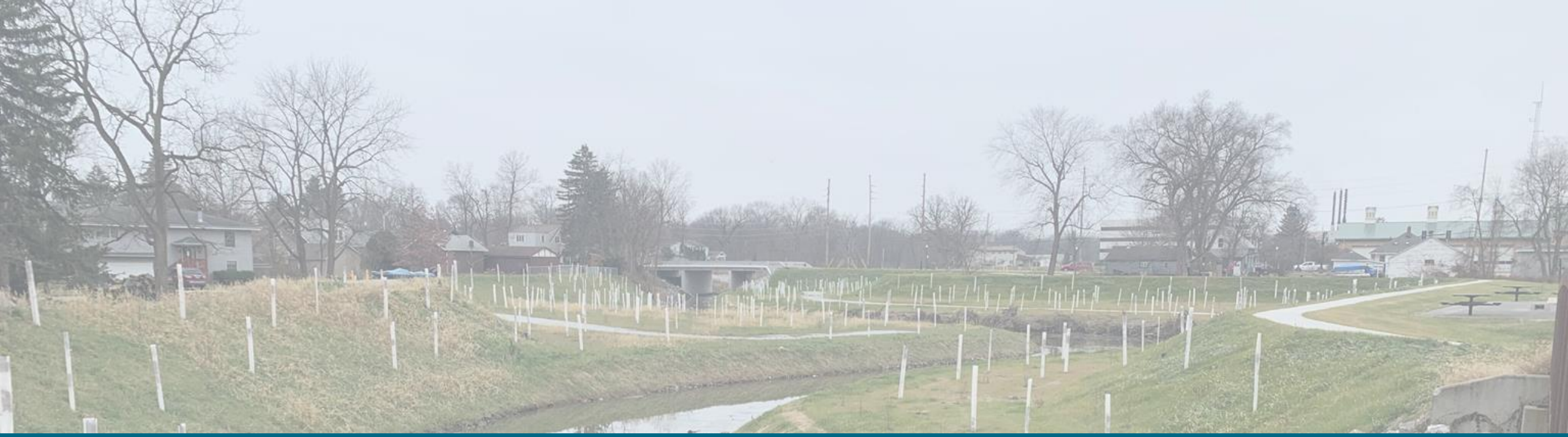
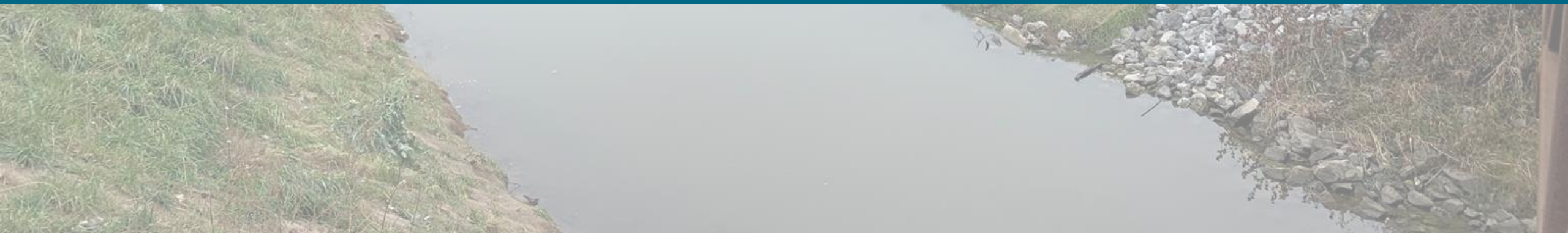


Hart Ditch Improvements

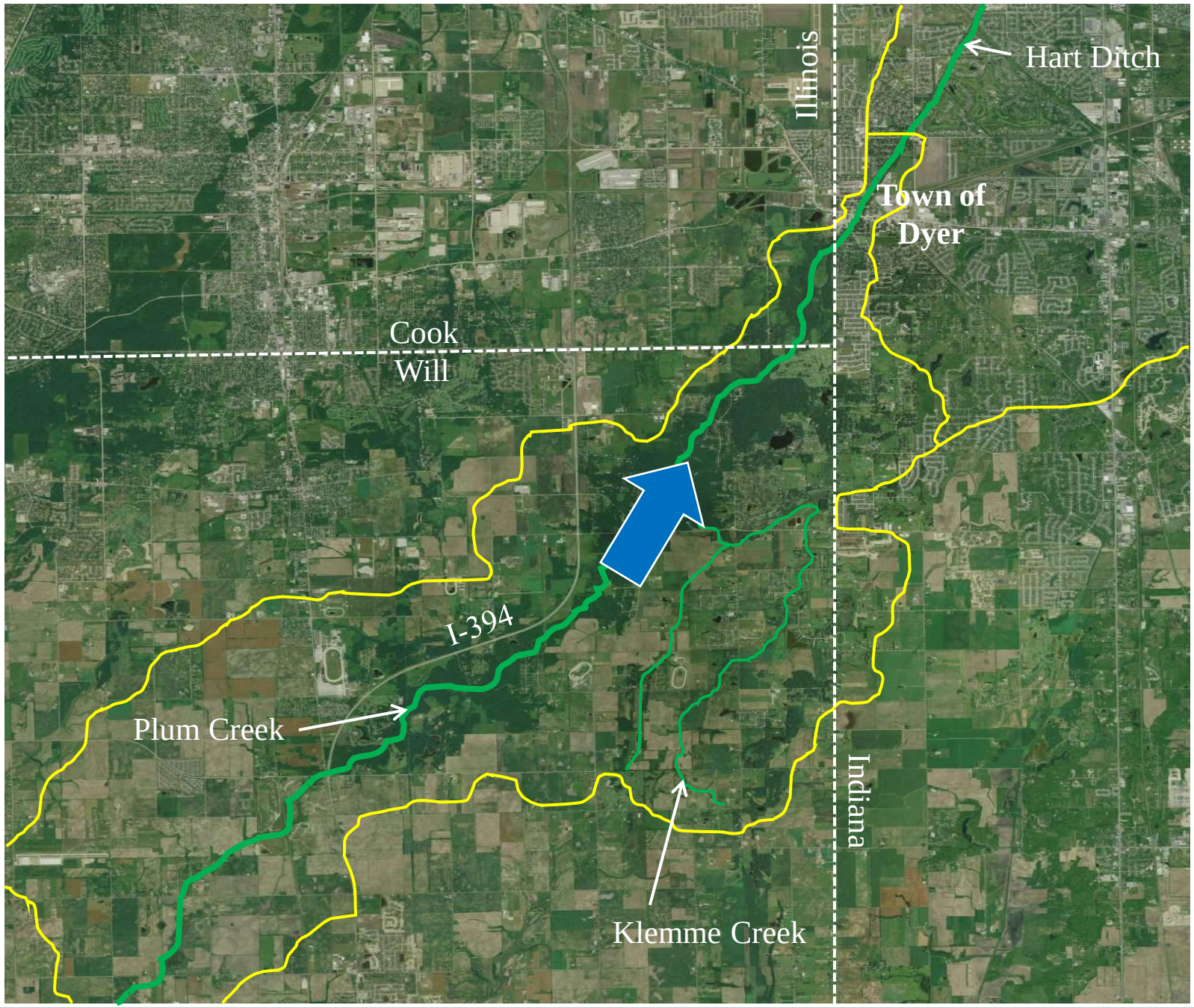
Joint Project in Northwest Indiana



Plum Creek/Hart Ditch Watershed

Confluence with Little Calumet River in Munster, IN

71 mi^2 at confluence with Little Calumet River

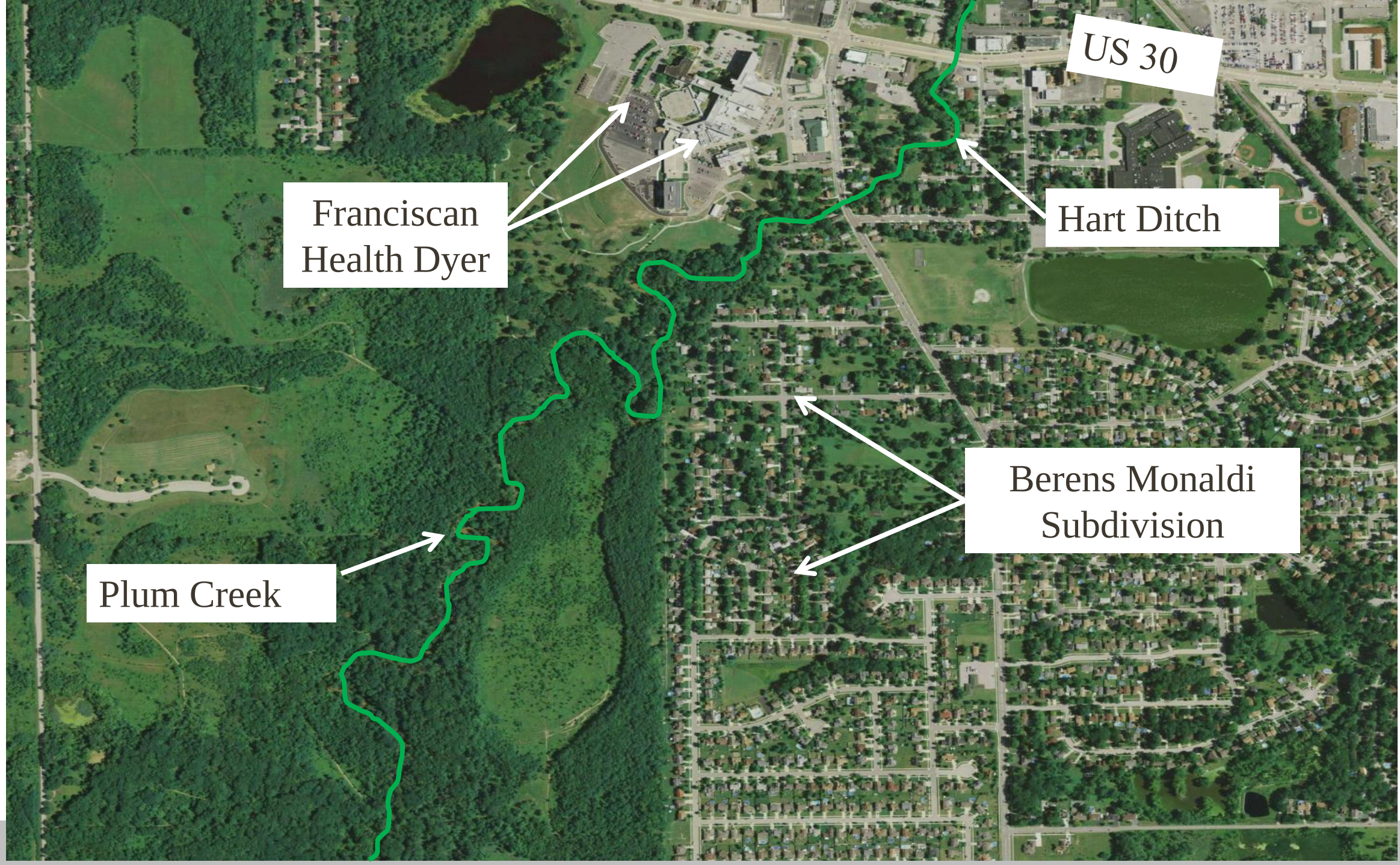


Plum Creek/Hart Ditch Watershed

71 mi^2 at confluence with Little Calumet River

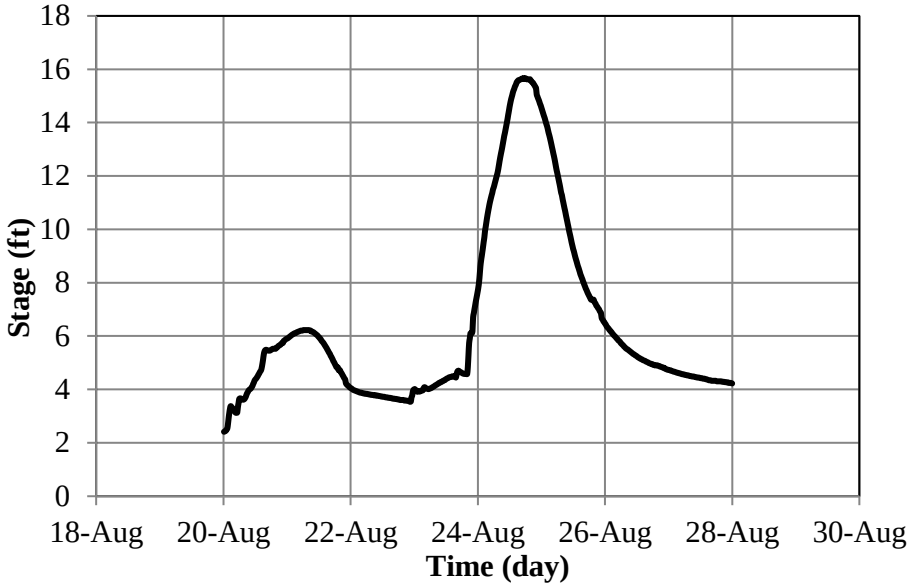
36 mi^2 drainage area in Illinois before it enters Dyer, IN

Water knows no boundaries!


