

**Village of Somers  
7511 12th Street  
Somers, WI 53171**

**Somers Stormwater Utility  
Commission Agenda  
Tuesday, February 6<sup>th</sup>, 2024  
Immediately Following the 5:30 pm Village of Somers  
Work Session**

<b>Water Commission Meeting:</b>	
<b>Item#</b>	
1	Call to order
2	Consent and approval of Minutes of Stormwater Meeting on August 15, 2023
3	Discussion and possible action on Proposal from Strand Associates for Comprehensive Flood Study listed in Stormwater Project Prioritization Recommendations
4	Adjourn

I hereby certify that as the designee of the chief elected official of the Village of Somers, I posted this notice of the February 6<sup>th</sup>, 2024 Somers Water Utility Commission Agenda in 1 public place & on the Village website.

Dated this 2<sup>nd</sup> day of February, 2024

Brandi Baker, Clerk-Treasurer

Requests from person with disabilities who need assistance to participate in this meeting should be made to the Clerk's Office at 262-859-2822 with as much notice as possible. **Notice is hereby given that members of the Commission may participate telephonically. Notice is hereby given that members of the Town Board may be in attendance for the sole purpose of gathering information. A quorum may be present. However, no Board action will be taken.**

**Village of Somers  
Proceeding from the Village Stormwater Utility Commission Meeting  
August 15, 2023**

Chairman George Stoner called the meeting to order at 6:20 p.m.

Present:

- Chairman George Stoner
- Commissioner Jackie Nelson
- Commissioner Ben Harbach
- Commissioner Joe Smith
- Commissioner Karl Ostby
- Commissioner Scott Fredrick

Absent: Commissioner Jack Aupperle

Staff present: Administrator Jason Peters, Assistant to the Administrator Kevin Poirier, and Clerk/Treasurer Brandi Baker.

**Update on Stormwater Management Plan and Public Informational Meeting Scheduled for June 14th, 2023**

Administrator Peters gave an update that the Mailers are in for the Public Meeting scheduled for June 14, 2023

**Action on Root, Pike Win's proposed Stormwater Culvert Replacement Project on Tax Parcel #82-4-222-103-0102**

Commissioner Nelson moved to approve Root, Pike, Win's proposed Stormwater Culvert Replacement Project on Tax Parcel # 82-4-222-103-0102

Seconded by Commissioner Fredrick. Motion carried. 6-0 vote.

Chairman Stoner explained the need for this replacement.

**Adjourn**

Commissioner Harbach moved to Adjourn at 6:16 pm.

Seconded by Commissioner Nelson. Motion carried. 6-0 vote

Drafted this 16<sup>th</sup> day of August 2023 by Brandi Baker, Clerk / Treasurer

These minutes are not official until approved by the Stormwater Utility Commission

**VILLAGE OF SOMERS  
STORM WATER UTILITY  
MEETING ITEM MEMORANDUM**

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**MEETING DATE:** February 6<sup>th</sup>, 2024

**TO:** Chairman and Storm Water Commissioners

**PREPARED BY:** Jason J. Peters, Administrator

**AGENDA ITEM:** #3 Discussion and possible action on Proposal from Strand Associates for Comprehensive Flood Study listed in Stormwater Project Prioritization Recommendations

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**BACKGROUND:**

On February 14<sup>th</sup>, 2023 the Board amended the Stormwater CIP through Resolution 2023-002 to include \$30,000 to hire an Engineering firm to create a Stormwater Management Plan. After these funds were allocated, Administrator Peters reached out to several possible firms. The Board was informed of this in the March 2023 Administrator's Report. In April of 2023, Administrator Peters selected the Strand Associates, Inc. proposal.

The staff level "kick off" meeting was held on May 3<sup>rd</sup>, 2023 with Strand Associates. Administrator Peters, Assistant to the Administrator Poirier, President Stoner, Root Pike Win Executive Director Giordano, Plan Commissioner Grimes, Strand Engineer Wood, and Strand Engineer Sadowski were in attendance. We discussed the history of the Stormwater Utility, our reasoning for hiring Strand, the Village's relationship with Root Pike Win, areas of concern, and scheduling of a public informational meeting.

On June 14<sup>th</sup>, 2023 the Stormwater Utility held its public informational "open house." The public was invited through a direct mailing campaign to come meet representatives of Strand and help identify and locate stormwater issues. Boards were provided to inform citizens of the process and what the current goals are. Large maps were laid out for citizens to identify problem areas. Stations were provided for citizens to write comments on what areas need to be addressed. Over the course of the two-hour meeting, we estimate 100 to 150 residents were in attendance.

On August 15, 2023 the Storm Water Utility Board reviewed the draft of the Stormwater Project Prioritization Matrix which ranked the Village-Wide Flooding Modeling at the top of the project list taking into account the following metrics: Project Duration, Impact

to Residents, Synergy with other Projects, Feasibility, Jurisdiction and Reported Property Impact.

#### PRIOR ACTION TAKEN:

At our January 16<sup>th</sup> Work Session Strand presented their proposal to the Board. At this Work Session the Board requested that President Stoner, Superintendent Kreye and Administration review the proposal and bring back suggestions to the Board on what areas should be studied first and what projects should move forward.

On January 25<sup>th</sup>, President Stoner, Superintendent Kreye and Administration met to review the proposals. At this meeting we reviewed the 18 projects listed in the Matrix and the suggested study areas. At this time, this group came up with the following:

- Area in Figure 3
  - Utility should move forward with Flood Model and Alternatives Analysis
  - Estimate fee \$20,500
- Area in Figure 5
  - Utility should move forward with Flood Model and Alternatives Analysis
  - Estimate fee \$26,000
- Area in Figure 10
  - Public Works Staff will address this area
- Area in Figure 10
  - Public Works Staff will address this area
- Area in Figure 11
  - Public Works Staff will address this area
- Area in Figure 16
  - Project has been completed with the help of Kenosha County Highways
- Area in Figure 18
  - Public Works Staff will address this area

#### SUGGESTED ACTION/ACTION REQUESTED/COMMENTS:

If the Utility wishes to move forward with the above recommendations, the cost to the for the studies will be \$46,500. Staff does not expect the areas in figures 10, 11, or 18 to be of significant cost. The majority of the cost will be “work hours”. Strand has proved an example of what the final study would look like. In the event that the Storm Water Utility agrees with the suggested action, a suggested motion to approve would be as follows:

*“Motion to approve Strand Associates Flood Model and Alternatives Analysis for Figures 3 and 4 in the amount of \$46,500.”*

ATTACHMENTS:

Stormwater Project Prioritization

Proposal for Comprehensive Flood Study

Flood Concern Map

Example Study

Stormwater Project Prioritization Matrix  
Village of Somers, Wisconsin  
July 2023

Project Figure	Complaint Description from Public Involvement Meeting	Potential Project Based on Complaint	Project ID	Prioritization Metrics						Overall Score
				Project Duration	Number of Residents Impacted	Synergy with Other Projects	Feasibility	Jurisdiction	Reported Property Impact	
N/A	N/A	Village-Wide Flood Modeling	N/A	3	2	3	3	3	3	162
5	11th and 12th Street Flooding	Flood Control Modifications (Pond/Culvert Upsizing)	5.1/5.3	1	3	3	2	2	3	108
10	Ditch isn't flowing along 43rd Avenue	Modifications to Ditches and Culverts	10.2	3	2	1	3	3	2	108
11	Flooding of ditches along 45th Avenue	Culvert Addition	11.3	3	2	1	3	3	2	108
18	Culvert under CTH Y gets clogged	Ditch Maintenance and Culvert Grate Installation	18.4	3	2	1	3	2	3	108
15	Whispering Meadows - ditch and pond debris buildup, collapsing inlet	Ditch/Pond Maintenance and Storm Sewer Repair	15.1/15.2	3	3	1	3	3	1	81
4	Standing water and basin issues in Maple Ridge Subdivision	Flood Control Modifications to Pond and/or Ditches	4.3	3	3	2	2	1	2	72
5	Flooding at 12th St and 88th Ave Intersection	Flood Control Modifications (Pond/Culvert Upsizing)	5.1/5.3	1	2	3	2	2	3	72
12	Log Debris Dam north of CTH A causes flooding of private property	Streambank Stabilization and Log Debris Dam Removal	12.1/12.6	2	2	3	2	1	3	72
18	Flooding of private properties and debris buildup	Flood Control Modifications to Pond or Storm Sewers	18.3	2	2	1	2	3	3	72
19	Basement flooding along 13th Place	Ditch Grading or Storm Sewer Installation	19.1	2	2	1	2	3	3	72
1	Issues with ditch drainage due to properties filling in ditches	Ditch Regrading/Storm Sewer Installation	1.2	2	2	1	2	3	2	48
6	Log Debris Dam north of CTH E	Remove Log Debris Dam	6.2	2	2	3	2	1	2	48
2	Box culvert across CTH S silts up	Sediment Removal of Box Culvert and Preventative Maintenance	2.4	3	1	1	3	2	2	36
3	Flood Overtops 88th street, floods backup on ag land	Flood Control Modifications (Pond/Culvert Upsizing)	3.1	2	1	2	2	2	2	32
10	Property is flooding north of CTH L	Culvert Upsizing	10.2	2	2	1	2	2	2	32
13	Bridge concerns on 4th Street, culverts blocked and undersized	Culvert Upsizing, Ditch Maintenance, and Bridge Inspection	13.1/13.3	2	2	1	2	2	2	32
14	Culvert Under CTH KR blocked by debris and potentially undersized	Culvert Upsizing and Ditch Maintenance	14.3	2	2	1	2	2	2	32
16	Ditch flooding along CTH A	Ditch Modifications/Storm Sewer Installation	16.2	2	2	1	2	2	2	32
15	Flooding of backyards along CTH G due to buildup in creek	Creek/Ditch Cleanup	15.3	1	2	3	2	1	2	24
8	Poorly sized culvert at CTH A and plugged drain tile	Culvert Resizing and Drain Tile Maintenance	8.1/8.3	2	1	1	2	2	2	16
9	WisDOT pond overflow to tilapia farm pond	Modifications to WisDOT Pond	9.1	2	1	1	2	2	2	16
7	Debris Buildup and erosion issues	Streambank Stabilization and Log Debris Dam Removal	7.2/7.3	1	1	3	2	1	2	12
2	Siltling and buildup of Pike River has caused floodplain expansion	Pike River Cleanup/Dredging	2.3	1	2	1	1	1	2	4
17	Asphalt roadway crumbling and trees falling down into creek	Roadway Repairs and Debris Clearing	17.2	2	1	1	2	1	1	4
1	Siltling and buildup of Pike River has caused floodplain expansion	Pike River Cleanup/Dredging	1.1	1	1	1	1	1	2	2

Scoring Criteria						
	Project Duration	Impact to Residents	Synergy with Other Projects	Feasibility	Jurisdiction	Reported Property Impact
	1 >2yrs	Few	None	Low	WDNR/ACOE	ROW Impacted
	2 1-2 Years	Some	Some	Mid	County/WisDOT	Yard Impacted
	3 1 Year	Many	A Lot	High	Village	Structure Impacted

December 14, 2023

Jason Peters, JD/MPA  
Village/Town Administrator  
Village of Somers  
7511 12th Street  
Somers, WI 53171

Re: Proposal for Comprehensive Flood Study

Dear Mr. Peters:

Thank you for the opportunity to submit our proposal for the *Comprehensive Flood Study*. We look forward to working with you and delivering a successful study for the Village. By selecting us, the Village will receive an expert partner to help generate well-advised alternatives to address flooding issues throughout the village. This proposal letter discusses our *proposed scope of services, proposed fee, and project schedule*.

### **Project Background and Need**

The Village retained our services in 2023 to assist with Stormwater Capital Improvement Planning with the goal of identifying high priority areas of needed improvements and scoping an early action project. These efforts began with an extensive public information meeting to gather and document resident complaints and comments about areas with known stormwater issues. Then, we generated a priority scoring matrix based on several criteria and ranked the areas of need. This effort made the need for a comprehensive flood study evident. The goal of a comprehensive flood analysis is to model the areas of need to better understand the existing causes of issues and identify the potential for overlapping opportunities for improvement in connected areas of concern. Proposed improvements would be modeled to demonstrate the expected return on the Village's investment if it were to move forward with various improvements.

The proposed improvements to be evaluated in the model will include recommendations from past reports along with potential new strategies to be developed by our team of experts.



A Comprehensive Flood Study further vets potential solutions to be employed at the priority-ranked areas of concern, documented at the public meeting on June 14, 2023, and helps demonstrate the expected return on investment for various projects.

### **Proposed Scope of Services**

Drainage evaluations will be performed for locations throughout the village with flooding concerns as identified by Village staff and residents. Modeling efforts are divided into two categories, Riverine Flood Modeling and Localized Flood Evaluations. The modeling and alternatives analysis for each area will consider impacts of downstream and upstream conditions to help the Village prioritize project implementation. Ultimately, a flood analysis report will be developed that summarizes the modeling efforts,

Jason Peters  
 Village of Somers  
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proposed alternatives, maintenance recommendations, opinions of probable construction cost, and potential funding opportunities. Below is a summary of the proposed scope items.

### Meetings

1. Prepare for and attend one project kickoff meeting with the Village.
2. Prepare for and attend two progress meetings with the Village.
3. Prepare for and attend one public information meeting.
4. Prepare for and attend one Village Board meeting to present results of the flood study.

### Riverine Flood Modeling and Alternative Analysis

The following areas were selected for riverine flood modeling because flood levels have overtopped the roadway or residents have voiced flooding complaints at these locations. Areas are shown on the map attached to this proposal and correspond with the flood concern mapping that we previously prepared for the Village. Areas can be added or removed to the scope based on the Village's desired level of effort for this project.

#### Area 3

Area 3 is located at CTH H between 18th Street and 38th Street. CTH H has flooded during large rainfall events and the property owner to the south of Maplecrest Country Club has reported new flooding within their property. Potential alternatives to address these issues include increasing the culvert capacity at CTH H and/or the Sooline Railroad to the east or providing additional flood storage upstream of CTH H. The following scope items are proposed for Area 3.

1. Conduct a topographic survey of Area 3. Survey shall include 10 channel cross sections, overland flow routes, roadway crossings, and lowest exposed elevations of nearby structures.
2. Run Conger Regression Equations upstream of CTH H for the 10, 50, 100, and 500-year events.
3. Obtain existing HEC2 modeling from the FEMA Engineering Library and develop a HEC RAS model utilizing the existing HEC2 model. Run the 10, 50, 100, and 500-year events.
4. Complete an alternatives analysis for up to three alternatives for Area 3.
5. Prepare a figure and opinion of probable construction cost for each alternative.
6. Summarize existing conditions flooding, modeling assumptions, and alternative analysis for incorporation into flood analysis report.

#### Area 4

Area 4 is located at CTH E between I-94 and 100th Avenue. CTH E at this location has flooded during large rainfall events. Potential alternatives to address this issue include increasing the culvert capacity at CTH E and/or raising the roadway elevation of CTH E through the floodplain. The following scope items are proposed for Area 4.

1. Conduct a topographic survey of Area 4. Survey shall include four channel cross sections and one roadway crossing.
2. Obtain existing HEC2 modeling from the FEMA Engineering Library and develop a HEC RAS model utilizing the existing HEC2 model. Run the 10, 50, 100, and 500-year events.
3. Complete an alternatives analysis for up to three alternatives for Area 4.
4. Prepare a figure and opinion of probable construction cost for each alternative.
5. Summarize existing conditions flooding, modeling assumptions, and alternative analysis for incorporation into flood analysis report.

Jason Peters  
Village of Somers  
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#### *Area 5*

Area 5 is located at the intersection of 12th Street and 88th Avenue and 11th Street west of 88th Avenue. Both the intersection and 11th Street have flooded during large rainfall events and residents have experienced significant flooding along 11th and 12th Street. Potential alternatives to address these issues include increasing the culvert capacity at the Canadian Pacific Railroad or CTH H, installing a storage basin south of 87th Avenue, or working with the Shoreland Lutheran Development to provide additional flood storage upstream of 11th Street. The following scope items are proposed for Area 5.

1. Conduct a topographic survey of Area 5. Survey shall include 16 channel cross sections, overland flow routes, roadway crossings, and lowest exposed elevations of nearby structures.
2. Develop hydrologic parameters (watershed delineation, runoff curve numbers, and time of concentration) that will represent up to 10 watersheds.
3. Prepare HEC HMS and HEC RAS models and run the 10, 50, 100, and 500-year events.
4. Complete an alternatives analysis for up to five alternatives for both Area 5.
5. Prepare a figure and opinion of probable construction cost for each alternative.
6. Summarize existing conditions flooding, modeling assumptions, and alternative analysis for incorporation into flood analysis report.

#### *Area 10*

Area 10 is located at CTH L between 41st Avenue and 44th Avenue. CTH L has flooded during large rainfall events and residents have had significant flooding through their properties. Potential alternatives to address these issues include increasing the culvert capacity at CTH L, providing an overland flow route for the flooded properties, or providing additional flood storage within the project area. The following scope items are proposed for Area 10.

1. Conduct a topographic survey of Area 10. Survey shall include 25 channel cross sections, overland flow routes, roadway crossings, and lowest exposed elevations of nearby structures.
2. Develop hydrologic parameters (watershed delineation, runoff curve numbers, and time of concentration) that will represent up to 10 watersheds.
3. Prepare HEC HMS and HEC RAS models and run the 10, 50, 100, and 500-year events.
4. Complete an alternatives analysis for up to three alternatives for Area 10.
5. Prepare a figure and opinion of probable construction cost for each alternative.
6. Summarize existing conditions flooding, modeling assumptions, and alternative analysis for incorporation into flood analysis report.

#### *Area 17*

Area 17 is located at 13th Avenue between 1st Street and 7th Street. 13th Avenue at this location has flooded during large rainfall events. Potential alternatives to address this issue include increasing the culvert capacities at one or a combination of the three culverts crossing 13th Avenue. The following scope items are proposed for Area 17.

1. Conduct a topographic survey of Area 17. Survey shall include 12 channel cross sections and three roadway crossings.
2. Prepare a HEC RAS model and run the 10, 50, 100, and 500-year events.
3. Complete an alternatives analysis for up to three alternatives for Area 17.
4. Prepare a figure and opinion of probable construction cost for each alternative.
5. Summarize existing conditions flooding, modeling assumptions, and alternative analysis for incorporation into flood analysis report.

Jason Peters  
 Village of Somers  
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 December 14, 2023

#### *Areas 20 & 21*

Areas 20 and 21 are located at 13th Avenue north of 7th Street and 30th Avenue between 4th Street and 7th Street. 13th Avenue and 30th Avenue have both flooded during large rainfall events and residents have voiced concerns of the growing floodplain throughout this area. Potential alternatives to address these issues include providing channel conveyance improvements between 30th Avenue and 22nd Avenue and increasing the culvert capacities and/or roadway elevations at 13th Avenue and 30th Avenue. The following scope items are proposed for Areas 20 and 21.

1. Conduct a topographic survey of Areas 20 and 21. Survey shall include 16 channel cross sections and four roadway crossings.
2. Prepare a HEC RAS model and run the 10, 50, 100, and 500-year events.
3. Complete an alternatives analysis for up to three alternatives for Areas 20 and 21.
4. Prepare a figure and opinion of probable construction cost for each alternative.
5. Summarize existing conditions flooding, modeling assumptions, and alternative analysis for incorporation into flood analysis report.

#### **Localized Flood Evaluations and Alternative Analysis**

The following areas of localized flooding were identified by residents at the public informational meeting on June 14th, 2023. Drainage evaluations will be conducted for each location listed below to assess alternatives for addressing resident concerns. Up to 64 hours of field topographic survey is anticipated as part of the evaluation of these areas. A figure and opinion of probable construction cost will be developed for each alternative and the evaluations will be summarized in the final flood analysis report. Areas are shown on the attached map and correspond with the flood concern mapping we previously prepared for the Village. Areas can be added or removed to the scope based on the Village's desired level of effort for this project.

*Area 1* – 63rd Avenue between 45th Street and 50th Street

*Area 8* – CTH A between I-94 and 110th Avenue

*Area 11* – 45th Avenue south of CTH E

*Area 13* – 4th Street west of CTH G

*Area 14* – CTH KR between Rossi Lane and 43rd Avenue

*Area 16* – CTH A between CTH Y and 18th Avenue

*Area 18* – 11th Street within Somers Estates Subdivision

*Area 19* – 13th Place east of STH 32

#### **Flood Analysis Report**

1. Prepare a draft flood analysis report incorporating project assumptions, existing conditions flooding, alternative analyses for each modeled and evaluated area, and potential project funding opportunities. The flood analysis report will include maintenance recommendations for up to ten locations. Maintenance recommendations may include items such as culvert and ditch clearing, log dam removals, and erosion control.
2. Incorporate Village comments into final report and submit final report to Village.

Jason Peters  
 Village of Somers  
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 December 14, 2023

**Proposed Fee**

Our proposed fee is based on the *Scope of Services* described above. The scope includes areas of concern that have already been identified through public involvement efforts. The possibility exists that the Village may wish to review other areas of concern not previously reported, as the project progresses. Additional areas can be added to the study through an amendment or, alternatively, a contingency “if authorized” budget could be added to the initial agreement that we would use only if directed by the Village.

Task	Estimated Fee
Meetings and Presentation to Village Board	\$15,000
Area 3 Flood Model and Alternatives Analysis	\$20,500
Area 4 Flood Model and Alternatives Analysis	\$12,000
Area 5 Flood Model and Alternatives Analysis	\$26,000
Area 10 Flood Model and Alternatives Analysis	\$21,500
Area 17 Flood Model and Alternatives Analysis	\$15,000
Area 20 & 21 Flood Model and Alternatives Analysis	\$18,500
Localized Flood Model	\$51,500
Flood Analysis Report	\$17,000
<b>Total Engineering Services (all tasks)</b>	<b>\$197,000</b>

**Anticipated Schedule**

Our proposed project schedule is outlined below.

Milestones	Anticipated Completion Dates
Notice to Proceed and Executed Agreement	February 2024
Project Kickoff Meeting	March 2024
Survey	April 2024
Flood Modeling and Alternative Analysis	August 2024
Progress Meeting 1	September 2024
Submit Draft Flood Analysis Report to Village	November 2024
Progress Meeting 2	December 2024
Submit Final Flood Analysis Report to Village	January 2025
Presentation to Village Board	February 2025

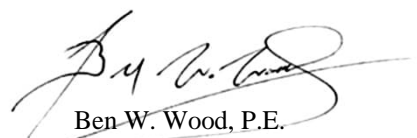
We are excited to deliver a successful study for the Village and continue building a strong stormwater partnership.

If there are any additional questions pertaining to our proposal, please contact us directly at 414-271-0771 or Anna.Sadowski@strand.com or Ben.Wood@strand.com.

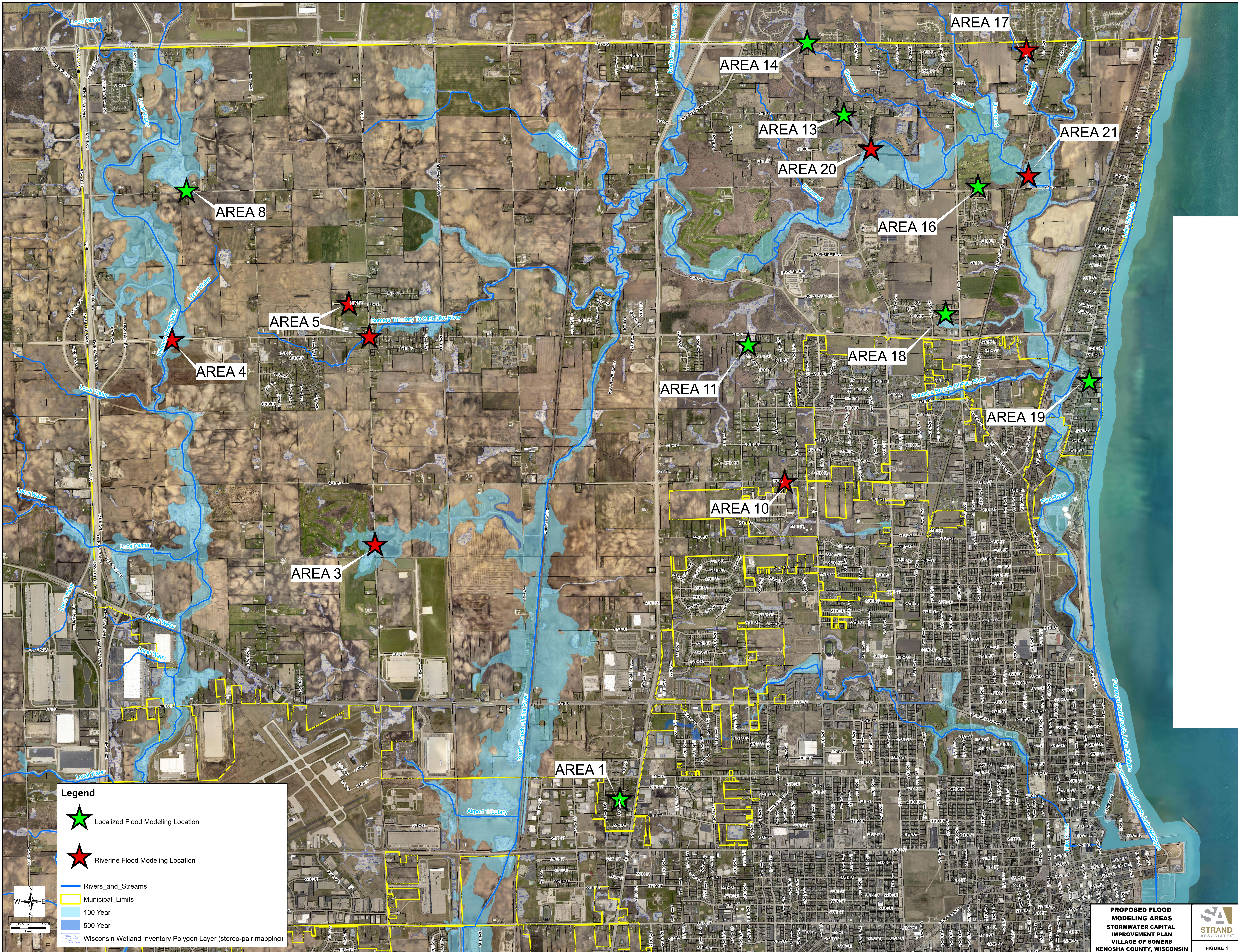
Sincerely,

STRAND ASSOCIATES, INC.®








  
 Anna T. Sadowski, P.E.  
 Project Manager

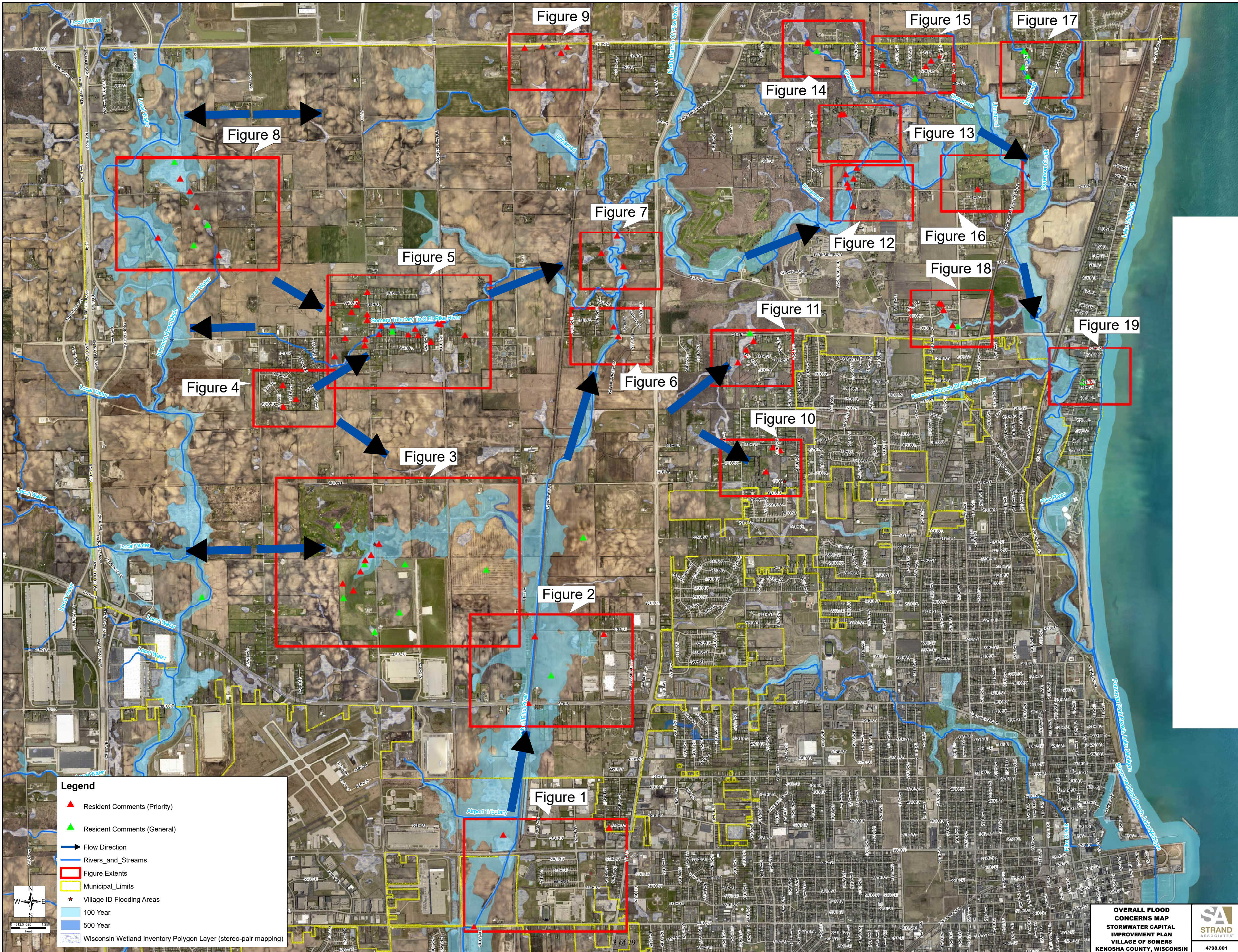
  
 Ben W. Wood, P.E.  
 Client Liaison

P230.840/ATS:beh



**Legend**

-  Localized Flood Modeling Location
-  Riverine Flood Modeling Location
-  Rivers\_and\_Streams
-  Municipal\_Limits
-  100 Year
-  500 Year
-  Wisconsin Wetland Inventory Polygon Layer (stereo-pair mapping)



