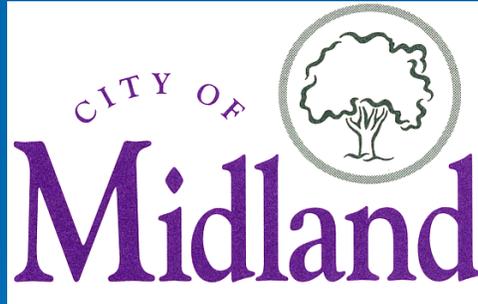


# The City of Midland Storm and Sanitary Sewer Study



July 25, 2018 & July 31, 2018



City of Midland  
Storm and Sanitary  
Sewer Study

Public  
Outreach  
Meeting

July 25, 2018  
July 31, 2018



## The Team



Orchard, Hiltz &  
McCliment



Hubbell, Roth &  
Clark



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## The Joint-Venture Team

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City of Midland:

1. Joe Sova – Utilities Director
2. Joshua Fredrickson, P.E. – City Engineer
3. Shane Bjorge, P.E. – Asst. City Engineer
4. Patrick Frazee – WWTP Superintendent
5. Katie Guyer – Communications Coordinator
6. Heather Holzinger – Budget Analyst/Account Supervisor

Hubbell, Roth & Clark

1. Keith McCormack, P.E. – Partner in Charge
2. Tom Maxwell, P.E. – Program Manager
3. Jennifer Morreale, P.E., CFM – Sr. Project Engineer
4. Dan Royal, P.E. – Project Engineer
5. Brian McElroy – GIS

OHM Advisors

1. Greg Kacvinsky, P.E. - Project Manager
2. Craig Schripsema, P.E. – Manager
3. Nancy Russell, F.E. – Project Engineer (Stormwater)
4. Erica Morgan – Project Engineer (AMM - Wastewater)
5. Alye Hannum, P.E. – Project Modeler (Stormwater)



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## Work Performed To Date

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- Team Scope
  1. Evaluate June 2017 Event
  2. Model Storm and Sanitary Sewer Systems
  3. Develop CIP to Address System Deficiencies
  4. Phase 2 Development
  5. Draft Report

**Draft Storm & Sanitary Report**

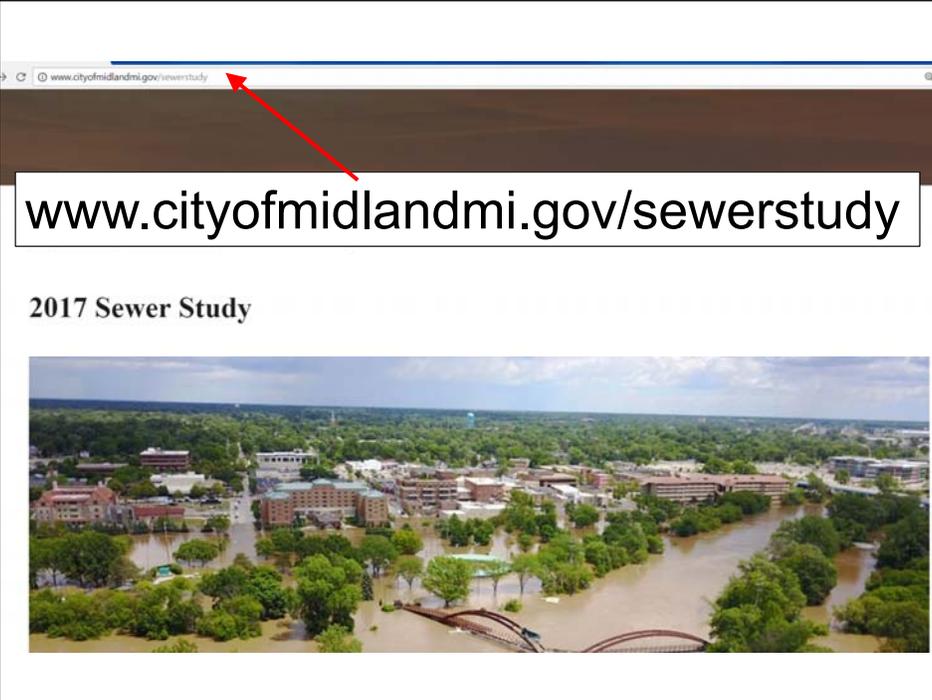
- [www.cityofmidlandmi.gov/sewerstudy](http://www.cityofmidlandmi.gov/sewerstudy)
- Then scroll down just below the Tridge picture

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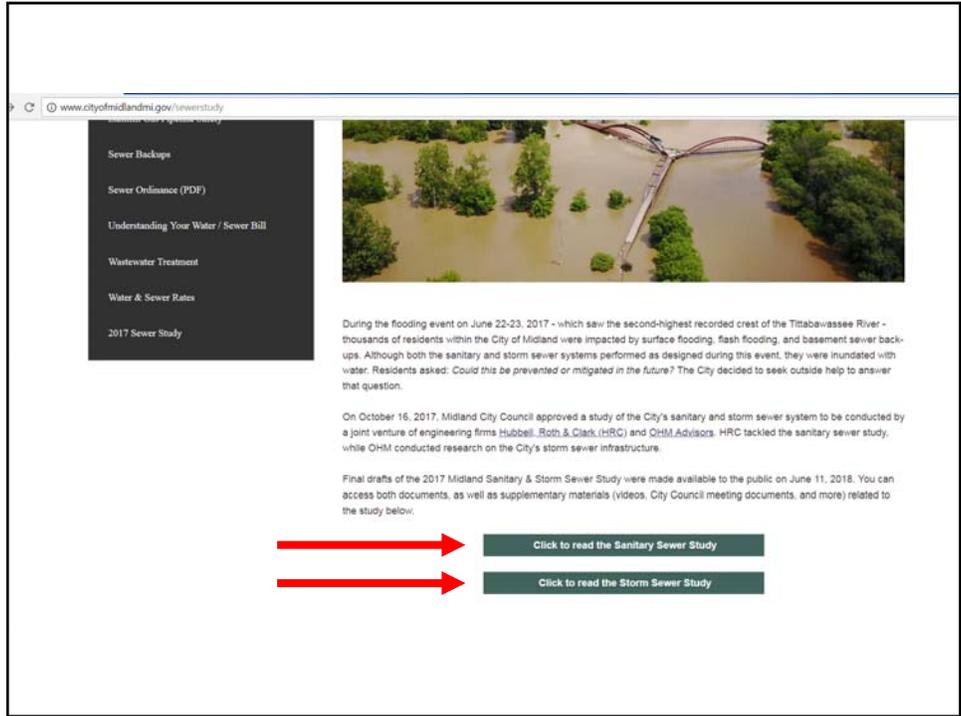
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**2017 Sewer Study**







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## Work Performed To Date

- Team Scope
- 1. Evaluate June 2017 Event
- 2. Model Storm and Sanitary Sewer Systems
- 3. Develop CIP to Address System Deficiencies
- 4. Phase 2 Development
- 5. Draft Report
- 6. Present Report to City Council



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## Draft Storm & Sanitary Report

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- [www.cityofmidlandmi.gov/sewerstudy](http://www.cityofmidlandmi.gov/sewerstudy)
- Then scroll down...



**Watch: City Council Action Related to Sewer Study**

Click the links below to access meeting video and documents presented to Midland City Council related to the sewer study.

