A Flowage Easement is required if a Project impounds water on land not owned by applicant.

- Impacts greater than 0.1 foot requires a property right.



APPLICATION/NOTIFICATION TO CONSTRUCT OR MODIFY A DAM, DIKE, RING DIKE OR OTHER WATER RESOURCE FACILITY

OFFICE OF THE STATE ENGINEER

REGULATORY DIVISION

SFN 51695 (2/15)

STATE WATER COMMISSION USE ONLY

No.

(SWC USE ONLY)

I, the undersigned, do hereby submit the following information to the Office of the State Engineer for determination and use as a filing of information required under North Dakota Century Code §61-04-02 or as an application to construct or modify a facility under North Dakota Century Code §61-16.1-38.

A. General Information

This Application/Notification Must Include A Map From An Actual Survey, Aerial Photo Or Topographic Map. The Size Of The Map Shall Be 8½ By 11 Inches. The Map Shall Have A North Arrow And Approximate Scale. If, In The Opinion Of The State Engineer, The Map Does Not Contain Information To Properly Evaluate The Project, It Will Be Returned.

The Proposed Facility Is A

- ☐ Dam (Complete Sections A, C & F)
- ☐ Dike (Complete Sections A, D & F)
- ☐ Ring Dike (Complete Sections A, D & F)
- ☐ Wetland Restoration (Complete Sections A, C, E & F)
- ☐ Pond, Lagoon, or Dugout (Complete Sections A, B & F)
- ☐ Diversion Ditch (Complete Sections A, B & F)
- ☐ Other (Complete Sections A, B & F)

Is This Application/Notification For Modification Of An Existing Structure? ☐ Yes ☐ No

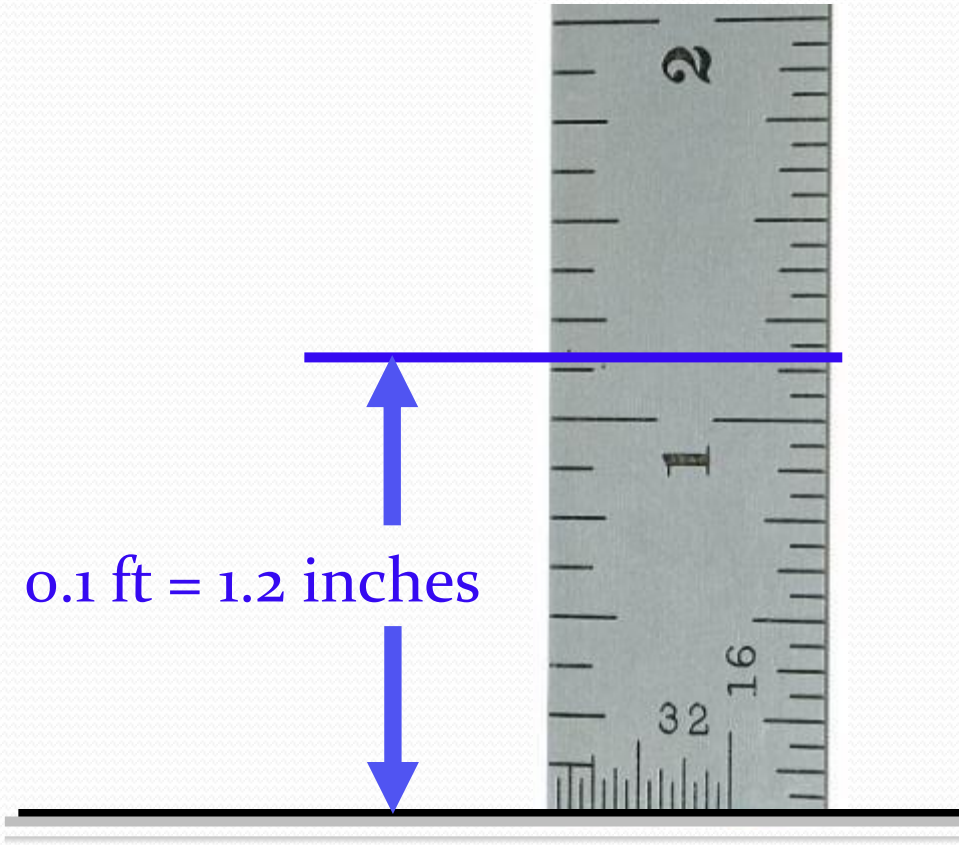
If So, What Year Was Existing Structure Constructed?	By Whom?

