

**ANNUAL DEPARTMENT REPORT
UNDERGROUND FACILITIES**

December 2024

MISSION STATEMENT

1. Provide safe, quality drinking water in sufficient quantity to meet all customer needs; maintain water distribution and wastewater collection systems; using operating procedures and service maintenance methods to meet all federal and state requirements.
2. Maintain water and collection systems' integrity.
3. Plan and provide for water and collection system improvements and expansions necessary to meet the needs of our owners.

LIST OF PROJECTS THIS PAST YEAR

Improvements.....Page 12

WATER DISTRIBUTION

FIXED ASSETS AND INFRASTRUCTURE

Pumping Stations:



North Street Pumping Station
765 W. North Street



Inside the North Street Pumping Station

The **North Street Pumping Station** was constructed in 1945. This station is operated daily. It can operate alone or with the Miami Street Pumping Station. A complete renovation of pumps, motors, air system and electrical controls was completed in 2024. Currently, we have remote SCADA capabilities to control the pumps in this station. The dispatchers have control of all pumps. In a loss of power the station is supported by a 200kw diesel generator and transfer switch. The generator will start automatically when power is lost and can operate up to two pumps simultaneously. High service pumps #1, #2, #3, and #4 are in the North Street Pumping Station.

Pump #1 is an Aurora. This is a horizontal split-case centrifugal pump with a rated capacity of 1600 gpm (2.3 mgd). This pump is powered by a 100hp 3 phase constant speed electric motor. The unit is rated at 100.

Pump #2 is an Aurora. This is a horizontal split-case centrifugal pump with a rated capacity of 1200 gpm (1.75 mgd). This pump is powered by a 75hp 3 phase constant speed electric motor. The unit is rated at 100.

Pump #3 is an Aurora. This is a horizontal split-case centrifugal pump with a rated capacity of 1600 gpm (2.3 mgd). The pump is powered by a 100hp 3 phase constant speed electric motor. The unit is rated at 100.

Pump #4 is an Aurora. This is a horizontal split-case centrifugal pump with a rated capacity of 1400 gpm (2 mgd). The pump is powered by a 100hp 3 phase constant speed electric motor. The unit is rated at 100.

All pumps in the North Street Pump Station are rated at 165 of Total Dynamic Head (TDH).

The **Miami Street Pumping Station** was constructed in 1972 when Wilson Foods located their new facility in Marshall. It was renovated in 1989. This pumping station can operate alone or together with the North Street Pumping Station. This is a well-constructed and well-maintained building. The exterior brick and stonework are in good condition. High Service Pumps #5, #6, & #7 are in Miami Street Pumping Station.

Pump #5 is an Aurora, installed in 1973. It is a split-case centrifugal pump with a rated capacity of 1400 gpm (2 mgd) and a rated head of 170'. It is powered by a 100 hp 3-phase, constant-speed electric motor. The unit is rated at 75.

Pump #6 is an Aurora, installed in 1973. It is a split-case centrifugal pump with a rated capacity of 2450 gpm (3.5 mgd) and rated head of 170'. It is powered by a 150 hp 3-phase, constant-speed electric motor. This pump is one of the primary pumps used in the summer months. This unit is rated at 65.

Pump #7 is a Patterson, installed in 1988. It is a split-case centrifugal pump with a rated capacity of 2775 gpm (4 mgd) and a rated head of 174'. It is powered by a 200-hp 3-phase, constant-speed electric motor. Condition of this pump is 85.

The two sump pumps for the basement were pedestal-type pumps. These original pumps failed several years ago and were replaced with submersible sump pumps.



Miami Street Pumping Station



Inside of the Miami Street Pumping Station

In 1990, the Shafer, Kline, and Warren (A.C. Kirkwood) engineering firm tested all seven pumps. Results of these tests indicate that all pumps are operating well within their rating curves and capacity. We continue to be proud of the well-maintained condition of both water and sewer pumping stations.

Buildings:

In August of 1999, water, and wastewater collection crews (Underground Facilities) moved into our new *Service Center* facility at 1455 West Arrow, along with Engineering and the Fleet Mechanic. It is a pleasure to have all our equipment and operations under one roof. Our office area (60' x 85') houses offices, inventory supply, engineering, conference room, and bathrooms. About a quarter of this office space is leased by MSDC. The garage/equipment part of the structure is where we store pickups, tools, safety barricades, equipment, and backhoes. Its dimensions are 240' x 80'. The building is in excellent condition and should last for many years.



