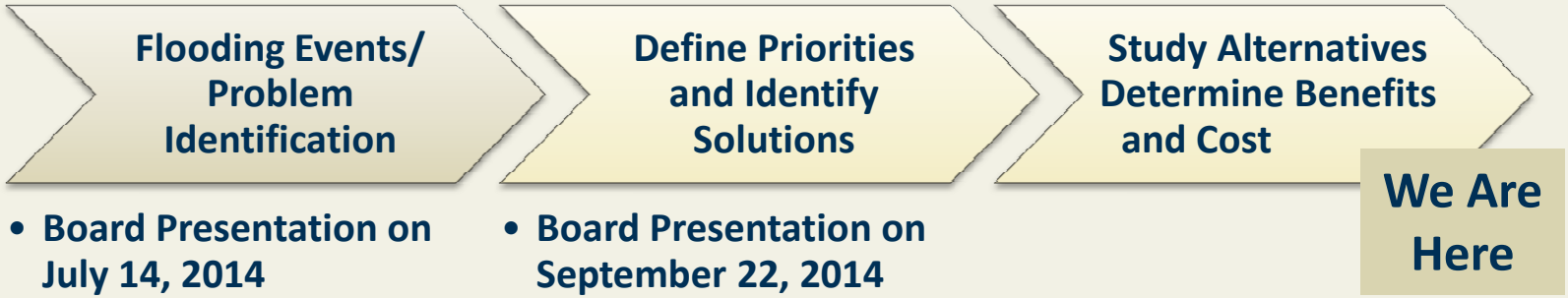
Village of La Grange, Illinois

South Basin Study

BAXTER & WOODMAN
Consulting Engineers

Project Timeline



- Board Presentation on July 14, 2014
- Board Presentation on September 22, 2014

Tonight's Presentation / Agenda

- Hydrology and Hydraulic Study Analysis and Results – Baxter & Woodman, Inc.
- Recommendations
- Cost Estimates
- Suggested Phasing
- Schedule
- Other Sewer Projects

[Revenues - January 26, 2015 Board Workshop]

Introductions

Mark Phipps, P.E., CFM, CPESC

Baxter and Woodman, Inc.

Water Resources Department Manager

Paul Siegfried, P.E., CFM, CPESC

Baxter and Woodman, Inc.

Senior Water Resources Engineer

Village of La Grange, Illinois

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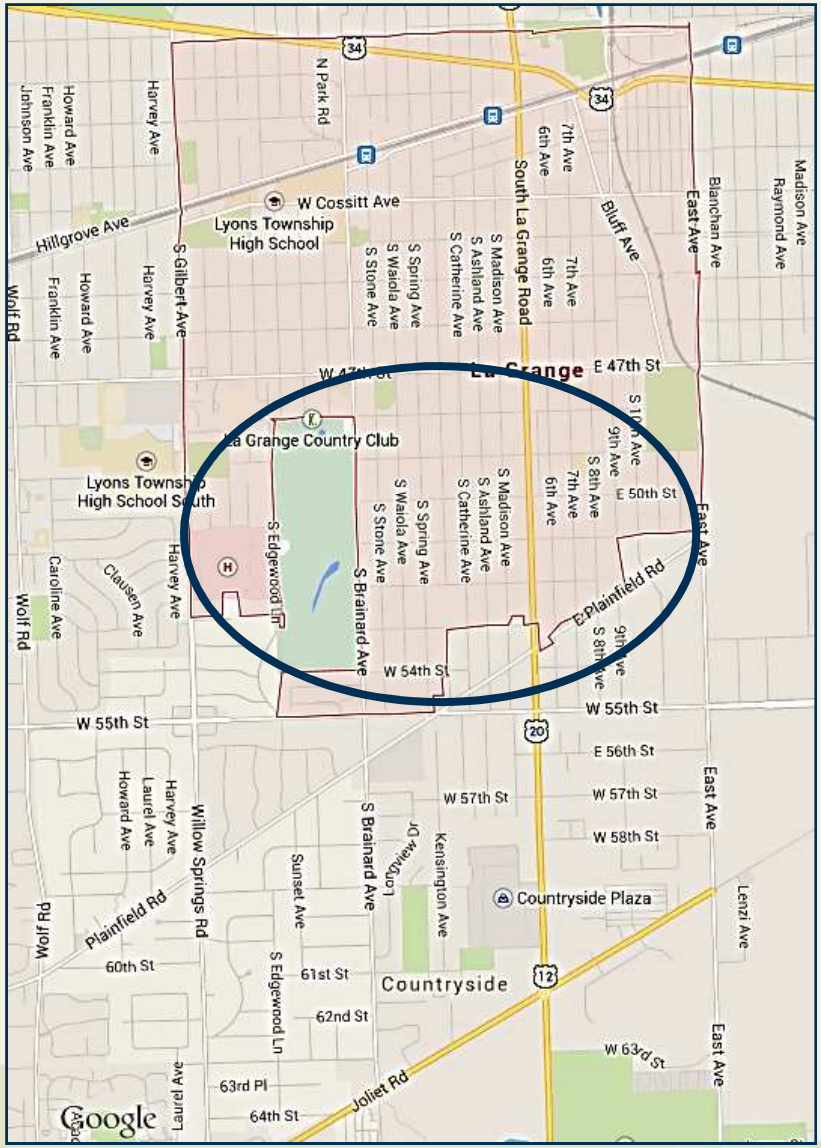
South Basin



1. Study Area
2. Watershed
3. Outlets
4. Depressions

Recent Severe Flooding

July 23-24, 2010

- 6.83 inches (total)
- 6.02 inches in 8 hours
- 100-year storm (1% annual chance)

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- 2.28 inches in 3 hours
- 5-year storm (20% annual chance)

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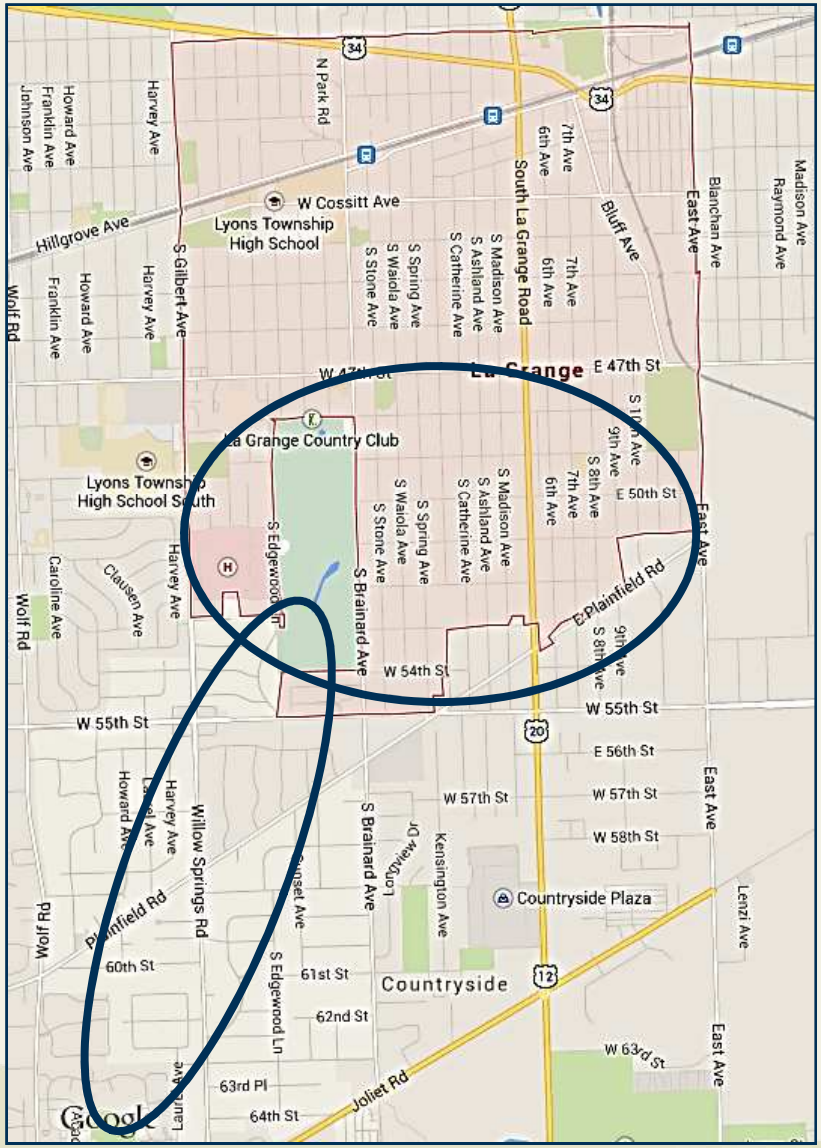
Note: gage location and soil saturation affect storm characterization

South Basin



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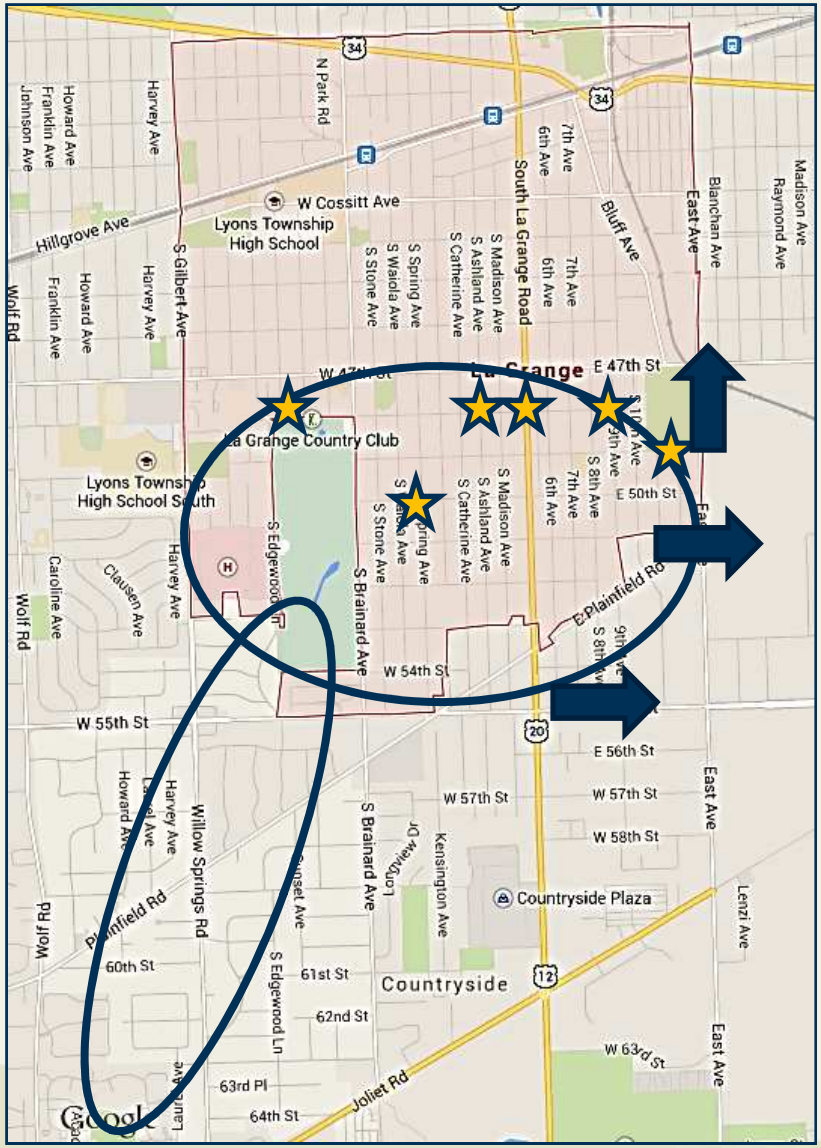

