



SPRING BROOK MEANDER PROJECT

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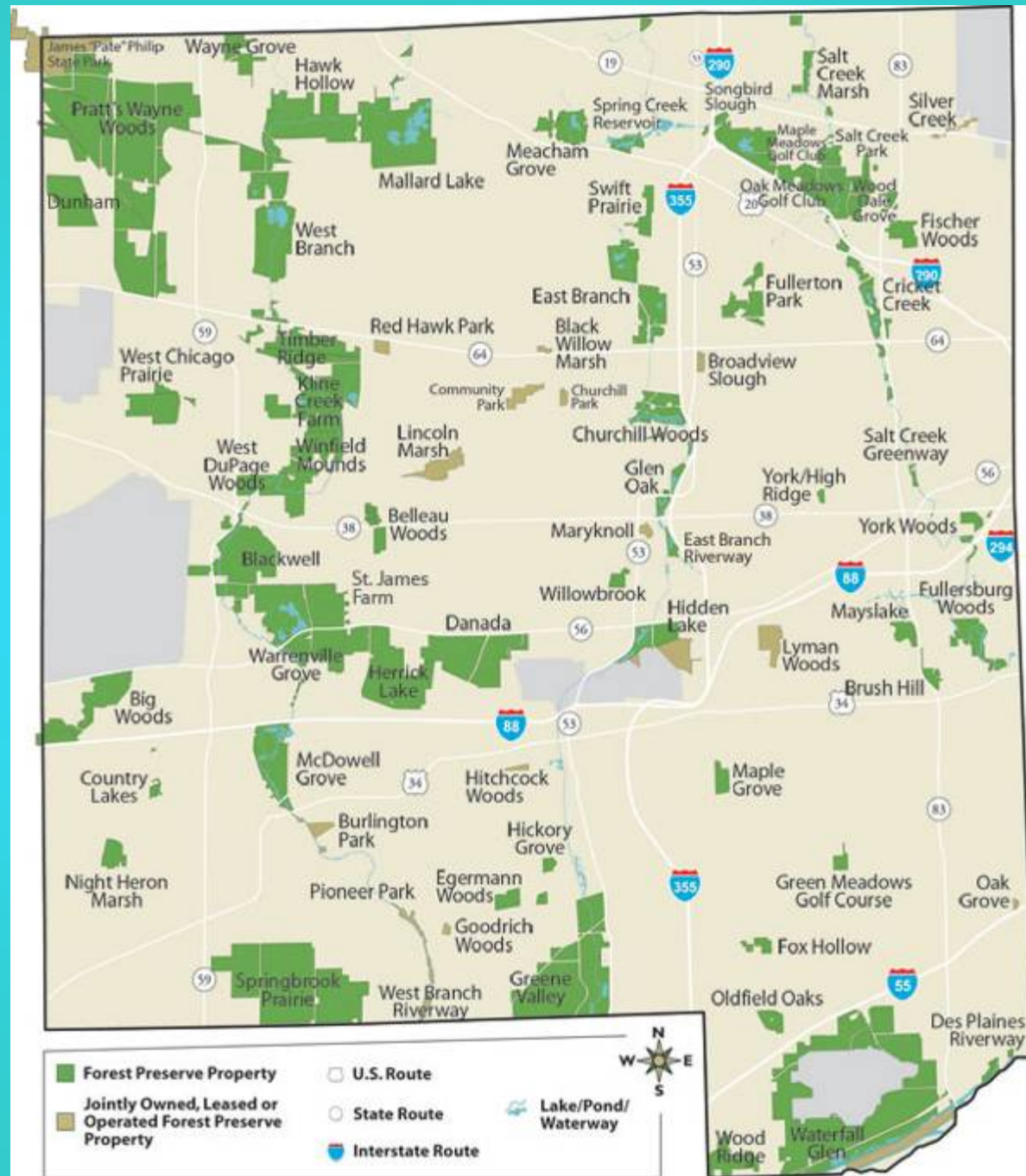


"...to acquire... and hold lands... for the purpose of protecting and preserving the flora, fauna and scenic beauties... for the purpose of the education, pleasure and recreation of the public."

-- Downstate Forest Preserve District Act of 1915



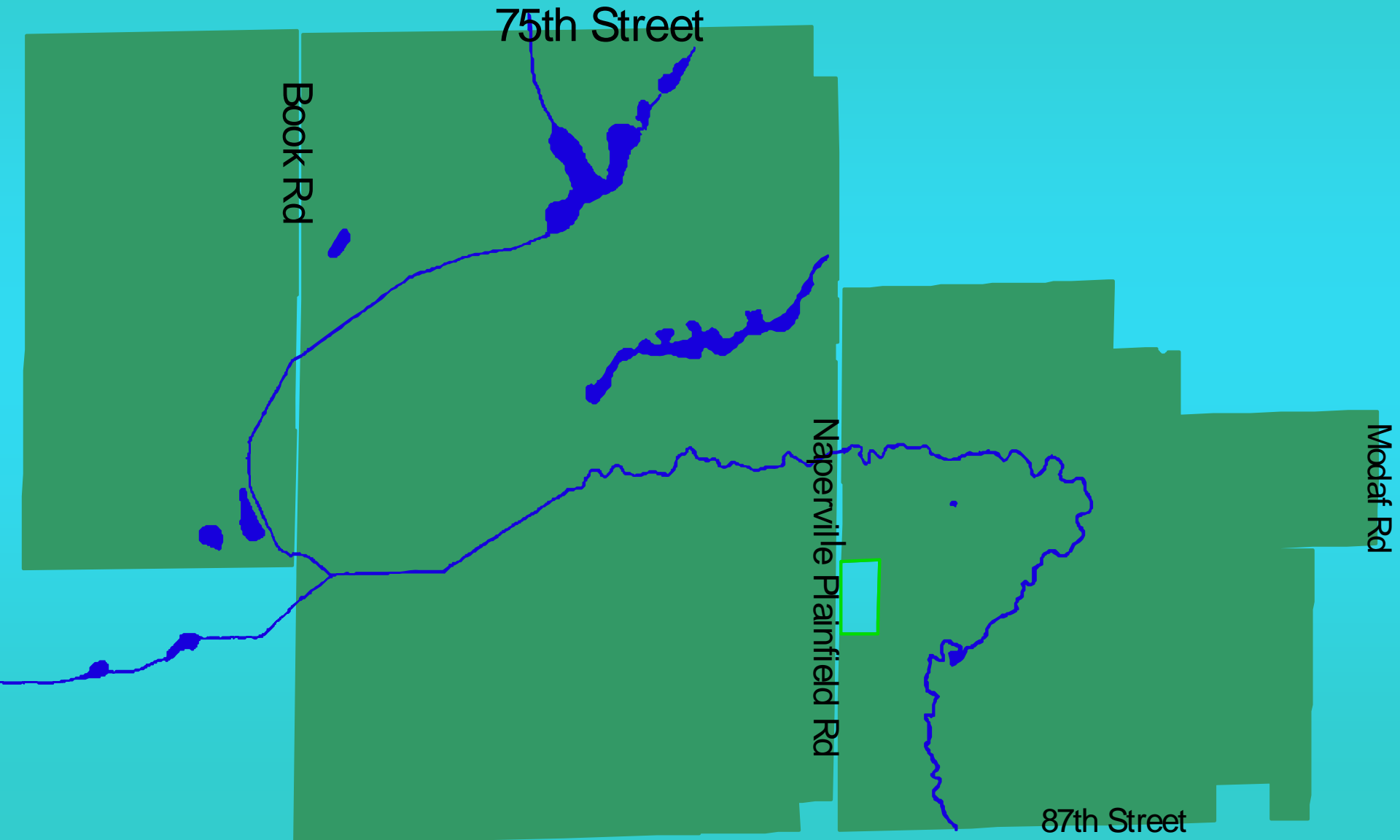
- ❑ 25,000 acres
- ❑ 60 Preserves
- ❑ 12% of County
- ❑ 25 miles west of Chicago