- [July 17, 2017 - Council Approval to Seek Consultants for Sewer Study \(20:48 mark\)](#)
- [October 16, 2017 - Council Approval of HRC & OHM to Conduct Study \(18:35 mark\)](#)
- [October 16, 2017 - Presentation of Sewer Study Proposal \(PPT FILE\)](#)
- [April 23, 2018 - Public Comment on Receive & File of Sewer Study Update \(1:23:00 mark\)](#)
- [June 11, 2018 - Preliminary Study Findings Discussed at Council \(30:00 mark\)](#)

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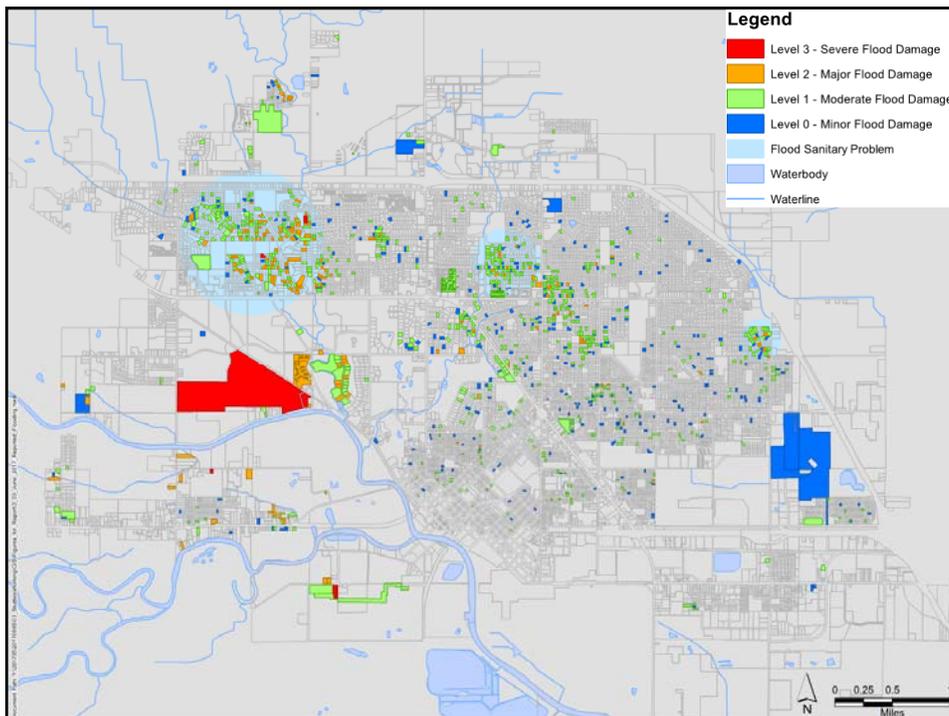
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## Key Points



1. June 2017 Storm Event → ~ 82-Year Event

- 1.2% chance of occurrence
- Significant stormwater and sanitary flooding occurred from this event



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## Key Points

### 2. Three major watersheds combine and flow through the City of Midland

- 2 major sources of stormwater flooding
  - 1) Local → More Control with local Stormwater projects
  - 2) Watersheds → Less Control

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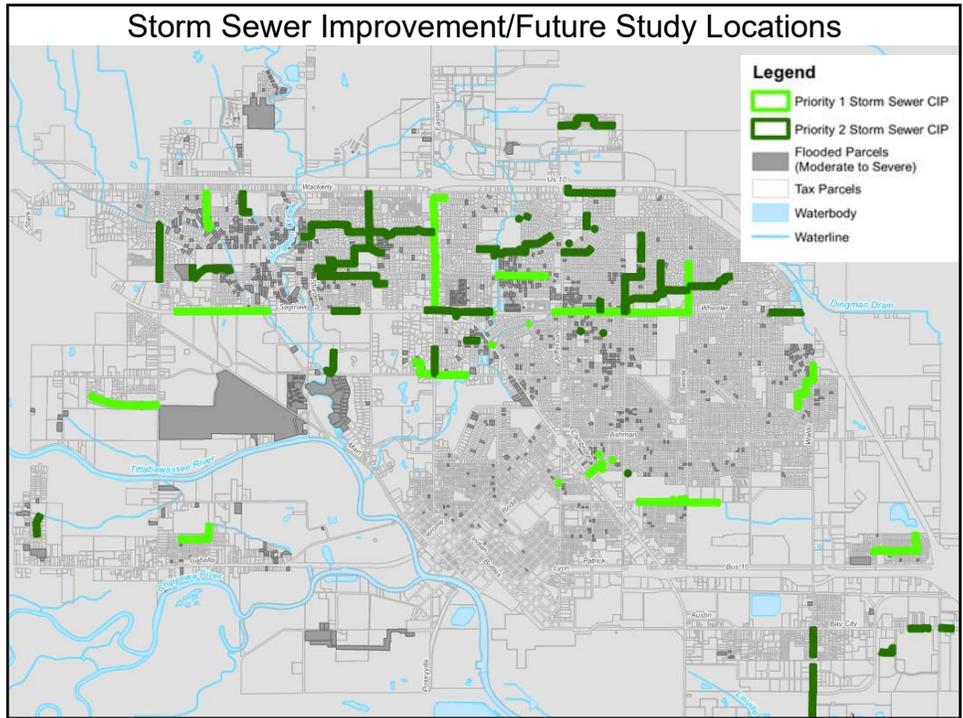
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## Key Stormwater Recommendations

### 3. Storm sewer design → 10-Year Event

- Allows up to ~ 5 inches of surface flooding
- Prioritize projects where surface flooding could impact sanitary sewers
- Recommendations
  - Initiate storm sewer Capital Improvement Plan
  - Prioritize projects to those having greatest impact
    - Replace four culverts along Snake Creek
    - Replace storm sewers in areas with greatest flood potential
    - Identify areas for flood storage (stormwater detention) to reduce impact on peak flows





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## Key Stormwater Recommendations

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### 3. Storm Sewer Recommendations (con't)

- General Operation & Maintenance Recommendations:
  - 3-year sewer televising/inspection program
  - Identify structural problems and repair, rehabilitate, or replace as necessary
  - Where possible, storm sewer replacement should coincide with street repaving projects

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## Key Stormwater Recommendations

### 3. Storm Sewer Recommendations (con't)

- Priority 1 Projects: \$29 million
- Other projects: \$50 million
- “other” projects less critical but still necessary to achieve desired Level of Service

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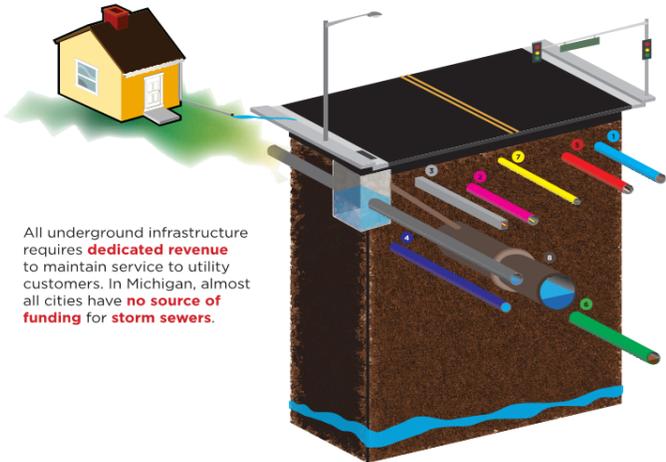
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## Key Points

# FUNDING

## STORMWATER INFRASTRUCTURE



All underground infrastructure requires **dedicated revenue** to maintain service to utility customers. In Michigan, almost all cities have **no source of funding** for storm sewers.

