

City Administrator Report to Mayor & City Council

2018.03.16, Edition No. 301

WEEKLY UPDATE:

- WPCP: WPCP Director Koch provided the following and attached to IDNR - Attached is the final report for the Papoose Force Main Repair Project. Adjustments can be made or information added if needed. I feel this is a good portrayal of the efforts put forth by the City to fix an aging infrastructure to the best of our abilities. The new slip line is functioning well.
- Fire: Please find the attached production photos of the engine provided by the manufacturer.
- Fireworks: Chief Ewers wanted to share the fireworks changes from other cities (What they did originally versus what they did after the first season of dealing with fireworks).
- Mississippi Drive: City Engineer Edgmond provided the following update - The section of Mississippi Drive from just downstream of Chestnut to just upstream of Broadway will be closed from around April 9 to April 20, 2018. This will be due to some utility, decorative paving and landscaping work needed to complete the project in that section of the roadway. The detour for this closure will be 8th street just as it was this summer. Also the access to Contrary Brewing and the other business adjacent to Contrary will be, Pine, #1 alley to Linn and Linn to the front of the Contrary.
- Housing: Per Chris Ales - IFA announced their 2018 LIHTC awards yesterday, and we are very pleased to advise you that Oak Park was approved. Thank you again for all of your help and assistance in getting us to this point. Although there is much more work ahead of us, and I am sure to be in touch with each of you in the near future, I wanted to share the good news with everyone.

| City: | Original Language | Current Language |
|----------------|---|--|
| Altoona | Banned | Banned |
| Burlington | Banned | Banned |
| Cedar Falls | Banned | Banned |
| Cedar Rapids | June 1- July 8, December 10 - January 3. | Banned |
| Charles City | Banned | Banned |
| Coralville | Banned | Banned |
| Council Bluffs | Banned | Limited around holidays |
| Clinton | Banned | Banned |
| Dubuque | Banned (allow possession) | Banned (allow possession) |
| Fort Dodge | June 1 – July 8 | July 1 – July 4 |
| Grimes | June 1- July 8, December 10 - January 3. | July 1 – July 8 December 29 – January 3 |
| Grinnell | Banned | Banned |
| Harlan | July 4 th Noon – 10 PM December 31 Noon – 12:30 AM on January 1 | Same |
| Iowa City | Banned | Banned |
| Johnston | Banned | Banned |
| Le Mars | June 1- July 8, December 10 - January 3. | July 1 – July 8 December 10 – January 3 |
| Marion | July 4 12:00 – 11:00 PM December 31 18:00 – 00:30 | July 1 – July 8 December 10 – January 3 |
| Muscatine | July 1 – 8 Dec 26 - Jan 3 | July 3 & 4 Dec 31 - Jan 1. |

| | | |
|-----------------|--|---|
| Nevada | June 1 – July 8 December 10 – Jan. 3 *Working on reducing fireworks to the week before and day after up to 9 pm. | June 1 – July 8* Dec. 30-Jan 1* |
| North Liberty | Banned | Banned |
| Oskaloosa | Banned | Banned |
| Ottumwa | June 24- July 4, December 31 - January 1. | June 24 – July 4 December 31 – January 1 |
| Spencer | Banned | Banned |
| Urbandale | Banned | Banned |
| Waterloo | June 30 – July 5 | Banned |
| Webster City | June 1 – July 8 | July 4 |
| West Des Moines | July 4 (4:00 – 10:00 PM) | Banned |

