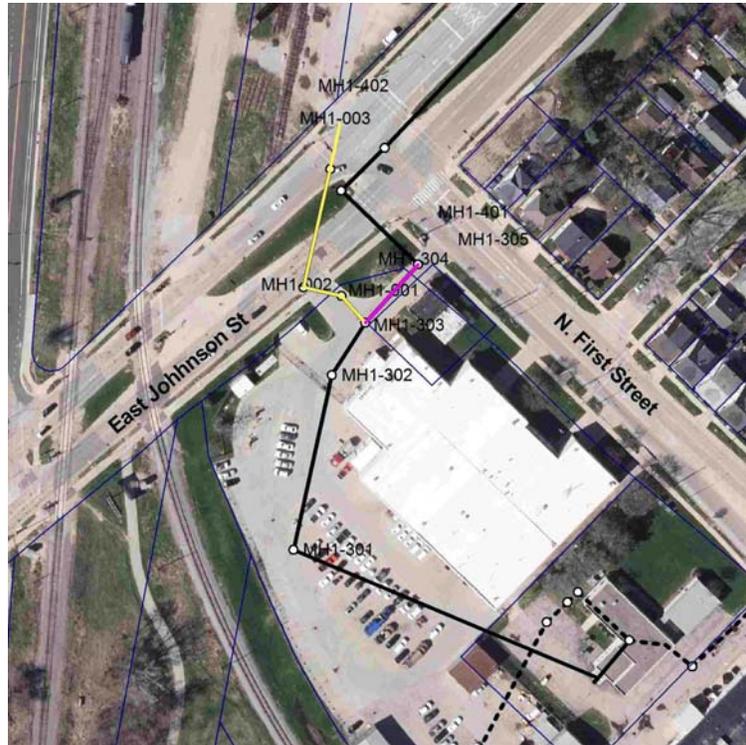


Northeast Interceptor Relief Sewer and East Johnson Street Relief Sewer Rehabilitation (Lining Project)



Project Purpose:

The purpose of this project is to correct condition defects and extend the service life of the Northeast Interceptor Relief Sewer and portions of the East Johnson Street Relief Sewer in the City of Madison (see yellow and magenta highlighted lines on map above).

Project1-5 Proposer/Champion: Todd Gebert

Department: Planning and Strategy

Project Involvement:

The Engineering Department will provide overall management of the project, including preparation of plans and specifications, contract administration, and construction management.

Project History and Status:

The Northeast Interceptor Relief Sewer from manhole MH01-003 to MH01-001 was constructed in 1937 and consists of 189 feet of 30" cast iron sewer. This section of sewer shows evidence of moderate to severe tuberculation. Tuberculation is the buildup of deposits on the inside walls of the pipe due to chemical reactions between the wastewater and the pipe surface. These deposits are commonly found in cast iron pipe and they act to reduce the carrying capacity of the sewer by reducing the effective diameter of the pipe and increasing the surface roughness. Tuberculation may also compromise the structural integrity of the pipe if allowed to go uncontrolled.

Approximately 38 feet of the Northeast Interceptor Relief Sewer was installed in 1979 as part of the East Johnson Street Relief Sewer project. This segment is comprised of 36" diameter reinforced concrete pipe which is in relatively good condition at this time. The portion of the East Johnson Street Relief Sewer from manhole MH01-304 to manhole MH01-303 is also 36" diameter reinforced concrete pipe. This pipe segment was last televised in 2011, during which time the reinforcing steel was clearly visible immediately downstream of manhole MH01-304. It is believed that this pipe segment has both an outer and inner cage of reinforcing steel in the pipe wall due to the high strength discharges from the Oscar Mayer meat processing plant which was located upstream of this location prior to 2016.

Options:

- a. **Description:** Portions of the Northeast Interceptor Relief Sewer are over 80 years old. The segments televised in East Johnson Street in 2011 show moderate to severe areas of corrosion along its length. It has reached the end of its useful life and is in need of rehabilitation or replacement to address corrosion of the interior pipe surface. Capacity upgrades are not deemed necessary for the next 50 years or more.

- b. **Alternatives**

Alternative 1 – Rehabilitate the existing sewer with a cured-in-place liner

Under this alternative four segments of cast iron and reinforced concrete pipe will be rehabilitated with a cured-in-place liner. All manholes will also be lined as part of the rehabilitation (see attached Figure 1).

It is proposed that this work take place in 2020 in conjunction with rehabilitation of the West Interceptor – Spring Street Relief Sewer on the near west side of Madison. Bidding the two projects together is considered advantageous for the

following reasons: (1). Similar type of work; (2). Similar pipe sizes; and (3). Efficiencies in contract and project administration.

Alternative 2 – Construct a new sewer with open cut excavation

This alternative consists of constructing replacement sewers parallel to or along the same alignment as that of the existing sewers. The existing sewers are located near a busy street intersection at East Johnson Street and N. First Street, which was reconstructed in 2019.

