CITY OF INKSTER
Lead Service & Water Main Replacement Report

City of Inkster - Department of Public Works
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Benesch Project No. 00050301.00

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1 PROJECT BACKGROUND

1.1 Study and Service Areas

The City of Inkster (City) is in Wayne County, Michigan. It is a fully developed community with a water system that serves the entire community. This plan addresses the need to replace lead water services and water mains older than 50 years with a majority of the pipelines 6-inches in diameter and smaller. The area is roughly bounded by Annapolis Street to the South, Avondale Avenue to the North, Beach Daily Drive to the east and Middle Belt Road on the west Figure 1 illustrates the location of the Study Area within the City.

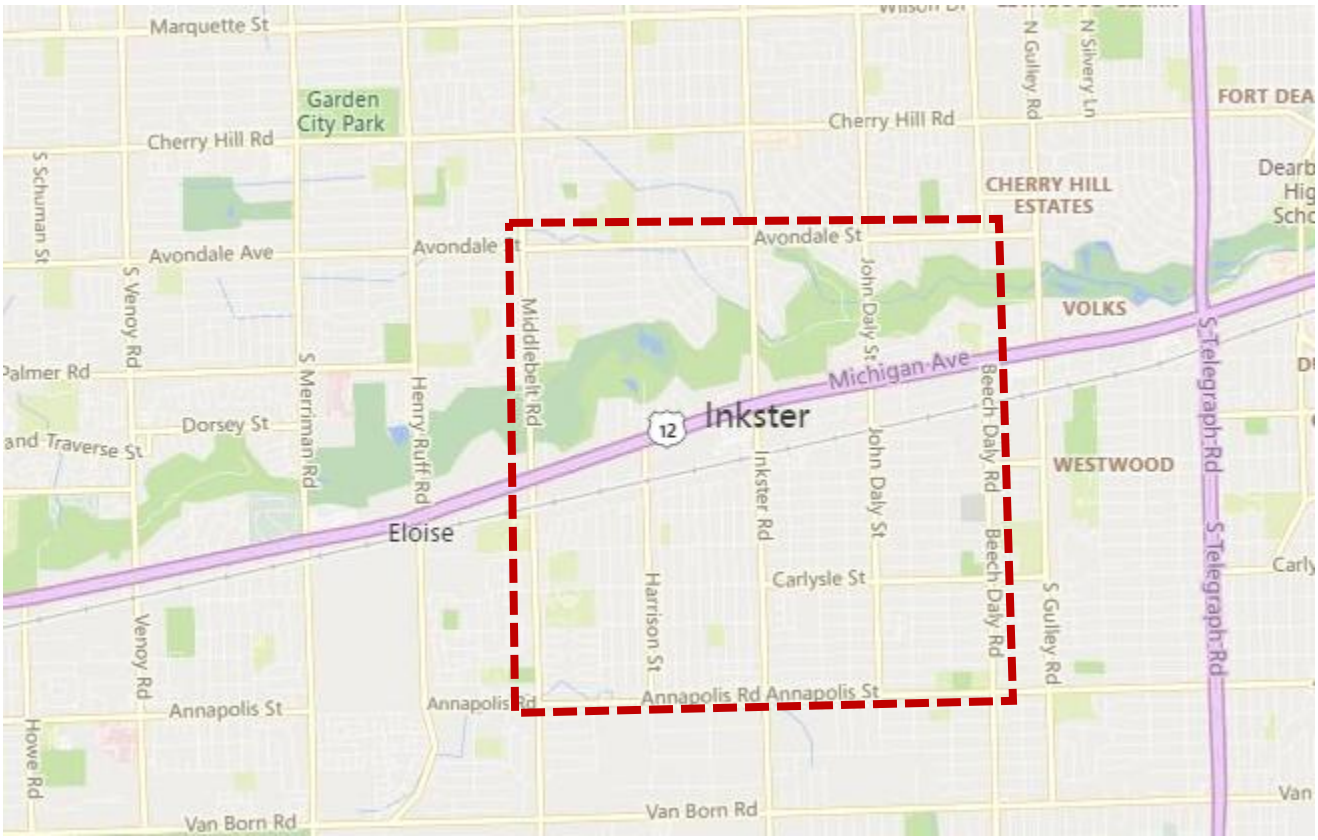


Figure 1 - Study Area

1.2 Population

Population data for the City was obtained from the Southeastern Michigan Council of Governments (SEMCOG) website and "Population and Household Estimates of Southeast Michigan" publication found on the website, dated December 2023. Based on the July 2023 SEMCOG estimate, the population of the City is 25,787 and the average household size is 2.50 persons per household. The City of Inkster expects no significant growth and is not impacted by

seasonal populations. As shown in Table 1, SEMCOG predicts the population to continue to slightly increase over the next 20 years and by approximately 400 people by 2045.

Based on the minor change in population projections for the next 20 years, minimal changes in the population are expected within the Study Area.

	2020	2030	2035	2040	2045
Population	26,088	25,845	25,915	26,074	26,179

Table 1 – Population Data for the City of Inkster

1.3 Land Use

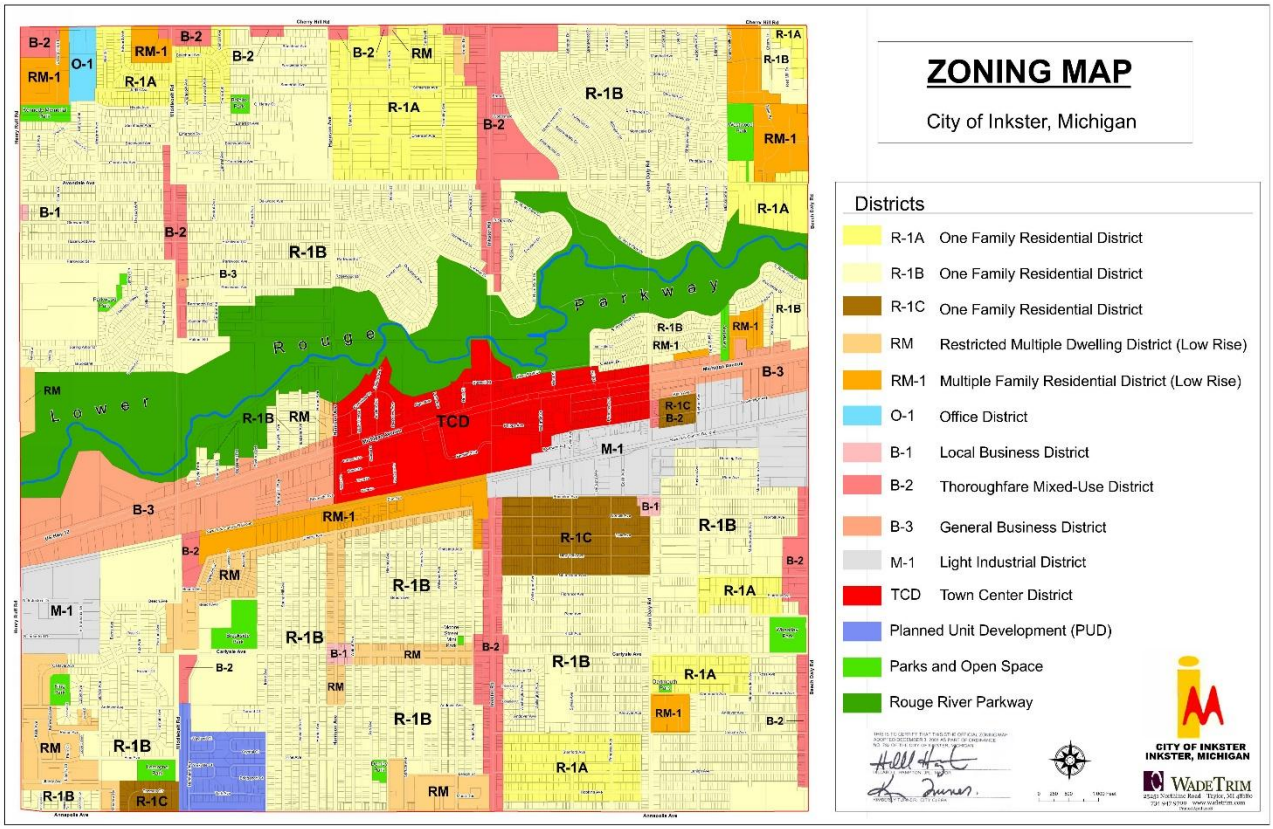


Figure 2 – Land Use Map

The existing land use within the City includes residential (40%), commercial and office (3%), industrial (2%), Transportation Communications and Utility (23%), Parks and Open Space (12%), Vacant (14%), Institutional (5%) and Retail (1%). The land use with the Study Area is predominately zoned residential with some industrial along Michigan Avenue and business

along Michigan Avenue, Middle Belt Road, Inkster Road and Beech Daly. Figure 2 illustrates the zoning within the Study Area.

1.4 Existing Environment Evaluation

1.4.1 Cultural and Historic Resources

Pursuant to the requirements of the State Revolving Fund (SRF) Project Plan Preparation Guidance Report, contact will be made to local and regional planning agencies, and the State Historical Preservation Officer. No local historical societies are known to be present within either of the study areas and a search of the Michigan State Historical Preservation Office did not identify any historic properties within the study areas.

1.4.2 Air Quality

There are no adverse long-term impacts to air quality anticipated as part of the project. Construction activities resulting from this report's recommendations would result in short-term adverse impacts due to the use of construction equipment and dust created during construction activities.

1.4.3 Wetlands

Per an examination of the EGLE Wetland Map Viewer for Wayne County wetlands exist along the Lower Rouge River within the Study Area. The nearest project location to the Lower Rouge River is South River Park Drive where the roadway is adjacent to the wetland but not located in the wetland. The water main is located under the pavement of the roadway and minimal impacts to the wetland is expected during construction. No long-term impacts are anticipated.

1.4.4 Great Lakes Shorelands, Coastal Zones, and Coastal Management

The Study Area is not located in proximity to the Great Lakes or other coastal zones.

1.4.5 Floodplains

While the area in the vicinity of the Lower Rouge River is located within a Federal Emergency Management Agency (FEMA) floodplain, no construction has been recommended within the floodplain. A copy of the floodplain map is in Appendix I.

1.4.6 Natural or Wild and Scenic Rivers

According to the National Wild and Scenic Rivers System website, there are no natural or wild and scenic rivers within the Study Area.

1.4.7 Major Surface Waters

The Rouge River is considered a Major Surface Water and is within the Study Area. Construction work on South River Park Lane is adjacent to the river. No long-term impacts to the surface

waters are expected. Short-term impacts during construction will be mitigated through soil erosion and sedimentation control measures.

Ground water levels in the City fluctuate due to seasonal precipitation. Based on the soil types in the City, ground water is seasonally high in the spring and other wet periods due to the low permeability of the soils. The City purchases water from the Great Lakes Water Authority (GLWA), and based on available information, there are no active ground water wells within the Study Area.

1.4.8 Topography

The City of Inkster topography ranges approximately 20 feet in in elevation from its highest point at the southwest corner of the city (647 Feet) to the lowest point (627 Feet) where the Lower Branch of the Rouge River crosses the eastern city limits at S Beech Daly Road. The City's topography generally gently slopes toward the Lower Branch of the Rouge River which flows from west to east. The lower branch of the Rouge meanders through the approximate middle of Inkster in a northeastern direction north of Michigan Avenue (M-12). As shown in Figure 3 below the river is the lowest part of the City. Additional low points in the southeast part of the city exist. Overall, there is very little relief within the city limits.

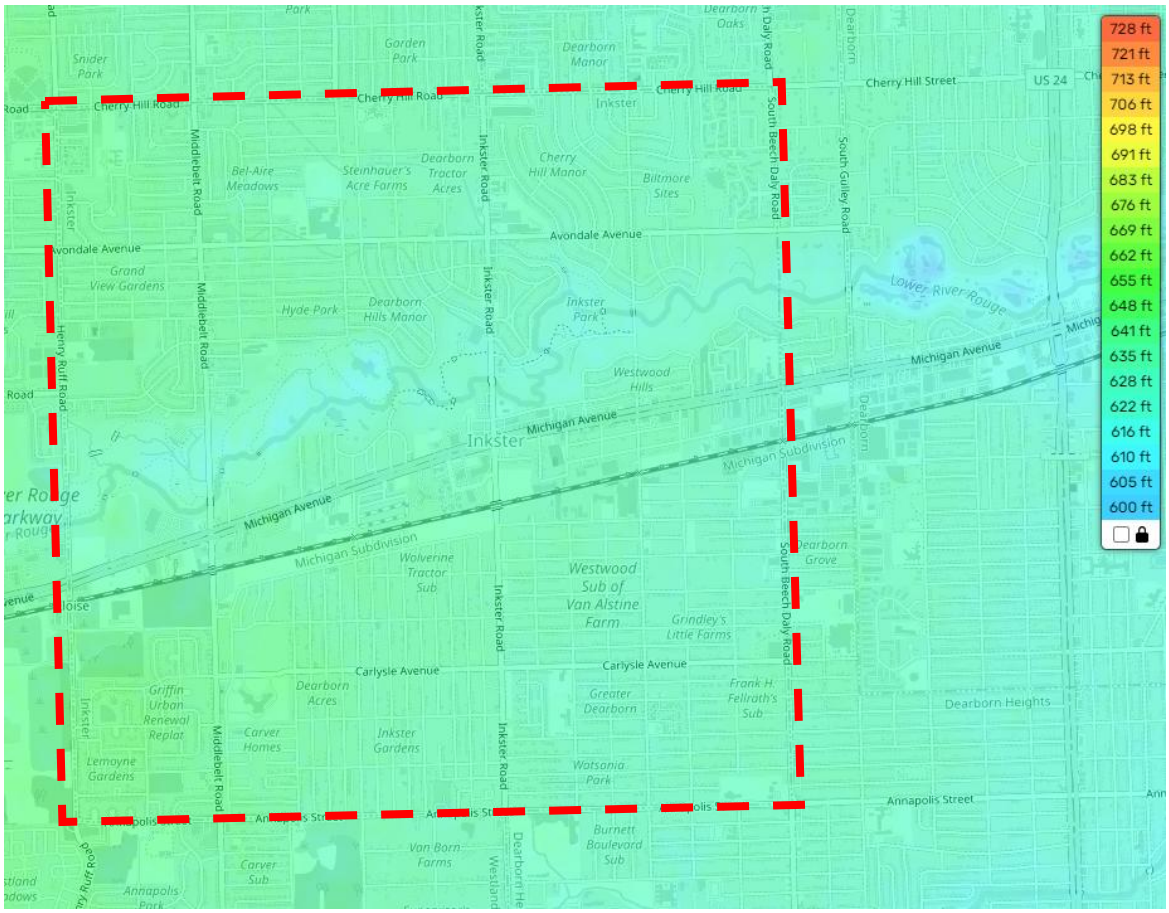


Figure 3 – Topographic Map

1.4.9 Geology

According to the National Geologic Map Database (NGMDB) the geology of Inkster is relatively consistent throughout the city limits. Bedrock consists of the Traverse Geologic Group consisting of Devonian limestones with shale components. Surface formations include Lake beds with sand and areas of Lake beds with clay.

1.4.10 Soil Types

Inkster soils consist of 39 different classifications as shown in Figure 4 below. Soil groups are generally sandy, loam and sandy loam with small areas of gravelly artifactual loam and sand and clay and summarized in Table 2. These soil classifications fall into Hydrologic Groups C and D. Based on soil boring samples taken throughout the City over the last six years, there are areas of the City where a layer of clay has been encountered.