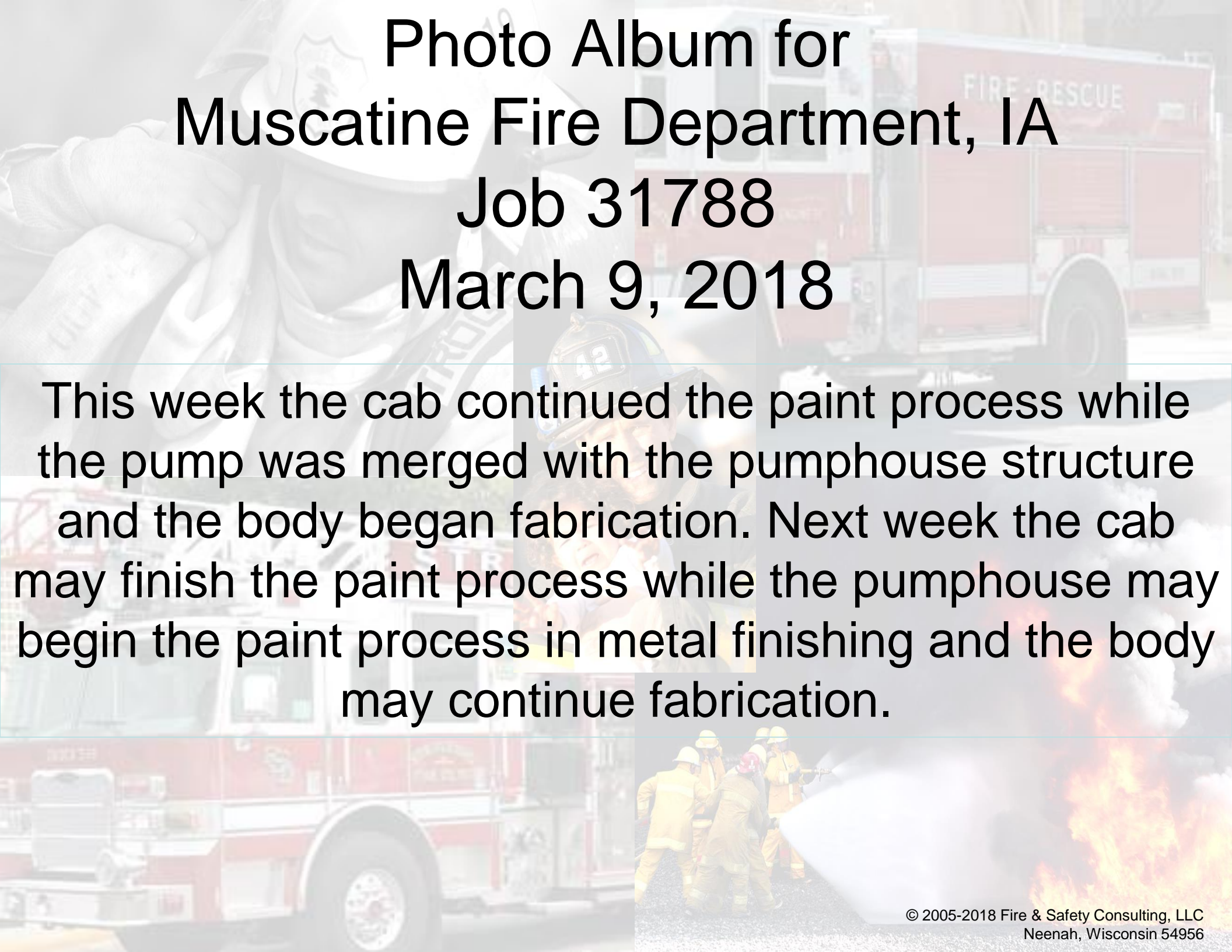
The background is a collage of fire department-related images. At the top, a firefighter in a white helmet and jacket is visible. Below that, a red fire truck with 'FIRE-RESCUE' written on its side is shown. In the bottom right corner, there is a scene of firefighters in yellow gear fighting a fire with a large plume of white smoke.

Photo Album for Muscatine Fire Department, IA Job 31788 March 9, 2018

This week the cab continued the paint process while the pump was merged with the pumphouse structure and the body began fabrication. Next week the cab may finish the paint process while the pumphouse may begin the paint process in metal finishing and the body may continue fabrication.