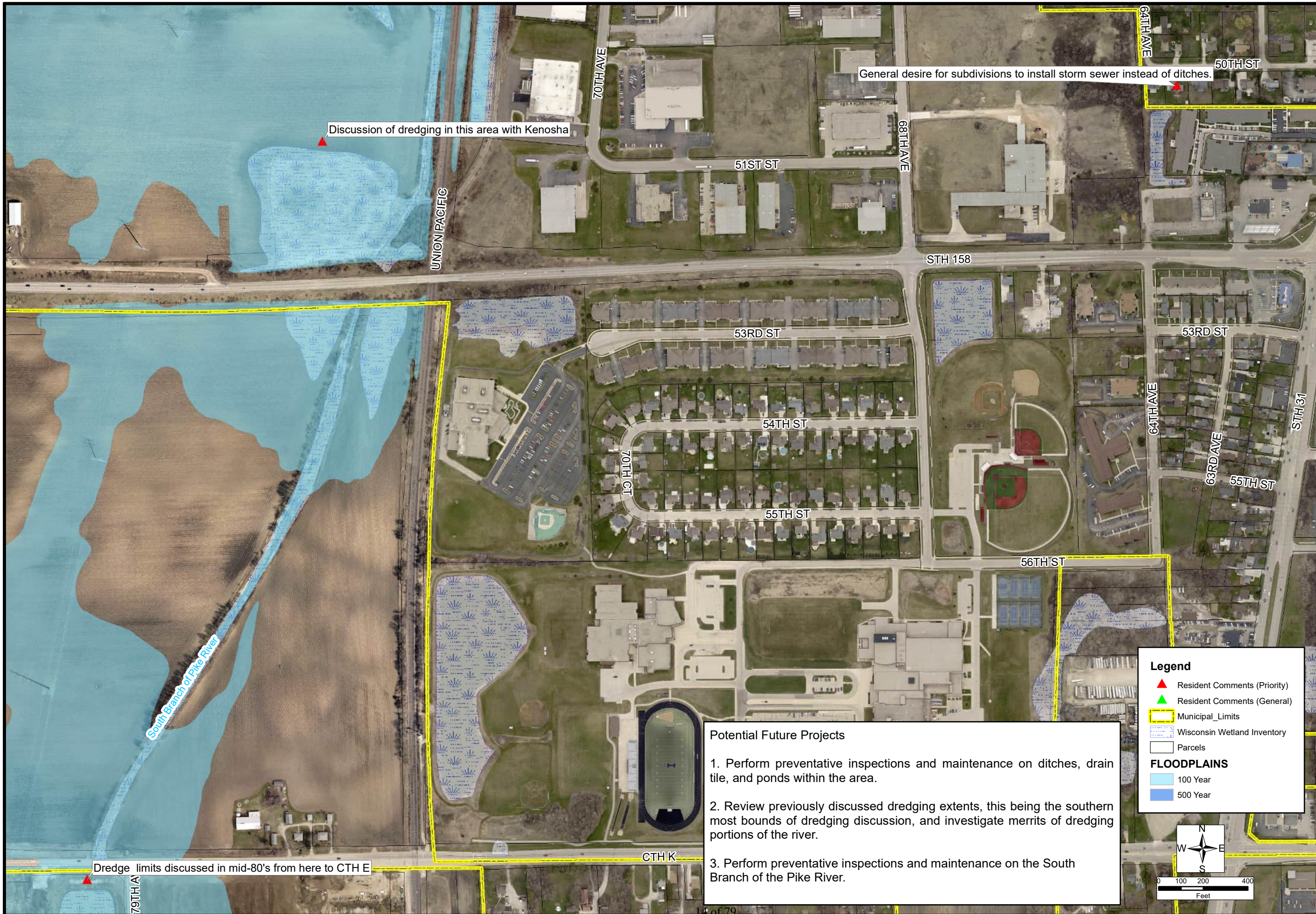
**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- ➔ Flow Direction
- Rivers\_and\_Streams
- ▭ Figure Extents
- ▭ Municipal\_Limits
- ★ Village ID Flooding Areas
- 100 Year
- 500 Year
- Wisconsin Wetland Inventory Polygon Layer (stereo-pair mapping)



**OVERALL FLOOD CONCERNS MAP**  
**STORMWATER CAPITAL IMPROVEMENT PLAN**  
**VILLAGE OF SOMERS**  
**KENOSHA COUNTY, WISCONSIN**

**SA STRAND ASSOCIATES**  
 4798.001



Discussion of dredging in this area with Kenosha

General desire for subdivisions to install storm sewer instead of ditches.

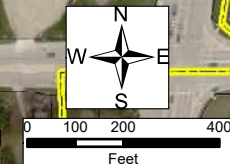
Dredge limits discussed in mid-80's from here to CTH E

**Potential Future Projects**

1. Perform preventative inspections and maintenance on ditches, drain tile, and ponds within the area.
2. Review previously discussed dredging extents, this being the southern most bounds of dredging discussion, and investigate merits of dredging portions of the river.
3. Perform preventative inspections and maintenance on the South Branch of the Pike River.

**Legend**

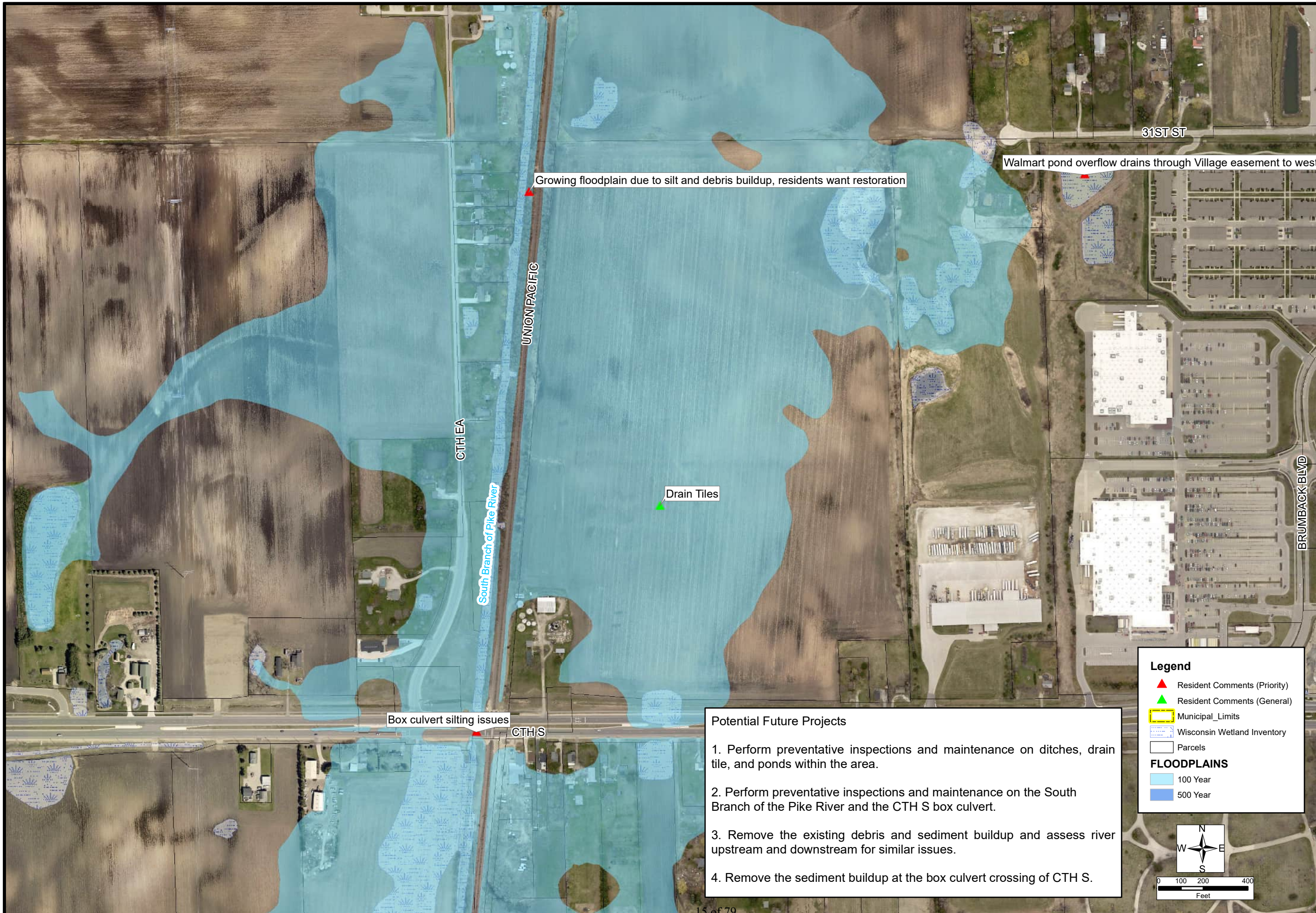
- ▲ Resident Comments (Priority)
  - ▲ Resident Comments (General)
  - ▭ Municipal\_Limits
  - ▭ Wisconsin Wetland Inventory
  - ▭ Parcels
- FLOODPLAINS**
- ▭ 100 Year
  - ▭ 500 Year



**COUNTY HIGHWAY K AND UNION PACIFIC RAILROAD  
 FLOODING CONCERNS MAP  
 STORMWATER CAPITAL IMPROVEMENT PLAN  
 VILLAGE OF SOMERS  
 KENOSHA COUNTY, WISCONSIN**



**FIGURE 1  
4798.001**



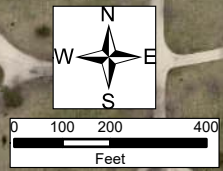
- Potential Future Projects**
1. Perform preventative inspections and maintenance on ditches, drain tile, and ponds within the area.
  2. Perform preventative inspections and maintenance on the South Branch of the Pike River and the CTH S box culvert.
  3. Remove the existing debris and sediment buildup and assess river upstream and downstream for similar issues.
  4. Remove the sediment buildup at the box culvert crossing of CTH S.

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- ▭ Municipal\_Limits
- ▭ Wisconsin Wetland Inventory
- ▭ Parcels

**FLOODPLAINS**

- 100 Year
- 500 Year



**COUNTY HIGHWAY EA AND UNION PACIFIC RAILROAD  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**



**FIGURE 2  
4798.001**

**Potential Future Projects**

1. Perform a Hydrology and Hydraulics analysis to assess potential flood control modifications along CTH H.
2. Perform preventative inspections and maintenance on ditches, drain tile, and ponds within the area.
3. Monitor situation revolving around the potential housing development.
4. Coordinate with WDNR to determine ordinary high water marks in the area.

Potential 600 house development proposed in the past.

Drain tile submerged in spring

Would drain area if graded differently

New artificial wetland area, did not used to be wet

Farmed Wetland

Pond is same elevation as pond to south

4" drain tile from pond to south

Property owner willing to participate in a solution

Resident wants accurate high water delineations done to show retention capacity

Plan drainage improvements in conjunction with golf course. Golf course is willing to participate

Drain Tile

Pond is same elevation as pond to north

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)

- ▭ Municipal\_Limits
- ▭ Wisconsin Wetland Inventory
- ▭ Parcels

**FLOODPLAINS**

- 100 Year
- 500 Year



**COUNTY HIGHWAY H AND 18TH STREET  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**



**FIGURE 3  
4798.001**



**Potential Future Projects**

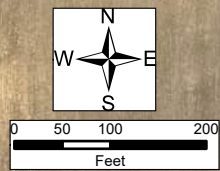
1. Perform preventative inspections and maintenance on ditches, swales, and driveway culverts within the neighborhood.
2. Perform preventative inspections and maintenance on the retention basins within the neighborhood.
3. Perform a Hydrology and Hydraulics analysis to assess potential flood control modifications to swales and ponds.

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- ▭ Municipal\_Limits
- ▭ Wisconsin Wetland Inventory
- ▭ Parcels

**FLOODPLAINS**

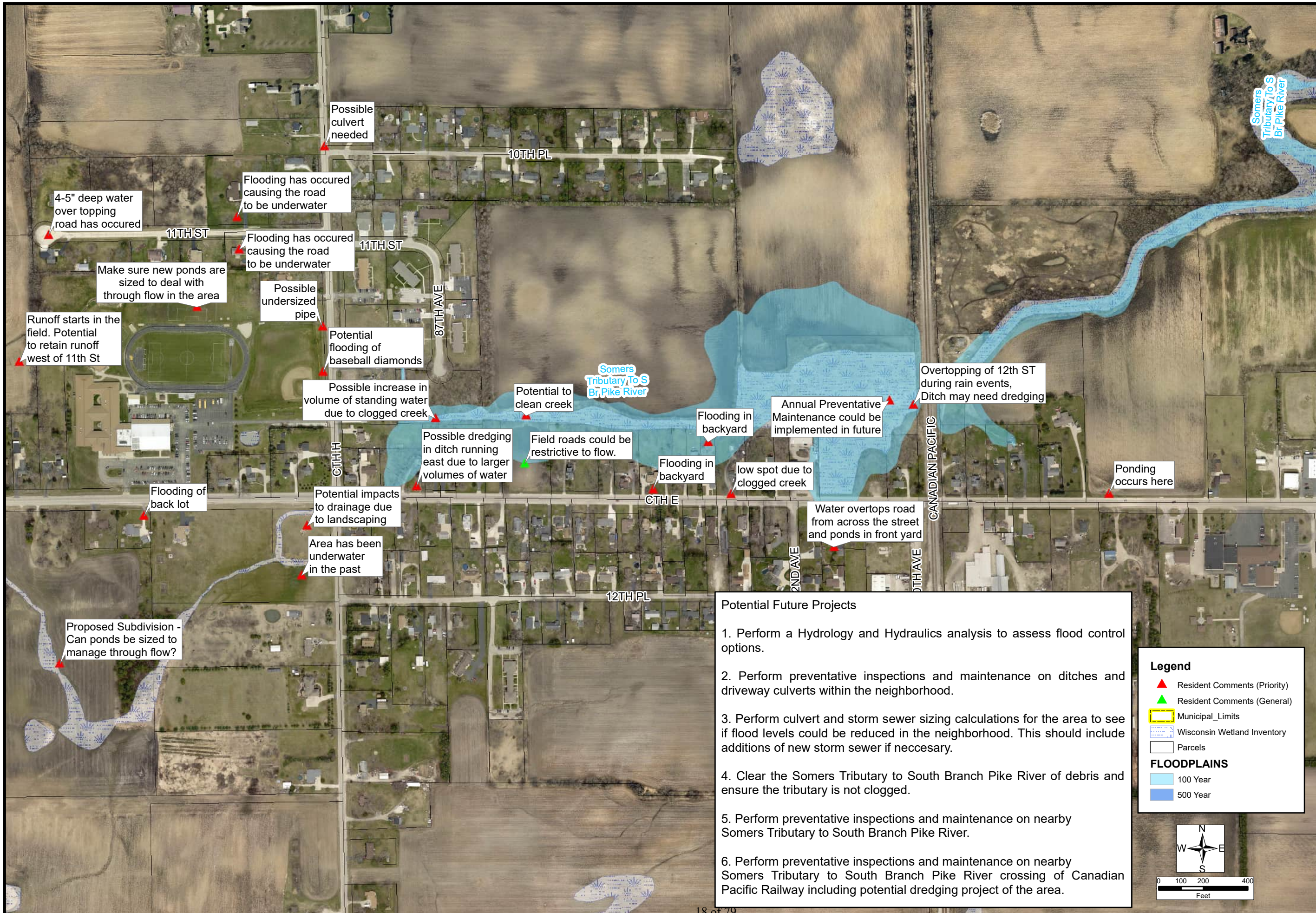
- ▭ 100 Year
- ▭ 500 Year



**MAPLE RIDGE NEIGHBORHOOD  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**



**FIGURE 4  
4798.001**



**12TH STREET AND COUNTY HIGHWAY H  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**

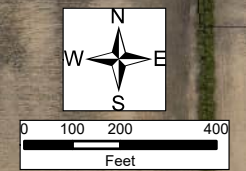
- Potential Future Projects**
1. Perform a Hydrology and Hydraulics analysis to assess flood control options.
  2. Perform preventative inspections and maintenance on ditches and driveway culverts within the neighborhood.
  3. Perform culvert and storm sewer sizing calculations for the area to see if flood levels could be reduced in the neighborhood. This should include additions of new storm sewer if necessary.
  4. Clear the Somers Tributary to South Branch Pike River of debris and ensure the tributary is not clogged.
  5. Perform preventative inspections and maintenance on nearby Somers Tributary to South Branch Pike River.
  6. Perform preventative inspections and maintenance on nearby Somers Tributary to South Branch Pike River crossing of Canadian Pacific Railway including potential dredging project of the area.

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- ▭ Municipal\_Limits
- ▭ Wisconsin Wetland Inventory
- ▭ Parcels

**FLOODPLAINS**

- 100 Year
- 500 Year



**FIGURE 5  
4798.001**



**Potential Future Projects**

1. Perform preventative inspections and maintenance on the South Branch of the Pike River.
2. Remove the existing log debris dam and inspect river for similar issues upstream and downstream of this location.
3. Review previously discussed dredging extents, this being the northern most bounds of dredging discussion, and investigate merits of dredging portions of the river.

Log Debris Dam

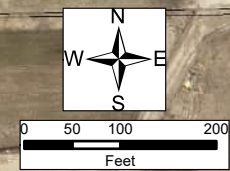
Historic discussion of dredging in this area, potential future dredging area

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- ▭ Municipal\_Limits
- ▭ Wisconsin Wetland Inventory
- ▭ Parcels

**FLOODPLAINS**

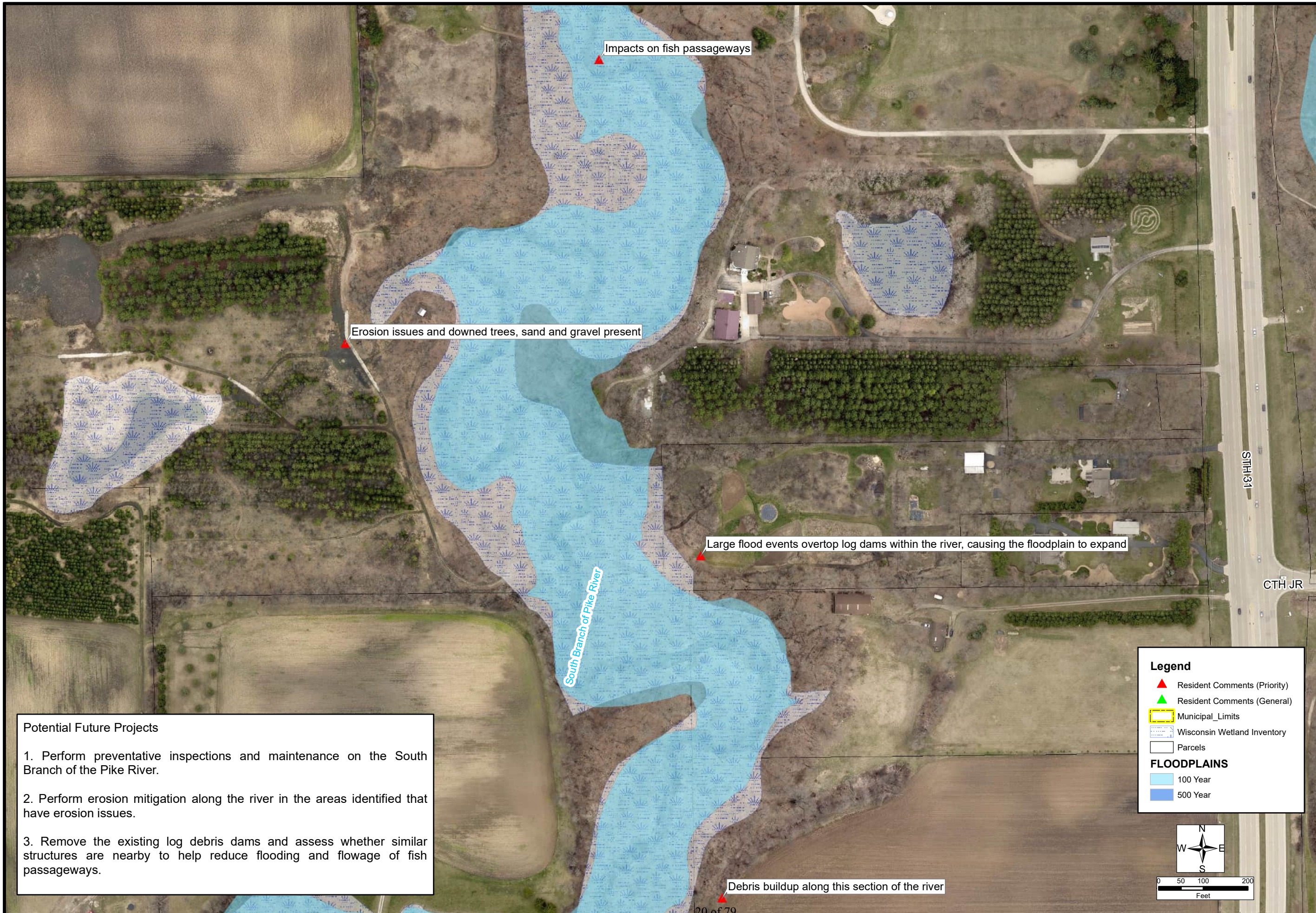
- 100 Year
- 500 Year



**CTH E AND SOUTH BRANCH OF PIKE RIVER  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**



**FIGURE 6  
4798.001**



**Potential Future Projects**

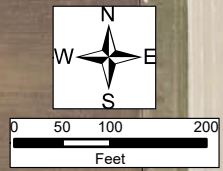
1. Perform preventative inspections and maintenance on the South Branch of the Pike River.
2. Perform erosion mitigation along the river in the areas identified that have erosion issues.
3. Remove the existing log debris dams and assess whether similar structures are nearby to help reduce flooding and flowage of fish passageways.