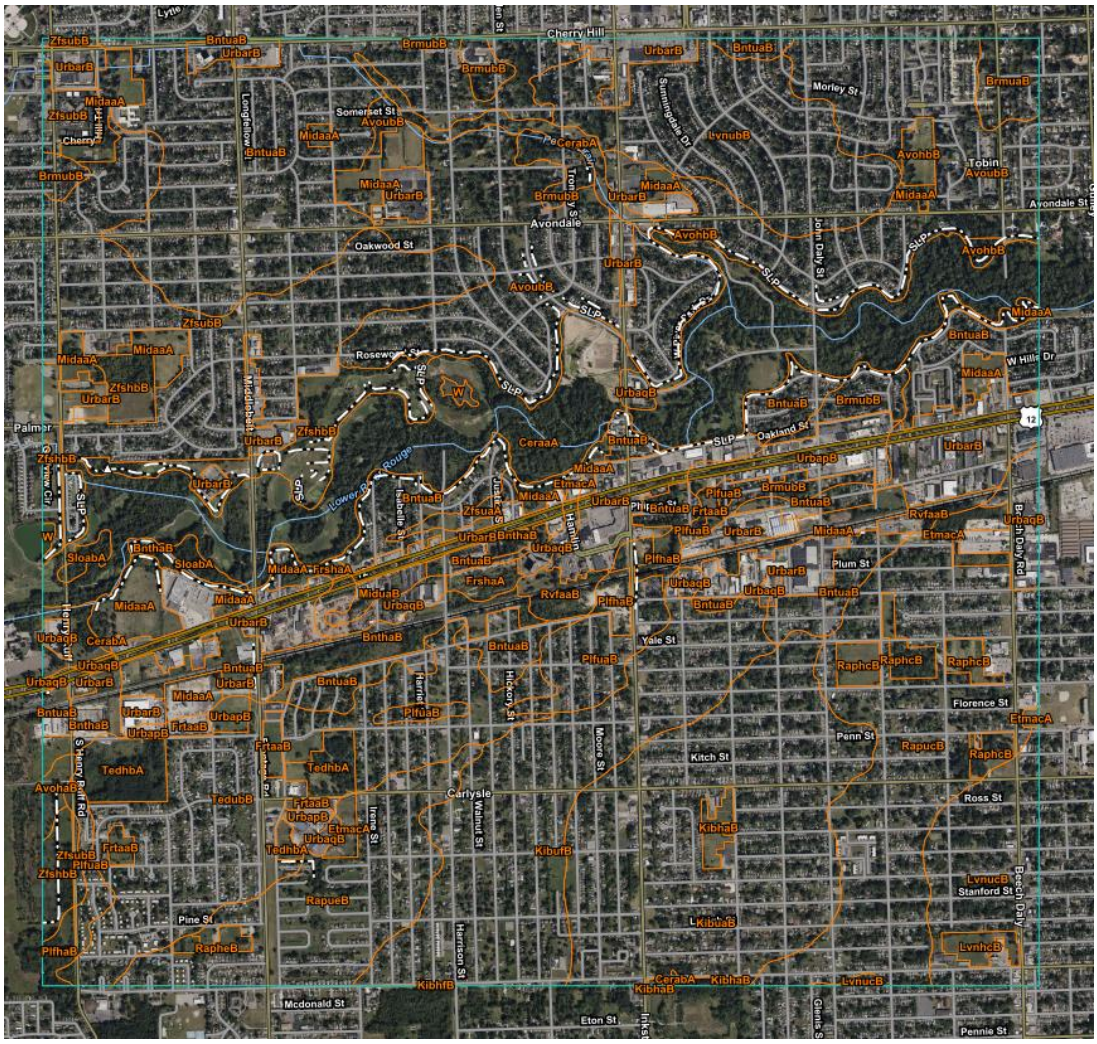


Figure 4 – Soil Types Map

Map Unit Symbol	Map Unit Name	Acres	Percent
AvohaB	Avoca sandy loam, 0 to 4 percent slopes	7.1	0.20%
AvohbB	Avoca-Blount sandy loams, 0 to 4 percent slopes	15.1	0.40%
AvoubB	Avoca-Urban land-Blount complex, 0 to 4 percent slopes	433.2	10.30%
BnthaB	Blount sandy loam, 0 to 4 percent slopes	63.8	1.50%
BntuaB	Blount-Urban land complex, 0 to 4 percent slopes	525.4	12.40%
BrmuaB	Brems-Urban land complex, 0 to 4 percent slopes	26.9	0.60%
BrmubB	Brems-Urban land complex, desnse substratum, 0 to 4 percer	61.2	1.40%
CeraaA	Ceresco-Sloan complex, 0 to 3 percent slopes	378	8.60%
CerabA	Ceresco-Sloan complex, 0 to 3 percent slopes protected	35.9	0.80%
EtmacA	Anthroportic Udorthents, 0 to 2 percent slopes	30.1	0.07%
FrshaA	Freesoil sandy loam, 0 to 2 percent slopes	11.2	0.03%
FrtaaB	Fortress family, 0 to 6 percent slopes	18.7	0.40%
KibhaB	Kibbie sandy loam, 0 to 4 percent slopes	16	0.40%
KibhfB	Kibbie-Wauseon sandy loams, 0 to 4 percent slopes	9.6	0.20%
KibuaB	Kibbie-Urban land complex, 0 to 4 percent slopes	326.5	7.40%
KibufB	Kibbie-Urban land-Wauseon complex, 0 to 4 percent slopes	259.6	5.90%
LvnhcB	Livonia-Berms, loamy substratum complex, 0 to 4 percent slo	8.7	0.20%
LvnubB	Livonia-Urban land complex, dense substratum complex, 0 to	165.4	3.80%
LvnucB	Livonia-Urban land-Brems, loamy substratum complex, 0 to 4	131.1	3.00%
MidaaA	Midtown gravelly-artifactual sandy loam, 0 to 2 percent slope	144.5	3.30%
MiduaB	Midtown-Urban oland complex, 0 to 4 percent slopes	9.6	0.20%
PlfhaB	Plainfield loamy sand, 0 to 4 percent slopes	26.1	0.60%
PlfuaB	Plainfield-Urban land complex, 0 to 4 percent slopes	71.6	1.60%
RaphcB	Rapson-Colwood sand loams, 0 to 4 percent slopes	32.2	0.70%
RapheB	Rapson-Kibbie sandy loams, 0 to 4 percent slopes	8.5	0.20%
RapucB	Rapson-Urban land-Colwood complex, 0 to 4 percent slopes	272.7	6.20%
RapueB	Rapson-Urban land-Kibbie compex, 0 to 4 percent slope	162.8	3.70%
RapufB	Rapson-Urban land-Kibbie complex, dense substratum, 0 to 4	0.4	0.00%
RvfaaB	Riverfront sandy loam, 0 to 4 percent slopes	23.9	0.50%
SloabA	Sloan silt loam, calcareous, 0 to 1 percent slopes	11.6	0.30%
TedhbA	Tedrow loamy sand, dense substratum, 0 to 4 precent slopes	42.6	1.00%
TedubB	Tedrow-Urban land complex, denses substratum, 0 to 4 perce	229.3	5.20%
UrbaoB	Urban land-Fortress family complex, 0 to 4 percent slopes	0.7	0.00%
UrbapB	Urban land-Fortress family complex, dense substratum, 0 to 4	49.8	1.10%
UrbaqB	Urban land-Riverfront complex, 0 to 4 percent slopes	81.7	1.90%
UrbarB	Urban land-Riverfront complex, dense substratum, 0 to 4 perc	310.5	7.10%
W	Water	4.2	0.00%
ZfshbB	Ziegenfuss-Avoca sandy loams, 0 to 4 percent slopes	108	2.50%
ZfsuaA	Ziegenfuss-Urban land Complex, 0 to 2 percent slopes	8.5	0.20%
ZfsubB	Ziegenfuss-Urban land Avoca Complex, 0 to 4 percent slopes	276.4	6.30%
		4407.7	100

Table 2 – City of Inkster Soil Classification Summary

1.4.11 Agricultural Resources

As detailed earlier, the Study Area is fully developed and there are no known unique or prime agricultural lands within this area.

1.4.12 Fauna and Flora

Based on the U.S. Fish and Wildlife Service Endangered, rare, threatened, or special concern species, or unique or critical habitats in the study area could include the following:

- Endangered Indiana bat
- Endangered northern long eared bat
- Threatened Eastern Massasauga snake
- Threatened Eastern Prairie Fringed Orchid
- Endangered Monarch Butterfly
- Threatened Northern Riffleshell
- Threatened Rufa Red Knot
- Proposed Endangered Tricolored Bat

Replacement of water mains will take place in existing roadway right-of-way adjacent to and sometimes in paved areas such as streets, driveways, and sidewalks. Water services that are replaced are located in road right-of-way and residential front and side yards. These areas have been disturbed. It is unlikely that critical habitats will be impacted. In the event a tree is required to be removed, a biologist will be consulted to determine if they are possible roosting habitat for bats.

1.5 Existing Facilities

Existing facilities consist of a distribution system and associated appurtenances and pressure reducing valves at two of the three water supply connections that serve City of Inkster customers. All water in the system is supplied by three Great Lakes Water Authority (GLWA) master meters. The system does not include wells, water storage or booster pump stations.

1.5.1 Water Distribution System

The City of Inkster's water system consists of approximately 106 miles of water main ranging in diameter from 6-inches to 16-inches and two pressure reducing valve vaults at two of the three GLWA master meters. Most of the water mains are 8-inches in diameter. The mains include approximately 860-line gate valves and 950 fire hydrants. Most fire hydrants include the year the hydrant was cast. This provides a rough estimate of the age of the water main associated with the hydrant. Water main pipelines range in age from the 1930's to the 1990's. Figure 5 provides an overview of the water system.

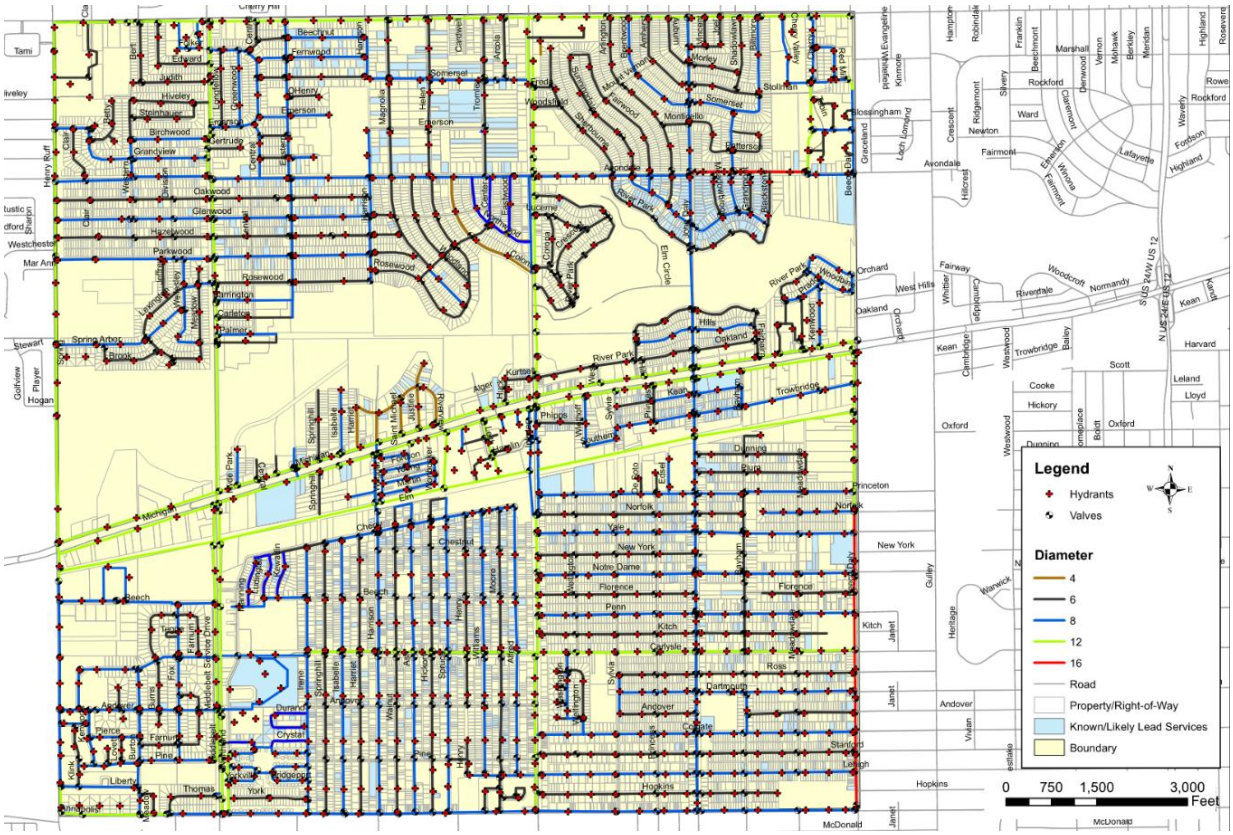


Figure 5 – City of Inkster Water System Map

1.5.2 Condition of the Water Distribution System

As previously mentioned, the age of much of the water system is 50 to 90 years old and has reached the end of its life cycle. The City spends a significant portion of its operation and maintenance on repairing leaks and main breaks and addressing customer complaints such as low water pressures and discolored water. The City experienced a high rate of main breaks over the 2022, 2023, and 2024 calendar years and found ways to reduce the number of leaks. Approximately 79 water main leaks were repaired in 2022, 72 water main leaks were repaired in 2023 and 68 water main leaks in 2024. A leak survey of the entire system in 2023 was completed as part of a water audit which located 12 leaks that were repaired. An additional 15 leaks were identified prior to and after the leak survey in 2023.

In addition to water main breaks, there has been an increased number of construction activities throughout the City that often causes water main leaks and breaks. The repair of these water mains has delayed construction schedules and caused interruptions to customers' water supply on numerous occasions. It has happened so often that the City includes the replacement of water mains wherever other infrastructure such as storm, sanitary and combined sewers are crossing or adjacent to existing water mains. The schedule of a large storm sewer project was delayed so

main water replacement design could be completed and added to the contract documents prior to advertising for bids.

The rehabilitation of an existing pressure reducing valve (PRV) downstream of the IK-02 GLWA master meter was performed in the spring 2022. The IK-04 master meter has an existing PRV and a new PRV at IK-01 is scheduled to be constructed in the fall of 2025. These PRV's help to reduce the impact of transient high pressures sometimes experienced in GLWA's delivery system that can cause pressure spikes in Inkster's system that result in water main breaks. The City has already experienced a noticeable reduction in the number of breaks per year with the two operating master meters that now have PRV's.

Efforts to replace fire hydrants in the Spring of 2023 found that line valves to isolate the hydrants for new installation were not reliable. All 950 fire hydrants are inspected each fall when they are winterized. Approximately 160 hydrants need major repairs including several that are inoperable. The age of the hydrants ranges from 90 to 45 years old based on the casting year stamped on most hydrants. Grants were obtained to purchase new fire hydrants, however, during the installation process several mainline valves were required to be operated to isolate the fire hydrants because so many were inoperable. Between 5 and 14 valves were required to be investigated to isolate hydrants for replacement. In some cases, customer water services were interrupted for several hours.

The City retained a consultant to assist with exercising valves to expedite the valve exercising program, so the inventory and the condition of all valves is current. An updated inventory is complete, and the replacement of valves and fire hydrants will be coordinated so that during installation the delivery of water is minimally interrupted. Coordinated hydrant and valve replacement will likely occur over the course of several years before all inoperable valves and hydrants are replaced.

A fire occurred August 9, 2022, at the Heatherwood Apartments north of Michigan Avenue just west of Beech Daly Road, where water flows were low during firefighting efforts. The responding fire departments were required to seek hydrants farther away from the location for adequate flows. This area was included in the list of locations for the next hydrant flow test effort.

Hydrant flow tests were performed at hydrants located throughout the City in April 2024 per American Water Works Association (AWWA) standards. Locations were based on previous test sites and additional locations where new pipelines have been installed. A summary of the flow test locations and results are shown in Table 3. A map showing the locations is shown in Figure 6. Please note that the sites are numbered based on previous test site locations and locations are not consecutively listed. The locations where flows did not register at a pressure of 20 psi were not included in the results. The results of all 31 test locations are included in Appendix II of this report.

The majority of hydrant flows tested in the 750 to 920 gpm range. Ideally, fire hydrants flowing over 1,000 gpm or greater are desired. This indicates that the water mains and/or fire hydrants

possibly have a decreased capacity. Several factors may contribute to the decreased capacity and are mostly related to aging infrastructure.

Most of the water main pipelines in the City of Inkster are known to be between 90 and 50 years old and made of cast iron and some ductile iron. It is suspected that tuberculation of the metal pipelines has occurred over time and has reduced the capacity of many of the pipelines. In addition, approximately one third of the pipelines in the system are 6-inch diameter and smaller. The minimum size of a water main recommended for a water distribution system the size of Inkster's is 8-inch diameter.