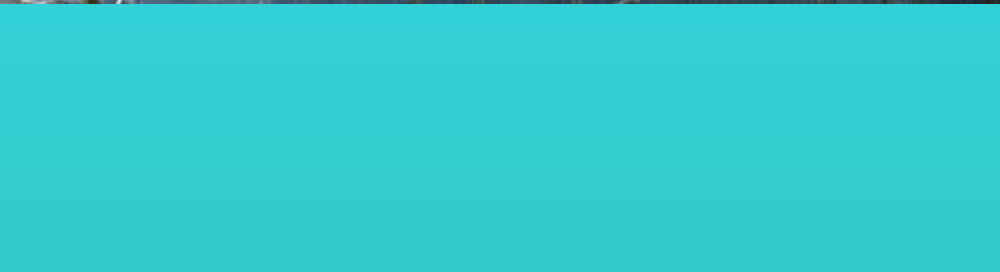
Springbrook Prairie Forest Preserve



Springbrook Prairie Forest Preserve



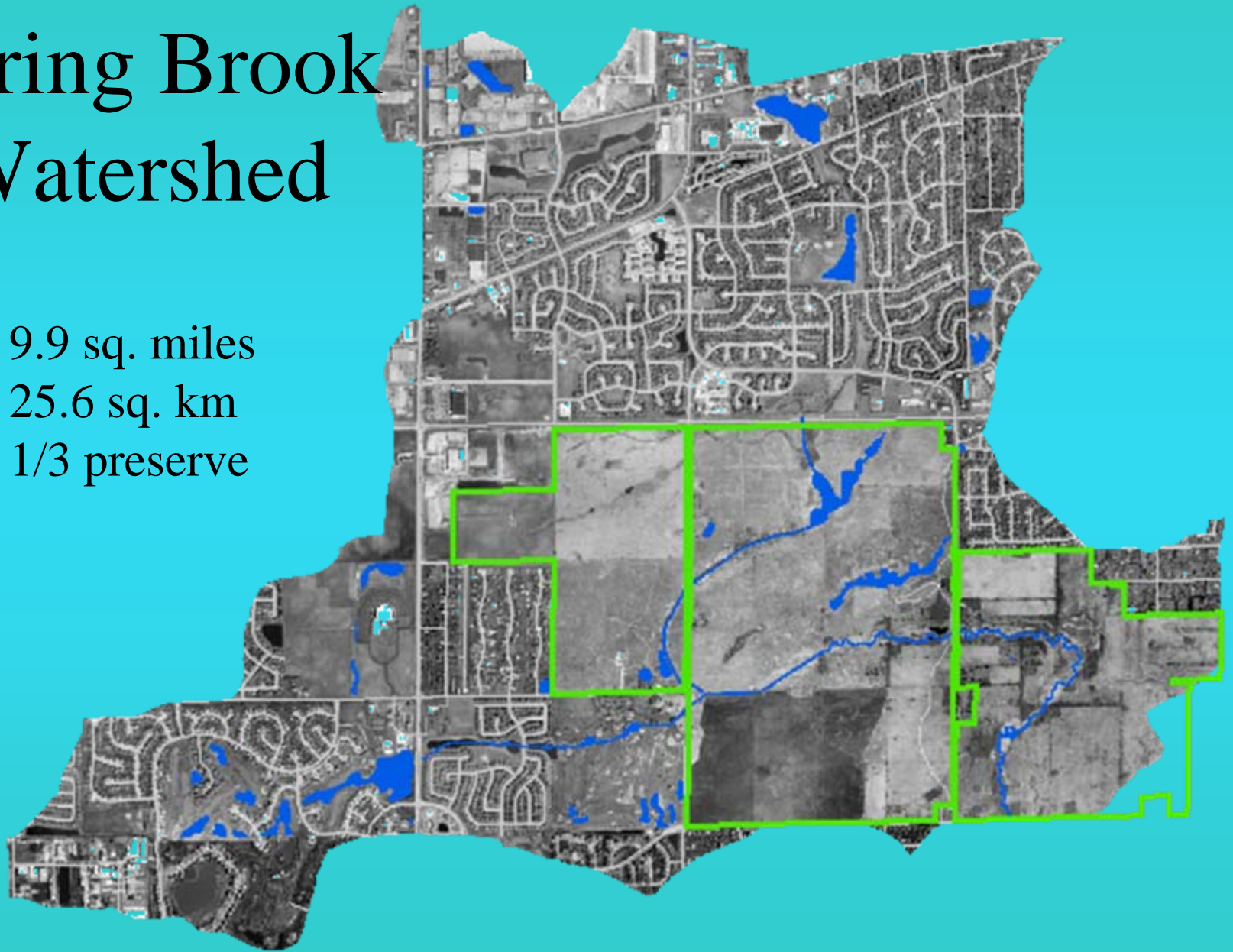






Spring Brook Watershed

- 9.9 sq. miles
- 25.6 sq. km
- 1/3 preserve



Watershed Characteristics

- Is it Springbrook? Spring Brook? Spring Brook No.2?
- Spring Brook No.2 is 2/3 residential and 1/3 forest preserve. The middle portion is forest preserve.
- Residential is mostly in the City of Naperville.

Watershed Characteristics

- Northern 2/3 is in DuPage County, southern 1/3 is in Will County
- Spring Brook No.2 is tributary to the DuPage River
- There are 2 main tributaries: Golf Course Tributary & Leverenz Road Tributary

Summary of Problem

- Channel was 15 to 30 feet wide and up to 6 feet deep, eroding, and continuing to degrade.
- Silty Bottom likely contributed substantial fine sediment to the system.
- Erosion and degradation would continue.

Design

Where do we start?

- Establish goals
- FPD selected a reach downstream of the project to study its already existing geomorphic and biological characteristics

Goals

- Create normal entrenchment conditions
- Create geomorphologic appropriate meanders
- Install measures to prevent channel incisement
- Establish native riparian species

Goals (cont'd)

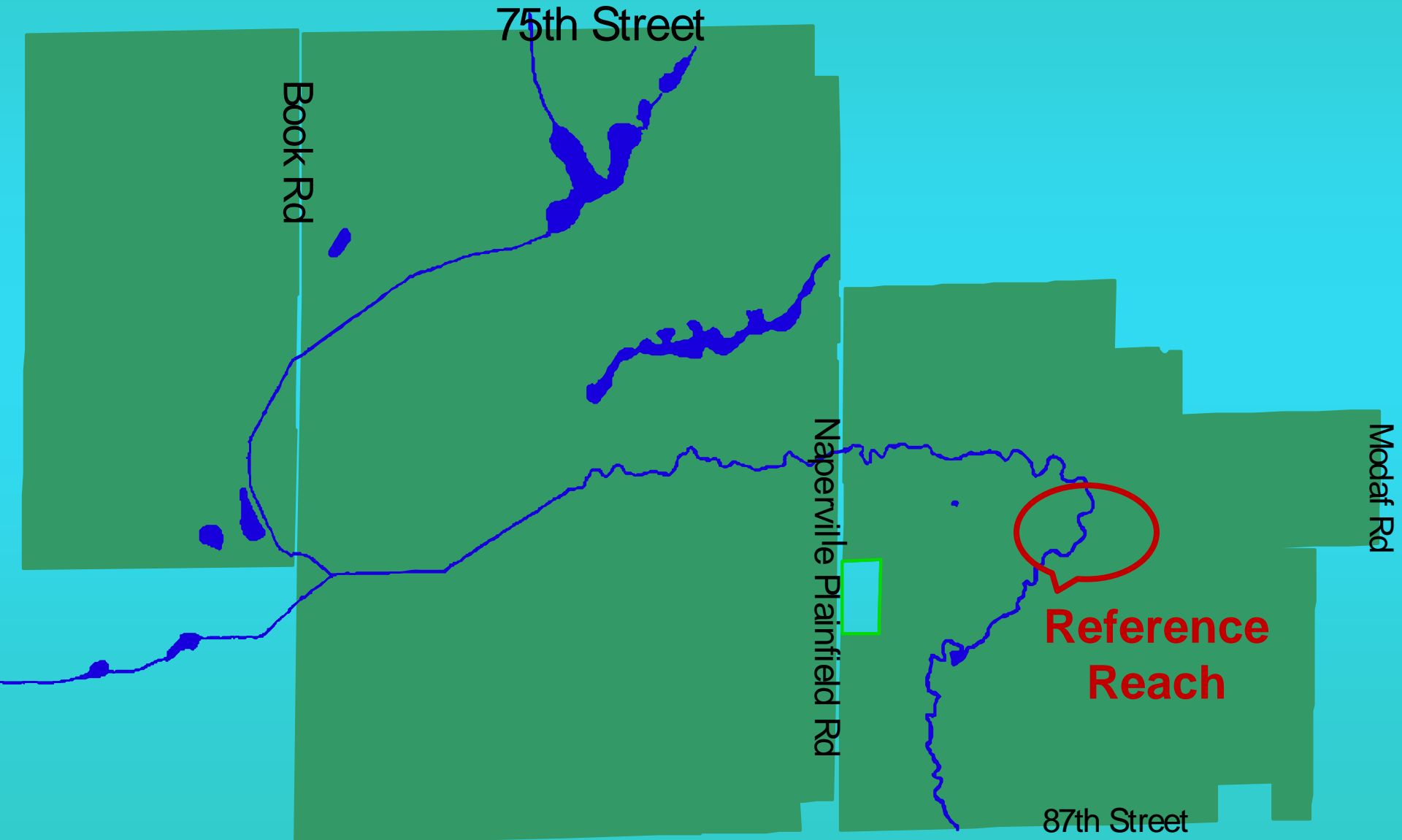
- Install natural bank revetment and bed substrates to improve lotic diversity
- Meet the DuPage County Ordinance
- Work with the City of Naperville to alleviate flooding at Book Road and 83rd Street intersection

Design Process

Initial Steps:

- The Fen, a reach downstream of the project, was selected as the “Reference Reach” to study its already existing geomorphic and biological characteristics

Springbrook Prairie Forest Preserve



The Fen

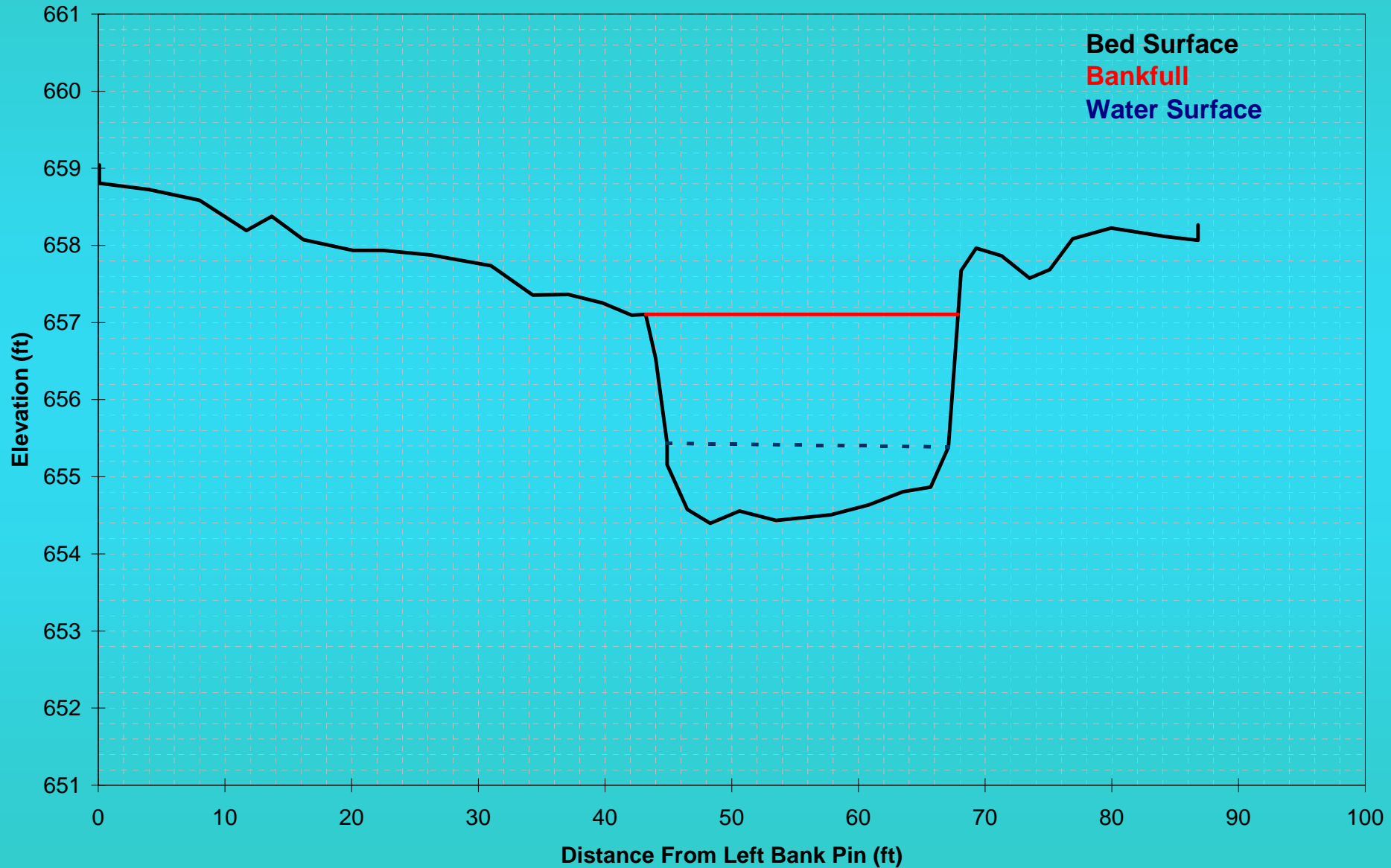
(Reference Reach)