Alternative 3 – Do nothing

Under this alternative the existing sewer would not be rehabilitated or replaced. Due to the age of the sewer and the condition defects present, this alternative is not considered feasible and was not advanced for further economic analysis.

c. Key Risks and Issues

Alternative 1. Rehabilitation of the existing sewer with a cured-in-place liner will cause minimal disruption. Bypassing of wastewater around the sections to be lined will be required during insertion of the liner. Due to its close proximity with MMSD's North Basin Interceptor, bypassing of the segments to be lined should not be overly difficult. Some traffic control may be needed in the intersection of East Johnson Street and N. First Street for the staging of pumps and bypass hoses.

There are no service laterals connected to the segments to be lined so disruptions to individual users should not be an issue.

Alternative 2. Construction of a replacement sewer with open cut excavation will cause significantly more disruption than Alternative 1. East Johnson Street and N. First Street were reconstructed in 2019. During this reconstruction many old and abandoned pipes were discovered. It will be difficult to find an open corridor for the Northeast Interceptor Relief Sewer across East Johnson Street. In addition, the segment from manhole MH01-003 to manhole MH01-002 is located directly underneath a City of Madison storm culvert which measures ten feet in width by four feet in height. This storm box is either partially or fully submerged and is known to leak at its joints, making any crossing with it extremely costly and risky.

Finally, since this street was recently reconstructed, any removal and patching of the new pavement will be unfavorably received by the City of Madison Engineering Department and the general public.

d. Economic Analysis

Please see the attached 50-year life cycle cost estimate. A summary of present worth costs is provided in the following table:

	Capital Cost	O&M Cost	Salvage Value	Total Present Worth
Alternative 1	\$224,000	-	\$1,000	\$223,000
Alternative 2	\$423,000	-	\$26,000	\$397,000

Recommended Option

Staff recommends Alternative 1 due to its lower cost and minimal social and environmental impacts. Rehabilitation of the sewer with a cured-in-place liner will cause significantly less disruption to commuter traffic and the neighborhood than construction of a replacement sewer by traditional open cut excavation.

Project Schedule:

	Start Date	Completion Date
Planning	January 2019	May 2019
Design	June 2019	March 2020
Bid Date	April 2020	May 2020
Construction	June 2020	August 2020

Financial Summary (2019 dollars):

Total Project Cost	
District Staff	\$25,000
Contractor	\$200,000
Total	\$225,000

Fiscal Year Allocation (2019 dollars):

	2020
District staff	\$25,000
Construction	\$200,000
Total	\$225,000

Note: Numbers will be modified by an inflation factor to bring them to the proper year's cash allocation within the Capital Budget.

Fiscal Year Allocation (actual dollars):