US 30
Franciscan Health Dyer
Hart Ditch
Berens Monaldi Subdivision
Plum Creek

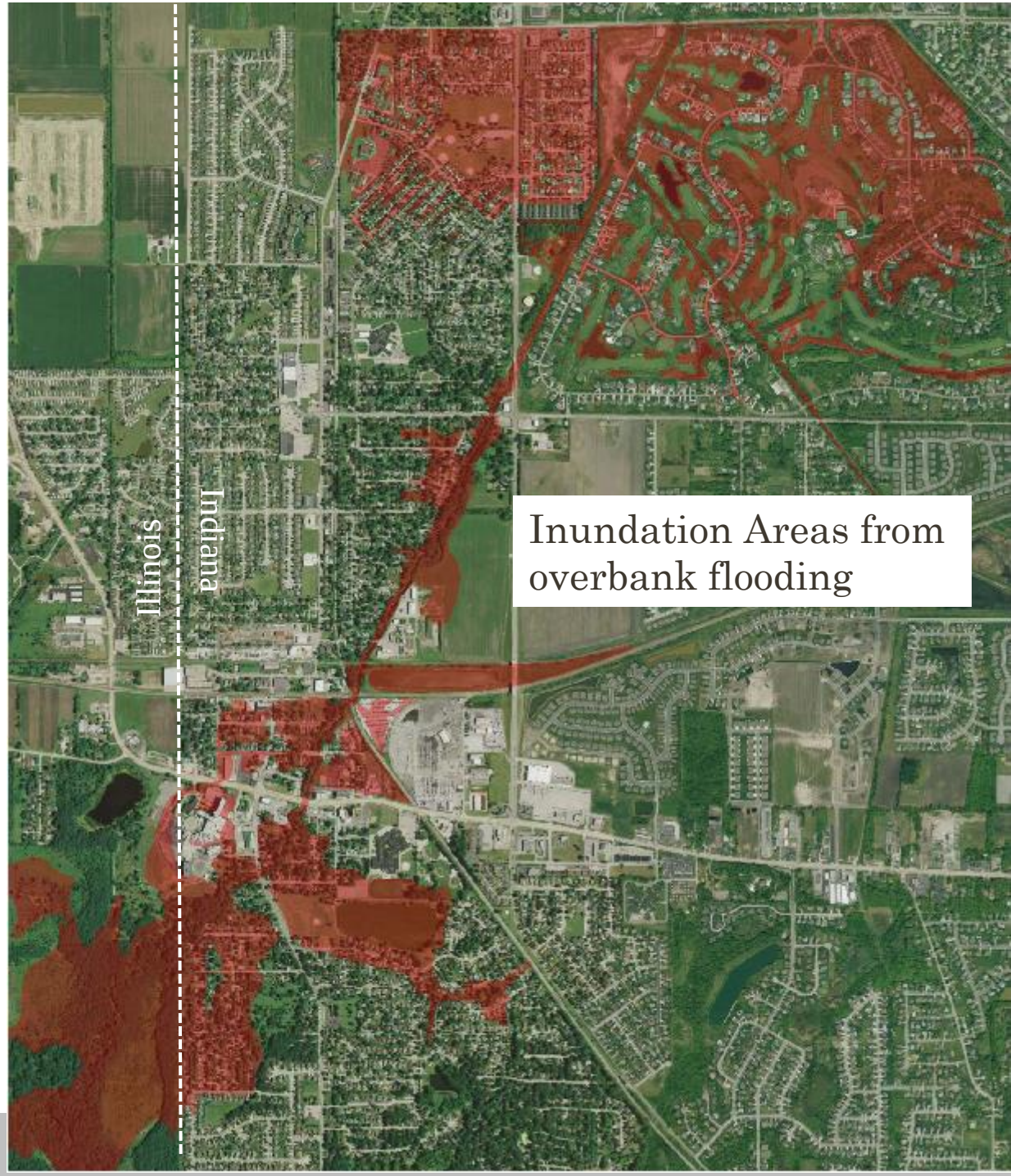
Flooding History

- November 1990
  - Significant flooding
  - 13 ft total rise
- August 2007 (saturated watershed)
  - 5” rain between 8/20 and 8/23
  - 1” in Dyer and 5” rain in Will Co. on 8/24
  - 9’ rise in 18 hours
- September 2008 (Hurricane Ike)
  - 9” on the 13th and 14th
  - 8’ rise in 18 hours



Event	Rainfall (in)	Peak Gage (ft)
Nov. 1990	~6”	13
Aug. 2007	10”	15.7
Sept. 2008	9”	16.8

Significant Flooding throughout Dyer from 2007 and 2008 events



Significant Flooding throughout Dyer from 2007 and 2008 events

- August 2007 had > $4M in damages to homes
  - $2.8M in Berens Monaldi subdivision
  - Cases of foundation collapses
  - Houses with 8 feet of water in the basement
  - $33M in damages at Franciscan Health Dyer
    - Over 2’ going through Emergency Room
- September 2008
  - More damages than Aug. 2007

Photos of the Year 2007

Hart Ditch

Dyer Fire Station

Main Entrance

Indiana

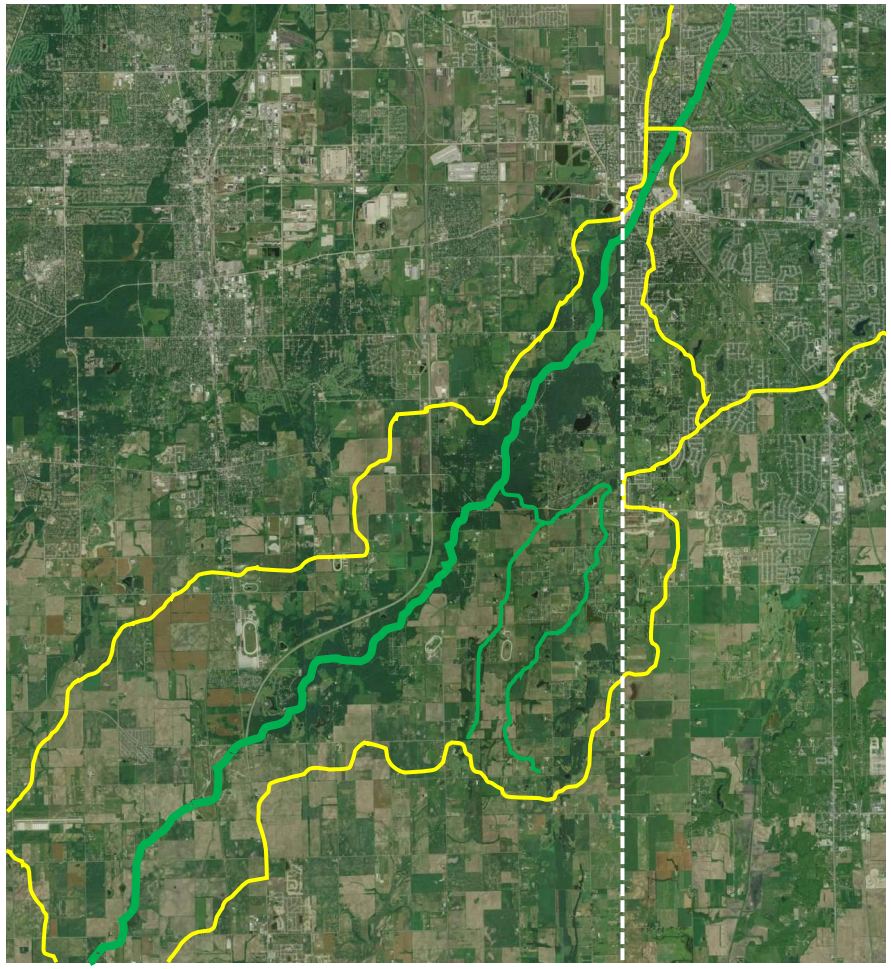
Illinois

JESSICA KOSCIELNIAK/ THE TIMES
Flood waters at St. Margeret Mercy in Dyer, Indiana.

Photo is looking south from US 30

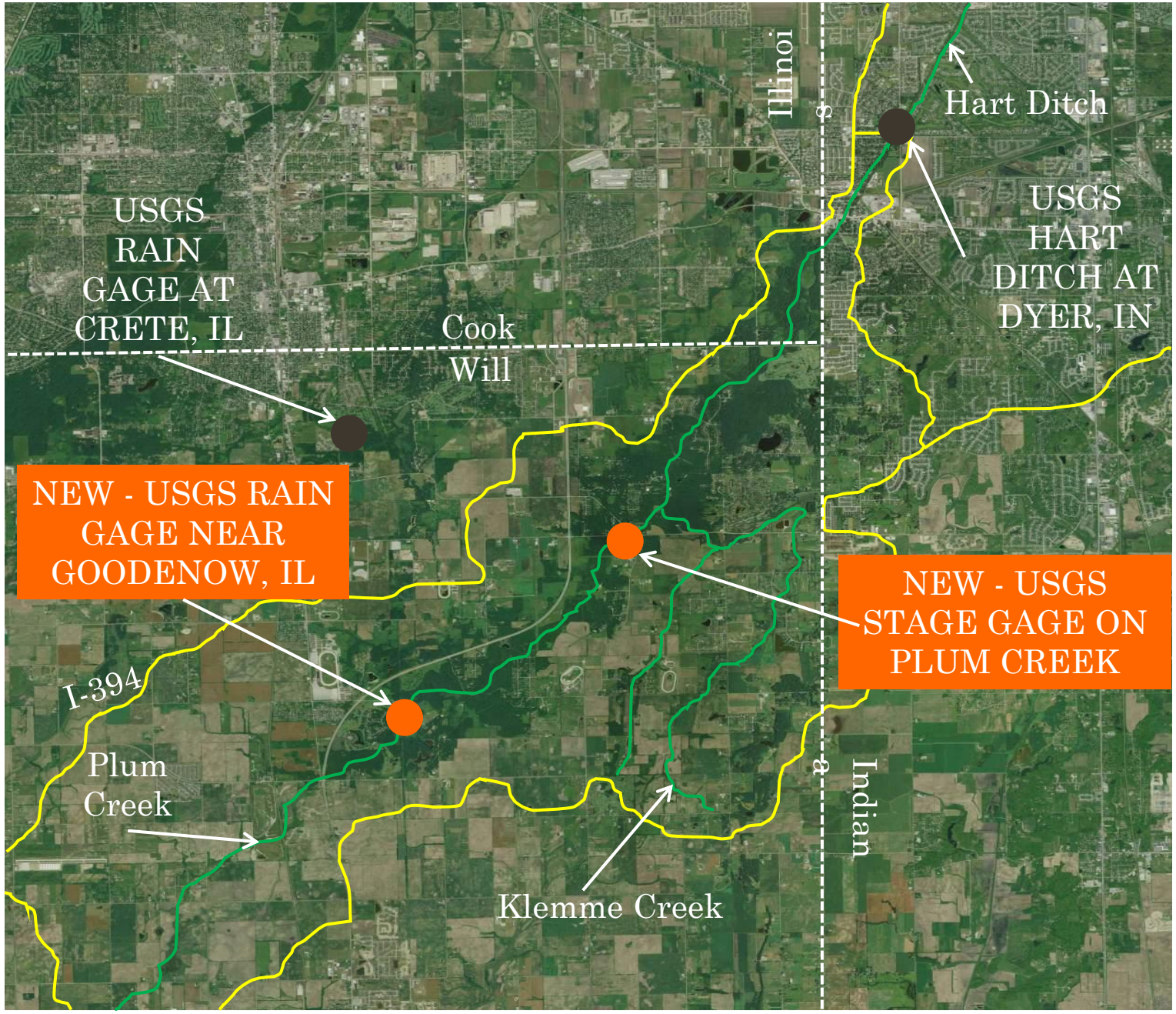
Flood Mitigation and Alternatives Measures