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4. The sanitary sewer system is complex

- Originally Combined Sewer System
- 1995 Separate Sanitary and Storm sewer system Completed
- Sanitary System Characteristics
  - 14,013 Acre Service Area
  - 42 Pump Stations
  - 4,436 Manholes
  - 135,000 feet FM (4" to 42" diameter)
  - 1.1 Million feet of Gravity Sewer (6" to 48")
  - WWTP (18 MGD Treatment/ 70 MGD Conveyance)
  - 3 Existing Sanitary Storage Facilities (47.3 MG)



## Key Points

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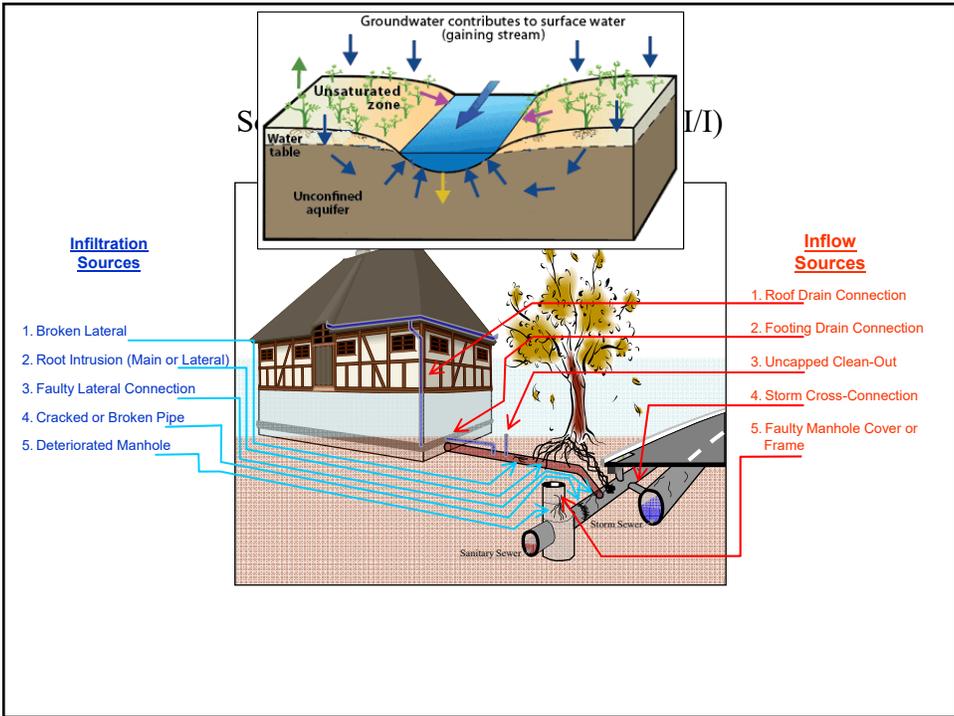
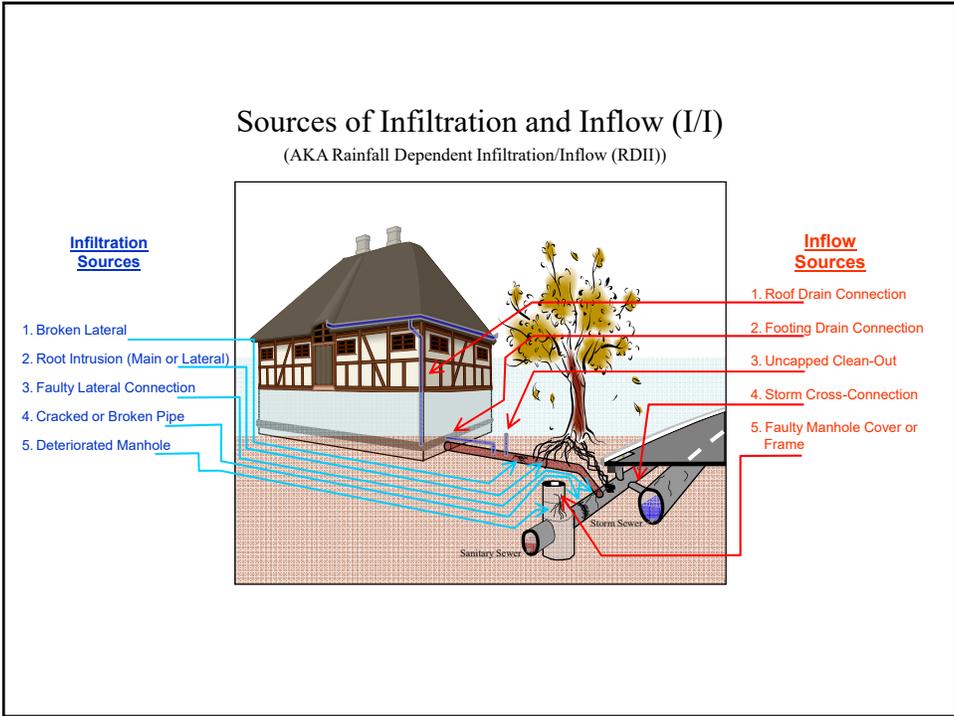
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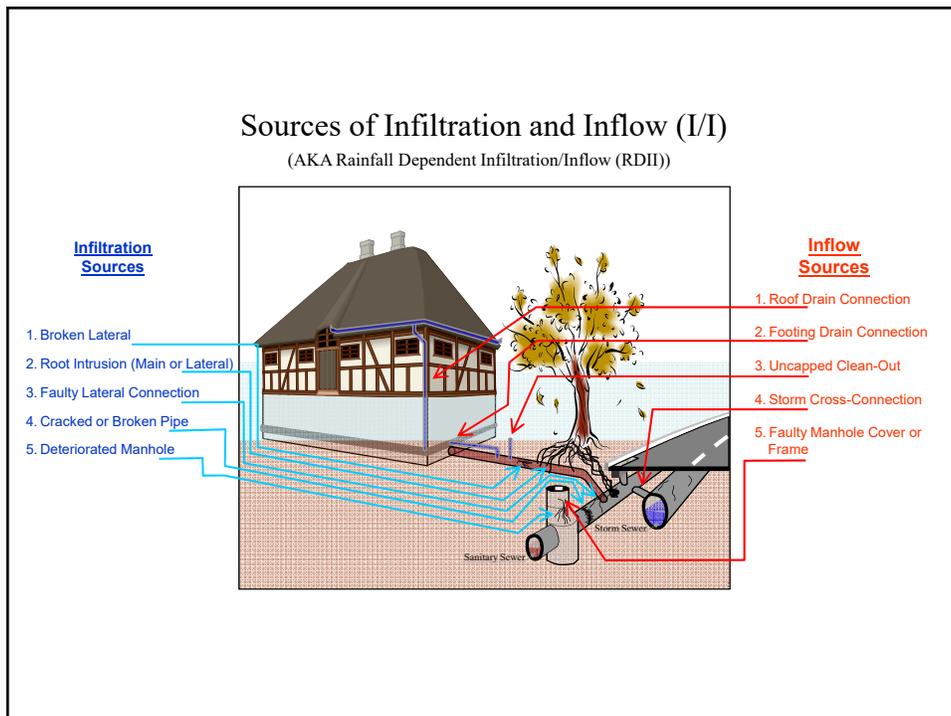
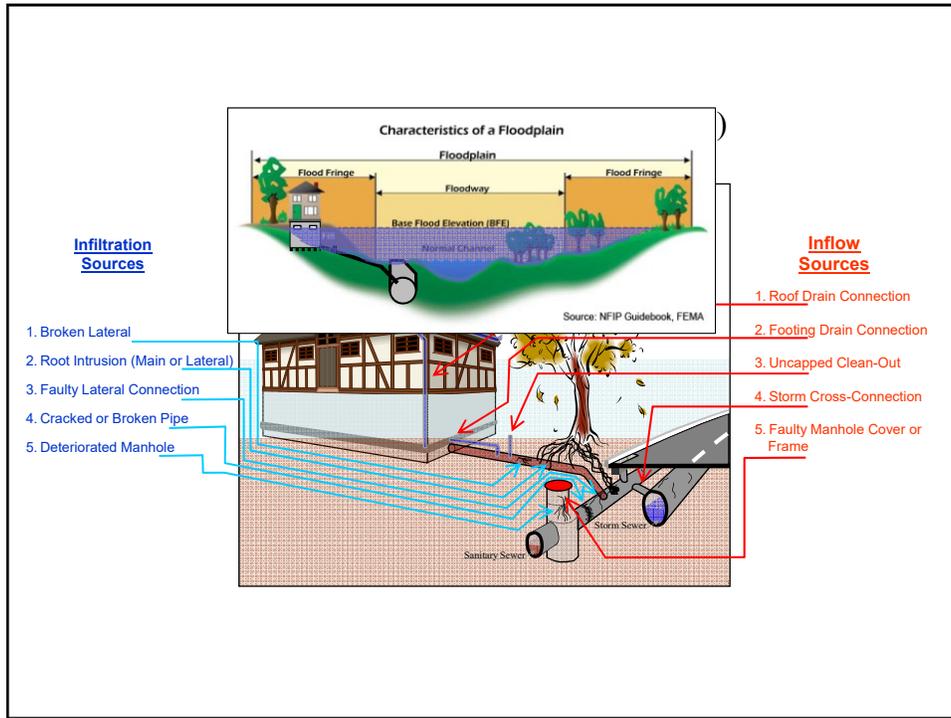
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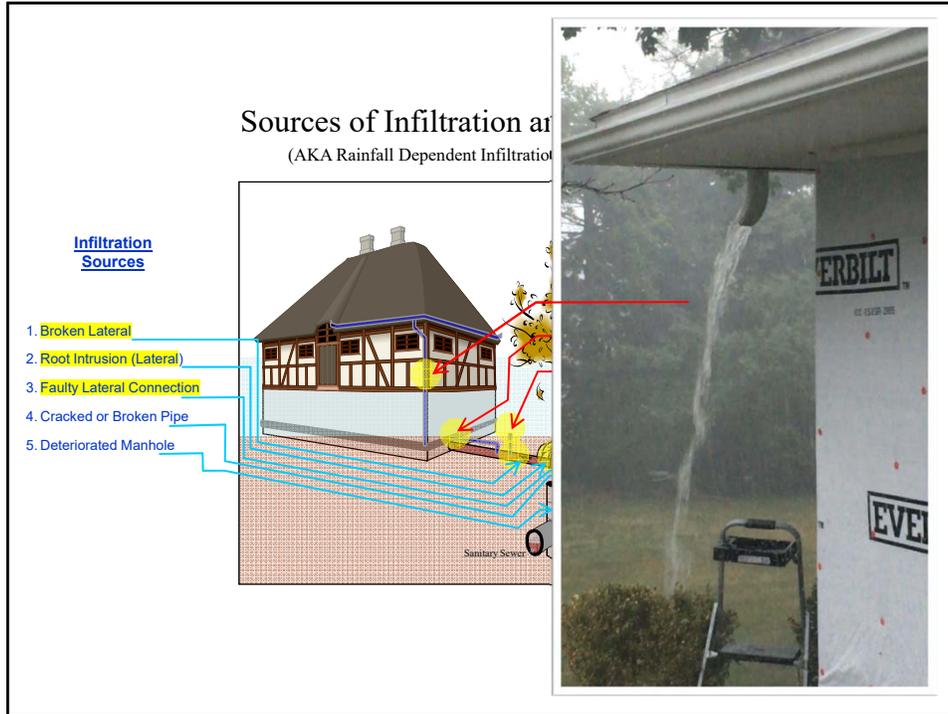