Project Will Be Located In Which Water Resource District

Legal Description	¼	¼ Section	Township	Range

(Optional) Latitude	Longitude

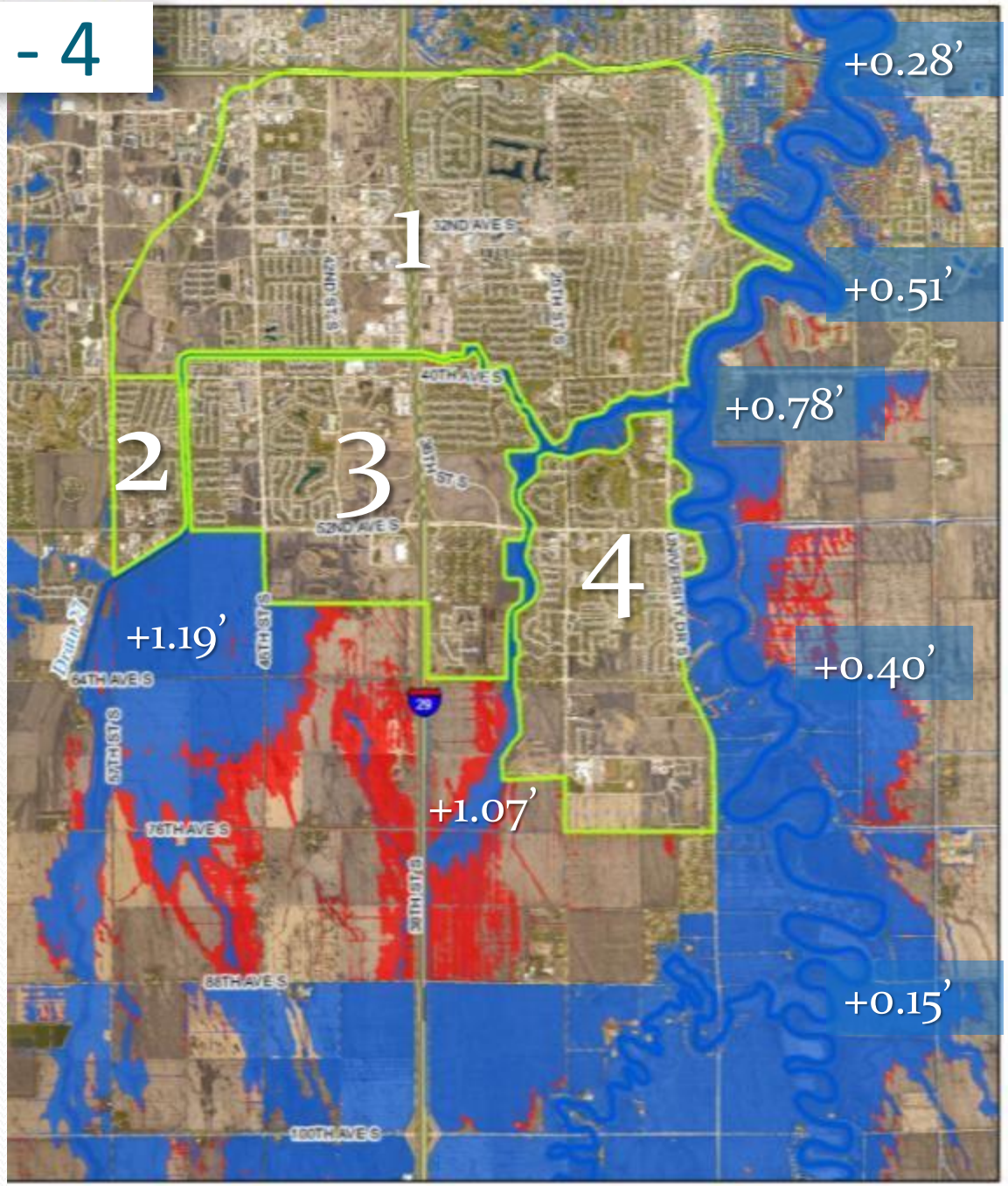
Waterway On Which Project Will Be Located