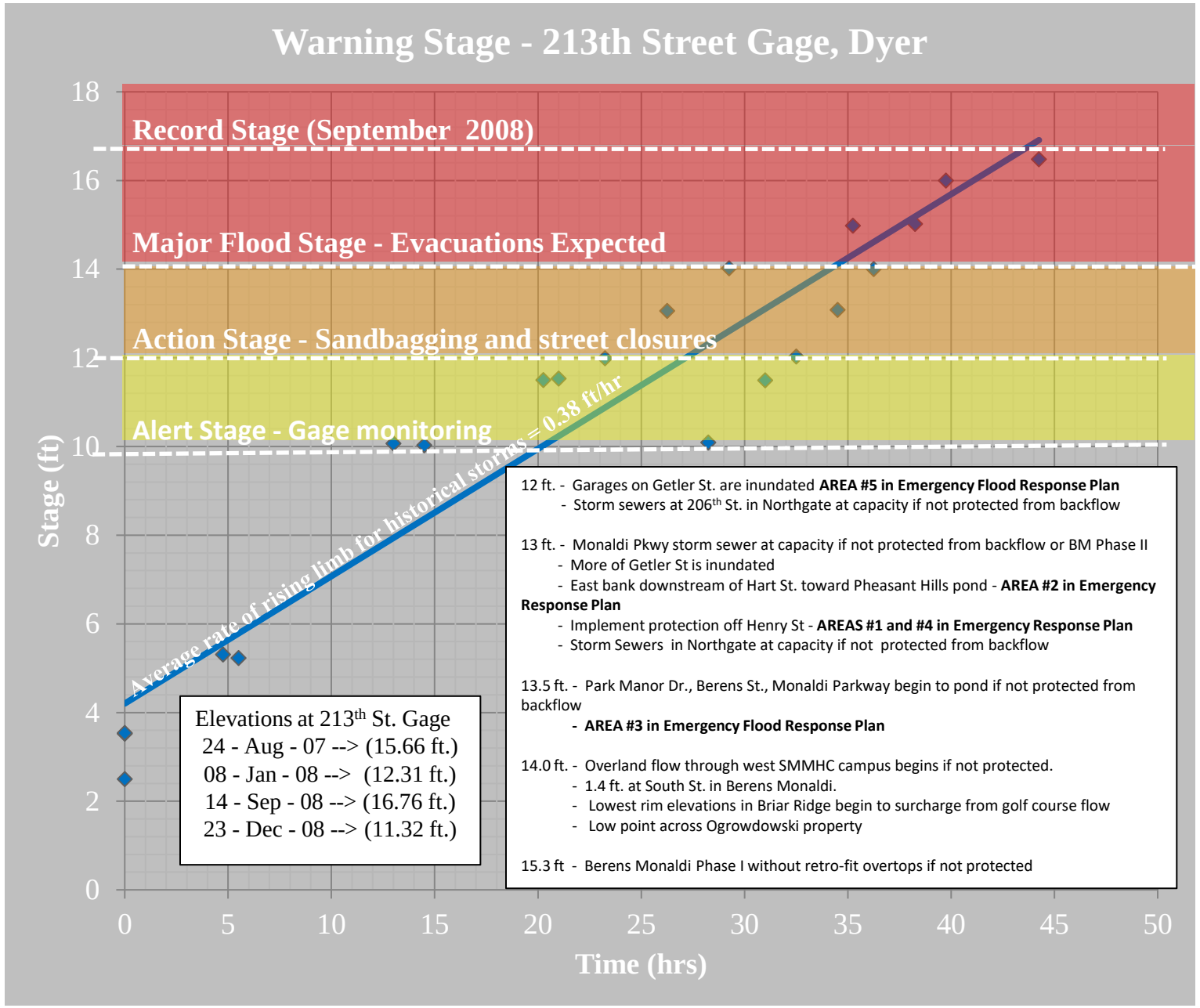
- Lake County Surveyor's Office commissioned a study of the watershed
  - Plum Creek Hart Ditch Watershed Study
  - Hydrologic and hydraulic models of the watershed
    - Calibrated to long and short duration events
    - Verified using Jan. 2008 and Sept. 2008 events
    - Used for predicting flood events on anticipated rainfall
    - Larger flows than regulatory flows (3389 cfs vs 1910 cfs)
- Added rain gage in Goodenow (2009)
- Added a stream gage on Plum Creek (2009)
- Emergency Action Plan



Gages Added in Plum Creek Watershed

- USGS Rain Gages
  - Hart Ditch at 213th Street in Dyer
  - Crete, IL
  - Goodenow, IL (new)
- USGS Stage Gages
  - Hart Ditch at 213th Street in Dyer
  - Plum Creek (new)





Predictions and Emergency Response

Used for predictions

Correlation between stage gages

Time to prepare for floods and enact emergency actions

Flood Mitigation and Alternatives Measures

- Longwood Golf Course in NW corner of Will County
- Widen Hart Ditch
- Multiple smaller storage areas
- Berms to protect subdivision and hospital

Flood Mitigation and Alternatives Measures

- Longwood Golf Course in NW corner of Will County
- Widen Hart Ditch
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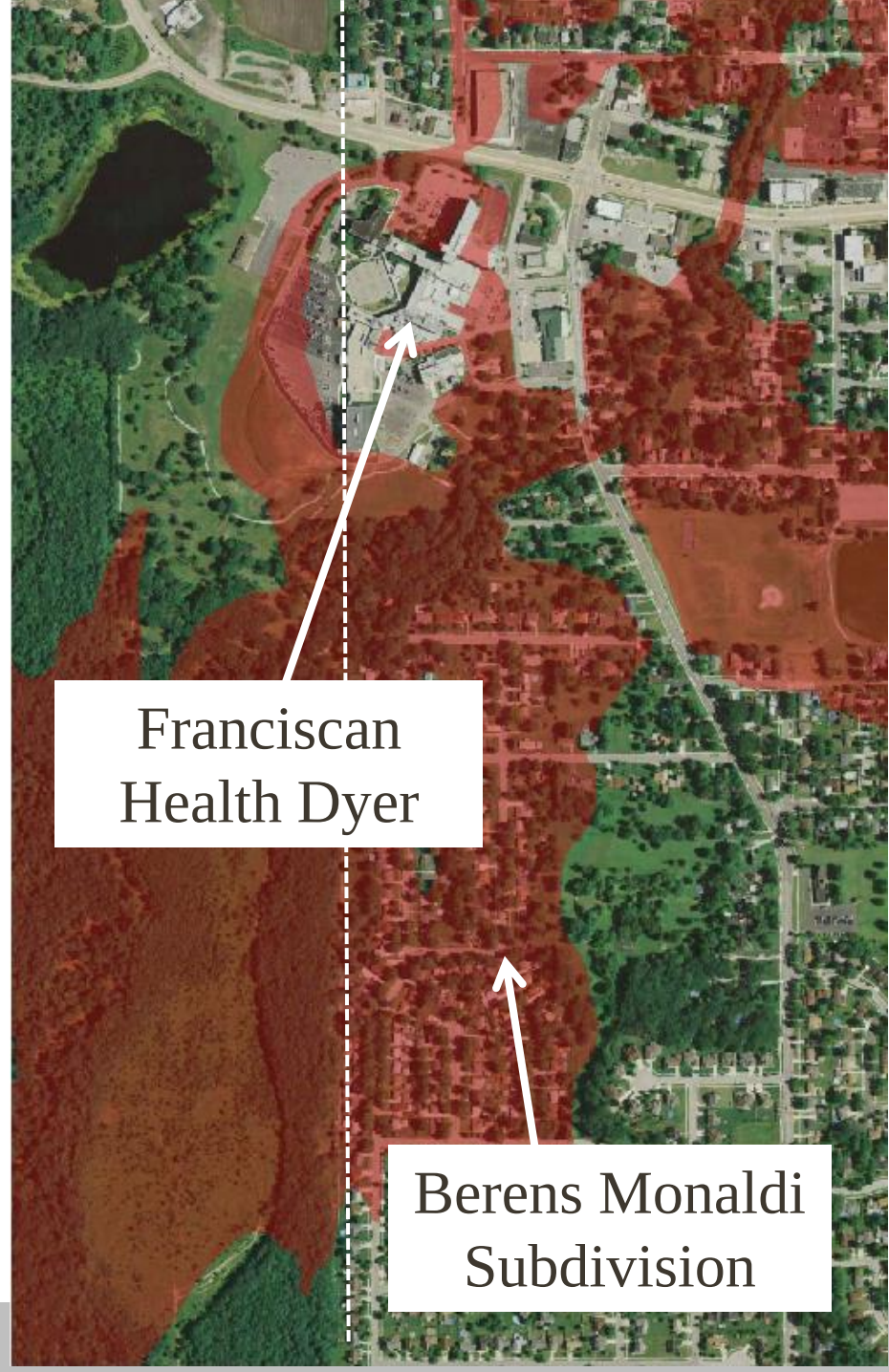
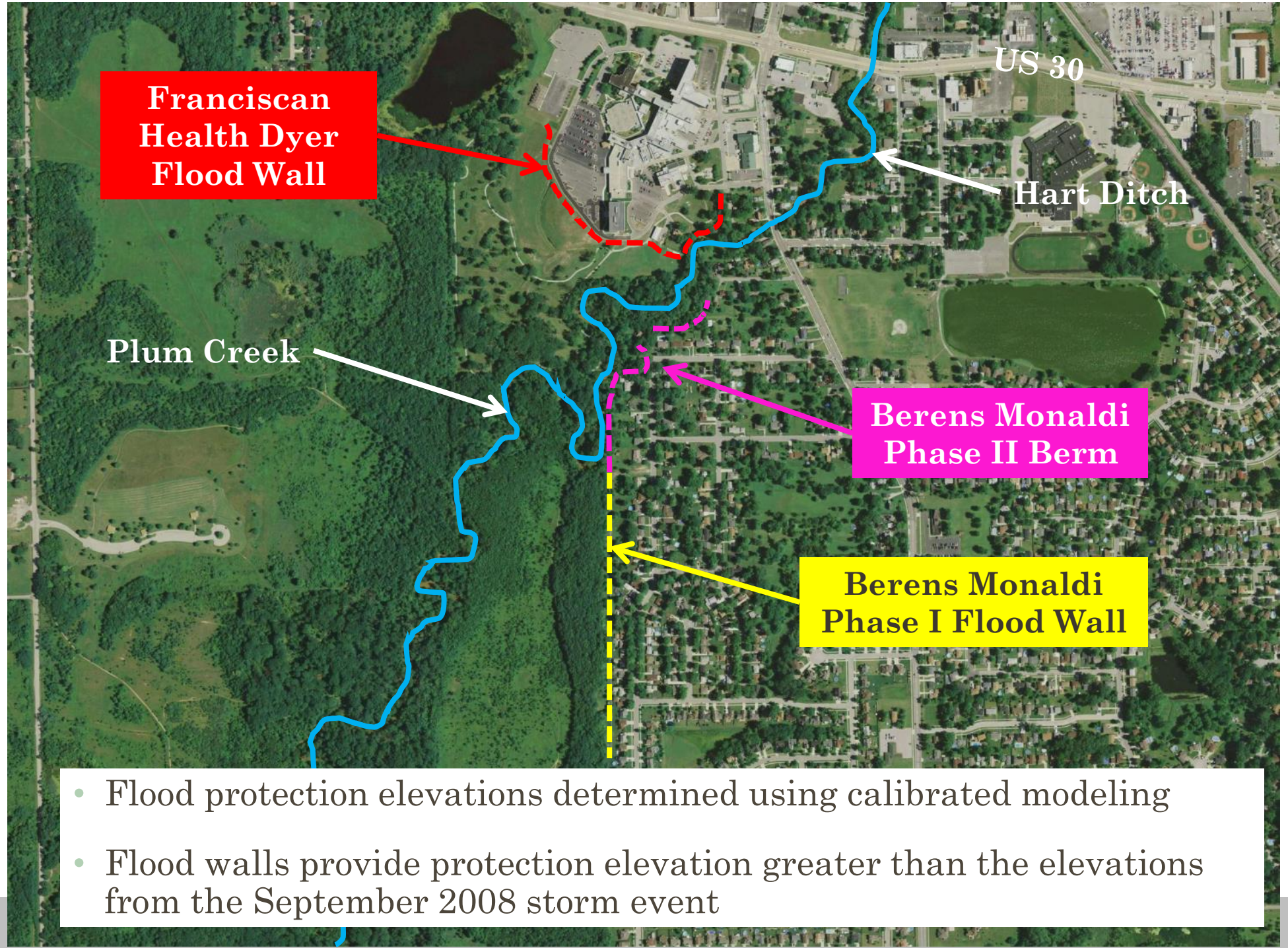