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- ▭ Municipal\_Limits
- ▭ Wisconsin Wetland Inventory
- ▭ Parcels

**FLOODPLAINS**

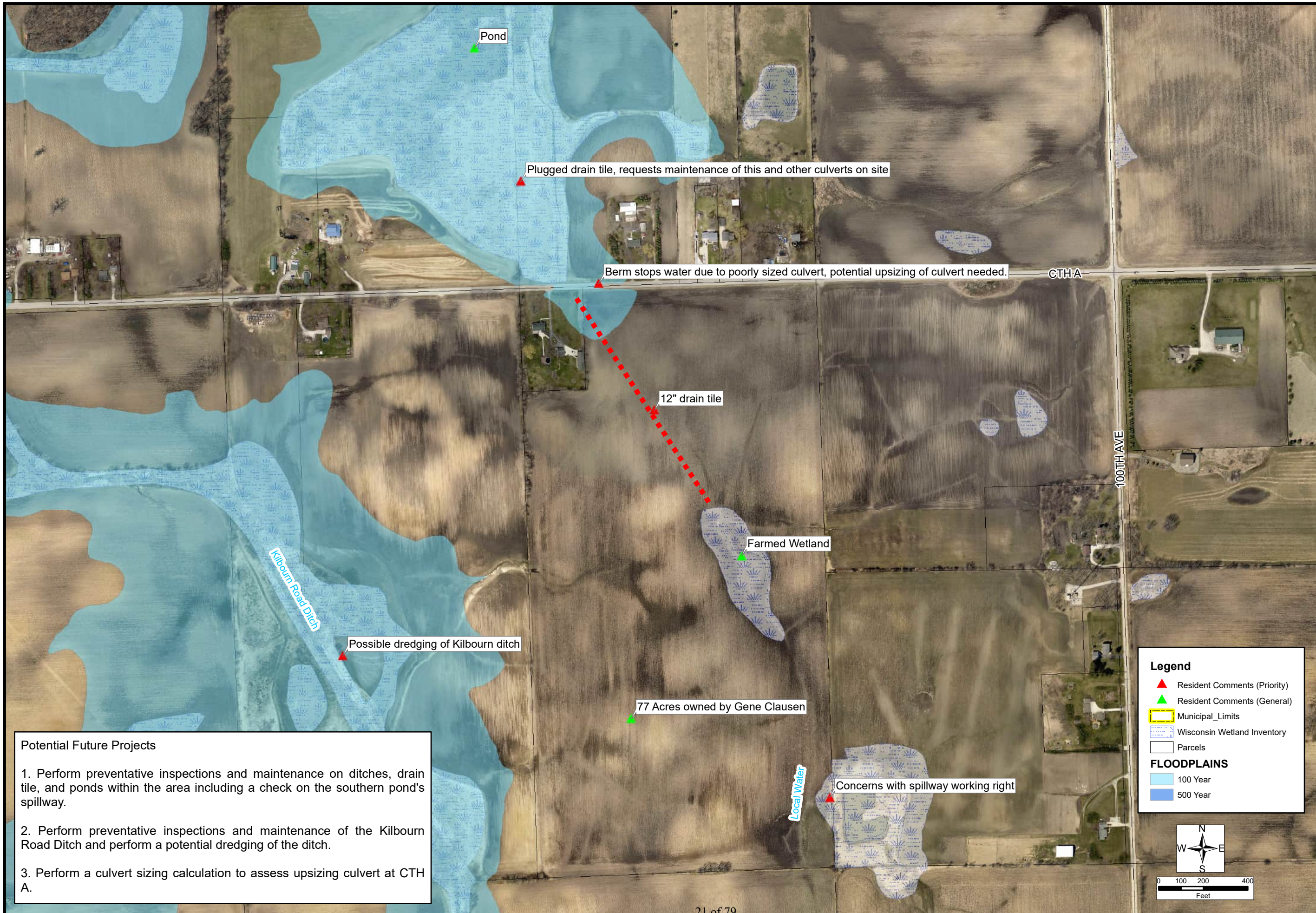
- 100 Year
- 500 Year



**SOUTH BRANCH OF PIKE RIVER AND STH 31  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**



**FIGURE 7  
4798.001**



**Potential Future Projects**

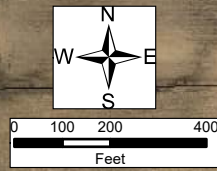
1. Perform preventative inspections and maintenance on ditches, drain tile, and ponds within the area including a check on the southern pond's spillway.
2. Perform preventative inspections and maintenance of the Kilbourn Road Ditch and perform a potential dredging of the ditch.
3. Perform a culvert sizing calculation to assess upsizing culvert at CTH A.

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- ▭ Municipal\_Limits
- ▭ Wisconsin Wetland Inventory
- ▭ Parcels

**FLOODPLAINS**

- 100 Year
- 500 Year



**COUNTY HIGHWAY A AND KILBOURN ROAD DITCH  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**



**FIGURE 8  
4798.001**



DOT Pond overflows during rain events

DOT Ditch overflows during rain events

Tilapia Farm

Pond is backup for farm, can't have salt and highway runoff in pond

CTH KR

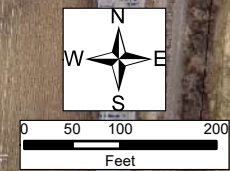
UNION PACIFIC

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- ▭ Municipal Limits
- ▨ Wisconsin Wetland Inventory
- ▭ Parcels

**FLOODPLAINS**

- 100 Year
- 500 Year



**Potential Future Projects**

1. Work with DOT to assess potential modifications to the pond and ditches along CTH KR to alleviate overflows to the tilapia farm backup

**1ST STREET AND TILAPIA FARM  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**



**FIGURE 9  
4798.001**



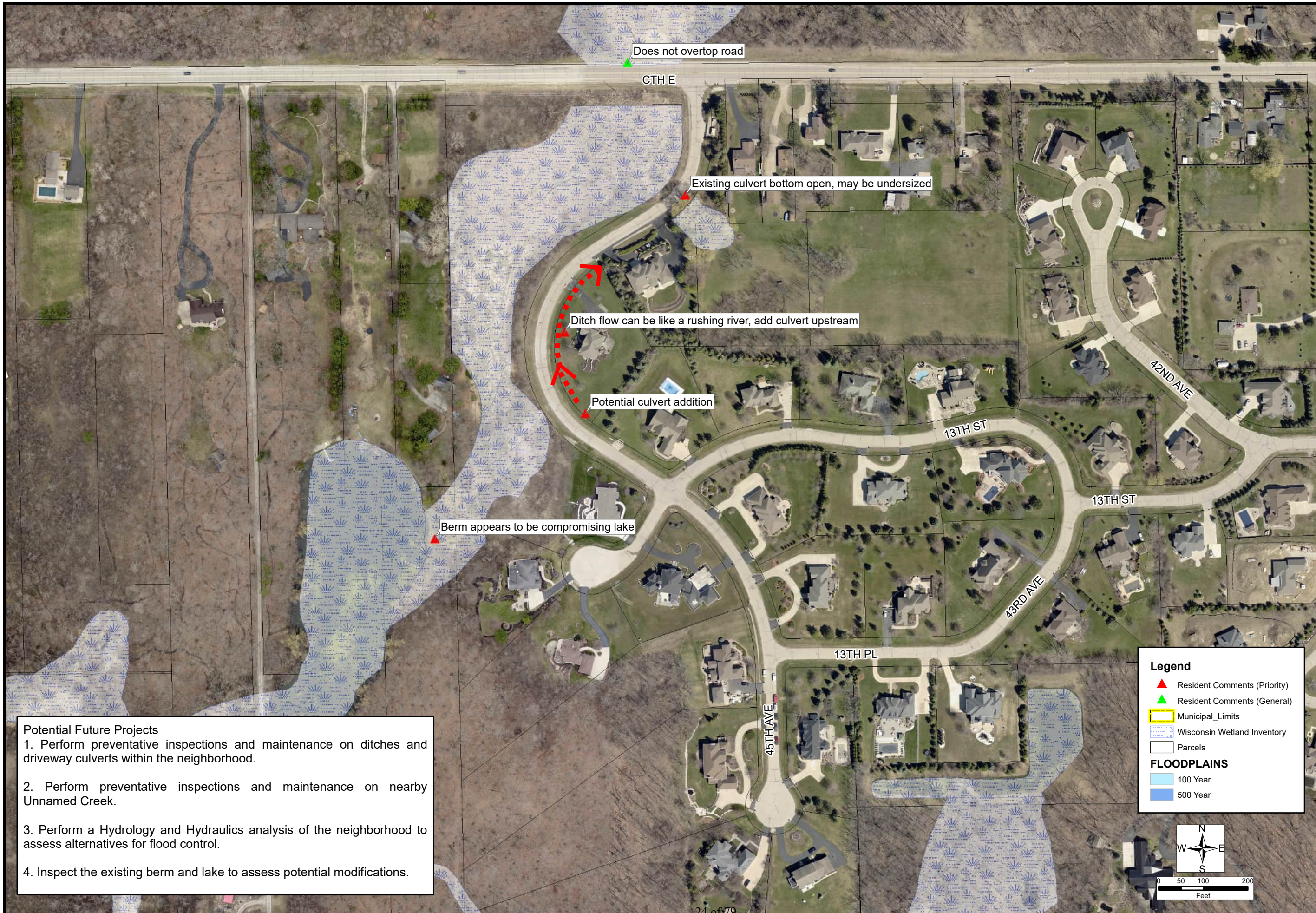
**Potential Future Projects**

1. Perform preventative inspections and maintenance on ditches and driveway culverts within the neighborhood.
2. Perform culvert sizing calculations to assess whether flood levels could be reduced in the neighborhood.

**COUNTY HIGHWAY L AND 43RD AVENUE  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**



**FIGURE 10  
4798.001**



- Potential Future Projects**
1. Perform preventative inspections and maintenance on ditches and driveway culverts within the neighborhood.
  2. Perform preventative inspections and maintenance on nearby Unnamed Creek.
  3. Perform a Hydrology and Hydraulics analysis of the neighborhood to assess alternatives for flood control.
  4. Inspect the existing berm and lake to assess potential modifications.

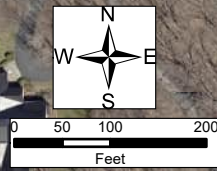
**CTH E AND 45TH AVENUE NEIGHBORHOOD  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- ▭ Municipal\_Limits
- ▨ Wisconsin Wetland Inventory
- ▭ Parcels

**FLOODPLAINS**

- 100 Year
- 500 Year



**FIGURE 11  
4798.001**



**COUNTY HIGHWAY A AND PIKE RIVER  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**

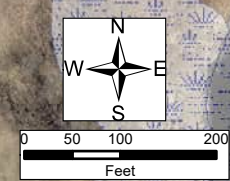
- Potential Future Projects**
1. Perform erosion mitigation under the bridge and along the river.
  2. Reinforce or replace retaining walls north of the road crossing.
  3. Perform a Hydrology and Hydraulics analysis of the area to assess alternatives for flood control.
  4. Perform preventative inspections and maintenance on bridge crossing CTH A.
  5. Perform preventative inspections and maintenance on Pike River.
  6. Remove the existing log debris dams from river.

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- ▭ Municipal\_Limits
- ▭ Wisconsin Wetland Inventory
- ▭ Parcels

**FLOODPLAINS**

- 100 Year
- 500 Year



**FIGURE 12  
4798.001**



**4TH STREET  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**

**Potential Future Projects**

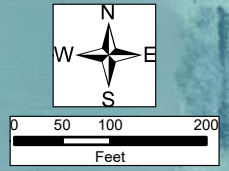
1. Perform preventative inspections and maintenance on culvert crossing 4th Street including addressing existing concerns over integrity of crossing.
2. Perform preventative inspections and maintenance on nearby Unnamed Creek.
3. Perform a culvert sizing calculation to assess upsizing culvert at 4th Street.

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- ▭ Municipal\_Limits
- ▨ Wisconsin Wetland Inventory
- ▭ Parcels

**FLOODPLAINS**

- 100 Year
- 500 Year



**FIGURE 13  
4798.001**



**Potential Future Projects**

1. Perform preventative inspections and maintenance on culverts crossing CTH KR.
2. Perform preventative inspections and maintenance on nearby Unnamed Creek.
3. Perform a culvert sizing calculation for the culvert that crosses CTH KR to assess whether flood levels could be reduced and perform a hydrology and hydraulics analysis of potential downstream flooding caused by an increase in downstream flows.

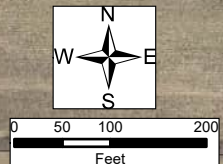
**COUNTY HIGHWAY KR  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**

**Legend**

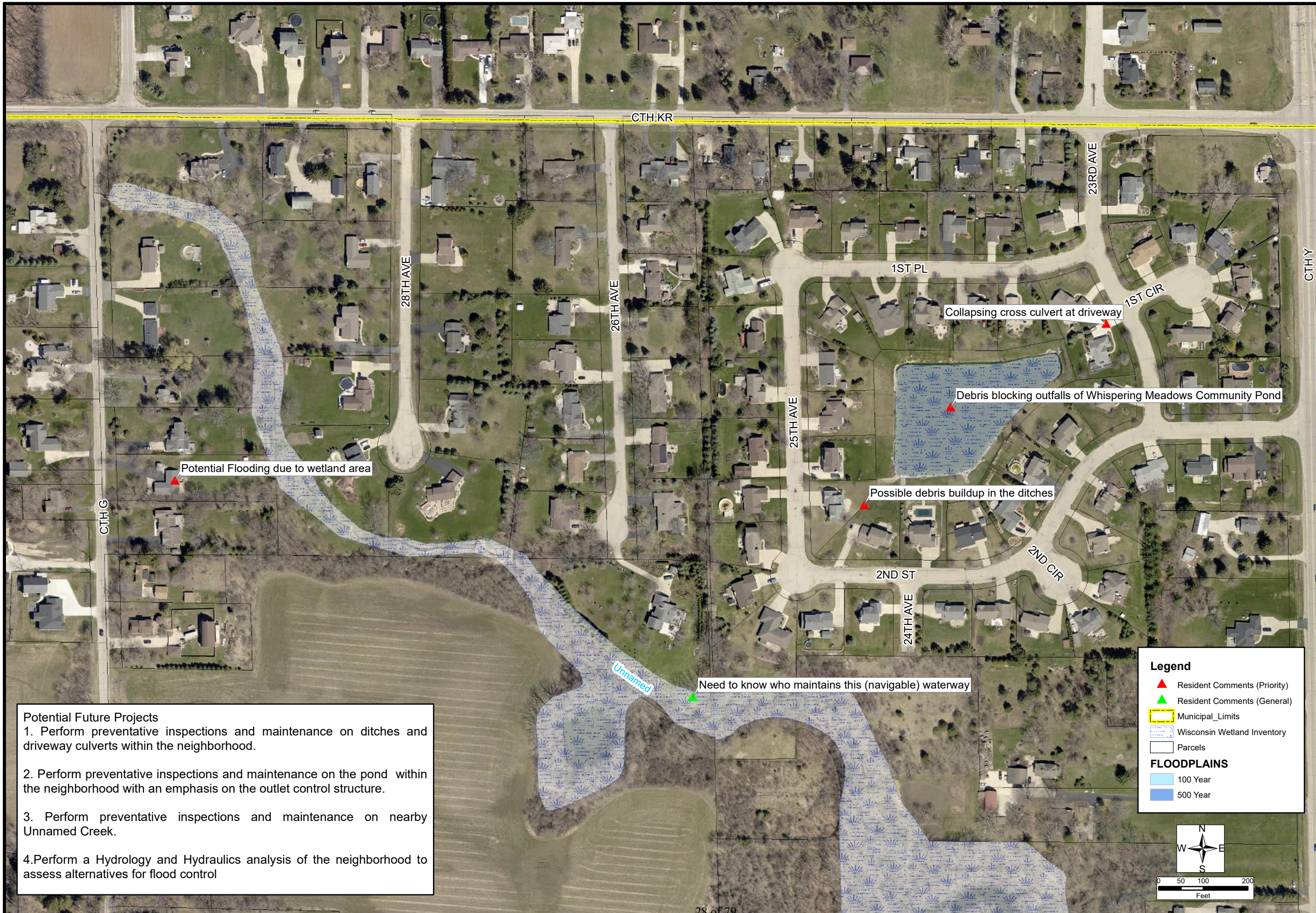
- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- Municipal Limits
- Wisconsin Wetland Inventory
- Parcels

**FLOODPLAINS**

- 100 Year
- 500 Year



**FIGURE 14  
4798.001**



**Potential Future Projects**

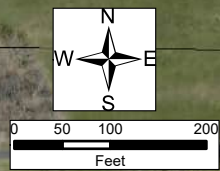
1. Perform preventative inspections and maintenance on ditches and driveway culverts within the neighborhood.
2. Perform preventative inspections and maintenance on the pond within the neighborhood with an emphasis on the outlet control structure.
3. Perform preventative inspections and maintenance on nearby Unnamed Creek.
4. Perform a Hydrology and Hydraulics analysis of the neighborhood to assess alternatives for flood control

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- Municipal Limits
- Wisconsin Wetland Inventory
- Parcels

**FLOODPLAINS**

- 100 Year
- 500 Year



**WHISPERING MEADOWS NEIGHBORHOOD  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**



**FIGURE 15  
4798.001**



Flooding in ditch, no discharge point. Possibly connect ditch to storm sewer across the street.

**Potential Future Projects**

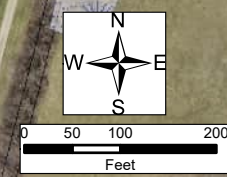
1. Perform preventative inspections and maintenance on ditches and driveway culverts within the neighborhood.
2. Perform a Hydrology and Hydraulics analysis of a potential pipe connection that connects the ditches to the storm sewer across the road.

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- ▭ Municipal\_Limits
- ▭ Wisconsin Wetland Inventory
- ▭ Parcels

**FLOODPLAINS**

- 100 Year
- 500 Year



**COUNTY HIGHWAY A AND 18TH AVENUE  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**



**FIGURE 16  
4798.001**



Asphalt Crumbling and trees falling down

Residents haven't seen overtopping of road

Creek hasn't overflowed up to houses - no major issues

Who is responsible for clearing trees in creek?

Potential Future Projects  
 1. Perform preventative inspections and maintenance on culvert crossings of 13th Avenue.  
 2. Perform preventative inspections and maintenance on nearby Unnamed Creek.

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- ▭ Municipal\_Limits
- ▨ Wisconsin Wetland Inventory
- ▭ Parcels

**FLOODPLAINS**

- 100 Year
- 500 Year

**13TH AVENUE  
 FLOODING CONCERNS MAP  
 STORMWATER CAPITAL IMPROVEMENT PLAN  
 VILLAGE OF SOMERS  
 KENOSHA COUNTY, WISCONSIN**



**FIGURE 17  
 4798.001**



**Potential Future Projects**

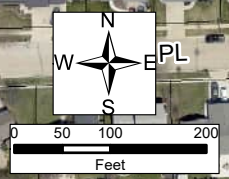
1. Perform preventative inspections and maintenance on the storm sewer within the neighborhood.
2. Perform preventative inspections and maintenance on the retention basin within the neighborhood.
3. Perform a Hydrology and Hydraulics analysis of a potential pipe upsizing that connects the fields north of the development to the retention basins in the middle of the development to prevent roadway overtopping. This should be accompanied with a potential regrading of the site north of the development to prevent flooding of the nearby houses.
4. Install a grate over the outfall of the retention basin to prevent debris clogging the outfall.

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- ▭ Municipal Limits
- ▭ Wisconsin Wetland Inventory
- ▭ Parcels

**FLOODPLAINS**

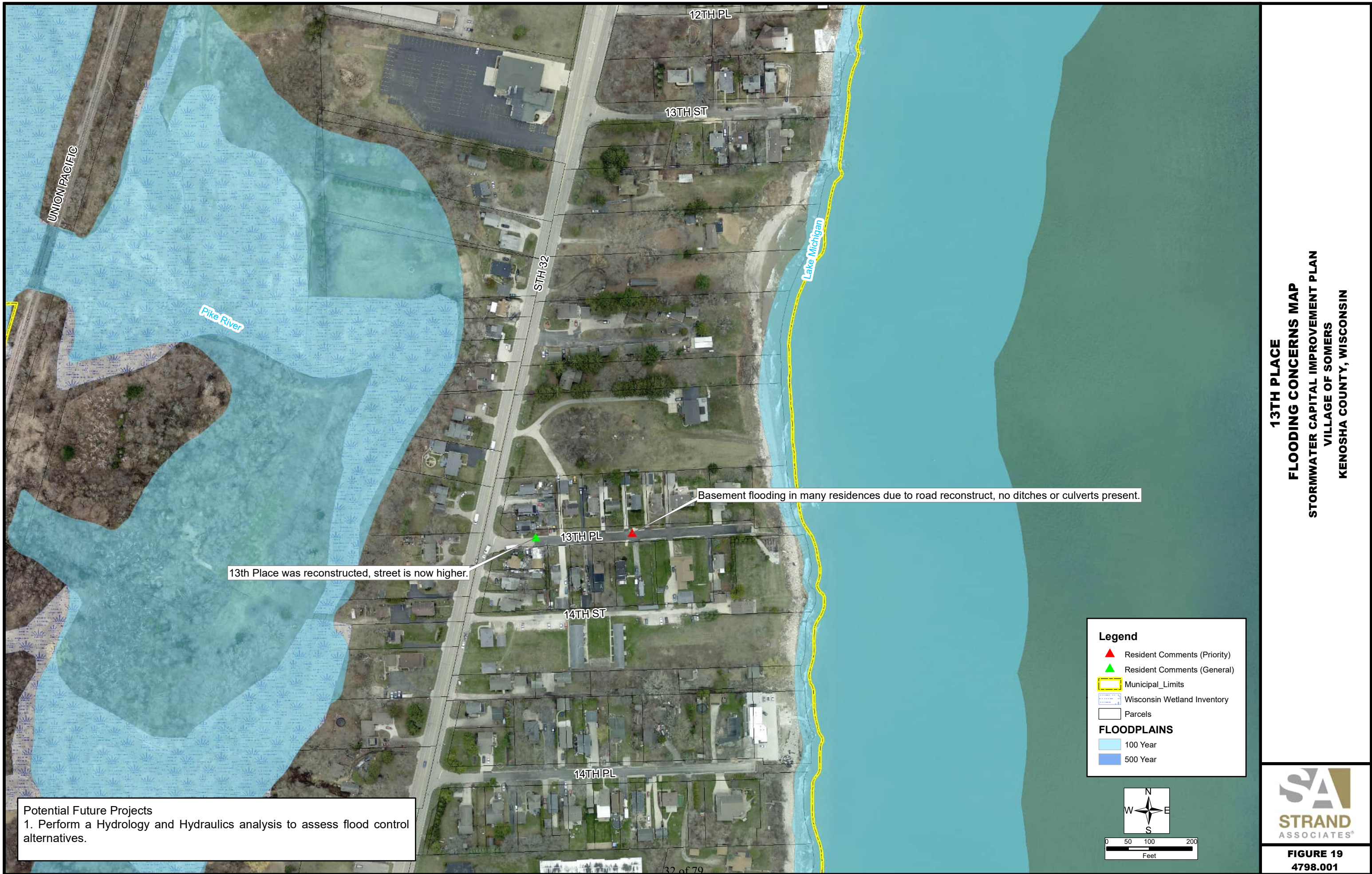
- 100 Year
- 500 Year



**SOMERS ESTATES CONDOMINIUMS  
FLOODING CONCERNS MAP  
STORMWATER CAPITAL IMPROVEMENT PLAN  
VILLAGE OF SOMERS  
KENOSHA COUNTY, WISCONSIN**



**FIGURE 18  
4798.001**



13th Place was reconstructed, street is now higher.

Basement flooding in many residences due to road reconstruct, no ditches or culverts present.

Potential Future Projects  
 1. Perform a Hydrology and Hydraulics analysis to assess flood control alternatives.

**Legend**

- ▲ Resident Comments (Priority)
- ▲ Resident Comments (General)
- Municipal\_Limits
- Wisconsin Wetland Inventory
- Parcels

**FLOODPLAINS**

- 100 Year
- 500 Year

**13TH PLACE  
 FLOODING CONCERNS MAP  
 STORMWATER CAPITAL IMPROVEMENT PLAN  
 VILLAGE OF SOMERS  
 KENOSHA COUNTY, WISCONSIN**



**FIGURE 19  
 4798.001**



**STRAND**  
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# STORMWATER HYDROLOGY AND HYDRAULICS STUDY

City of Manitowoc, WI

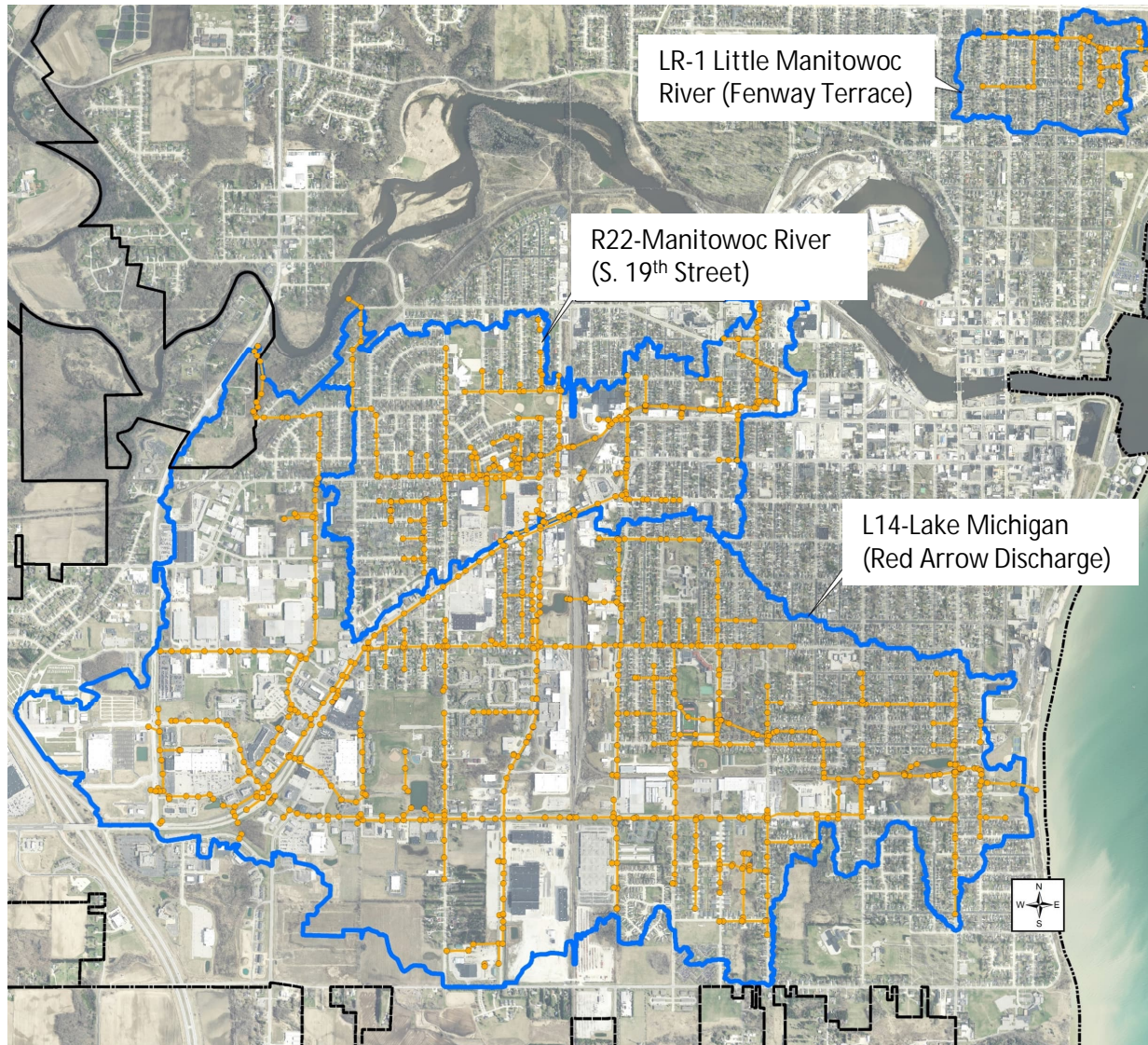
March 1, 2023



# Presentation Outline

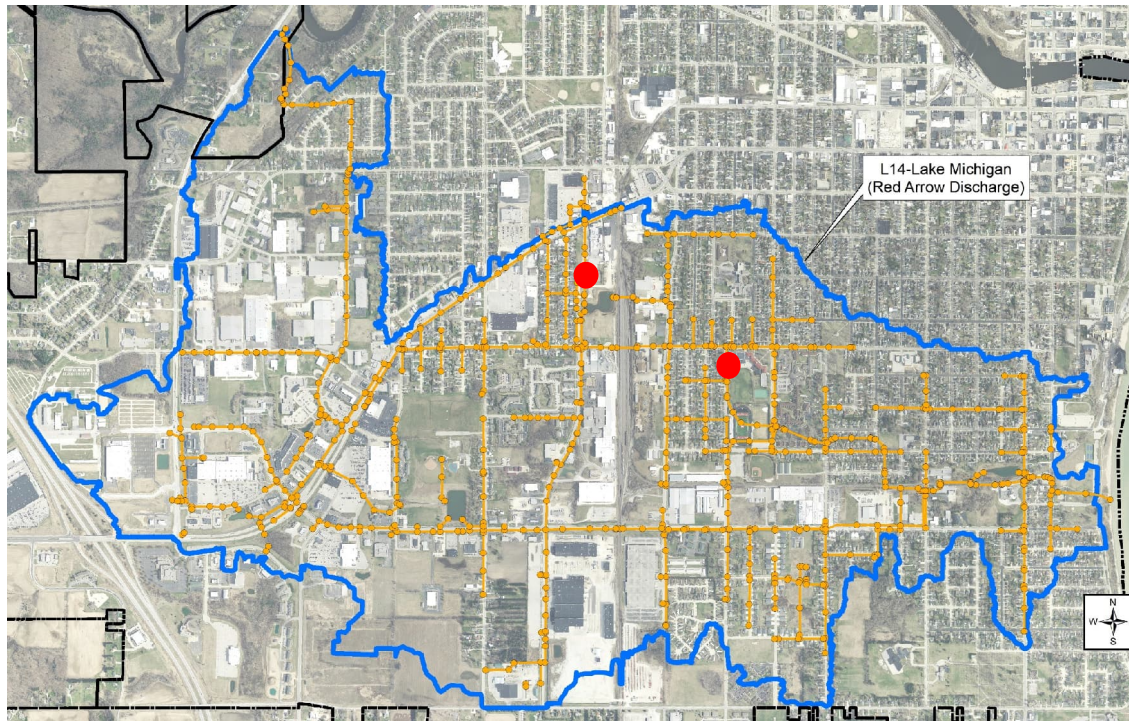
- Introduction and Project Background
- Flood Problem Areas
- Existing Condition Model Calibration
- Alternative Analysis
- Recommended Alternative
- Project Funding Opportunities