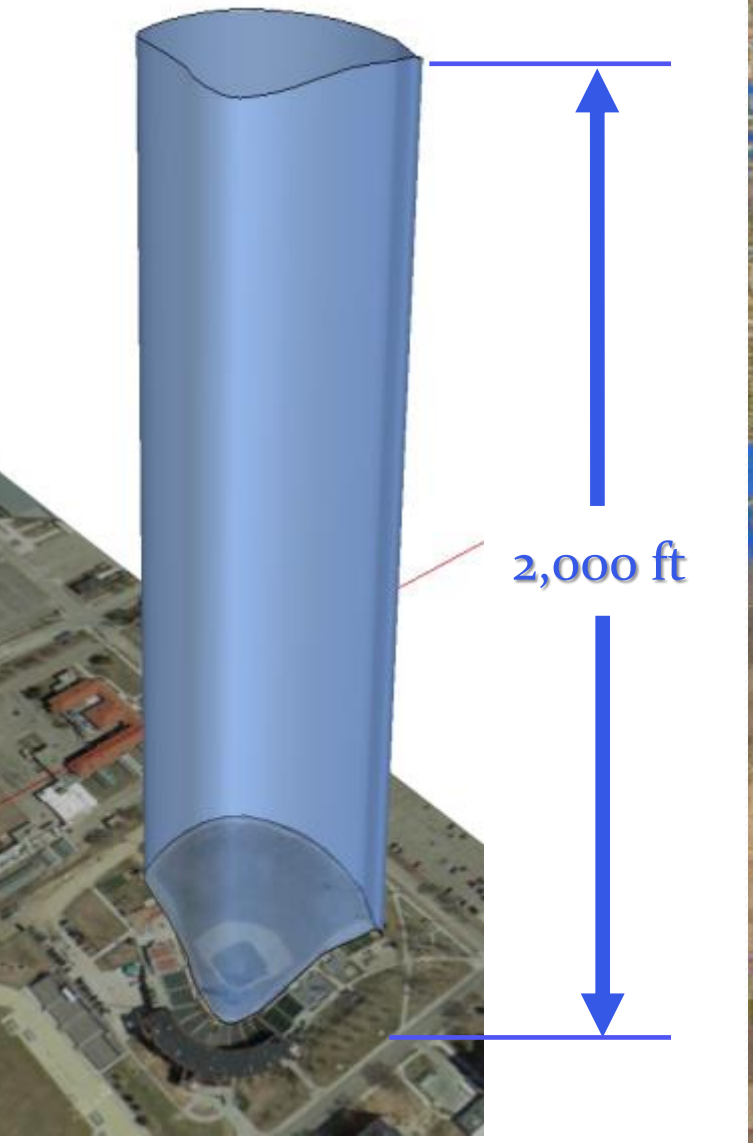
Impacts – Areas 1 - 4

Impacts from Current Flood Protection

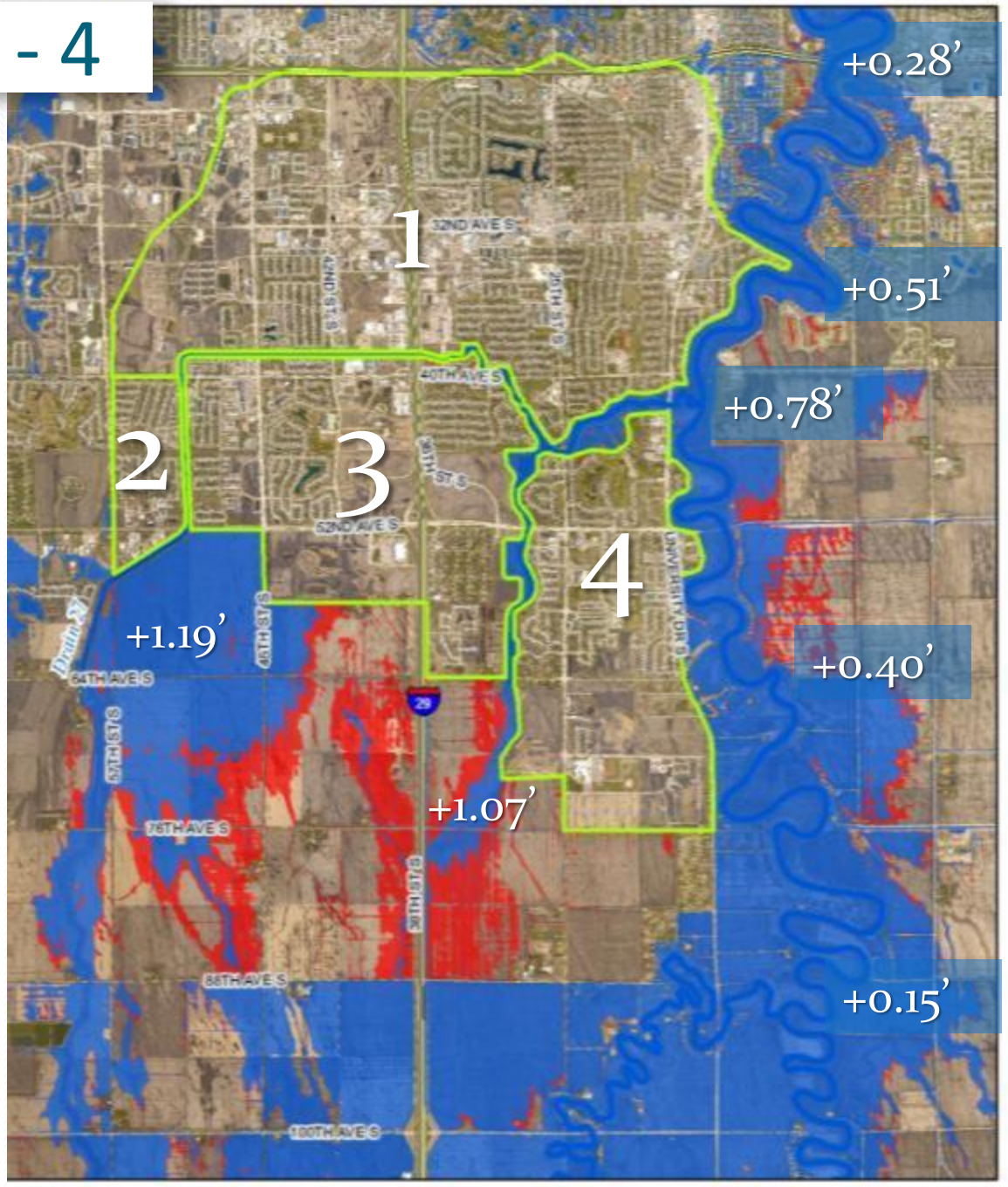
Area 1 = 3,100 ac-ft
Area 2 = 100 ac-ft
Area 3 = 1,000 ac-ft
Area 4 = 800 ac-ft
Loss of flow = 15,000 ac-ft
Total = **20,000 ac-ft**