Flood Mitigation and Alternatives Measures

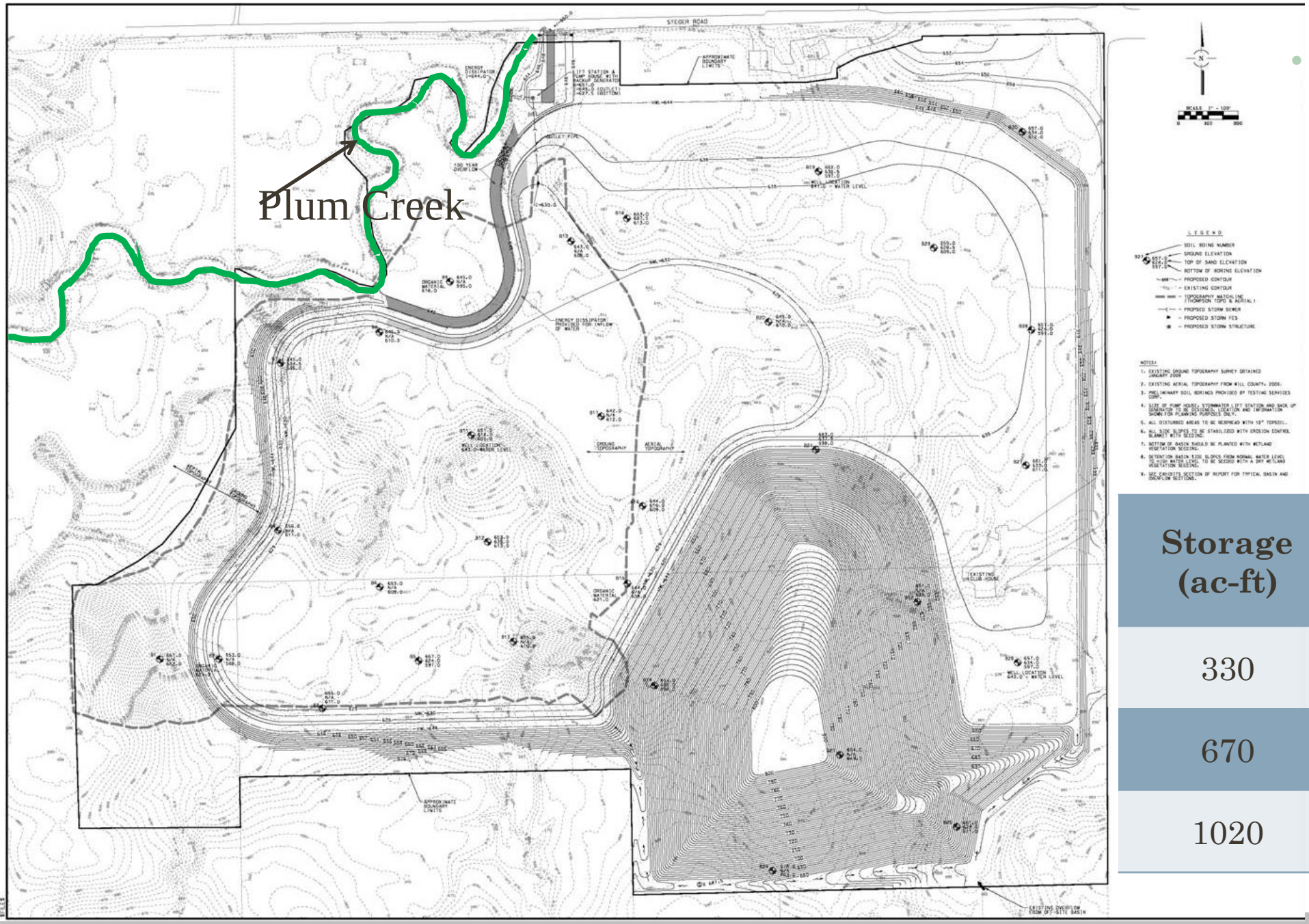
- Berens Monaldi Subdivision berms and pump station paid for by Town of Dyer
- Franciscan Health Dyer berms paid for by the hospital



- Flood protection elevations determined using calibrated modeling
- Flood walls provide protection elevation greater than the elevations from the September 2008 storm event

Flood Mitigation and Alternatives Measures Implemented

- Town of Dyer
  - In excess of $2,800,000
- Franciscan Health Dyer
  - In excess of $1,000,000
- Updated Stormwater Ordinance
- Search for storage projects using “compensatory storage” requirements from berms
- Longwood golf course project was studied in detail



- **CHALLENGES**
  - Uncooperative sellers
  - Significant permitting issues
  - Will County FPD
  - Cost

Storage (ac-ft)	Cost ($M)	Reduction at Hart St (ft)
330	7	0.4
670	12.8	1.3
1020	21	1.8

Flood Mitigation and Alternatives Measures

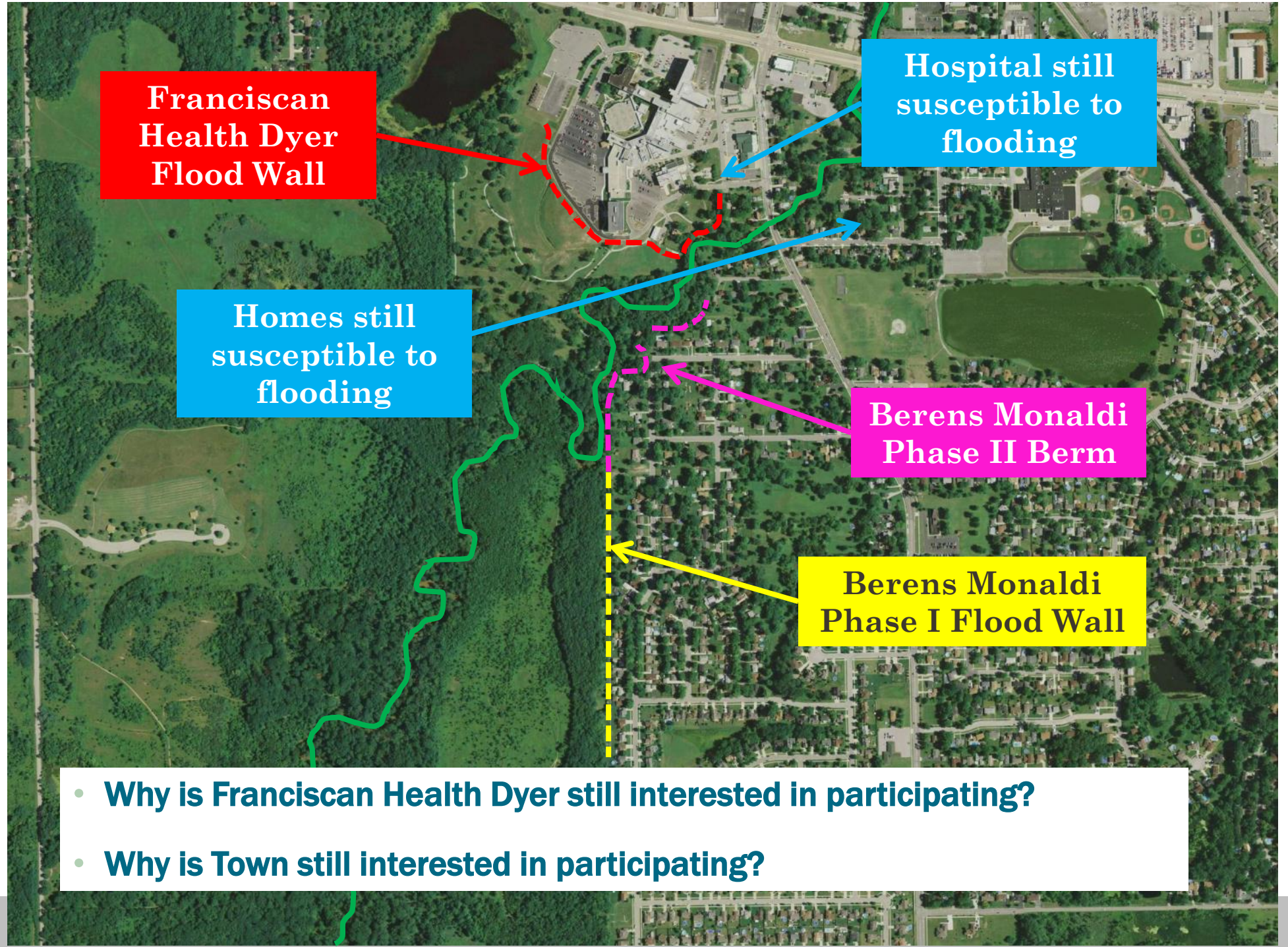
- Town of Dyer
  - In excess of $2,800,000
- Franciscan Health Dyer
  - In excess of $1,000,000
- Updated Stormwater Ordinance
- Search for storage projects using “compensatory storage” requirements from berms
- Longwood golf course project was studied in detail
- Identified 2-stage channel improvements

Cooperative Effort

- Town of Dyer
- Franciscan Health Dyer
- Lake County Drainage Board
- Little Calumet River Basin Development Commission
- Lake County Highway Department

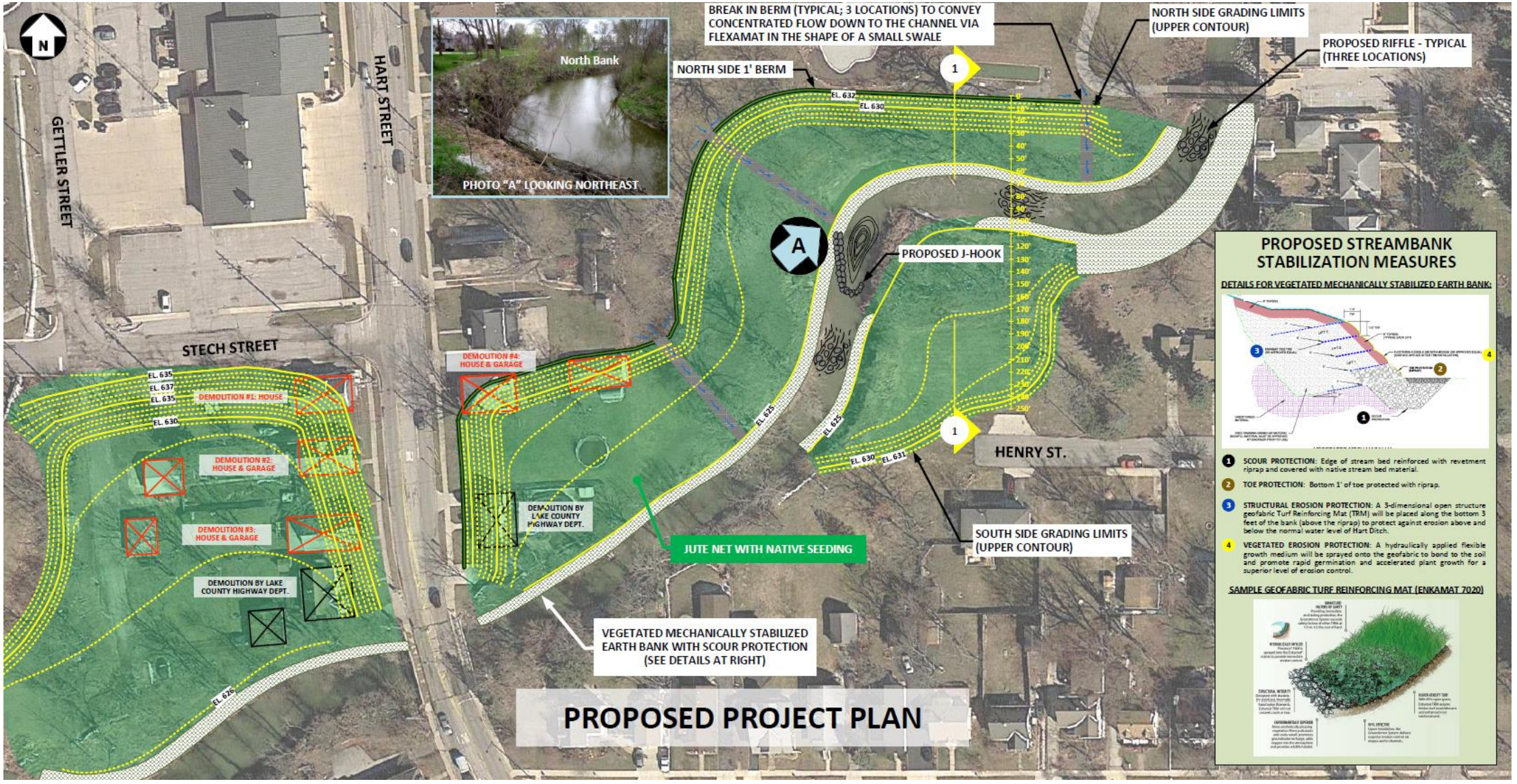
Cooperative Effort

- Awarded bid - $1,856,309.78 to Dyer Construction, with change orders about $1.9M
- Town paid $1,090,880 for purchase of houses and demolition and tree clearing
- Total Cost was approximately $3.3M
- Franciscan Health Dyer contributed $2,047,118.22 (agreement from 2010)
- Little Calumet River Basin Development Commission contributed $600,000
- Received grant from DNR Lake Michigan Coastal Program for $100,000
- 3 Houses removed and land dedicated to Town from Lake County Highway Department
- Lake County Surveyor’s Office funded initial watershed study and various alternative studies

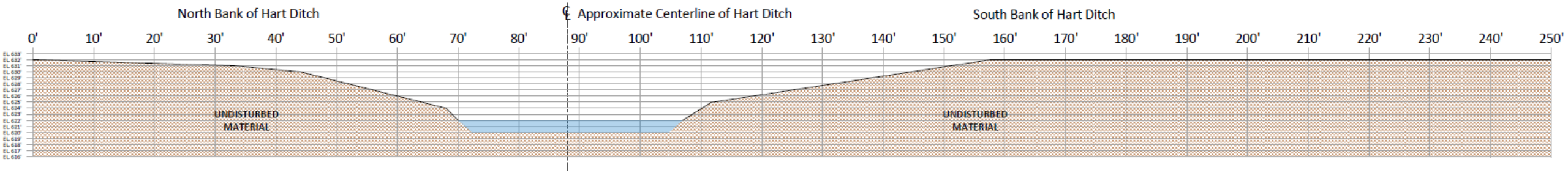


- Why is Franciscan Health Dyer still interested in participating?
- Why is Town still interested in participating?