5. Sanitary sewer design → 25-Year Event

- Sources of Excess Flow (I/I)







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## Sanitary Sewer System Improvements

- **Multiple Potential Solutions:**
  1. **RDII Reduction**

Removes flow from the system

    - Footing Drain Disconnection
    - Other I/I Removal
      - Flood Proofing Flood-Prone Structures
      - Other I/I Removal
  2. **Improved Conveyance**

Transfers peak flow downstream

    - Increase Sewer Capacity
      - New Larger Sewer
      - Parallel Sewer
    - Increased Pump Station Capacity
  3. **Storage**

Removes effect of peak flow from system, eventually all flow is conveyed downstream

    - Sanitary Retention Tank
    - Large Pipe

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**Sanitary Sewer System Improvements**

RDII Reduction – Footing Drain Disconnection

Preferred Downspout Configuration

Roof Downspouts

(Undesirable) Downspout Connected to Footing Drain

Floor Drain

Sanitary Sewer

Footing Drain

45°

45°

Approx. Limit of Excavation During Original Construction

Approx. Limit of Excavation During Original Construction

Connected Footing Drain Schematic

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**Sanitary Sewer System Improvements**

RDII Reduction – Footing Drain Disconnection

Roof Downspouts

Flexible Pipe

To Street Curb and Gutter

Floor Drain

Sanitary Sewer

Footing Drain

NEW Sump Pump

NEW Sump Pump

Connected Footing Drain Schematic

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## Sanitary Sewer System Improvements

RDII Reduction – Footing Drain Disconnection



*Overall exterior disruption.  
Approximately a 10' x 5' excavation.*

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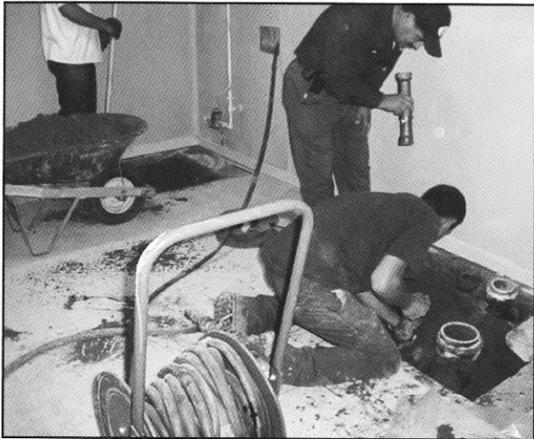
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## Sanitary Sewer System Improvements