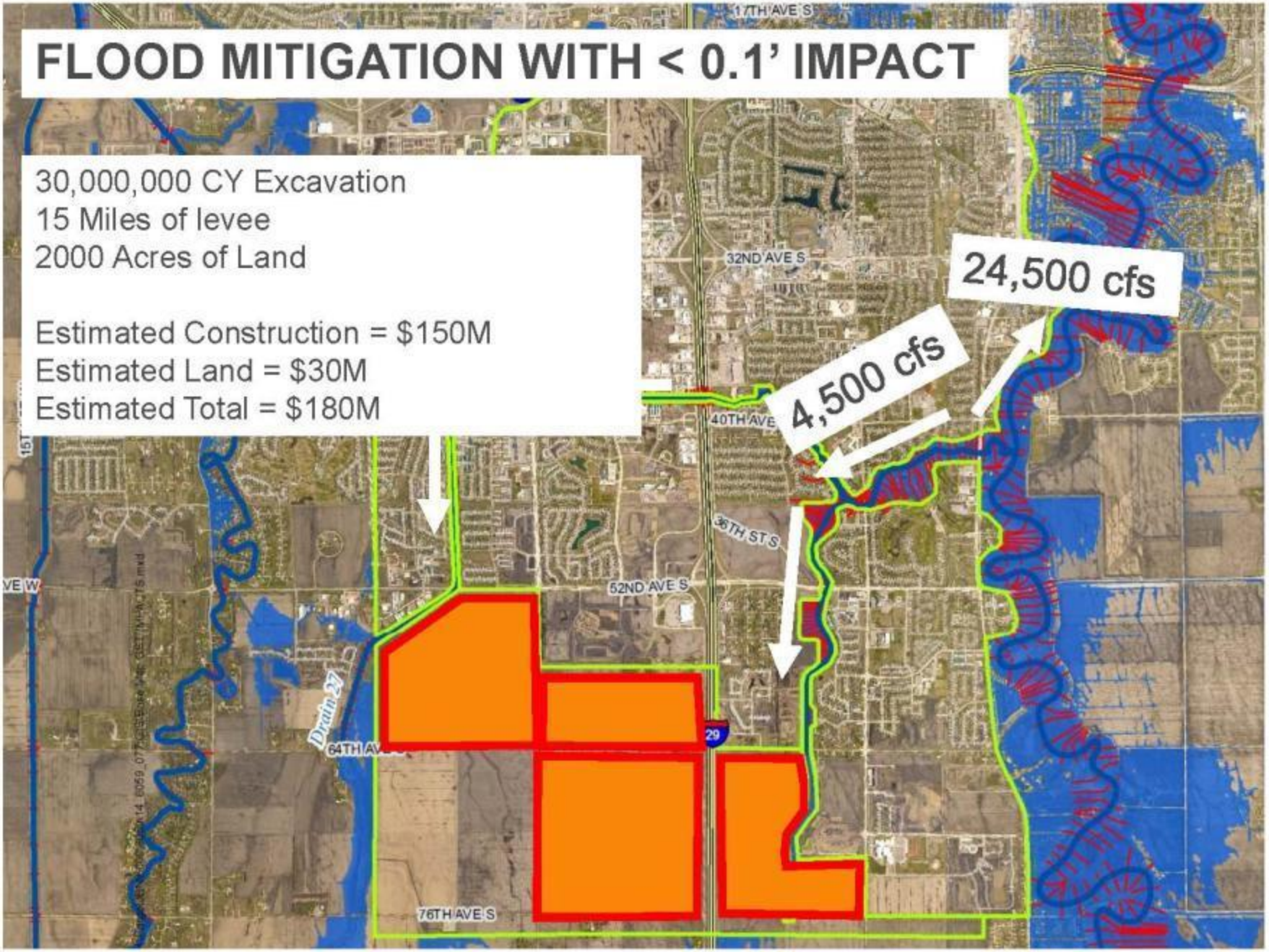


Impacts – Areas 1 - 4

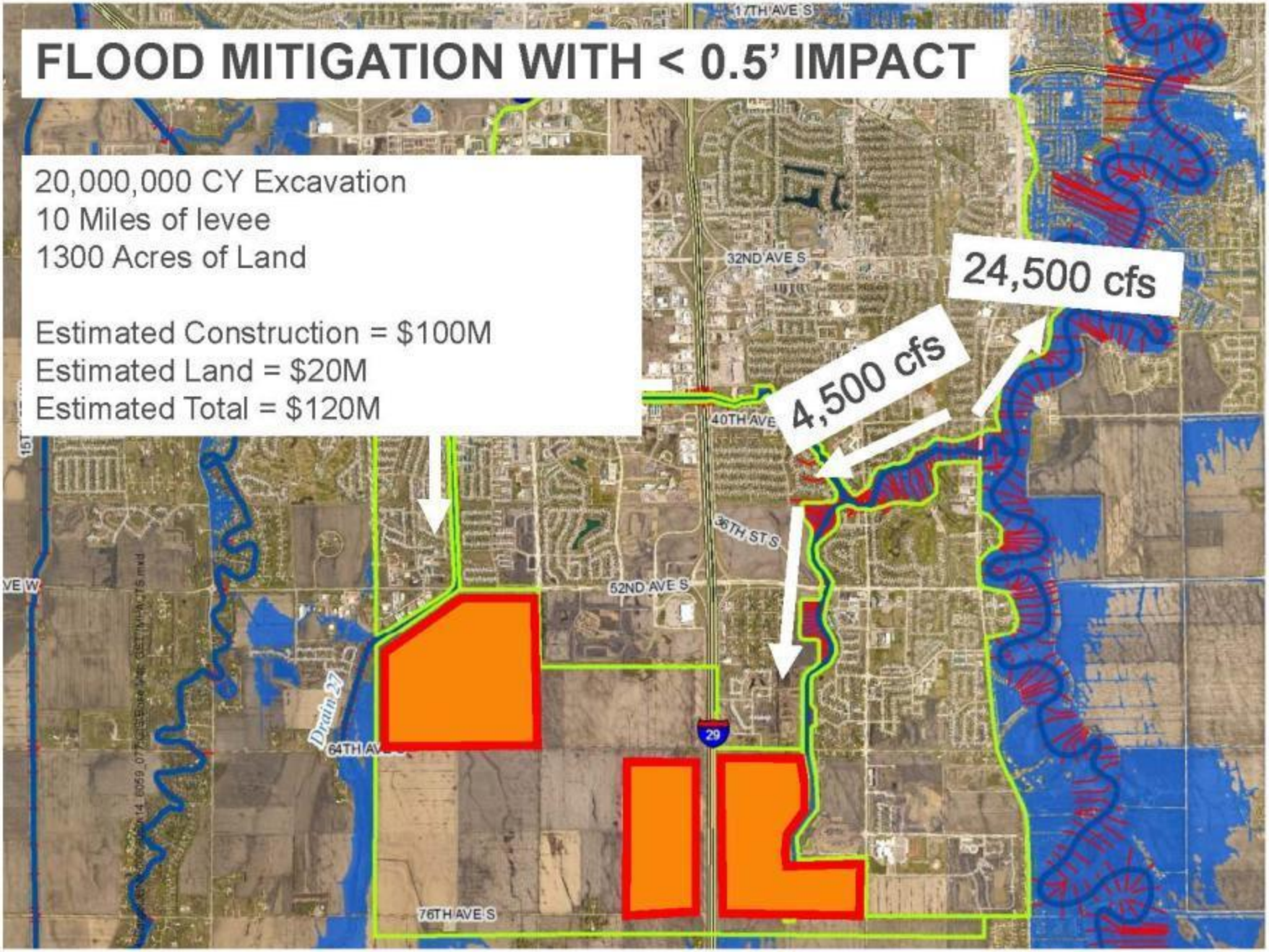


Newman Outdoor Field x 2000 ft high



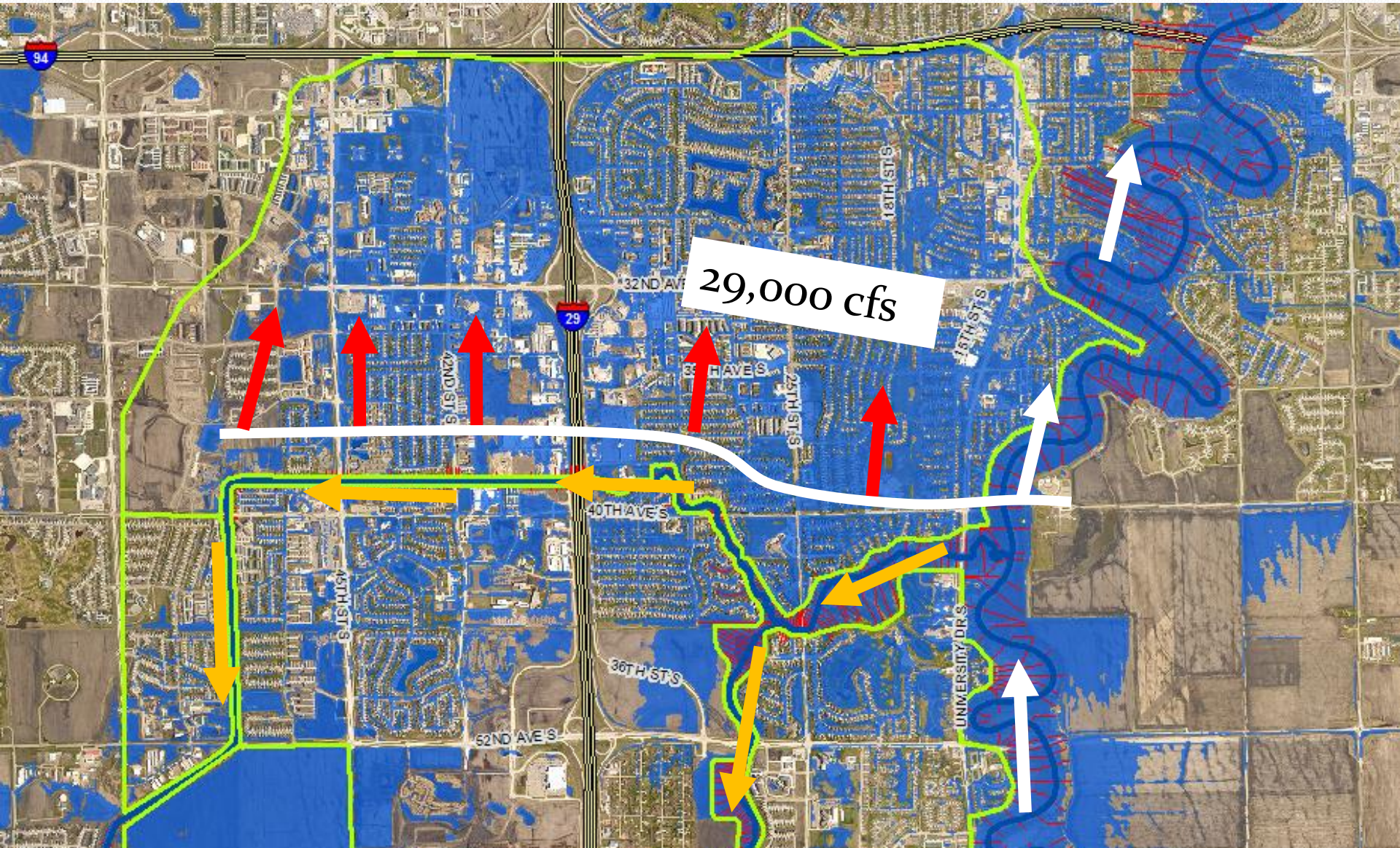

FLOOD MITIGATION WITH < 0.1' IMPACT
30,000,000 CY Excavation
15 Miles of levee
2000 Acres of Land
Estimated Construction = $150M
Estimated Land = $30M
Estimated Total = $180M
24,500 cfs
4,500 cfs
17TH AVE S
32ND AVE S
40TH AVE
36TH ST S
52ND AVE S
64TH AVE
76TH AVE S
Drain 27
29