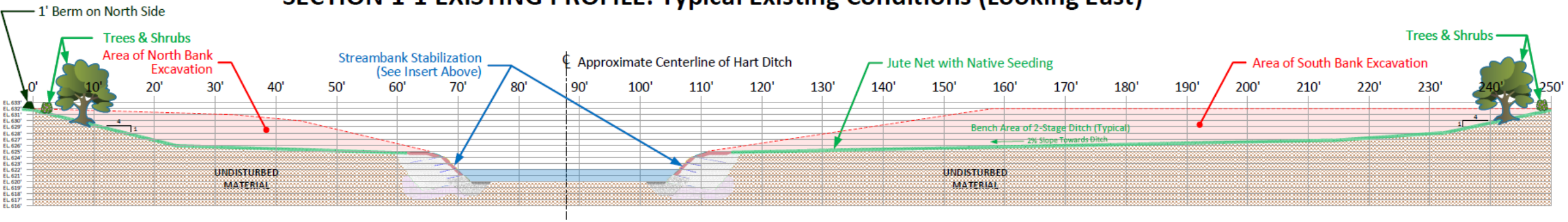
Concept Design



Creating a 2-Stage Ditch: Existing and Proposed Section Views



SECTION 1-1 EXISTING PROFILE: Typical Existing Conditions (Looking East)

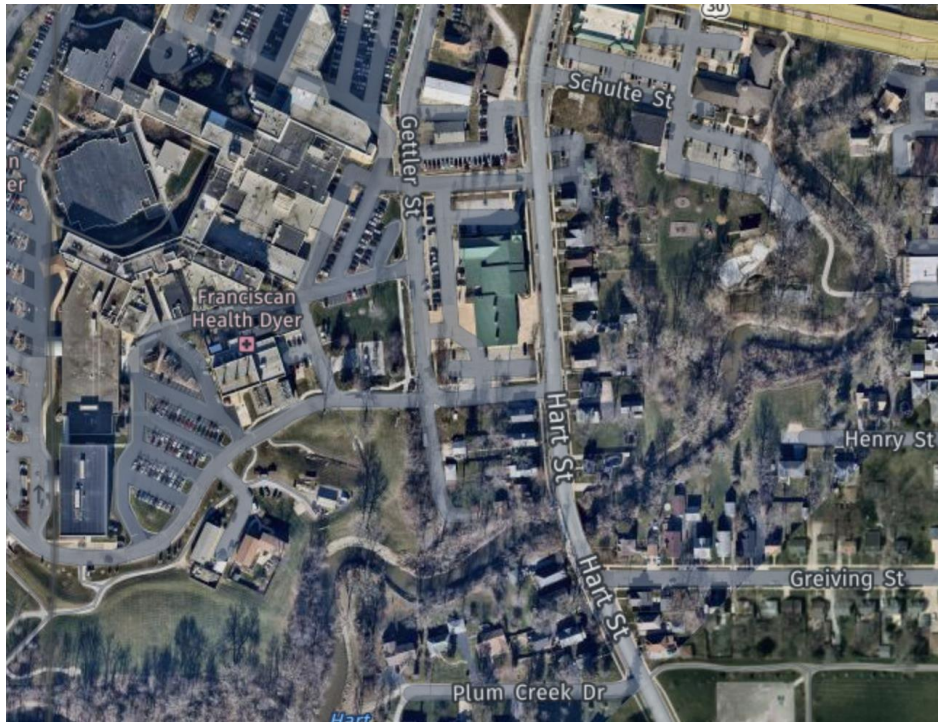


SECTION 1-1 PROPOSED PROFILE: 2-Stage Ditch with Reinforced Stream Bank Edge (Typical Conditions -- Looking East)

Site Conditions prior to design

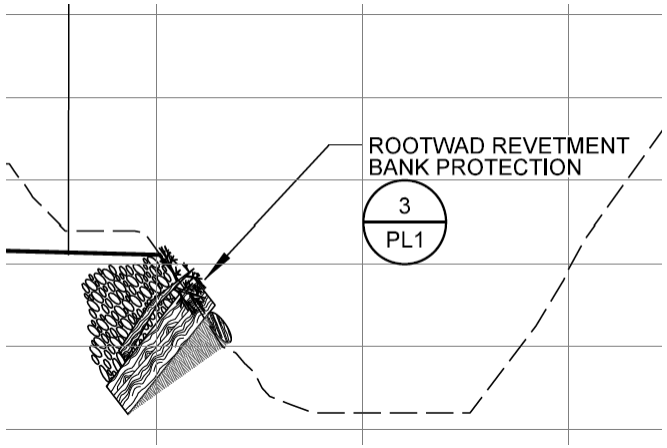
- Video from February 21, 2018 after storm event
  - Berm protecting hospital
  - First area to flood is behind homes on west side of Hart Street
  - Large trees throughout project site
  - Potential overtop locations to the south (left in video)
  - Hart Street bridge is a 2 lane bridge

  - Survae

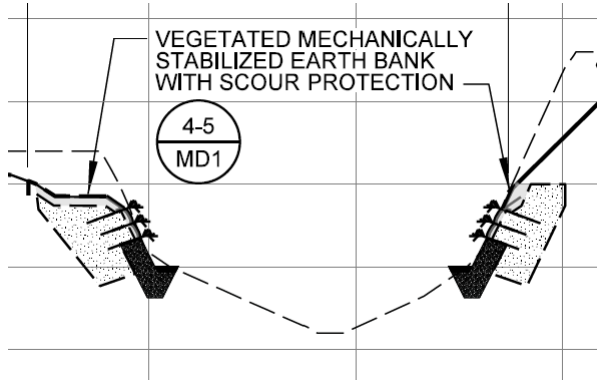


Pictures from December 2021

Expected Project Benefits



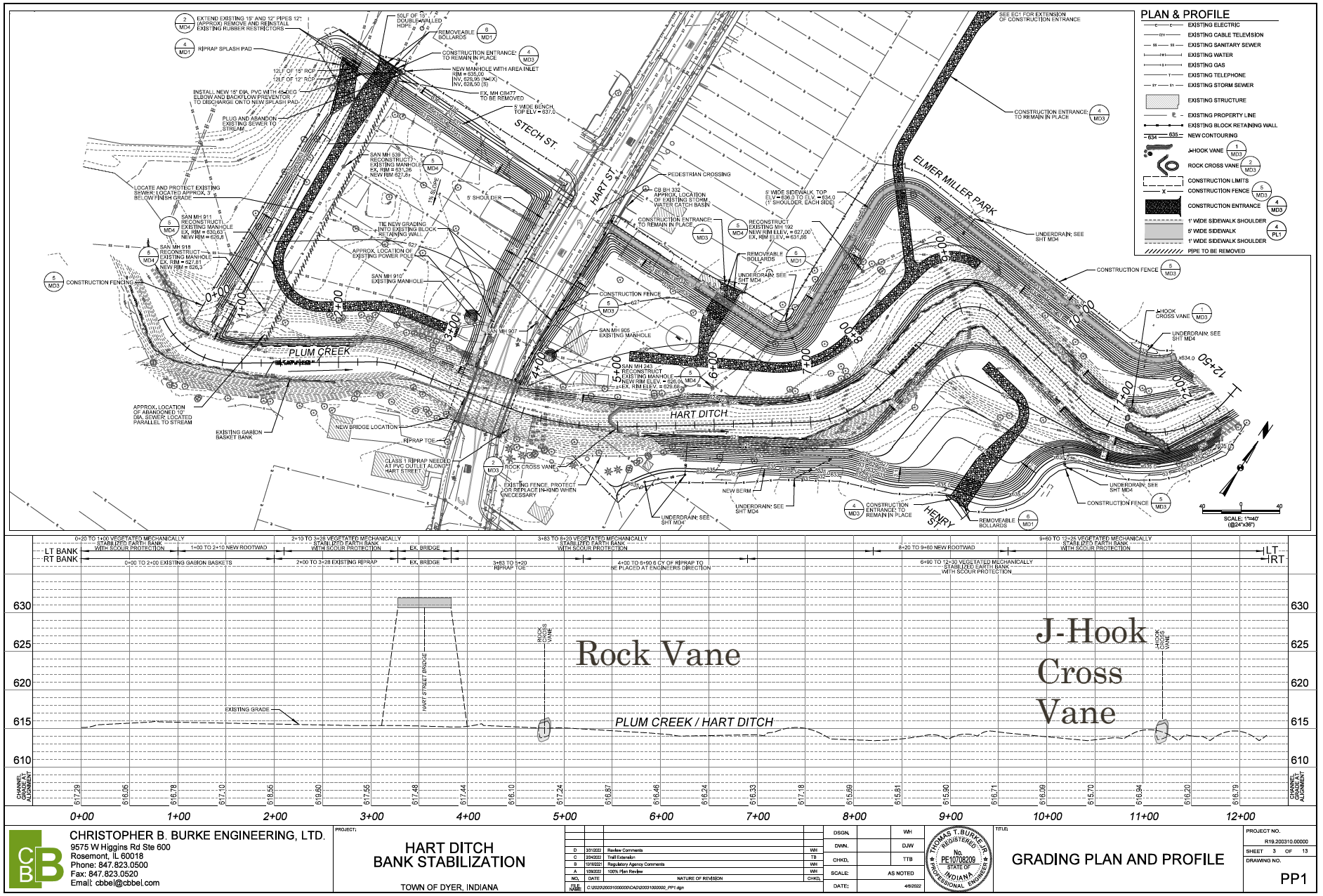
- Water Quality and Quantity Benefits
  - Significantly improved ditch stability:
    - Bench area to be sloped towards ditch at 2%
    - After bench, bank sloped at 2:1 to maximize storage area
    - Toe of the ditch reconstructed as a preventive scour measure (rootwads and riprap) with vegetated mechanically stabilized earth bank above toe
    - J-hook and rock vane
  - Sediment reduction
    - Finer sediment particles will settle out on the bench areas
    - Coarser particles will form ditch bed



Expected Project Benefits

- Environmental
  - Bio-uptake of nutrients by vegetation located within the bench areas
  - The bench areas will filter pollutants and provide groundwater recharge
  - Native seed mix will provide wildlife habitat and accommodate migrating birds
- Educational
  - Kahler Middle School is 2 blocks from the site and students can walk to site to observe the results of the environmental restoration with native plants
  - Demonstration that 2-stage channel restoration can work in highly urban areas
  - Signage being installed explaining the project
  - Walking path

Design



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Phone: 847.823.0500
Fax: 847.823.0520
Email: cbbel@cbbel.com

PROJECT:
HART DITCH
BANK STABILIZATION
TOWN OF DYER, INDIANA

NO.	DATE	NATURE OF REVISION	CHKD.
D	3/31/2022	Review Comments	WH
C	3/24/2022	Trail Extension	TB
B	12/16/2021	Regulatory Agency Comments	WH
A	1/28/2022	100% Plan Review	WH