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Project Background

2010 Recommendations

- Brainard Ave Floodwall
- 51st St Relief Sewer
- 48th St Relief Sewer
- Total Est. Cost = $22.2 M

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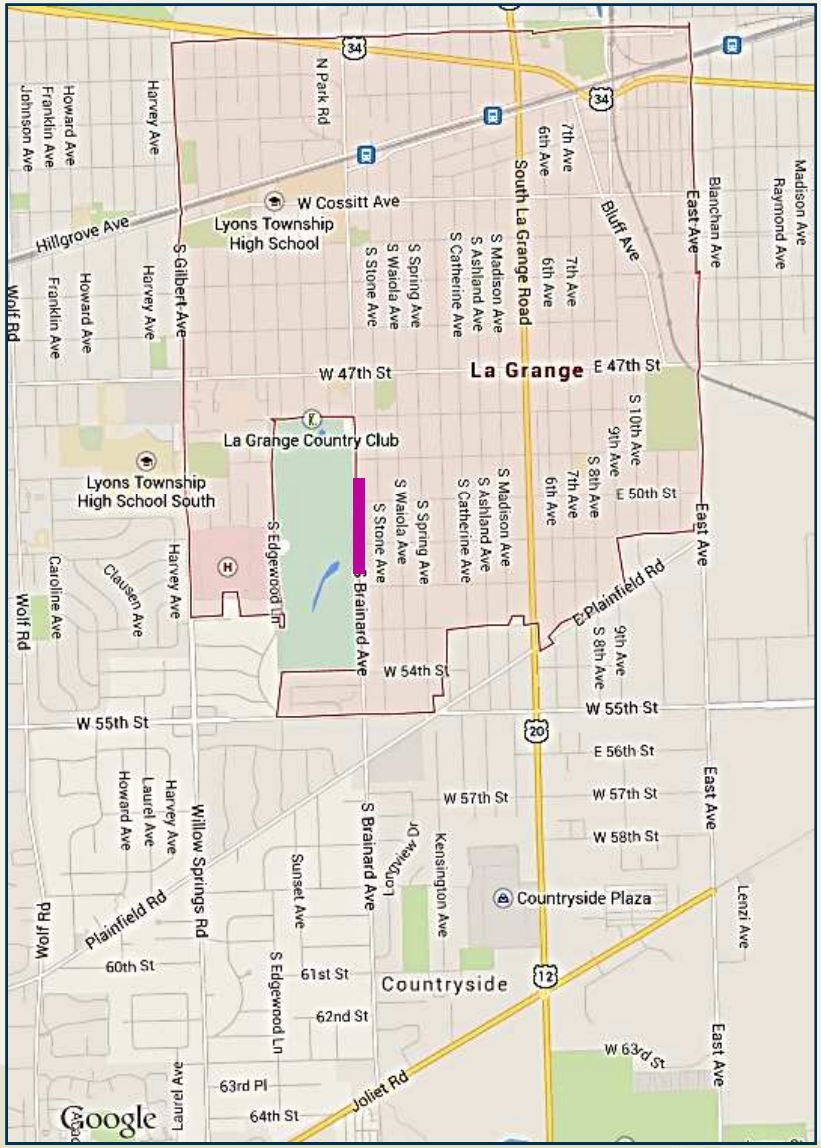
B&W Scope of Services

- Survey Critical Elevations
- Obtain Soil Borings
- Refine Alternatives to Address Overland Flooding

Model Development

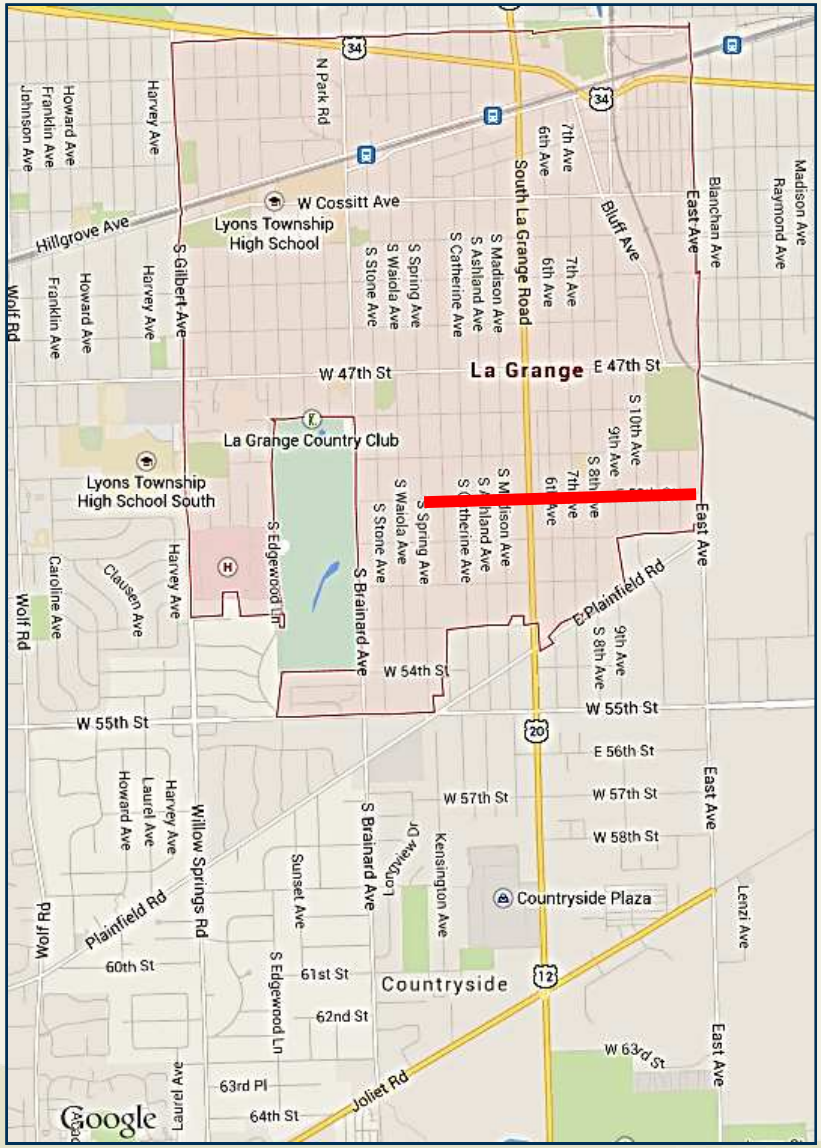
- Re-created 2010 Model
- Incorporated Survey Data and Added Detail
- Evaluated a Wide Range of Storms
- Compared Results with Resident Flood Reports
- Accurate for Comparing Alternatives

Alternatives Analysis



1. Brainard Ave Floodwall
2. 50th St Relief Sewer
3. Alt 2 with Laterals
4. Alt 3 with Upsized Outlet
5. Alt 4 with Alt 1
6. Other Improvements

Alternatives Analysis



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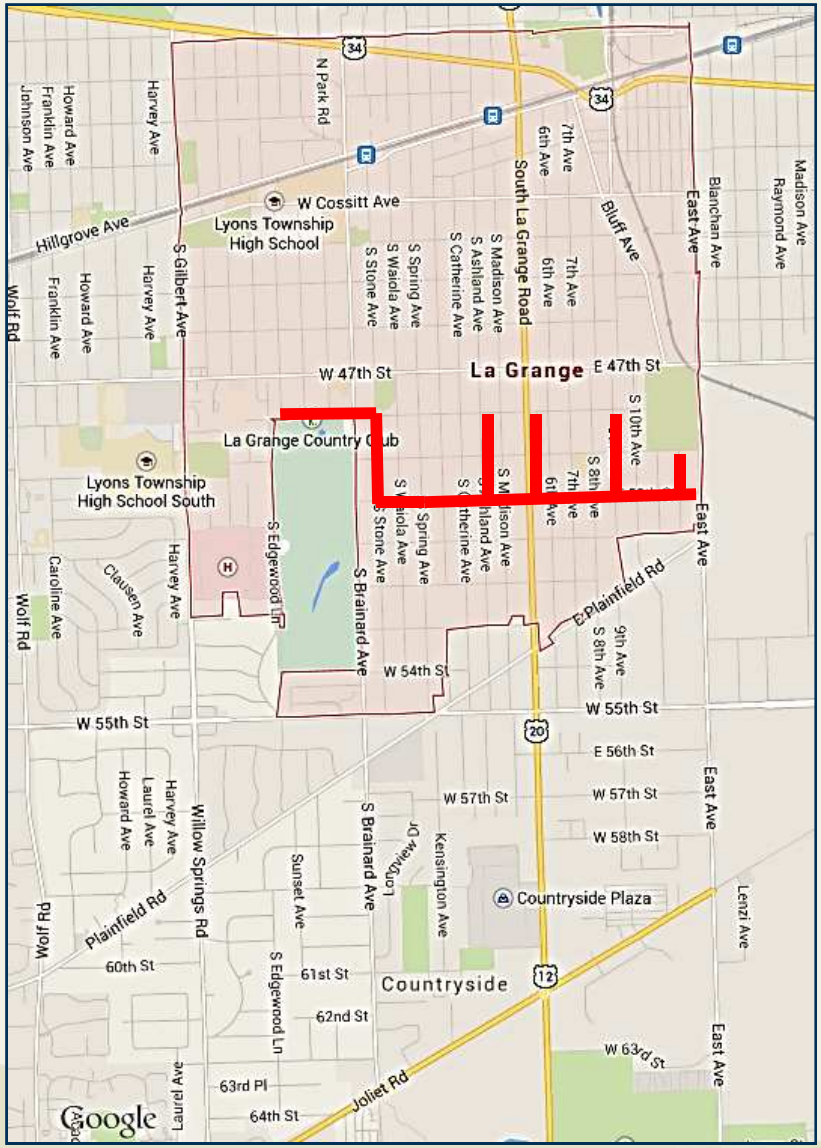

