



McKenna Blvd./Park Edge- Park Ridge Flood Mitigation

MARCH 13, 2019

Presentation Overview

- ▶ Design Standards and Flash Flooding Background
- ▶ Watershed/Modeling Overview
- ▶ Proposed Public Works Project
 - ▶ Project Location and Features
 - ▶ Layout
 - ▶ Construction Phasing & Schedule





Background Information

DESIGN STANDARDS AND FLASH FLOODING

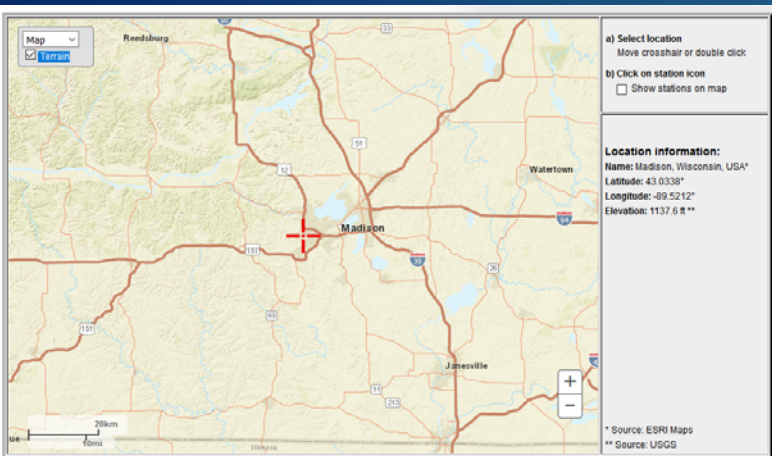
Flash Flooding – Why?

- ▶ Historic rain (what do I mean if I say 100-year event)

The term "100-year storm" is used to define a rainfall event that statistically has a 1% chance of occurring in any given year. Just because it rained 10 inches in one day last year doesn't mean it can't rain 10 inches in one day again this year.

- ▶ To define an event you must know its **INTENSITY** and **DURATION**.
 - ▶ There are multiple combinations that result in "100 – year" events. In our area for example:
 - ▶ 1 hour 3.09"
 - ▶ 2 hours 3.87"
 - ▶ 12 hours 5.96"
 - ▶ 24 hours 6.76"

Most recent (Atlas 14) rainfalls from NOAA



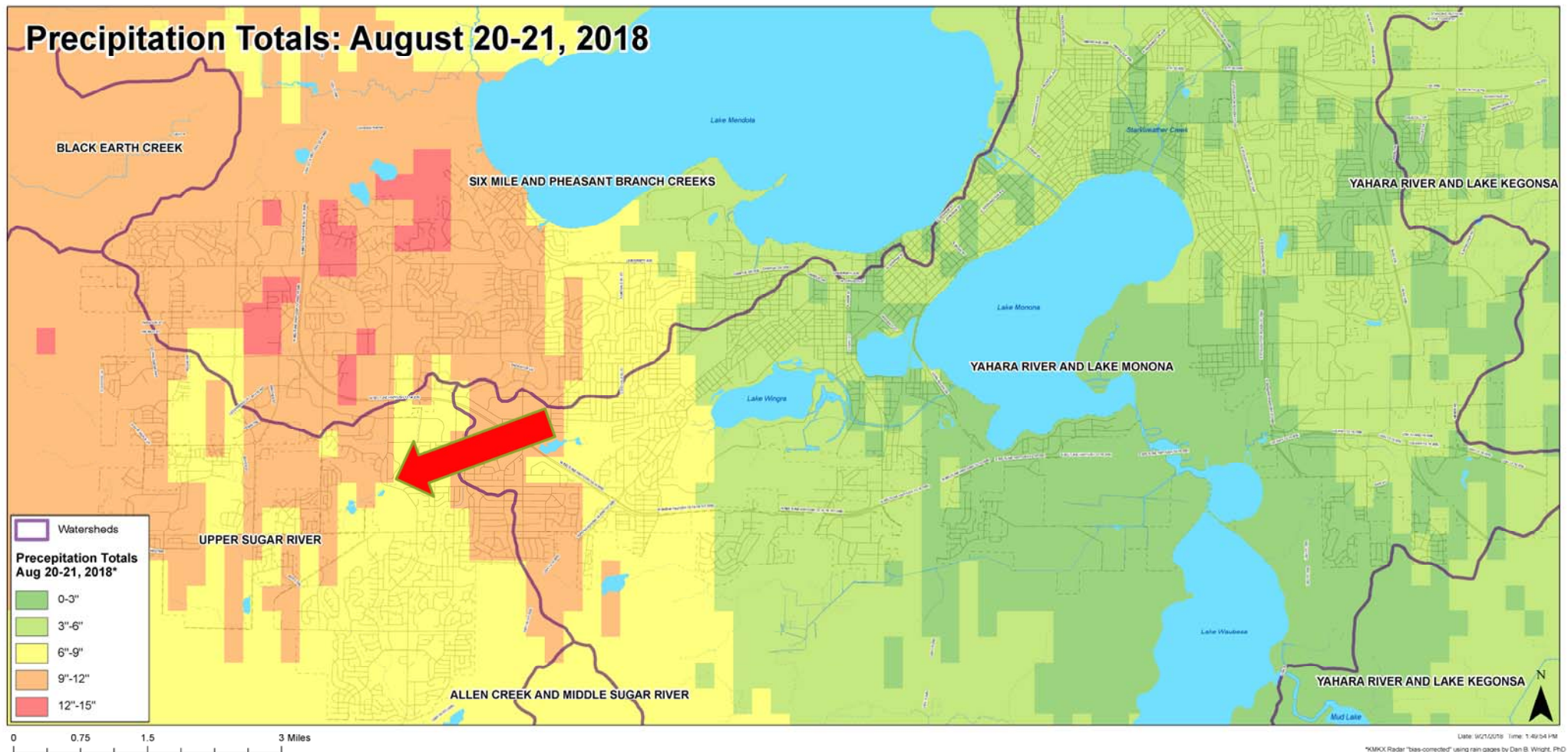
POINT PRECIPITATION FREQUENCY (PF) ESTIMATES
WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 8, Version 2