# Studied Watersheds



# Flooding Problem Areas

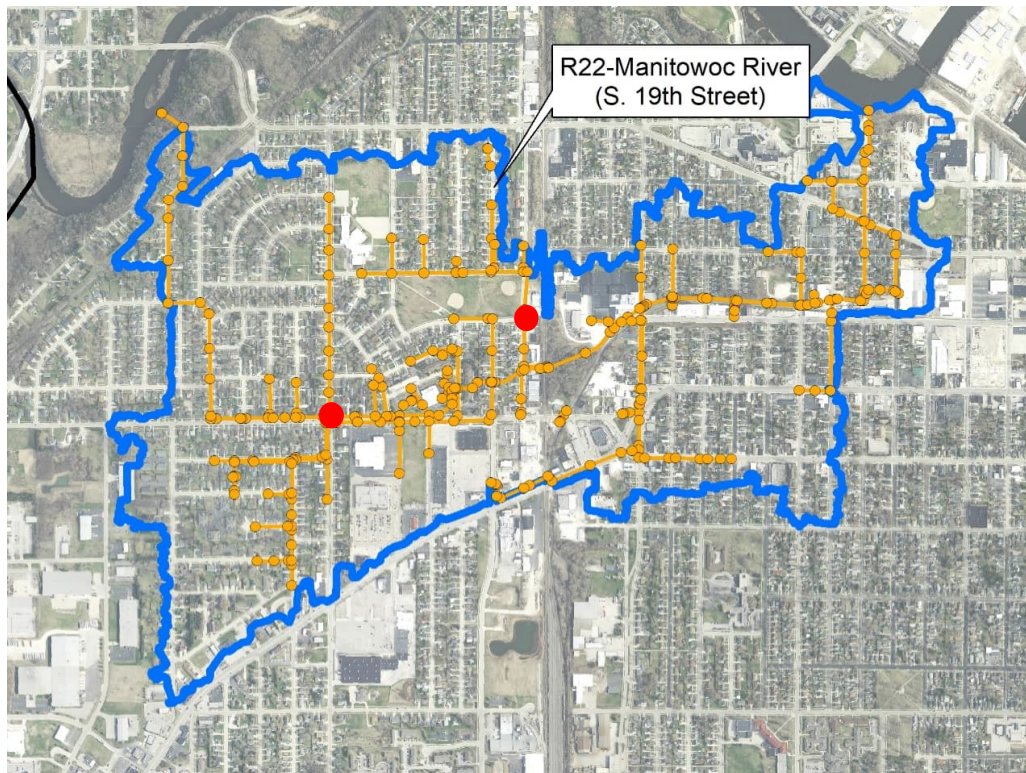
- L14 - Lake Michigan (Red Arrow Discharge)
  - 23rd Street from Division Street to Grand Avenue
  - 30th Street from HWY 42 to Division Street.



L14 Flooding Problem Areas

# Flooding Problem Areas

- R22 - Manitowoc (S. 19th Street) Watershed
  - Intersection of 29th Street and Mero Street
  - Intersection of Custer Street and 35th Street



R22 Flooding Problem Areas

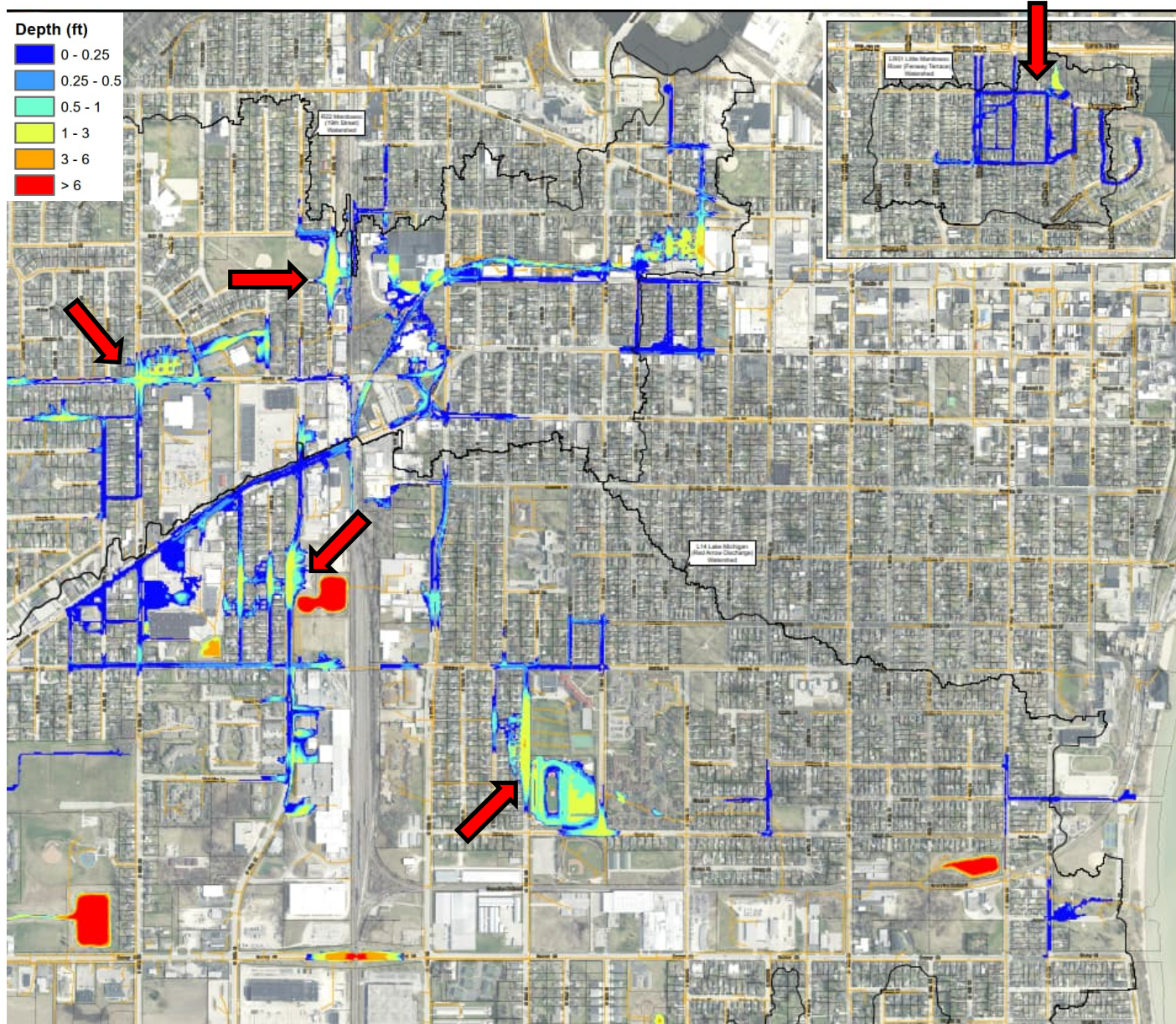
# Flooding Problem Areas

- LR1 - Little Manitowoc River (Fenway Terrace) Watershed
  - Intersection of Pine Street and 5th Street.

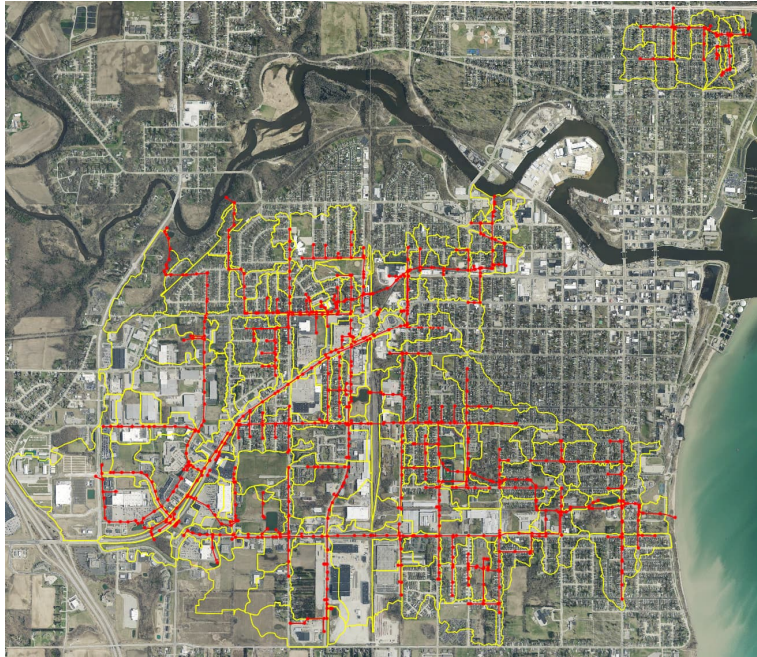


LR-1 Flooding Problem Areas

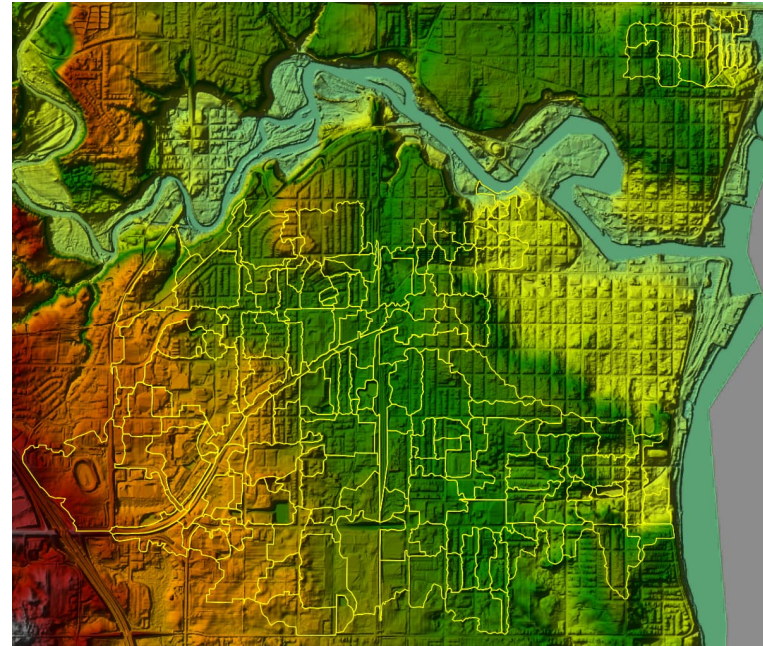
# Existing Condition Flood Depth Mapping



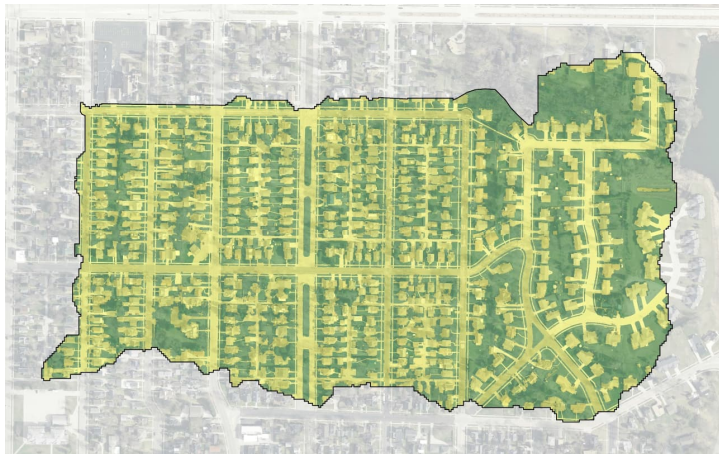
# Existing Condition Modeling



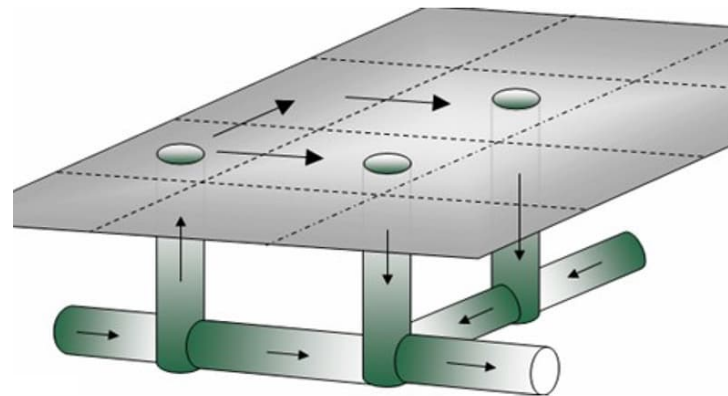
Watershed Delineation & Modeled Storm



Digital Elevation Model (Surface)



Impervious Area & Building Footprints

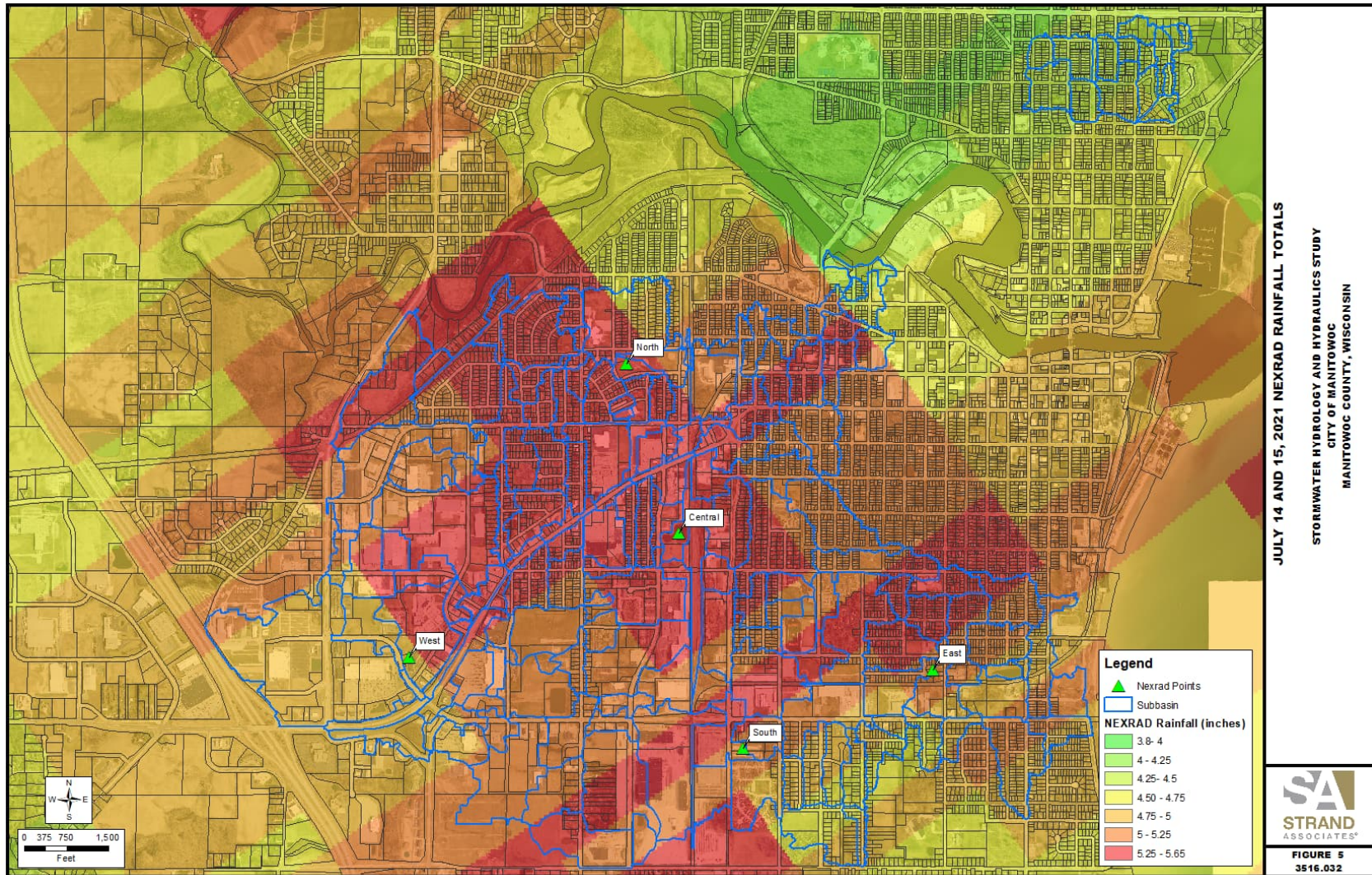


XPSWMM 1D & 2D

# Existing Condition Model Calibration

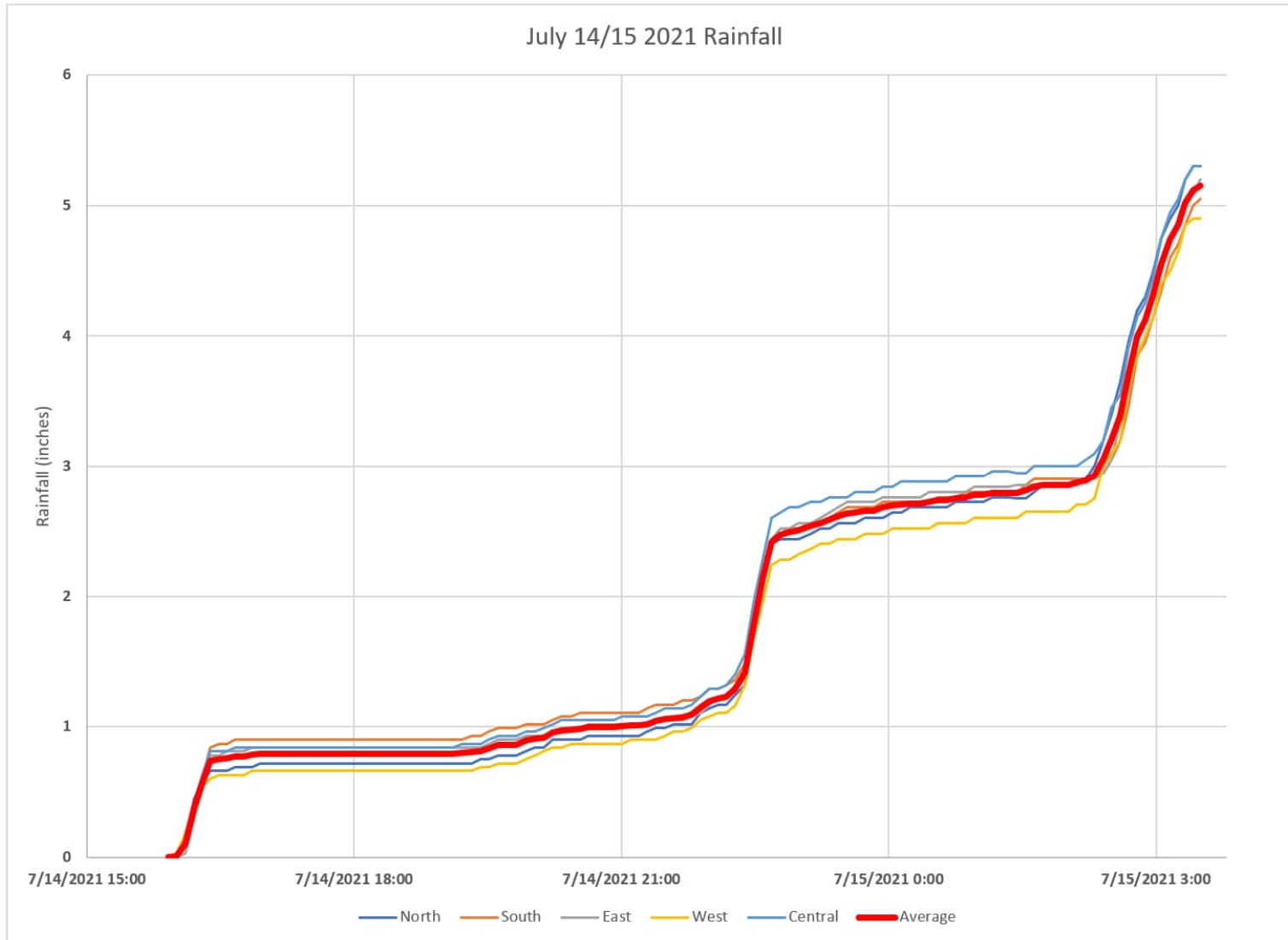
- Calibration Storm Event
  - July 14 and 15, 2021
- Calibration Locations
  - 23<sup>rd</sup> Street by Rubick Field
  - 1305 31<sup>st</sup> Street
  - 35<sup>th</sup> Street and Custer Street Intersection
  - 904 29<sup>th</sup> Street
  - Sabbatical Brewery
  - Pine Street and 5<sup>th</sup> Street Intersection

# July 14 and 15, 2021 Storm Event



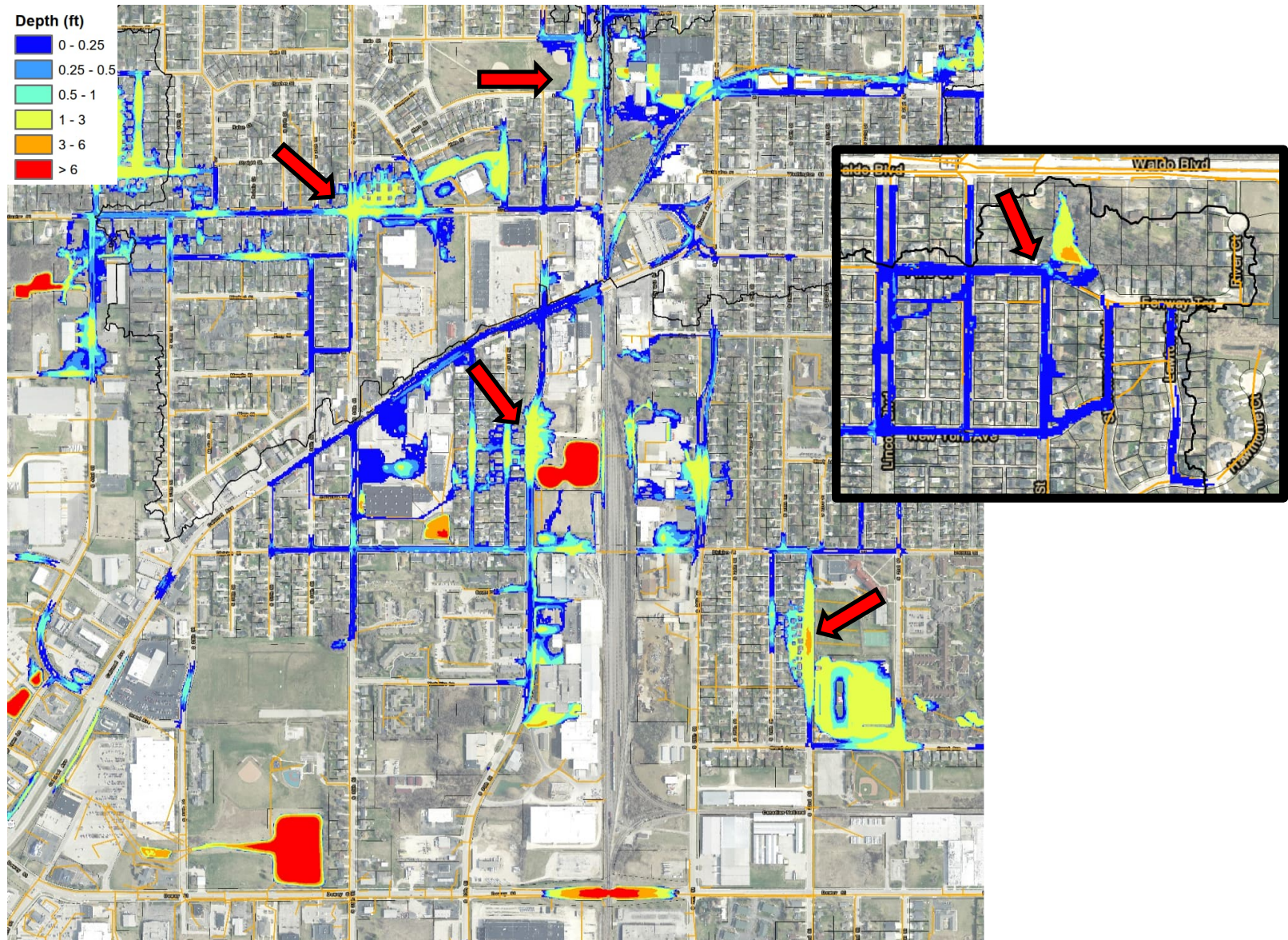
Radar Precipitation Totals – July 14 and 15, 2021

# July 14 and 15, 2021 Storm Event



Radar Precipitation Totals – July 14 and 15, 2021

# Existing Condition Model Calibration Locations



# Alternative Analysis Design Criteria

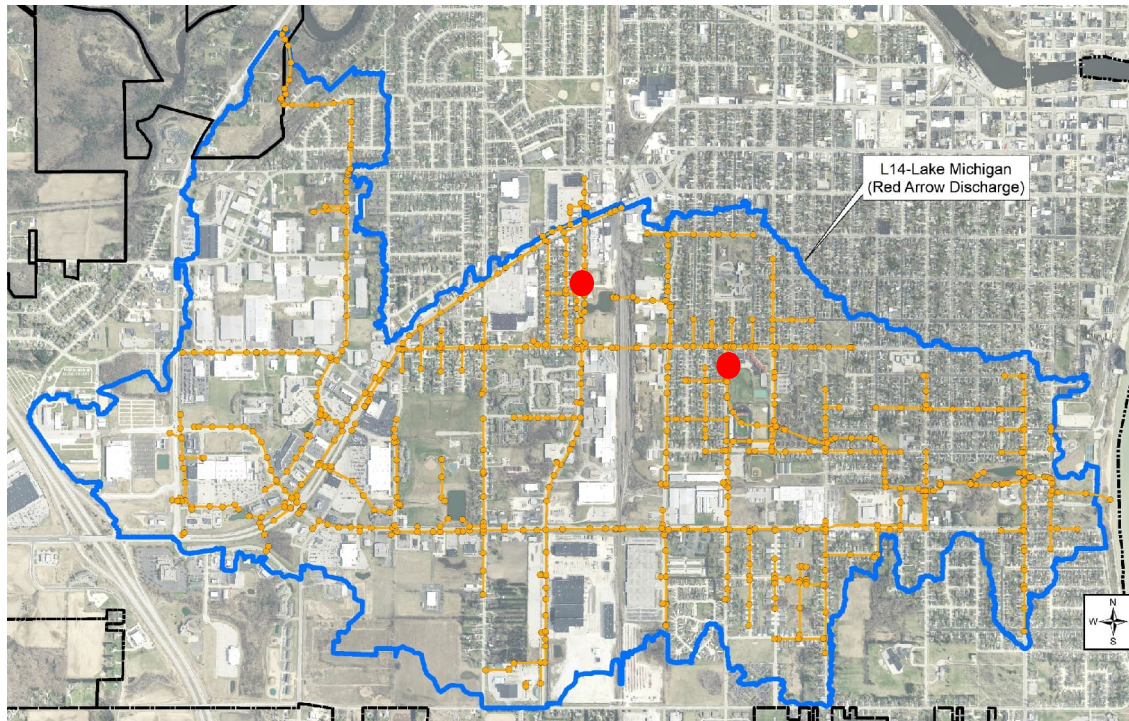
- 100-year design storm flooding contained within the right of way.
- In areas with an overland flow route the storm sewer system shall be designed with a conveyance capacity of a 25-year design storm.
- In areas with a lack of an overland flow route the storm sewer system shall be designed with a conveyance capacity of a 100-year design storm.
- Do not create/increase other flooding problems within the watershed.