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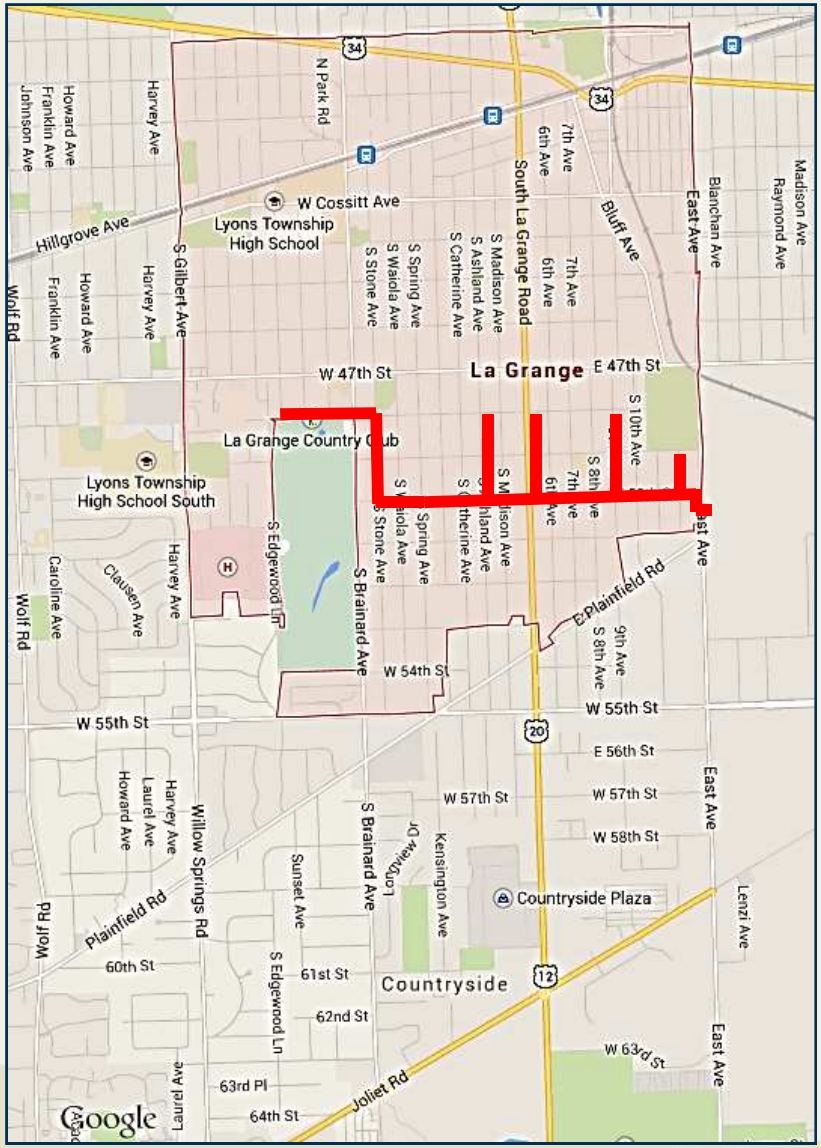

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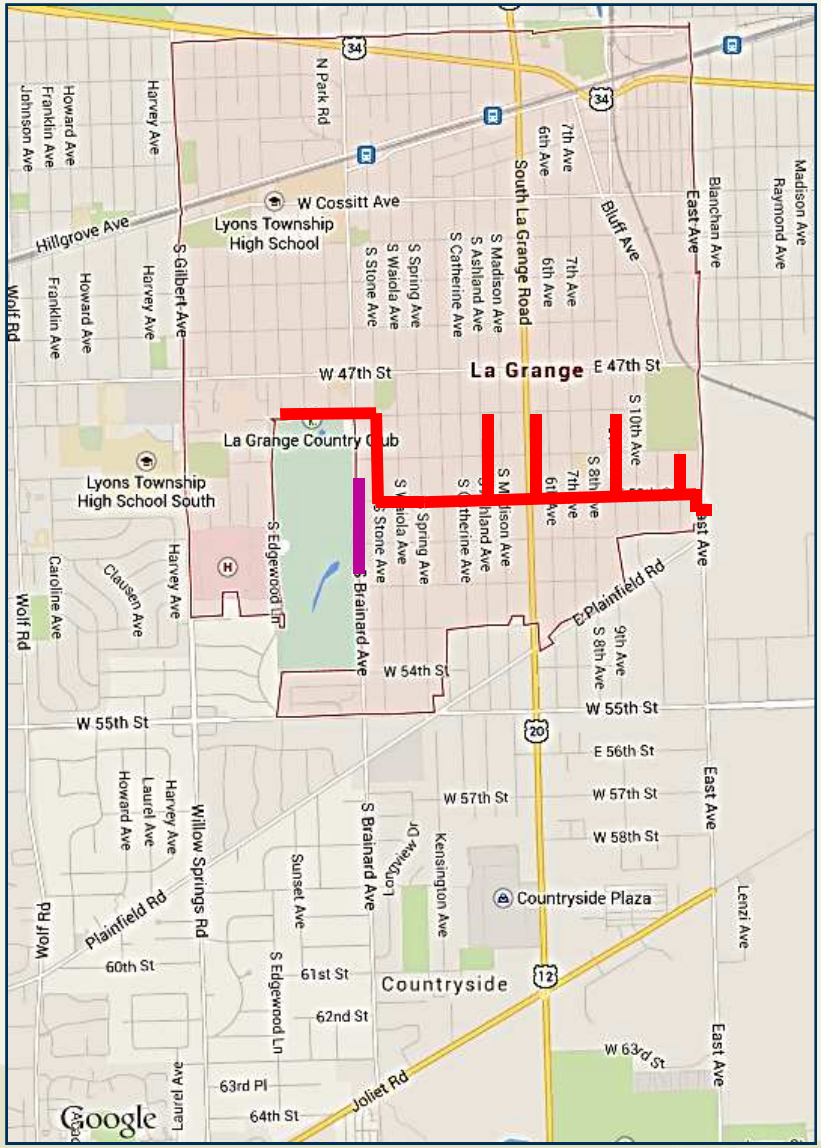

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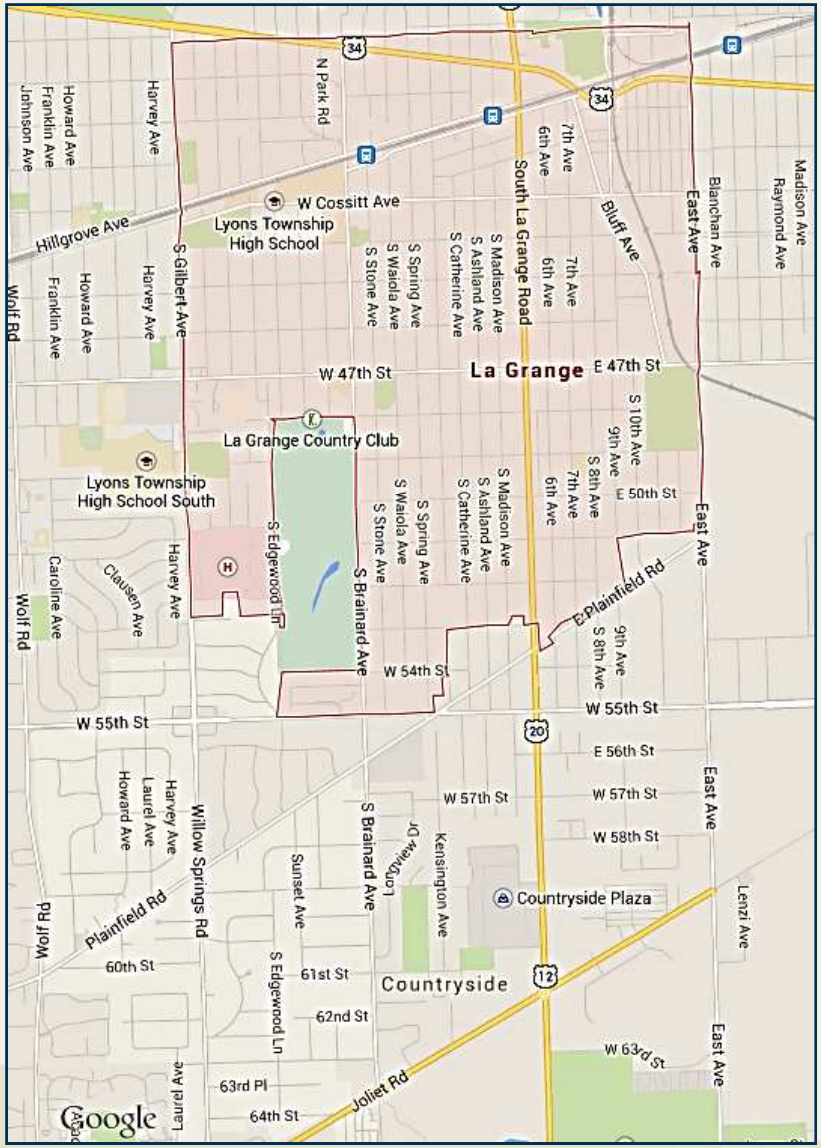