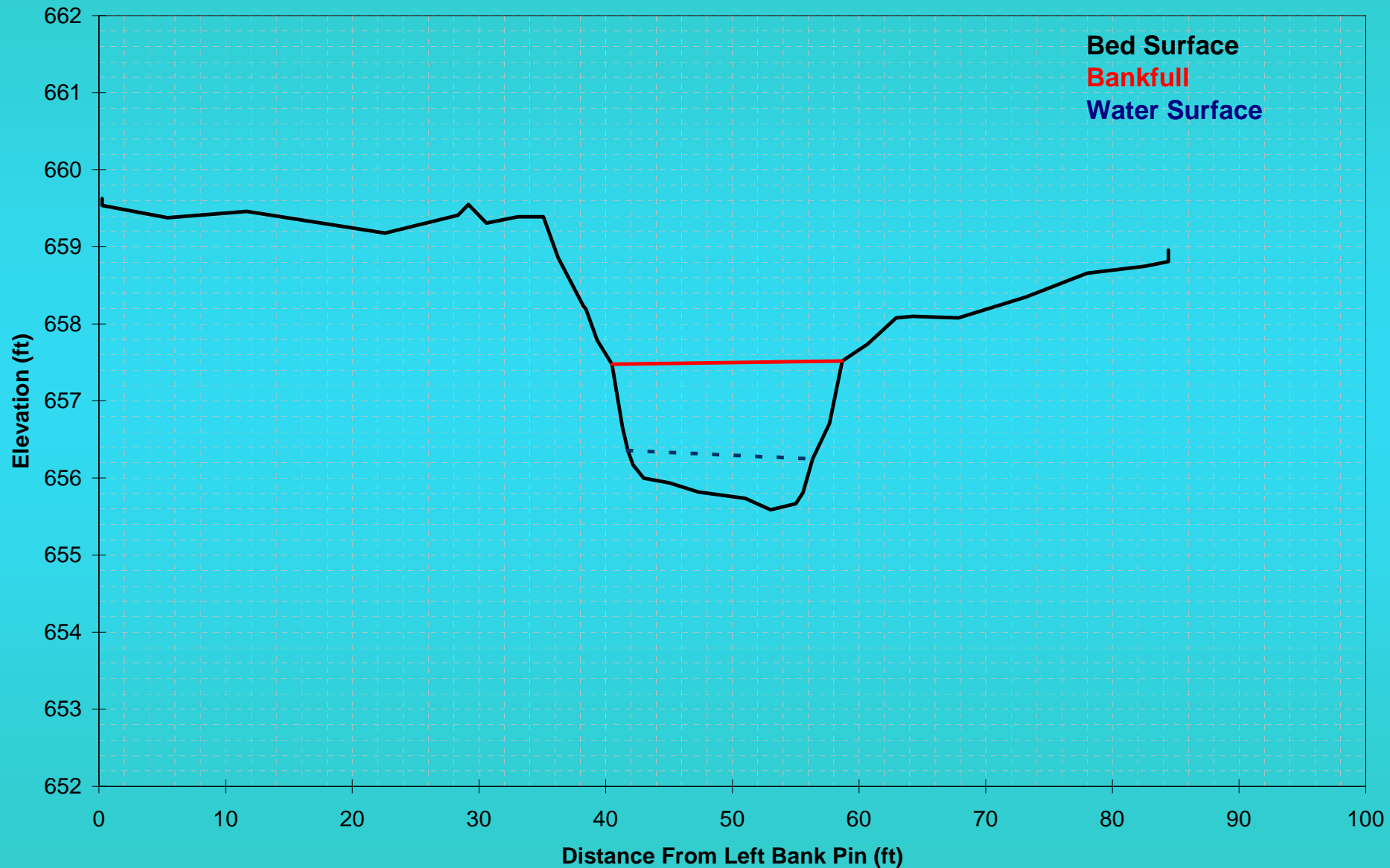
Cross-Section Studies



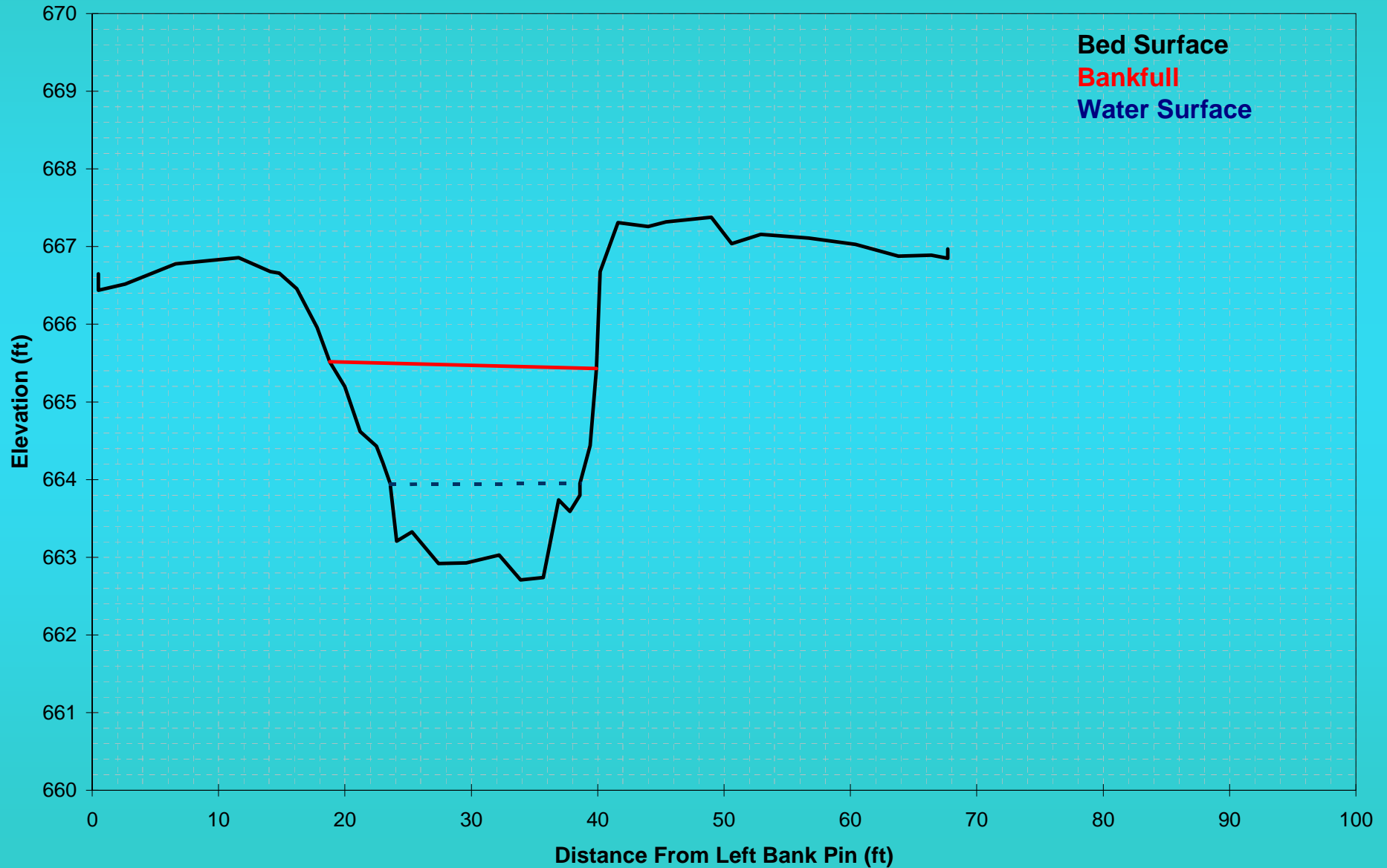
Springbrook Creek: Cross Section - O



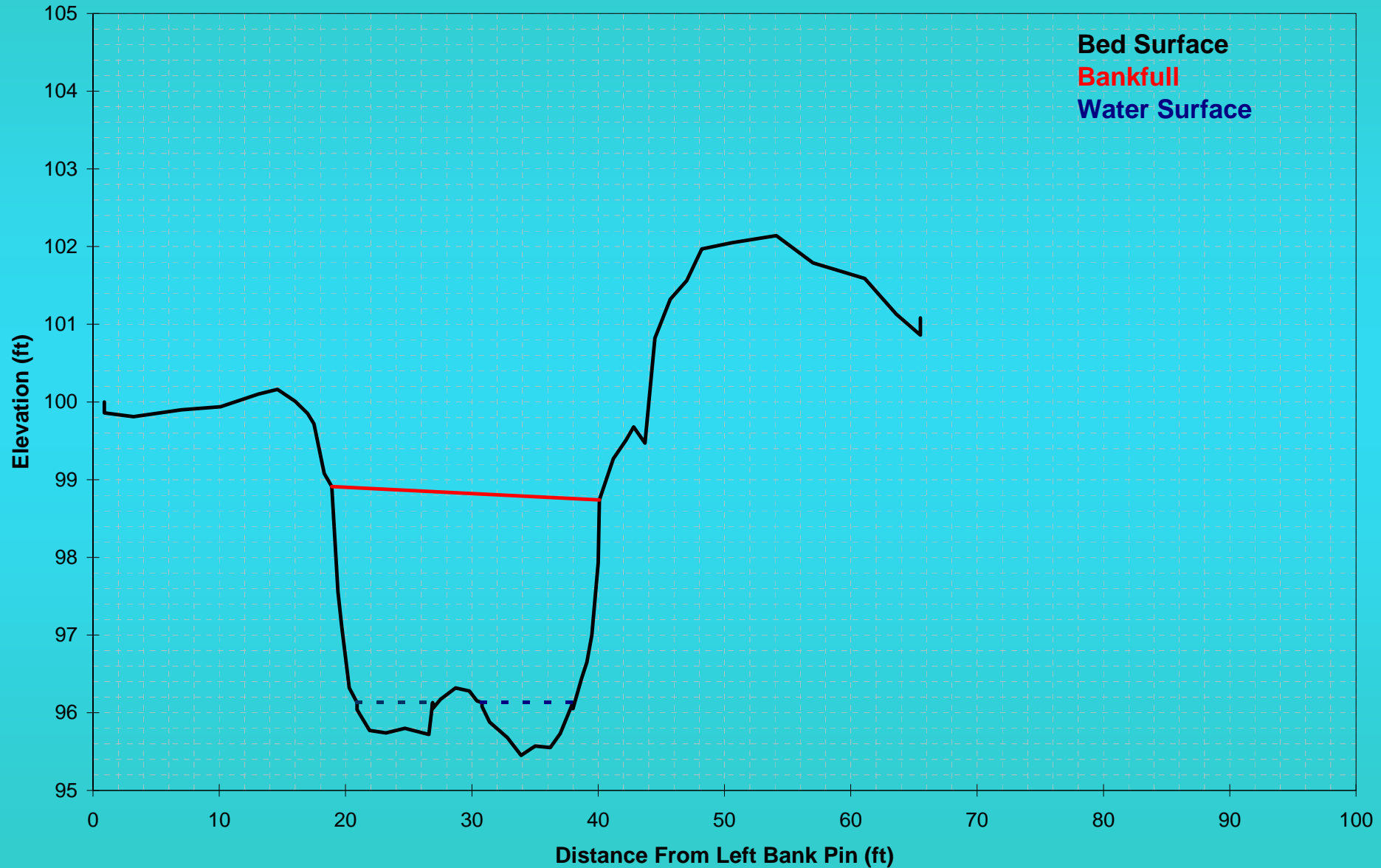
Springbrook Creek: Cross Section - R



Springbrook Creek: Cross Section - NN



Springbrook Creek: Cross Section - TT



Bank Erosion – Bank Pins



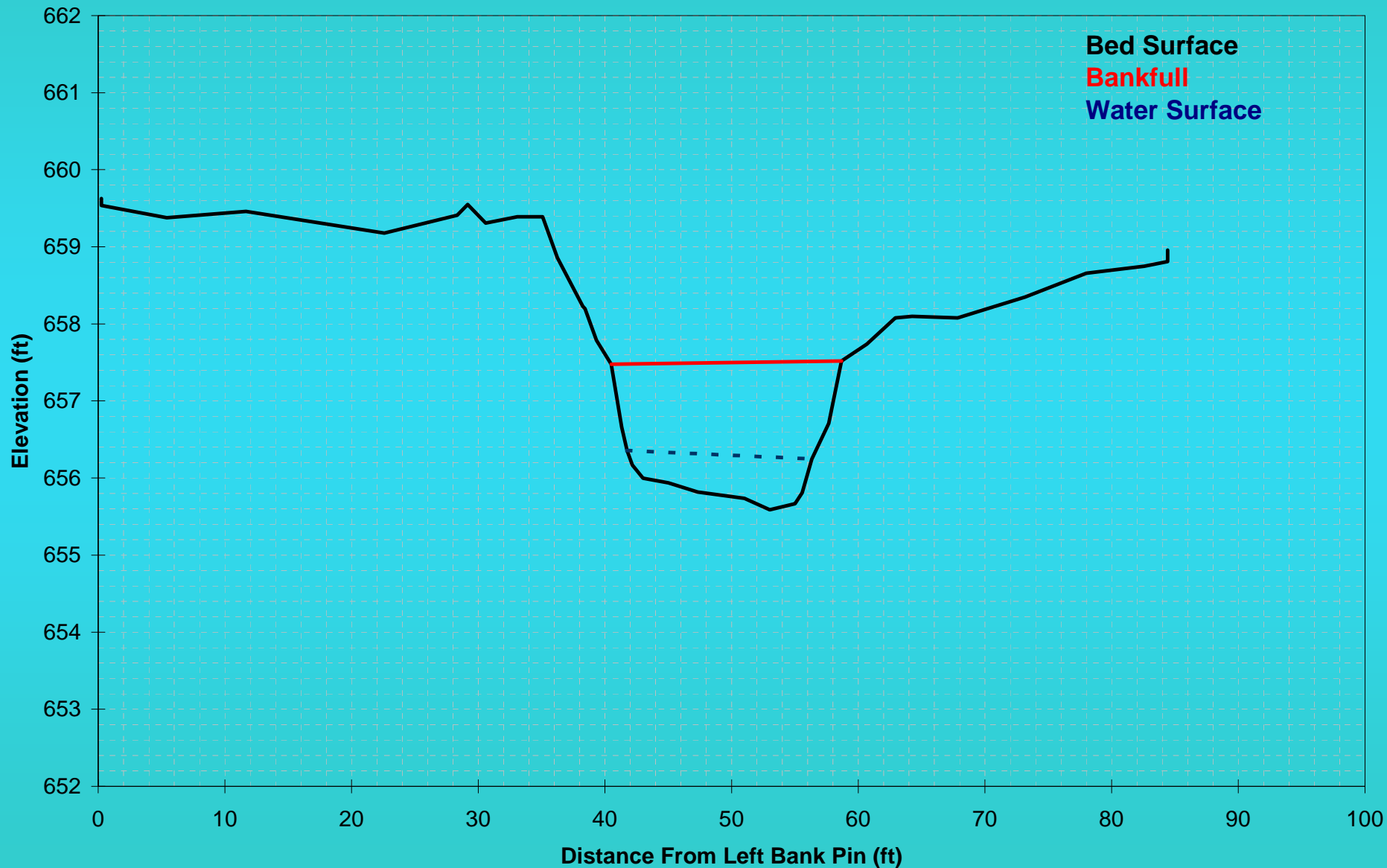