# Alternative Analysis

- 10 Alternatives Analyzed
- L14 – Lake Michigan (Red Arrow Discharge)
  - Alternative 1 - 4
    - Components – Underground Detention Basin, Dry Detention Basin, Expanded Detention Basin, Storm Sewer Upsizing
- R22 - Manitowoc (S. 19th Street) Watershed
  - Alternative 1 - 3
    - Components – Wet Detention Basin, Storm Sewer Upsizing
- LR01 - Little Manitowoc River (Fenway Terrace) Watershed
  - Alternative 1 - 3
    - Components – Storm Sewer Upsizing, Easement Regrading, Road Regrading

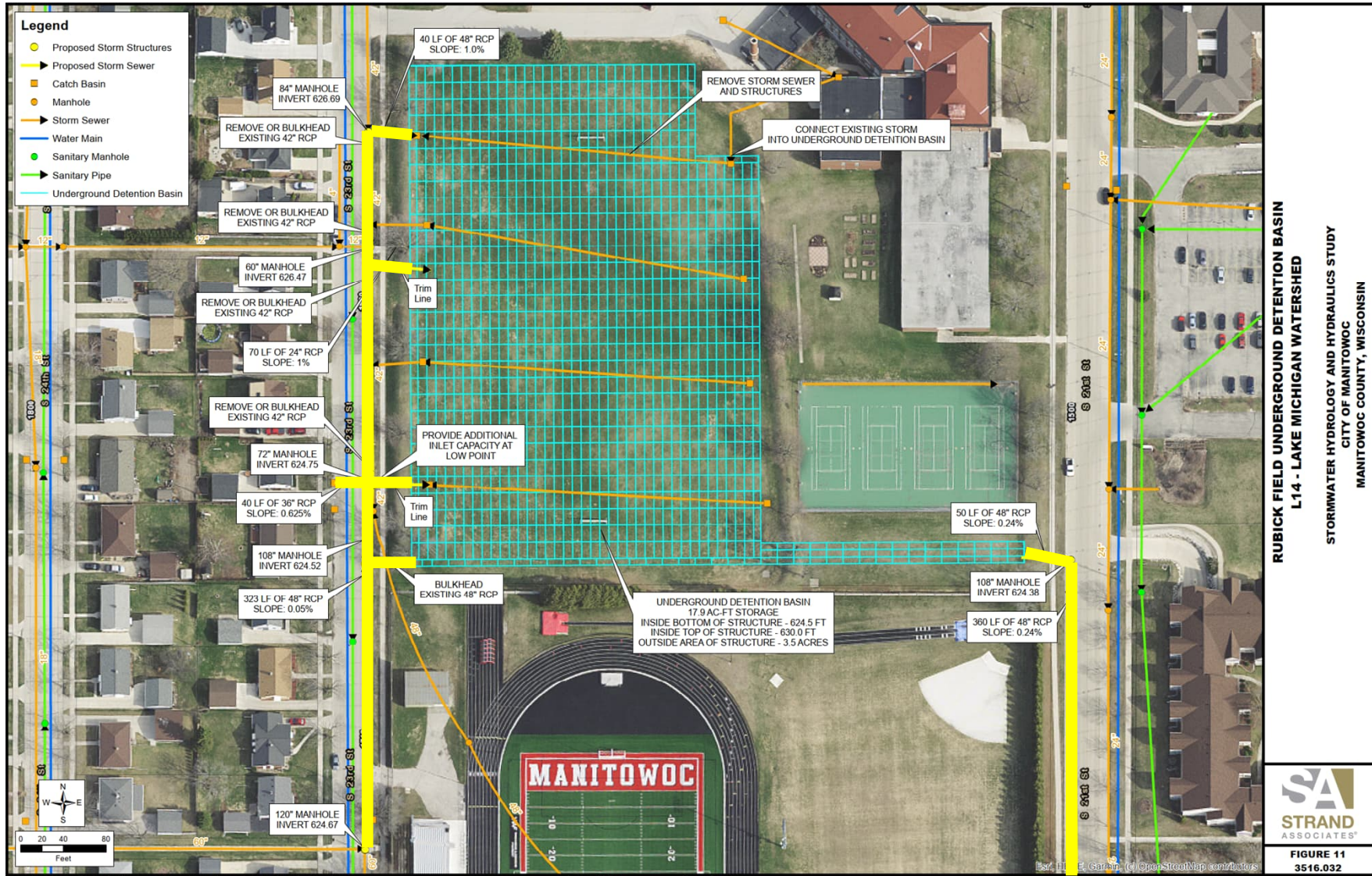
# Flooding Problem Areas

- L14 - Lake Michigan (Red Arrow Discharge)
  - 23rd Street from Division Street to Grand Avenue
  - 30th Street from HWY 42 to Division Street.

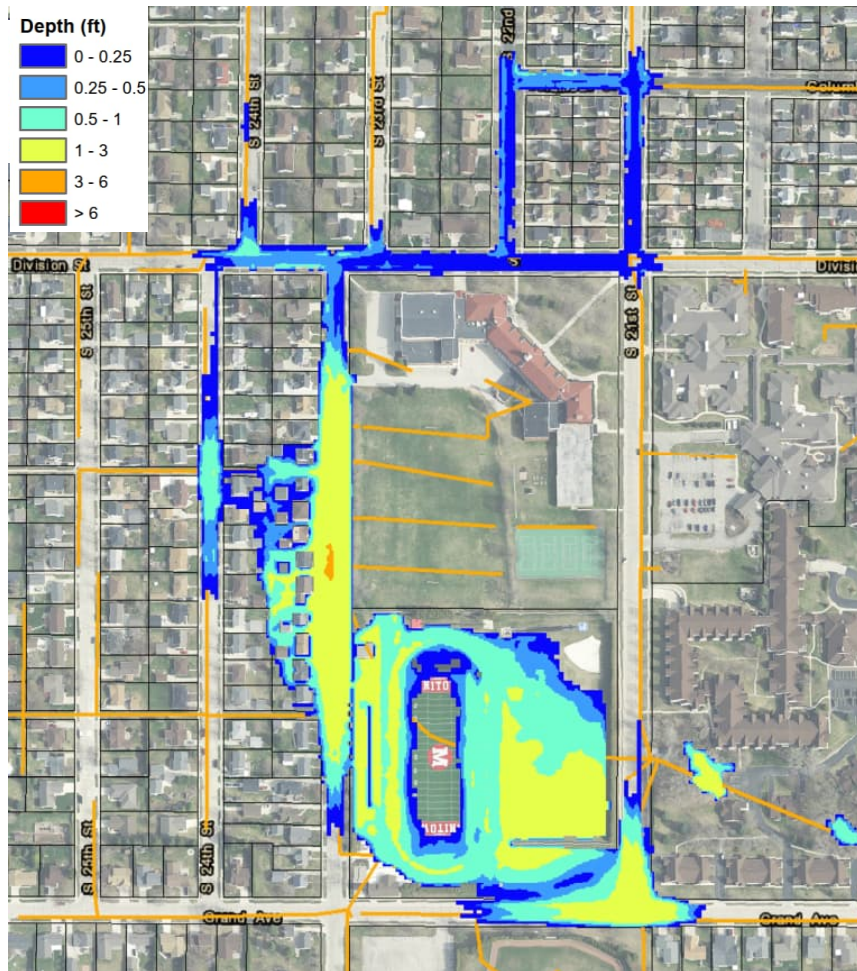


L14 Flooding Problem Areas

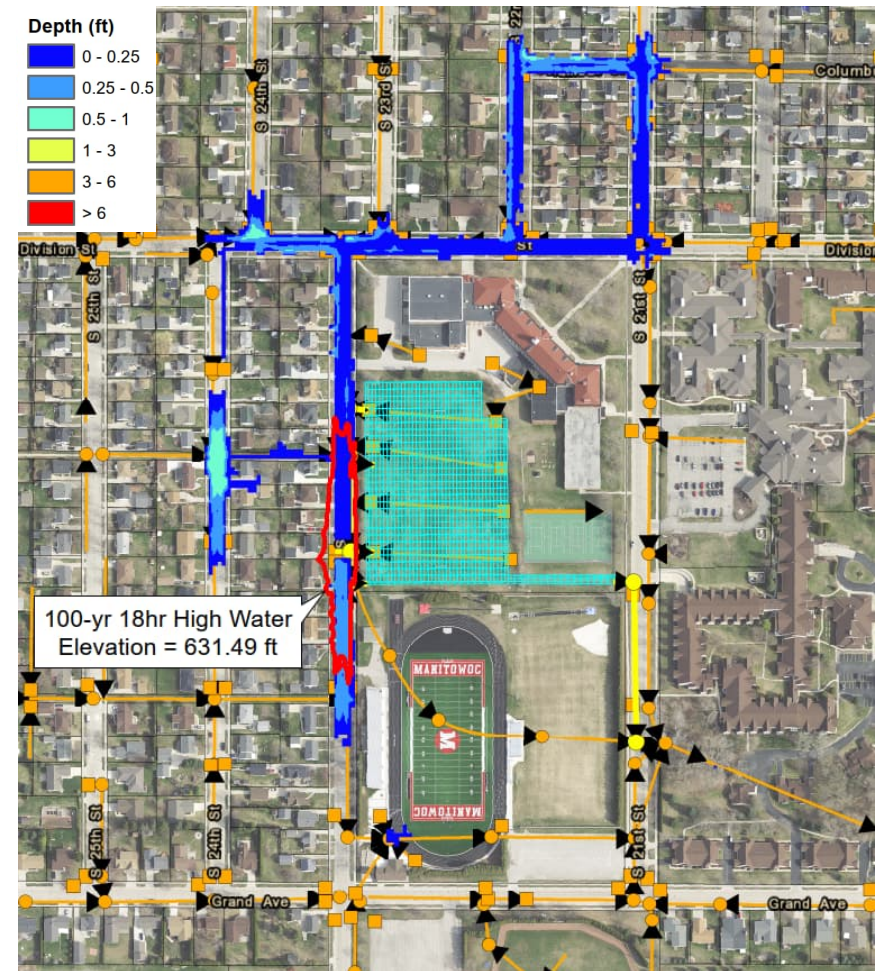
# L14 Alternative 1



# L14 Alternative 1



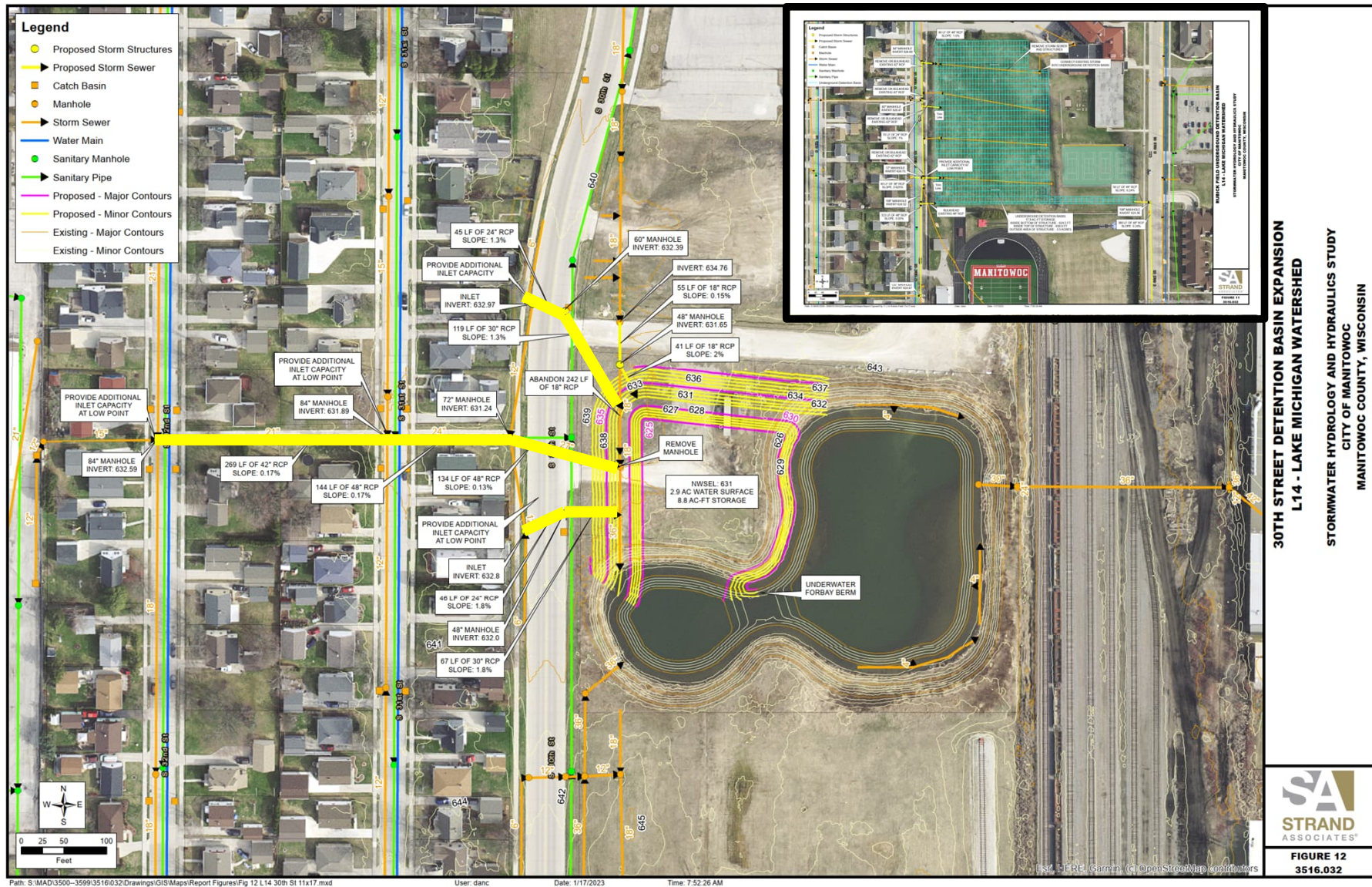
Existing Condition 100-Year Flood Depth



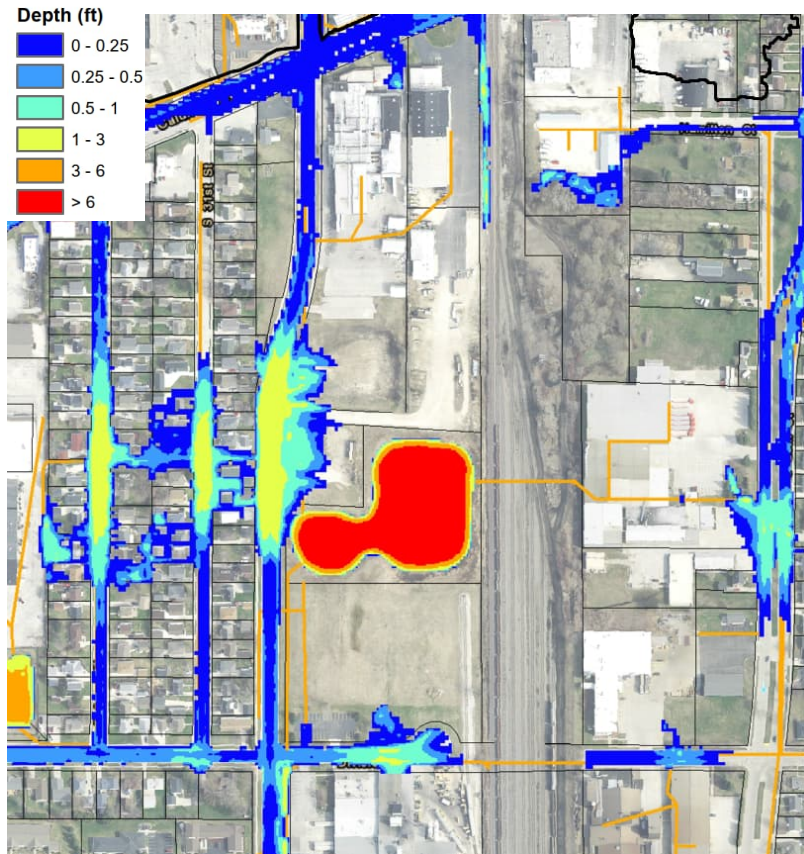
Alternative 1 100-Year Flood Depth

- The 100-Year flood depth on 23<sup>rd</sup> Street goes from 3.42 feet to 1.52 feet for a reduction of 1.9 feet.

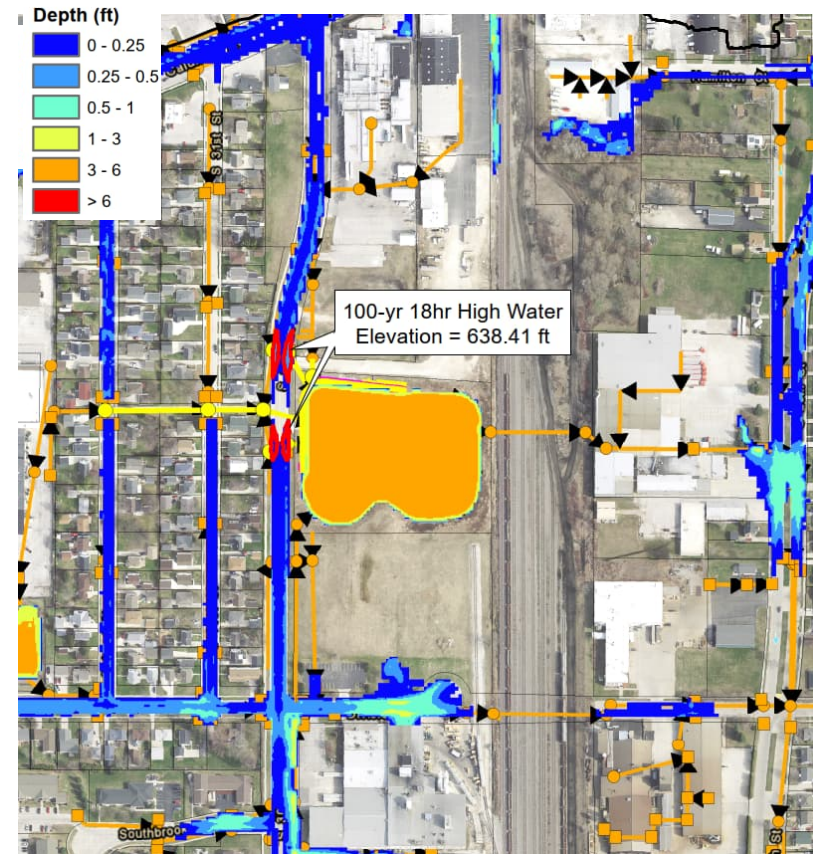
# L14 Alternative 2



# L14 Alternative 2



Existing Condition 100-Year Flood Depth

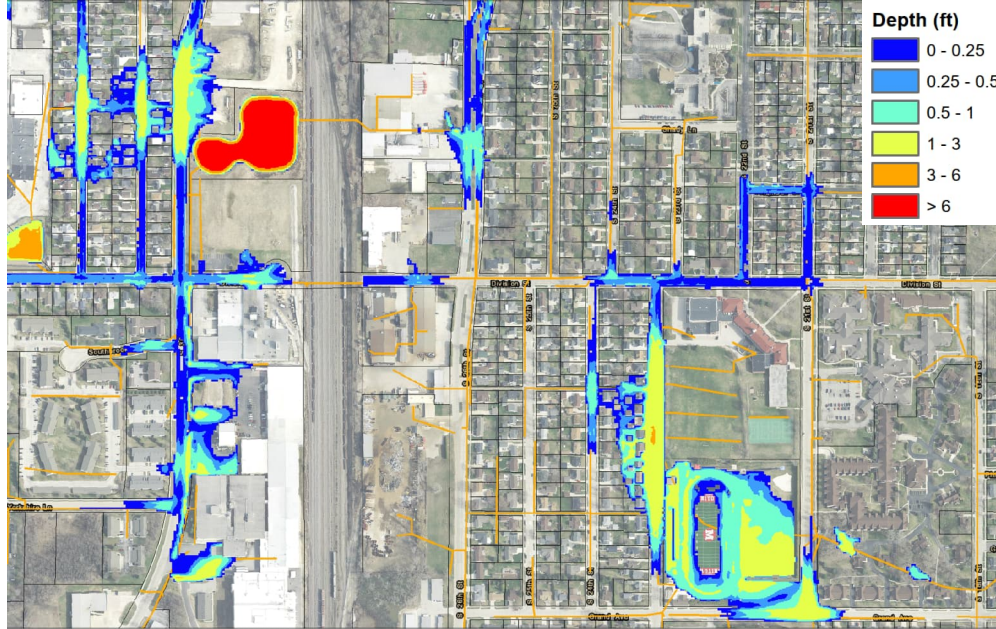


Alternative 2 100-Year Flood Depth

- The 100-Year flood depth on 30th Street goes from 2.21 feet to 0.32 feet for a reduction of 1.89 feet.
- The 100-Year flood depth on 23<sup>rd</sup> Street goes from 3.42 feet to 1.34 feet for a reduction of 2.08 feet.



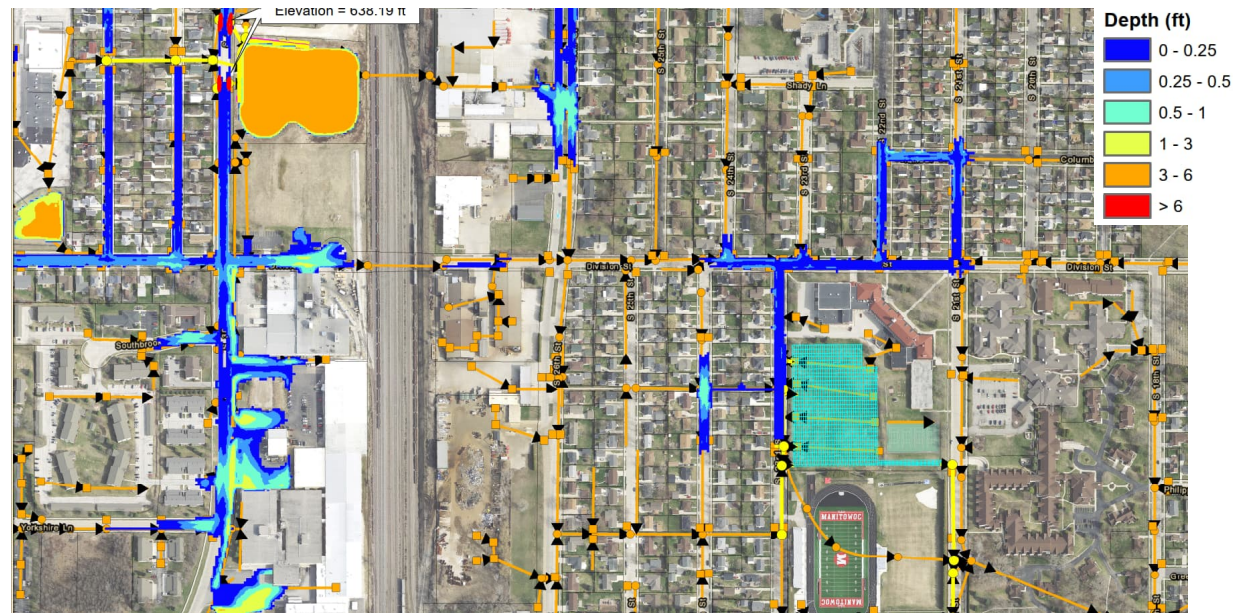
# L14 Alternative 3



Alternative 2 100-Year Flood Depth

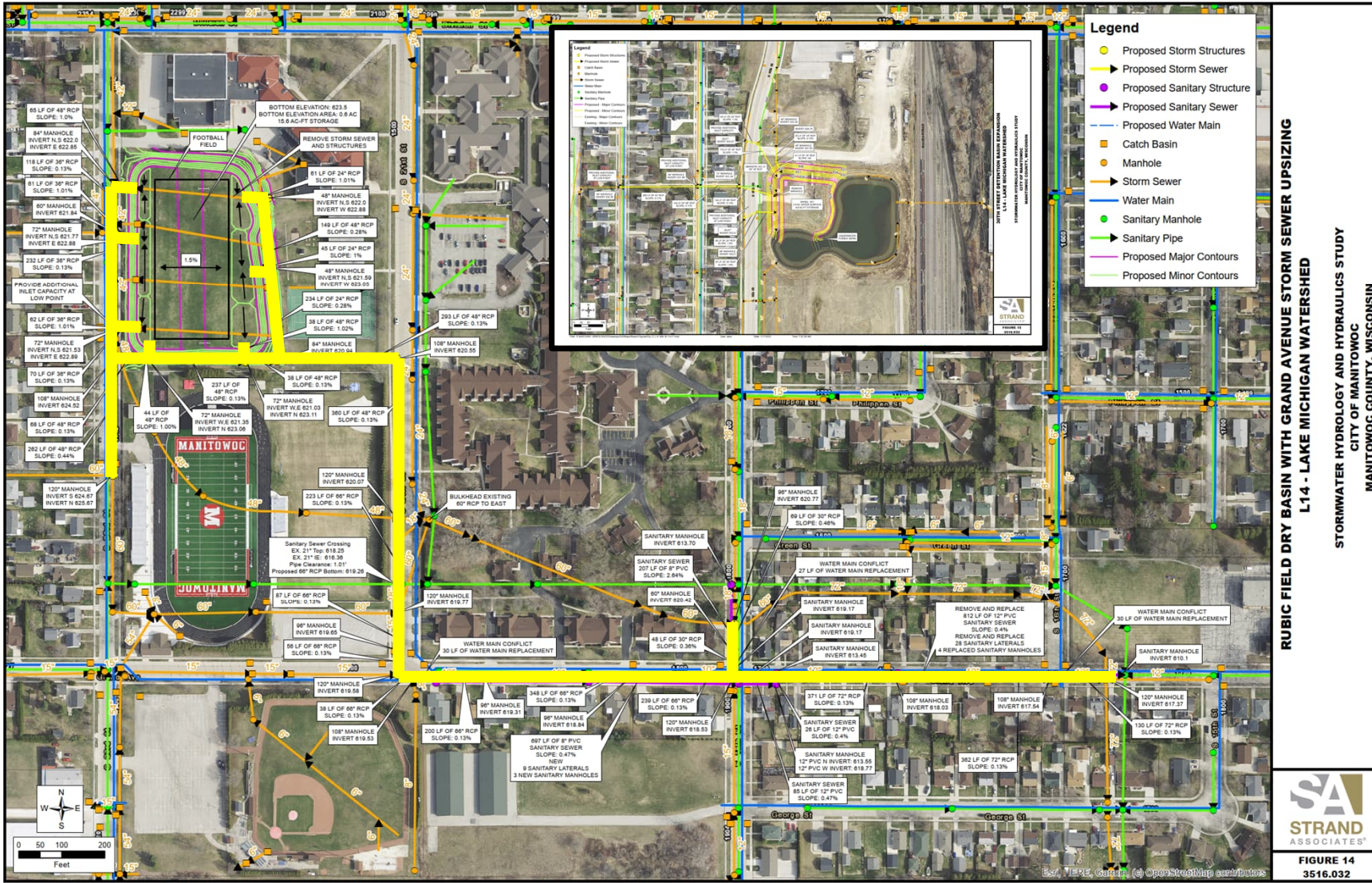
- The 100-Year flood depth on 30th Street goes from 2.21 feet to 0.18 feet for a reduction of 2.03 feet.