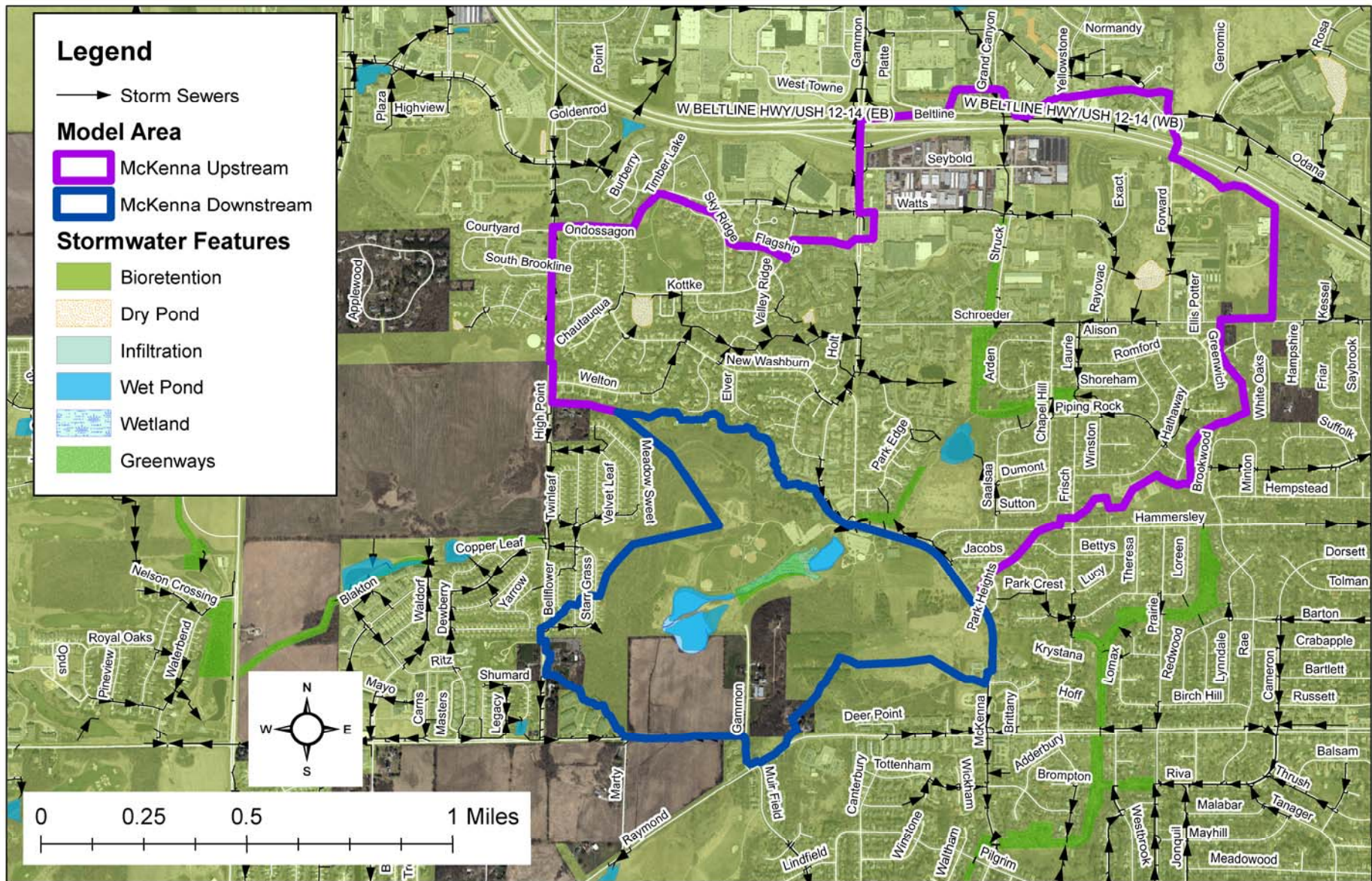
In August some areas in Madison and the surrounding areas received 12-15 inches in approximately 8 hours. This is literally off the chart.

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)¹

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.381 (0.327-0.447)	0.437 (0.373-0.511)	0.531 (0.453-0.623)	0.613 (0.520-0.722)	0.732 (0.605-0.889)	0.829 (0.670-1.02)	0.929 (0.728-1.16)	1.04 (0.782-1.32)	1.18 (0.861-1.54)	1.30 (0.922-1.71)
10-min	0.559 (0.478-0.654)	0.639 (0.547-0.749)	0.777 (0.663-0.912)	0.898 (0.761-1.06)	1.07 (0.886-1.30)	1.21 (0.981-1.49)	1.36 (1.07-1.70)	1.52 (1.14-1.93)	1.73 (1.26-2.25)	1.90 (1.35-2.50)
15-min	0.681 (0.583-0.798)	0.780 (0.667-0.913)	0.948 (0.808-1.11)	1.10 (0.928-1.29)	1.31 (1.08-1.59)	1.48 (1.20-1.81)	1.66 (1.30-2.07)	1.85 (1.40-2.36)	2.11 (1.54-2.75)	2.32 (1.65-3.05)
30-min	0.939 (0.804-1.10)	1.08 (0.921-1.26)	1.31 (1.12-1.54)	1.52 (1.29-1.79)	1.82 (1.50-2.20)	2.06 (1.66-2.52)	2.30 (1.81-2.88)	2.57 (1.94-3.27)	2.93 (2.13-3.81)	3.21 (2.28-4.22)
60-min	1.19 (1.02-1.40)	1.38 (1.18-1.62)	1.71 (1.46-2.01)	1.99 (1.69-2.35)	2.40 (1.99-2.92)	2.74 (2.21-3.36)	3.09 (2.42-3.85)	3.45 (2.60-4.40)	3.96 (2.88-5.15)	4.36 (3.09-5.72)
2-hr	1.45 (1.25-1.69)	1.69 (1.46-1.97)	2.11 (1.81-2.45)	2.47 (2.11-2.88)	2.99 (2.49-3.61)	3.42 (2.78-4.17)	3.87 (3.05-4.80)	4.34 (3.30-5.49)	4.99 (3.66-6.46)	5.51 (3.94-7.18)
3-hr	1.60 (1.39-1.86)	1.88 (1.62-2.17)	2.35 (2.03-2.73)	2.77 (2.37-3.22)	3.38 (2.83-4.07)	3.88 (3.17-4.72)	4.41 (3.49-5.46)	4.97 (3.79-6.28)	5.75 (4.24-7.42)	6.37 (4.57-8.28)
6-hr	1.89 (1.65-2.17)	2.20 (1.91-2.53)	2.75 (2.38-3.16)	3.24 (2.79-3.74)	3.98 (3.36-4.78)	4.60 (3.79-5.56)	5.26 (4.20-6.48)	5.97 (4.60-7.51)	6.98 (5.18-8.96)	7.79 (5.62-10.1)
12-hr	2.20 (1.93-2.51)	2.52 (2.21-2.87)	3.10 (2.71-3.54)	3.64 (3.16-4.18)	4.47 (3.82-5.36)	5.19 (4.32-6.25)	5.96 (4.81-7.31)	6.81 (5.28-8.52)	8.02 (6.01-10.3)	9.02 (6.55-11.6)
24-hr	2.51 (2.21-2.84)	2.87 (2.53-3.25)	3.53 (3.10-4.00)	4.14 (3.62-4.71)	5.08 (4.36-6.03)	5.88 (4.93-7.03)	6.76 (5.48-8.23)	7.71 (6.02-9.58)	9.08 (6.84-11.5)	10.2 (7.46-13.0)