Bank Pins

11/2000 thru 7/2004

(Feet)

X-Section	Top Pin	Bottom Pin
XS-E	1.63	1.69
XS-N	0.05	0.55
XS-O	0.18	0.42
XS-R	0.09	0.49
XS-Z	1.54	1.56
XS-CC	0.18	0.41
XS-GG	0.96	1.47
XS-II	0.35	1.17
XS-JJ	0.89	1.10
XS-KK	0.57	1.75
XS-NN	1.46	1.95

Springbrook Creek: Cross Section - R

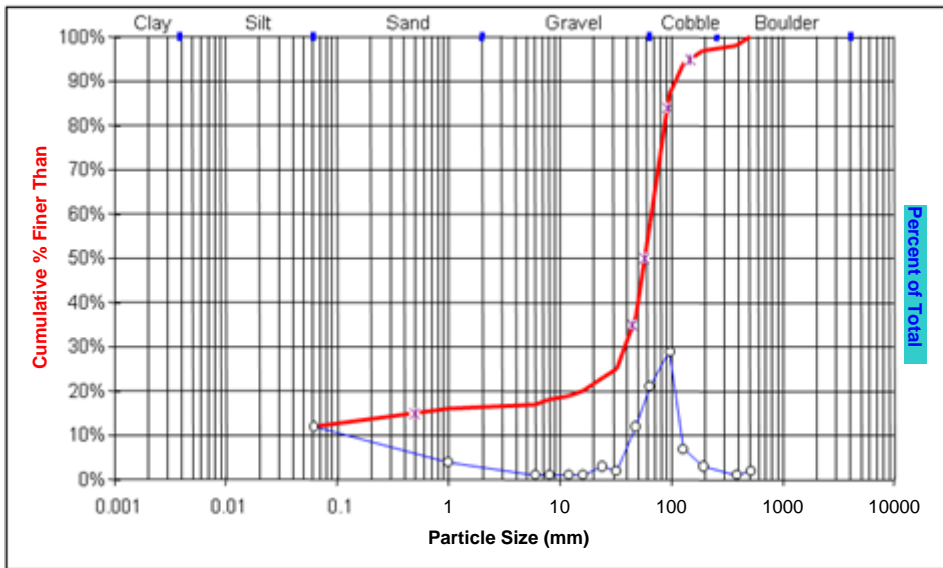


Design Process (cont'd)