- The 100-Year flood depth on 23rd Street goes from 3.42 feet to 0.00 feet for a reduction of 3.42 feet.

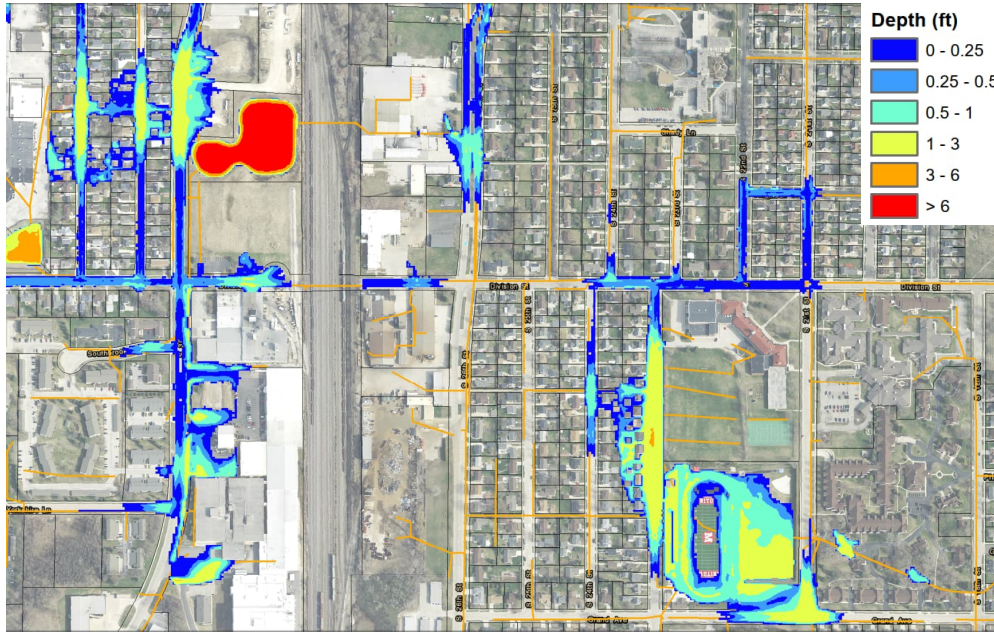


Alternative 3 100-Year Flood Depth

# L14 Alternative 4



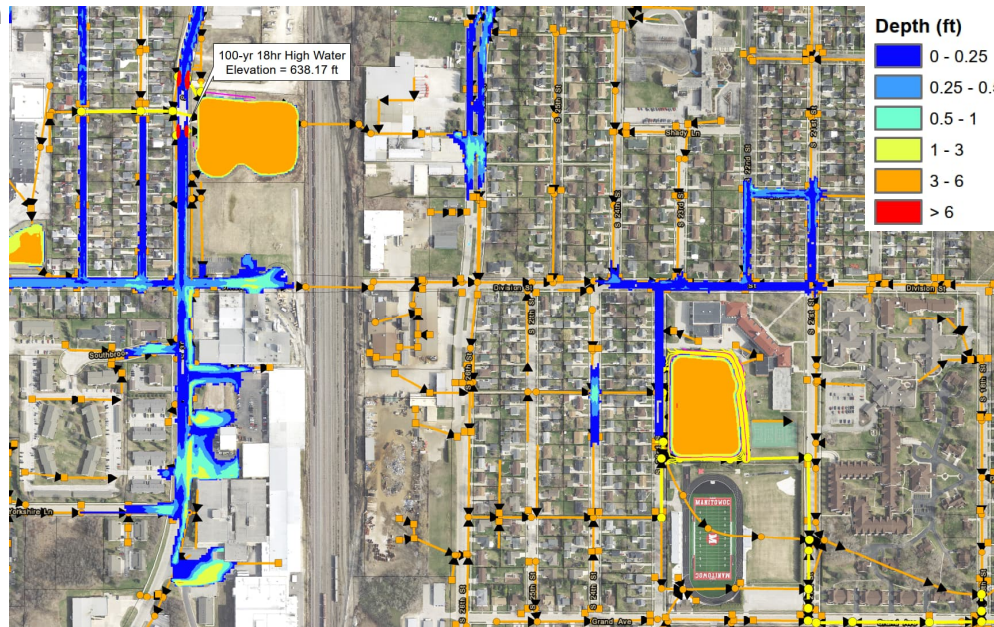
# L14 Alternative 4



Existing Condition 100-Year Flood Depth

- The 100-Year flood depth on 30th Street goes from 2.21 feet to 0.14 feet for a reduction of 2.07 feet.

- The 100-Year flood depth on 23rd Street goes from 3.42 feet to 0.00 feet for a reduction of 3.42 feet.



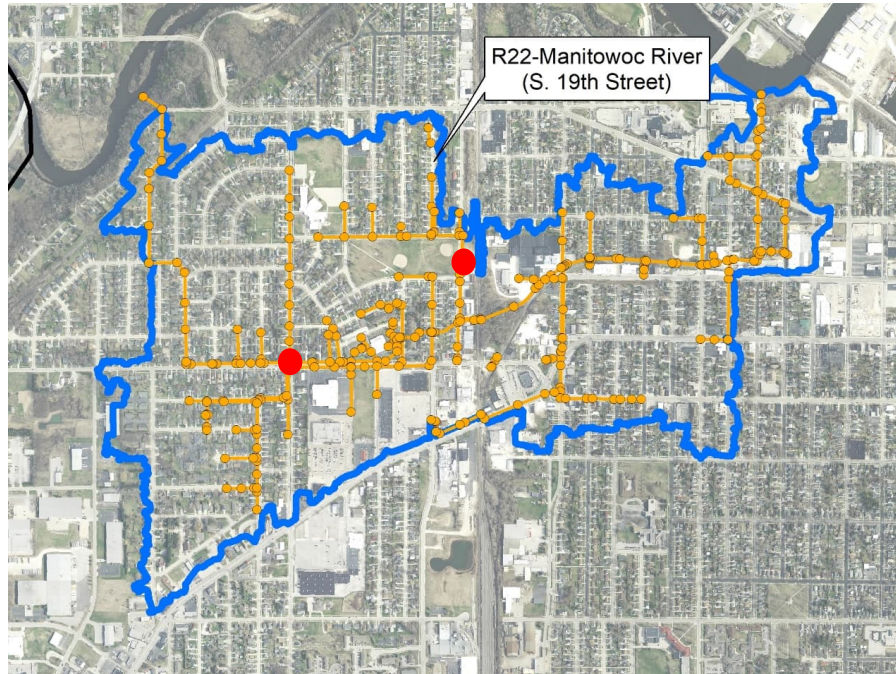
Alternative 4 100-Year Flood Depth

# L14 Opinion of Probable Construction Cost

Project Descriptions	OPCC
<b><u>L14 Alternative 1</u></b>	
Rubick Field Underground Detention Basin	\$13,336,300
L14 Alternative 1 Total	\$13,336,300
<b><u>L14 Alternative 2</u></b>	
Rubick Field Underground Detention Basin	\$13,336,300
30 <sup>th</sup> Street Detention Basin Expansion	\$1,788,300
L14 Alternative 2 Total	\$15,124,600
<b><u>L14 Alternative 3</u></b>	
Rubick Field Underground Detention Basin	\$13,336,300
30 <sup>th</sup> Street Detention Basin Expansion	\$1,788,300
Grand Avenue Storm Sewer Upsizing	\$4,338,500
L14 Alternative 3 Total	\$19,463,100
<b><u>L14 Alternative 4</u></b>	
Rubick Field Dry Detention Basin	\$3,749,700
Grand Avenue Storm Sewer Upsizing (With Rubick Field Dry Det.)	\$4,437,500
30 <sup>th</sup> Street Detention Basin Expansion	\$1,788,300
L14 Alternative 4 Total	\$9,975,400

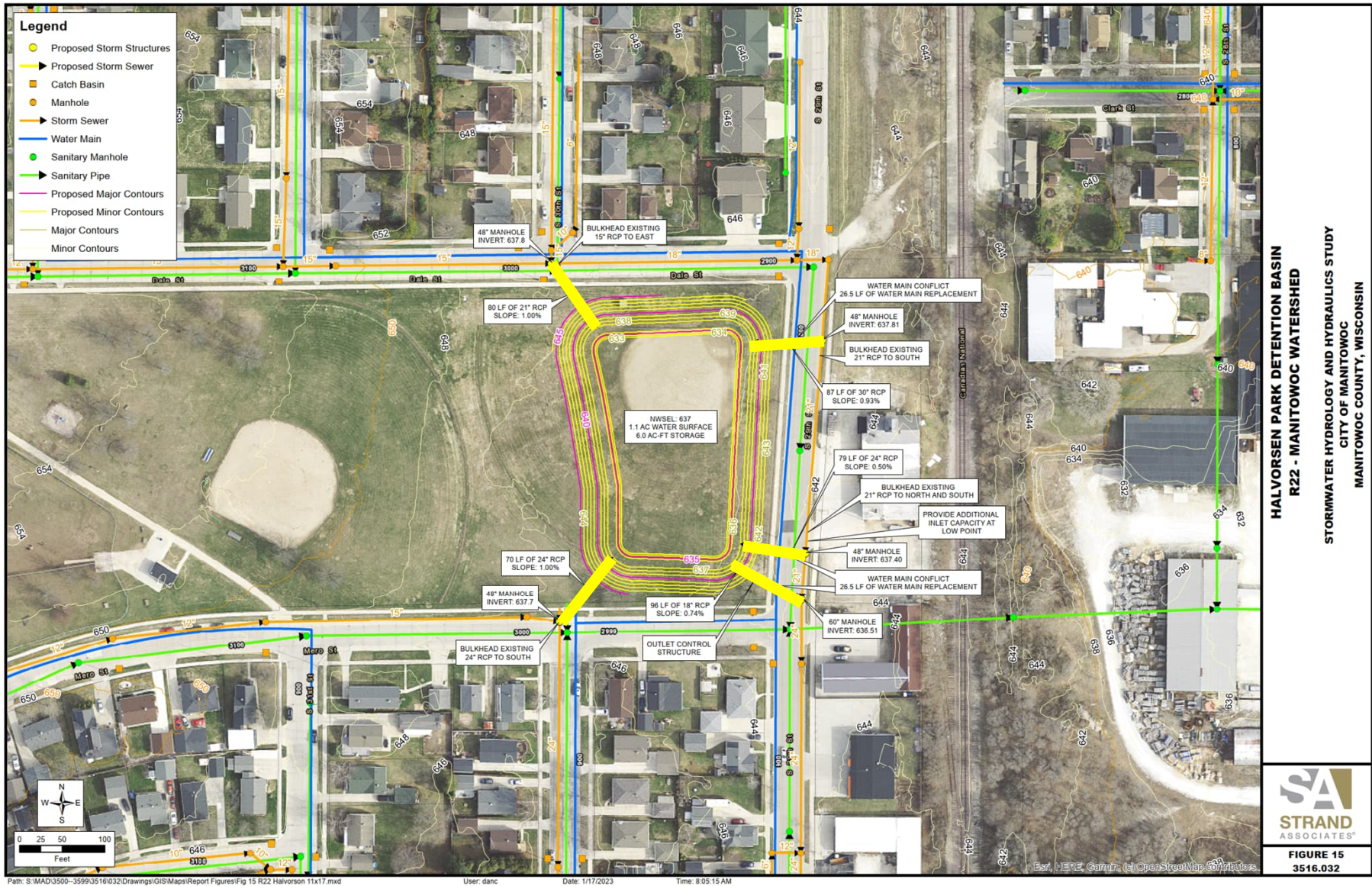
# Flooding Problem Areas

- R22 - Manitowoc (S. 19th Street) Watershed
  - Intersection of 29th Street and Mero Street
  - Intersection of Custer Street and 35th Street

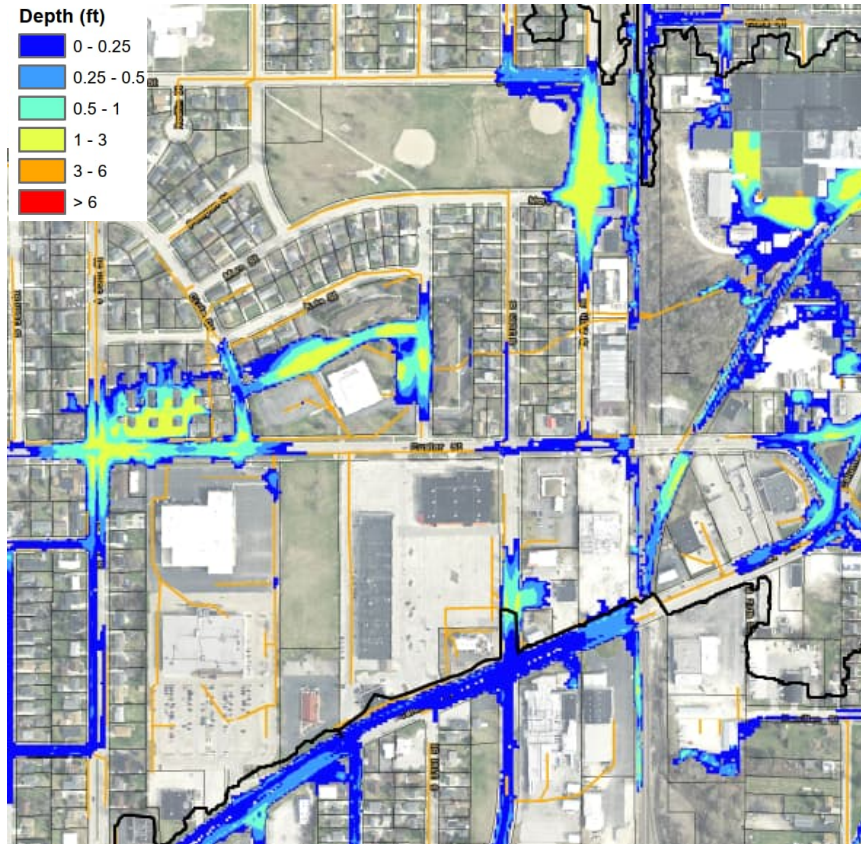


**R22 Flooding Problem Areas**

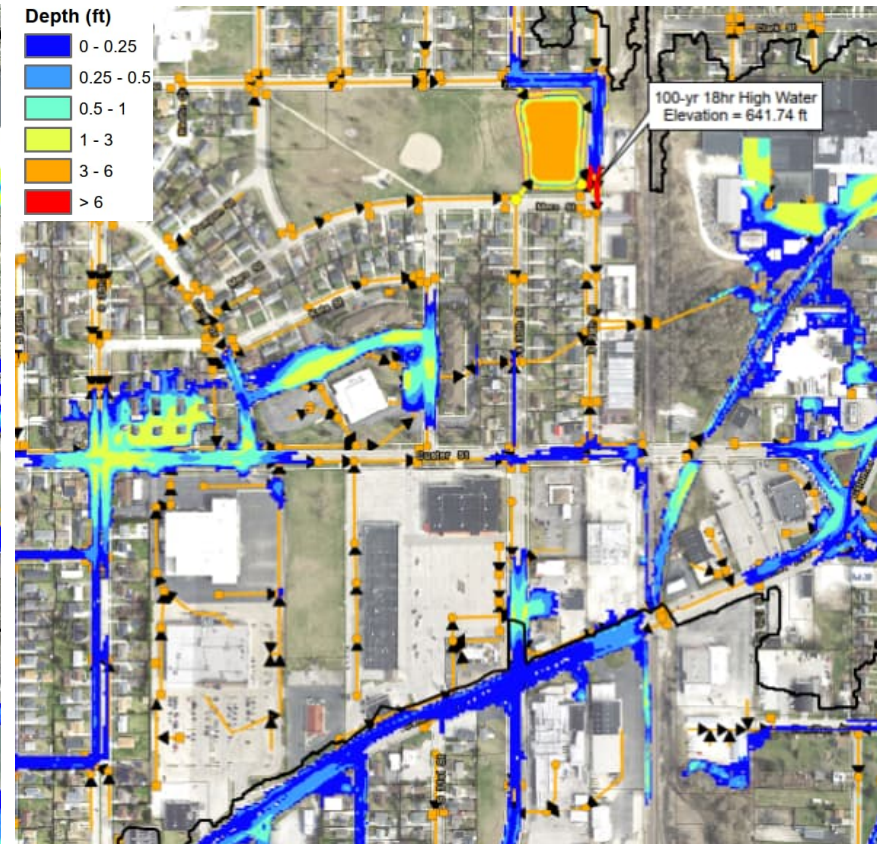
# R22 Alternative 1



# R22 Alternative 1



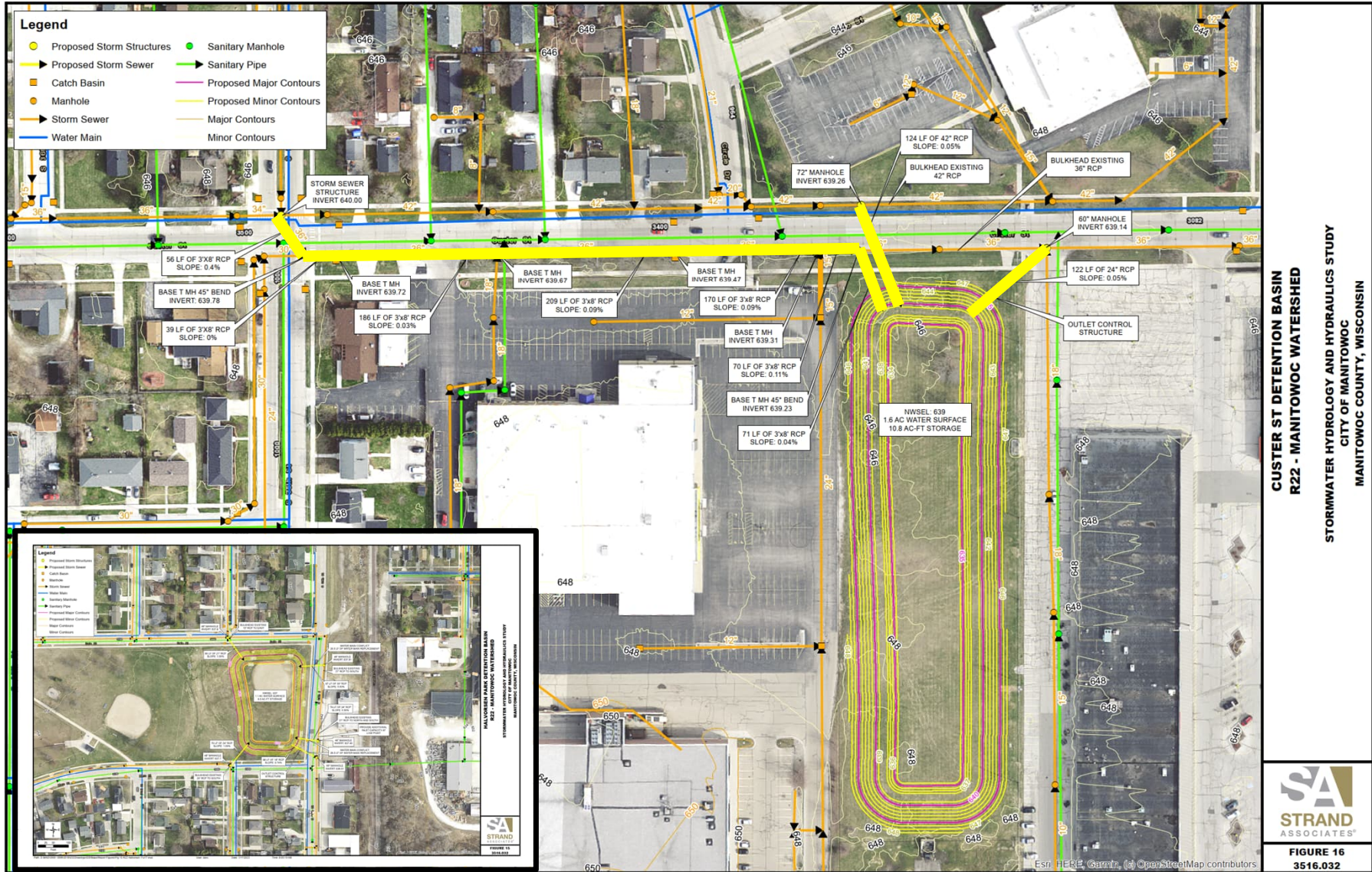
Existing Condition 100-Year Flood Depth



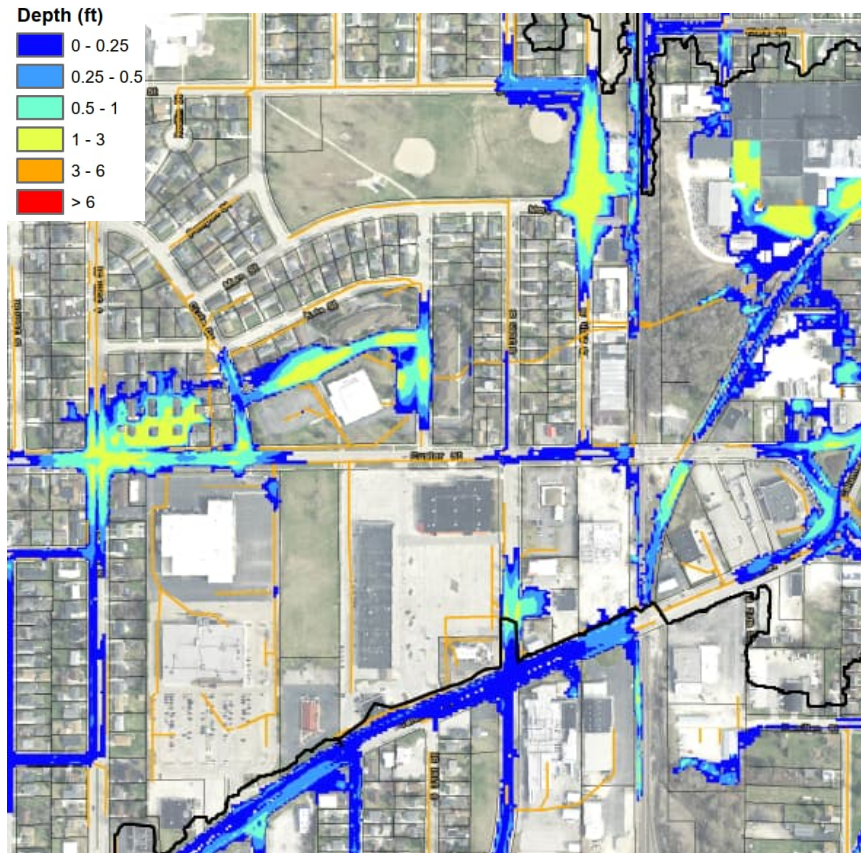
Alternative 1 100-Year Flood Depth

- The 100-Year flood depth on 29<sup>th</sup> Street goes from 2.08 feet to 0.14 feet for a reduction of 1.94 feet.