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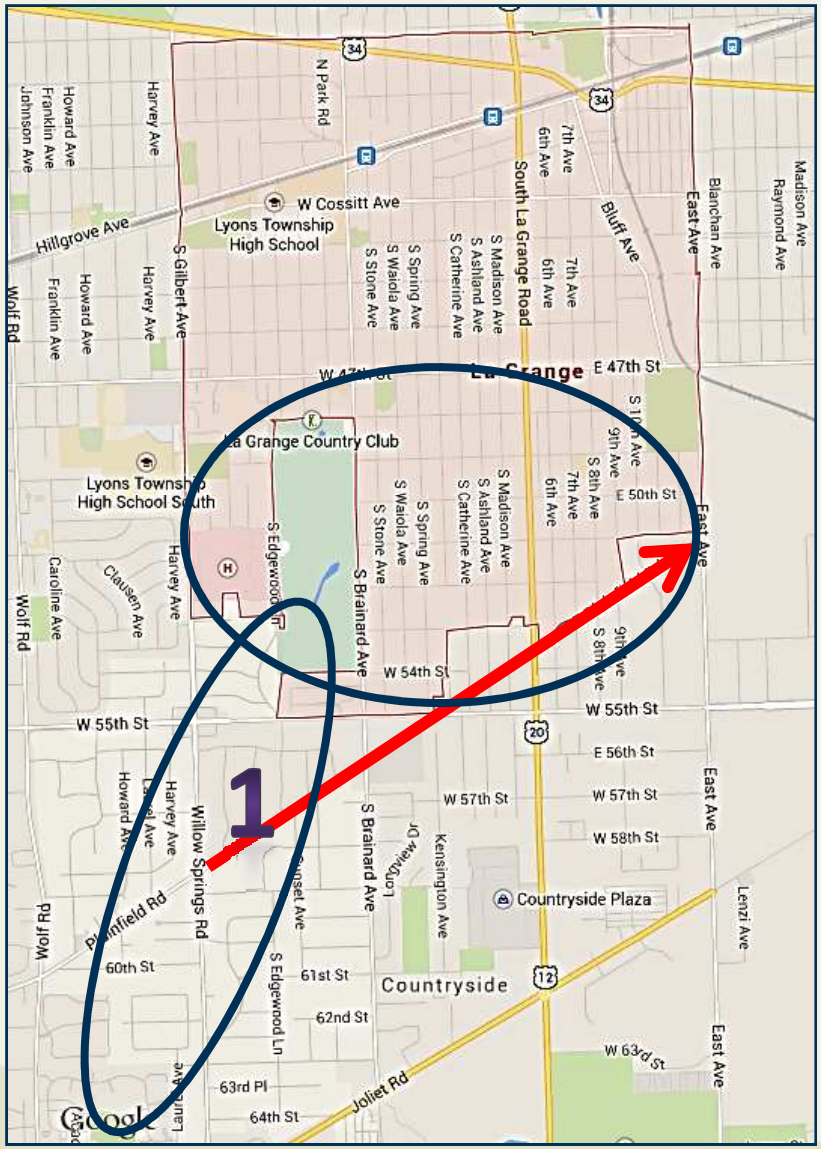
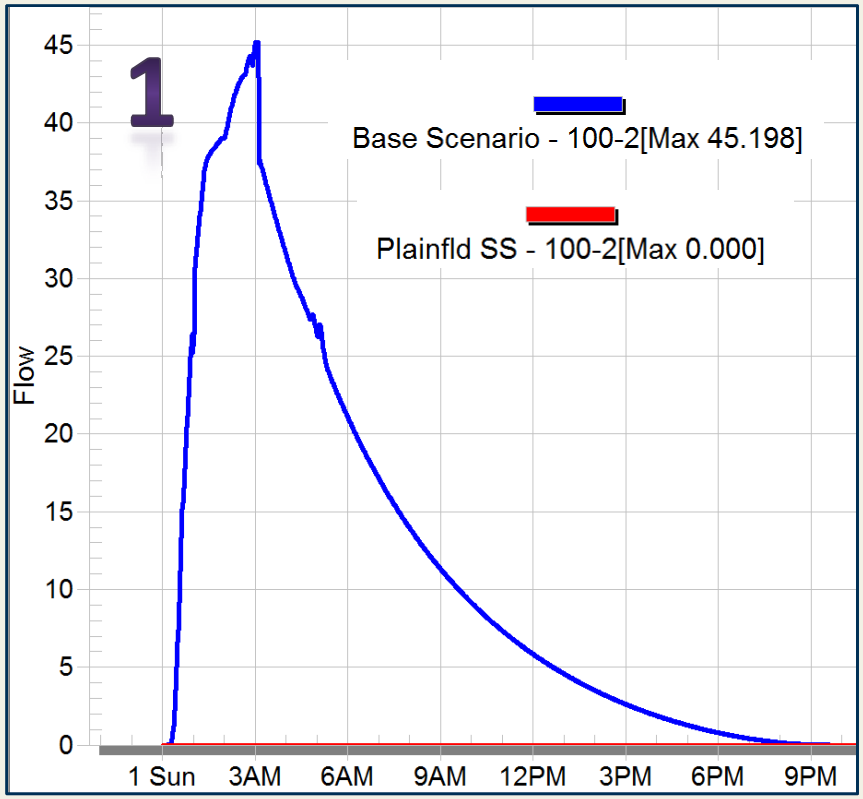
Other Improvements

- Inlet Restrictors
  - Storage volume required would not fit in Village right-of-way
- Plainfield Road Drainage Improvements
  - Runoff intercepted at Plainfield Road would not significantly reduce flooding in the South Basin

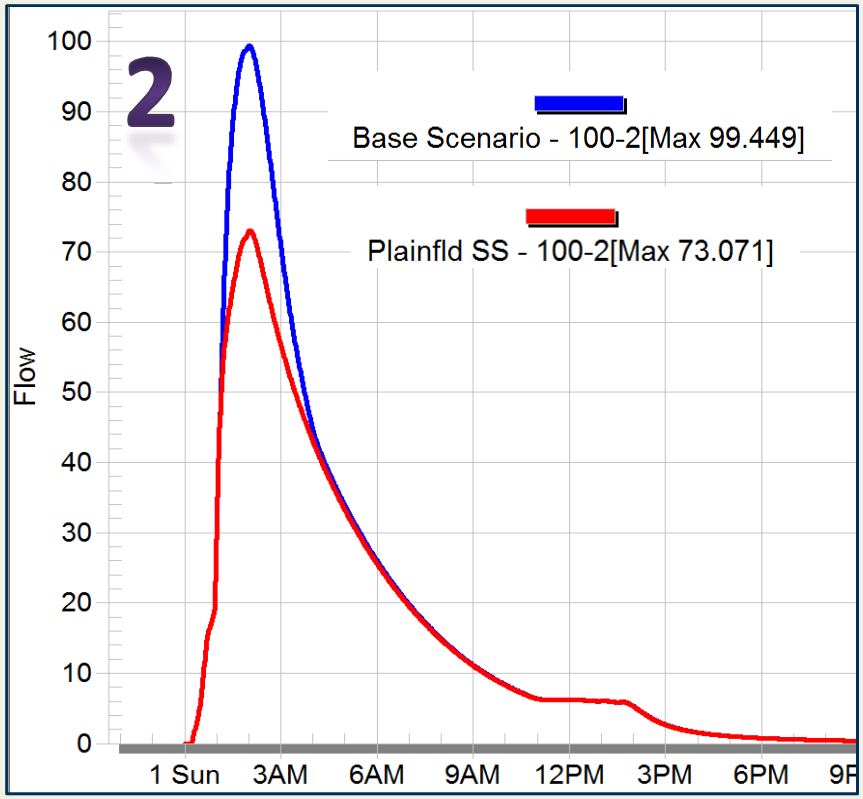
Other Improvements – Plainfield Road





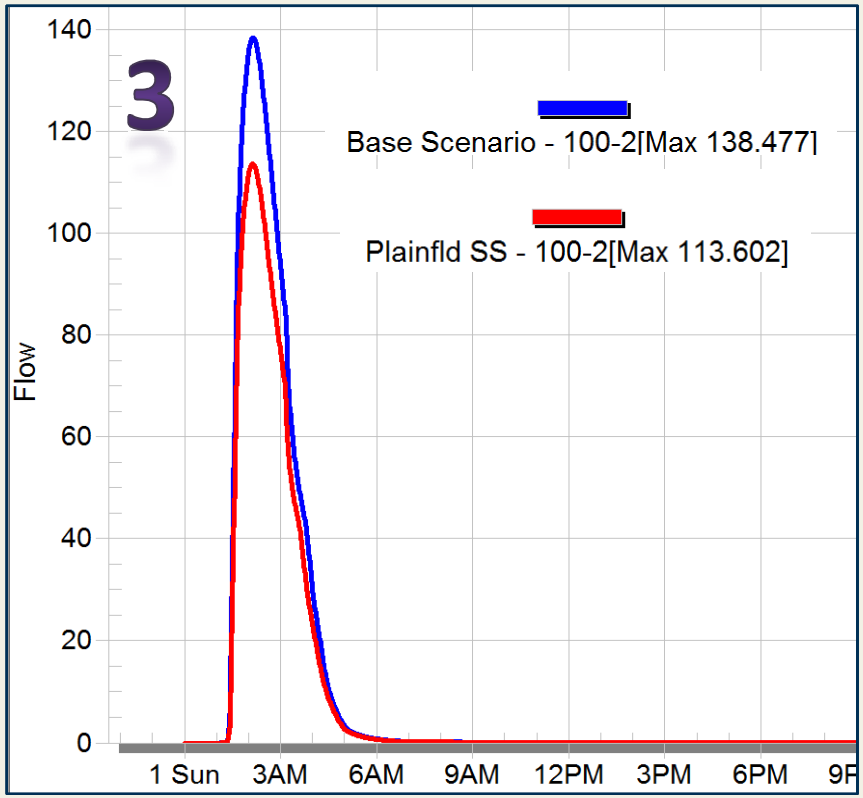
Location 1: Plainfield Rd (east of Willow Springs Rd)