Flash Flooding in Madison: Aug 20-21, 2018





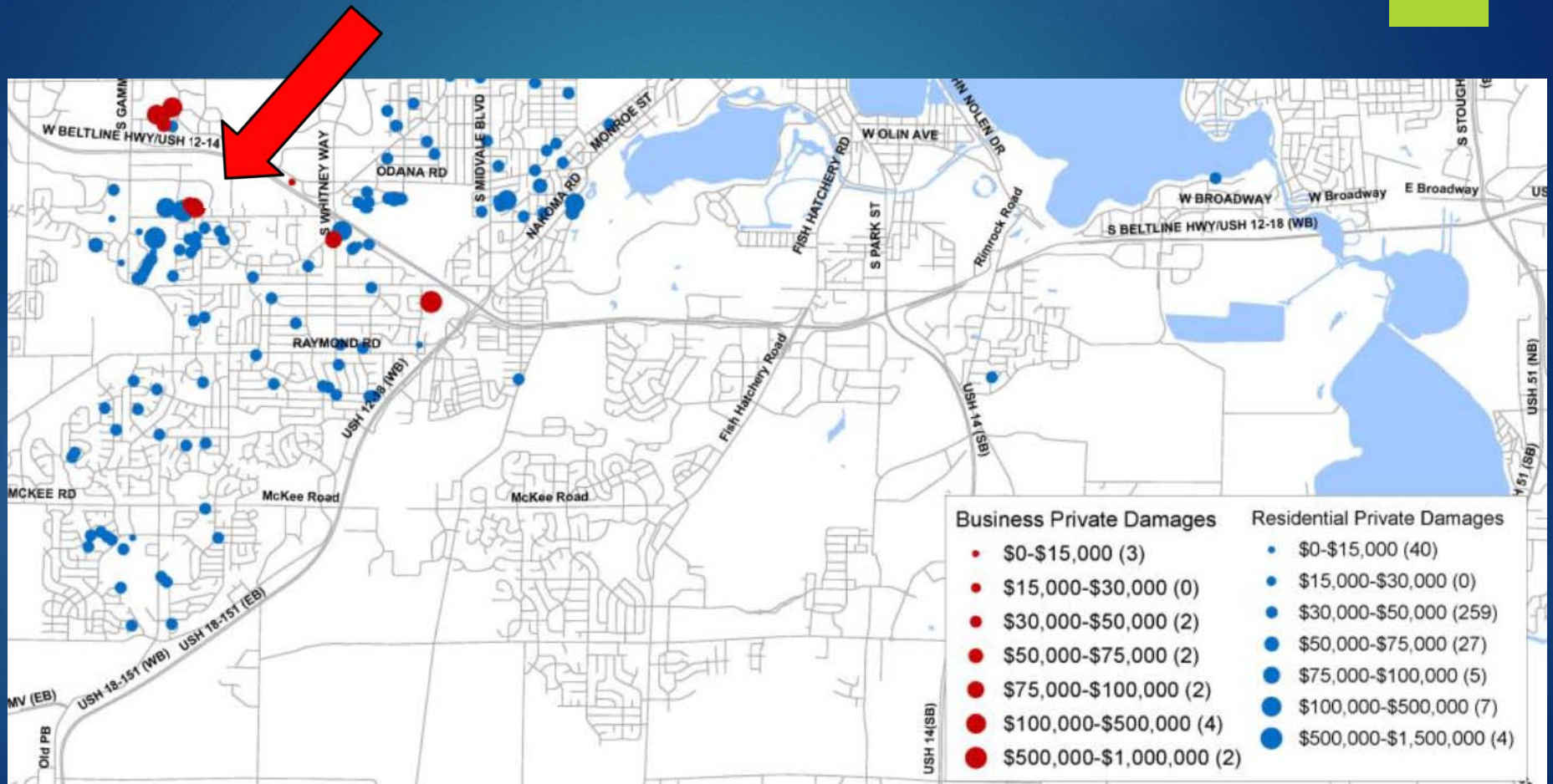
Rainfall in Elver Park Watershed

- ▶ July 21, 2016 – 2.75" in 2 hrs
 - ▶ **10-25 year event**
 - ▶ BUT grates were almost entirely clogged
- ▶ July 10, 2017 – 4.33" in 4.5 hrs
 - ▶ **~50 year event**
- ▶ June 16, 2018 – 4.03" in 2 hrs
 - ▶ **>100 year event**
- ▶ August 20, 2018 – 11.75" in 14 hrs
 - ▶ **>1000 year event** – off the defined chart



July 2016 flooding

REPORTED Property Damage in August 2018





COMMON SIGHT – ENTIRE LOWER LEVELS GUTTED



THOUSANDS OF
SANDBAGS PLACED
BY NATIONAL
GUARD

SANDBAGS 3-4FT
TALL – SAME
HEIGHT AS
FLOOD WATERS

Modeling/Design Challenges



- ▶ Specific modeling/design challenges in the watershed
 - ▶ Grate clogging/greenway maintenance
 - ▶ Culverts under McKenna are undersized
 - ▶ Cunette is very shallowly sloped (0.1%)
 - ▶ Greentree Landfill limits expansion of channel to the east
 - ▶ Older construction means older design standards for stormwater control and development
 - ▶ Redevelopment is more difficult to retrofit
 - ▶ Emergency access on McKenna Blvd
- ▶ Aug 20, 2018 forced City Engineering to step back and review design standards
- ▶ BUDGET! We had sufficient funds for a much smaller project in 2017, but requested additional funding Nov 2018 for a more comprehensive design.



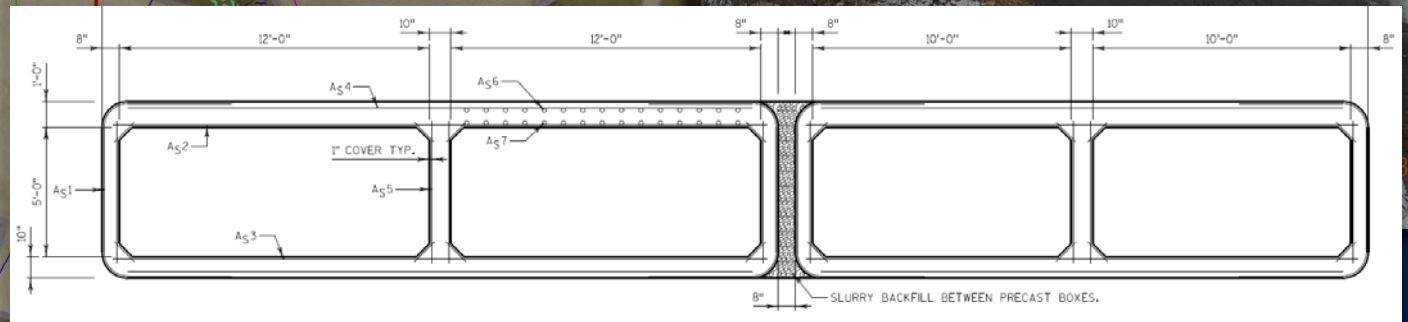
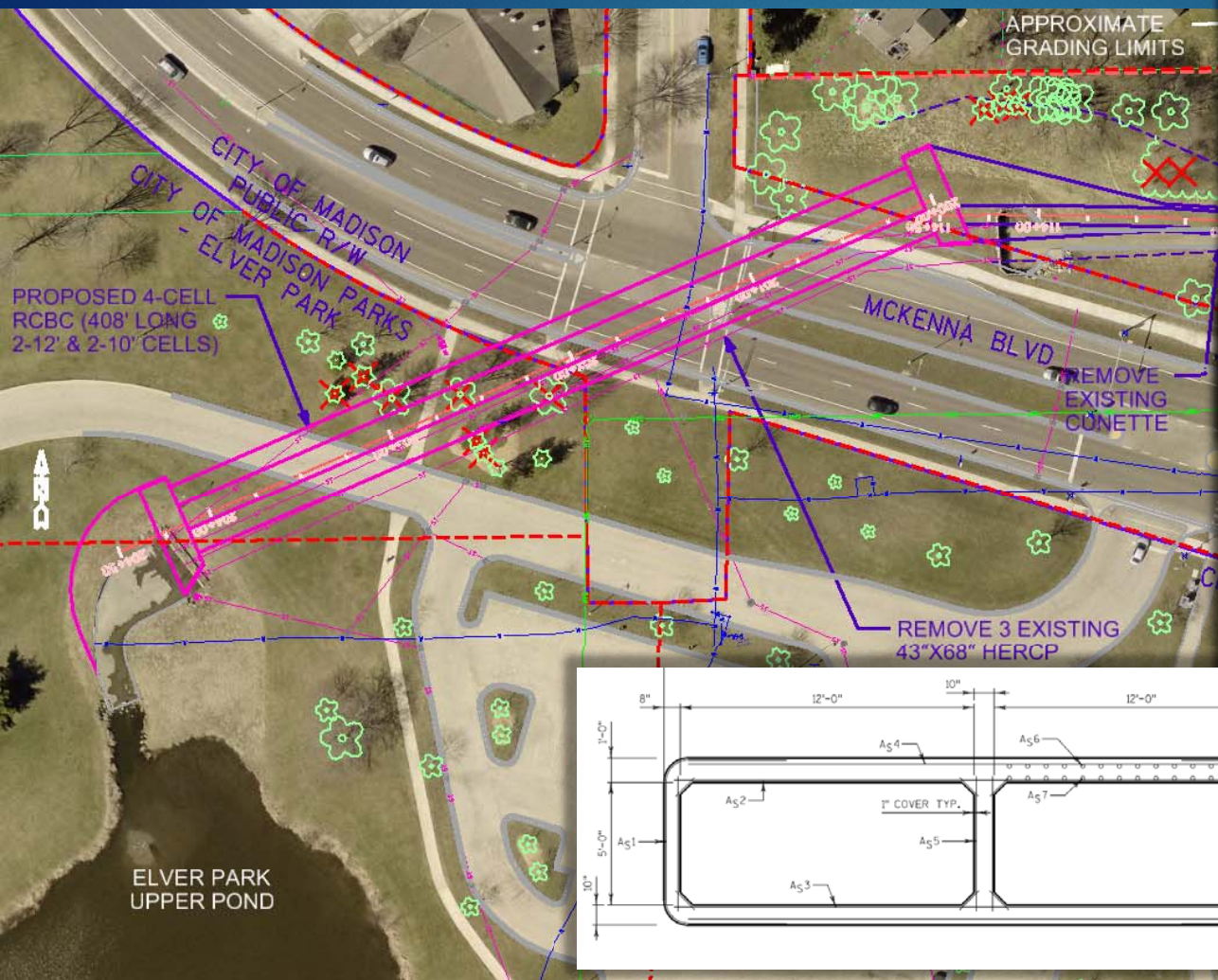
Proposed Public Works Project Design