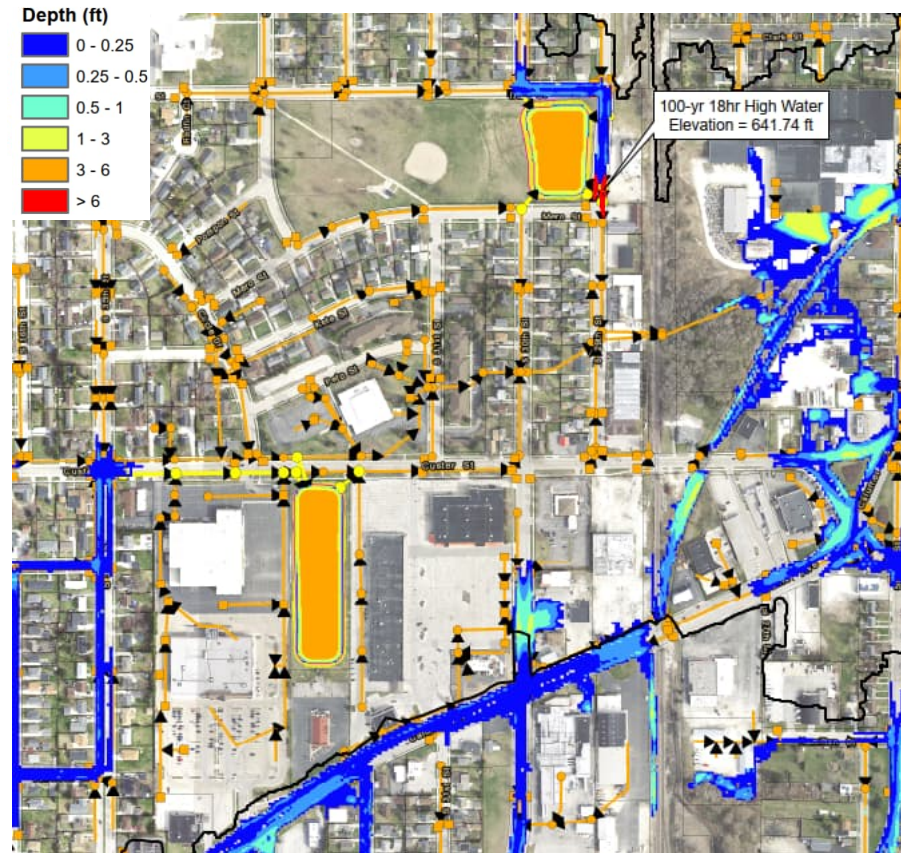
# R22 Alternative 2



# R22 Alternative 2



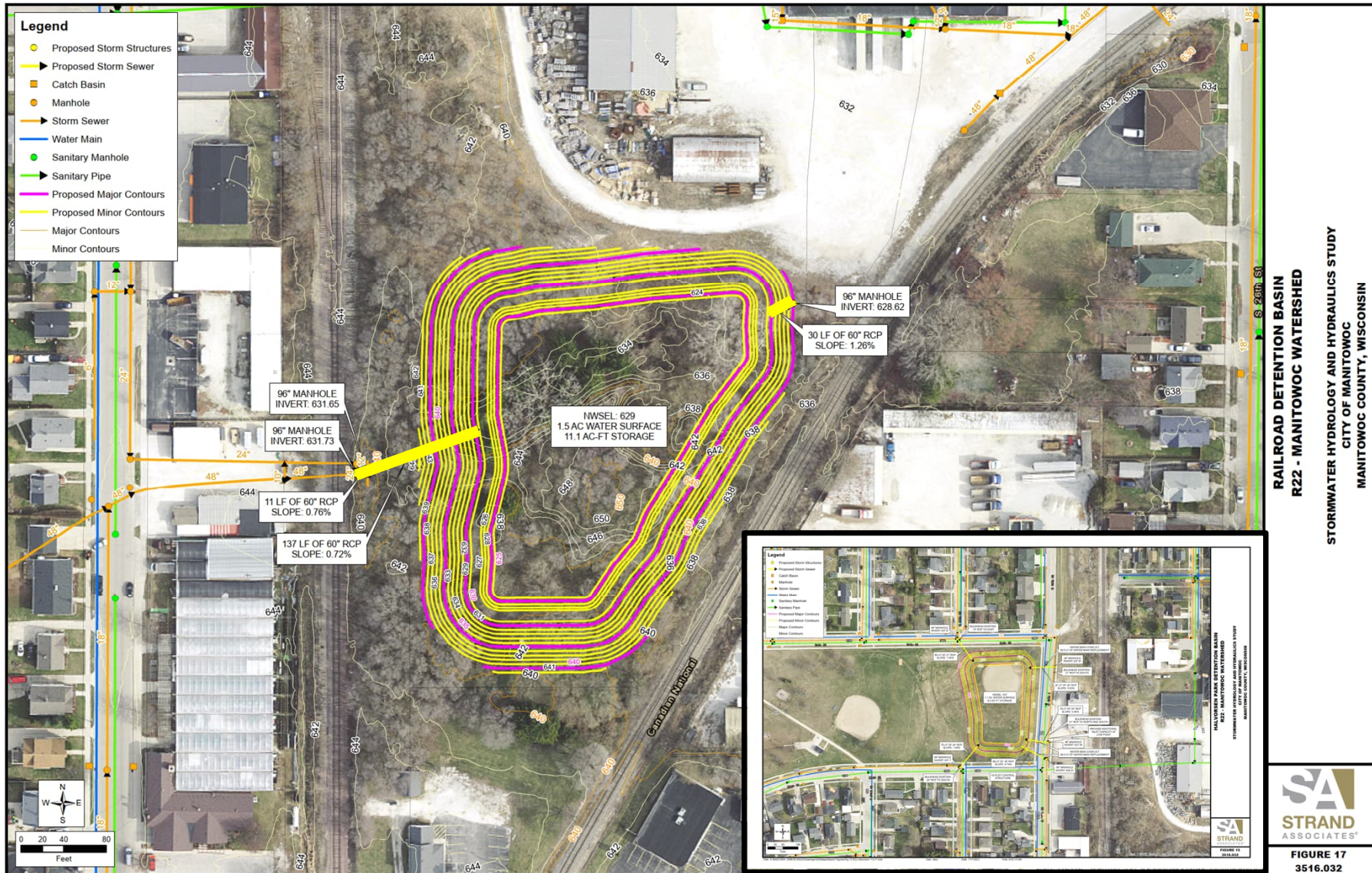
Existing Condition 100-Year Flood Depth



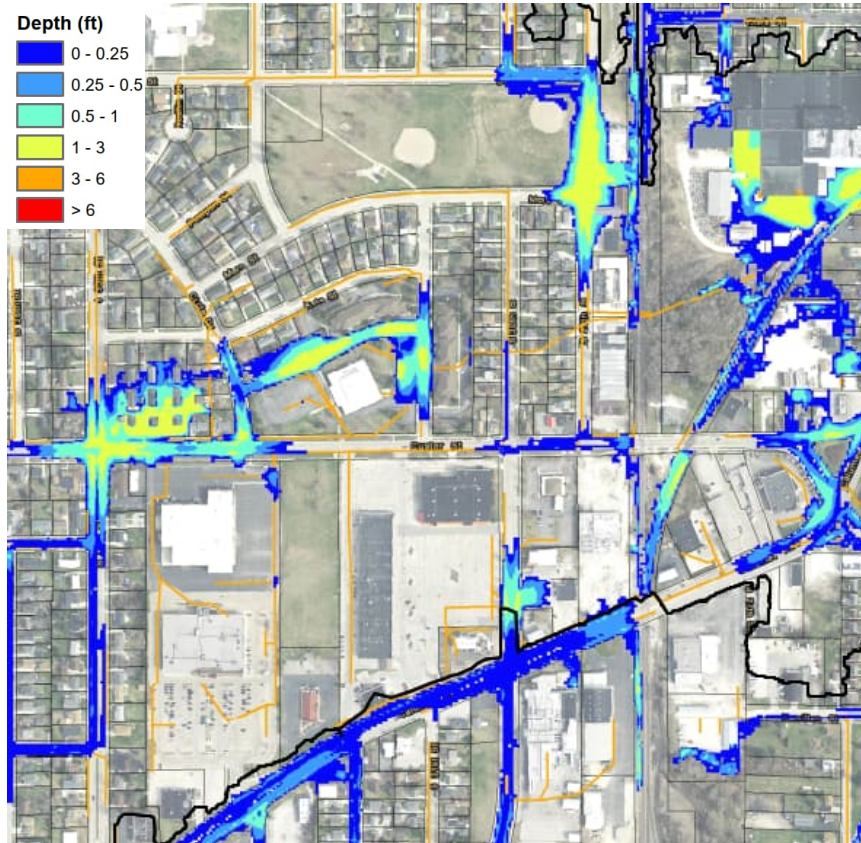
Alternative 2 100-Year Flood Depth

- The 100-Year flood depth on 29<sup>th</sup> Street goes from 2.08 feet to 0.10 feet for a reduction of 1.98 feet.
- The 100-Year flood depth on Custer Street goes from 1.19 feet to 0.00 feet for a reduction of 1.19 feet.

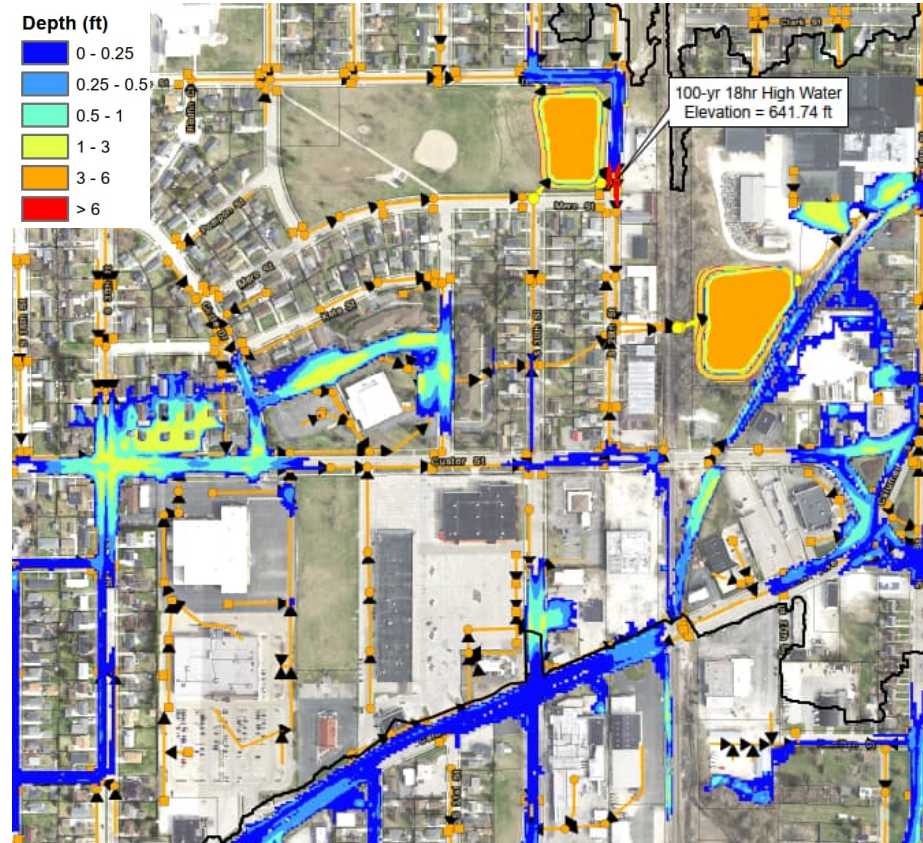
# R22 Alternative 3



# R22 Alternative 3



Existing Condition 100-Year Flood Depth



Alternative 3 100-Year Flood Depth

- The 100-Year flood depth on 29<sup>th</sup> Street goes from 2.08 feet to 0.16 feet for a reduction of 1.92 feet.
- The 100-Year flood depth on Custer Street stays at 1.19 feet.

# R22 Opinion of Probable Construction Cost

Project Descriptions	OPCC
<b><u>R22 Alternative 1</u></b>	
Halvorsen Park Detention Basin	\$1,415,700
R22 Alternative 1 Total	\$1,415,700
<b><u>R22 Alternative 2</u></b>	
Halvorsen Park Detention Basin	\$1,415,700
Custer Street Detention Basin	\$3,157,000
R22 Alternative 2 Total	\$4,572,700
<b><u>R22 Alternative 3</u></b>	
Halvorsen Park Detention Basin	\$1,415,700
Railroad Detention Basin	\$2,199,700
R22 Alternative 3 Total	\$3,615,400

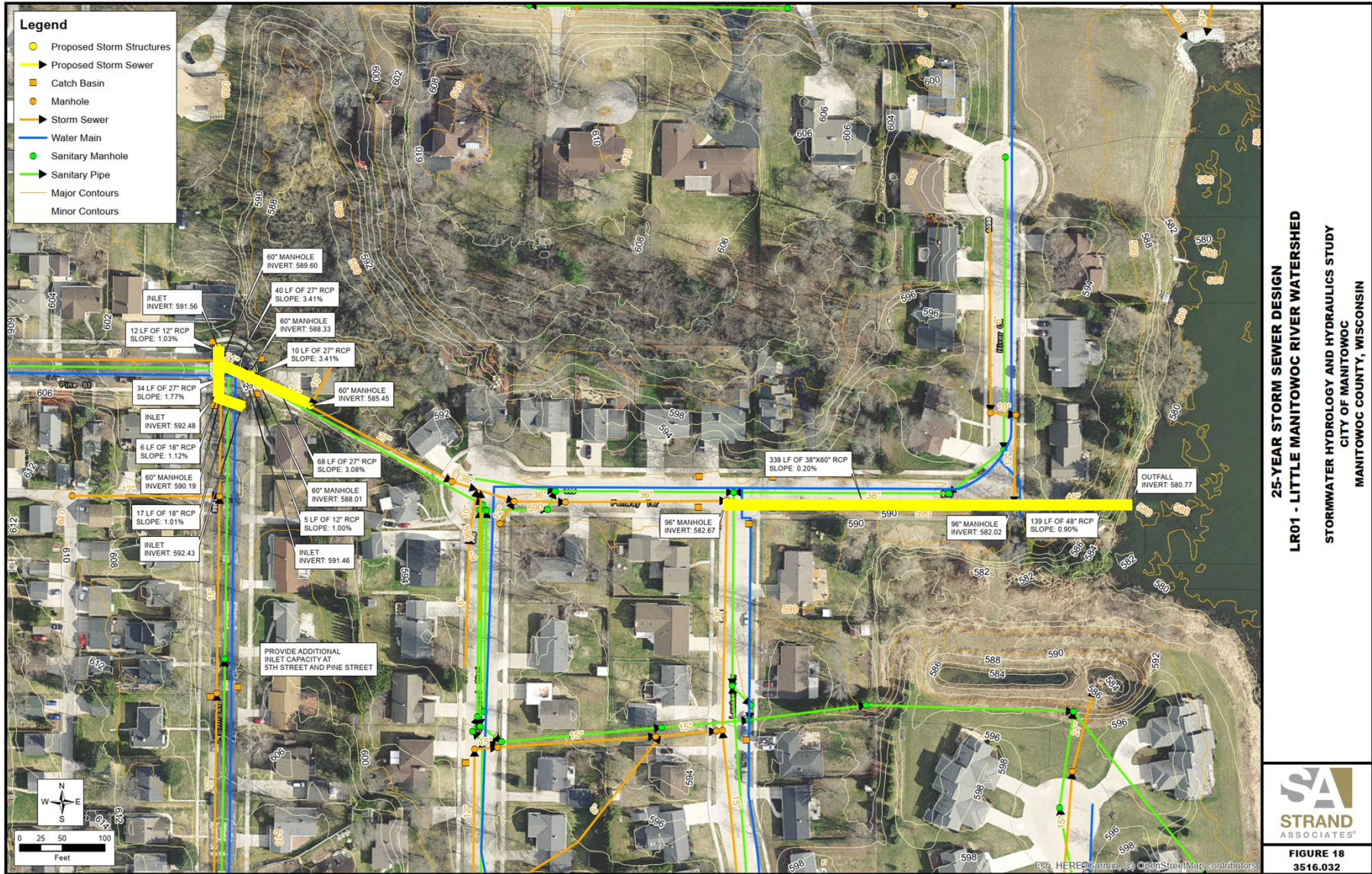
# Flooding Problem Areas

- LR1 - Little Manitowoc River (Fenway Terrace) Watershed
  - Intersection of Pine Street and 5th Street.



LR-1 Flooding Problem Areas

# LR01 Alternative 1

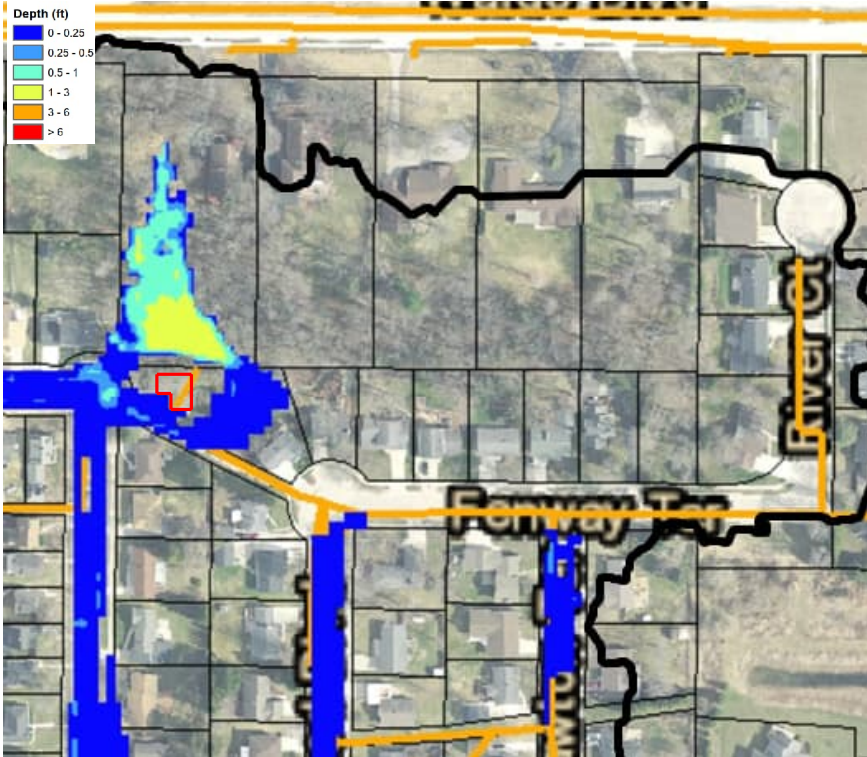


**25-YEAR STORM SEWER DESIGN**  
**LR01 - LITTLE MANITOWOC RIVER WATERSHED**  
 STORMWATER HYDROLOGY AND HYDRAULICS STUDY  
 CITY OF MANITOWOC  
 MANITOWOC COUNTY, WISCONSIN