Other Improvements – Plainfield Road



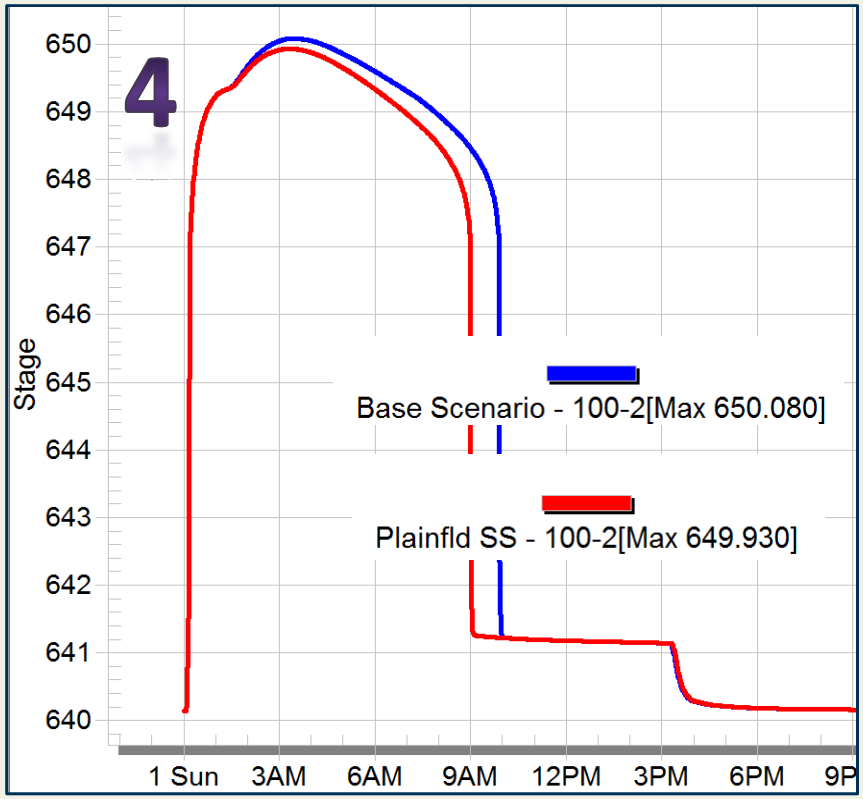
Location 2: Country Club Ponds

Other Improvements – Plainfield Road



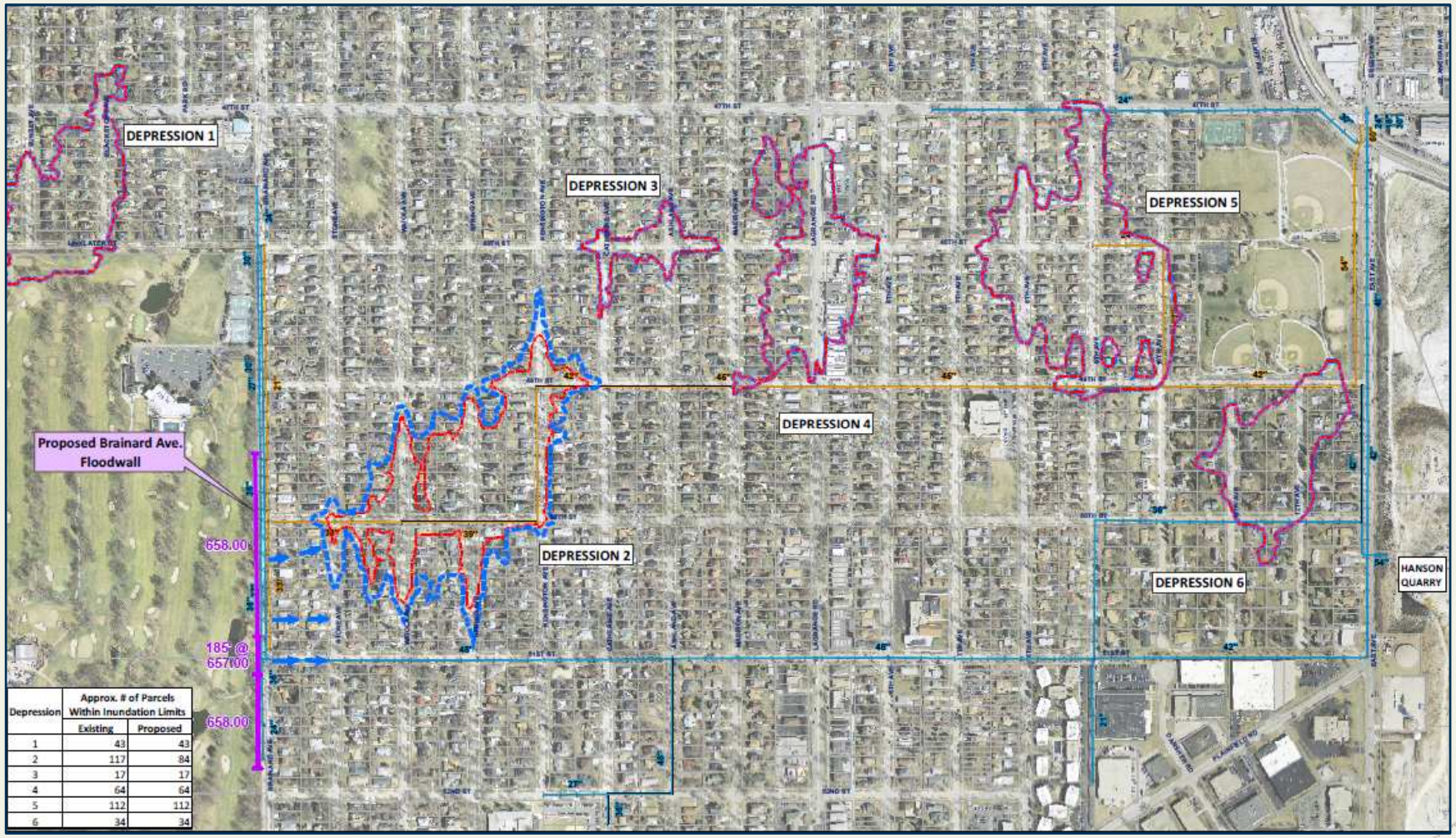
Location 3: 51st St (east of Brainard Ave)

Other Improvements – Plainfield Road



Location 4: 50th St and Spring Ave

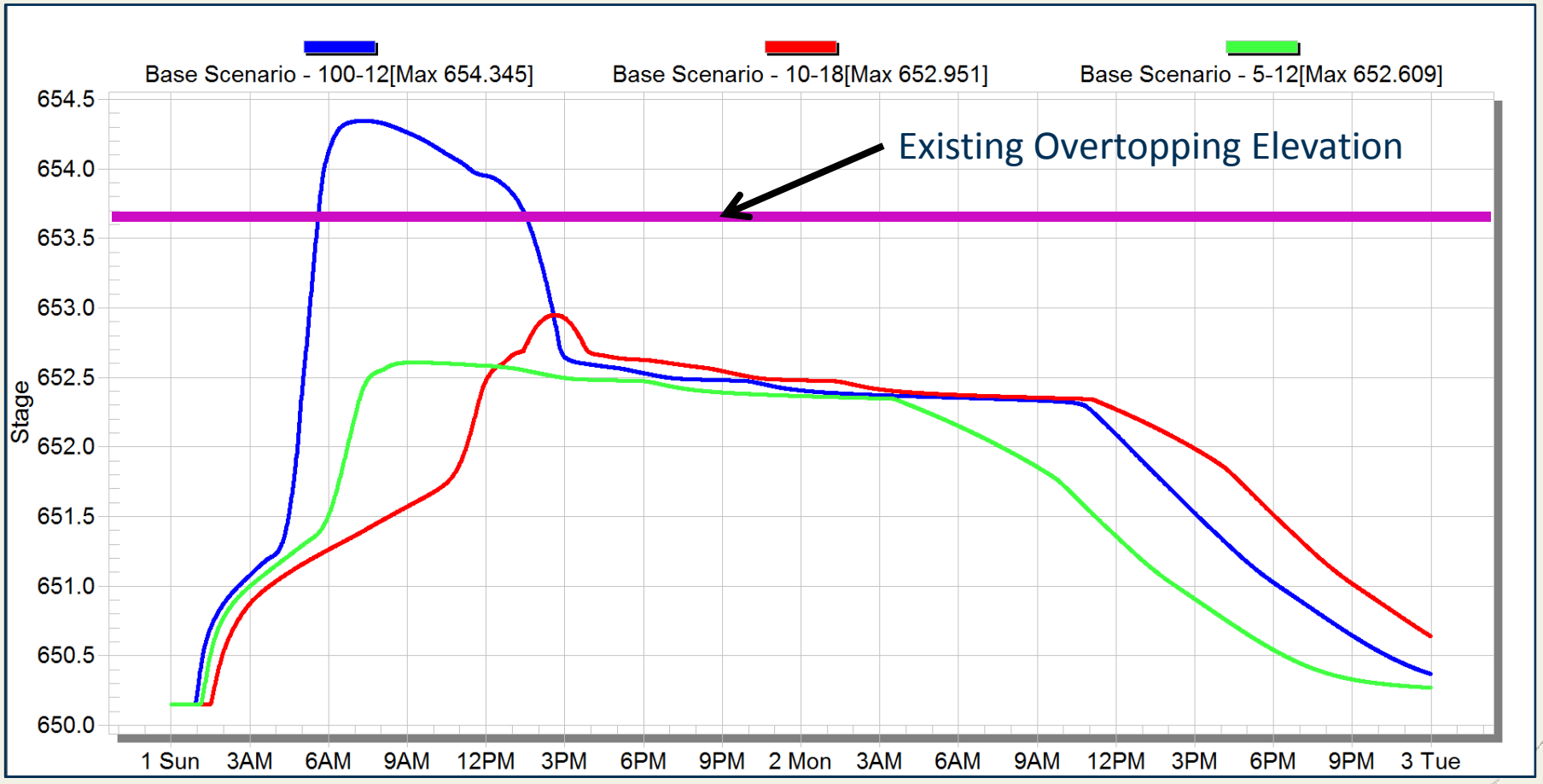
Brainard Avenue Floodwall (Alt 1)



Depression	Approx. # of Parcels Within Inundation Limits	
	Existing	Proposed
1	43	43
2	117	84
3	17	17
4	64	64
5	112	112
6	34	34

- Reduces 100-yr flooding by 0.9 ft at Depression 2 (no reduction in other depressions)
- Protects several properties from overland flow in 100-yr storm

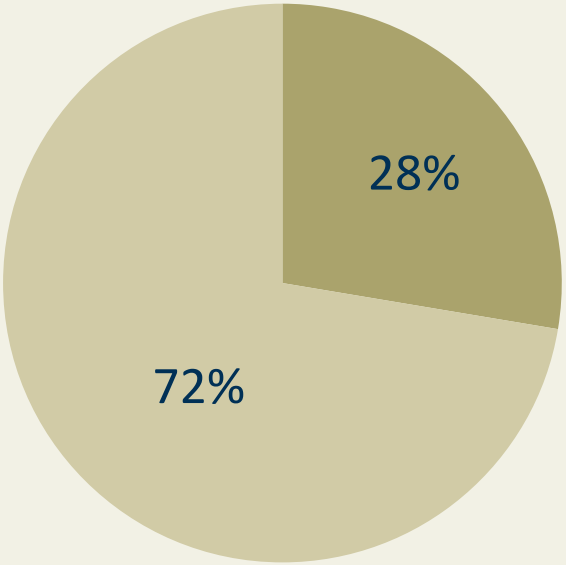
Brainard Avenue Floodwall (Alt 1)



- No benefit for any depression in the 5- and 10-yr storms
- Only benefits Depression 2 when the storm overtops Brainard Ave

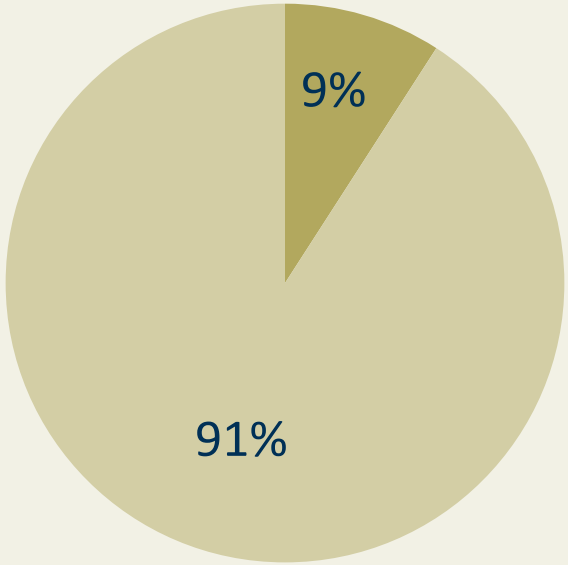
Brainard Avenue Floodwall (Alt 1)