Test No.	Test Location	Flow GPM	Pressure - PSI		Flow @ 20psi
			Static	Residual	
1	Henry Ruff south of Cherry Hill	750	39	30	1123
4	Grandview/Birchwood/ Eastern	750	44	34	1203
5	Avondale and Harrison	840	44	30	1124
6	SE Corner of Inkster & Cherry Hill	920	47	36	1494
8	Avondale near Blackstone	840	45	32	1196
12	EB Michigan Ave just east of Middle Belt	750	43	33	1176
22	Eastbound Michigan Ave. west of Beech Daly	750	43	31	1066

Table 3 – City of Inkster Hydrant Flow Test Summary

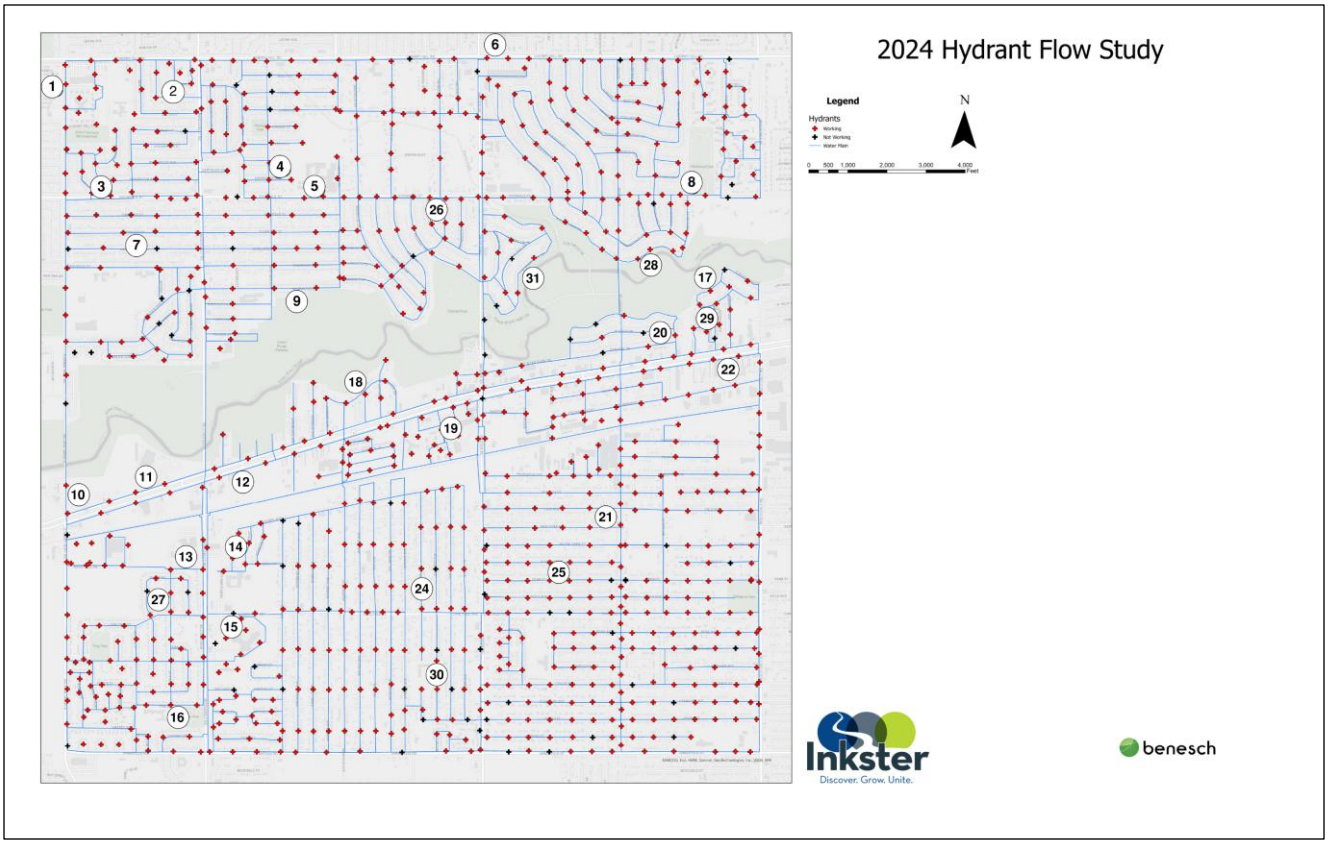


Figure 6 – City of Inkster Map of Hydrant Flow Test Locations

1.5.3 Water System Demands

The Inkster water system is supplied by the Great Lakes Water Authority (GLWA) through three master meters, IK-01, IK-02 and IK-04 as shown in Figure 7. It should be noted that IK-01 was closed on November 2, 2022, when IK-02 was put back in service. IK-02 had been closed for several years until the existing pressure reducing valve was replaced and recalibrated. The IK-01 master meter will be put back in service when a new pressure reducing valve downstream of the master meter is installed in the fall of 2025. Inkster's master meters are summarized in Table 4.

Meter ID	Location	Type	Volume (MGD)	Percent of Total Water
IK-01	Michigan Avenue & Inkster Road	10-inch Magnetic Meter	0	0%
IK-02	Merriman Road & Michigan Avenue	10-inch x 2-inch Turbine Meter	380.8 High Flow 15.5 Low Flow	53.1%
IK-04	Inkster Road & Cherry Hill Road	8-inch Magnetic Meter	349.8	46.8%
		TOTAL	746.1	

Table 4 – City of Inkster Master Meter Details (2023 Flow Data)

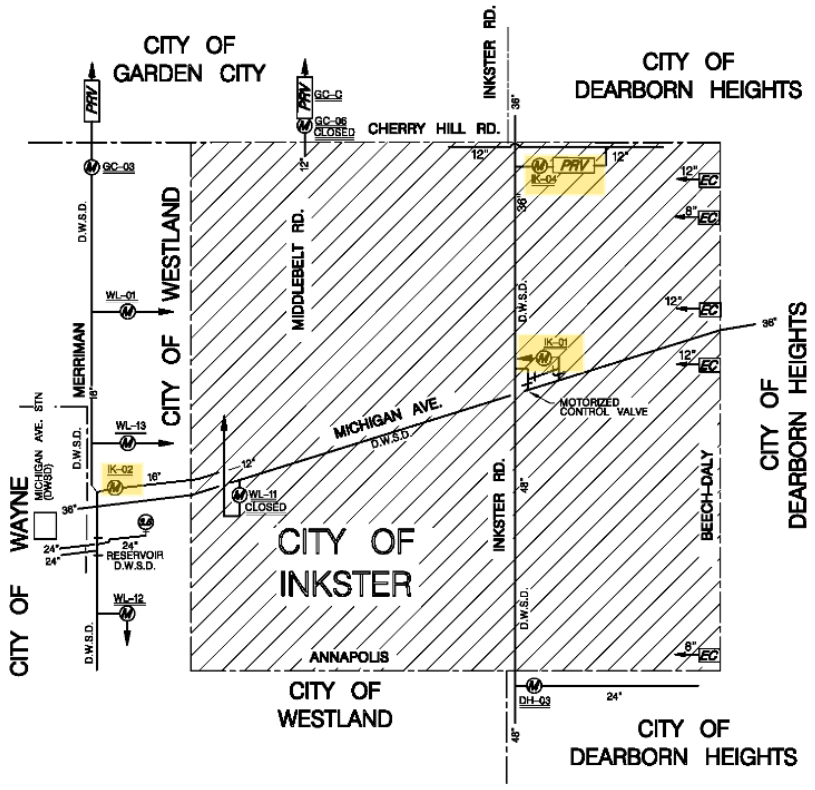


Figure 7 – City of Inkster Master Meter Map

The City of Inkster water system serves a population of 25,787 which includes 8,500 water services. Approximately 345 of these water services are commercial. The total water supplied to the City of Inkster in fiscal year 2023 (July 1, 2022, to June 30, 2023) was 784.8 million gallons. In fiscal year 2023 approximately 6.1% of demand was attributed to commercial/industrial water usage.

Based on the comparison of historical supply data an overall reduction of water usage was observed until about the time of the pandemic in 2020 as shown in Table 5 below. Inkster experienced a decrease in population over the last two decades. The increase in water usage in 2021 can be mostly attributed to changes associated with the pandemic when, like most of the world, Inkster's population was quarantined at home, remotely working, and using on-line education. As people returned to work and school, average water usage returned to approximately the same level as pre-pandemic.

Year	Volume (MG)
2006	972.75
2008	892.76
2011	863.73
2015	826.53
2019	742.84
2020	684.51
2021	880.03
2022	784.45
2023	746.12

Table 5 – City of Inkster Master Meter Historical Supply Summary

1.5.4 Water Services, Meters and Lead Services

The City bills approximately 8,850 customers each month. All residential water meters were replaced in 2012 when the City installed an Advanced Metering Infrastructure (AMI) system which allows the City to obtain water meter reads remotely and reduces the effort to obtain meter reads for billing. Like all communities in the State of Michigan, a Complete Distribution System Materials Inventory (CDSMI) of all water service lines was submitted to the Michigan Department of Environmental, Great Lakes, and Energy, Drinking Water, and Environmental Health Division (EGLE) in October 2024. The CDSMI is based on a random sampling of all unknown water service materials. The City is in the process of completing the physical verification of the remaining unknown lead services in the system to determine the total number of lead services.

In the fall of 2019, the City was notified by EGLE that the Lead and Copper Monitoring of the City's water supply exceeded the Action Level (AL). This prompted several requirements the City is obligated to meet per the Michigan Safe Drinking Water Act, 1976 PA 399 (Act 399). Included

among the requirements is to replace existing known and suspected lead service lines at the rate of seven percent of the total known annually. In 2020, despite the global pandemic, the city replaced 67 lead service lines and replaced the same number or more in 2021, 2022 and 2023 and 2024. The City is on track to replace over 90 lead service lines in 2025.

The City purchased bonds to pay for the cost to replace the existing AMI system and the water meters for all customers. Billing for the current system is estimated for more than 35 percent of their customers. This is due to two conditions; 1) the current AMI system fails to read all meters due to faulty transmitters, and 2) the meters compatible with the AMI system are manufactured in Ukraine and since the start of the Ukrainian war with Russia, the City has not been able to purchase additional meters. The City's inventory of meters has been depleted and there are dozens of customers without meters that are billed with estimated water usage. A financial analysis performed by Plante Moran in 2023 estimated that based on a conservative assessment of the water loss from billing, the rate of return on a new AMI system with new water meters would be less than three years. The City plans to start installing new water meters in April 2025 and estimates the work to take approximately one year to be completed.

1.5.5 Climate Resiliency

Inkster's water system consists of pipelines, main valves, fire hydrants and pressure reducing valves. The system operation does not rely on power for pumps or treatment. Currently the only system communication is provided by GLWA's Wholesale Automated Meter Reading (WAMR) web-based system. It provides flow and pressure data for the master meters and pressures downstream of the pressure reducing valves.

The City plans to install a sump pump at the pressure reducing station for the IK-02 PRV vault. It currently experiences flooding during the spring when the groundwater is high due to rainfall and snowmelt. This pump will require monitoring in the event of an extended power outage.

Water mains adjacent to the Lower Branch of the Rouge River are not located in the 100-year floodplain, however these facilities could potentially be impacted in the event of an extremely intense rainfall. A large amount of rainfall in a short period of time could increase the flow in the river that could erode or overflow the riverbanks. Plans have been prepared to isolate the water mains in these areas to protect water mains outside these areas. Main valves that require shut off were identified and trial shutdowns were performed. Some of these valves are inoperable and have been identified for replacement. Until they can be replaced, a larger area of customers may potentially be without water in the event the areas along the river need to be isolated from the rest of the water distribution system.

The City has invested in different methods of public communication to inform customers of interruptions to their water service for both planned and unplanned events, as well as updates to ongoing construction and maintenance activities. Social media, the city's website and a

robocall/texting service called Code Red have all been utilized over the last several years. Code Red has been utilized for the last two years and requires customers to provide contact phone numbers. This spring a Department of Public services newsletter will be mailed out with customer water bills to update customers about construction activities, the water meter replacement program and provide information about registering for the Code Red notification program.

1.6 Summary of Project Need

1.6.1 Compliance with Act 399

Based on the age of the water distribution system and the number of annual main breaks, a programmed replacement of mains is necessary to maintain and ensure delivery of water to its customers. In addition, the system includes a significant number of 6-inch diameter mains that should be replaced with 8-inch diameter pipe and dead ends that need to be eliminated. The city has started to implement a water main replacement program with Drinking Water State Revolving Funds (DWSRF) from previous years and almost all 4-inch water mains have been replaced with 8-inch mains. However, with the need to address lead service replacement, fire hydrant and line valve repairs and replacements, and the replacement of water meters and an AMI system, financial strains will delay the water main replacement program without supplemental funding sources.

Based on the most recent hydrant flow test pressures, the system is adequate to maintain delivery to customers. However, improving the capacity of the system will ensure the system can maintain pressures in the event the distribution system is taxed by multiple events, i.e. a hot day when fire flow for a major emergency is required.

1.6.2 Orders of Enforcement Actions

When the City exceeded the action level for Lead and Copper Monitoring in 2019 they were required to meet several action items as stipulated by the Michigan Department of Environment, Great Lakes, and Energy (EGLE). These items include providing a Preliminary Distribution Systems Materials Inventory (DSMI) which was completed in 2019 and is updated each year. The number of known lead services were determined as part of the DSMI and seven percent (7%) are required to be replaced each year. This equates to 67 lead services that are replaced each year. This effort began in 2020 and is expected to be completed by 2034. In addition to replacing the known lead services the City was also required to provide a Complete Distribution System Materials Inventory (CDSMI) in October 2024 based on a random sampling. The City has obtained funding to complete further investigations to identify water service materials at locations categorized as unknown. Since the City exceeded the AL, a new requirement issued by the U.S. Environmental Protection Agency (EPA) mandates all water municipalities to replace all lead service lines by 2035.

1.6.3 Drinking Water Quality Problems

Lead services continue to impact the water quality of customers in Inkster. On-going testing of water at the request of customers continues to identify services where the lead action level is exceeded. In addition, continued water main breaks introduce the potential for water quality issues. In 2018 a boil water advisory was issued due to a significant pipeline break. In 2024 a boil water advisory was issued for a four-block area due to a water main valve that was broken in the shut off position during construction activities.

1.6.4 Projected Needs for the Next 20 Years

Lead services are required to be replaced due to health and government mandates, and water mains will continue to require repairs to meet customer demands. No amount of lead in water is safe and water municipalities are required to replace all lead services by the year 2035. Investigations to identify the location and number of lead services are ongoing. The last fire flow analysis for the City water system was performed in 2016 and it recommended the replacement of all 6-inch mains with 8-inch mains to meet future fire flows. The City is currently in the process of updating their water model to assess current fire flow demands. Without proactively replacing the water distribution pipelines, Water mains will continue to age, which results in the continued reduction of the capacity of the mains and increased efforts and resources to repair main breaks.

1.7 Projected Future Need

Although the population of Inkster is expected to only slightly Increase over the next two decades, an initial increase in water demands in the next 2 to 4 years is anticipated due to specific planned development. Over the last five years five medical marijuana grow facilities have been approved by the City of Inkster. Two of these facilities have been in operation over the last two years and are located at commercial and industrial sites where water services exist. One of these locations has been billed on estimated usage because the water meter transmitter is faulty. Another location has only recently opened for operation and a new water meter will be installed as part of the new AMI system. There are 3 other locations, two of which are new construction. One of these facilities is of considerable size and will be located on a 30-acre site. The estimated water requirement for indoor marijuana plants is generally 1 gallon per day per plant. One eighth of an acre (50 feet by 100 feet) typically holds up to 50 cannabis plants. That's 50 gallons a day for 5,000 square feet grow area. Multiple large facilities could have an impact on the city's water demands based on the size of the growing area and the number of facilities that operate in the city. The City's Department of Public Services (DPS) will continue to monitor the facilities currently in operation. The planned facilities have experienced delays in construction due to inflation and other current economic conditions and progress will be monitored by the DPS.

2 ANALYSIS OF ALTERNATIVES

2.1 Alternative 1 - Separate Lead Service and Water Main Replacement Programs

Proceeding with separate projects for lead service replacements and water main replacements under separate design and construction contracts was considered due to the requirement to complete a minimum of lead service replacements by the end of September of each year. Until the City can complete more investigations of the water meters with unknown material, they are replacing 90 lead services each year to meet the new requirement of replacing all lead services by 2035.