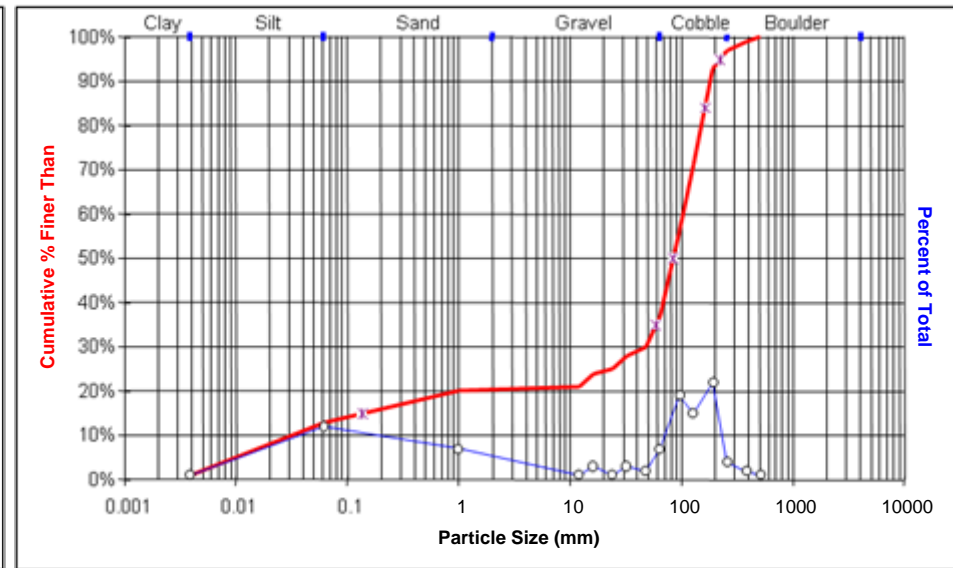
Initial Steps:

- Streambed substrate will contain material found in the Reference Reach
- Particle size distribution will be similar to selected stable cross section “R”

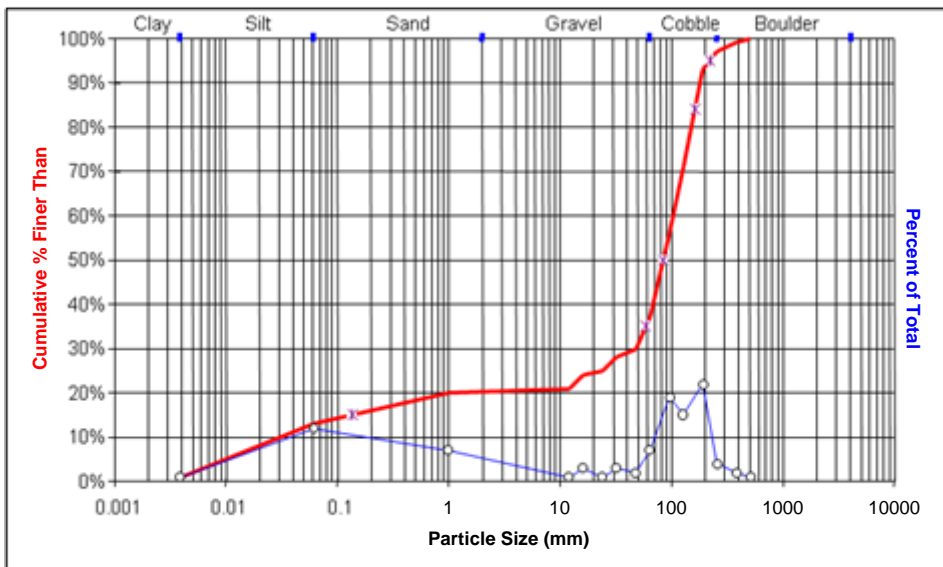
Springbrook Creek: Cross Section - O



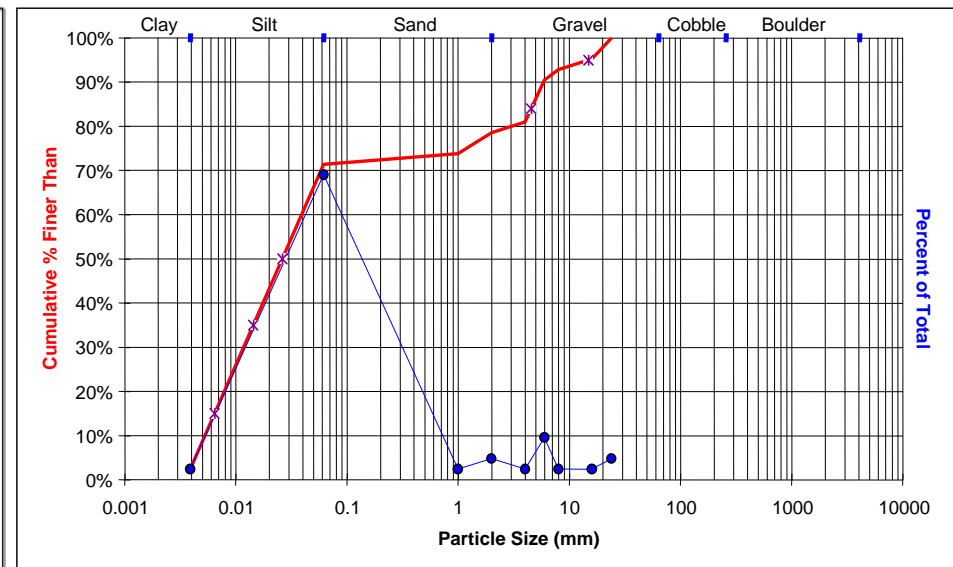
Springbrook Creek: Cross Section - R



Springbrook Creek: Cross Section - NN



Springbrook Creek: Cross Section - TT



Hydrological Data

USGS Gage Station

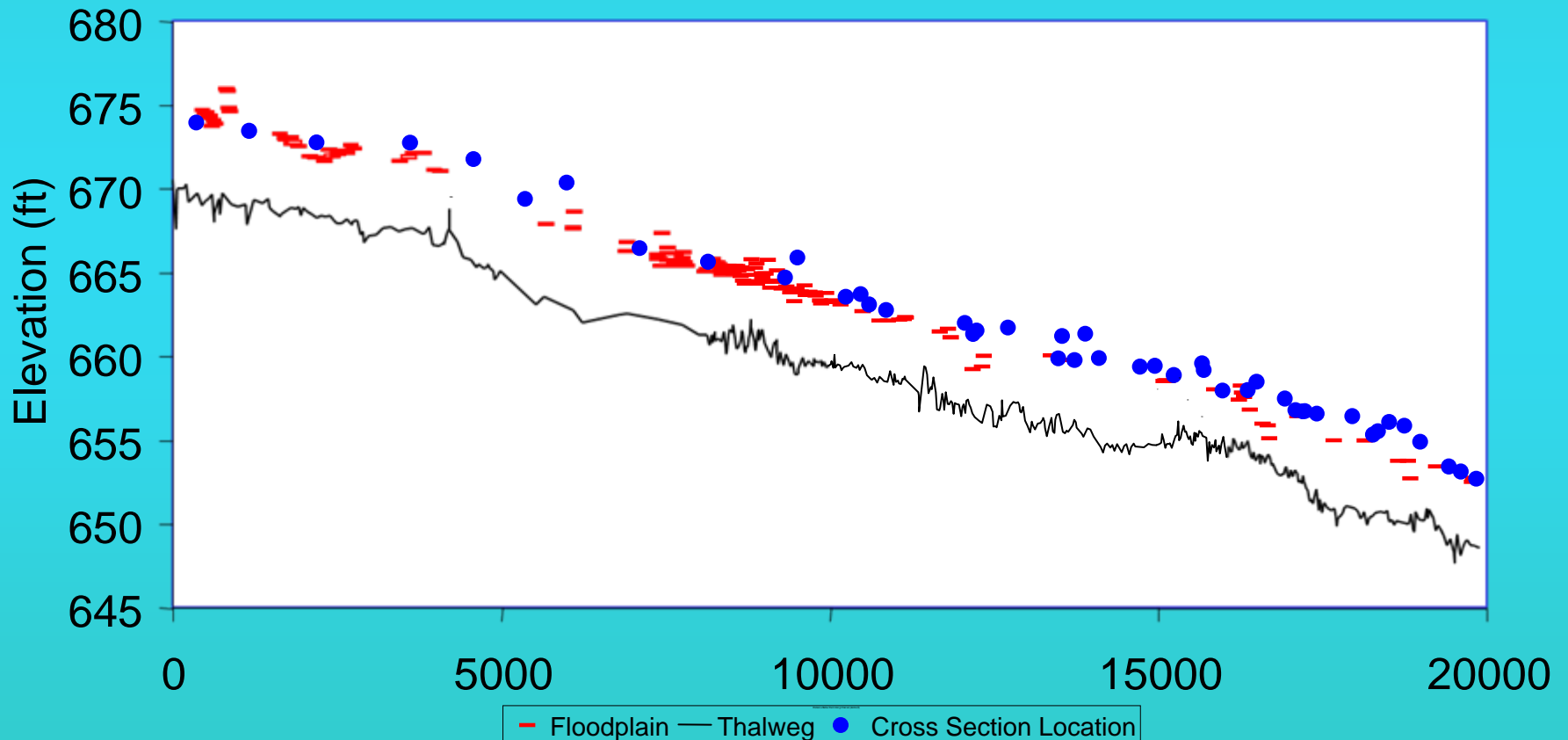
1988 - 2001

Duration of Flows at Gage Station	
Average No. Days per Year	Mean Daily Flow (cfs)
0.25	300
5	200
1	135
2	105
5	65
10	55
15	40
30	30
Peak Discharge	
Recurrence Interval (years)	Instantaneous Peak Discharge (cfs)
1.5	135

Estimated Bankfull

Spring Brook

Longitudinal Profile



Design Process (cont'd)

Concept Design:

- Calculate channel dimension (width, mean depth, area)
- Calculate meander parameters (meander wavelength, sinuosity, belt width)
- Other (maximum depth, pool depths, width/depth ratio)