Underground Facilities Building

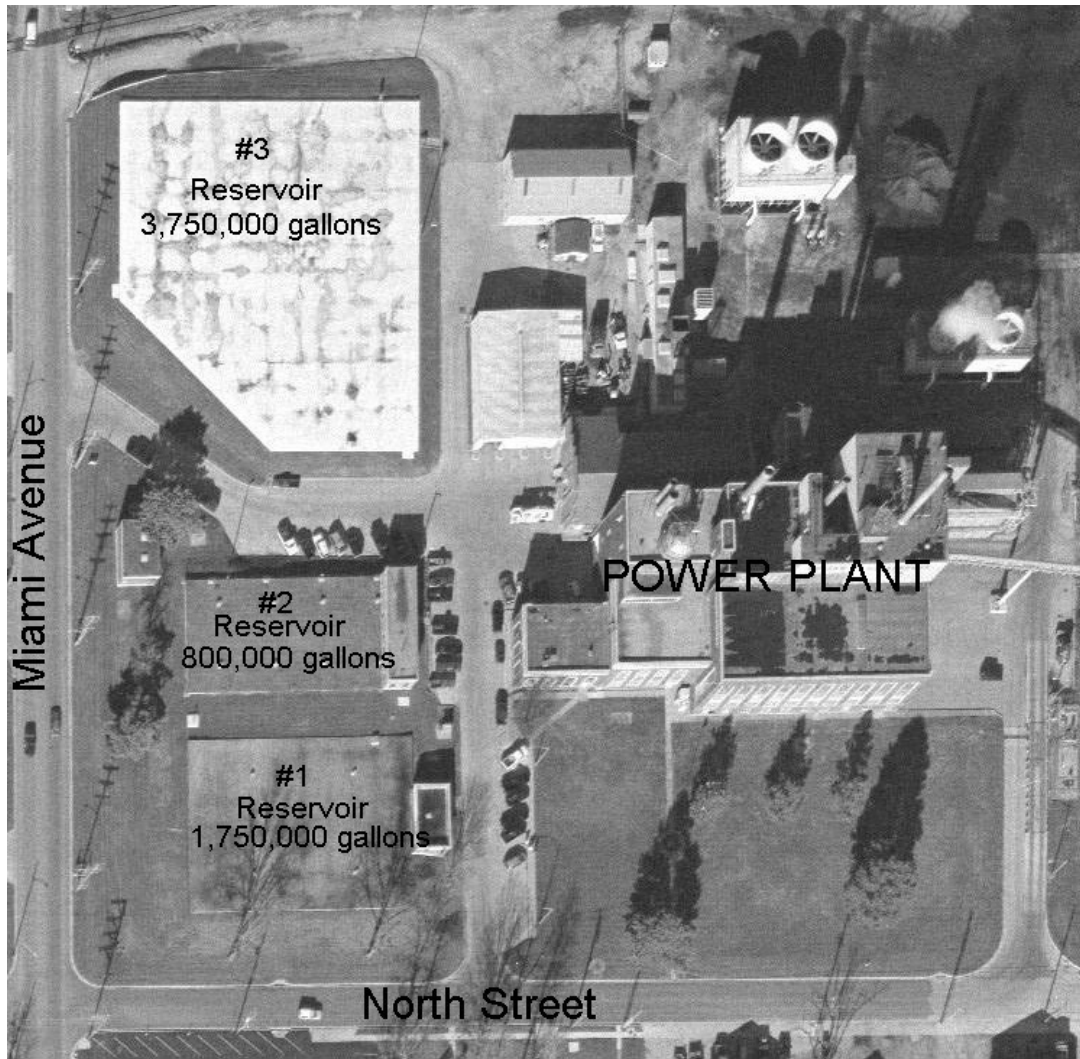
Reservoir #1 is an underground water storage tank located at the North Street Pumping Station. The pumping station and reservoir were constructed in 1945. The storage capacity of Reservoir #1 is 1.75 million gallons. Draining, cleaning, and inspection of this reservoir were completed in 2014 by MMU personnel. Approximately ½ inch of lime sludge was removed from the reservoir floor. The interior floors, walls, piers, and ceilings are in good condition. The reservoir should last for many years. Mixers were installed in July 2017, as part of the THM reduction project. Cleaning was done in August 2024, no major issues were found.