100-Year Peak Flow



- Overflow from Brainard Ave
- Local Runoff to Depression 2

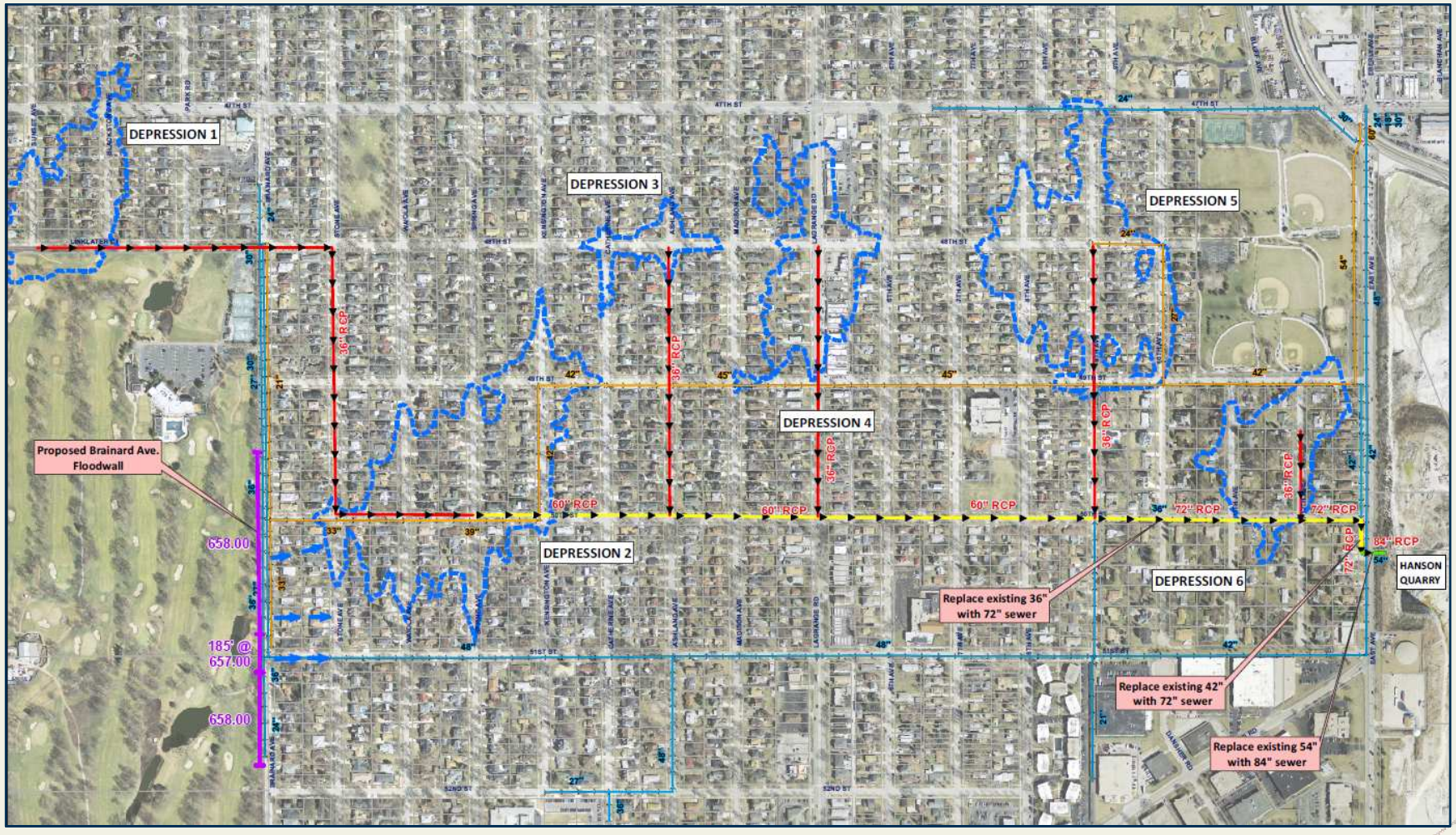
100-Year Peak Flow



- Overflow from Brainard Ave
- Runoff from South Basin

- Similar results when the floodwall was modeled with a restricted outlet at Brainard

50th Street Relief Sewer (Alt 2-5)



- Alternatives 2-5 all involve a relief sewer along 50th St
- Proposed sewer below existing sewer and above bedrock

50th Street Relief Sewer (Alt 2-5)

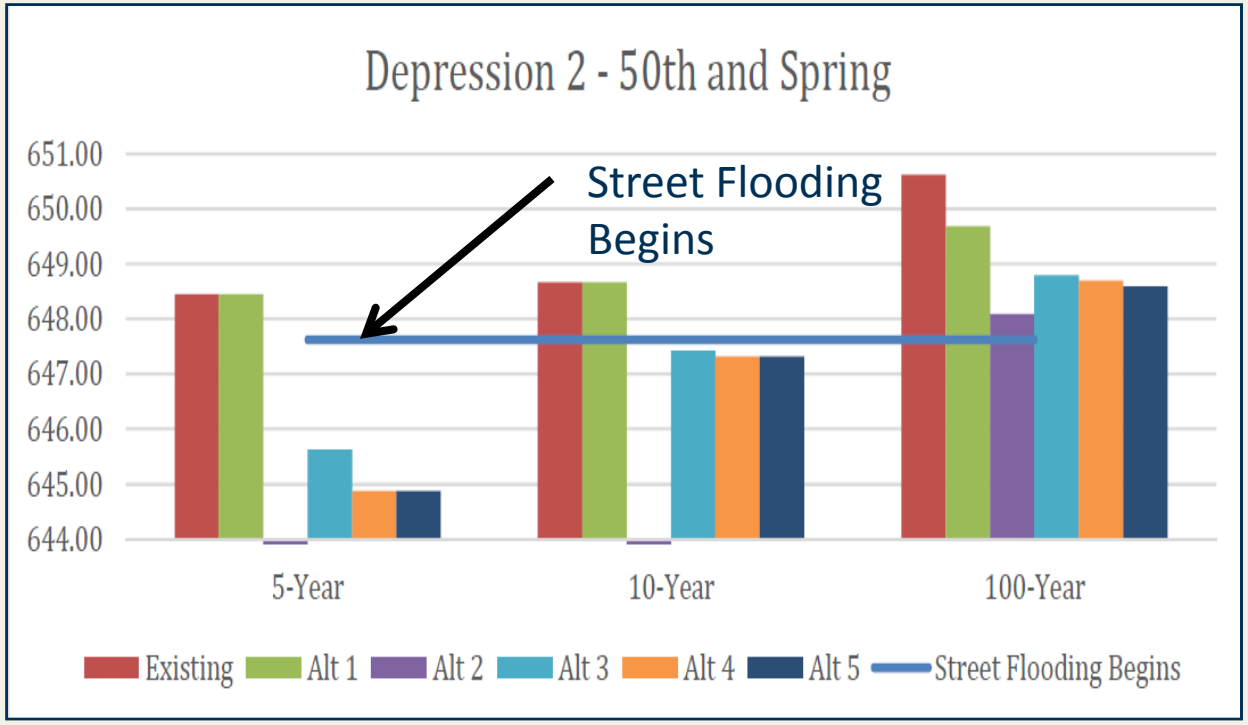


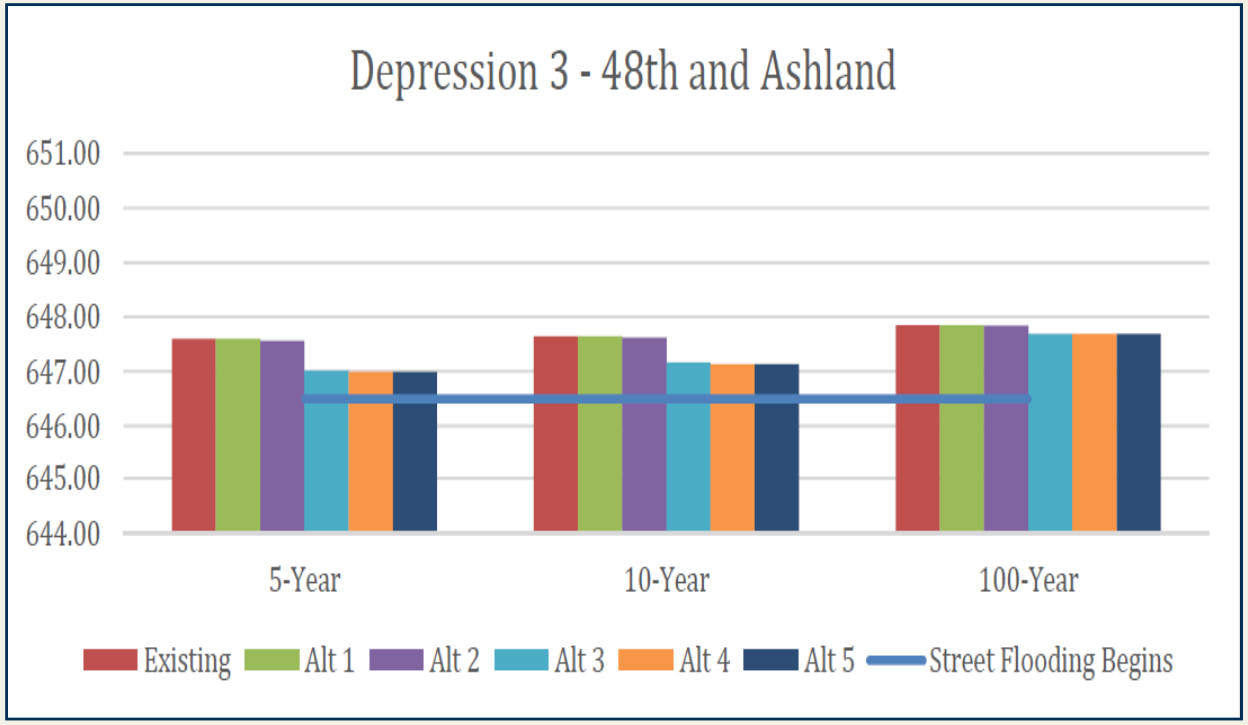
Figure 2

Legend

1. Brainard Ave Floodwall
2. 50th St Relief Sewer
3. Alt 2 with Laterals
4. Alt 3 with Upsized Outlet
5. Alt 4 with Alt 1

- The Relief Sewer (Alt 2) is much more effective than the Floodwall (Alt 1)
- The Relief Sewer (Alt 2) eliminates 5- and 10-yr flooding in Depression 2
- The benefit of the Relief Sewer (Alt 2) in Depression 2 is reduced by adding the Laterals (Alt 3)

50th Street Relief Sewer (Alt 2-5)