Project Features

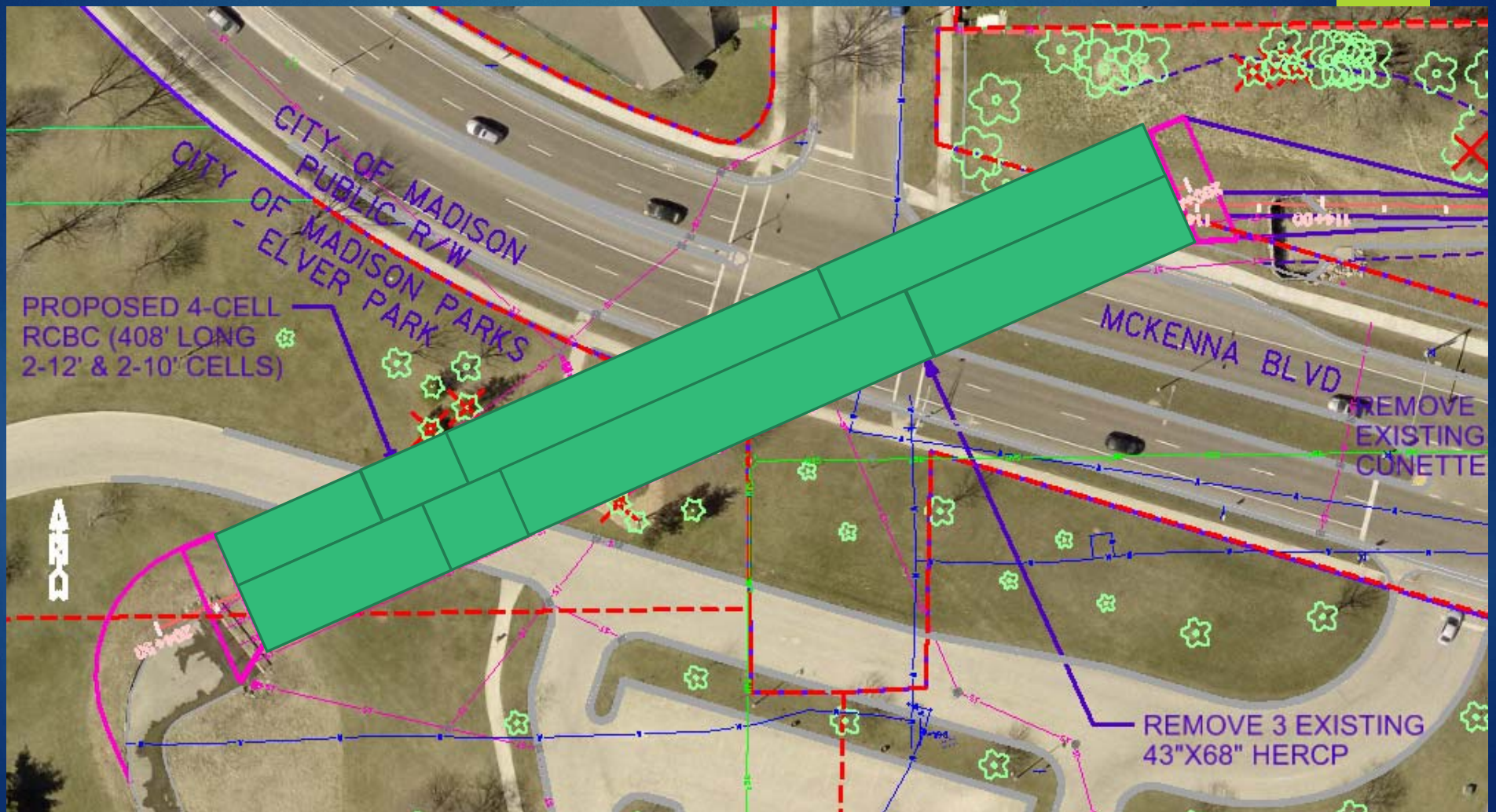
- ▶ Large box culverts (2-5'x12' & 2-5'x10') at McKenna Blvd. to carry flood flows
- ▶ Replace concrete channel lining
 - ▶ Re-align and lower cunette
 - ▶ Retaining wall with protective railing
- ▶ Remove and replace culverts at Greentree Pond
 - ▶ Lower pipe invert elevations by 1.5'
 - ▶ Modify bike path in Greentree Landfill
- ▶ Lower channel upstream of Greentree Pond
 - ▶ Extend greenway modification upstream past Schroeder Road
 - ▶ Proposed grading match into existing ground
 - ▶ Remove and replace culverts under Schroeder