Reservoir #2, constructed in 1936, is an underground water storage tank located between Reservoirs #1 and #3. The storage capacity of this reservoir is 800,000 gallons. The structural integrity of this reservoir is questionable. An interior inspection of this structure by the engineering firm of Black and Veatch in 1985/86 indicated exposed steel on the roof area and loss of concrete around the structural steel. Based on information received from Black and Veatch's report, it was determined that, for the safety of personnel, the upper part of the reservoir should be vacated. We installed a security fence around the structure to keep the general public from walking on it. The reservoir was removed from service and inspected in 2010. MMU personnel drained the reservoir and cleaned the floor. Small amounts of concrete debris were removed from the floor. Repairs were made on all the entryways and vents. Some repairs were needed on the exterior walls. New storage at the water treatment plant will cover this loss of storage. The reservoir is scheduled to be taken out of service and demolished.



Reservoir #3 was constructed in 1963 and is the largest of the three underground water storage reservoirs. It has a capacity of 3.75 million gallons of water. We removed the original roof coating in 1995 and gave the exposed concrete top deck a light sandblasting and then applied two-part epoxy sealant paint in September of 1996. Mixers were installed in July 2017, as part of the THM reduction project, and failed in 2020. This reservoir was taken out of service and cleaned in June 2000 & 2022 by a diving contractor. Approximately 3” to 4” of lime was vacuumed from the floor. Interior inspection revealed no major defects in the structural integrity of this reservoir. In 2003, we power-washed the roof and repainted it with epoxy paint. The walls, roof, and support columns are in excellent condition. Outside contractors replaced both mixers and completed an inspection of the reservoir, followed by lime sludge removal in 2022.



The 500,000-gallon spheroid elevated *water storage tower* is in the southeast part of Marshall just outside the city limits. Universal Tank Company erected this tank in 1979. In the fall of 1995, the interior and exterior of the tank were repainted. In July of 2017, the tank was taken out of service and inspected by Ozark Applicators. The exterior coat was in good condition but showing signs of chalking. The interior dry area is showing light rust, but the primer is still in good condition. The interior wet area of the tank has a few scattered small rust spots and stains. Overall, the tank is in good condition. The tank was inspected when taken out of service to install the new mixing system as part of the water treatment plant THM reduction upgrades. The tank exterior was repainted in the fall of 2018. The tower was taken out of service in Fall 2024, to have the interior wet area sandblasted and recoated.



Transmission Flow Lines (2):

The 12" cast iron transmission flow line is the original flow line installed in 1945/46 to supply water to the City of Marshall from the Water Treatment Plant. Due to the type of joint material used when installing the 8 miles of transmission main, we have had six to twelve failures on the 12" line per year. Most of the failures are caused by a fracture of a bell joint. The existing 12" flow line is still reliable. Rating scale. MMU has included the transmission line in the Master Plan for possible resizing and replacement...40.

The concrete 20" transmission flow line was installed in 1963 during the 1963 Water Treatment Plant/reservoir #3 expansion project. We have never had a failure on this line. Rating scale...90.

Fire Hydrants:

We have a yearly fire hydrant flushing/maintenance program. Once a year, we go to each fire hydrant in our system (excluding the old Marshall Habilitation Center and Cargill Meat Solutions), flush it, and record any problems we experience. We start with the most serious problems found and immediately repair them. If time permits, we continue and repair lesser problems encountered with the hydrants. We now have a total of 746 fire hydrants in our system.

Control Valves:

We have 2,246 water control valves in our distribution system; this includes fire hydrant control valves. We try to operate each control valve annually. While operating valves, we check records and log any problems. We always have several valve box lids that need to be replaced due to damage that occurs from snowplowing. Because of our distribution grid valving system, we can isolate small areas of Marshall to improve our water distribution system. Overall, we have a very reliable valving system.

Water Services:

We have 5,818 water services, ranging in size from ¾" to 8". All known lead services have been removed. We have several water services on lots that are vacated. These homes or businesses have been demolished. As we have time, we remove the water service by disconnecting the piping from the main.

Water Mains:

We have approximately 100 miles of distribution mains. Although parts of our distribution system mains are over 100 years old, we have a very well-maintained distribution system. Last year we had a total of 60 main failures in the distribution system and 22 on the transmission line. Compared to other water supply systems in the state, we can be proud of ours and its excellent condition. We have demonstrated that we can endure droughts and maintain water for major fires without having to curtail consumption.