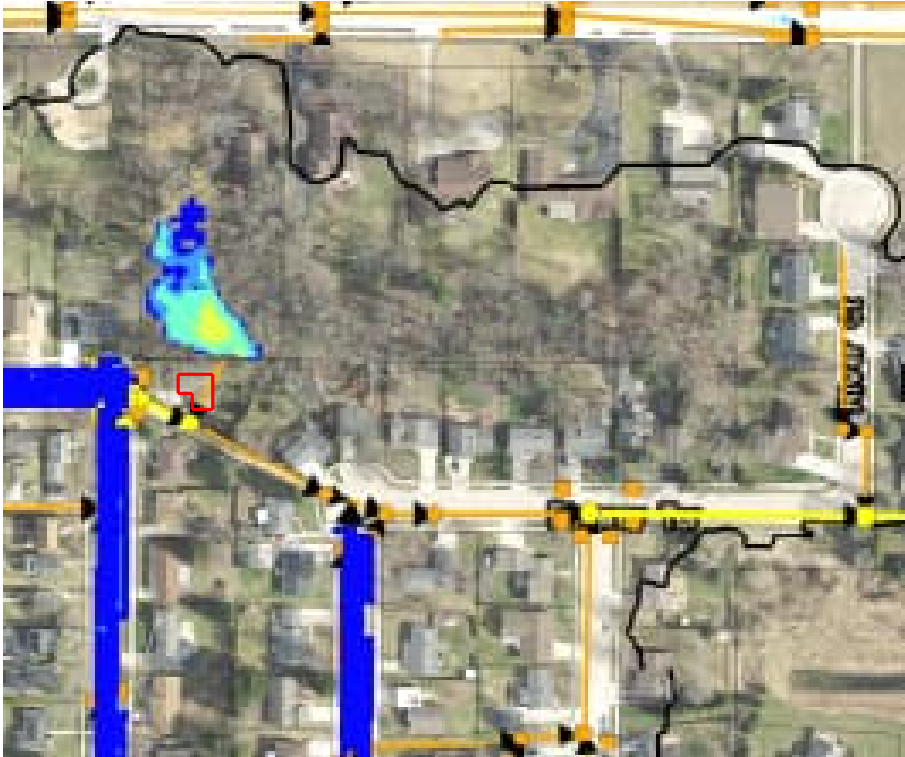
**SA**  
**STRAND**  
 ASSOCIATES®

**FIGURE 18**  
**3516.032**

# R22 Alternative 1

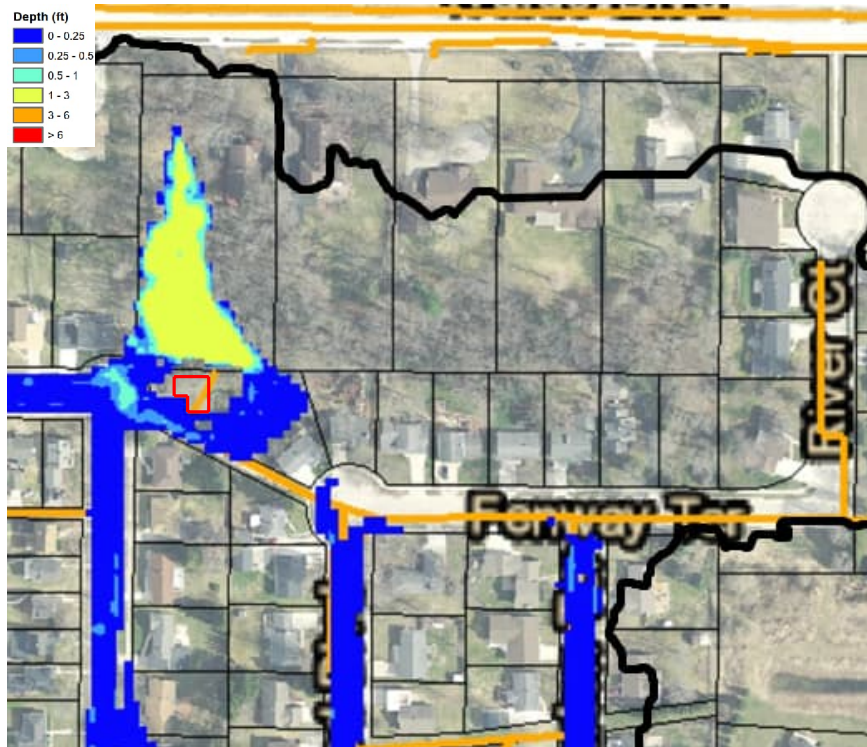


Existing Condition 25-Year Flood Depth

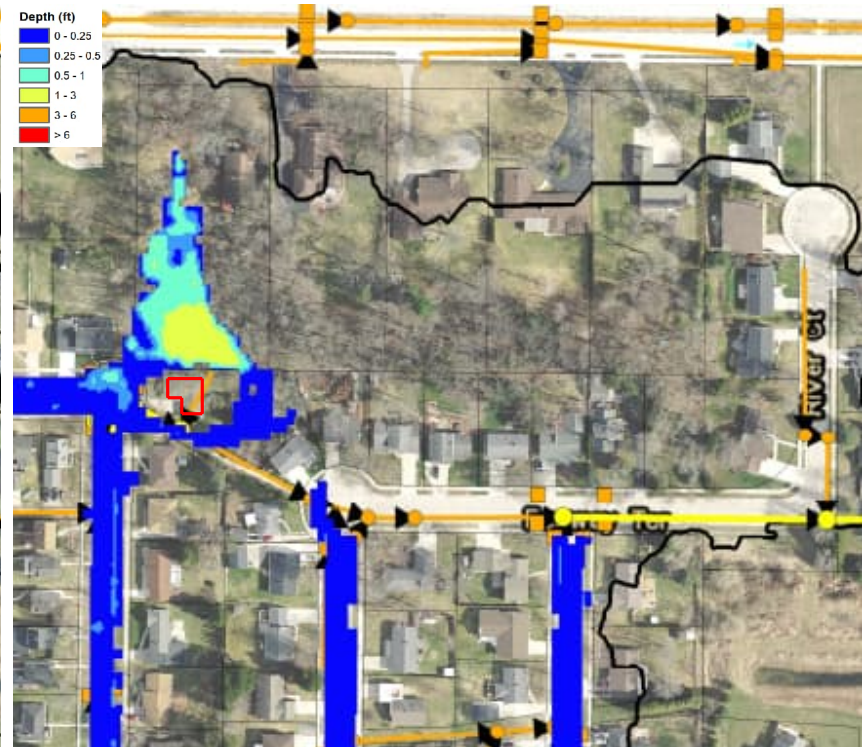


Alternative 1 25-Year Flood Depth

# R22 Alternative 1

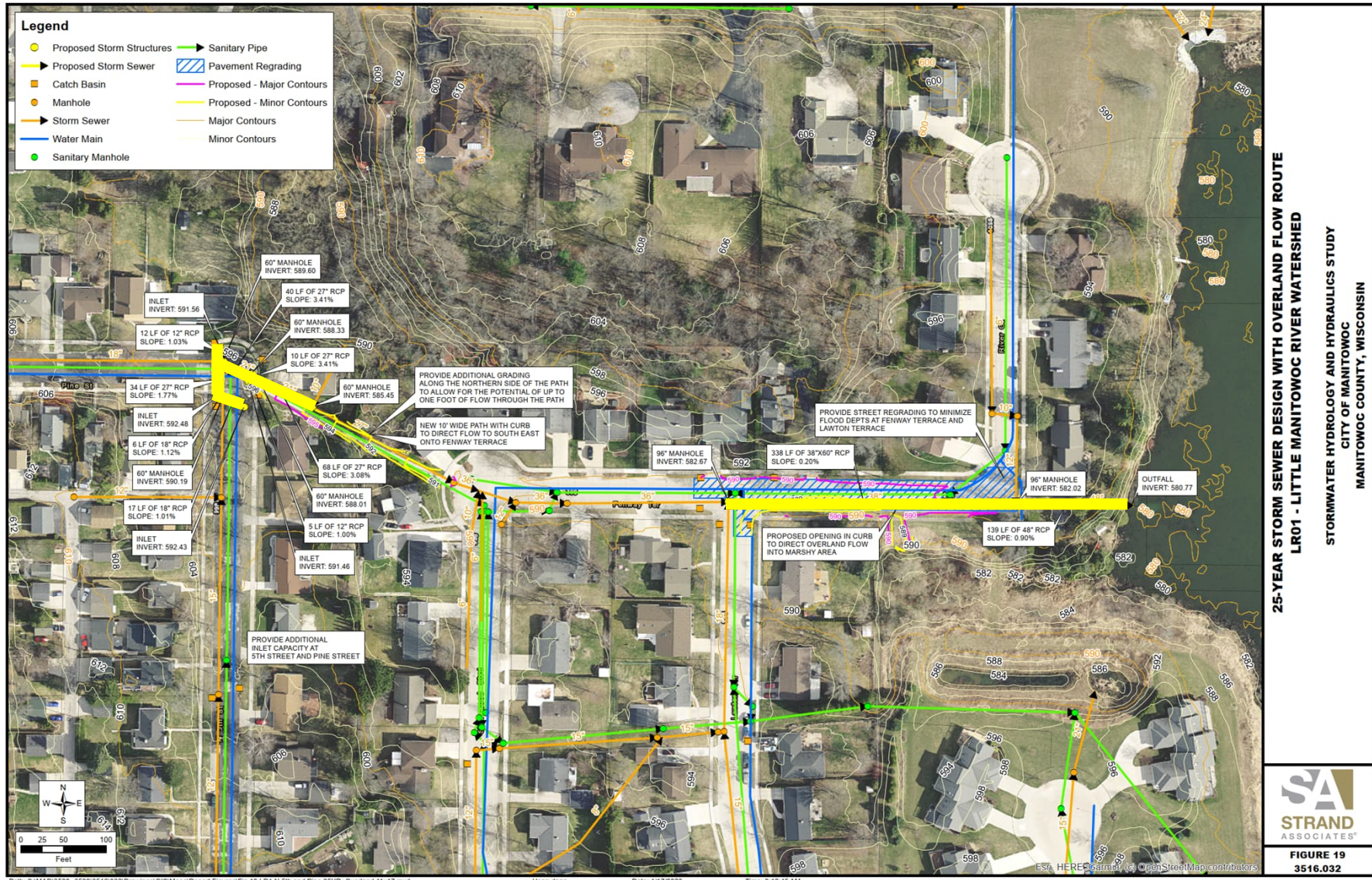


Existing Condition 100-Year Flood Depth

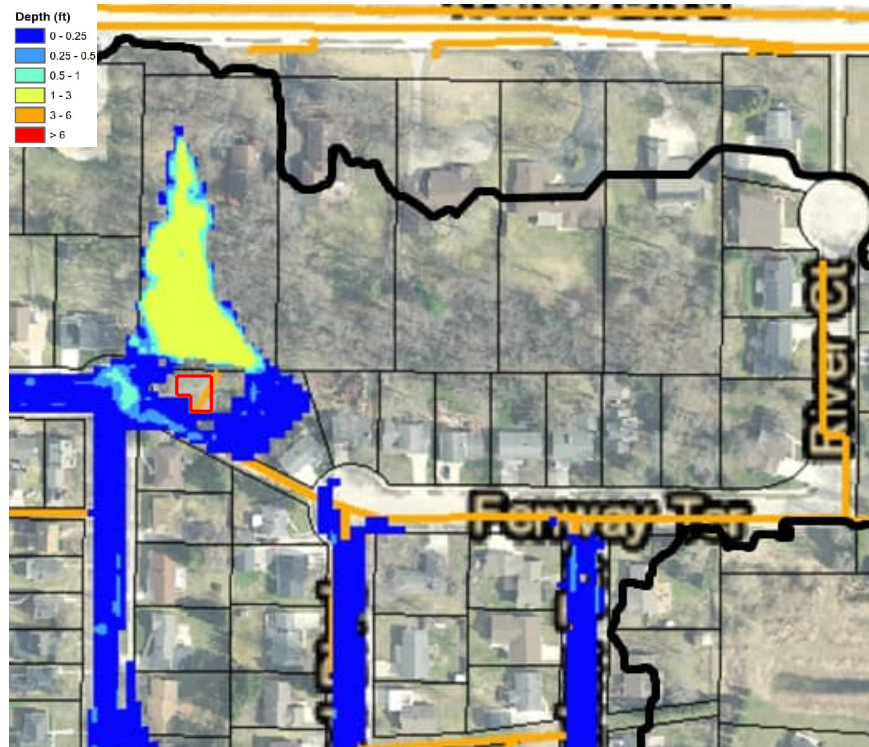


Alternative 1 100-Year Flood Depth

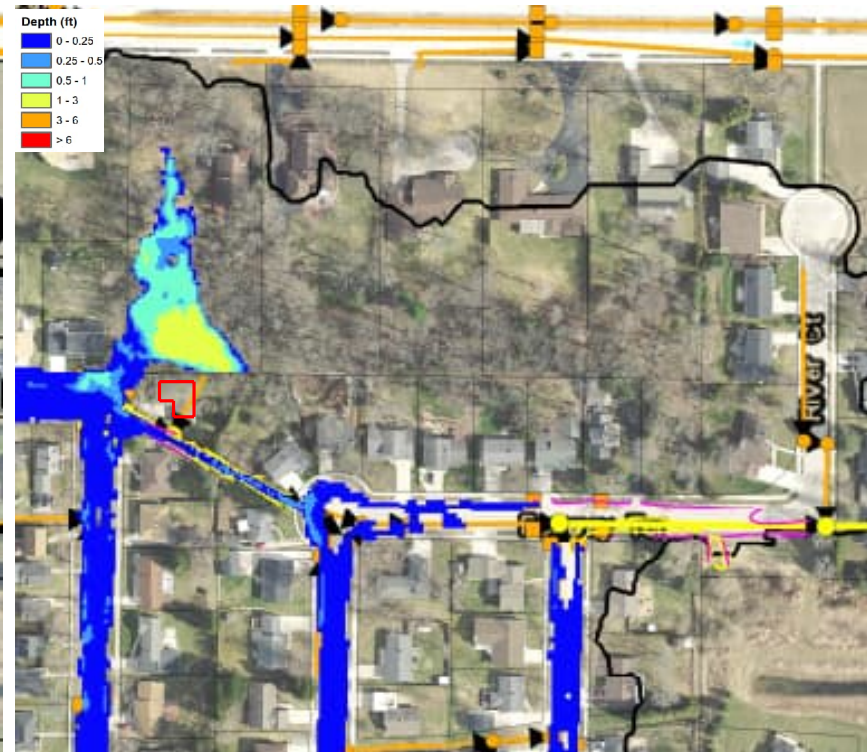
# LR01 Alternative 2



# R22 Alternative 2

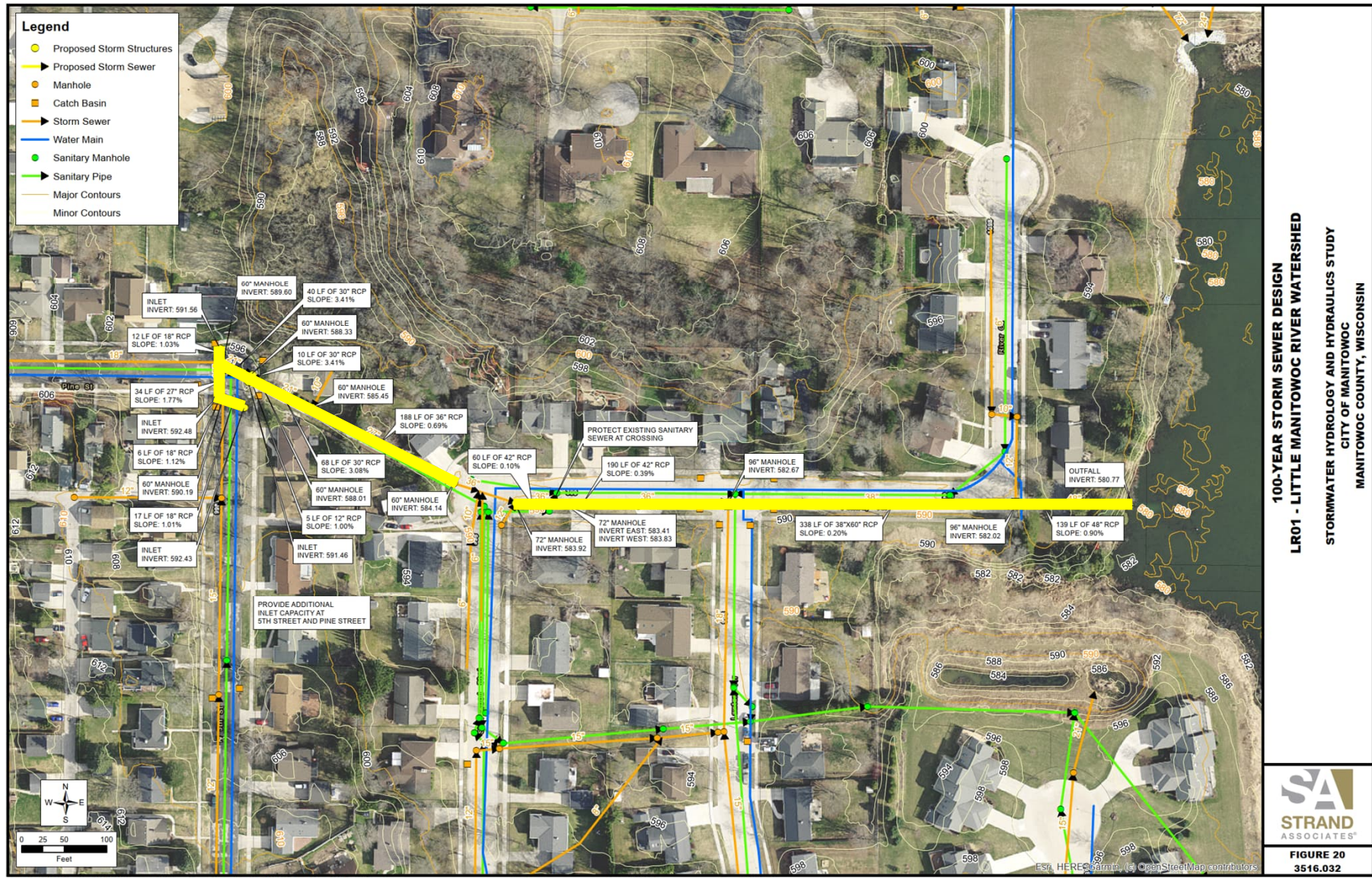


Existing Condition 100-Year Flood Depth

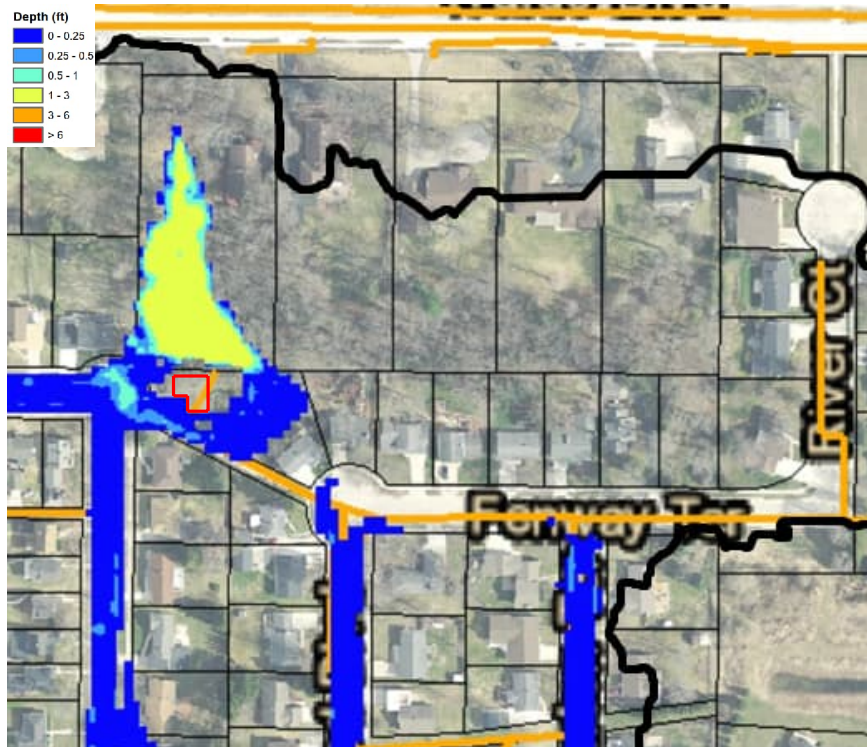


Alternative 2 100-Year Flood Depth

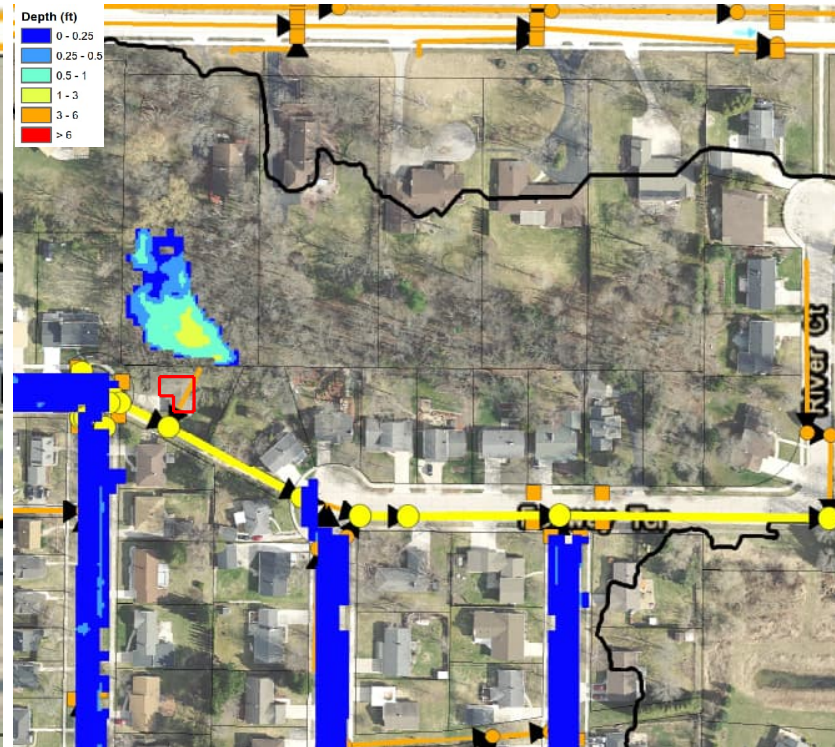
# LR01 Alternative 3



# R22 Alternative 3



Existing Condition 100-Year Flood Depth



Alternative 3 100-Year Flood Depth

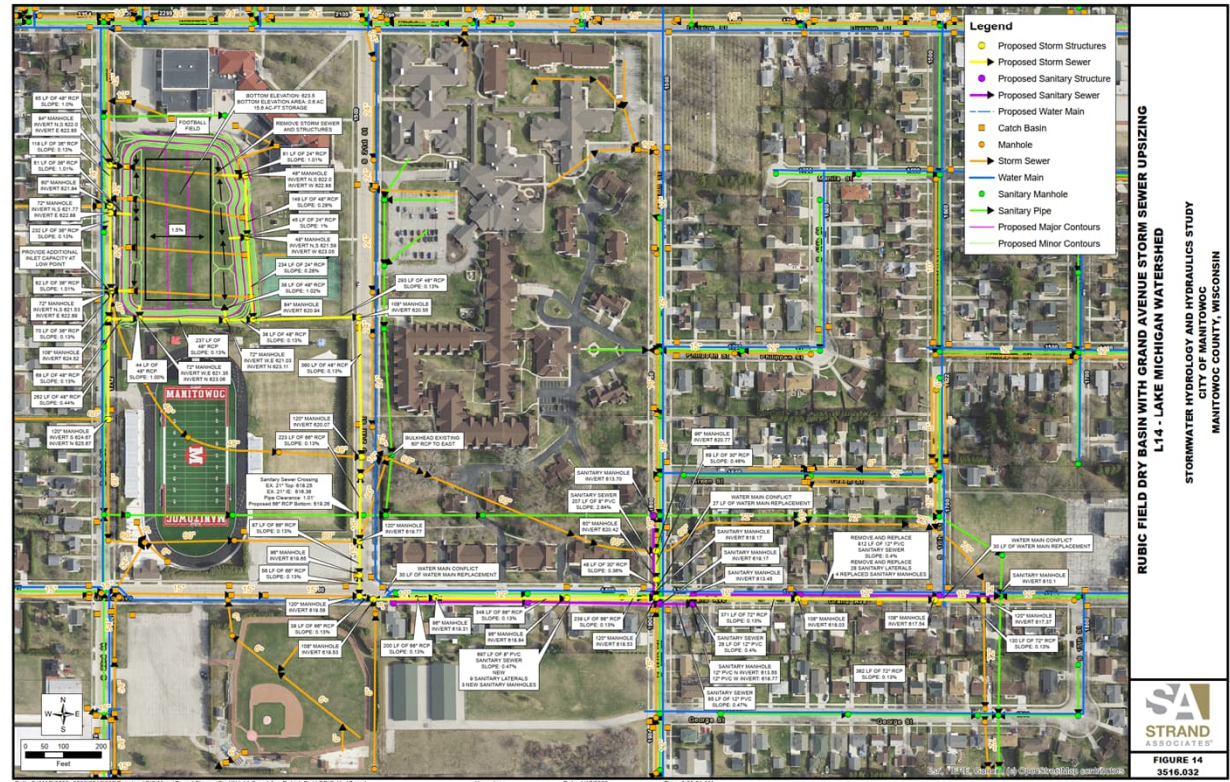
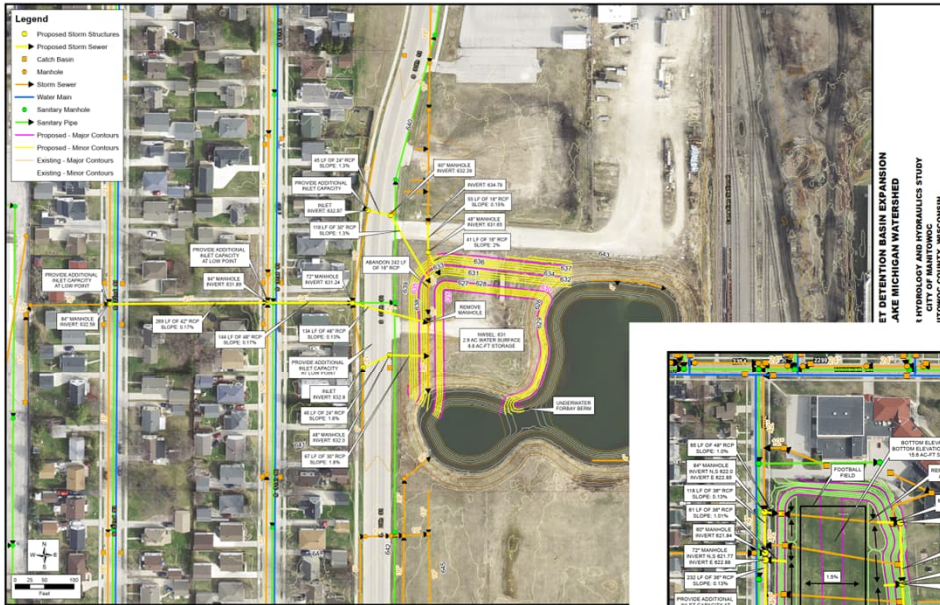
# LR01 Opinion of Probable Construction Cost

Project Descriptions	OPCC
<b><u>LR01 Alternative 1</u></b>	
25-Year Storm Sewer Design	\$547,900
LR01 Alternative 1 Total	\$547,900
<b><u>LR01 Alternative 2</u></b>	
25-Year Storm Sewer Design with Overland Flow Route	\$722,700
LR01 Alternative 2 Total	\$722,700
<b><u>LR01 Alternative 3</u></b>	
100-Year Storm Sewer Design	\$860,200
LR01 Alternative 3 Total	\$860,200

# L14 Recommended Alternative

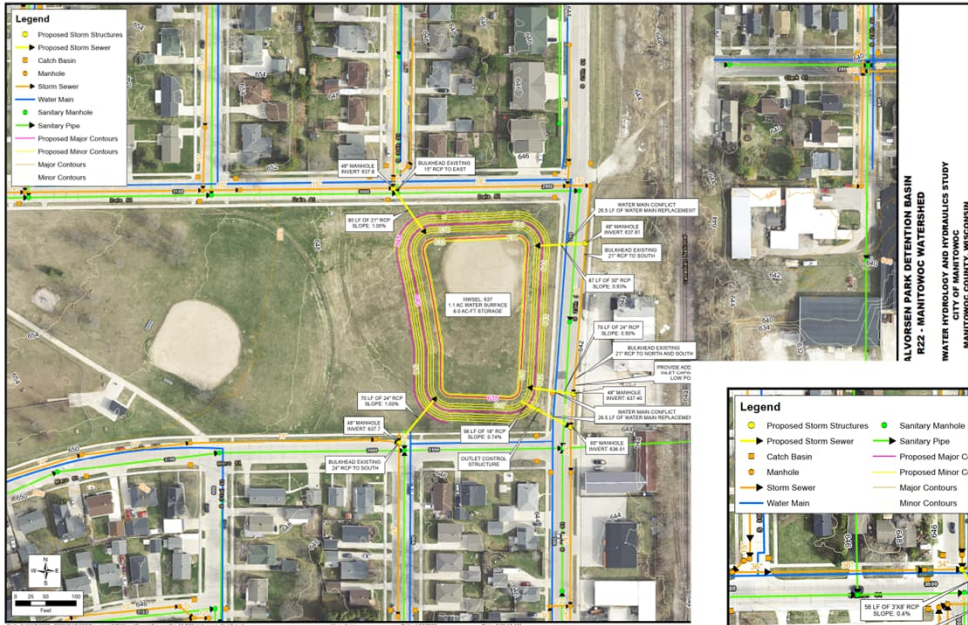
## Alternative 4

Project Descriptions	OPCC
L14 Alternative 4	
Rubick Field Dry Detention Basin	\$3,749,700
Grand Avenue Storm Sewer Upsizing (With Rubick Field Dry Det.)	\$4,437,500
30 <sup>th</sup> Street Detention Basin Expansion	\$1,788,300
L14 Alternative 4 Total	\$9,975,400

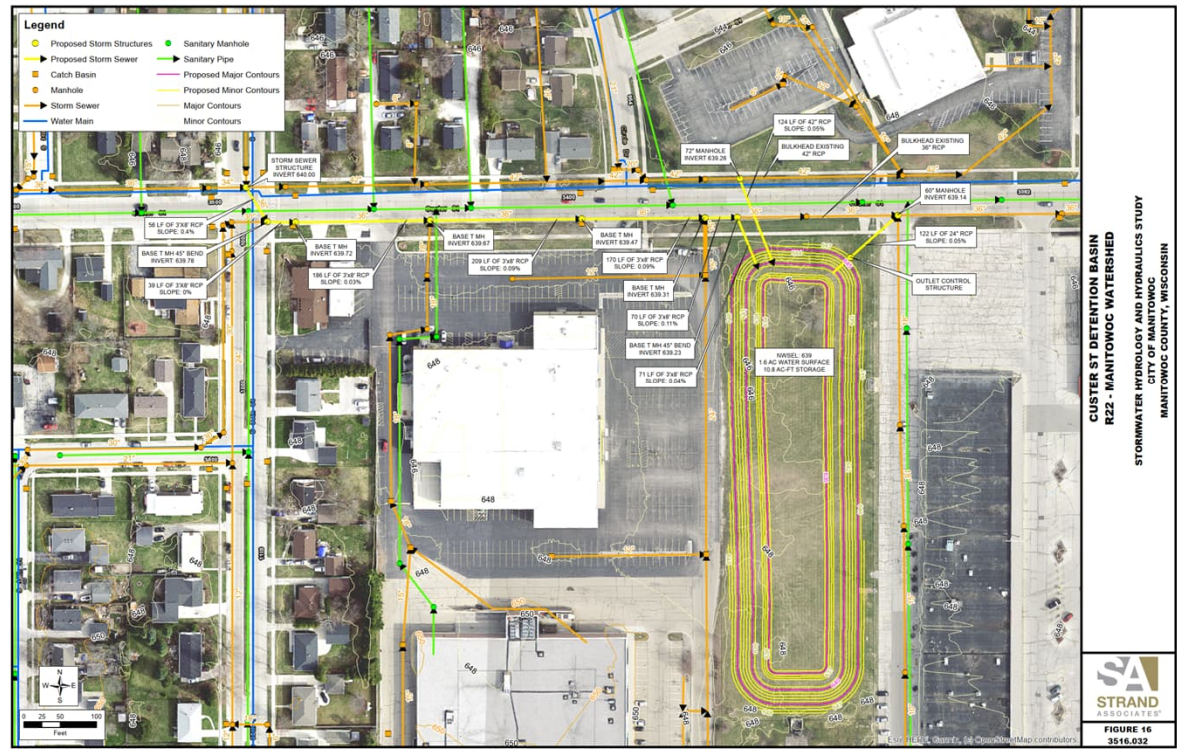


# R22 Recommended Alternative

- Alternative 2



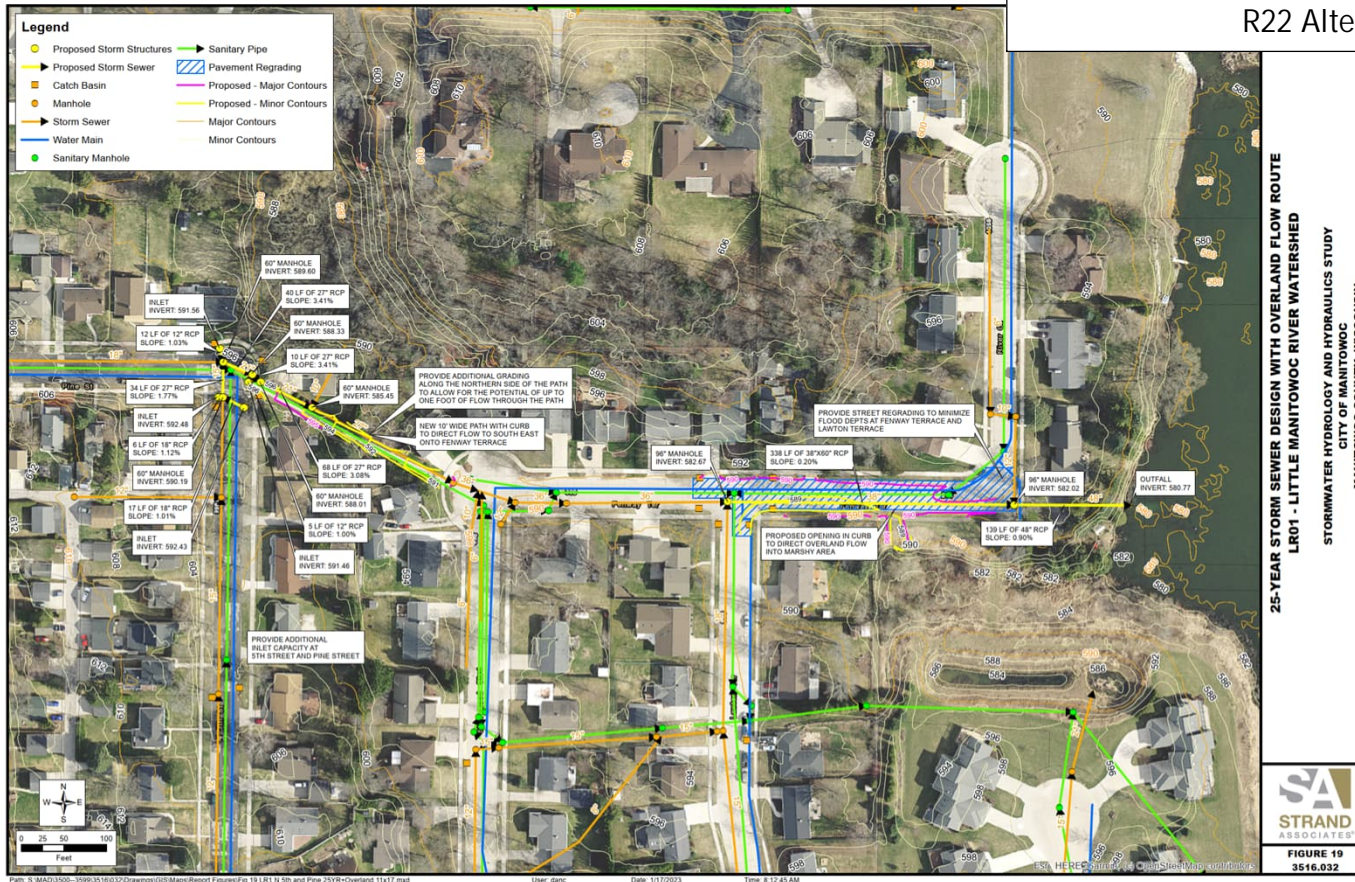
Project Descriptions	OPCC
<b>R22 Alternative 2</b>	
Halvorsen Park Detention Basin	\$1,415,700
Custer Street Detention Basin	\$3,157,000
<b>R22 Alternative 2 Total</b>	<b>\$4,572,700</b>



# LR01 Recommended Alternative

- Alternative 2

Project Descriptions	OPCC
R22 Alternative 2	
Halvorsen Park Detention Basin	\$1,415,700
Custer Street Detention Basin	\$3,157,000
<b>R22 Alternative 2 Total</b>	<b>\$4,572,700</b>







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