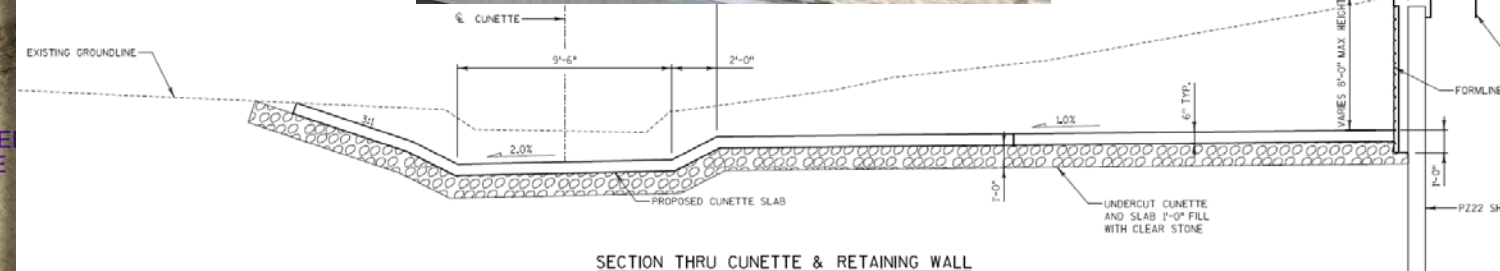
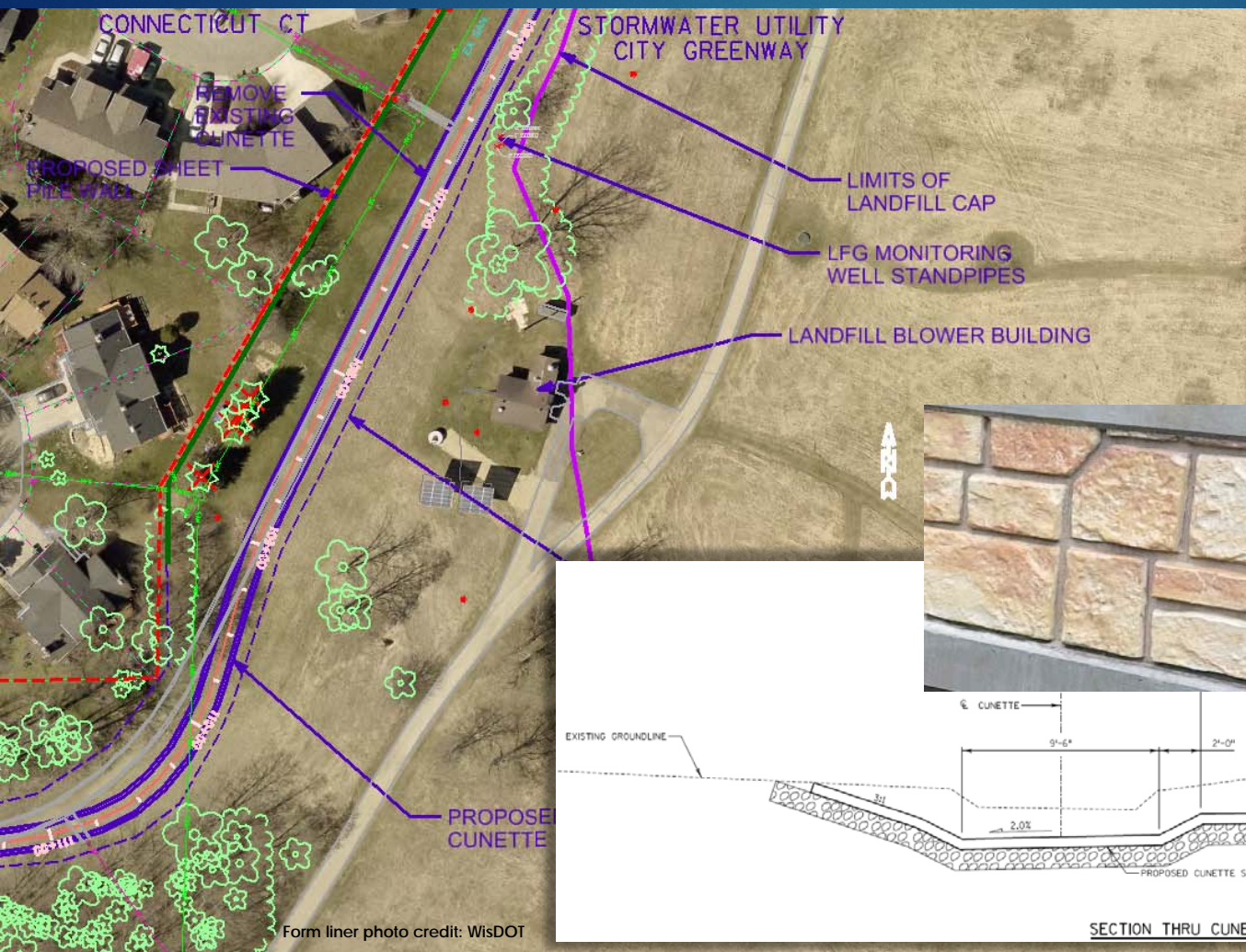
McKenna Blvd. Segment