Bankfull Channel Design Parameters by Reach

	Upper	Middle	Lower
Discharge (cfs)	50	50	70
Width (ft)	18 – 22	18 - 22	22 - 25
Cross Sectional Area (ft ²)	30 – 40	30 - 40	40 - 50
Mean Depth (ft)	1.6 - 1.8	1.6 - 1.8	1.8 - 2.0
Max Depth (ft)	1.75 - 2.25	1.75 - 2.25	2.0 - 2.5

Bankfull Channel Design Parameters by Reach (cont'd)

Pool Depth (ft)	3.0 - 5.0	3.0 - 5.0	4.0 - 6.0
Width/Depth Ratio (ft/ft)	11.8	11.8	12.4
Belt Width (ft)	110 - 130	110 - 130	110 - 130
Meander Wavelength (ft)	200 - 280	200 - 280	240 - 320
Sinuosity (ft/ft)	1.37	1.22	1.38
Slope (ft/ft)	0.0008	0.0012	0.0008

Design Process (cont'd)

Other Design Considerations
(regulatory flows):

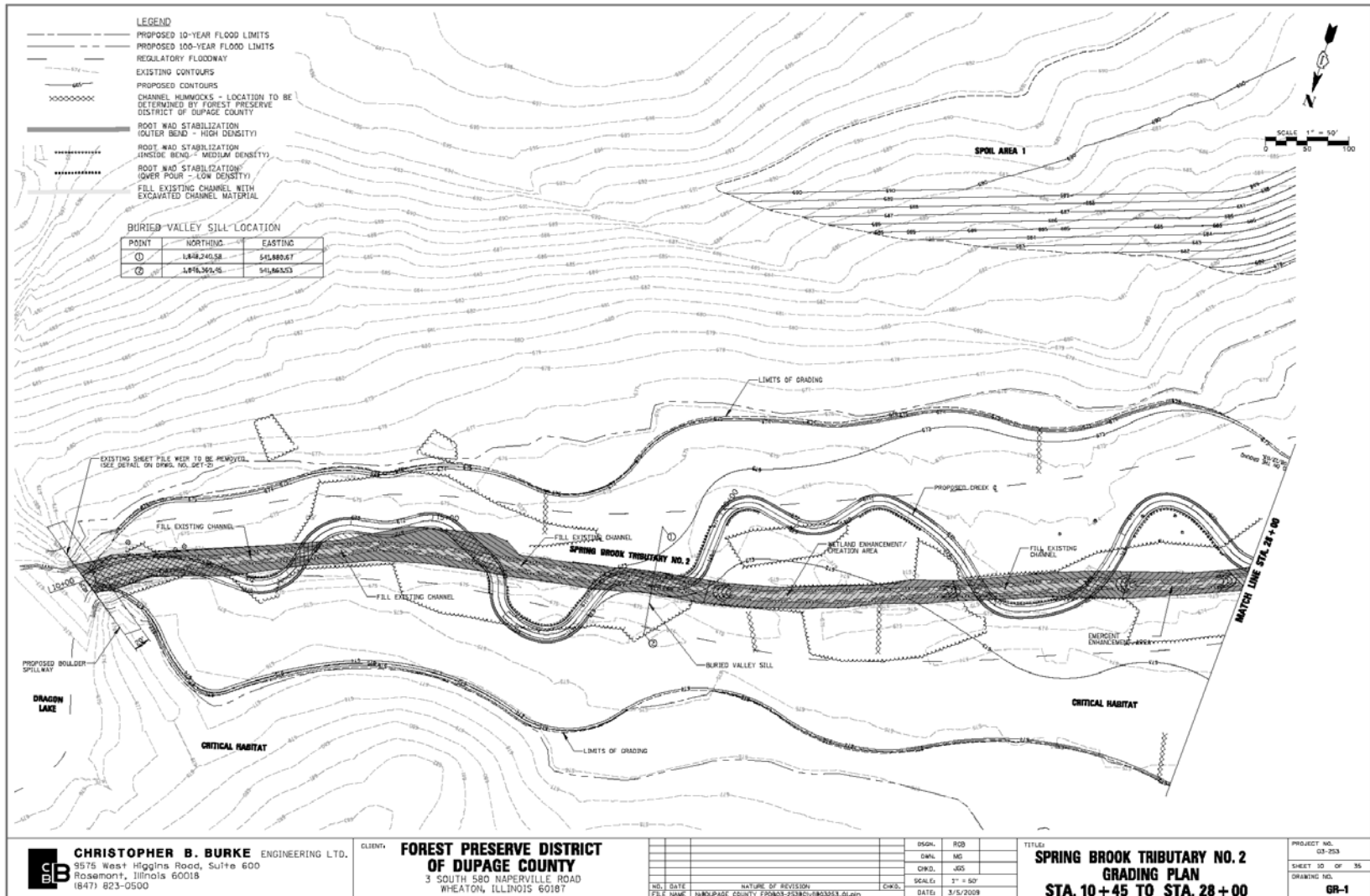
REACH	10-year (cfs)	100-year (cfs)
Upper	375	670
Middle	501	949
Lower	799	1485

Design Process (cont'd)

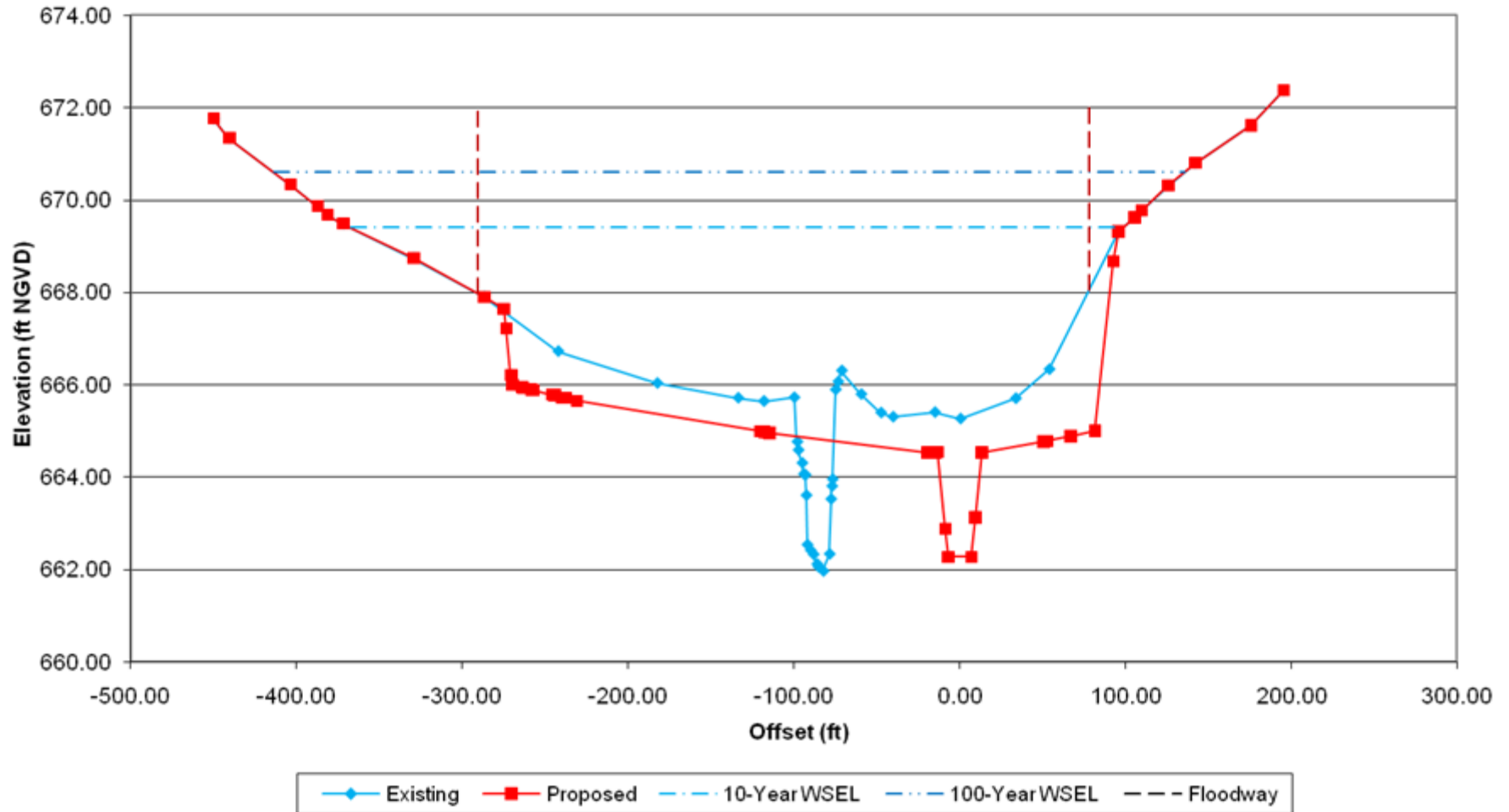
Other Design Considerations:

- Book Road Culverts
- Book Road & 83rd Street Intersection Improvements which include culvert sizing and inverts
- FEQ Watershed Model