FILE NAME: C:\2020\20031000000\CAD\20031000000_PP1.dgn

DSGN.		WH
DWN.		DJW
CHKD.		TTB
SCALE:		AS NOTED
DATE:		4/6/2022

THOMAS T. BURKE JR. REGISTERED No. PE10708209 STATE OF INDIANA PROFESSIONAL ENGINEER

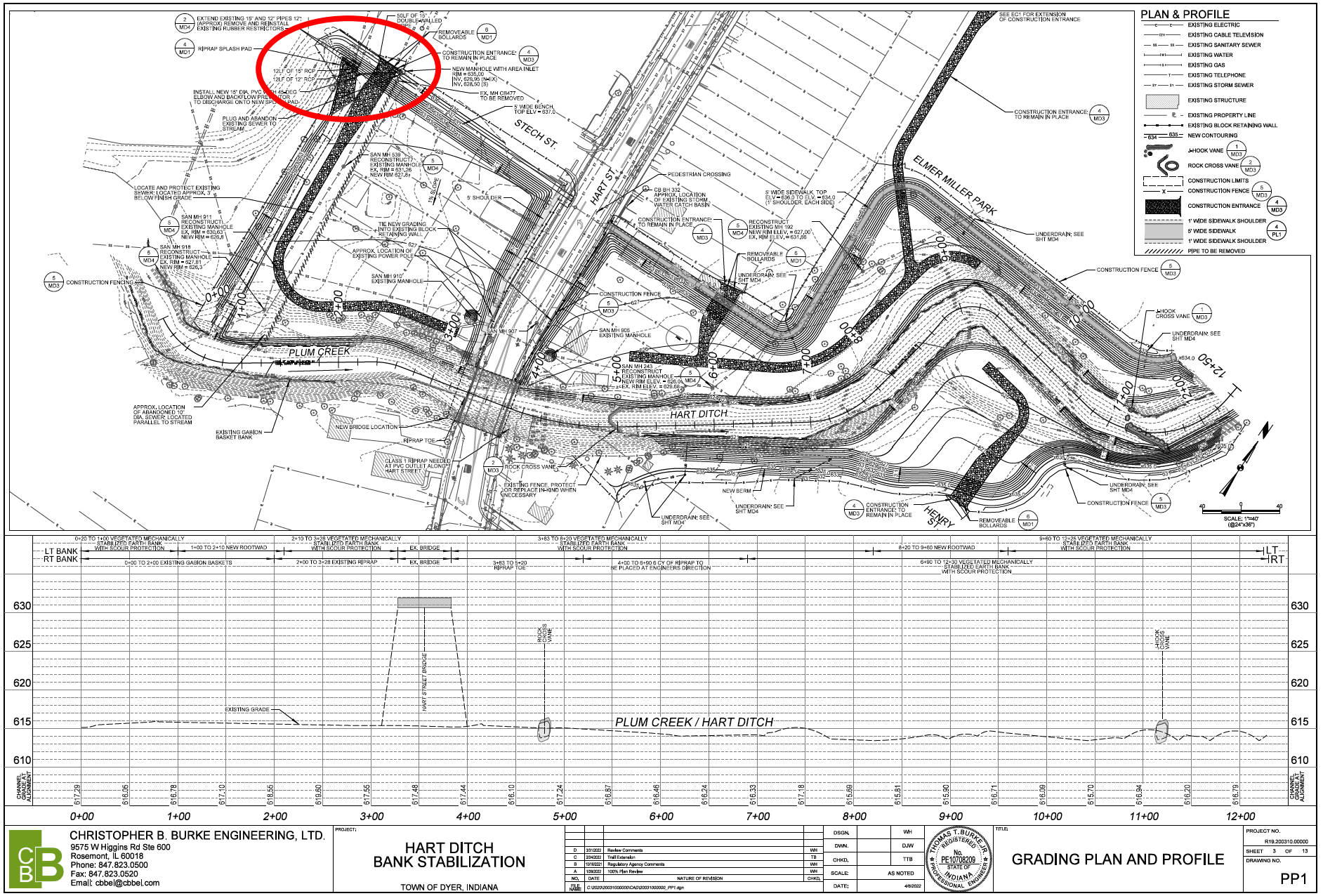
TITLE:
GRADING PLAN AND PROFILE

PROJECT NO. R19.200310.00000
SHEET 3 OF 13
DRAWING NO. PP1

Alternative protection for hospital

Install emergency concrete jersey barriers each time a flood was possible across entrances

Design to tie into hospital berm



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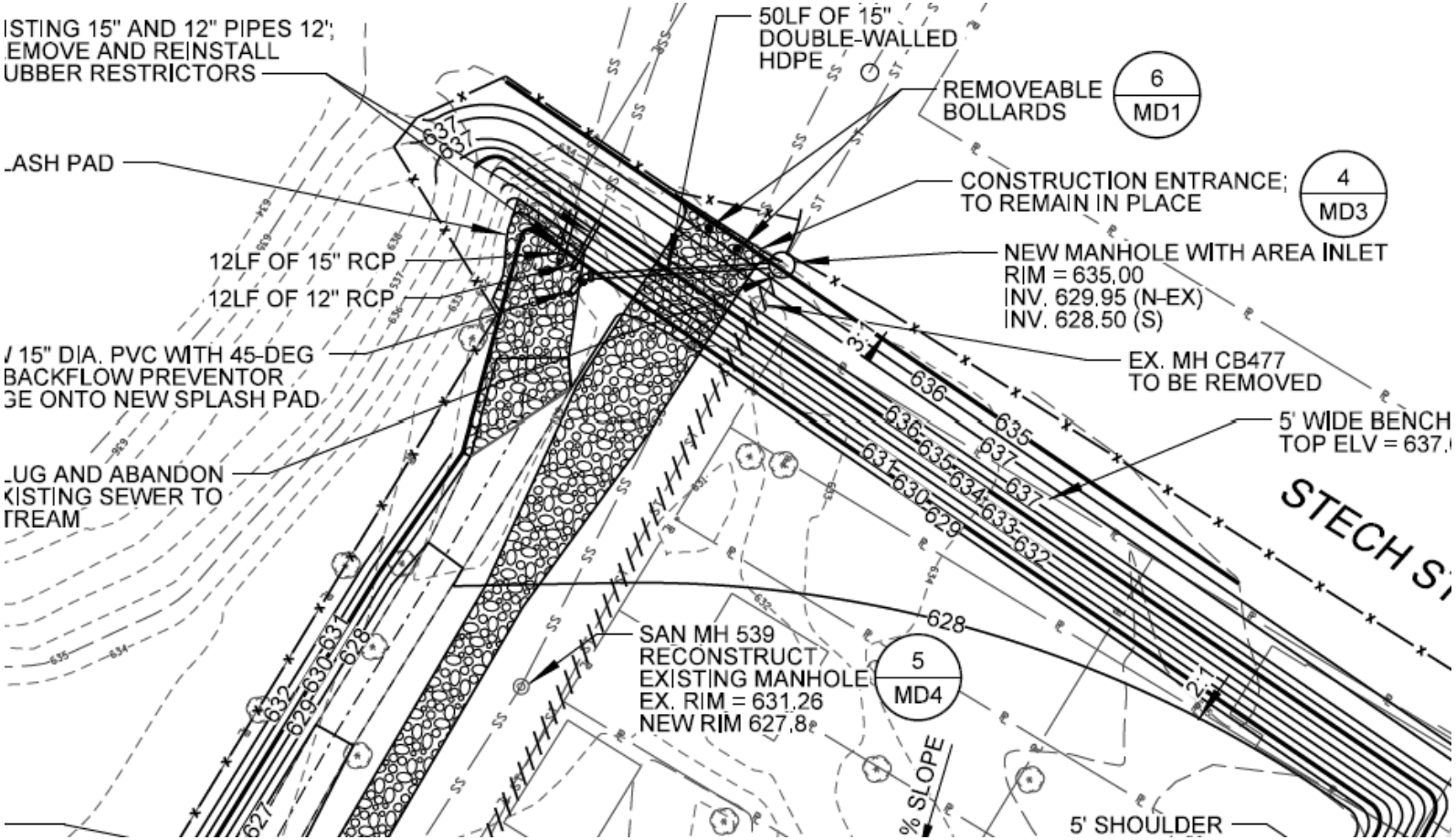
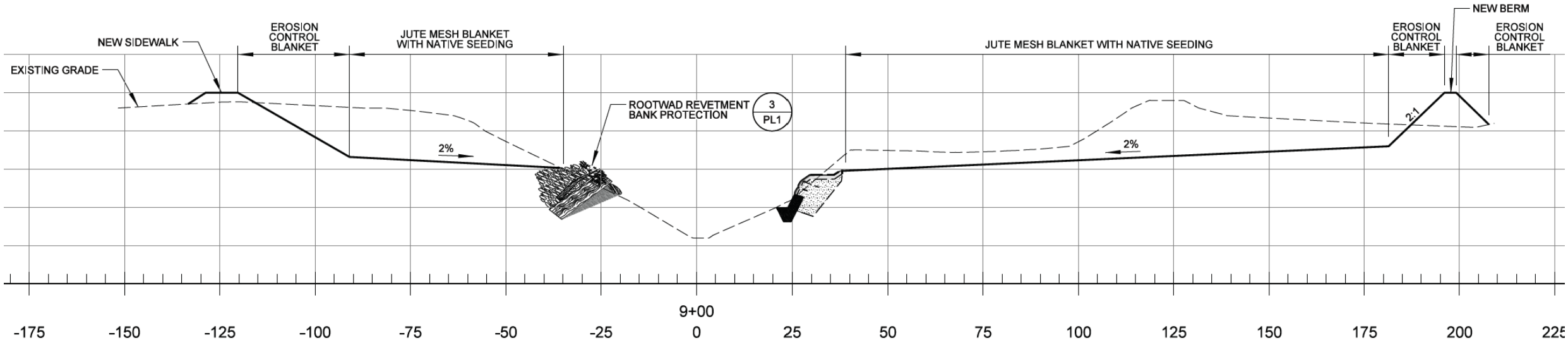
Provides hospital needed protection



Design Cross-sections



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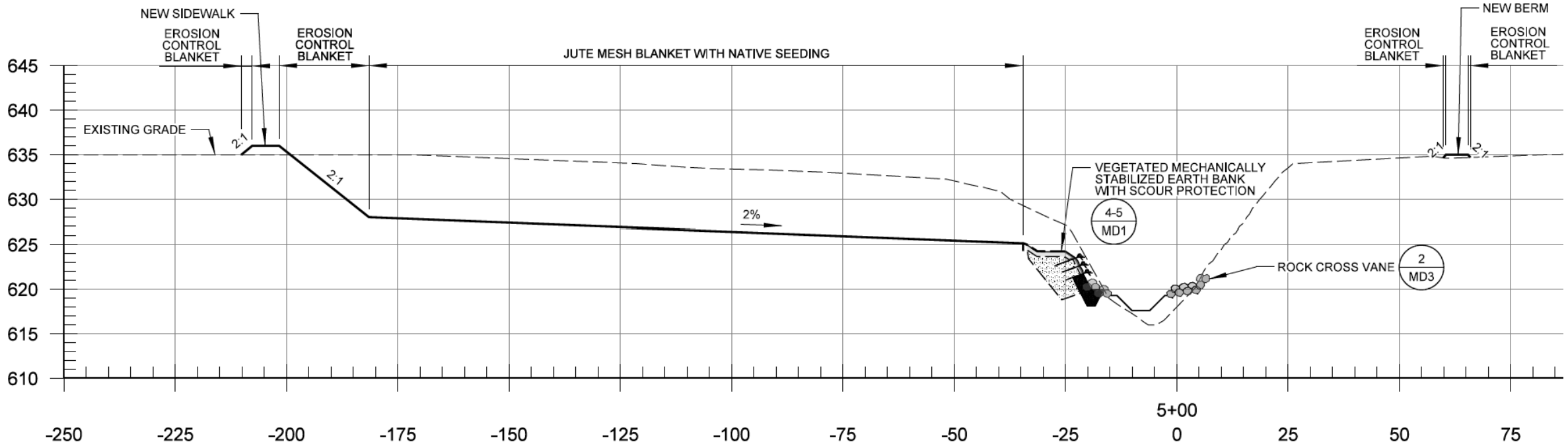
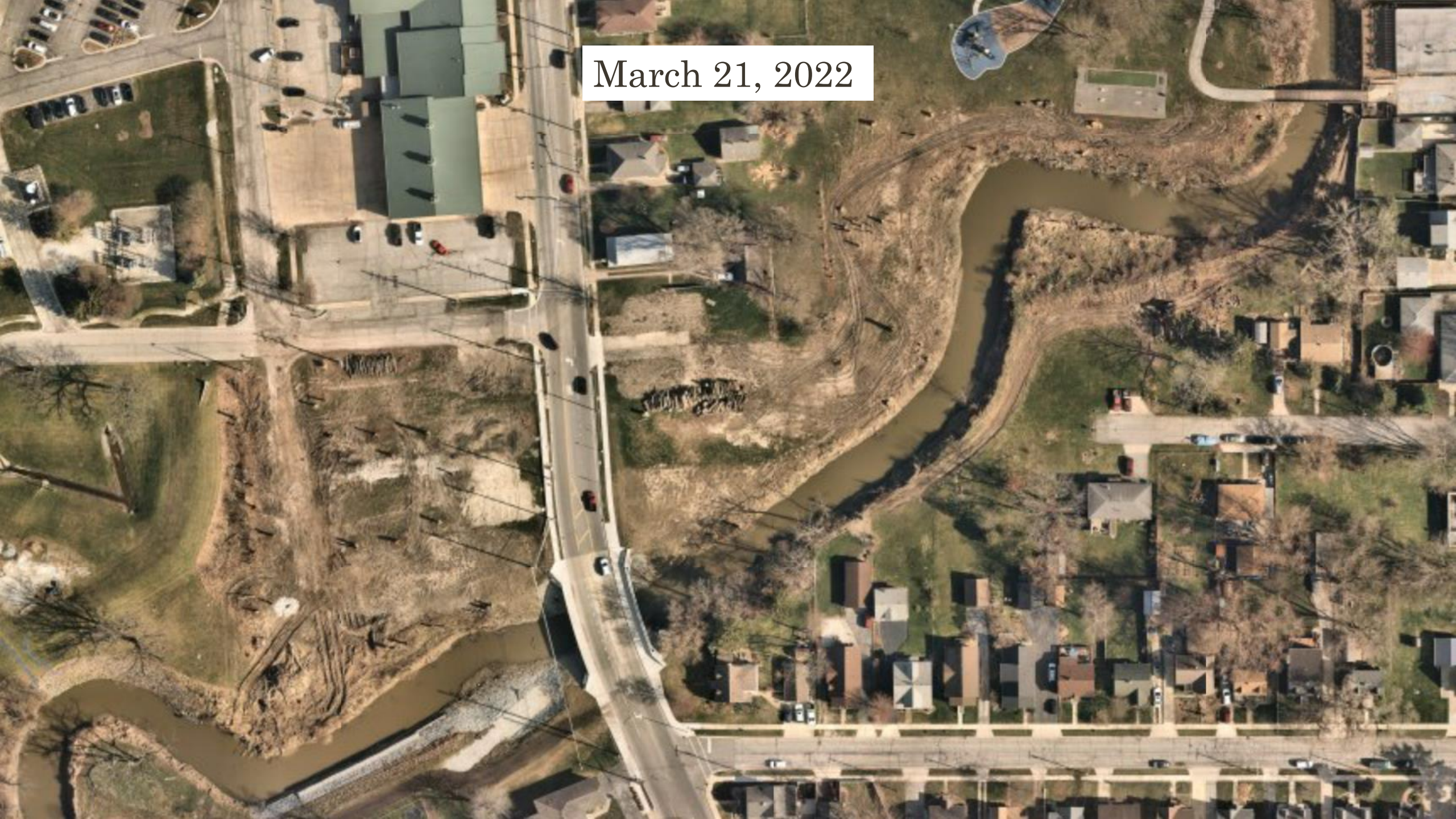