Water Mains Installation and Replacement:

Most new buildings for different types of businesses usually need large meters and fire protection. Tees and valves are installed for the fire line that serves the fire sprinkler system. Fire lines installed this year include a A 6" at 1325 S. Highland Court and a 6" at 1316 S. Conway for the MVC housing.

Equipment:

<u>Description</u>	<u>Mileage/hrs.</u>	<u>Cost</u>	<u>Condition</u>	<u>Repl. Cost</u>
#201 2017 Ford F-150	35,310/2,675	\$ 26,684	40 %	\$45,000
#202 1975 Low Boy Trailer	N/A	\$ 15,270	50 %	\$ 50,000
#203 2022 F-150	24,544/2,616	\$ 29,640	90 %	\$ 40,000
#204 2009 F-150	96,837	\$ 23,228	40 %	\$ 40,000
#205 2007 Freightliner Hoist/Crane Truck	8,233/1,785	\$ 159,300	80 %	\$ 180,000
#208 2023 International Dump Truck	5,303/411	\$155,000	100	\$ 155,000
#210 2011 CAT Backhoe	2,912 / 3806	\$ 95,303	75 %	\$ 125,000
#211 2024 22' Trailerman Trailer	NA	\$14,000	100 %	\$ 14,000
#212 1992 Kodiak Trailer	NA		35 %	\$ 5,000
#213 1996 Ingersoll Compressor	917	\$ 10,844	65 %	\$ 25,000
#214 1988 Stanley Hydraulic Power	4,718		20 %	\$ 30,000
#215 2022 Ford 1-ton Truck w/utility bed	7090/950	\$ 54,719	90 %	\$ 70,000
#217 1996 John Deere Excavator	4,224	\$ 143,550	40 %	\$ 270,000
#216 2018 Kubota Mini Excavator KX057-4R3A	1,290	\$ 58,681	90 %	\$ 90,000
#218 1999 CAT Track Loader	7,493	\$ 141,644	40 %	\$ 190,000
#219 2000 Sterling 2 ½-Ton Dump Truck	138,882/10,816	\$ 81,705	50 %	\$ 190,000
#220 1976 Miller Welder with Trailer	963966	\$ 3,500	40 %	\$ 10,000
#222 1987 Trailer w/Portable Backflow Meter	NA		80 %	\$5,000
#223 1980 Mueller Tapping Unit	NA	\$ 25,000	75 %	\$30,000
#225 2005 Rivercraft 14' Trailer w/Boring Mach.	156	\$ 79,507	80 %	\$ 110,000
#226 2024 22' Trailerman Trailer	NA	\$	100 %	\$ 14,000
#227 2012 John Deere Excavator 120	2,099	\$ 148,000	60 %	\$ 190,000
#228 2008 Vermeer Vacuum Excavator	1,312	\$ 46,937	60 %	\$ 94,000
#229 2017 Vermeer Vacuum Excavator	788	\$ 64,500	90 %	\$ 94,000
#322 2010 Ford F-150 Truck	40,091	\$ 15,399	75 %	\$ 40,000
#402 2004 Ford F-150 Truck	48,383/7,001	\$ 13,350	30 %	\$ 40,000
#403 2013 Ford F-350	88,440/9,202	\$ 47,218	80 %	\$ 60,000
#404 2013 Ford F-150	91,510/11,245	\$ 18,180	70 %	\$ 60,000
#407 1997 Ingersoll Compressor	725	\$ 11,384	75 %	\$ 25,000
#409 2015 Sewer Jet	577	\$ 47,420	75 %	\$ 75,000
#412 1992 Case 621 Wheel Loader	4,324	\$ 61,000	40 %	\$ 180,000
#414 2001 Haulmark Trailer	NA		60 %	\$ 5,000
#418 2013 Bravo Camera Trailer	NA	\$ 15,964	95 %	\$ 25,000
#502 2022 F-150	15,208/1,261	\$ 29,640	90 %	\$ 40,000
#503 2022 GMC 1500	8,364/507	\$ 36,249.95	90 %	\$ 45,000
#504 2022 F-450	7,701/1,038	\$ 54,719	90 %	\$ 70,000
#505 2016 Bobcat Mini Excavator	2,328	\$ 58,944	80 %	\$ 90,000
#508 2023 Freightliner Dump Truck	5,838/378	150,000	100%	\$ 155,000
#519 2024 Vermeer Vacuum Excavator	75	\$101,945	100%	\$ 110,000
#520 2006 F-350	73,740/6,773	\$ 27,583	40 %	\$ 70,000
2007 Onan 100 KW Generator & 18' Trailer	1,434	\$ 34,665	95 %	\$ 60,000
#550 2018 Kubota Skid Steer SVL75-2HWC	947	\$ 48,166	90 %	\$ 70,000
#608 2023 Scag Mower	477	\$ 11,466	90 %	\$ 15,000
#617 2023 Husqvarna F500-500c Street Saw	19.9	\$ 33,780	90 %	\$ 40,000