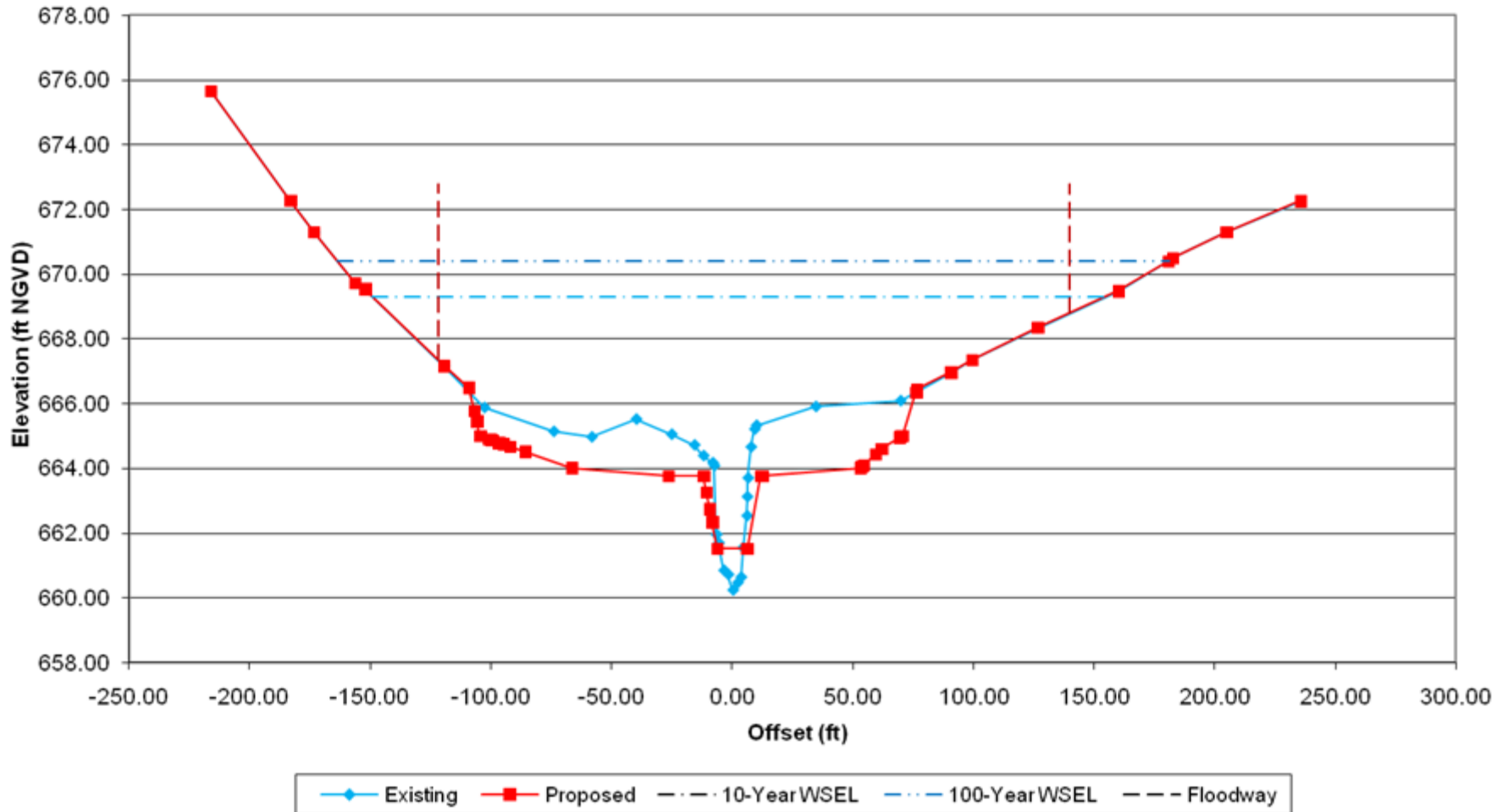
Upper Reach Section



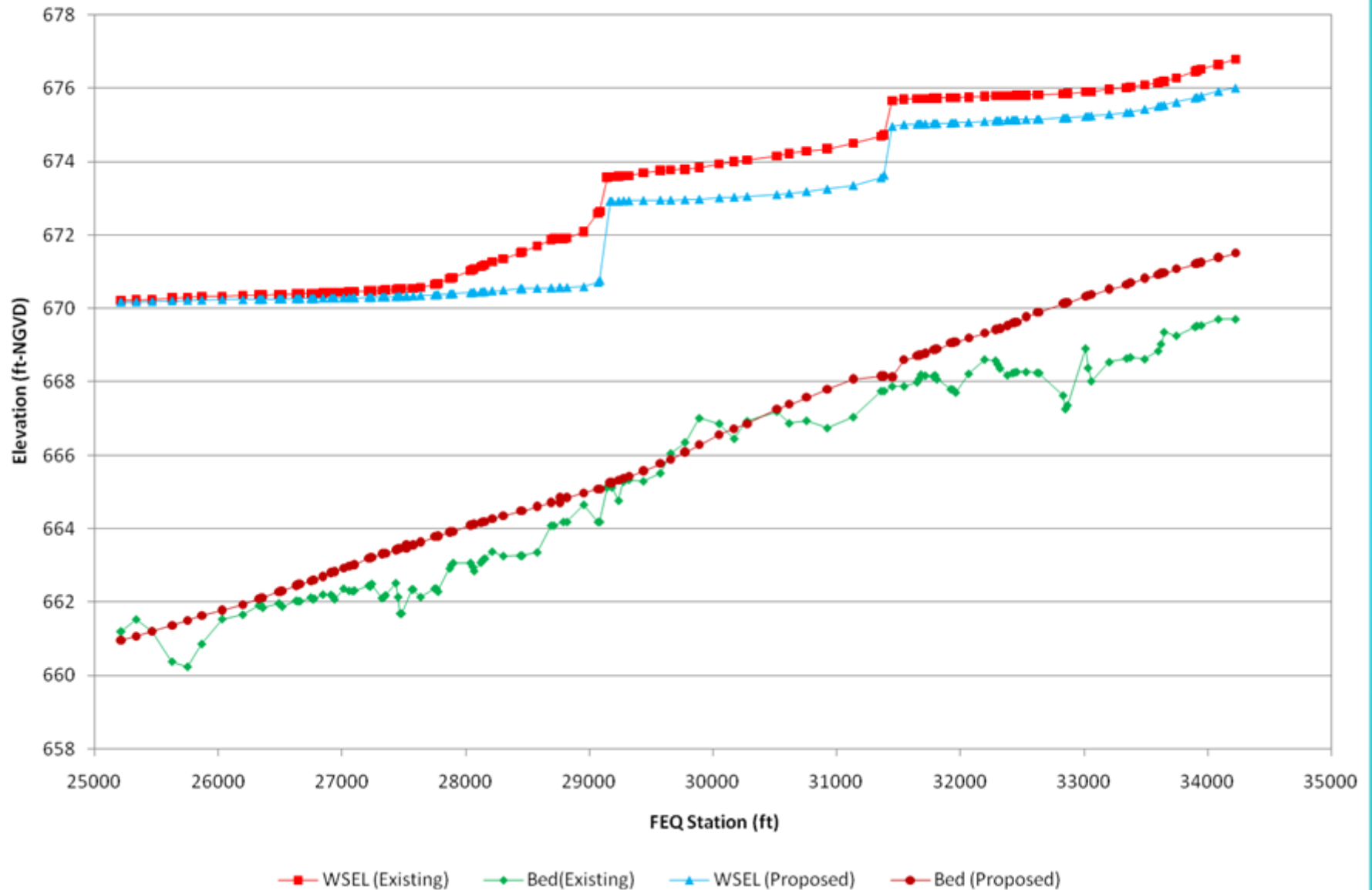
Spring Brook No. 2 Remeander Project
Existing 10- and 100-Year Flood Elevations with Floodway Limits
Cross Section: 110+05
FEQ Table No. 3647



Spring Brook No. 2 Remeander Project
Existing 10- and 100-Year Flood Elevations with Floodway Limits
Cross Section: 119+88
FEQ Table No. 3654



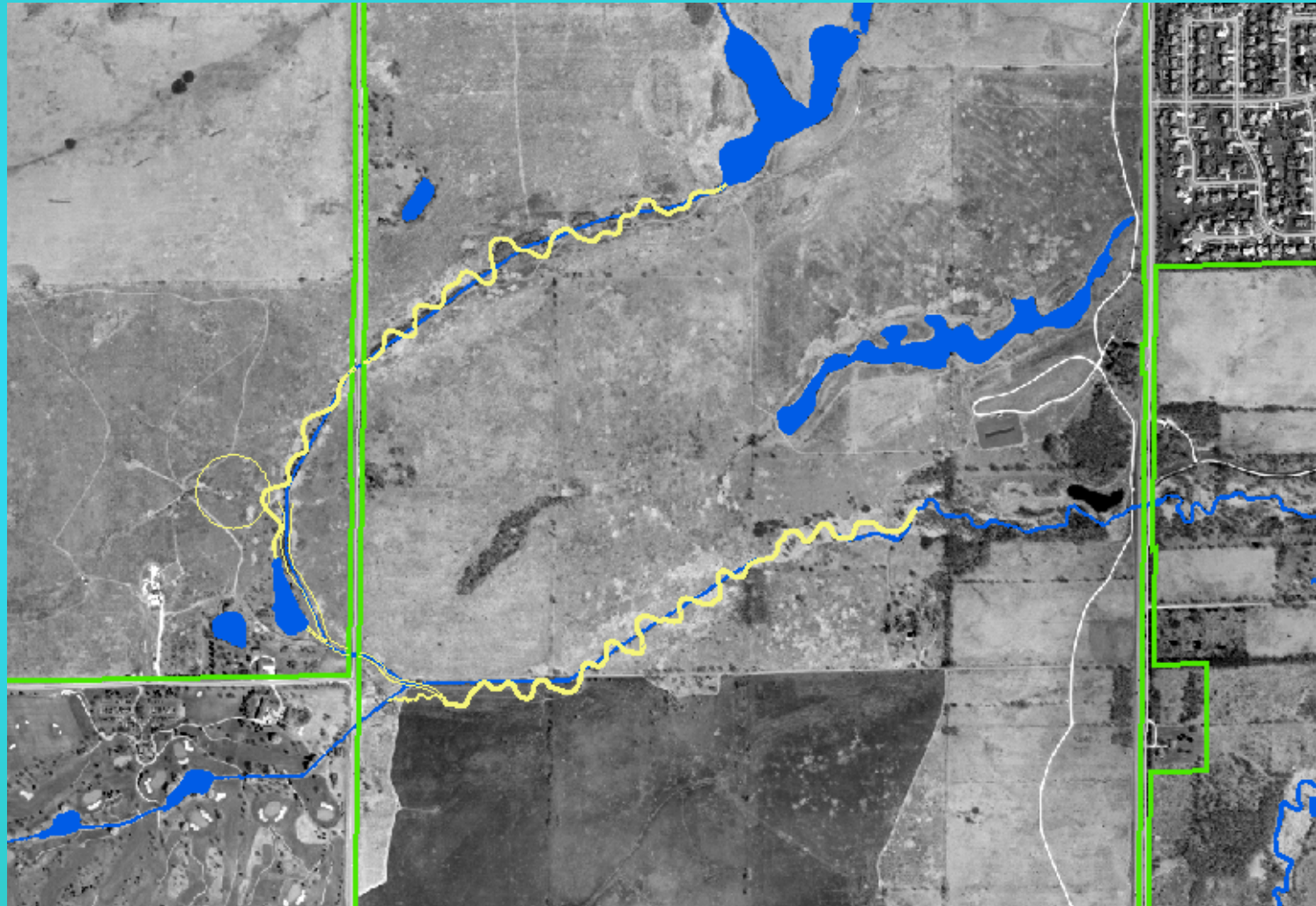
Channel Bottom and Flood Elevation Profile August 1972 Storm Event