Figure 8 shows the locations of the properties that have known lead services or likely have lead services, based on the research of water tap sheets, available construction documents and the age of structures based on records that indicate when lead services were typically installed. The color coding indicates the proposed fiscal year the lead service at the property will be replaced. Water services that were tested and exceeded the action level were prioritized along with any nearby known/likely lead services. Water testing is on-going at the request of residents. Locations that exceed the action level will continue to be added to the first available lead water service replacement contract.

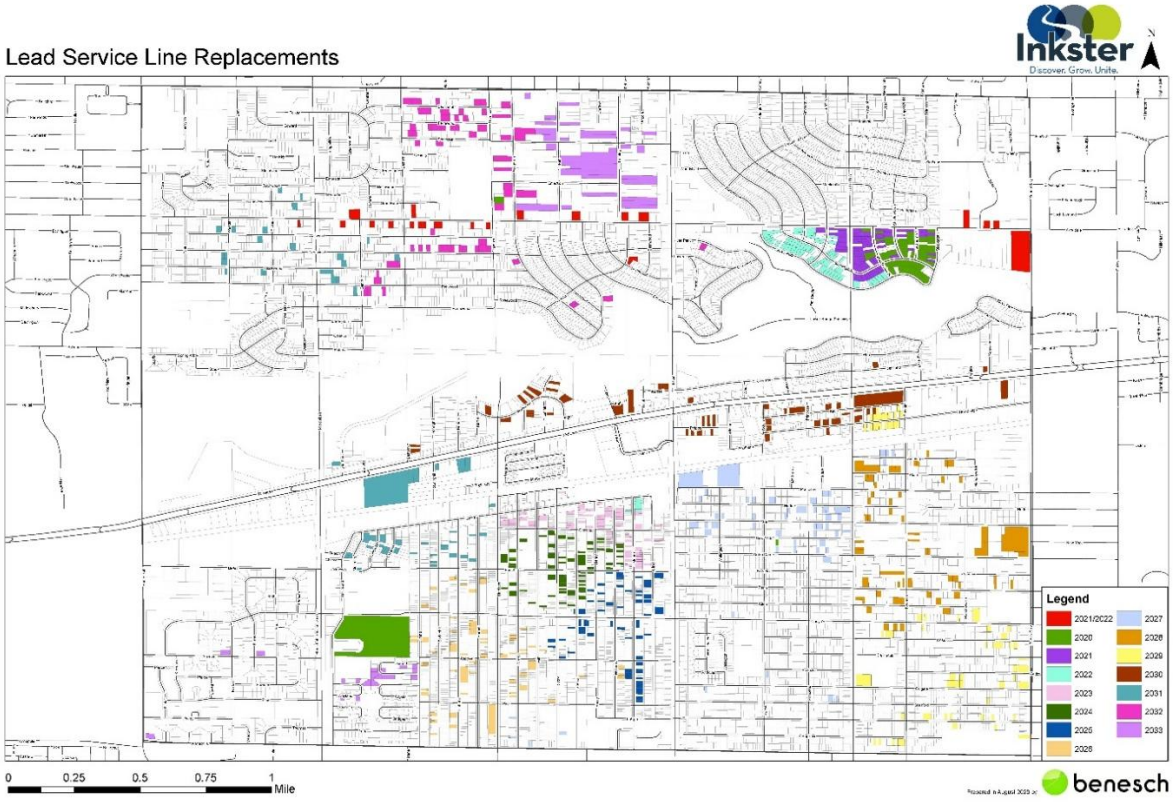


Figure 8 – Alternative 1 Lead Service Replacement

Figure 9 shows the water mains that are programmed for replacement in colored shaded areas. Each color represents a fiscal year. Fiscal year 2026 includes the 6-inch diameter water mains in the Heatherwood Apartment area near Michigan Avenue and Beech Daly Road which will be replaced with 8-inch diameter pipelines. This will address the fire flow needs in the area. Substandard 6-inch mains in South River Park Drive and Oakland Street north of Michigan Avenue at John Daly Road are also planned for replacement. Rosewood Drive from Middle Belt Road to Harrison Street, and Sherbourne Drive from Avondale Avenue to Cherry Hill Road are included in the 2026 fiscal year because they have experienced several breaks over the last several years including during the 2024-2025 winter months.

The replacement of water mains identified in fiscal year 2027 are associated with sewer mains that are proposed to be separated using Clean Water State Revolving Funds (CWSRF). The City has found that any construction adjacent to existing water mains often results in the mains leaking or breaking. Therefore, the sewer separation is planned to include the replacement of water mains at the same time. This will avoid water main breaks and leaks and unplanned interruptions to customers' water service.

Water main replacement locations for fiscal years 2028, 2029 and 2030 include water mains that are 6-inches in diameter that are planned to be replaced with 8-inch diameter pipe, have a high number of known lead service lines and include mains with a history of water main breaks.

The pipelines shown in Figure 9 are summarized in Tables 6 and 7 by street segment, existing and proposed pipe diameters and the proposed construction fiscal year. Most of these pipelines are smaller than 6-inches in diameter and will be replaced with 8-inch diameter pipelines.

Street	From	To	Existing Pipe Diameter (inches)	Proposed Pipe Diameter (inches)	Fiscal Year
S. River Park Dr	Prado	Woodbine	6	8	2026
S. River Park Dr	Woodbine	S. Beech Daly	8	8	2026
Prado	S. River Park Dr	Woodbine	8	8	2026
Woodbine	S. River Park Dr	Prado	8	8	2026
Woodbine	Prado	S. Beech Daly	6	8	2026
Kenwood	Michigan	Prado	8	8	2026
S. Beech Daly	Woodbine	S. River Park Dr	8	8	2026
Franklin	Michigan	Prado	6	8	2026
Heatherwood	Michigan	Franklin	6	8	2026
Heatherwood	Heatherwood	Prado	6	8	2026
Kurtsell	Huck	Inkster	6	8	2026
Huck	Michigan	Kurtsell	6	8	2026

Table 6 – Alternative 1 Water Main Replacement Summary

Street	From	To	Existing Pipe Diameter (inches)	Proposed Pipe Diameter (inches)	Fiscal Year
S. River Park Dr	John Daly	Hill/Oakland	6	8	2026
S. River Park Dr	Hill/Oakland	Michigan	6	8	2026
Oakland	Hill	Fairbairn	6	8	2026
Fairbairn	Michigan	S. River Park Dr	6	8	2026
Moore Circle/Ct	Moore Ave	Annapolis	6	8	2026
Rosewood	Harrison	Middle Belt	6	8	2026
Sherbourne	Dead end	Avondale/N. River	6	8	2026
Ross	Sylvia	Beech Daly	6	8	2027
Dartmouth	Sylvia	Beech Daly	8	8	2027
Andover	Bayhan	Beech Daly	6	8	2027
Colgate	John Daly	Beech Daly	8	8	2027
Stanford	John Daly	Beech Daly	6	8	2027
Lehigh	John Daly	Beech Daly	8	8	2027
Phipps	Inkster	Wiethoff	6	8	2028
Hamlin	RR ROW	Inkster	6	8	2028
Kean	Sylvia	Princess	6	8	2028
Princess	Michigan	Trowbridge	6	8	2028
Dunning	John Daly	Meadowdale	6	8	2028
Plum	John Daly	Meadowdale	6	8	2028
Bayhan	Princeton	Carlysle	6	8	2028
Norfolk	Inkster	Bayhan	6	8	2028
New York	Inkster	John Daly	6	8	2028
Florence	Inkster	John Daly	6	8	2028
Walnut	RR ROW	Annapolis	6	8	2029
Harriet	Cherry	Annapolis	6	8	2029
Springhill	Cherry	Annapolis	6	8	2029
Hickory	RR ROW	Annapolis	6	8	2029
Florence	Bayhan	Beech Daly	6	8	2030
Kitch	Inkster	E. of Meadowdale	6	8	2030
Andover	Bayhan	John Daly	6	8	2030
Stanford	Inkster	John Daly	6	8	2030
Hopkins	Inkster	East of Bayhan	6	8	2030
Oakwood	Henry Ruff	Harrison	6	8	2030

Table 7 Continued – Alternative 1 Water Main Replacement Summary

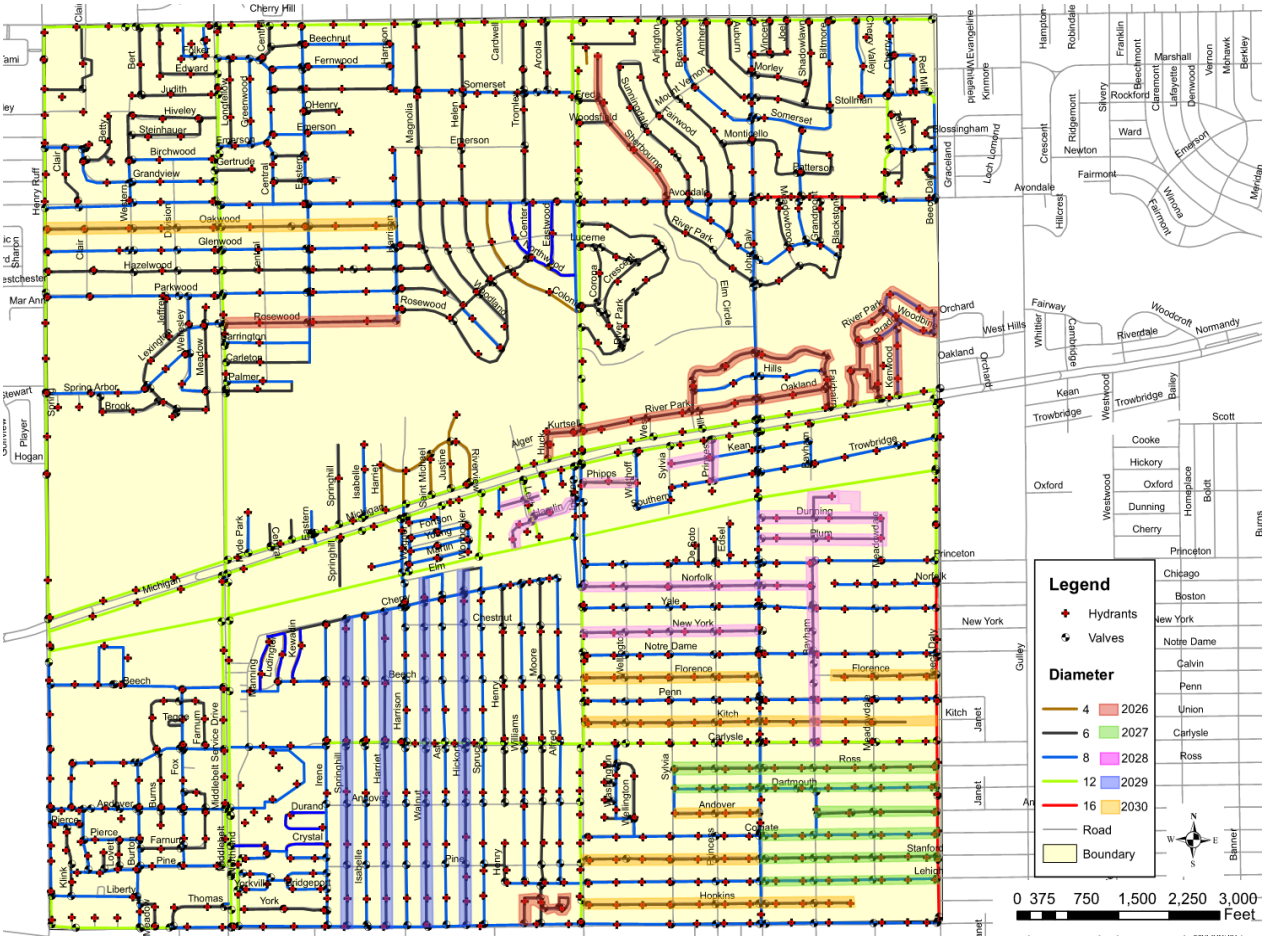


Figure 9 – Alternative 1 Water Main Replacement Map

2.2 Alternative 2 - Coordinate Lead Service and Water Main Replacement

Alternative 2 is shown in Figure 10 and shows shaded areas indicating the locations of water main replacements and associated lead service repairs. The colors indicate different fiscal years of construction. Properties with that were identified with lead services are shown in blue. Table 8 and 9 summarize the street segments where each watermain is located and the existing and proposed pipe diameters.

Water main replacements shown for the 2026, 2027, 2028, 2029 and 2030 fiscal years were prioritized by pipeline sizes that needed to be increased, the number of lead service replacements associated with each main replacement and historical maintenance and operation information such as main breaks and hydrant flows. This includes approximately 20,000 linear feet of water main replacement per year and a total of over 230 lead service line replacements.

Water mains 6-inches in diameter in areas with known issues such as fire flows and a history of main breaks were identified to be replaced during fiscal year 2026. As previously mentioned, 6-

inch diameter water mains located in the area northwest of the intersection of Michigan Avenue and Beech Daly Road, which includes the Heatherwood Apartments, are scheduled to be replaced with 8-inch mains. Low fire flows at the apartment complex were experienced during a fire in 2022. Fire hydrant tests in this area in 2024 verified the low flows. The area north of Michigan Avenue at John Daly Road is also included where there are 6-inch mains and lead services.

In the area of Meadowdale and Carlysle there are several water mains that are planned for replacement in fiscal year 2027 with the construction planned for the separation of combined sewers. Thes mains include both 6- and 8-inch diameter mains that will be replaced with new 8-inch pipelines. As previously mentioned, construction that occurs adjacent to existing water mains often results in water main breaks and/or leaks. The City plans to apply for CWSRF to complete the separation of combined sewers in this area and complete the work for both the sewer and water mains as one project. There are also approximately 40 lead service lines that will be replaced as part of this work.

Street	From	To	Existing Pipe Diameter (inches)	Proposed Pipe Diameter (inches)	Fiscal Year
S. River Park Dr	Prado	Woodbine	6	8	2026
S. River Park Dr	Woodbine	S. Beech Daly	8	8	2026
Prado	S. River Park Dr	Woodbine	8	8	2026
Woodbine	S. River Park Dr	Prado	8	8	2026
Woodbine	Prado	S. Beech Daly	6	8	2026
Kenwood	Michigan	Prado	8	8	2026
S. Beech Daly	Woodbine	S. River Park Dr	8	8	2026
Franklin	Michigan	Prado	6	8	2026
Heatherwood	Michigan	Franklin	6	8	2026
Heatherwood	Heatherwood	Prado	6	8	2026
Kurtsell	Huck	Inkster	6	8	2026
Huck	Michigan	Kurtsell	6	8	2026
S. River Park Dr	John Daly	Hill/Oakland	6	8	2026
S. River Park Dr	Hill/Oakland	Michigan	6	8	2026
Oakland	Hill	Fairbairn	6	8	2026
Fairbairn	Michigan	S. River Park Dr	6	8	2026
Moore Circle/Ct	Moore Ave	Annapolis	6	8	2026

Table 8 – Alternative 2 Water Main Replacement Summary

Street	From	To	Existing Pipe Diameter (inches)	Proposed Pipe Diameter (inches)	Fiscal Year
Hickory	RR ROW	Annapolis	6	8	2027
Phipps	Inkster	Wiethoff	6	8	2027
Hamlin	RR ROW	Inkster	6	8	2027
Kean	Sylvia	Princess	6	8	2027
Princess	Michigan	Trowbridge	6	8	2027
Dunning	John Daly	Meadowdale	6	8	2027
Plum	John Daly	Meadowdale	6	8	2027
Meadowdale	Dunning	Plum	6	8	2027
Bayhan	Princeton	Carlysle	6	8	2027
Walnut	RR ROW	Annapolis	6	8	2028
Harriet	Cherry	Annapolis	6	8	2028
Springhill	Cherry	Annapolis	6	8	2028
Norfolk	Inkster	Bayhan	6	8	2028
New York	Inkster	John Daly	6	8	2029
Florence	Inkster	John Daly	8	8	2029
Florence	Bayhan	Beech Daly	8	8	2029
Kitch	Inkster	E of Meadowdale	6	8	2029
Ross	Sylvia	Beech Daly	6	8	2029
Andover	Sylvia	John Daly	6	8	2030
Andover	Bayhan	Beech Daly	6	8	2030
Stanford	Inkster	Beech Daly	6	8	2030
Hopkins	Inkster	East of Bayhan	6	8	2030
Oakwood	Henry Ruff	Harrison	6	8	2030