FLOOD MITIGATION WITH < 0.5' IMPACT



Extra Slides

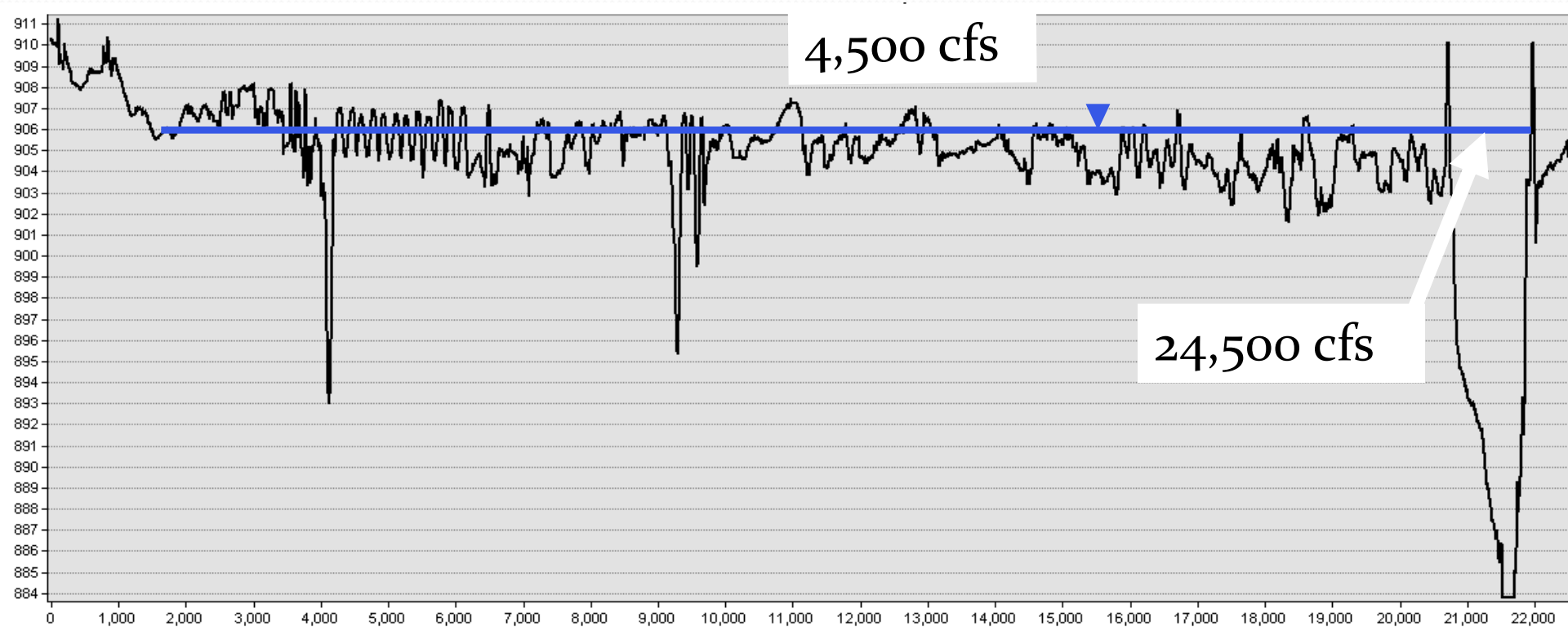
CONVEYANCE LOSS



CONVEYANCE LOSS

Flow over entire width of floodplain