Iterative Design Process

- Channel width and depth
- Floodplain Width
- Channel slope
- No off-site flood elevation increases
- Book Rd/83rd St Culvert Inverts
- Floodway and Floodplain Storage

The Spring Brook Stream Meander Project





















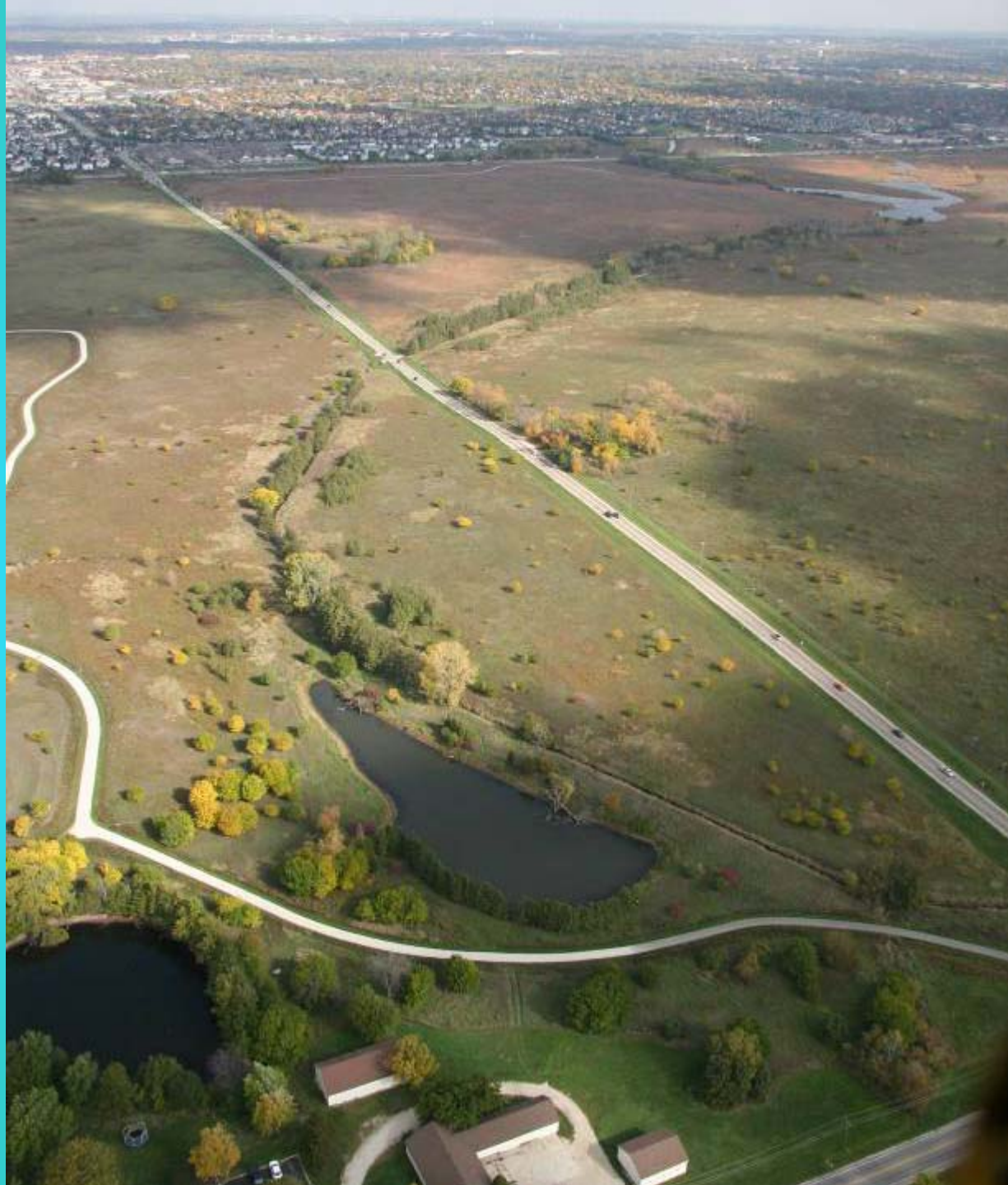










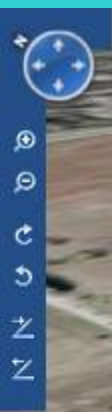
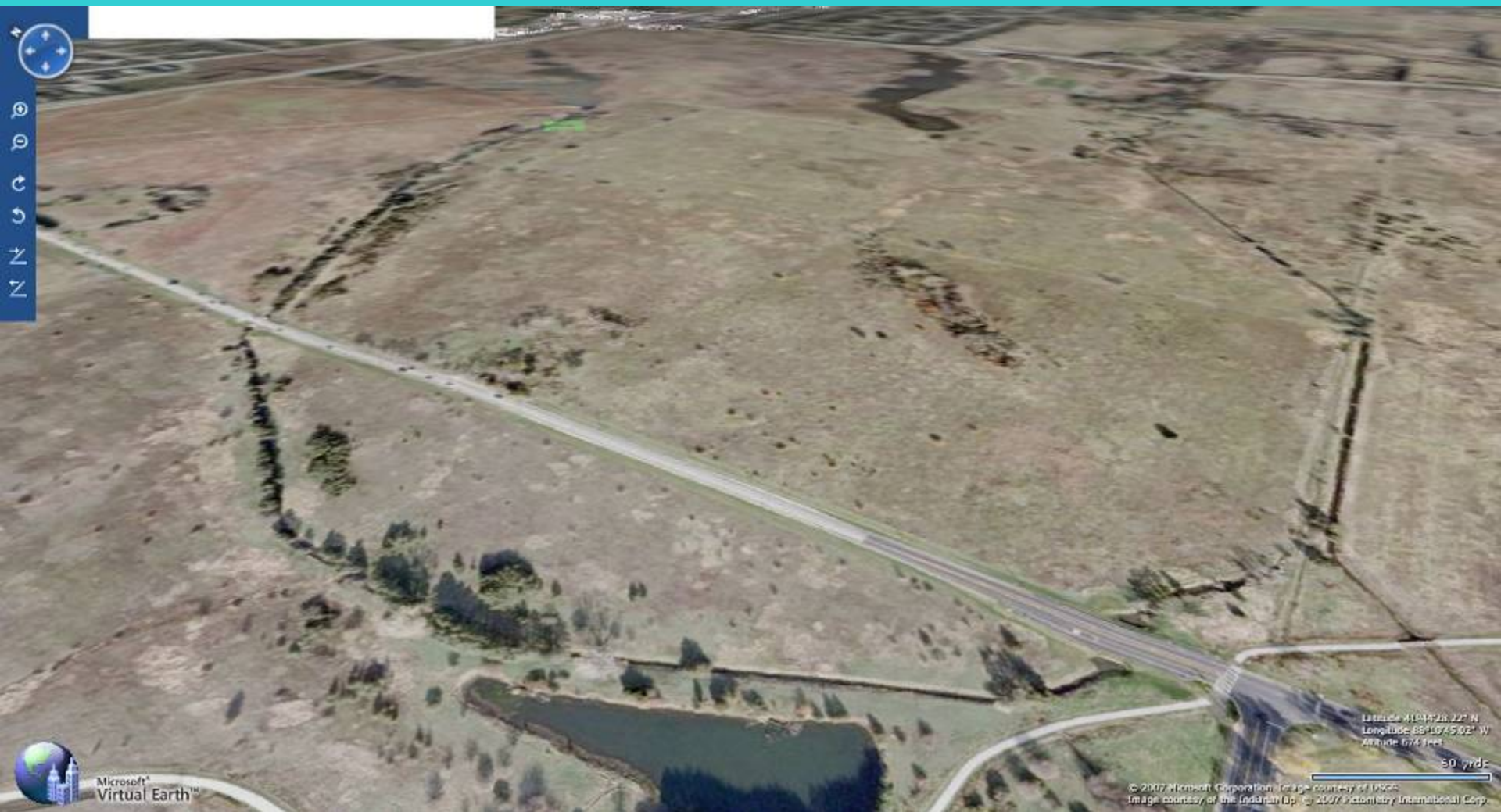












Microsoft
Virtual Earth™

Latitude 41°44'28.22" N
Longitude 88°10'15.92" W
Altitude 674 feet

80,770

© 2007 Microsoft Corporation. Image courtesy of NASA.
Image courtesy of the Indiana Dept. of Transportation.







Spring Brook Stream Meander Project

US Environmental Protection Agency

Illinois Environmental Protection Agency

Illinois Department of Natural Resources

DuPage County

USDA Natural Resource Conservation Service



Learn to Read the River

- Scalable
- Change the entrenchment ratio
- Reconnect with floodplain
- Take the flood plain down
- Lock it in place by redistributing the energy



A landscape photograph showing a narrow stream or creek flowing through a field of yellow wildflowers and green grass. The stream is in the center, with a rocky bank on the left and a grassy bank on the right. The background features a line of trees under a cloudy sky. The word "Questions?" is overlaid in white text in the center of the image.

Questions?