Table 9 Continued – Alternative 2 Water Main Replacement Summary

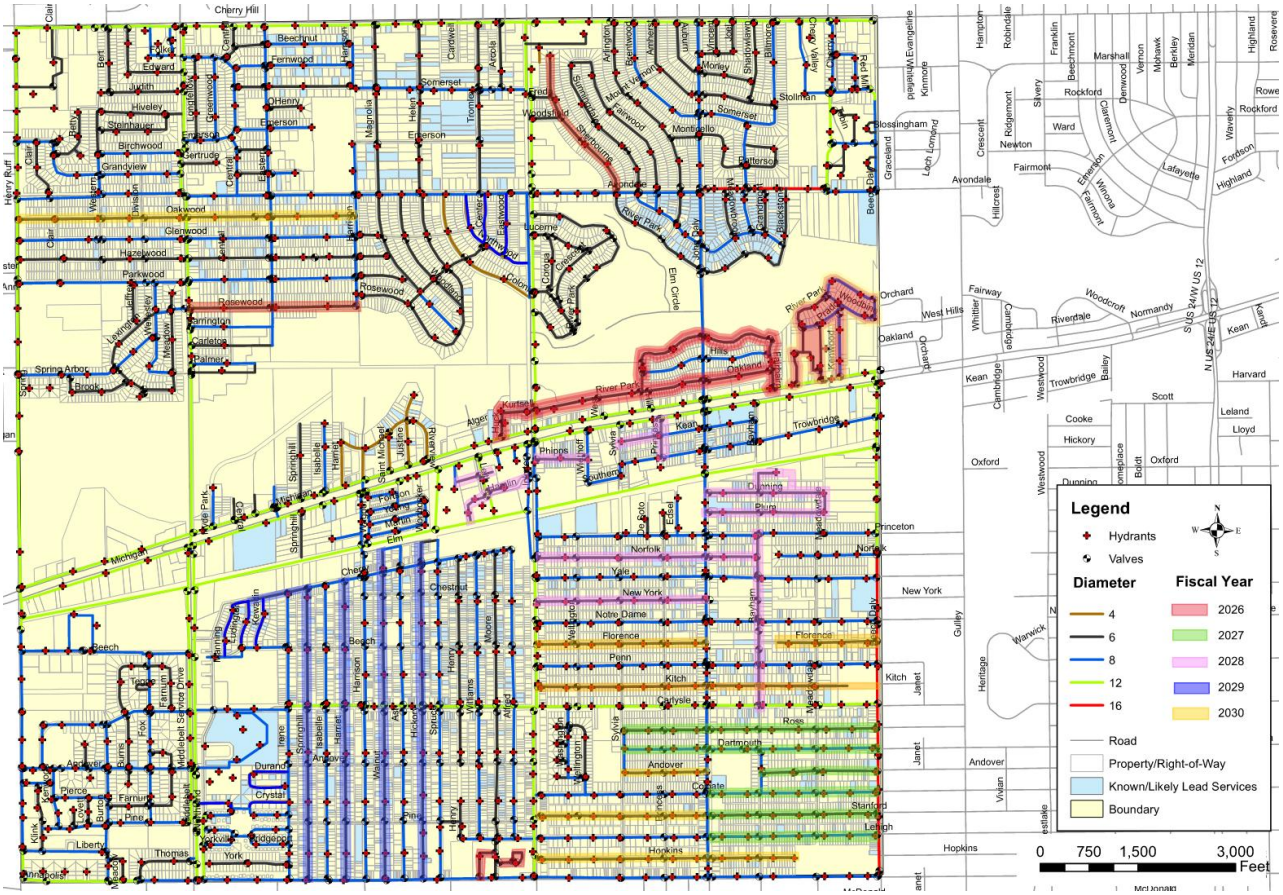


Figure 10 – Alternative 2 Lead Services and Water Main Replacement Coordinated

2.3 No-Action

Taking no action to replace lead water services and water mains results in increased health risks to customers, increased maintenance of water main breaks/leaks, increased reduction of distribution system delivery water pressures and, the increased potential of a catastrophic main brake or sink holes. Without replacing lead services unsafe water will be delivered to existing customers and the added cost of filters and bottled water will be a burden on customers. Delaying the replacement of water mains will increase the need for continued repairs of leaks. Without replacing them they will continue to tuberculate and delivery of the quantity of water will decrease along with the pressure at which it is delivered.

2.4 Optimum Performance Existing Facilities

Inkster's existing water distribution system is believed to be operating at its optimum performance with the current facilities. The operating pressure of the system is maintained at 40 to 45 psi which is close to the minimum recommended operating pressure of 35 psi. Increasing the pressures delivered to the system by GLWA may possibly result in an increase in main breaks

and leaks. While breaks and leaks still occur on a regular basis, maintaining the system at lower range pressures minimizes the incidence.

2.5 Regional Alternatives

The City of Inkster receives its water from GLWA. There are no regional alternatives.

2.6 Monetary Evaluation

Table 10 summarizes the costs for Alternatives 1 and 2 for proposed fiscal years. A detailed cost estimate can be found in Appendix III. The monetary evaluation was completed for the 2026 fiscal year costs.

Alt.	Cost/Fiscal Year					Total Cost
	2026	2027	2028	2029	2030	
1	$19,016,250	$15,498,125	$16,708,750	$15,360,000	$18,496,250	$85,079,375
2	$18,847,500	$15,329,375	$16,540,000	$15,191,250	$18,327,500	$84,235,625

Table 10 – Summary of Costs for Alternatives 1 & 2

2.6.2 Present Worth

Determine the present worth of construction and Operation, Maintenance and Replacement (OM&R) components.

One-Time Expenditures = Capital Costs

PW=F*(1/(1+i)n)

F = The future value = the estimated project cost

n = the number of years, 30 years, for disadvantaged communities

i = the discount rate = 4.4% According to the U.S. Office of Management and Budget for both 20-year and 30-year loans (Revised November 14, 2024).

Alternative 1 PW = $5,225,284
Alternative 2 PW = $5,178,915

2.6.3 Uniform Series Present Worth Recurring Equal Expenditures

Equal Expenditures = OM&R Costs and are assumed to be the same for both alternatives. The same linear feet of water main and lead services are expected to be replaced with both alternatives which would required the same operations, maintenance, and replacement costs (OM&R) in the City of Inkster.

$PW=A*[((1+i)^n -1)/i(1+i)^n$

A = the annual expenditure
n = the number of years, 30 years, for disadvantaged communities
i = the discount rate = 4.4% According to the U.S. Office of Management and Budget for both 20-year and 30-year loans (Revised November 14, 2024).

Reoccurring Equal Expenditure = $13,942,258 for Alternative 1
= $13,942,258 for Alternative 2

Operation and Maintenance, and Replacement Costs (OM&R) Costs

- Annual maintenance and operation costs are $21.5 million for 106 miles of water mains.
- $21,500,000 for 106 miles of watermain including appurtenances, fire hydrants, valves and services.
- $202,830/mile of watermain= $38.41/foot of water main
- Replacement Cost = $650/linear foot of water main including appurtenances.
- 22,020 linear feet of water main including appurtenances proposed for fiscal year 2026.
- Maintenance, Operation & Replacement Costs are summarized for fiscal year 2026 as shown in Table 11.

	Linear Feet of Pipeline & Appurtenances	Maintenance & Operation Costs	Replacement Costs	Total OM&R Cost
Alternative 1	22,020 LF	$845,894	$14,313,000	$15,158,894
Alternative 2	22,020 LF	$845,894	$14,313,000	$15,158,894

Table 11 – MO&R Costs for Alternatives 1 & 2 for Fiscal Year 2026

2.6.4 Salvage Value

The same linear feet of water main and lead services are expected to be replaced with both alternatives which would equal the same salvage value.

Life of a water main = 50 years Period of 30 years

Present Worth of the Salvage Value = $249,360 Alternative 1
= $249,360 Alternative 2

2.6.5 Total Present Worth

As shown in Table 12 the combined present worth of Alternative 2 is slightly higher than Alternative 1.

	Construction Present Worth	OM&R Present Worth	Salvaged Present Worth	Total Present Worth
Alternative 1	$5,225,284	$15,158,894	$249,360	$20,134,819
Alternative 2	$5,178,915	$15,158,894	$249,360	$20,088,450

Table 12 – Total Present Worth for Alternatives 1 & 2 for Fiscal Year 2026

2.6.6 User Costs

The cost of the proposed improvements to water customers was evaluated based on the annual payments for the total loan over 30 years divided up by the number of Residential Equivalent Units (REU's) for the water distribution system. An REU represents the volume of water expected to be used by a single-family residence. REU's are calculated for larger water users such as commercial and industrial businesses to be used as a standard of basis to measure and compare water usage throughout the system.

The costs for Alternatives 1 and 2 for fiscal year 2026 shown in Table 12 were amortized over 30 years at an interest rate of 2.75%. This interest rate is based on the State Revolving Fund (SRF) fiscal year 25 interest rate. The annual payments for each alternative were divided by the number of Residential Equivalent Units REU's for the water distribution system. The annual cost per REU and the cost for each REU over the life of the loan are summarized in Table 13.

	Annual Payment	Cost per REU Annually	Total Cost per REU at the end of 30 Years
Alternative 1	$939,107	$80	$2,400
Alternative 2	$930774	$79	$2,378

Table 13 – Cost per Residential Equivalent Unit for Alternatives 1 & 2 for Fiscal Year 2026

The cost to customers based on the cost per REU is summarized in Table 14 below. Residential customers are assumed to have a 5/8-inch to ¾" meters, small to medium businesses are assumed to have meters ranging in size from 1- to 2-inches and large businesses are assumed to have 3-inch meters and larger.

Type of Customer	Estimated Annual Cost to Customer	
	Alternative 1	Alternative 2
Residential	$80 - $120	$79 – $119
Small-Medium Business	$200 - $640	$198 – $632
Large Business	$1,200 – $4,000	$1,185 - $3,950

Table 14 – Cost per Type of Water Customer for Alternatives 1 & 2 for Fiscal Year 2026

2.7 Environmental Evaluation

Neither Alternative is expected to have long term environmental impacts and short-term impacts for both Alternatives occur during construction and generally have the same impacts that can be mitigated. However, Alternative 2 could be considered to have less environmental impacts because the construction time is a shorter period that occurs once. Combining the work and completing the replacement of both the lead services and the water mains at the same time has less impact on most areas than completing them as separate tasks that occur at different times.

The following items have been identified as potential environmental impacts and all are short term that would occur during construction. The mitigation for each is also described below:

2.7.1 Air Quality

There are no adverse long-term impacts to air quality anticipated as for either Alternative. Construction activities resulting from this report's recommendations would result in short-term adverse impacts due to the use of construction equipment and dust created during construction activities.

Several actions can be taken during the design and construction of the improvements to mitigate any anticipated negative impacts to air quality. These actions include performing backfilling operations as soon as practical and minimizing the movement of stockpiled materials.

2.7.2 Dust

Dust is associated with Air quality. Once airborne materials are deposited, dust can be mitigated by regularly sweeping the streets in the area during construction and applying water to stock piles and recently placed dirt.

2.7.3 Wetlands/Sedimentation and Erosion Control

Short term mitigation measures to ensure wetlands adjacent to the construction that will occur on N River Drive include maintaining all soil erosion and sediment control (SESC) measures throughout the duration of construction and implementing all post-construction requirements such as seeding and sodding all disturbed areas that are not paved. SESC measures will be applied to all construction site locations as required by Part 91.

2.7.4 Traffic Disruptions

Traffic will be disrupted during construction activities; however, all residents will be provided access to their homes during this time. This is a standard requirement of all City of Inkster water main and lead service replacement projects. Advance notification of all traffic access limitations and street parking will be provided to the residents directly affected as well as the community. Written notification to residents for times when parking is prohibited will be provided via flyers delivered to their homes and posted on social media. Limited access to streets during construction will also be posted on the City's website and social media accounts.

2.7.5 Noise

Noise will impact residents and areas adjacent to the construction zone for the duration of work. Although noise cannot be eliminated, limiting the hours of work according to the City of Inkster's noise ordinance will limit impacts to residents.

2.8 Technical Considerations

All aspects of the work proposed in this project plan will comply with Act 399 and will meet the "Recommended Standards for Waterworks", also known as the 10-State standards. Construction permits will be obtained from the Michigan Department of Environment, Great Lakes, and Energy (EGLE). The work described in this report will enable the City to better meet all the requirements of the Safter Drinking Water Act, 1976 PA 399. A more reliable supply less susceptible to repairs and breaks will be provided. Better water quality by eliminating lead pipe and tuberculated pipe that sheds rust particles into the water.

3 SELECTED ALTERNATIVE

Alternative 2 is the preferred option due to the reduced impacts on residents by conducting construction activities during one period instead of two or more and the reduced cost.

3.1 Design Parameters

Water main with a high incidence of breaks and six-inch diameter main with a high number of lead services lines have been targeted for replacement. All six-inch diameter water main will be replaced with 8-inch diameter. Water demand is not expected to increase in the next 20 years and increasing the size of 6-inch mains ensures adequate flow.

The current system is operating at approximately 40 to 45 psi. This is closer to the minimum recommended operational range. Replacing water mains will help to increase operational pressure in the future without stressing the system,

Different methods of pipe installation will be evaluated based on each pipe location. These methods include pipe bursting, directional drilling and open trench digging.

3.2 Useful Life

It is assumed that the useful life of the new assets will be approximately the same as the assets they are replacing. The existing assets are 50 to 90 years old. Therefore, a conservative estimated useful life is assumed to be 50 years. That would make the weighted useful life equal to 50 years.

3.3 Water Efficiency

Water efficiency would be realized in the reduction of maintenance and operation activities that use or waste water on a regular basis. This includes water main breaks, leaking hydrants and valves, additional flushing due to water quality issues and complaints. Water is also lost when additional flushing is required due to valves not seating to isolate a section of pipeline or hydrant. When cloudy or discolored water is reported by a customer it is recommended that they run their water until it is clear.

3.4 Schedule for Design and Construction

The City will start preliminary design in the summer of 2025 and if funding is awarded through the SRF continue with design so it is completed by March of 2026 so it can begin construction in June 2026. Topographic survey and geotechnical investigations will be performed in August and September of 2025. If the City is awarded funding design will be completed so contract documents can be advertised for bid in March of 2026. The projects will be split into two or three different bid packages to ensure the projects are substantially completed before the end of the construction season. Once awarded, construction is expected to occur between June and November of 2026.

3.5 Cost Summary

The total cost of the fiscal year water main and lead service replacement project is summarized in Table 15. Administration costs include financing and legal bond council for preparing and obtaining bonds. Preliminary design includes topographic survey, geotechnical investigations, pipeline material and installation method evaluations. The Design Task includes the preparation of plans and specifications for soliciting bids for the project as well as obtaining permits from EGLE, Wayne County and MDOT. Construction and construction engineering and inspection will occur at the same time.

TASK	COST
Bonding Admin & Financing	$100,000
Preliminary Design	$100,000
Design	$1,427,800
Construction	$15,130,500
Construction Engineering & Inspection	$2,141,700
Total	**$18,900,000**

Table 15 – Improvement Cost for Alternative 1 for Fiscal Year 2026

3.6 Implementability

The existing water pipelines are located in City of Inkster street right-of-way where all replacement pipelines will also be located. Lead service lines are partially located on private property and the City is well versed in coordinating with owners for access to replace water service lines. The City has ordinances in place for accessing water service lines and water meters including a notification process that outlines multiple scenarios and attempts to contact both property owners and tenants.

4 ENVIRONMENTAL AND PUBLIC HEALTH IMPACTS

4.1 Direct Impacts

4.2.1 Construction Impacts

As described in section 2.7 of this report, all impacts caused by the proposed improvements will occur during construction and are mitigable. All pipelines will be constructed in public right-of-way accordance with the 10 State Standards. These areas are disturbed and impacts to sensitive environmental resources are not anticipated.

Most of the existing water mains are located in the area between sidewalks and the curb line, which is typically covered in grass. Impacts to curb and gutter and sidewalks are planned and include the removal and replacement of both. Occasionally a tree located is located this area. An evaluation to avoid the tree is conducted. The evaluation considers the rerouting of the pipeline, directionally drilling under it, the condition and value of the tree for both landscaping purposes and possible roosting habitat for endangered and threatened bats.