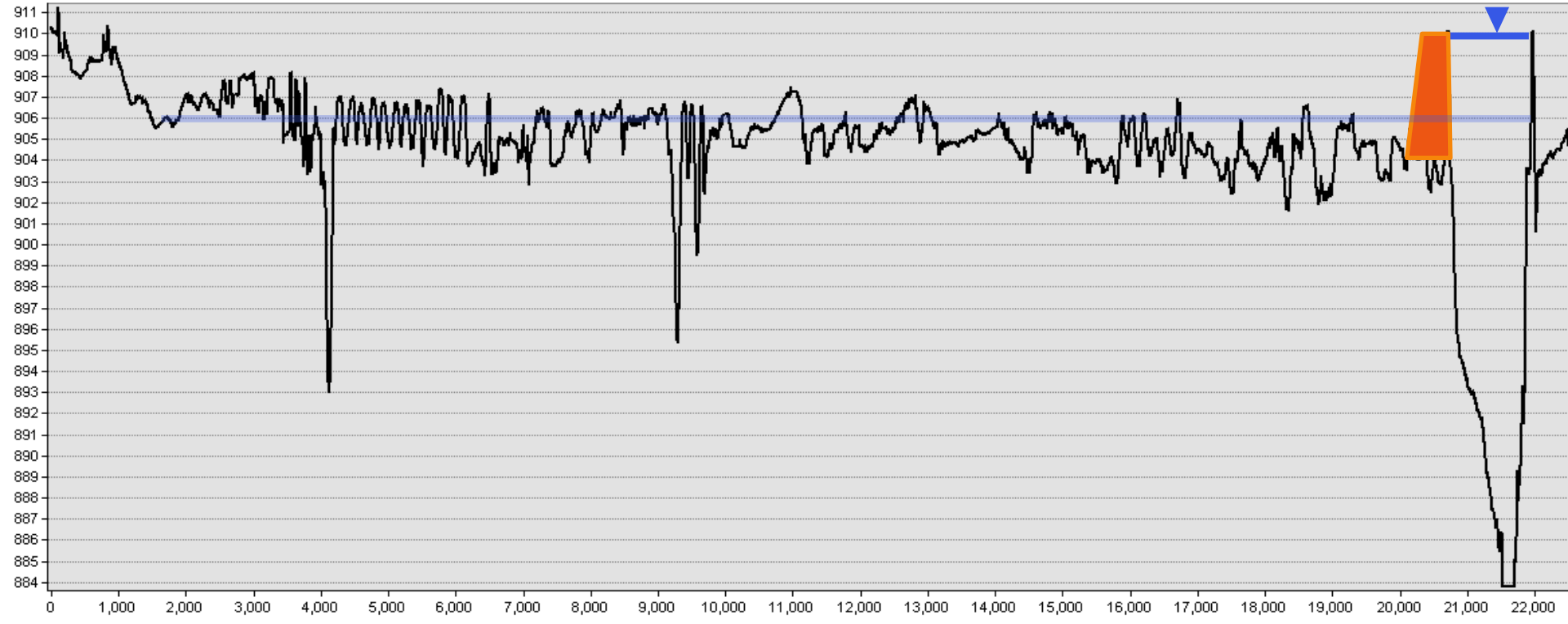
Total = 29,000 cfs



CONVEYANCE LOSS

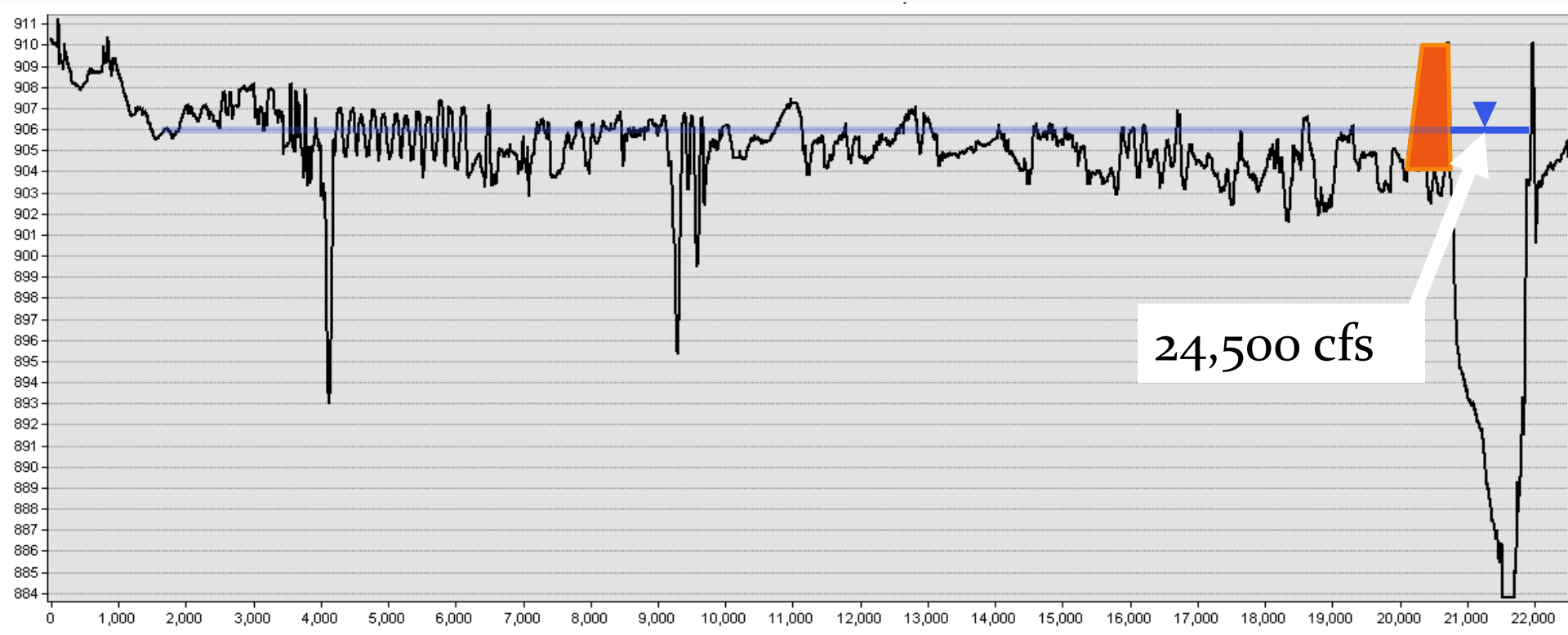
Levee Construction
Forces flow between the levees
Results in a stage increase