RDII Reduction – Footing Drain Disconnection



*Overall view of disruption to the basement.  
Floor is sawcut at cleanouts and  
at sump pump location.*

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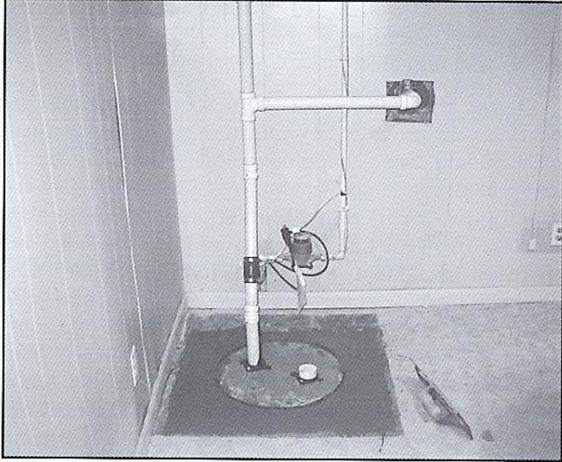
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## Sanitary Sewer System Improvements

### RDII Reduction – Footing Drain Disconnection



*Sump pump upon completion of installation.*

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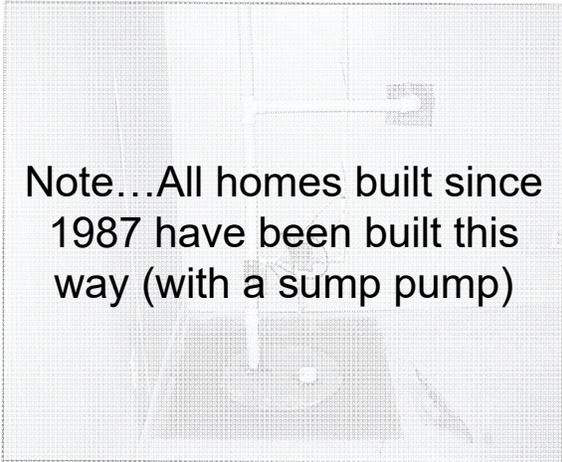
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## Sanitary Sewer System Improvements

### RDII Reduction – Footing Drain Disconnection



**Note...All homes built since 1987 have been built this way (with a sump pump)**

*Sump pump upon completion of installation.*

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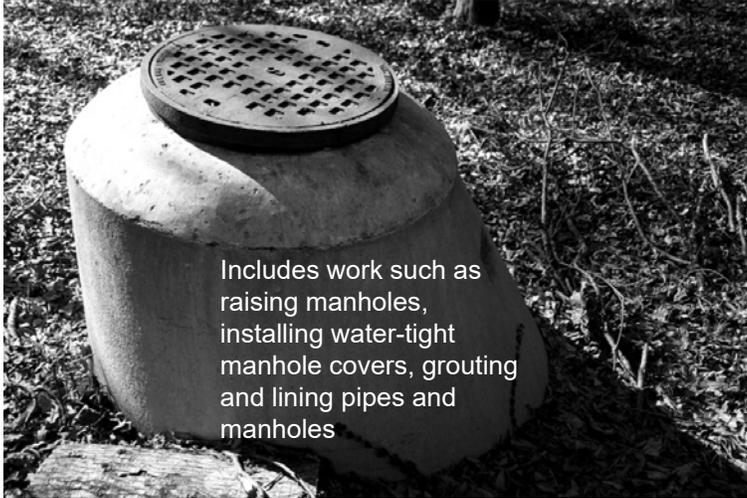
## Sanitary Sewer System Improvements

RDII Reduction – Flood Proofing Structures

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Includes work such as raising manholes, installing water-tight manhole covers, grouting and lining pipes and manholes

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## Sanitary Sewer System Improvements

RDII Reduction – Flood Proofing Structures

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**Leaky joint in a community (not Midland) next to a waterbody**

**Joint → Pre-Grouting**

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## Sanitary Sewer System Improvements

RDII Reduction – Flood Proofing Structures

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## Sanitary Sewer System Improvements

RDII Reduction – Flood Proofing Structures

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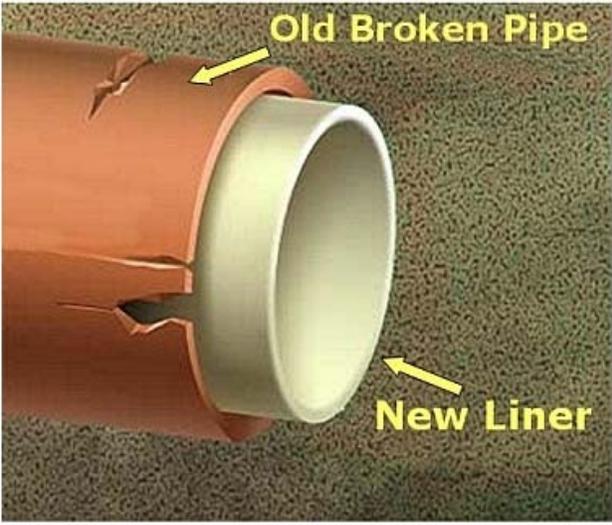
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**Sanitary Sewer System Improvements**

RDII Reduction – Sealing Leaks in Pipes and Manholes



The diagram shows a cross-section of a pipe relining process. On the left, a section of an old, cracked brown pipe is labeled "Old Broken Pipe" with a yellow arrow pointing to the damage. On the right, a smooth, light-colored pipe is labeled "New Liner" with a yellow arrow pointing to it. The new liner is shown inserted into the old pipe, effectively sealing the cracks.

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**Sanitary Sewer System Improvements**

RDII Reduction – Sealing Leaks in Pipes and Manholes



The photograph shows a manhole opening in a concrete surface. Inside the manhole, a large pipe is being relined. A white and orange relining machine, labeled "AT 1500X", is positioned at the edge of the manhole. A long, flexible hose extends from the machine down into the manhole, where it is connected to the pipe being relined. The interior of the manhole is painted a bright green color.

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## Sanitary Sewer System Improvements

### Improved Conveyance (i.e. Bigger Pipes)



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## Sanitary Sewer System Improvements

### Improved Conveyance (i.e. Bigger Pipes)



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## Sanitary Sewer System Improvements

Improved Conveyance (i.e. Pump Station Improvements)



The photograph shows a concrete walkway leading to a green utility box in a wooded area. The walkway is made of several slabs of concrete, and the utility box is a large, rectangular, green metal structure. The surrounding area is lush with green trees and grass.

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## Sanitary Sewer System Improvements

Improved Conveyance (i.e. Pump Station Improvements)



The photograph shows a construction site with an excavator and a green utility box. The excavator is orange and is positioned on a dirt mound. The green utility box is a large, cylindrical structure. A worker in a blue shirt is visible in the foreground, and another worker is visible in the background. The site is surrounded by trees and a clear sky.