DSC01346



DSC01347



DSC01348



DSC01349



DSC01350



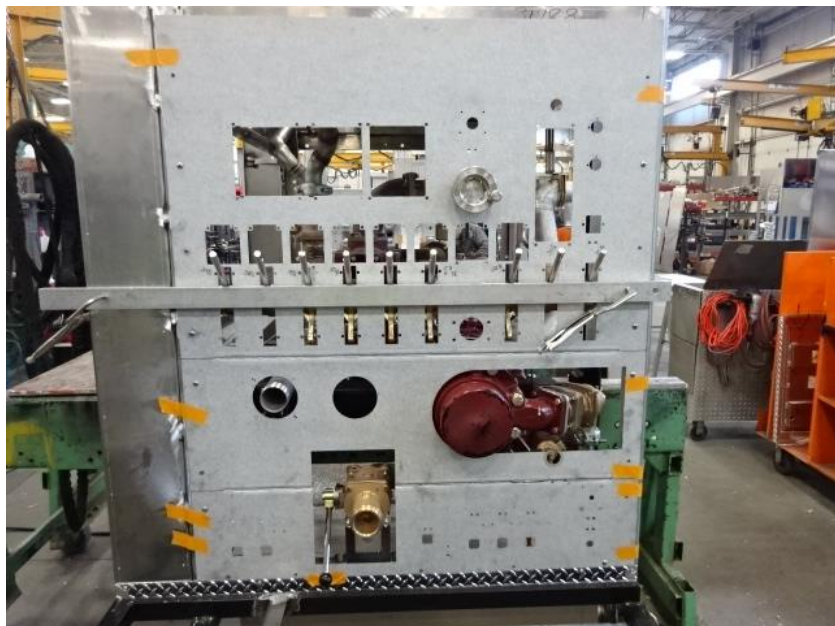
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DSC07333



DSC07334



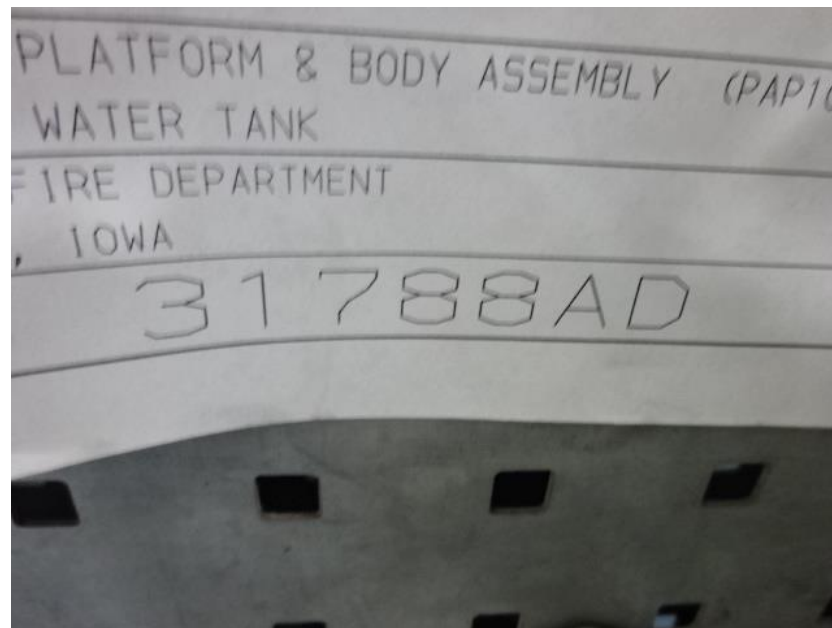
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DSC07336



DSC07337



DSC07192



DSC07193



DSC07194



DSC07195



DSC07273



DSC07274



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WATER POLLUTION CONTROL PLANT

muscatineiowa.gov

To: Terry Jones, IDNR
From: Jon Koch, City of Muscatine WPCP
Date: March 9, 2018

Report of the Papoose Force Main Emergency Repair 2017-2018

The City of Muscatine maintains 21 lift stations with a Water Pollution Control Plant that is permitted to treat an average of 5.15 million gallons of wastewater a day. This report details the circumstances of a leak in the 30" force main for the Papoose Lift Station that occurred in October 2017. It will also detail the work done to return the City to full treatment compliance.

At approximately 9:00 am Monday October 30th the City was notified by an employee from Muscatine Power and Water of water bubbling up at the intersection of Nebraska, Day and Birch Streets. By odor and appearance it was assumed to be sanitary wastewater and sent for testing to the Muscatine Environmental Laboratory. Excavation of the area was started immediately in the area of the leak adjacent to the street pavement. A dewatering pipe was put in place and a pump was set up to drain the area for exploratory excavation. This was pumping approximately 10 gallons per minute throughout the night. The DNR was notified and made aware of the situation at 3:45 pm October 30th.