All the equipment within the department is maintained to keep it in good operating condition and to detect failures. The pickup trucks and service trucks that are used daily should be replaced after 10 to 12 years of service. We should try to replace one or two vehicles a year to prevent replacing several vehicles at one time. The small tools such as pumps, cut-off saws, and other hand tools are replaced as they wear out.

SCADA – System Control and Data Acquisition

Water Tower: The tower level is monitored and alarms are set on high water, low water, intrusion, loss of power, a panic button, and mixer amps.

North Street Pumping Station: The reservoir is monitored for level, pressure, flow, runtime, and cycles, with alarms for pump status, door, air pressure, flood, high and low temperature, and panic alarms. There are remote controls for turning the pumps on and off with operator-controlled lockouts. The Venturi meter for this station has failed and needs to be replaced. This meter monitors both the flow in millions of gallons per day and the flow totalizer for the pump station. We replaced the Venturi meter with a new mag meter during the North Street Pump Station Project.

Miami Street Pumping Station: The pumping station is monitored for pressure, flow, runtime, and cycles, with alarms for pump status, door, high and low temperature, and panic alarms. There are remote controls for turning the pumps on and off with operator-controlled lockouts.

REGULATORY COMPLIANCE

Water Operator Certification: Anyone who makes a “process control/system integrity decision” for the distribution system must be certified. We require DS-III certification for Underground Facilities Director and Foremen. We encourage all Underground Facilities personnel to obtain certification. Ten water distribution personnel have a DS-III certification and one has a C water license. We have also established and maintained written instructions for situations that are routinely handled by non-certified personnel such as Dispatch Operators and on-call personnel.

Under drinking water regulation [10 CSR 60-4.080 (9)], the MMU distribution system is required to maintain a minimum of 20 psi (pounds per square inch) throughout the system under normal operating conditions. Failure to do so triggers a requirement to issue a boil water advisory to the public either through the news media or, in small isolated cases, by hand-delivered notices to the service connections in the area of a failure.

Record maintenance is required by DNR (10 CSR 60-9.010 Requirements for Maintaining Public Water System Records). All suppliers of water to a public water system must retain records on their premises or at a convenient location near their premises as follows:

- a) Records of bacteriological and operational analyses must be retained for a minimum of five years. Records of chemical analyses must be retained for a minimum of ten years.
- b) Records of action taken by the system to correct violations of these rules must be retained for a period of at least three years after the last action taken to correct the violation.
- c) Written reports, summaries, or communications relating to sanitary surveys of the system conducted by the system itself, by a private consultant, or by any local state or federal agency, must be retained for at least ten years.
- d) Records concerning a variance or exemption granted to the system must be retained for a period of at least five years.
- e) Original records of all sampling data and analyses, reports, surveys, letters, evaluations, schedules, state determinations, and any other information required by 10 CSR 60-5.010 must be retained for no fewer than twelve years.

Backflow DNR regulation, 10 CSR 60-11.010, requires that water suppliers take several steps in preventing backflow contamination of the water system. These include:

1. Remove meters or otherwise sever service to a customer causing a cross connection, to a customer refusing to correct any violation of the backflow regulation, or if ordered to do so by a local government authority or DNR;
2. Retain records; and
3. Track annual inspections of class I and class II backflow prevention devices and notify the customer with the device, any appropriate local government authority, and DNR of any failure to test a device annually.

The regulation allows water systems to develop procedures to implement the requirements. The City of Marshall has a backflow prevention ordinance. MMU currently maintains certification records on over 200 backflow devices. Owners are notified by letter when their backflow device(s) is due for inspection and a record is kept when the device has been certified. All backflow devices must be tested by a state-certified tester once a year.