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## Sanitary Sewer System Improvements

### Storage



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## Sanitary Sewer System Improvements

### Storage





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# Sanitary Sewer System Findings

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- Volume 3 -

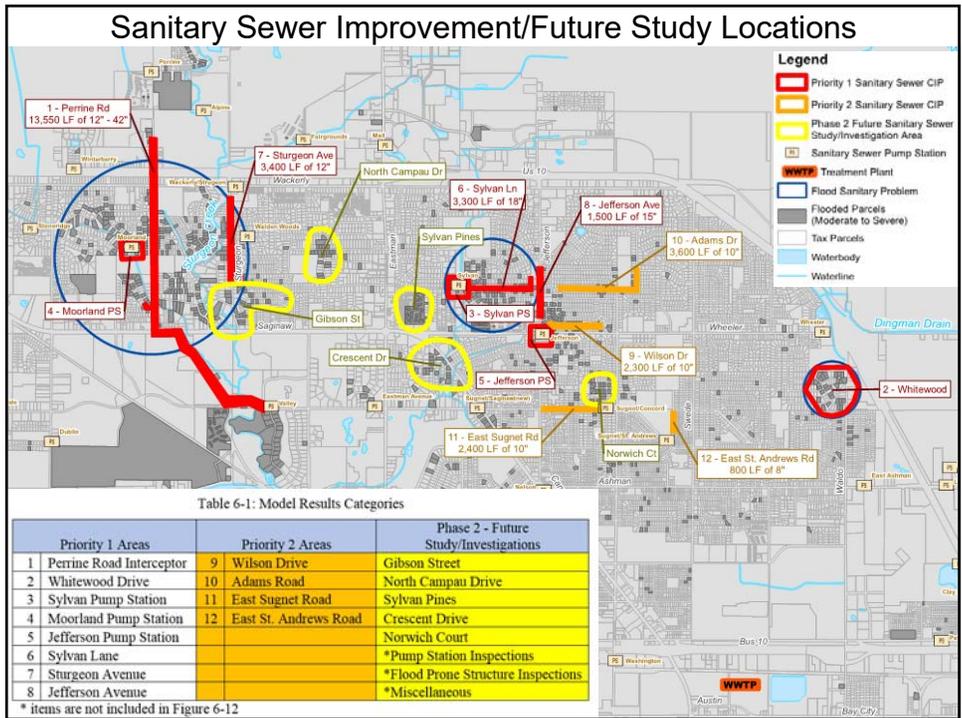
## Section 7 - Capital Improvement Plan

*A. Capital Improvements Introduction*

Collection system improvements generally fit into three categories as follows:

1. RDI Reduction
2. Improved Conveyance
3. Storage

Each improvement category provides various potential advantages and disadvantages. Depending on the situation, a single improvement category may provide an adequate solution, or a combination of categories may be necessary to provide an adequate solution. Each improvement category is described as follows.





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## Sanitary Sewer System Findings

Table 6-1: Model Results Categories

Priority 1 Areas		Priority 2 Areas		Phase 2 - Future Study/Investigations
1	Perrine Road Interceptor	9	Wilson Drive	Gibson Street
2	Whitewood Drive	10	Adams Road	North Campau Drive
3	Sylvan Pump Station	11	East Sugnet Road	Sylvan Pines
4	Moorland Pump Station	12	East St. Andrews Road	Crescent Drive
5	Jefferson Pump Station			Norwich Court
6	Sylvan Lane			*Pump Station Inspections
7	Sturgeon Avenue			*Flood Prone Structure Inspections
8	Jefferson Avenue			*Miscellaneous

\* items are not included in Figure 6-12

- Alt A – RDII Reduction (via Footing Drain Disconnection)
- Alt B – Improved Conveyance
- Alt C – Storage

Alt D –  
Combination



## Sanitary Sewer System Findings

Table 7-1: Summary of CIP Alternatives Reviewed

Item	Area of Concern	Major Pump Station District	Number of Pumps	Total Number of Pipes	Alternative A - FDD		Alternative B - Improved Conveyance		Alternative C - Storage	Alternative D - Combination			
					FDD - Low	FDD - High	Pump Station Improvements	Sanitary Sewer Replacement/Relief		Option 1	Option 2		
1	Perrine Rd	Valley	672	1,626	672	100%	Not Feasible	N/A	New sewer - 13,100 LF	Off-Line Storage	Option 1	Option 2	
2	Whitewood Dr	East Ashmun	161	206	95	59%	161 (3)	100%	New 700 gpm PS	New sewer - 5,500 LF (10" to 12")	Not Feasible	N/A	N/A
3	Sylvan PS	Sylvan	799	1,973	750	94%	See Alt D	90% increase to 7,900 gpm	N/A	600,000 gal basin under Russel Park	100% FDD + 0.15 MG Storage	100% FDD + 40% PS increase to 5,900 gpm	N/A
4	Moorland PS	Valley	180	530	90	47%	170	89%	60% increase to 1,250 gpm	N/A	75,000 gal linear storage under roadway	N/A	N/A
5	Jefferson PS	Jefferson	96	237	70	73%	96 (3)	100%	50% increase to 1,050 gpm	N/A	35,000 gal linear storage in PS easement	N/A	N/A
	Sylvan Lane	Sylvan	473	764	300	63%	473 (3)	100%	N/A	New sewer - 3,300 LF (18" to 24")	260,000 gal storage (1,300 LF of 6ft pipe) (or use Church field)	N/A	N/A
	Sturgeon Ave	Valley	45	323	Not Feasible	Not Feasible	Not Feasible	N/A	New sewer - 3,400 LF (12" to 18")	Not Feasible	N/A	N/A	
	Henson Ave	Sylvan	350	486	156	45%	289	83%	N/A	New sewer - 1,500 LF (15" to 18")	106,000 gal storage (500 LF of 6ft pipe storage)	N/A	N/A
	Wilson Dr	Jefferson	24	160	N/A	N/A	N/A	N/A	Add interconnection at Wheeler and Washington (and do E. Sugnet CIP) (2)	21,000 gal storage	New sewer - 2,300 LF (10" to 12")	N/A	
	Adams Rd	Sylvan	135	266	86	64%	135 (5)	100%	N/A	New sewer - 3,600 LF (10" to 12")	33,000 gal linear storage under roadway (160 LF 6ft pipe storage)	N/A	N/A
	Norwich Ct	Nelson	216	242	64	30%	119	55%	N/A	Modify 100 LF of sewer to better utilize the Sugnet Concord PS (1)	50,000 gal storage	New sewer - 2,400 LF (10" to 12")	N/A
	Crescent Dr	Nelson	130	132	22	17%	41	32%	N/A	New sewer - 800 LF (8" to 10")	12,000 gal storage	N/A	N/A

*Note: Field investigation to verify conditions. This would be investigated as part of Phase 2 study effort that the East Sugnet Road CIP conveyance improvement be implemented.*

*Note: Amount of storage under the FDD - High alternative column to address the 25 year design event.*