On Tuesday October 31st it was apparent that the volume of water was significant. The roads were closed and excavation of the 30" force main below the street was started. The force main is directly underneath a 16" water main serving hundreds of homes and businesses in the south end of town. Sanitary water was filling the hole quickly and pumps were having difficulty keeping up due to the large amount of sand in the ground. The water was sent to a nearby sanitary sewer line which was quickly plugged due to sand. The water was then temporarily diverted to a storm sewer that leads to Briar's Ditch and eventually to the Muscatine Slough. The Slough runs out of Muscatine County into Louisa County to the Louisa County Pump Station to be discharged to the Mississippi. Notification was made to local media and those affected downstream in the area of the Slough. Sampling was performed at multiple locations along Briar's Ditch and the Slough for e Coli and ammonia as well as BOD and other constituents (see attached test results). Pumping of the excavated hole continued throughout the night. In order to drain the line, the Papoose Lift Station that feeds the force main was shut off and valves were shut to isolate the leak. Sanitary

**"I remember Muscatine for its sunsets. I have never seen any
on either side of the ocean that equaled them" — Mark Twain**

wastewater began bypassing treatment from the permitted Papoose CSO and discharged to the Mississippi River at latitude 41° 25' 13" and longitude 91° 02' 35" in Muscatine. The public access area downstream was closed and notification was sent to the local media and downstream drinking water facilities (Burlington and Keokuk). Approximately 2,100 gallons per minute was bypassing to the River from this location. The river was flowing at 41 million gallons per minute during this time. Sampling was started downstream of the bypass in the Mississippi River for e Coli, ammonia, BOD and other wastewater constituents.

On Wednesday November 1st the water continued to fill the excavated hole faster than crews were able to remove material. A sand point well pump was drilled in the area to drain the water that had saturated the sand and surface pumping continued. This water was sent to the sanitary sewer and discharge to Briar's Ditch was stopped. The area was monitored during the day and pumping of the area continued throughout the night. The bypass from the Papoose Lift station continued at approximately 2,100 gallons per minute. Sampling downstream of the bypass in the Mississippi River continued.

On Thursday November 2nd the area was continuing to fill with water and pumping continued. More pumping was installed at the WPCP where the force main outfalls in the plant head box. There is no mechanism to drain the line quickly so the pace of draining remained determined by the as yet unknown size of the force main leak. The bypass from the Papoose Lift station continued at approximately 2,100 gallons per minute. Sampling downstream of the bypass in the Mississippi River continued.

On Friday November 3rd pumping continued and progress was seen in the levels and volume of water in the excavated area. Additional pumping was added at the WPCP and staff scheduled to return to fuel generators and other equipment to continue draining the line through the weekend.

By November 4th the force main was not draining completely and investigation of several valves was performed. Diversion of flows and revalving was done to ensure no new water was entering the force main. Muscatine Power and Water was tasked with installing line stops to the water main for the safety of the water supply. Valving was not sufficient and they were not confident that even the stops would completely isolate the line. This was key in the City's later decision to minimize excavation in the affected area. By November 8th the line stops were in place on the water main and careful, slow excavation of the area began. On November 9th the line break had been found and exposed, showing a 4 foot plus long split in the bottom of the pipe.

Work began on a solution involving contractors, engineers, the Public Works Department and the Water Pollution Control Plant personnel (see attached Detailed Solutions Summary). With three solid solution options, a time line of 6 to 8 weeks was determined to be the best case scenario. Replacement of as much pipe as possible was important as the full extent of the pipe

condition was not yet known. Due to the length of the split in the pipe, the whole integrity of the 2,500 foot run was in question and an inspection of the full length was deemed prudent to avoid future bypassing and possible drinking water contamination. Deep excavation of the area and banding the immediate leak was possible but dangerous due to the vicinity of the drinking water main and easily collapsing sandy soils. Complete leak stoppage by banding was also not ensured due to the length of the split requiring multiple overlapping bands.

A cure in place lining for the force main was considered the best long term approach. Unfortunately the lead time for getting a lining crew and production of the lining was six plus weeks. The condition and age of the pipe was also determined to be risky and failure of the lining was a strong possibility. Slip lining a new pipe into the existing force main was determined to be the quickest solution with the best chance of success for the long term. The IDNR was consulted and on November 20th concurred that this would be the best solution to avoid future leaking.