Legend

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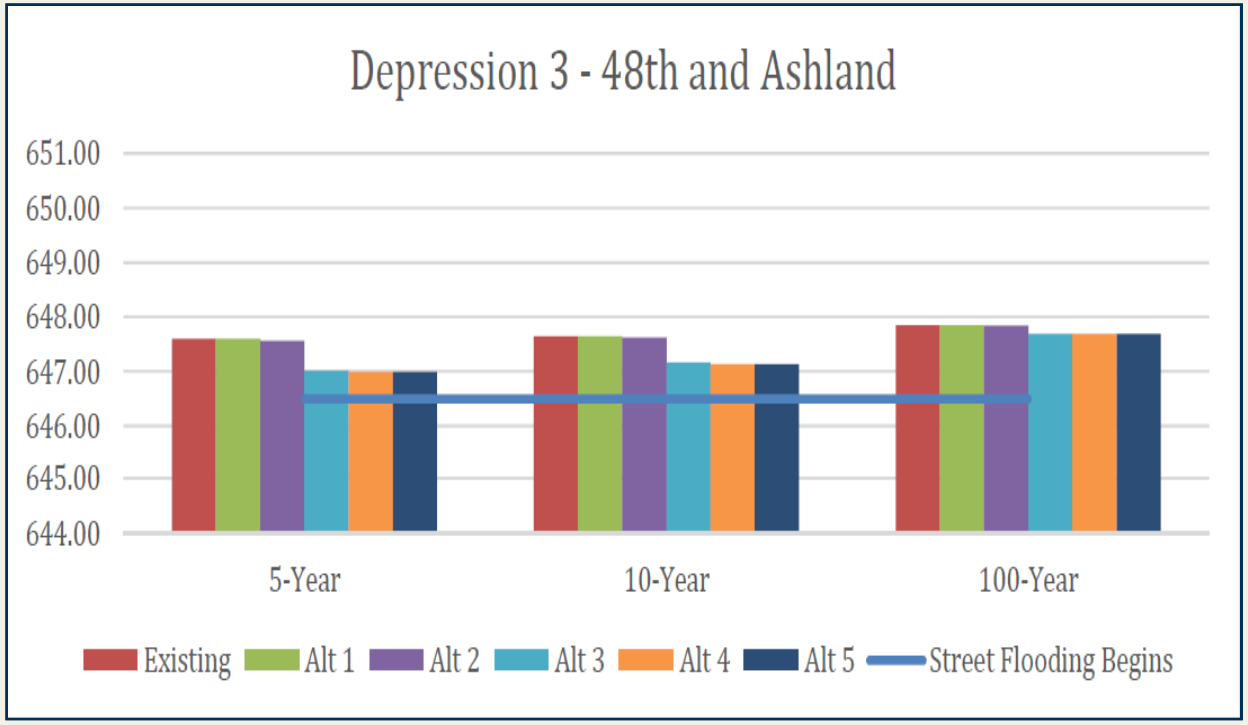
Figure 3 (Similar Results in Figures 1 and 4)

- The Relief Sewer with Laterals (Alt 3) is effective in Depression 3, but the Floodwall (Alt 1) is not
- The Relief Sewer with Laterals (Alt 3) is effective in Depression 3 even without the Upsized Outlet (Alt 4)

50th Street Relief Sewer (Alt 2-5)



Legend

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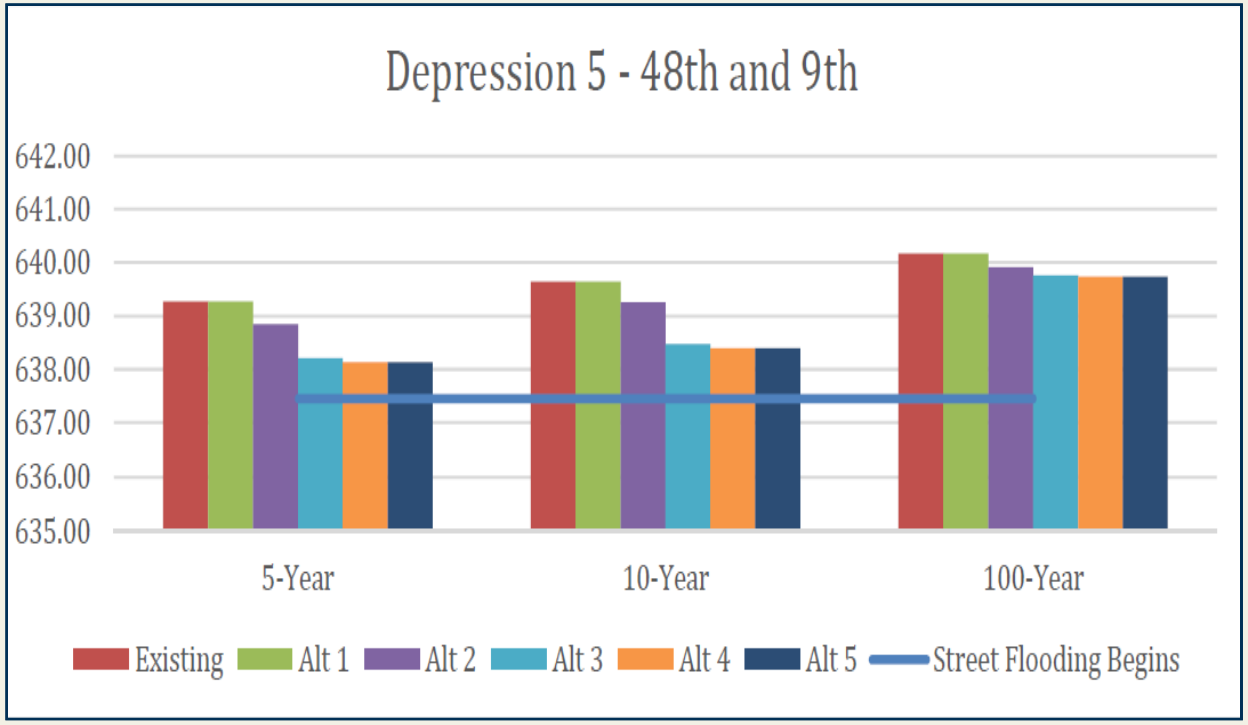
Figure 3 (Similar Results in Figures 1 and 4)

- Flooding in Depression 3 would be reduced but not eliminated by the Relief Sewer with Laterals (Alt 3)
- There is no benefit in Depression 3 to adding the Floodwall to the Relief Sewer (Alt 5)

50th Street Relief Sewer (Alt 2-5)



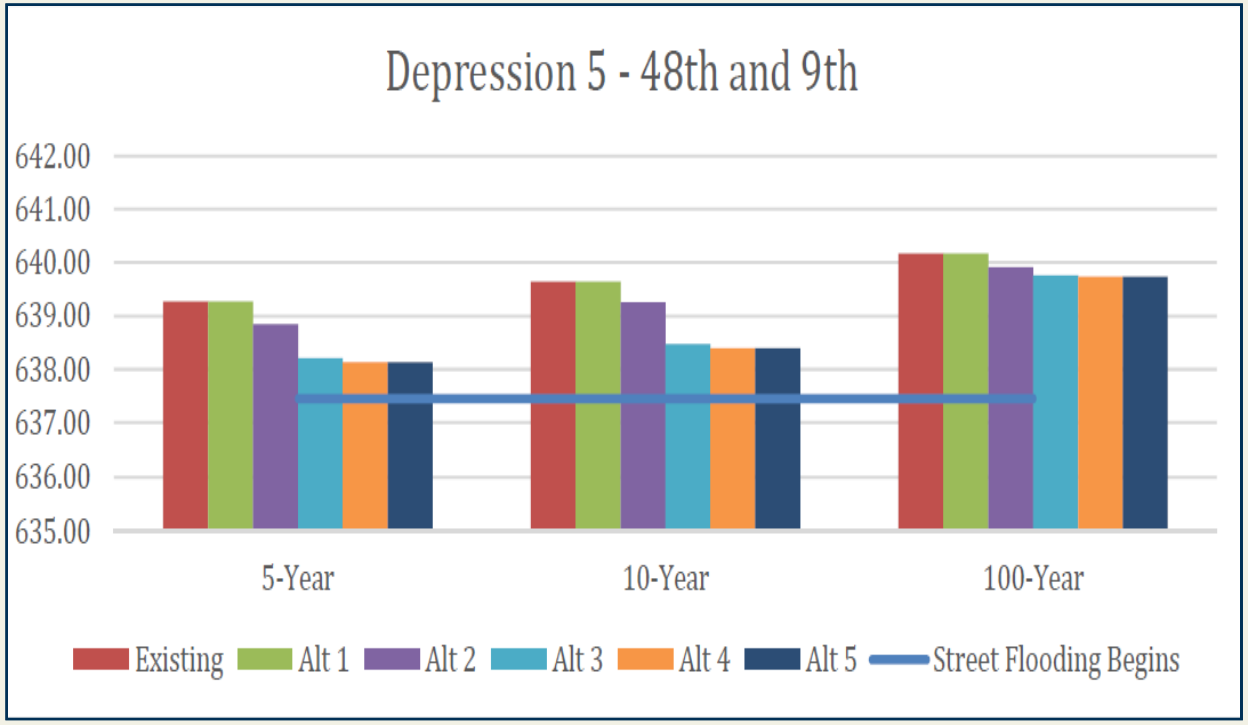
Legend

1. Brainard Ave Floodwall
2. 50th St Relief Sewer
3. Alt 2 with Laterals
4. Alt 3 with Upsized Outlet
5. Alt 4 with Alt 1

Figure 5 (Similar Results in Figure 6)

- The Relief Sewer (Alt 2) is effective in Depression 5, but the Relief Sewer with Laterals (Alt 3) is more effective.
- The Relief Sewer (Alt 2) and Relief Sewer with Laterals (Alt 3) are effective in Depression 5 even without the Upsized Outlet (Alt 4)

50th Street Relief Sewer (Alt 2-5)



Legend

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Figure 5 (Similar Results in Figure 6)

- Flooding in Depression 5 would be reduced by Alt 2-5, but not eliminated
- There is no benefit in Depression 5 to adding the Floodwall to the Relief Sewer (Alt 5)

Critical Duration

- Rainfall depth and storm duration
- 100-year storm = 1% chance of occurring in a given year
- 100-year storm = 2.8” in 30 min, 4.5” in 2 hr, 7.6” in 24 hr
- A critical duration analysis models a range of storm durations to determine which produces the highest flood elevation.

50th Street Relief Sewer (Alt 4)