## Sanitary Sewer System Findings

Table 7-1: Summary of CIP Alternatives Reviewed

Table 7-2: Summary of CIP Alternatives Estimated Costs

Item	Area of Concern	Alternative A - FDD		Alt B - Conveyance		Alt C - Storage	Alt D - Combination	
		FDD - Low	FDD - High	P.S. Improvements	Sewer Replacement/Relief	Off-Line Storage	Option 1	Option 2
1	Perrine Rd	\$ 10,416,000	N/A	N/A	\$ 9,906,000	N/A	N/A	N/A
2	Whitewood Dr	\$ 1,473,000	\$2,496,000 (3)	\$ 1,260,000	\$ 4,913,000	N/A	N/A	N/A
3	Sylvan PS	\$ 11,625,000	see Alt D	\$ 11,200,000	N/A	\$ 10,291,000	\$ 15,454,000	\$ 15,325,000
4	Moorland PS	\$ 1,395,000	\$ 2,635,000	\$ 1,583,000	N/A	\$ 2,580,000	N/A	N/A
	Jefferson PS	\$ 1,085,000	\$1,488,000 (3)	\$ 1,079,000	N/A	\$ 2,160,000	N/A	N/A
	Sylvan Lane	\$ 4,650,000	\$7,332,000 (3)	N/A	\$ 3,260,000	\$ 3,963,000	N/A	N/A
	Sturegon Ave	N/A	N/A	N/A	\$ 2,047,000	N/A	N/A	N/A
	Jefferson Ave	\$ 2,418,000	\$ 4,480,000	N/A	\$ 1,226,000	\$ 2,731,000	N/A	N/A
	Wilson Dr	N/A	N/A	N/A	\$ 189,000 (2)	\$ 1,813,000	\$ 2,368,000	N/A
	Adams Dr	\$ 1,333,000	\$2,093,000 (3)	N/A	\$ 3,640,000	\$ 2,151,000	N/A	N/A
	East Sugnet Rd	\$ 992,000	\$ 1,845,000	N/A	\$ 203,000 (1)	\$ 2,207,000	\$ 2,451,000	N/A
	East Saint Andrews Rd.	\$ 341,000	\$ 636,000	N/A	\$ 650,000	\$ 1,688,000	N/A	N/A

Lowest Cost Alternative  
Alternative that removes most flow from system  
Alternative with lowest cost and removes most flow from system

Alternative requires additional field investigation to verify conditions. This would be investigated as part of Phase 2 study effort.  
Alternative requires that the East Sugnet Road CIP conveyance improvement be implemented. Add yellow highlighted project cost for project 11B.  
Alternative requires a minor amount of storage under the FDD - High alternative column to address the 25 year design



## Planning Level Cost Summary

Table 7-3: Alternative CIP Cost Summary

Project No.	Area of Concern	Lowest Cost Alternative	Estimated Lowest Cost Alternative (\$ Million)	FDD Estimated Cost Range (\$ Million)	
				(FD @ 5 GPM)	(FD @ 2.7 GPM)
1	Perrine Rd	Alt B - Sewer Replacement/Relief	\$9.9	\$10.4	(1)
2	Whitewood Dr	Alt A- FDD - Low (5 GPM)	\$1.5	\$1.5	\$2.5
3	Sylvan PS	Alt C - Off-Line Storage	\$10.3	\$11.6	\$15.3
4	Moorland PS	Alt A- FDD - Low (5 GPM)	\$1.4	\$1.4	\$2.6
5	Jefferson PS	Alt B - Pump Station Imps.	\$1.1	\$1.1	\$1.5
6	Sylvan Lane	Alt B - Sewer Replacement/Relief	\$3.3	\$4.7	\$7.3
7	Sturegon Ave	Alt B - Sewer Replacement/Relief	\$2.0	(1)	(1)
8	Jefferson Ave	Alt B - Sewer Replacement/Relief	\$1.2	\$2.4	\$4.5
9	Wilson Dr	Alt C - Off-Line Storage	\$1.8	(1)	(1)
10	Adams Dr	Alt A- FDD - Low (5 GPM)	\$1.3	\$1.3	\$2.1
11	East Sugnet Rd	Alt B - Sewer Replacement/Relief (2)	\$0.2	\$1.0	\$1.8
12	East St. Andrews Rd.	Alt A- FDD - Low (5 GPM)	\$0.3	\$0.3	\$0.6
TOTAL			\$34.4	\$35.7	\$38.3

Notes:

- (1) - FDD is not a feasible alternative based on area and limited number of FDs available to disconnect from system.
- (2) - This Alternative requires additional field investigation under Phase 2.



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## Sanitary Sewer Improvement Financing

- APPROXIMATE INCREASE** per average **RESIDENTIAL** user (on quarterly sewer bill)

Project Cost	Approximate <b>INCREASE</b> to Individual Sewer Bill		
	Monthly	Quarterly	Yearly
\$5,000,000	\$1.33	\$4.00	\$16.00
\$10,000,000	\$3.00	\$9.00	\$36.00
\$25,000,000	\$7.00	\$21.00	\$84.00
\$35,000,000	\$9.67	\$29.00	\$116.00
\$50,000,000	\$13.67	\$41.00	\$164.00
\$75,000,000	\$20.67	\$62.00	\$248.00

Assumes 25-year Bond at 4% interest

(Approximately) an additional \$4 per quarter for every \$5 million  
(for average residential users)



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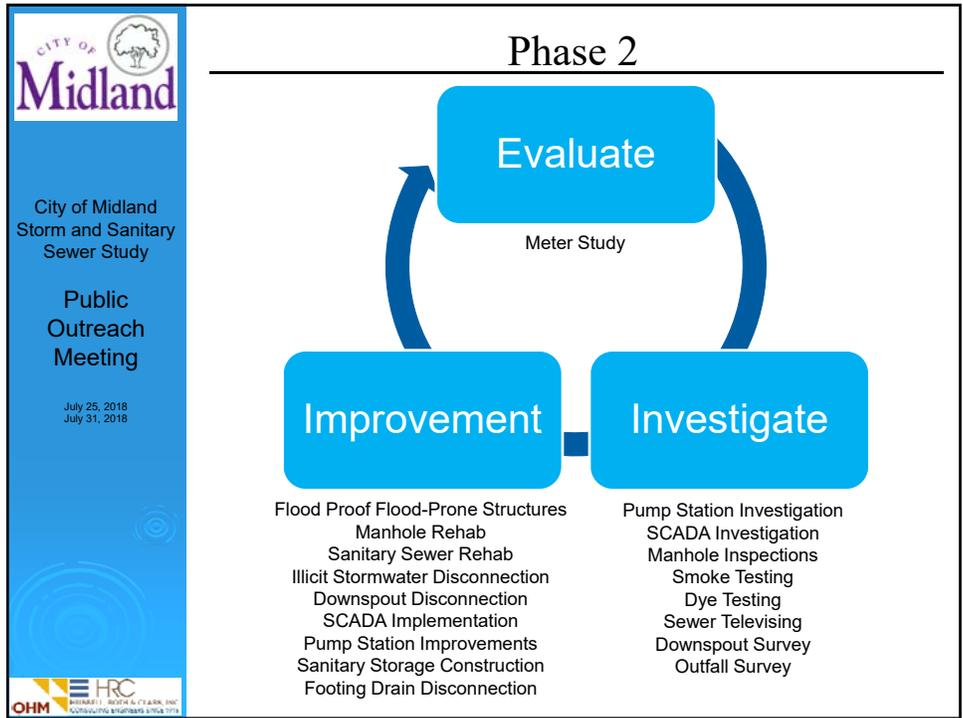
## Sanitary Sewer System Findings

Table 6-1: Model Results Categories

Priority 1 Areas		Priority 2 Areas	Phase 2 - Future Study/Investigations	
1	Perrine Road Interceptor	9	Wilson Drive	Gibson Street
2	Whitewood Drive	10	Adams Road	North Campan Drive
3	Sylvan Pump Station	11	East Sugnet Road	Sylvan Pines
4	Moorland Pump Station	12	East St. Andrews Road	Crescent Drive
5	Jefferson Pump Station			Norwich Court
6	Sylvan Lane			*Pump Station Inspections
7	Sturgeon Avenue			*Flood Prone Structure Inspections
8	Jefferson Avenue			*Miscellaneous