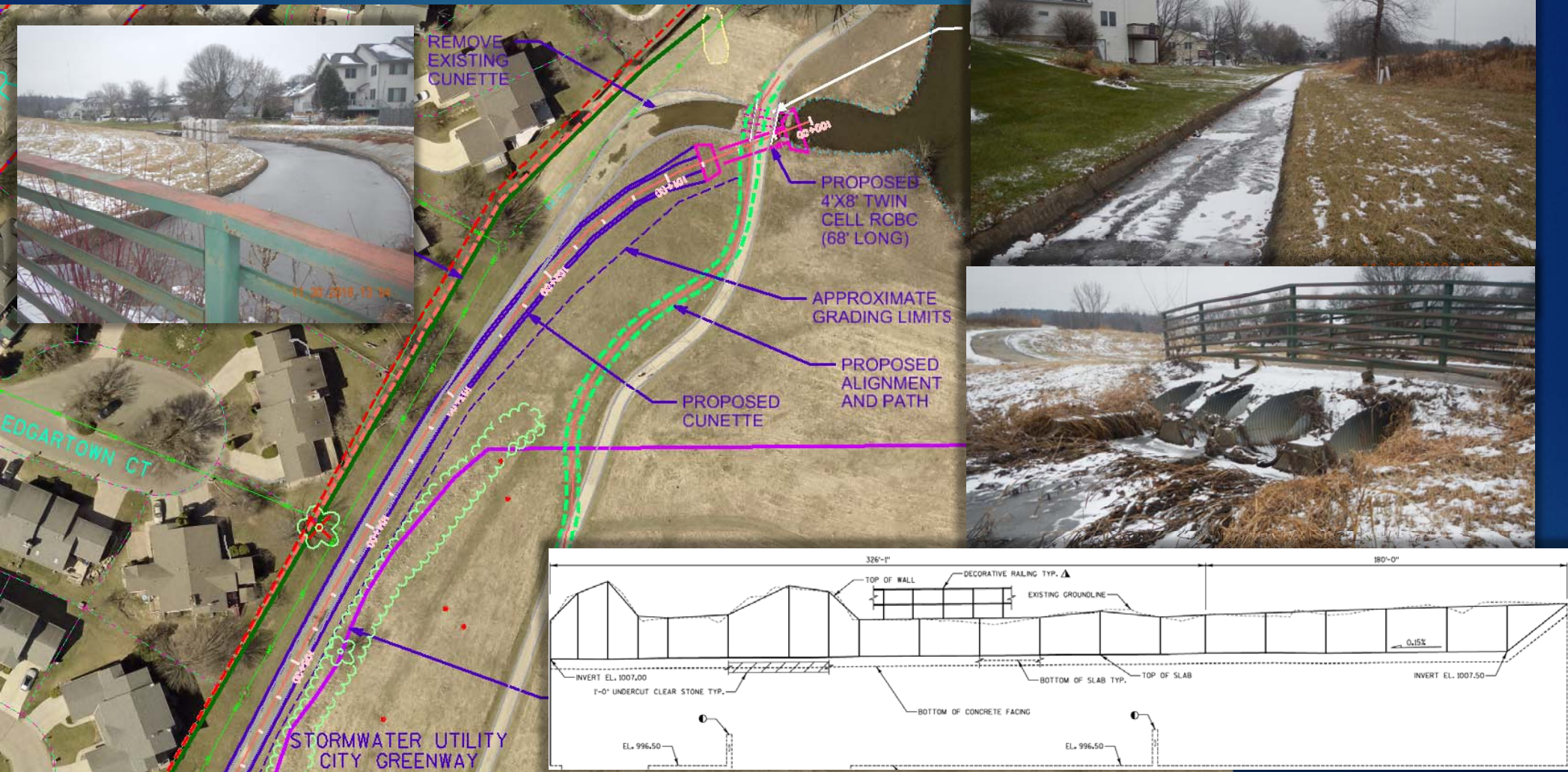
Culvert Construction Phasing



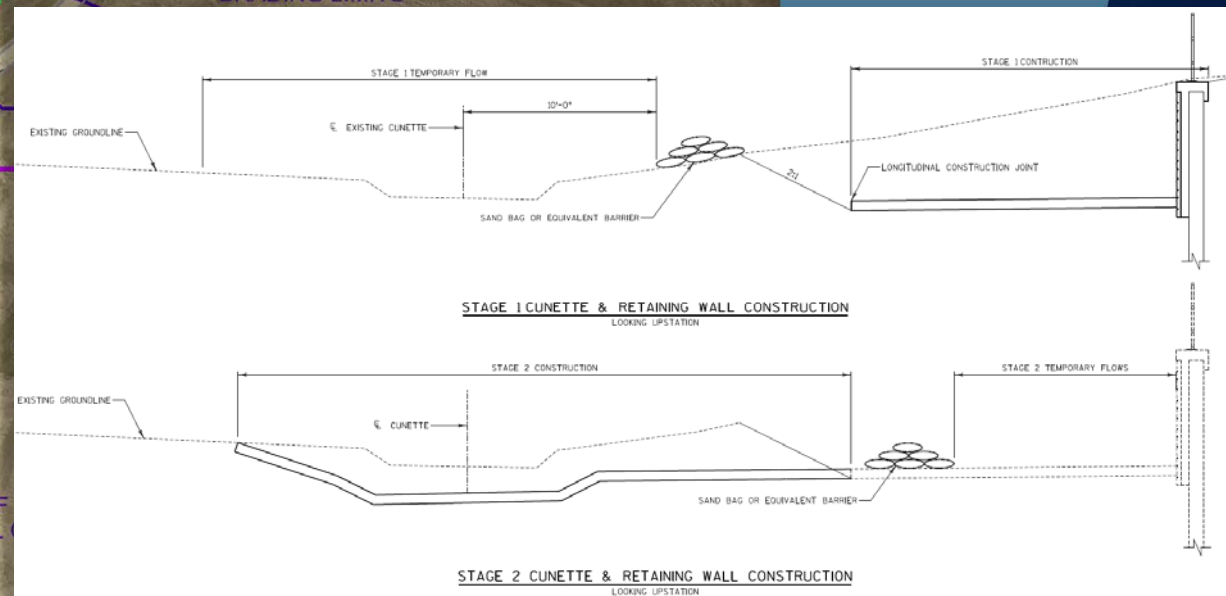
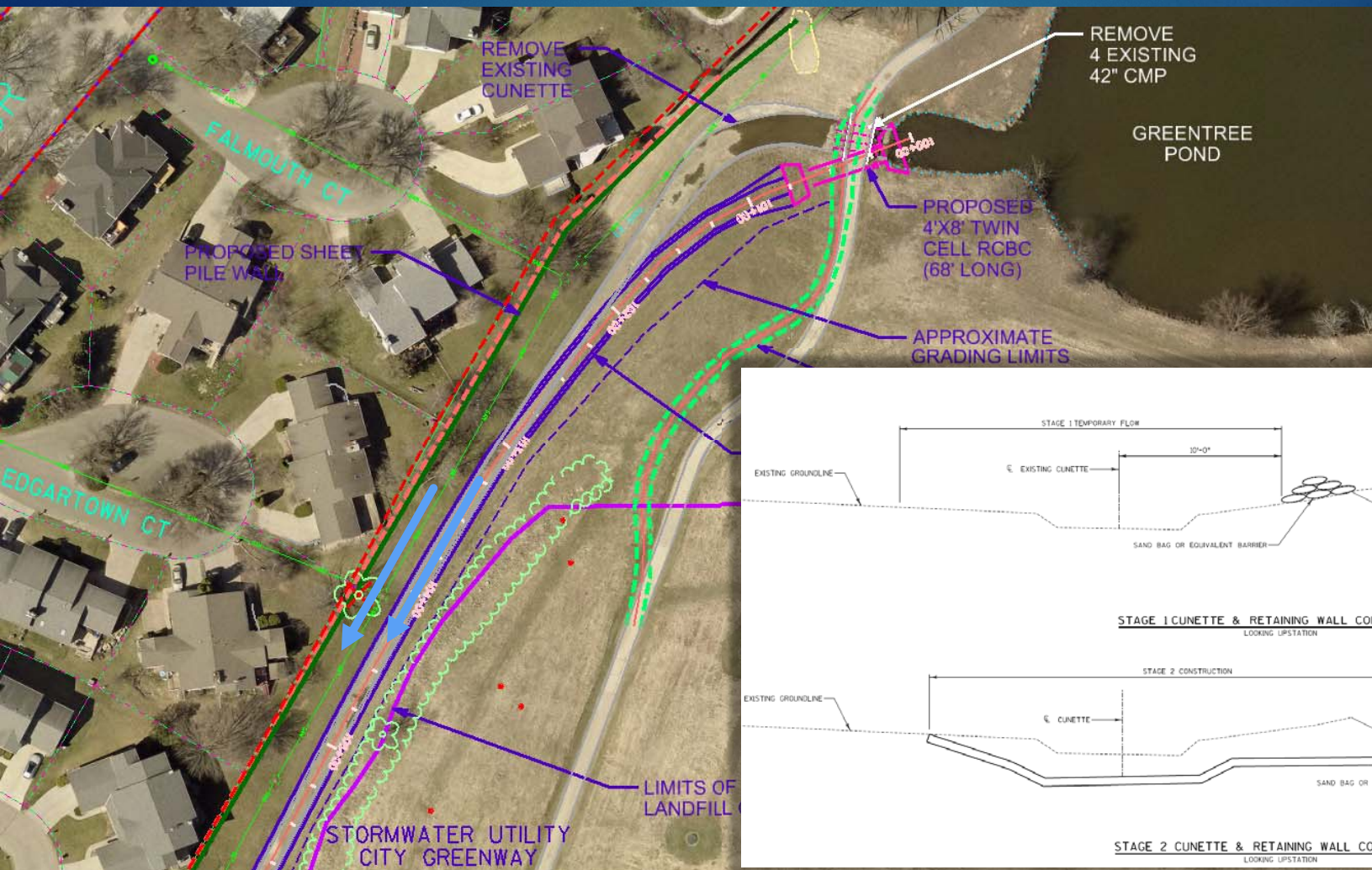
Greentree Mid Segment