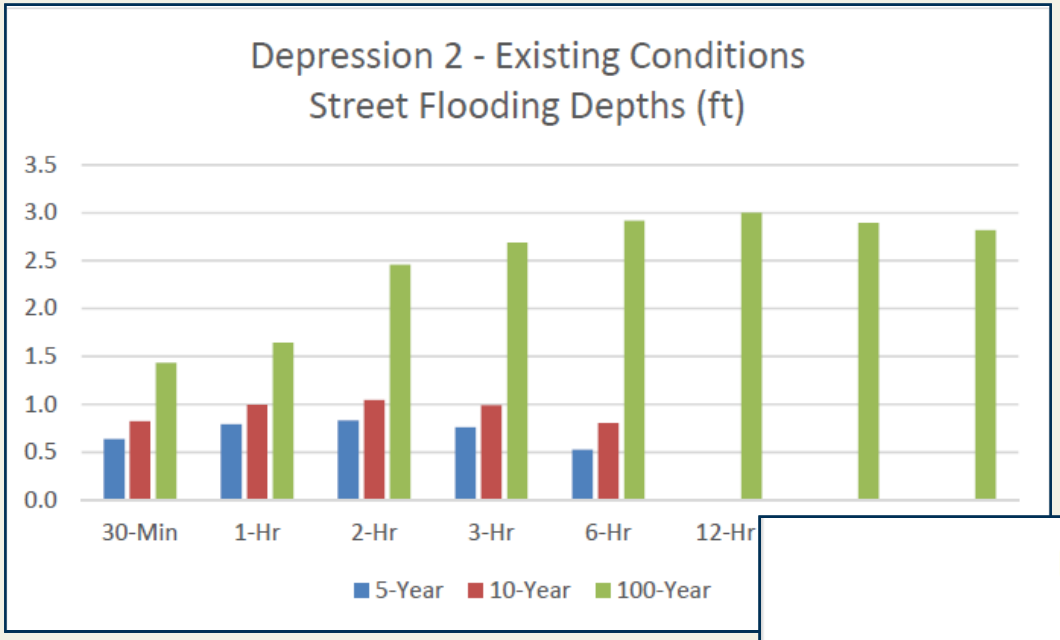
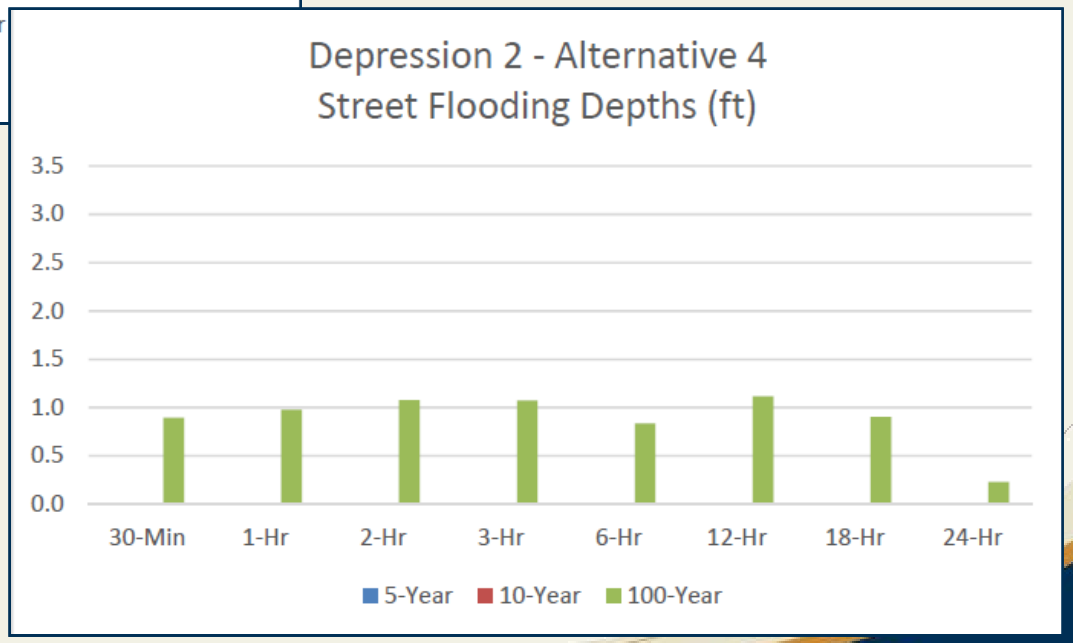


Figure 8a

- Alt 4 would eliminate 5- and 10-yr flooding in Depression 2.
- 100-yr flooding would be significantly reduced.

Figure 8b



50th Street Relief Sewer (Alt 4)

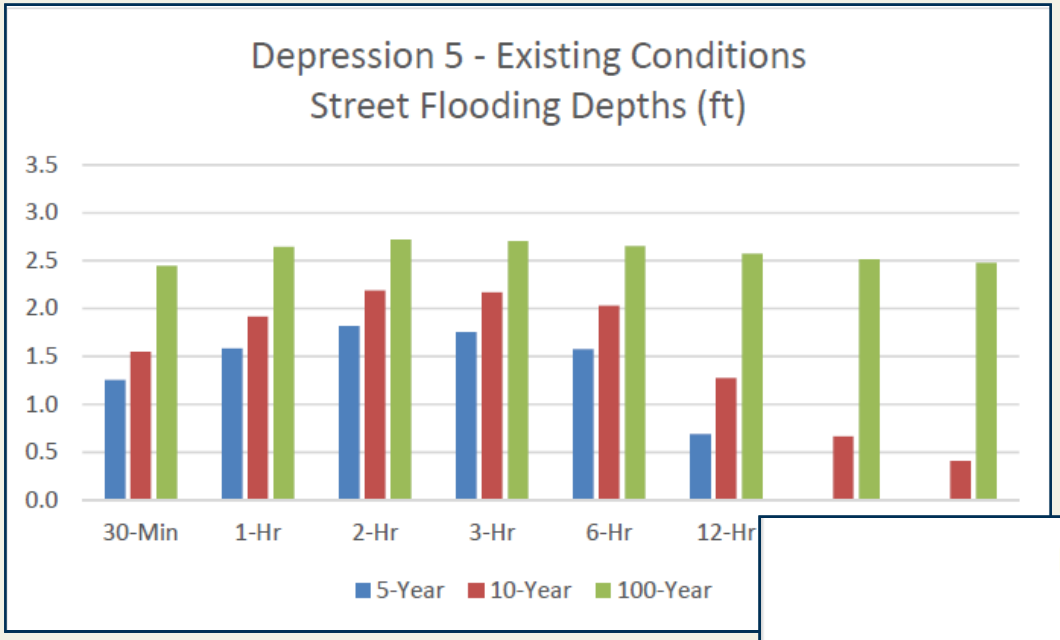
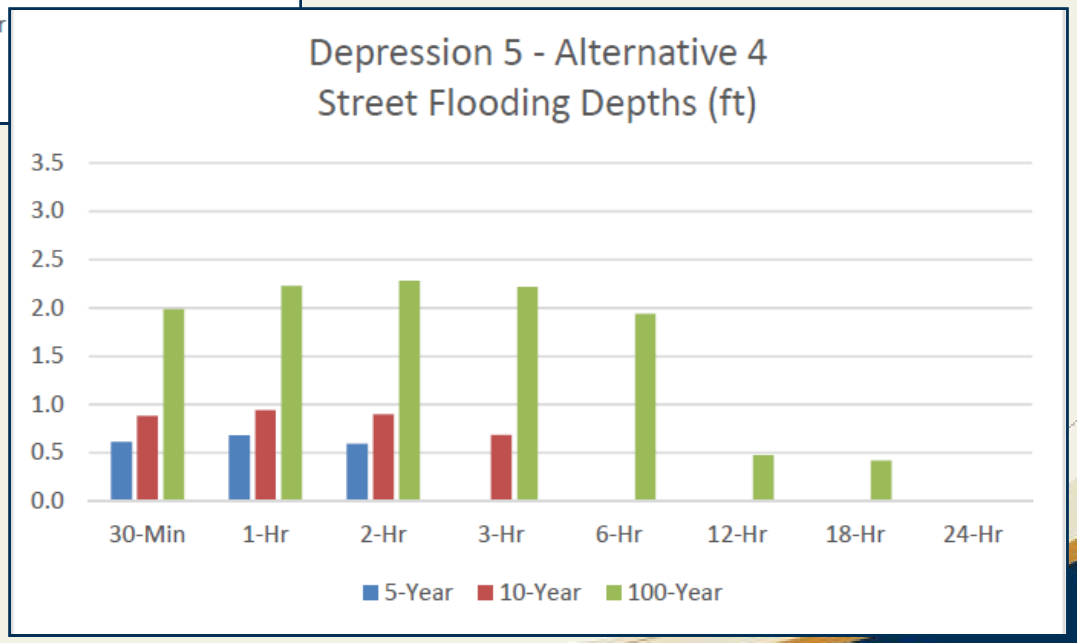


Figure 11a

- Alt 4 significantly reduces 5- and 10-yr flooding in Depression 5
- 100-yr flooding with storm durations longer than 6-hrs are also significantly reduced

Figure 11b



- Results are similar for Depressions 1, 3, 4, and 6 (Figures 7, 9, 10, and 12)

Conclusions – Relief Storm Sewer

- A relief storm sewer along 50th Street is the most effective solution to address overland flooding in the South Basin.
- Of the relief sewer configurations evaluated, Alternative 4 provides the greatest overall benefit.

Conclusions – Relief Storm Sewer

- For a 5-yr, 3-hr storm (similar to Aug 21-22, 2014), Alt 4 would eliminate street flooding in 3 of the 6 depressions and nearly eliminate street flooding in the other 3.
- For a 100-yr, 8-hr storm (similar to July 23-24, 2010), Alt 4 would significantly reduce flooding in 4 of the 6 depressions.

Conclusions – Brainard Avenue Floodwall

- The floodwall is the only alternative considered that prevents overland flow between Brainard Ave and Depression 2.
- The floodwall only provides relief for storm events that would overtop Brainard Ave.

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Cost Estimates

Description	Cost
Alternative No. 1 - Brainard Avenue Floodwall	$750,000
Alternative No. 2 - Relief Storm Sewer	$11,720,000
Alternative No. 3 - Relief Storm Sewer, Laterals and Extensions	$22,380,000
Alternative No. 4 - Relief Storm Sewer, Laterals and Extension, Upsized Outlet	$22,890,000
Alternative No. 5 - Combination of Alternatives 1 and 4	$23,640,000

Cost Estimates for Lateral Extensions

Description	Cost
Depression 1 – Sunset Avenue and Linklater Avenue	$,3,720,000
Depression 3 - Ashland Avenue and 48th Street	$1,930,000
Depression 4 - La Grange Road and 48th Street	$2,600,000
Depression 5 - 9th Avenue and 48th Street	$2,110,000
Depression 6 – 12th Avenue and 50th Street	$320,000

Suggested Phasing

	Phase 1	Cost
A	Construct 50th Street Relief Sewer to Depression 2	$11,720,000
B	Upsize 84” Outlet	$520,000
C	Construct Lateral to Depression 5	$2,110,000
	Total Phase 1	**$14,350,000**
	Phase 2	
D	Construct Lateral to Depression 3	$1,930,000
E	Construct Lateral to Depression 4	$2,600,000
	Total Phase 2	**$4,530,000**
	Phase 3	
F	Construct Lateral to Depression 1	$3,720,000
G	Construct Lateral to Depression 6	$320,000
	Total Phase 3	**$4,040,000**

Possible Grant Opportunities

- Metropolitan Water Reclamation District of Greater Chicago (MWRD)
- Federal Emergency Management Agency (FEMA)
- State of Illinois
- Cook County

Schedule – 50th Street Storm Sewer

Task	Duration
Complete Detailed Engineering, Plans, and Specifications	4 months
Permitting	2 months
Bid and Award Project	2 months
Construction	24 months

Emergency Sewer Televising Program

A. Televised approximately 44,000 feet of sewer

B. Focus on main line sewers

C. No collapsed pipes, confirmation of model

D. Repairs identified

   1. Immediate (0-1 year) - $772,000

   2. Pipe Conflict Repairs - $398,000

   3. Non-immediate Repairs (2-5 years) - $1,105,000

Other Sewer Projects

A. Sewer Lining Program

B. Maple Avenue Relief Sewer Project

- 1,750,000 (FY2019-20)
- 1,600,000 (FY2022-23)

C. Ogden Avenue Relief Sewer

D. Plainfield Road Sewer Project – Metropolitan Water Reclamation District (MWRD)

Village of La Grange, Illinois

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