\* items are not included in Figure 6-12

Evaluate → Investigate → Improvement



## Sanitary Sewer System Findings

Table 6-1: Model Results Categories

Priority 1 Areas		Priority 2 Areas		Phase 2 - Future Study/Investigations
1	Perrine Road Interceptor	9	Wilson Drive	Gibson Street
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8	Jefferson Avenue			*Miscellaneous

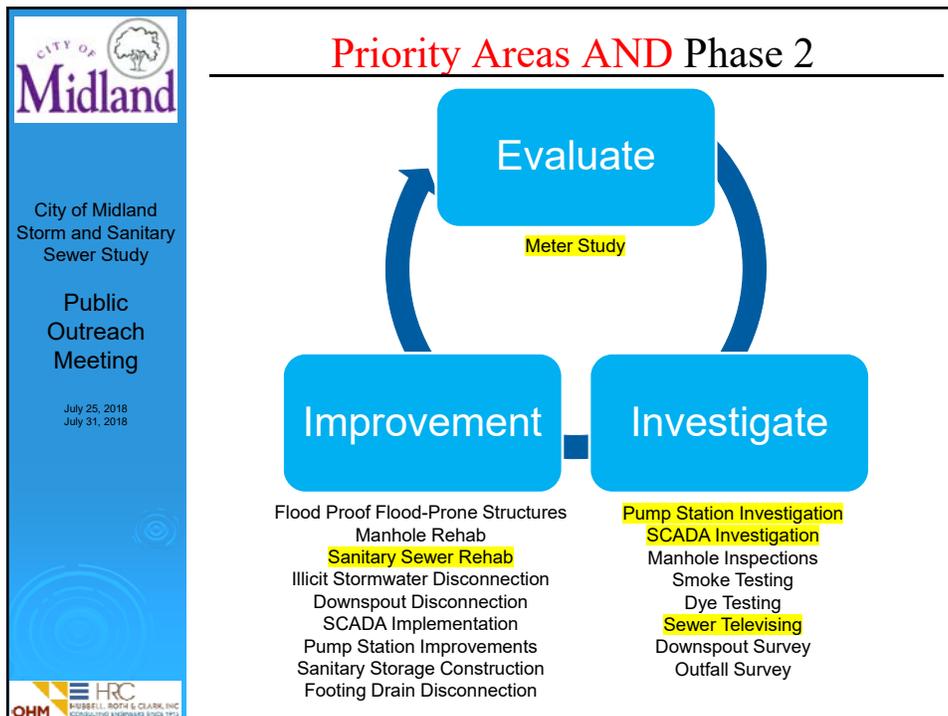
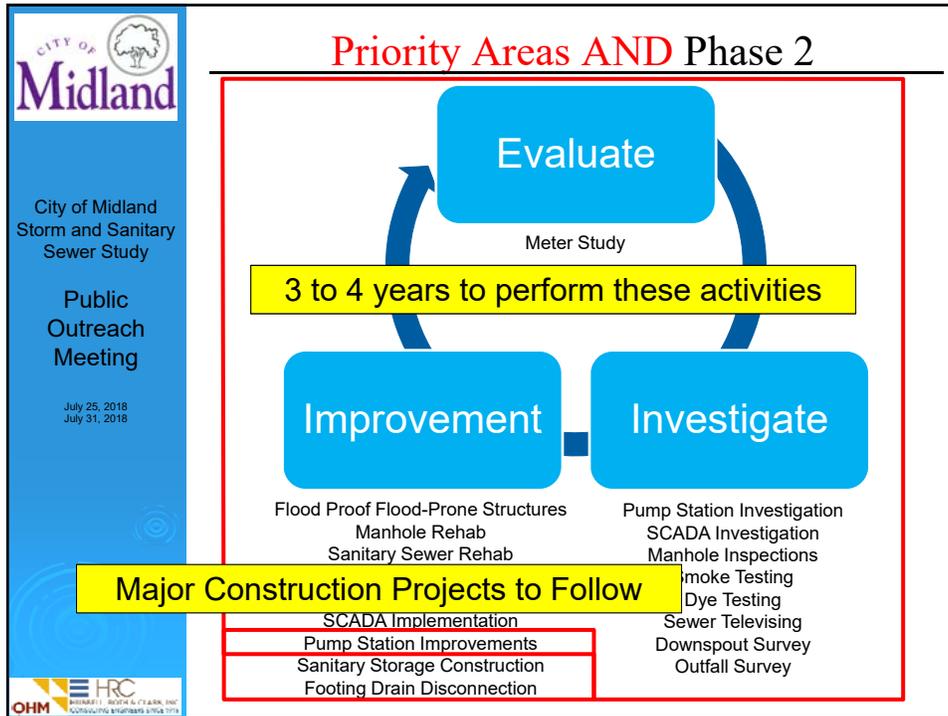
\* items are not included in Figure 6-12

**Evaluate → Investigate → Improvement**

1. Additional detailed local evaluation may reveal/highlight other areas for improvements.
2. More data collected will aid in further improving the system model.
3. Priority 1 and 2 project sizing will be confirmed and may be reduced.
4. Phase 2 improvements may further reduce the size and cost of a priority project.
5. Reducing project sizing will likely lead to reduced project costs.
6. Conversely, more detailed information may lead to larger projects more adequately sized to handle the design event.

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## Final Note

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Typical storm sewer design → 10-Year Event  
10% chance of occurrence

Sanitary sewer design → 25-Year Event  
4% chance of occurrence

June 2017 Storm Event → 82-Year Event  
1.2% chance of occurrence

Improvements reduce the impact of surface flooding and the frequency of basement flooding; however, it is generally impossible to completely eliminate the impact of surface flooding and occurrence of basement flooding as there will always be a larger event that can exceed the selected design.

Downtown Flooding along the Tittabawassee  
Source: Midland Daily News, June 25, 2017



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## Anticipated Next Steps

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1. July 2018 - Public meetings (Next One is 7/31/18 at Dow High School at 6:00 pm)
2. August 7 – Deadline for Public Comments

[bit.ly/sewersurvey2018](http://bit.ly/sewersurvey2018)



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## Anticipated Next Steps

1. July 2018 - Public meetings (Next One is 7/31/18 at Dow High School at 6:00 pm)
2. August 7 – Deadline for Public Comments
3. August/September 2018 – Finalize Report
4. August/September – Council Approval
5. 2018 thru 2022 – Bolster Investigations in Priority Areas and Phase 2 Study Areas
6. 2018 thru 2022 – Bolster I/I Removal
7. thru 2023 – Model Refinements and Refine Original Study Capital Improvements
8. 2023 thru ???? - Construct Major Capital Improvements



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## Community Resilience



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**E-CityHall Questions**

[bit.ly/sewersurvey2018](http://bit.ly/sewersurvey2018)

Questions The City has Received

E-CityHall

E-CityHall

From: [Name] Date: [Date] Status: [Status]

Provide feedback, comment  
Sanitary & Storm Sewer Study.

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**Questions?**

Question Format

Please line up behind microphone and state:

1. First and Last Name
2. Address
3. Indicate if Question/comment is related to Storm, Sanitary or both
4. Question/Comment

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**THANK YOU**



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