All new water main construction for new developments or subdivisions must be designed by engineers and approved by DNR. Also, main replacement projects installed by MMU personnel must be approved by DNR. The Owner's Supervised Plan (OSP) allows us to work on all main replacement projects. The Owner's Supervised Plan was developed in 2013 by Shafer, Kline & Warren. Evaluations were made on the condition of the existing water distribution system and future growth expectations over the next ten years. They also identified and prioritized necessary water system capital improvements based on current and future water demand. The technical construction specifications of the water system materials, installation, and disinfection procedures were reviewed and updated. The Plan was approved for five years by DNR and was renewed in 2018. Burns & McDonnell were selected to renew the OSP in 2024.

MMU has requested qualifications for engineering services to update the Water Distribution System Master Plan. This plan will update and add proposed system improvements for 2025 and beyond.

The updated plans have 21 proposed water system improvements. Also included is the engineer's opinion of probable construction costs. The following list is a very aggressive improvement to the water distribution system. If other improvements are needed, the plans will be designed and sealed by an engineer, and approval by DNR is requested. The following improvements are in a random list without any starting or completion dates.

Missouri Department of Natural Resources is requiring all communities to inventory both the utility side and private side of each residence by October 16, 2024. MMU staff have completed the inventory of the utility side and have mailed literature asking assistance from residents to identify private service line material. This is the first phase of inventorying the private side. 1,445 services were identified in the first phase. 70 galvanized and 6 lead services were found on the private side, with 4,373 being left unknown.

IMPROVEMENTS THIS YEAR

A water main project on Boyd Street was approved by the Board in March 2024. The project consisted of replacing approximately 680' of cast iron main with 6" C900 PVC main. The project was completed in August 2024.

IMPROVEMENTS NEEDED

6" and 8" Main Replacement on Olson, Rea to College; and on College, Olson to Brunswick—this project will remove some of the older 4" mains and improve pressure and fire protection. Estimated cost of the project is \$87,750.

12" Main on Fairground Road—There is a short section of 6" main between the entrance to the hospital and Atchison Avenue. The 12" line would tie mains between the two sections and is part of the 12" loop on the west side of town. Estimated cost of the project is \$24,375.

12" Loop Tie on Atchison Avenue at State Highway YY, North to the area south of College Street—This will complete the south and west loop from the water tower, hospital, and Westport Addition. Estimated cost of the project is \$245,625.

6" Main on College Street between Brunswick and Sharp—Several main breaks have occurred in the past year in this section of the main. Estimated cost of the project is \$54,000.

6" Main on Vest from Brunswick to Lincoln—The street improvements on Vest will determine when this main will be replaced. Several main breaks have occurred in this section. Estimated cost of the project is \$103,500.

12" Water Main Extension, Park Avenue to Vest, Vest to Yerby to E. Mitchell—This project will complete a tie from Sunrise Addition to Eastwood Avenue. A section of 6" main on Vest and Yerby will be replaced by 12" main. The project may be divided into two phases. Phase I:

12" Park Avenue to Vest and Yerby to Mitchell with an estimated cost of \$198,750; Phase II: Yerby, Vest to Park Avenue with an estimated cost of \$63,750.

4" main Replaced with a 6" Main; Ted, Bond, Wall to High Street—This area is served by an older 4" cast iron main with low fire flows and pressure. Estimated cost of the project is \$177,000.

4" Main replaced with a 6" Main; Ellsworth, Vest to Jackson—This area is served by an older 4" main that has had failures in the past. A new 6" main would be installed. Estimated cost of the project is \$46,500.

4" Main replaced with 6" Main on Brunswick, Porter to Lacy Street—This 4" main has failed several times. New 6" main would improve flows in this area. Estimated cost of the project is \$52,500.

6" Main Replacement on Eastwood from Park Avenue to Osage Drive—This 6" main is in poor condition with many failures in the past. Estimated cost of the project is \$109,500.

6" Main Replacement on College Street from Lafayette to Grant Avenue—This section has had many failures in the past. Improvements on College Street by Municipal Services may determine the schedule of the project. Estimated cost of the project is \$151,000.

There may be other sections of the distribution system that may need to be replaced that are not in the Owner's Supervised Plan. These projects could be added to the plan with an engineer's approval. MMU has received a legislative grant through MDNR to assist with funding materials for these projects. Areas that may need improvements are:

- a) Removal of number 2 reservoir
- b) Upgrading the Miami Pump Station
- c) Major improvements in the distribution system
- d) Transmission main replacement