Tree removal in March 2022

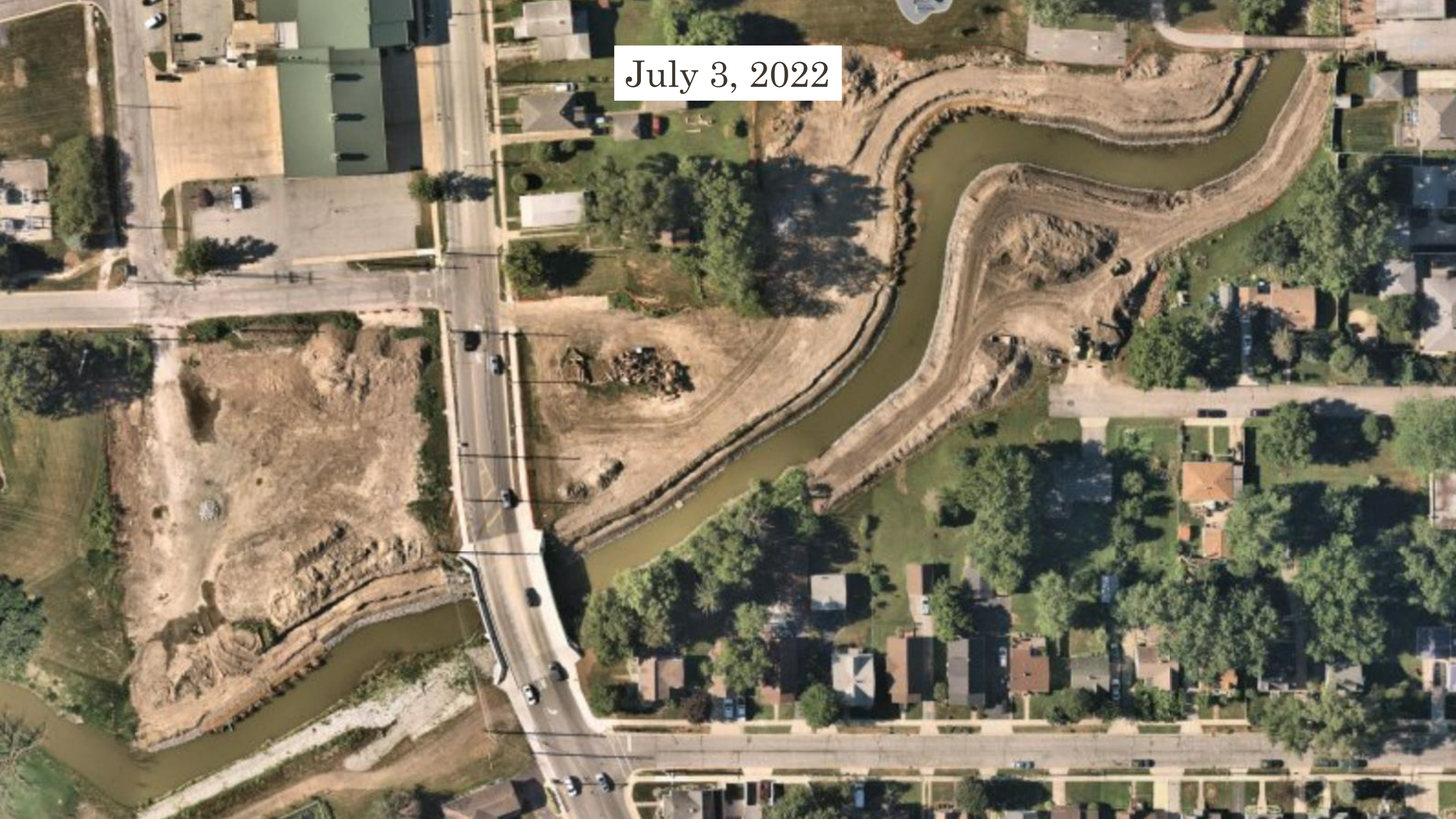
New 3 lane Hart Street Bridge


March 21, 2022

Construction begins June 2022


Early July 2022


DEERE


July 3, 2022

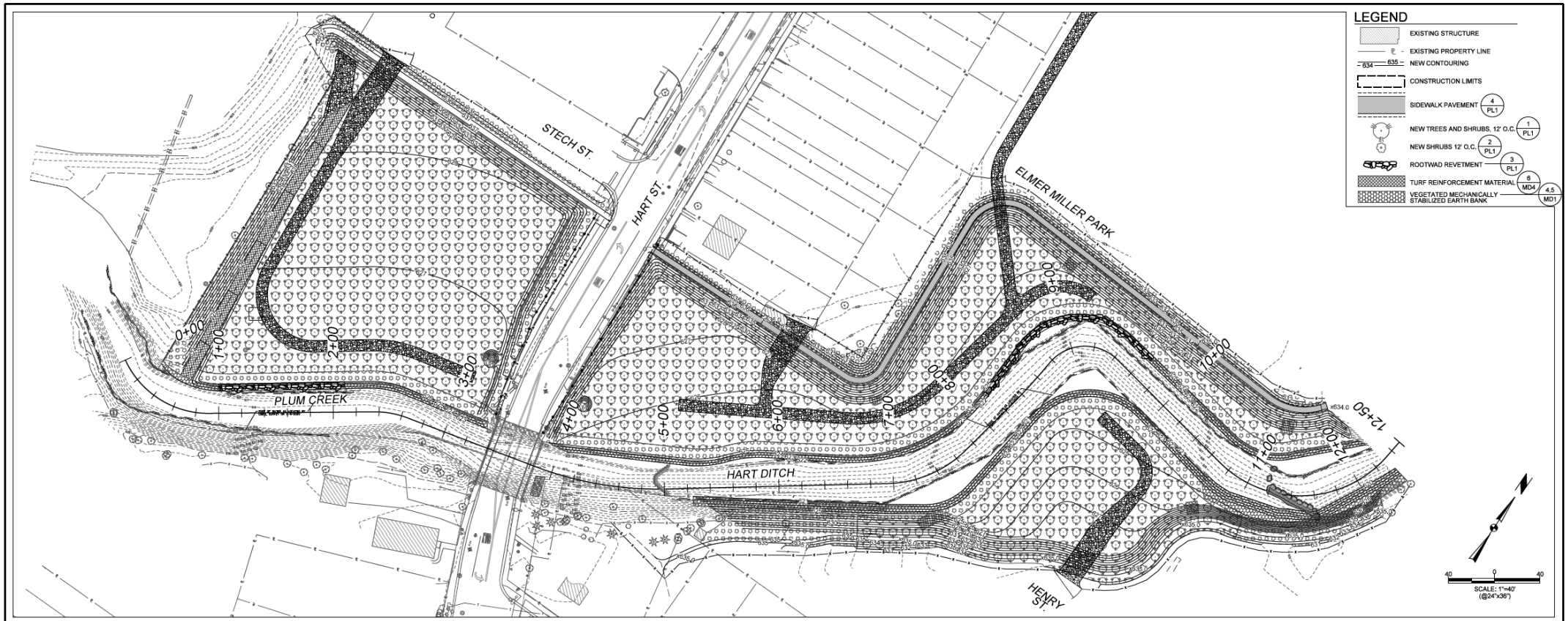

Early August 2022
DEERE

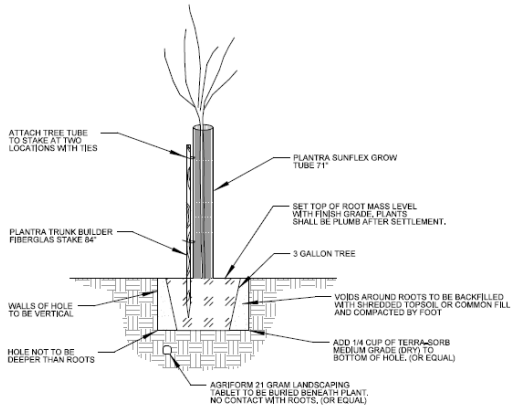

DEERE


DEERE

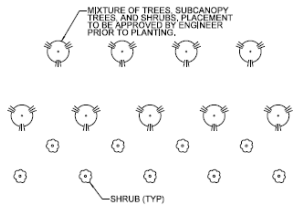
Sept. 28, 2022 Photos

- Backflow preventors on all storm sewers
- Landcaping
  - Trees – 775
  - Shrubs - 500
  - Live stakes – 1,167





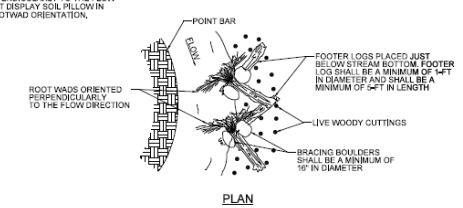
1 CONTAINER TREE PLANTING DETAIL
NOT TO SCALE



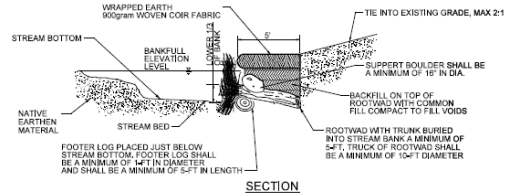
NOTES:
1. TREES SHALL BE PLANTED AT 12-FT ON CENTER.
2. SHRUBS SHALL BE PLANTED AT 12-FT ON CENTER.
3. TREE AND SHRUB PLANTING SCHEDULE: SEPTEMBER 15th TO DECEMBER 15th OR UNTIL THE GROUND HAS FROZEN OR THE LATTER OF MARCH 1st OR WHEN THE FROST LEAVES THE GROUND IN SPRING TO JUNE 1st.

2 TREE AND SHRUB SPACING DETAIL
NOT TO SCALE

NOTE:
ROOTWADS ARE ORIENTED PERPENDICULARLY TO THE FLOW DIRECTION. PLAN VIEW DOES NOT DISPLAY SOIL PILLOW IN ORDER TO PROVIDE VIEW OF ROOTWAD ORIENTATION.