Locating 24" pipe soon became a problem as production at multiple manufacturing locations had been secured by other customers. 3,000 feet of 26" pipe was located in California that had been used as a temporary over-ground bypass and shipment was set up. Pipe began arriving on December 7th but during shipment much of the pipe was damaged during the wildfires that were occurring and was rejected by the City. Fusing of the undamaged pipe began December 8th while trying to find a new source of pipe. A pipe manufacturer was located that could produce the remaining needed pipe in 24" and could deliver by the end of December. This new pipe began arriving on December 29th and fusing began immediately.

Due to freezing weather, multiple delays from the pipe fusing company with damaged pipe and coupling equipment that had to be re-ordered, the project was not completed until February 12th, 2018. The estimate best case of 6-8 weeks turned into 14 weeks. Cost of the project has been \$680,000 with an additional \$15,000 to finish excavation work for a total project cost of \$695,000. Initial estimates were for \$750,000.

The City trucked high strength waste from the Kraft/Heinz facility to the WPCP for treatment during the project to reduce the amount of BOD loading to the river (see attached data). Lab data indicates that while the coliform count in downstream samples was elevated, the BOD load was not significantly higher than upstream samples. The river was frozen for much of the project limiting sampling but also limiting any recreational use. While bypassing is never desirable, the environmental impact of the long bypass appears to be minimal due to the size of the receiving stream and evidenced by the lab data from samples collected. Note the January 30th samples collected showing upstream BOD levels at 3.92 mg/L and 0.9 miles downstream of the bypass at 3.91 mg/L. The highest difference between the two sample points was found on December 7th to be 1.57 mg/L upstream and 5.94 mg/L downstream of the bypass.

The City recognizes that this is a critical area to add redundancy and is currently planning for a second line to be installed for the Papoose Lift Station. Funding is being secured for a nearly \$1 million project to begin in the next 3-5 years. New valving and connections were installed during the emergency project to ensure no bypassing is required for future projects. The City is committed to replacing aging infrastructure throughout the entire system and is currently engaged in a multi-decade separation project mandated by the EPA with a price of nearly \$60 million. The City has planned well to finance these and other projects and is capable of making these changes as they arise due to progressive long range planning and a good rate structure with a strong industrial customer base.

Time Line, Lab Data and Maps

Summary of Force Main Repair October 2017-February 2018

The City of Muscatine repaired the only force main leading to the Water Pollution Control Plant from the junction in Musser Park of 16" and 24" pipes from the Papoose Lift Station. This is the largest station in town accounting for approximately 3 to 4 million of the average 3.4 to 5.5 million gallons of flow per day.

Timeline

Papoose Force Main Break at Day St. and Nebraska St.

- 10/30/2017 - Call from MP&W at 9:15 am concerning water coming out of the ground at Day and Nebraska St. Leak determined to be sewage. Approx. 10 gal/min. at that time. Water running into storm sewer.
- 10/31/2017 – Began excavation. 11:30am condition changed, hole began to rapidly fill with water (pumps couldn't keep up) had to shut down Papoose Lift Station. Some water still running into the storm sewer (to Brier's ditch).
- 11/1/2017 – All pumping going to the sanitary or WPCP.
- 11/4/2017 – Closed 24" valve (V2911) at Cargill, began to catch up to pumping.
- 11/6/2017 - Use of existing line stop in water main decided for safety.
- 11/7/2017 – Two IDNR people made visit to excavation site and outlet at Papoose Lift Station.
- 11/8/2017 – Line stop in place, began excavation.
- 11/9/2017 – Located break, long split in bottom of force main (4+ feet).
- 11/13/2017 – Decision made to pursue long term solution (Koch, Steinman, and Chandler).
- 11/14/2017 thru 11/17/2017 – Progress updates made.
- 11/16/2017 – Meeting held with Jay Brady, John Hagerty, Jim Edgemond, Brian Steinman, Jon Koch, Matt Chandler to discuss time line and possible install of a smaller diameter pipe within the damaged 30". Stanley Consultants to provide engineering service to see if this is feasible. Funding approved by council.
- 11/18/2017 - Turned off 3" pump at WPCP at 10:00 am.
- 11/20/2017 - Pipe in a pipe method approved by IDNR.
- 11/22/2017 – OK given to Hagerty Earthworks to begin work. Existing pipe will require cleaning and CCTV. MP&W can have the line stop removed.
- 11/27/2017 – Work began on pipe in a pipe project.
- 11/29/2017 – Began ordering materials.
- 12/04/2017 – MP&W removed line stop, hole in Day St. at that location filled in. Cleaning and CCTV crew arrived in town they will be working on West Hill while Hagerty gets the line opened up and drained.
- 12/06/2017 – Municipal Pipe Tool began cleaning and televising.
- 12/07/2017 – Used HDPE pipe began arriving from west coast.
- 12/08/2017 – Began fusing HDPE pipe.
- 12/13/2017 – Informed that some of the pipe (approx. 1/2) is caught in the California forest fires.