29,000 cfs

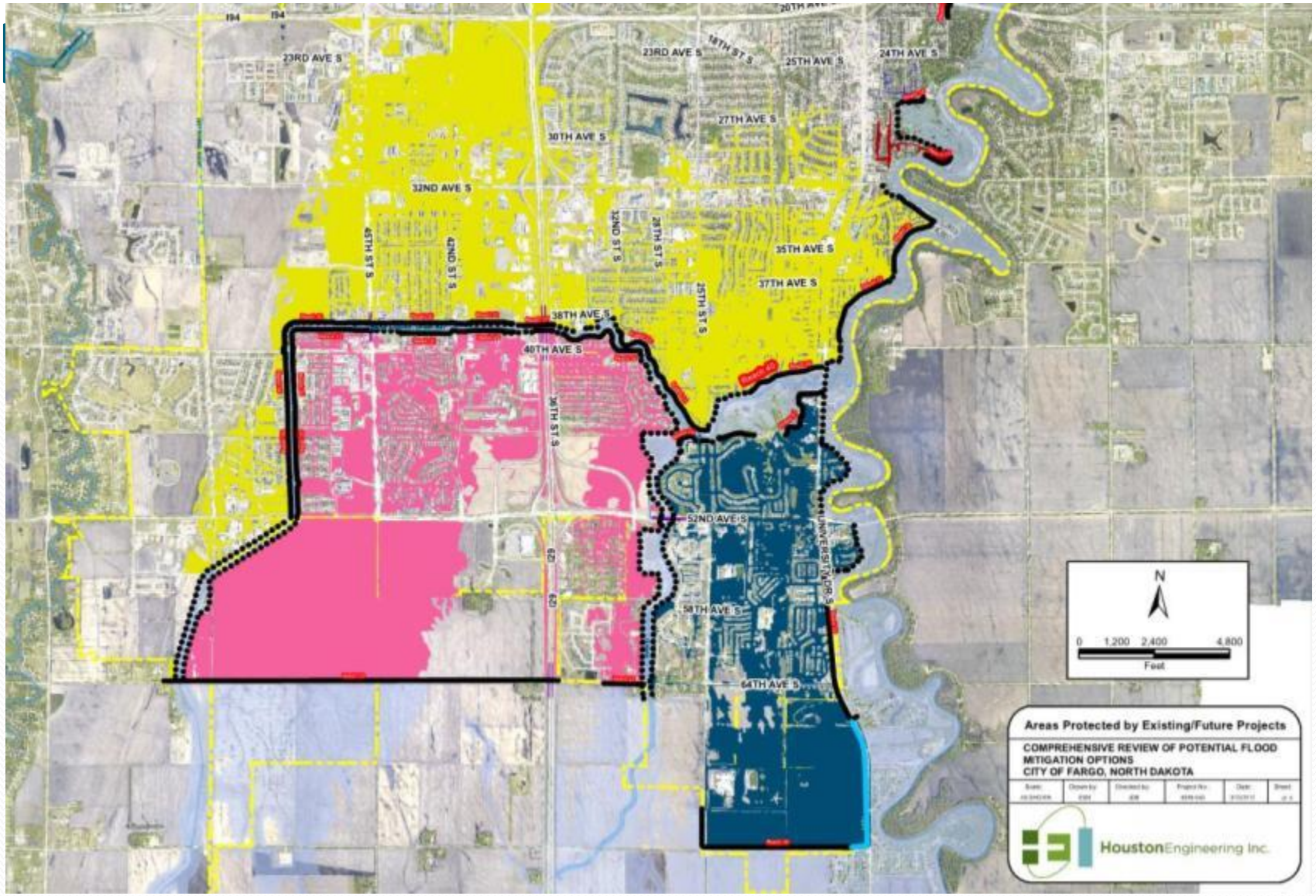


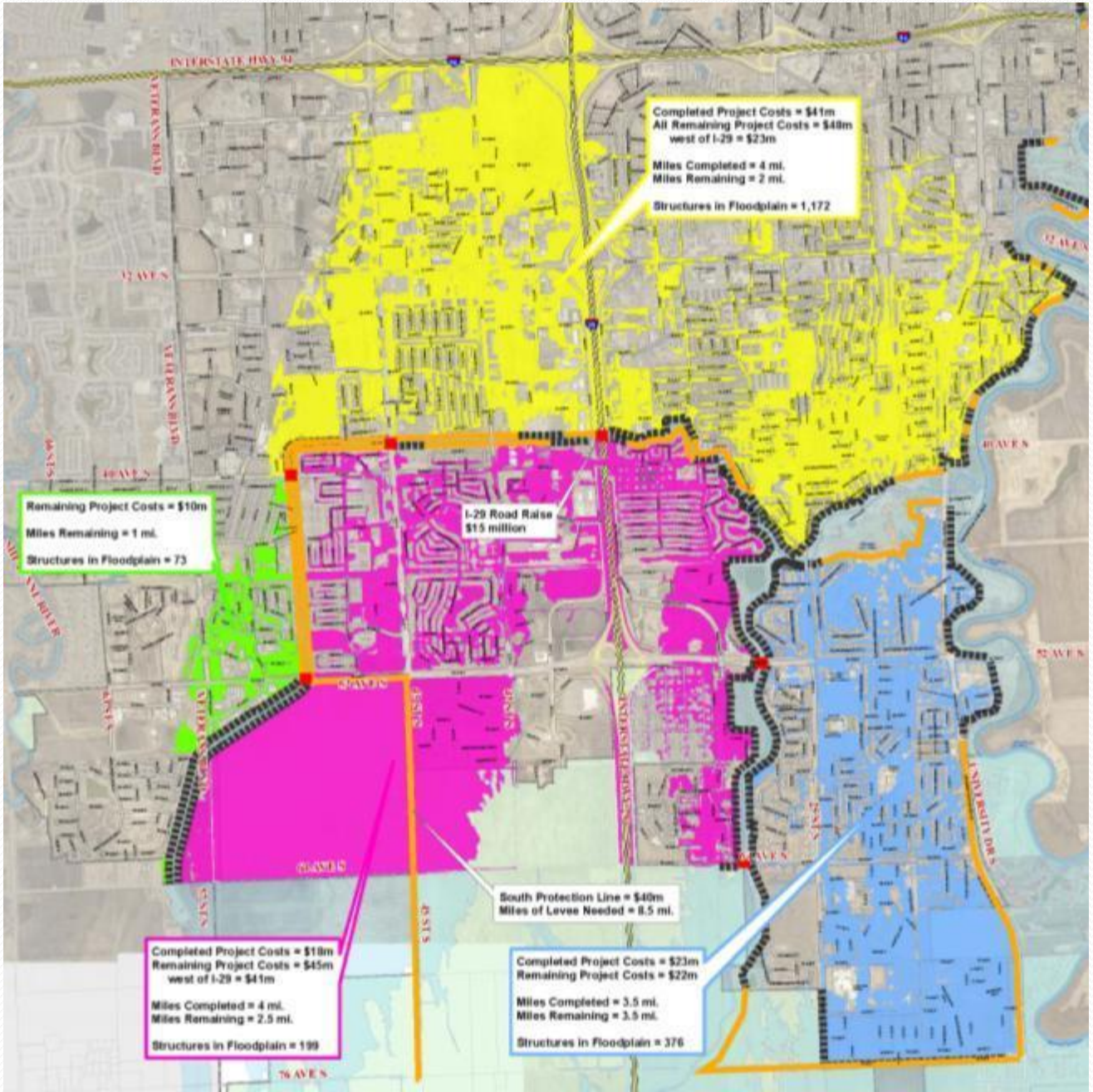
CONVEYANCE LOSS

Levee Construction
Forces flow between the levees
Results in a stage increase
Requires Storage to reduce stage to pre levee elevation



Comprehensive flood mitigation




Completed Project Costs = $41m
All Remaining Project Costs = $48m
west of I-29 = $23m
Miles Completed = 4 mi.
Miles Remaining = 2 mi.
Structures in Floodplain = 1,172
Remaining Project Costs = $10m
Miles Remaining = 1 mi.
Structures in Floodplain = 73
I-29 Road Raise
$15 million
South Protection Line = $40m
Miles of Levee Needed = 8.5 mi.
Completed Project Costs = $18m
Remaining Project Costs = $45m
west of I-29 = $41m
Miles Completed = 4 mi.
Miles Remaining = 2.5 mi.
Structures in Floodplain = 199
Completed Project Costs = $23m
Remaining Project Costs = $22m
Miles Completed = 3.5 mi.
Miles Remaining = 3.5 mi.
Structures in Floodplain = 376