Water mains may also be located under the street pavement that requires removal and replacement of asphalt and/or concrete pavement. Wherever possible, trenchless installation methods will be implemented such as pipe bursting and directional drilling. This reduces the impacts on the surrounding environment, so less restoration is required and reduces the amount for construction which in turn reduces the amount of noise, dust, and traffic disruption to residents on the streets.

As previously mentioned, water mains are not located in the 100-year flood plain or wetlands, however, the water main located in South River Park Drive is located adjacent to the Lower Branch of the Rouge River. A soil erosion and sediment control permit from Wayne County will be obtained for this work that will ensure the impacts to the river and surrounding area is minimal. Controls such as silt fences and silt bags for catch basins in the area will be required as part of the construction contract documents.

GLWA supplies the City of Inkster water's water and does not rely on groundwater for their water supply. The need to dewater during construction has occurred in the past but has been minimal at the depths the watermains will be installed. The geotechnical investigation typically identifies the possible depth of encountering ground water during construction. Pipelines are typically 8-7 feet deep to ensure approximately 6 feet of cover from the top of the pipeline to the existing surface.

4.2.2 Operational Impacts

As described in section 2.7 of this report, the majority of impacts from the water main and lead service replacements will occur during construction and will mostly impact residents adjacent to the construction area. These impacts include air quality, dust, noise and disruptions to traffic.

Air quality will be affected during the removal of pavement and earth, and during movement of trench materials such as sand, subbase and backfill. The air quality and dust are related. Once the airborne particles settle, this dust will need to be removed from streets, residential vehicles, structures and windows. This can be minimized by using water on sand and dirt materials to keep particles from being launched airborne and sweeping of the streets where dust collects will also help reduce it from being airborne again and being washed into the storm sewer system.

Noise will occur due to the heavy machinery, removal of dirt and pavement, and installation of the new facilities. Constant loading and unloading of materials and equipment will also contribute as well as the added traffic from the equipment and workers at the site. The City's ordinance restricts working hours and will be enforced during construction to minimize impacts on residents.

Disruptions to traffic will occur around the immediate work zone. Access to residences will be maintained but streets may not be open to through traffic during all phases of construction. When open trenches are present, and during and after the restoration of pavement, street parking will be prohibited. Advanced notification will occur so residents can plan around these limitations.

Customers will be without water service for 2 to 4 hours at some point during the new water main installation, or lead service replacement, when their water service line is connected to the new main or completely replaced. Advanced notice will be provided to all impacted customers. In the case of a lead water service replacement residents are required to provide access to their homes so their water line inside the house can be replaced at the water meter.

After construction is complete, customers served by the new water mains may find their water pressures have improved and experience less incidences of cloudy or discolored water. Lead service replacements also increase customers' water quality.

4.2.3 Social Impacts

The overall cost of the new facilities for water system customers will be approximately $79 per year. This equals less than $7 per month for customers residing in single family homes. Small businesses may experience an annual cost of $199 to $632 or $17 to $53 monthly. And for large businesses a cost of $1,185 to $3,950 annually, or $99 to $330 may occur. While any increase may be a burden for some, these increases are considered modest for the benefit of eliminating lead in water and increasing the reliability of the overall water system.

4.2 Indirect Impacts

- No new development is anticipated in the City of Inkster. Minor redevelopment is expected over the next 20 years. The population is projected to increase by 2045 to the equivalent of the total population in 2020.

- Changes in land use are not anticipated to occur due to the improvements described in this report.
- Air quality is expected to remain the same and will not be affected long term by the improvements described in this report.
- The water quality of the potable water system is expected to improve with the implementation of the improvements described in this report.
- Secondary growth is not expected to occur due to improvements described in this report.
- The aesthetics of the community are not expected to be impacted by the improvements described in this report.

4.2 Cumulative Impacts

Cumulative impacts are mostly seen as positive by implementing the projects described in this report. Positive impacts include improved water system reliability, increased water delivery, improved water quality and the reduction of lead contaminants. Negative cumulative impacts include the cost passed on to the customer. However, if this cost is compared to the cost of the continued operation and maintenance costs to repair the system that will continue to fail, this cost is modestly incremental.

5 MITIGATION

Mitigating the short-term impacts that occur during construction has been covered throughout this report and is summarized below:

- Air Quality and Dust - Spray water on sand and dirt materials to keep dust particles to a minimum during excavating activities and when dirt and sand materials are being transferred. Regularly sweeping of the streets where dust collects to reduce it from being transferred or being washed into the storm sewer system.
- Adjacent River/Wetlands – Implement and maintain erosion and sedimentation control measures as required by the State of Michigan Natural Resources and Environmental Protection Act Part 91.
- Noise – Enforce the City's ordinance that restricts working hours during construction to minimize impacts on residents.
- Traffic Disruptions – Provide advanced notice to residents directly adjacent to the construction area and the community in general regarding limited access on streets and prohibited parking on streets. Enforce requirements for the contractor to provide access to all residences during construction.
- Interruptions to Water Service – Provide advanced notification to customers and meet all scheduled times. Make appropriate accommodation for alternate water sources when schedules change.

6 PUBLIC PARTICIPATION

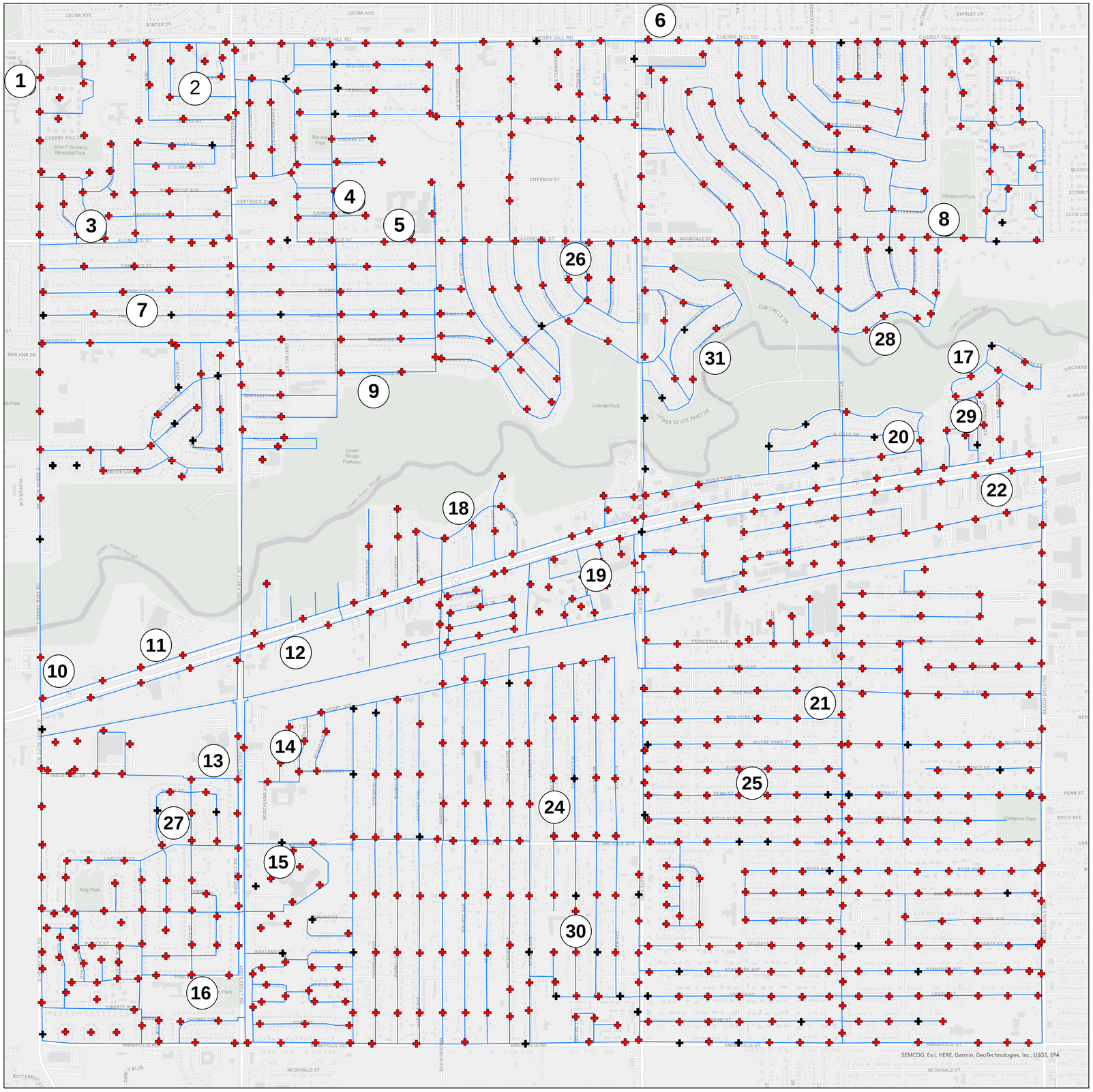
Appendix I – Hydrant Flow Test Data

CITY OF INKSTER, MI

2024 HYDRANT FLOW DATA SUMMARY

Test No.	Test Location	Service	Flow GPM	Pressure - PSI		Flow @ 20psi	Comments
				Static	Residual		
1	Henry Ruff south of Cherry Hill	City of Inkster	750	39	30	1123	
2	R-29628, F-29533 Edward	City of Inkster	500	40	31	770	
3	R-775, F-710 Claire	City of Inkster	530	41	26	636	Replaced Avondale Phase 1
4	Grandview/Birchwood/ Eastern	City of Inkster	750	44	34	1203	
5	Avondale and Harrison	City of Inkster	840	44	30	1124	
6	SE Corner of Inkster & Cherry Hill	City of Inkster	920	47	36	1494	
7	Glenwood	City of Inkster	650	41	31	970	Replaced Avnondale Phase 2
8	Avondale near Blackstone	City of Inkster	840	45	32	1196	
9	Rosewood by Central and Eastern	City of Inkster	380	45	26	441	
10	Henry Ruff North of Michigan	City of Inkster	#N/A	45	41	#N/A	
11	WB Michigan between Henry Ruff and Middle Belt	City of Inkster	650	43	25	742	
12	EB Michigan Ave just east of Middle Belt	City of Inkster	750	43	33	1176	
13	30000 Industrial	City of Inkster	710	39	35	1647	
14	Beech and Ludington	City of Inkster	630	41	29	852	Replaced Manning, Ludington, Kewadin
15	Baylor School	City of Inkster	480	36	29	750	
16	Pine west of Middle Belt	City of Inkster	650	39	29	919	
17	South River Park Drive and Woodbine	City of Inkster	605	43	0	432	Test Abandoned 2020
18	Justine and Riverview	City of Inkster	#N/A	42	38	#N/A	
19	27425 Michigan	City of Inkster	605	44	34	971	
20	West Hills and S River Park	City of Inkster	#N/A	0	0	#N/A	
21	John Daly and New York	City of Inkster	530	44	16	488	
22	Eastbound Michigan Ave. west of Beech Daly	City of Inkster	750	43	31	1066	
23	Annapolis and Beech Daly	City of Inkster	650	43	30	885	
24	Henry between Andover and Carlysle	City of Inkster	290	42	35	538	
25	Penn between Sylvia and Princess	City of Inkster	530	44	26	619	
26	28494 Colonial	City of Inkster	380	45	26	441	New watermain
27	3685 Fox to Carlysle	City of Inkster	530	36	21	549	Low pressure reported at 3549 Farnum
28	River Park Drive Avondale to Sunningdale	City of Inkster	710	49	37	1143	New pipeline
29	Heatherwood apartments	City of Inkster	650	44	29	838	Heatherwood Apts
30	4131 Will	City of Inkster	650	44	27	783	
31	1376 S River Park Drive	City of Inkster	380	48	37	629	

2024 Hydrant Flow Study



Legend

Hydrants
- Working
- Not Working

Water Main

N

0 500 1,000 2,000 3,000 4,000 Feet

Inkster
Discover. Grow. Unite.

benesch

CITY OF INKSTER
2024 HYDRANT FLOW TEST

Date:	4/16/2024		Test Start	10:02 AM	
Test Site Number	1		Test End	10:36 AM	
Tester Name	Nakeya Walker		Witness	Jeremiah B	
Purpose					
Static Hydrant #	OBJ_1:331	Pressure Reading (P_S)	39	PSI	
Residual Hydrant:		Pressure Reading (P_R)	30	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	20	PSI	
Manufacturer	EJIW	Model	TC	Year	1967
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Henry Ruff south of Cherry Hill				
Comments					
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	750				

Date:	4/16/2024		Test Start	10:42 AM	
Test Site Number	2		Test End	11:13 PM	
Tester Name	Nakeya W.		Witness	Jeremiah B.	
Purpose					
Static Hydrant #	OBJ_1:276	Pressure Reading (P_S)	40	PSI	
Residual Hydrant:		Pressure Reading (P_R)	31	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	9	PSI	
Manufacturer	EJIW	Model	Ejiw	Year	1958
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	R-29628, F-29533 Edward				
Comments					
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	500				

Date:	4/16/2024		Test Start	11:25 PM	
Test Site Number	3		Test End	12:02 PM	
Tester Name	Nakeya W		Witness	Jeremiah B.	
Purpose					
Static Hydrant #		Pressure Reading (P_S)	41	PSI	
Residual Hydrant:		Pressure Reading (P_R)	26	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	10	PSI	
Manufacturer	EJIW	Model	DFD	Year	1955
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	R-775, F-710 Claire				
Comments $Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	530				

Date:	4/16/2020		Test Start		1:00 PM
Test Site Number	4		Test End		1:21 PM
Tester Name	Nakeya W.		Witness	Jeremiah B.	
Purpose	H4AB				
Static Hydrant #	OBJ_1: 265	Pressure Reading (P_S)	44	PSI	
Residual Hydrant:		Pressure Reading (P_R)	34	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	20	PSI	
Manufacturer	EJIW	Model	DFD	Year	1930
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Grandview/Birchwood/ Eastern				
Comments $Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	750				

Date:	4/16/2024		Test Start		1:27 PM
Test Site Number	5		Test End		1:39 PM
Tester Name	Nakeya W.		Witness	Jeremiah	
Purpose					
Static Hydrant #		Pressure Reading (P_S)	44	PSI	
Residual Hydrant:		Pressure Reading (P_R)	30	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	25	PSI	
Manufacturer	EJIW	Model	DFD	Year	1941
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Avondale and Harrison				
Comments					
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	840				

Date:	4/16/2024		Test Start		1:00 PM
Test Site Number	6		Test End		1:30 PM
Tester Name	Nakeya W.		Witness	Jeremiah B.	
Purpose					
Static Hydrant #	OBJ_1:150	Pressure Reading (P_S)	47	PSI	
Residual Hydrant:		Pressure Reading (P_R)	36	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	30	PSI	
Manufacturer	EJIW	Model	DFD	Year	1941
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	SE Corner of Inkster & Cherry Hill				
Comments	A/R=Family Dollar & B/F= VIP Wear				
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	920				

Date:	4/26/2024		Test Start		11:18 PM
Test Site Number	7		Test End		12:40 PM
Tester Name	Nakeya W		Witness	Jeremiah	
Purpose					
Static Hydrant #		Pressure Reading (P_S)	41	PSI	
Residual Hydrant:		Pressure Reading (P_R)	31	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	15	PSI	
Manufacturer	EJIW	Model	DFD	Year	1952
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Glenwood				
Comments					
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	650				

Date:	4/16/2024		Test Start	11:05 a.m.	
Test Site Number	8		Test End	11:28 p.m.	
Tester Name	Nakeya W.		Witness	Jeremiah B.	
Purpose					
Static Hydrant #		Pressure Reading (P_S)	45	PSI	
Residual Hydrant:		Pressure Reading (P_R)	32	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	25	PSI	
Manufacturer	EJIW	Model	DFD	Year	1997
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Avondale near Blackstone				
Comments					
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	840				

Date:	4/16/2024		Test Start		11:26 AM
Test Site Number	9		Test End		12:01 AM
Tester Name	Nakeya W.		Witness	Jeremiah B.	
Purpose			Witness		
Static Hydrant #		Pressure Reading (P_S)	45	PSI	
Residual Hydrant:		Pressure Reading (P_R)	26	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	5	PSI	
Manufacturer	EJIW	Model	DFD	Year	1931
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Rosewood by Central and Eastern				
Comments	28494 & 28660				
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	380				