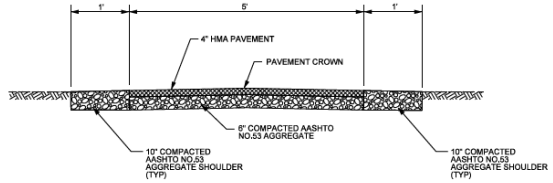


PLAN



SECTION

3 ROOTWAD DETAIL
NOT TO SCALE



4 SIDEWALK PAVEMENT DETAIL
NOT TO SCALE


Sept 20, 2022

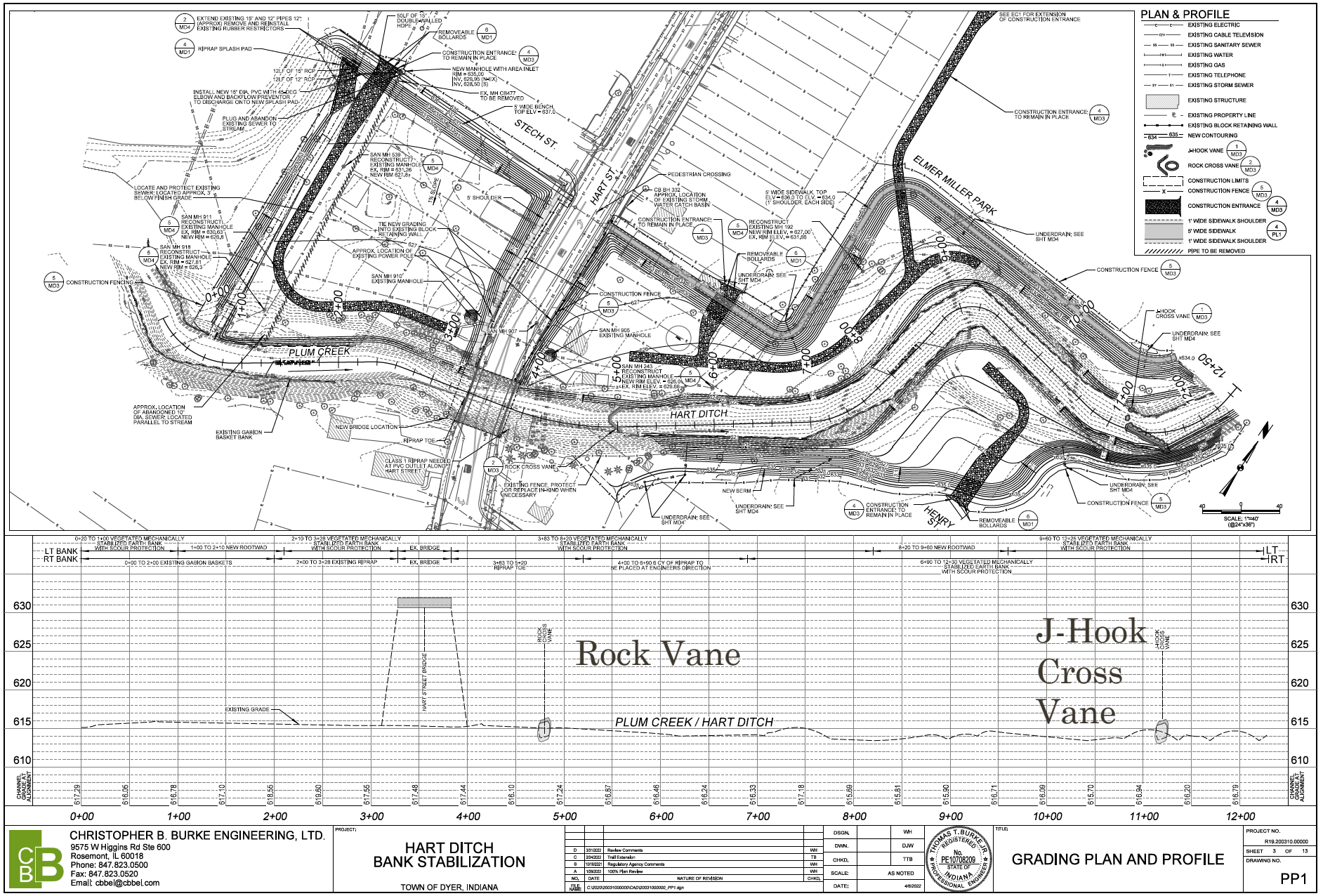
Live Stake Planting – Dec. 13, 2022

Aerial video from Feb. 28, 2023

- https://play.survae.com/?ll=41.49173550409626,-87.520862&z=17&mr=1&account=117&page=1&obj=BRbWjTOYpGnO&utc=1677608953842

Benefits

- Walking path
- Access path for maintenance
- Stopped overtopping to the south
- Provided protection for the hospital
- Creates 14.5 acre-feet of online flood storage
- Lowers the WSEL up to 0.9 feet



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SHEET 3 OF 13
DRAWING NO. PP1

Signage

Rootwads, J-Hooks, and Rock Vanes

What are they?

Here are a few ways Hart Ditch/Plum Creek was transformed.

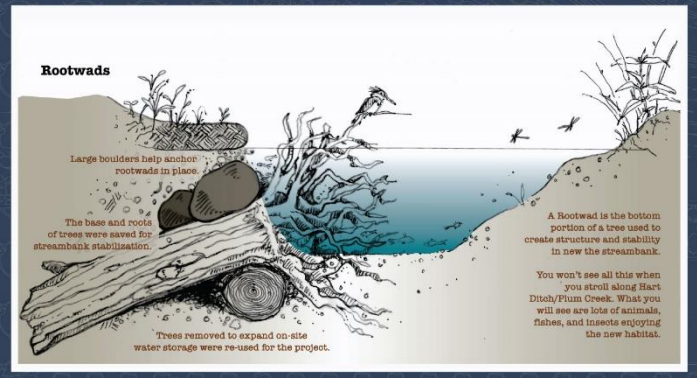
Water flowing through a community can be its most incredible beauty and a welcome asset.

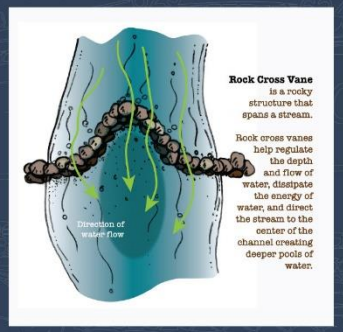
Community leaders came together and embarked upon a multi-year project employing dozens of solutions and thousands of hours to transform Hart Ditch/Plum Creek into a beautiful natural asset.

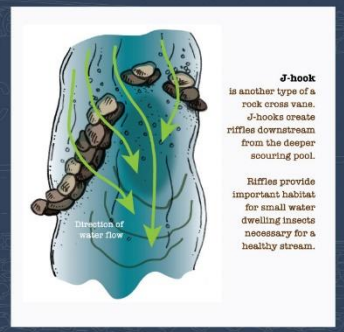
A Do-Over

Top-to-bottom, side-to-side, Hart Ditch/Plum Creek needed a complete do-over. The earth along the creek was resculpted to ensure a healthy flow of water. Hundreds of native trees, shrubs, grasses, and wildflowers were planted along the waterway.

Rootwads, J-hooks, rock vanes, and 2-stage benches are also some of the many solutions used for the urban stream restoration of Hart Ditch/Plum Creek.







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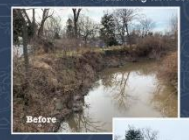
L. Wallis, Freelance Illustrations

A local long-term solution was needed

For most of its history, Hart Ditch/Plum Creek could have been a better asset in the Town of Dyer. Upstream issues caused problems the Town of Dyer had no control over.

Sediment washed downstream, thickly coating the creek bed prohibiting a healthy environment. The waterway constantly overflowed its banks, causing repeated flooding of nearby homes and roadways, impacting the hospital grounds and buildings. There was no public access to the waterway as the banks were nearly vertical.

A local long-term solution was designed and implemented.



Project Partners:
Town of Dyer Stormwater Management Board
Lake County Surveyor's Office
Franciscan Hospital Dyer
Little Calumet River Basin Development Commission
Lake Michigan Coastal Program
Lake County Highway Department

Healthy Neighborhoods Need Healthy Environments

We all live in neighborhoods

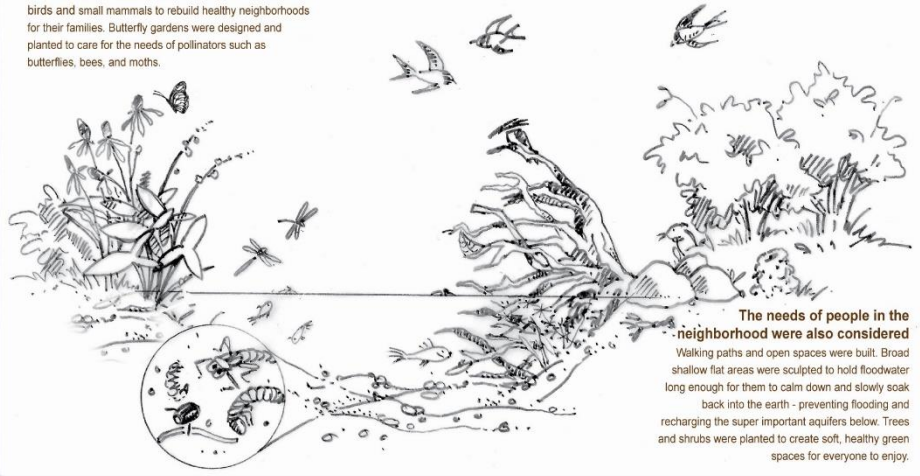
Our neighborhoods include…food, shelter, water, and safe places for us to grow.

Birds, mammals, fishes, aquatic creatures,

The needs of small creatures were built into the project

The aquatic insects were given new homes with the riffles built into the creek, as well as fishes, and native crustaceans. The needs of migrating birds were considered in the planning. Many native trees, shrubs, grasses, and wildflowers were planted for birds and small mammals to rebuild healthy neighborhoods for their families. Butterfly gardens were designed and planted to care for the needs of pollinators such as butterflies, bees, and moths.

The art will be in color



The needs of people in the neighborhood were also considered

Walking paths and open spaces were built. Broad shallow flat areas were sculpted to hold floodwater long enough for them to calm down and slowly soak back into the earth - preventing flooding and recharging the super important aquifers below. Trees and shrubs were planted to create soft, healthy green spaces for everyone to enjoy.

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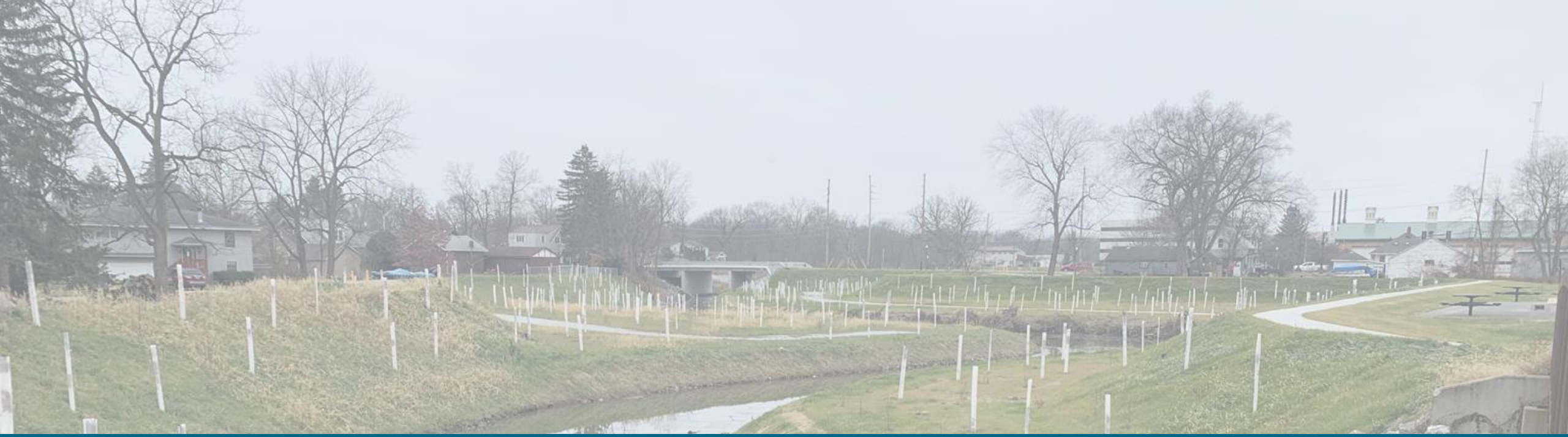

Questions?