	2020
District staff	\$25,000
Construction	\$205,000
Total	\$230,000

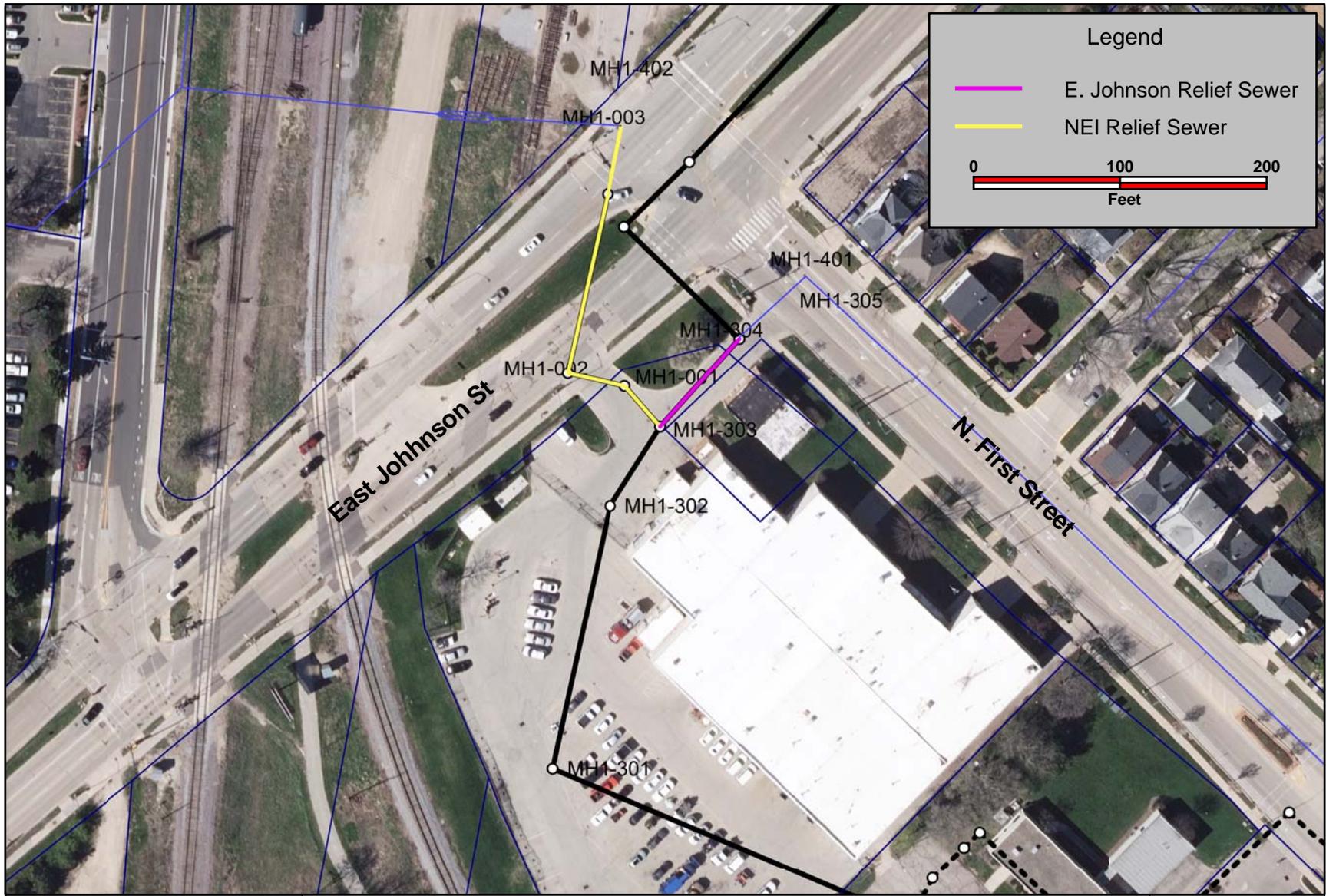


Figure 1 - Northeast Interceptor Relief Sewer and East Johnson Relief Sewer Rehabilitation

**50-YEAR PRESENT WORTH COST ANALYSIS
FOR NORTHEAST RELIEF SEWER AND EAST JOHNSON STREET RELIEF SEWER**

Present-Worth Analysis Year 2019
 Analysis Period (yrs) 50
 End of Analysis Year 2069

Project Description	Year	Capital Cost		O&M Costs	Salvage Value		Total 2019 Present Worth
		Cost in Year Constructed	2019 Present Worth	2019 Present Worth	Year 2069	2019 Present Worth	
<u>Alternative 1 - Rehabilitate existing sewer</u>							
Install cured-in-place pipe and manholes	2020	232,000	224,000	(7)	5,000	1,000	223,000
<u>Alternative 2 - Replacement sewer</u>							
Replacement sewer	2020	438,000	423,000	(7)	152,000	26,000	397,000

Assumptions and Notes:

- (1). Base interest rate = 3.625%
- (2). Construction cost escalation rate = 3.00%
- (3). Interceptor & Forcemain Service Life (yrs) = 75
- (4). Pipe liner life (yrs) = 50
- (5). Annual O&M interceptor cost (\$/ft) = 0.25
- (6). Annual O&M forcemain cost (\$/ft) = 0.25
- (7). Annual O&M costs between the alternatives are considered to be equal.

CAPITAL COSTS FOR NORTHEAST INTERCEPTOR RELIEF SEWER AND EAST JOHNSON STREET RELIEF SEWER

Capital Costs for Northeast Interceptor Relief Sewer and East Johnson Street Relief Sewer						
No.	Description	Footnote	Estimated Quantity	Units	2019 Unit Cost	2019 Total Cost
Alternative 1 - Rehabilitate existing sewer with cured-in-place liner						
	Mobilization		1	L.S.	\$25,000	\$25,000
	30" cured-in-place liner		189	L.F.	\$225	\$42,525
	36" cured-in-place liner	(3)	122	L.F.	\$275	\$33,550
	Rehabilitate manhole		3	EACH	\$4,500	\$13,500
	Flow bypassing		1	L.S.	\$30,000	\$30,000
	Pressure test pipe joints		21	EACH	\$90	\$1,890
	Grout pipe joints		7	EACH	\$70	\$490
	Traffic control		1	LS	\$25,000	\$25,000
				Sub-total		\$171,955
				Contingencies	15%	\$25,793
				Construction Total		\$200,000
				Engineering	12%	\$25,000
				2019 Project Total		\$225,000
Alternative 2 - Replacement sewer						
	Replace 30" and 36" sewer	(2), (3)	311	L.F.	\$1,370	\$426,000
				2019 Project Total		\$425,000
Notes:						
(1). All unit costs in 2019 dollars.						
(2). Unit price taken from MMSD's 50-year Master Plan with increase of 5% per annum. Surcharge of 40% added to unit price to adjust for congested utility corridor, traffic conditions, crossing of large storm culvert, and recently reconstructed street.						
(3). Includes approximately 184 feet of East Johnson Street Relief Sewer from MH01-303 to MH01-304.						