Date:	4/17/2024		Test Start	12:15 P.M.	
Test Site Number	10		Test End	12:45 P.M.	
Tester Name	Nakeya Walker		Witness	Jeremiah	
Purpose			Witness		
Static Hydrant #		Pressure Reading (P_S)	45	PSI	
Residual Hydrant:		Pressure Reading (P_R)	41	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	1.2	PSI	
Manufacturer	EJIW	Model	TC	Year	1978
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Henry Ruff North of Michigan				
Comments $Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	#N/A				

Date:	4/17/2024		Test Start	12:50 PM	
Test Site Number	11		Test End	1:22 PM	
Tester Name	Nakeya W.		Witness	Jeremiah B.	
Purpose			Witness	Kim Bright	
Static Hydrant #		Pressure Reading (P_S)	43	PSI	
Residual Hydrant:		Pressure Reading (P_R)	25	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	15	PSI	
Manufacturer	EJIW	Model	TC	Year	1931
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	WB Michigan between Henry Ruff and Middle Belt				
Comments					
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	650				

Date:	4/26/2024		Test Start		9:22 AM
Test Site Number	12		Test End		10:10 AM
Tester Name	Nakeya W.		Witness	Jeremiah B.	
Purpose			Witness		
Static Hydrant #		Pressure Reading (P_S)	43	PSI	
Residual Hydrant:		Pressure Reading (P_R)	33	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	20	PSI	
Manufacturer	EJIW	Model	TC	Year	2016
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	EB Michigan Ave just east of Middle Belt				
Comments	28661 & 28473				
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	750				

Date:	4/23/2024		Test Start		8:45 AM
Test Site Number	13		Test End		9:15 AM
Tester Name	Nakeya W.		Witness	Otis	
Purpose			Witness	Zane	
Static Hydrant #		Pressure Reading (P_S)	39	PSI	
Residual Hydrant:		Pressure Reading (P_R)	35	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	18	PSI	
Manufacturer	EJIW	Model	TC	Year	1978
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	30000 Industrial				
Comments					
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	710				

Date:	4/23/2024		Test Start	8:45 A.M.	
Test Site Number	14		Test End	9:15 P.M.	
Tester Name	Nakeya W.		Witness	Otis	
Purpose			Witness	Zane	
Static Hydrant #		Pressure Reading (P_S)	41	PSI	
Residual Hydrant:		Pressure Reading (P_R)	29	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	14	PSI	
Manufacturer	EJIW	Model	TC	Year	2021
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Beech and Ludington				
Comments					
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	630				

Date:	4/23/2020		Test Start		1:01 PM
Test Site Number	15		Test End		1:28 PM
Tester Name	Nakeya W.		Witness	Otis L.	
Purpose			Witness		
Static Hydrant #		Pressure Reading (P_S)	36	PSI	
Residual Hydrant:		Pressure Reading (P_R)	29	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	8	PSI	
Manufacturer	EJIW	Model	TC	Year	1991
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Baylor School				
Comments	28685 Carlyse				
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	480				

Date:	11/6/2020		Test Start	10:02 AM	
Test Site Number	16		Test End	10:35 AM	
Tester Name	Nakeya W.		Witness	Otis	
Purpose			Witness		
Static Hydrant #		Pressure Reading (P_S)	39	PSI	
Residual Hydrant:		Pressure Reading (P_R)	29	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	15	PSI	
Manufacturer	EJIW	Model	TC	Year	1968
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Pine west of Middle Belt				
Comments					
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	650				

Date:	4/25/2024		Test Start		8:58 PM
Test Site Number	17		Test End		10:02 PM
Tester Name	Nakeya		Witness	Otis	
Purpose			Witness		
Static Hydrant #		Pressure Reading (P_S)	43	PSI	
Residual Hydrant:		Pressure Reading (P_R)	32	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	13	PSI	
Manufacturer	EJIW	Model	TC	Year	1955
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	South River Park Drive and Woodbine				
Comments					
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	605				

Date:	4/24/2024		Test Start	9:15 AM	
Test Site Number	18		Test End	9:44 AM	
Tester Name	Nakeya W.		Witness	Jeremiah B.	
Purpose					
Static Hydrant #		Pressure Reading (P_S)	42	PSI	
Residual Hydrant:		Pressure Reading (P_R)	38	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	n/a	PSI	
Manufacturer	EJIW	Model	TC	Year	2016
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Justine and Riverview				
Comments	no accurate reading				
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	#N/A				

Date:	4/25/2024		Test Start		2:25 PM
Test Site Number	19		Test End		3:18 PM
Tester Name	Nakeya W.		Witness	Otis	
Purpose			Witness		
Static Hydrant #		Pressure Reading (P_S)	44	PSI	
Residual Hydrant:		Pressure Reading (P_R)	34	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	13	PSI	
Manufacturer	EJIW	Model	TC	Year	1977
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	27425 Michigan				
Comments	27575 Michigan				
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	605				

Date:	4/25/2024		Test Start		1:16 PM
Test Site Number	20		Test End		1:26 PM
Tester Name	Nakeya W		Witness	Jeremiah B.	
Purpose			Witness		
Static Hydrant #		Pressure Reading (P_S)		PSI	
Residual Hydrant:		Pressure Reading (P_R)		PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})		PSI	
Manufacturer	EJIW	Model		Year	
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	West Hills and S River Park				
Comments					
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	#N/A				

All had problems; leak on nut, rounded nut, leak on nozzle opening
no other Hydrants to test in area

Date:	4/25/2024		Test Start	10:21 PM	
Test Site Number	21		Test End	10:48 PM	
Tester Name	Nakeya W.		Witness	Jeremiah	
Purpose			Witness		
Static Hydrant #		Pressure Reading (P_S)	44	PSI	
Residual Hydrant:		Pressure Reading (P_R)	16	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	10	PSI	
Manufacturer	EJIW	Model	TC	Year	1931
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	John Daly and New York				
Comments	26911				
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	530				

Dropped below 20 PSI (16) then went back to the Static Pressure once the flow hydrant was closed.

Date:	4/16/2020		Test Start		10:08 PM
Test Site Number	22		Test End		10:28 PM
Tester Name	Nakeya W.		Witness	Jeremiah	
Purpose			Witness		
Static Hydrant #		Pressure Reading (P_S)	43	PSI	
Residual Hydrant:		Pressure Reading (P_R)	31	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	20	PSI	
Manufacturer	EJIW	Model	TC	Year	2016
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Eastbound Michigan Ave. west of Beech Daly				
Comments	26051				
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	750				

Date:	4/24/2024		Test Start		9:43 PM
Test Site Number	23		Test End		10:03 PM
Tester Name	Nakeya W.		Witness	Otis B.	
Purpose			Witness		
Static Hydrant #		Pressure Reading (P_S)	43	PSI	
Residual Hydrant:		Pressure Reading (P_R)	30	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	15	PSI	
Manufacturer	EJIW	Model	TC	Year	1953
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Annapolis and Beech Daly				
Comments	25831				
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	650				

Date:	4/23/2024		Test Start	2:55 AM	
Test Site Number	24		Test End	4:00 PM	
Tester Name	Nakeya W.		Witness	Otis B	
Purpose			Witness		
Static Hydrant #		Pressure Reading (P_S)	42	PSI	
Residual Hydrant:		Pressure Reading (P_R)	35	PSI	
Flow Hydrant	B	Pitot Tube Reading (P_{PT})	3	PSI	
Manufacturer	EJIW	Model	TC	Year	1953
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Henry between Andover and Carlysle				
Comments	Very low flows in this area				
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	290				

Date:	4/24/2024		Test Start		9:01 PM
Test Site Number	25		Test End		9:26 PM
Tester Name	Nakeya W.		Witness	Otis	
Purpose			Witness		
Static Hydrant #		Pressure Reading (P_S)	44	PSI	
Residual Hydrant:		Pressure Reading (P_R)	26	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	10	PSI	
Manufacturer	EJIW	Model	TC	Year	1978
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Penn between Sylvia and Princess				
Comments	27008				
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	530				

Date:	4/16/2024		Test Start	11:26 AM	
Test Site Number	26		Test End	12:01 P.M.	
Tester Name	Nakeya W.		Witness	Jeremiah B.	
Purpose					
Static Hydrant #		Pressure Reading (P_S)	45	PSI	
Residual Hydrant:		Pressure Reading (P_R)	26	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	5	PSI	
Manufacturer	EJIW	Model	DFD	Year	1931
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	28494 Colonial				
Comments $Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	380				

Date:	4/23/2024		Test Start	9:26:00 P.M.	
Test Site Number	27		Test End	9:58 A.M.	
Tester Name	Nakeya W.		Witness	Otis	
Purpose					
Static Hydrant #		Pressure Reading (P_S)	36	PSI	
Residual Hydrant:		Pressure Reading (P_R)	21	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	10	PSI	
Manufacturer	EJIW	Model	DFD	Year	1963
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	3685 Fox to Carlysle				
Comments $Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	530				

Date:	11/3/2020		Test Start		10:59 AM
Test Site Number	28		Test End		11:39
Tester Name	Nakeya W.		Witness	Otis L.	
Purpose					
Static Hydrant #		Pressure Reading (P_S)	49	PSI	
Residual Hydrant:		Pressure Reading (P_R)	37	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	18	PSI	
Manufacturer	EJIW	Model	DFD	Year	1941
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	River Park Drive Avondale to Sunningdale				
Comments $Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	710				

Date:	4/16/2024		Test Start		10:31 AM
Test Site Number	29		Test End		10:47 AM
Tester Name	Nakeya W.		Witness	Jeremiah B.	
Purpose					
Static Hydrant #		Pressure Reading (P_S)	44	PSI	
Residual Hydrant:		Pressure Reading (P_R)	29	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	15	PSI	
Manufacturer	EJIW	Model	DFD	Year	1941
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	Heatherwood apartments				
Comments	1730				
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	650				

Date:	4/24/2024		Test Start		8:15 AM
Test Site Number	30		Test End		8:50 PM
Tester Name	Nakeya W		Witness	Jeremiah B	
Purpose					
Static Hydrant #		Pressure Reading (P_S)	44	PSI	
Residual Hydrant:		Pressure Reading (P_R)	27	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	15	PSI	
Manufacturer	EJIW	Model	DFD	Year	1941
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	4131 Will				
Comments $Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	650				

Date:	4/25/2024		Test Start	1:25 PM	
Test Site Number	31		Test End	2:05 PM	
Tester Name	Nakeya W.		Witness	Otis L.	
Purpose					
Static Hydrant #		Pressure Reading (P_S)	48	PSI	
Residual Hydrant:		Pressure Reading (P_R)	37	PSI	
Flow Hydrant		Pitot Tube Reading (P_{PT})	5	PSI	
Manufacturer	EJIW	Model	DFD	Year	2022
Nozzle Diameter (d)(in)	2.5	Nozzle Coefficient (c)	0.8		
Location	1376 S River Park Drive				
Comments					
$Q=29.84*d^2*P_{PT}^{1/2}*C$=Flow in GPM					
Flow GPM	380				

Appendix II – FEMA Floodplain Map

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Michigan State Plane South zone 6401 (FIPSZONE 2113). The **horizontal datum** was NAD83. Differences in datum, spheroid, projection or state plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910 - 3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**,or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was derived from the Wayne County Geographic Management Unit at a scale of 1:7920 from aerial photography dated April 2001.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

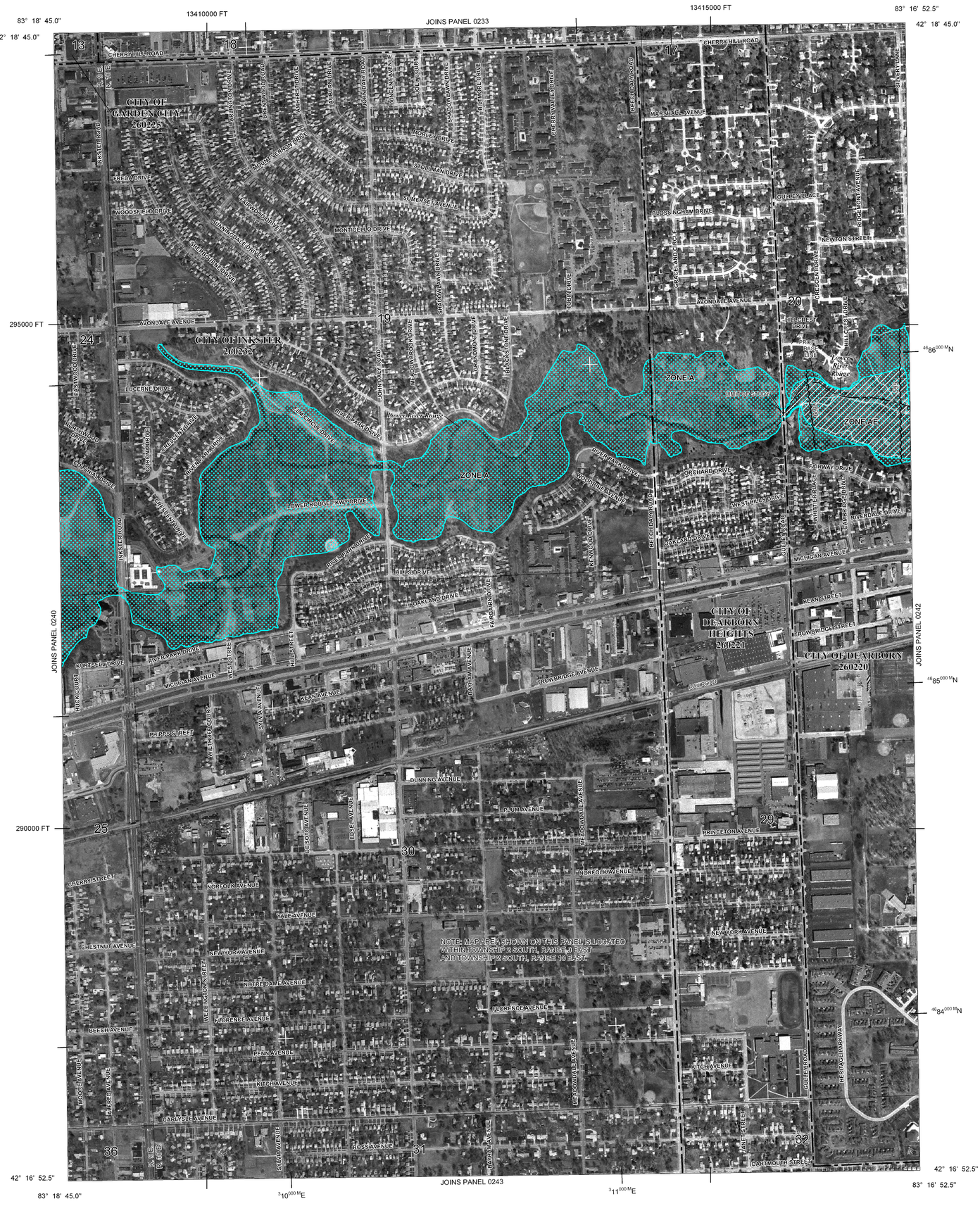
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov/. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** or visit the FEMA website at http://www.fema.gov/business/nfip.