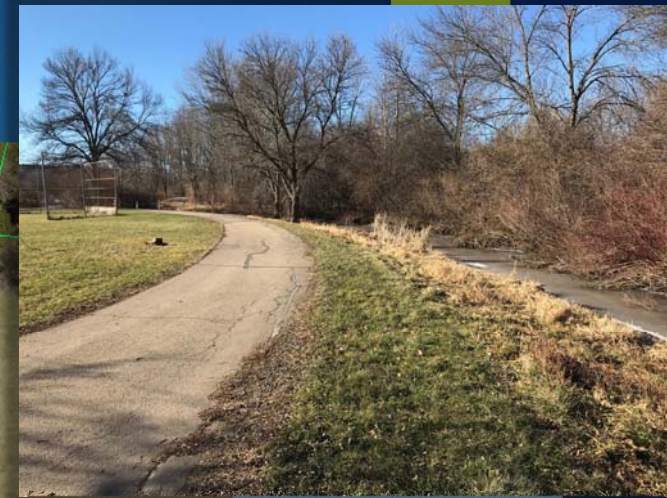
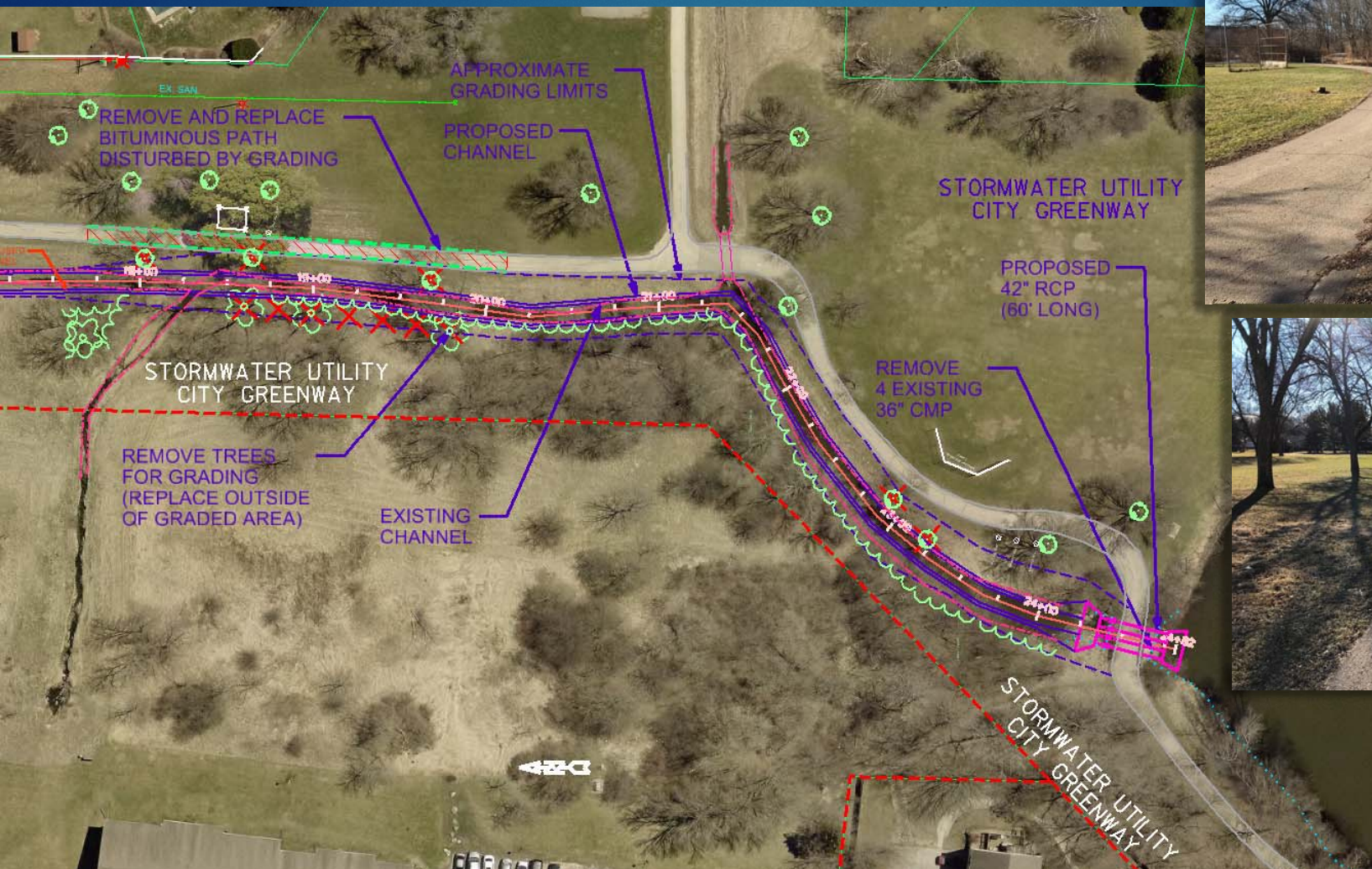
Pond Outlet Segment