The **profile base lines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile base line**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100 year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard may include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside of the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 10) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- Bridge
- Culvert
- 85° 03' 45.0" , 41° 24' 22.5" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4687000 M — 1000-meter Universal Transverse Mercator grid values, zone 17
- 2250000 FT — 5000-foot grid ticks: Michigan State Plane South Coordinate System, 6401 zone (FIPSZONE 2113), Lambert Conformal Conic Projection
- KA0015 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
February 2, 2012

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1 " = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0241E

FIRM
FLOOD INSURANCE RATE MAP

WAYNE COUNTY, MICHIGAN
(ALL JURISDICTIONS)

PANEL 241 OF 575
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DEARBORN, CITY OF	260220	0241	E
DEARBORN HEIGHTS, CITY OF	260221	0241	E
GARDEN CITY, CITY OF	260225	0241	E
INKSTER, CITY OF	260232	0241	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
26163C0241E

EFFECTIVE DATE
FEBRUARY 2, 2012

Federal Emergency Management Agency

Appendix III – Detailed Cost Estimates for Alternatives 1 & 2

CITY OF INKSTER
2026 WATER & LEAD SERVICE REPLACEMENT PROGRAM
ALTERNATIVE 1

Project Location			Length (ft)	Construction Cost	Engineering & Admin Cost (25%)	Total Project Cost
Street	From	To				
S. River Park Dr	Prado	Woodbine	770	$ 500,500	$ 125,125	$ 625,625
S. River Park Dr	Woodbine	S. Beech Daly	1060	$ 689,000	$ 172,250	$ 861,250
Prado	S. River Park Dr	Woodbine	770	$ 500,500	$ 125,125	$ 625,625
Woodbine	S. River Park Dr	Prado	350	$ 227,500	$ 56,875	$ 284,375
Woodbine	Prado	S. Beech Daly	700	$ 455,000	$ 113,750	$ 568,750
Kenwood	Michigan	Prado	1250	$ 812,500	$ 203,125	$ 1,015,625
Beech Daly	Woodbine	S. River Park Dr	330	$ 214,500	$ 53,625	$ 268,125
Franklin (Park at Heatherwoods Apt)	Michigan	Prado	900	$ 585,000	$ 146,250	$ 731,250
Heatherwood Drive	Michigan	Franklin	1200	$ 780,000	$ 195,000	$ 975,000
Heatherwood Drive	Heatherwood Drive	Prado	380	$ 247,000	$ 61,750	$ 308,750
Kurtsell	Huck	Inkster	460	$ 299,000	$ 74,750	$ 373,750
Huck	Michigan	Kurtsell	410	$ 266,500	$ 66,625	$ 333,125
S. River Park Dr	John Daly	Hill/Oakland	1710	$ 1,111,500	$ 277,875	$ 1,389,375
S. River Park Dr	Hill/Oakland	W Hills	2420	$ 1,573,000	$ 393,250	$ 1,966,250
Oakland	Hill	Fairbairn	2040	$ 1,326,000	$ 331,500	$ 1,657,500
Fairbairn	Michigan	S River Park	800	$ 520,000	$ 130,000	$ 650,000
Moore Circle, Moore Court	Moore Ave	Annapolis	1410	$ 916,500	$ 229,125	$ 1,145,625
Rosewood	Harrison	Middle Belt	2640	$ 1,716,000	$ 429,000	$ 2,145,000
Sherbourne	Dead end	Avondale/N. River Park Dr	2420	$ 1,573,000	$ 393,250	$ 1,966,250
		SubTotals	22,020	$ 14,313,000	$ 3,578,250	$ 17,891,250

Lead Service Line Contract in addtion to Water Main Replacement	Each	Construction Cost	Engineering & Admin Cost	Total Project Cost
Lead Service Line Replacement (min. number of lead service line reaplacements annually)	90	$ 900,000	$ 225,000	$ 1,125,000
SubTotals	90	$ 900,000	$ 225,000	$ 1,125,000

TOTAL COST	**$ 19,016,250**

CITY OF INKSTER
2027 WATER & LEAD SERVICE REPLACEMENT PROGRAM
ALTERNATIVE 1

Project Location			Length (ft)	Construction Cost	Engineering & Admin Cost (25%)	Total Project Cost
Street	**From**	**To**				
Ross WM/LSLR	Sylvia	Beech Daly	3960	$ 2,574,000	$ 643,500	$ 3,217,500
Dartmouth WM/LSLR	Sylvia	Beech Daly	3960	$ 2,574,000	$ 643,500	$ 3,217,500
Andover WM/LSLR	Bayhan	Beech Daly	1850	$ 1,202,500	$ 300,625	$ 1,503,125
Colgate WM/LSLR	John Daly	Beech Daly	2640	$ 1,716,000	$ 429,000	$ 2,145,000
Stanford WM/LSLR	John Daly	Beech Daly	2640	$ 1,716,000	$ 429,000	$ 2,145,000
Lehigh	John Daly	Beech Daly	2640	$ 1,716,000	$ 429,000	$ 2,145,000
		SubTotals	17,690	$ 11,498,500	$ 2,874,625	$ 14,373,125

Lead Service Line Contract in addtion to Water Main Replacement	Each	Construction Cost	Engineering & Admin Cost	Total Project Cost
Lead Service Line Replacement (min. number of lead service line reaplacements annually)	90	$ 900,000	$ 225,000	$ 1,125,000
SubTotals	90	$ 900,000	$ 225,000	$ 1,125,000

TOTAL COST	**$ 15,498,125**

CITY OF INKSTER
2028 WATER & LEAD SERVICE REPLACEMENT PROGRAM
ALTERNATIVE 1

Project Location			Length (ft)	Construction Cost	Engineering & Admin Cost (25%)	Total Project Cost
Street	**From**	**To**				
Phipps	Inkster	Wiethoff	700	$ 455,000	$ 113,750	$ 568,750
Hamlin	RR ROW		870	$ 565,500	$ 141,375	$ 706,875
Kean	Sylvia	Princess	620	$ 403,000	$ 100,750	$ 503,750
Princess	Michigan	Trowbridge	310	$ 201,500	$ 50,375	$ 251,875
Dunning	John Daly	Meadowdale	1900	$ 1,235,000	$ 308,750	$ 1,543,750
Plum	John Daly	Meadowdale	1900	$ 1,235,000	$ 308,750	$ 1,543,750
Meadowdale	Dunning	Plum	400	$ 260,000	$ 65,000	$ 325,000
Bayhan	Princeton	Carlysle	2640	$ 1,716,000	$ 429,000	$ 2,145,000
Norfolk WM/LSLR	Inkster	Bayhan	4520	$ 2,938,000	$ 734,500	$ 3,672,500
New York WM/LSLR	Inkster	John Daly	2660	$ 1,729,000	$ 432,250	$ 2,161,250
Florence WM	Inkster	John Daly	2660	$ 1,729,000	$ 432,250	$ 2,161,250
		SubTotals	19,180	$ 12,467,000	$ 3,116,750	$ 15,583,750

Lead Service Line Contract in addtion to Water Main Replacement	Each	Construction Cost	Engineering & Admin Cost	Total Project Cost
Lead Service Line Replacement (min. number of lead service line reaplacements annually)	90	$ 900,000	$ 225,000	$ 1,125,000
SubTotals	90	$ 900,000	$ 225,000	$ 1,125,000

TOTAL COST	**$ 16,708,750**

CITY OF INKSTER
2029 WATER & LEAD SERVICE REPLACEMENT PROGRAM
ALTERNATIVE 1

Project Location			Length (ft)	Construction Cost	Engineering & Admin Cost (25%)	Total Project Cost
Street	**From**	**To**				
Walnut WM/LSLR	RR ROW	Annalpolis	5100	$ 3,315,000	$ 828,750	$ 4,143,750
Harriet WM/LSLR	Cherry	Annapolis	4640	$ 3,016,000	$ 754,000	$ 3,770,000
Springhill WM/LSLR	Cherry	Annapolis	3450	$ 2,242,500	$ 560,625	$ 2,803,125
Hickory WM/LSLR	RR ROW	Annalpolis	4330	$ 2,814,500	$ 703,625	$ 3,518,125
		SubTotals	17,520	$ 11,388,000	$ 2,847,000	$ 14,235,000

Lead Service Line Contract in addtion to Water Main Replacement	Each	Construction Cost	Engineering & Admin Cost	Total Project Cost
Lead Service Line Replacement (min. number of lead service line reaplacements annually)	90	$ 900,000	$ 225,000	$ 1,125,000
SubTotals	90	$ 900,000	$ 225,000	$ 1,125,000

TOTAL COST	**$ 15,360,000**

CITY OF INKSTER
2030 WATER & LEAD SERVICE REPLACEMENT PROGRAM
ALTERNATIVE 1

Project Location			Length (ft)	Construction Cost	Engineering & Admin Cost (25%)	Total Project Cost
Street	**From**	**To**				
Florence WM/LSLR	Bayhan	Beech Daly	1860	$ 1,209,000	$ 302,250	$ 1,511,250
Kitch WM/LSLR	Inkster	East of MeadowDale	4320	$ 2,808,000	$ 702,000	$ 3,510,000
Andover WM/LSLR	Sylvia	John Daly	1320	$ 858,000	$ 214,500	$ 1,072,500
Stanford WM/LSLR	Inkster	John Daly	2660	$ 1,729,000	$ 432,250	$ 2,161,250
Hopkins WM/LSLR	Inkster	East of Bayhan	5300	$ 3,445,000	$ 861,250	$ 4,306,250
Oakwood WM/LSLR	Henry Ruff	Harrison	5920	$ 3,848,000	$ 962,000	$ 4,810,000
		SubTotals	21,380	$ 13,897,000	$ 3,474,250	$ 17,371,250

Lead Service Line Contract in addtion to Water Main Replacement	Each	Construction Cost	Engineering & Admin Cost	Total Project Cost
Lead Service Line Replacement (min. number of lead service line reaplacements annually)	90	$ 900,000	$ 225,000	$ 1,125,000
SubTotals	90	$ 900,000	$ 225,000	$ 1,125,000

TOTAL COST	**$ 18,496,250**

CITY OF INKSTER
2026 WATER & LEAD SERVICE REPLACEMENT PROGRAM
ALTERNATIVE 2

Project Location			Length (ft)	Construction Cost	Engineering & Admin Cost (25%)	Total Project Cost
Street	From	To				
S. River Park Dr	Prado	Woodbine	770	$ 500,500	$ 125,125	$ 625,625
S. River Park Dr	Woodbine	S. Beech Daly	1060	$ 689,000	$ 172,250	$ 861,250
Prado	S. River Park Dr	Woodbine	770	$ 500,500	$ 125,125	$ 625,625
Woodbine	S. River Park Dr	Prado	350	$ 227,500	$ 56,875	$ 284,375
Woodbine	Prado	S. Beech Daly	700	$ 455,000	$ 113,750	$ 568,750
Kenwood	Michigan	Prado	1250	$ 812,500	$ 203,125	$ 1,015,625
Beech Daly	Woodbine	S. River Park Dr	330	$ 214,500	$ 53,625	$ 268,125
Franklin (Park at Heatherwoods Apt)	Michigan	Prado	900	$ 585,000	$ 146,250	$ 731,250
Heatherwood Drive	Michigan	Franklin	1200	$ 780,000	$ 195,000	$ 975,000
Heatherwood Drive	Heatherwood Drive	Prado	380	$ 247,000	$ 61,750	$ 308,750
Kurtsell	Huck	Inkster	460	$ 299,000	$ 74,750	$ 373,750
Huck	Michigan	Kurtsell	410	$ 266,500	$ 66,625	$ 333,125
S. River Park Dr	John Daly	Hill/Oakland	1710	$ 1,111,500	$ 277,875	$ 1,389,375
S. River Park Dr	Hill/Oakland	W Hills	2420	$ 1,573,000	$ 393,250	$ 1,966,250
Oakland	Hill	Fairbairn	2040	$ 1,326,000	$ 331,500	$ 1,657,500
Fairbairn	Michigan	S River Park	800	$ 520,000	$ 130,000	$ 650,000
Moore Circle, Moore Court	Moore Ave	Annapolis	1410	$ 916,500	$ 229,125	$ 1,145,625
Rosewood	Harrison	Middle Belt	2640	$ 1,716,000	$ 429,000	$ 2,145,000
Sherbourne	Dead end	Avondale/N. River Park Dr	2420	$ 1,573,000	$ 393,250	$ 1,966,250
Lead Service Line Replacement				$ 765,000	$ 191,250	$ 956,250

TOTALS	22,020	$ 15,078,000	$ 3,769,500	**$ 18,847,500**

CITY OF INKSTER
2027 WATER & LEAD SERVICE REPLACEMENT PROGRAM
ALTERNATIVE 2

Project Location			Length (ft)	Construction Cost	Engineering & Admin Cost (25%)	Total Project Cost
Street	**From**	**To**				
Ross WM/LSLR	Sylvia	Beech Daly	3960	$ 2,574,000	$ 643,500	$ 3,217,500
Dartmouth WM/LSLR	Sylvia	Beech Daly	3960	$ 2,574,000	$ 643,500	$ 3,217,500
Andover WM/LSLR	Bayhan	Beech Daly	1850	$ 1,202,500	$ 300,625	$ 1,503,125
Colgate WM/LSLR	John Daly	Beech Daly	2640	$ 1,716,000	$ 429,000	$ 2,145,000
Stanford WM/LSLR	John Daly	Beech Daly	2640	$ 1,716,000	$ 429,000	$ 2,145,000
Lehigh	John Daly	Beech Daly	2640	$ 1,716,000	$ 429,000	$ 2,145,000
Lead Service Line Replacement				$ 765,000	$ 191,250	$ 956,250
		TOTALS	17,690	$ 12,263,500	$ 3,065,875	**$ 15,329,375**

CITY OF INKSTER
2028 WATER & LEAD SERVICE REPLACEMENT PROGRAM
ALTERNATIVE 2

Project Location			Length (ft)	Construction Cost	Engineering & Admin Cost (25%)	Total Project Cost
Street	**From**	**To**				
Phipps	Inkster	Wiethoff	700	$ 455,000	$ 113,750	$ 568,750
Hamlin	RR ROW		870	$ 565,500	$ 141,375	$ 706,875
Kean	Sylvia	Princess	620	$ 403,000	$ 100,750	$ 503,750
Princess	Michigan	Trowbridge	310	$ 201,500	$ 50,375	$ 251,875
Dunning	John Daly	Meadowdale	1900	$ 1,235,000	$ 308,750	$ 1,543,750
Plum	John Daly	Meadowdale	1900	$ 1,235,000	$ 308,750	$ 1,543,750
Meadowdale	Dunning	Plum	400	$ 260,000	$ 65,000	$ 325,000
Bayhan	Princeton	Carlysle	2640	$ 1,716,000	$ 429,000	$ 2,145,000
Norfolk WM/LSLR	Inkster	Bayhan	4520	$ 2,938,000	$ 734,500	$ 3,672,500
New York WM/LSLR	Inkster	John Daly	2660	$ 1,729,000	$ 432,250	$ 2,161,250
Florence WM	Inkster	John Daly	2660	$ 1,729,000	$ 432,250	$ 2,161,250
Lead Service Line Replacement			n/a	765000	191250	$ 956,250
		TOTALS	19,180	$ 13,232,000	$ 3,308,000	**$ 16,540,000**

CITY OF INKSTER
2029 WATER & LEAD SERVICE REPLACEMENT PROGRAM
ALTERNATIVE 2

Project Location			Length (ft)	Construction Cost	Engineering & Admin Cost (25%)	Total Project Cost
Street	**From**	**To**				
Walnut WM/LSLR	RR ROW	Annalpolis	5100	$ 3,315,000	$ 828,750	$ 4,143,750
Harriet WM/LSLR	Cherry	Annapolis	4640	$ 3,016,000	$ 754,000	$ 3,770,000
Springhill WM/LSLR	Cherry	Annapolis	3450	$ 2,242,500	$ 560,625	$ 2,803,125
Hickory WM/LSLR	RR ROW	Annalpolis	4330	$ 2,814,500	$ 703,625	$ 3,518,125
Lead Service Line Replacement			n/a	$ 765,000	$ 191,250	$ 956,250
		TOTALS	17,520	$ 12,153,000	$ 3,038,250	**$ 15,191,250**

CITY OF INKSTER
2030 WATER & LEAD SERVICE REPLACEMENT PROGRAM
ALTERNATIVE 2

Project Location			Length (ft)	Construction Cost	Engineering & Admin Cost (25%)	Total Project Cost
Street	**From**	**To**				
Florence WM/LSLR	Bayhan	Beech Daly	1860	$ 1,209,000	$ 302,250	$ 1,511,250
Kitch WM/LSLR	Inkster	East of MeadowDale	4320	$ 2,808,000	$ 702,000	$ 3,510,000
Andover WM/LSLR	Sylvia	John Daly	1320	$ 858,000	$ 214,500	$ 1,072,500
Stanford WM/LSLR	Inkster	John Daly	2660	$ 1,729,000	$ 432,250	$ 2,161,250
Hopkins WM/LSLR	Inkster	East of Bayhan	5300	$ 3,445,000	$ 861,250	$ 4,306,250
Oakwood WM/LSLR	Henry Ruff	Harrison	5920	$ 3,848,000	$ 962,000	$ 4,810,000
Lead Service Line Replacement			n/a	$ 765,000	$ 191,250	$ 956,250
		TOTALS	21,380	$ 14,662,000	$ 3,665,500	**$ 18,327,500**