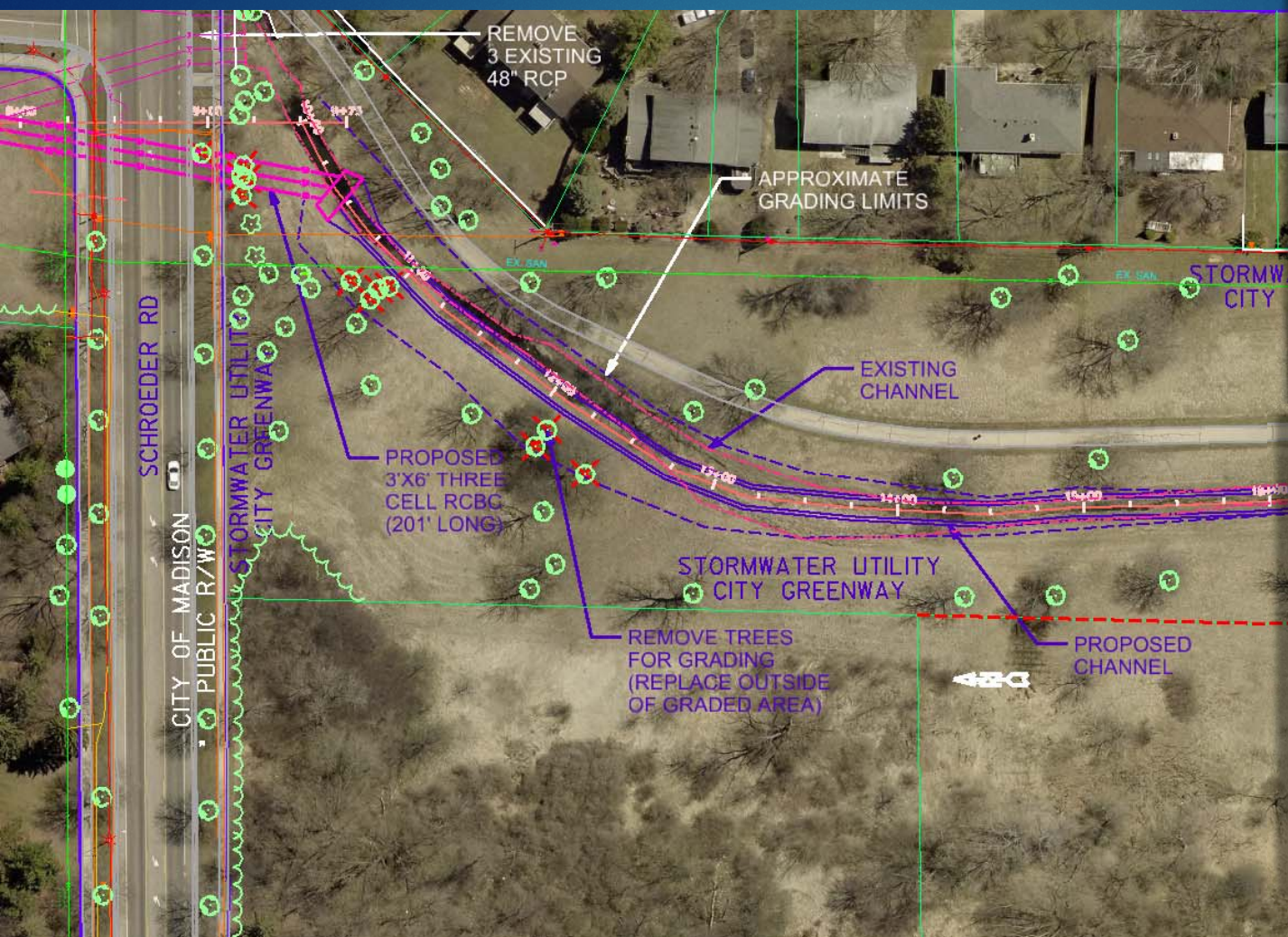
Channel Construction Phasing



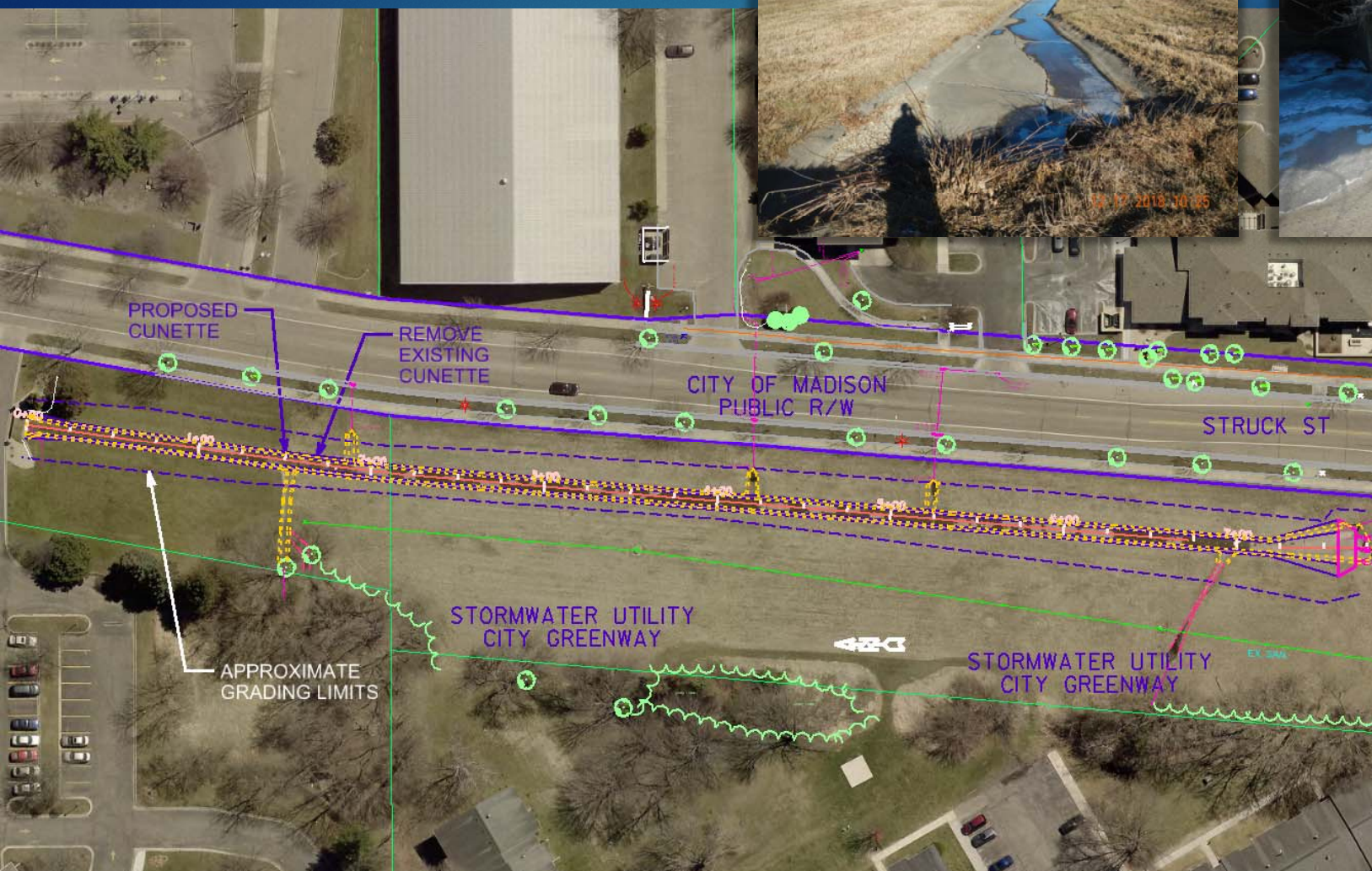
Pond Inlet Segment



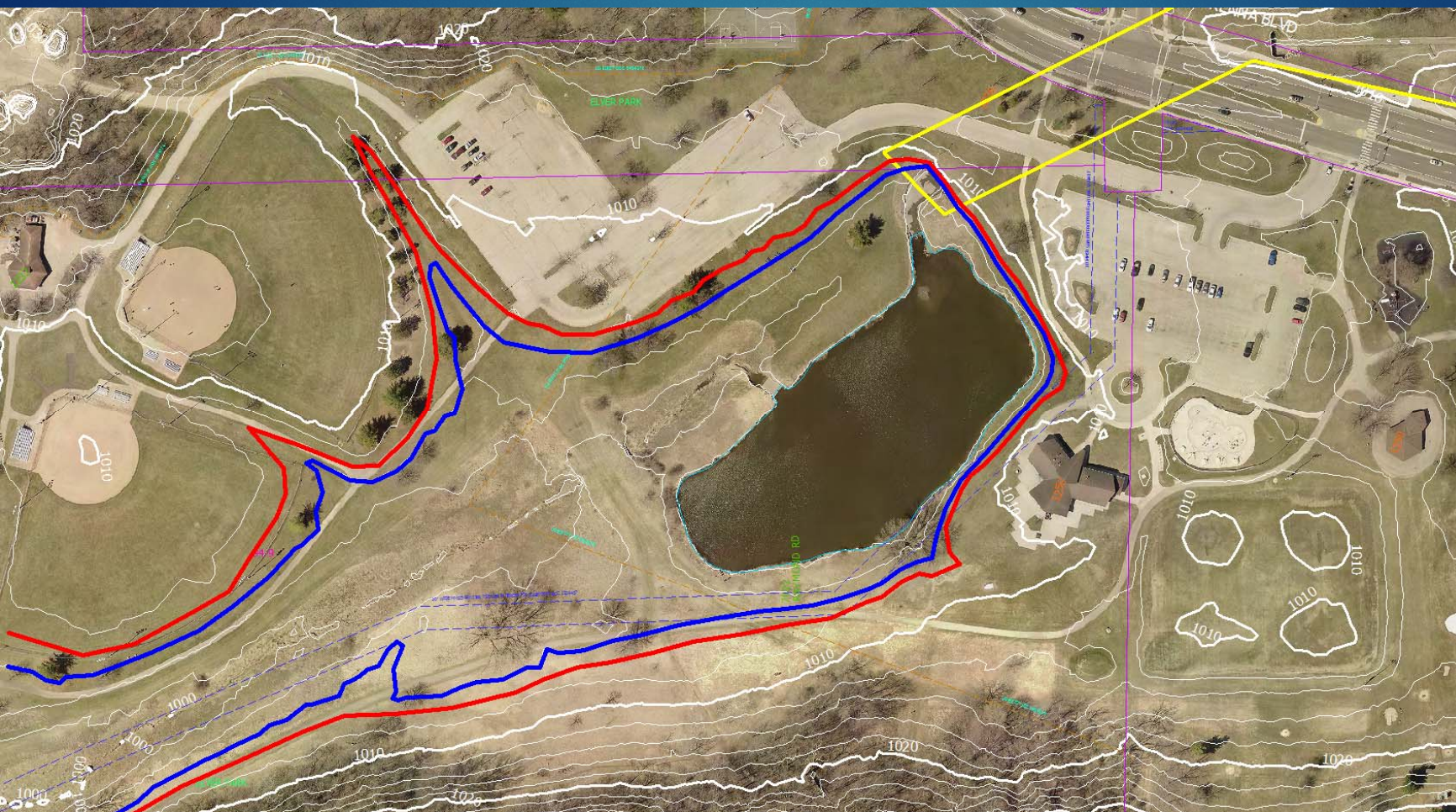
Schroeder Segment



Watts Segment



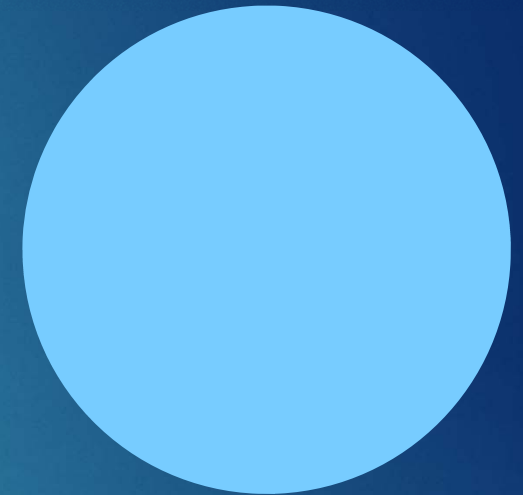
Elver Park Pond



Inundation
time: 5 hours

Tentative Construction Schedule

- ▶ Bidding:
 - ▶ Late Spring -Summer 2019
- ▶ Construction:
 - ▶ Late Summer through late Fall 2019
 - ▶ Street Construction on Struck and upper reach may be moved to 2020 depending on contractor availability
 - ▶ Culvert:
 - ▶ 6 stages, alter traffic pattern on McKenna Blvd.
 - ▶ Maintain Elver Park west parking lot access
 - ▶ Channel:
 - ▶ Drive sheet pile from south to north
 - ▶ Pour channel concrete from south to north
 - ▶ Temporary flow diversion



QUESTIONS?