- 12/22/2017 – Hagerty fixed leaking 2" water line to the Western Mall at the initial break location at Day and Nebraska St. and backfilled hole.
- 12/29/2017 – New HDPE pipe delivered to WPCP site.
- 01/03/2017 – Finished welding pipe at WPCP, moved welder to Musser Park.
- 01/04/2017 – Welding pipe in Musser Park. Took down two (approx. 50' each) sections of ball diamond fence (one along left base line and one at right field) to make room to string out welded pipe.
- 01/09/2018 - Began excavation for pull pit at Lewis Bros.
- 01/10/2018 – Pulling rods arrived, truck hauling pulling machine broke down in route.
- 01/11/2018 – C&D crew vac'ed out 24" stand pipe (completely full of sand and grit) at WPCP grit chamber where new connection will be made. Hagerty welding fittings on HDPE.
- 01/11/2018 – Working on existing connection at WPCP grit chamber in preparation for new pipe. Pulling machine arrived in the afternoon.
- 01/12/2018 – Began excavation for pulling pit at Lewis Bros.
- 01/19/2018 – Began pushing the pulling rod toward the WPCP.
- 01/20/2018 – Finished pushing the pulling rods towards the WPCP, and connected pipe to pulling rods.
- 01/22/2018 – Began pulling pipe from the WPCP towards Lewis Bros.
- 01/23/2018 – Finished pulling pipe from WPCP to Lewis Bros.
- 01/24/2018 – Began open cut section of pipe from grit building to west end of new pipe. Also working to setup pulling machine for pull from Musser Park, (completed by the end of the day).
- 01/25/2018 – Continued working on the open cut section. Began pushing pulling rods toward Musser Park. Also excavating pipe at Musser Park.
- 01/26/2018 – Working in Musser Park cutting out section of existing 30" in preparation for pull towards Lewis Bros. Also working on connecting 26" OD HDPE at WPCP grit building.
- 01/27/2018 – Placed open cut section of pipe (approx. 400') into trench and finished connection at the grit building. Also finished pushing pulling rods to Musser Park and connecting pipe to pulling rods.
- 10/29/2018 – Began and finished pulling pipe form Musser Park to Lewis Bros.
- 01/30/2018 – IDNR made visit to site approx. 8:45 am. Hagerty began working on setting valves and making the connection at Musser Park.
- 01/31/2018 – Continued working at Musser Park, heat fusion coupler failed to complete its cycle will need to be removed and replaced (parts will have to be ordered).
- 02/01/2018 – Removed pulling machine from excavation at Lewis Bros. Fusing machine and pulling machine removed from project in the AM. Installed 26' section of pipe and fused ends together with fusion couplers at the pulling machine location (Lewis Bros.) completing the pipe at that location.
- 02/02/2018 – Began and completed fusing a 17' section at the WPCP at the east end of the open cut section completing the pipe to Musser Park. Cut out the failed coupler at Musser Park.
- 02/04/2018 – Sent a man to Wisconsin (near Oshkosh) to get an end welded on a short pipe of pipe for the repair at the failed coupler location in Musser Park.
- 02/05/2018 – Fused saddle on pipe at Nebraska and Day St. air tested connection at 20 lbs. overnight, connection passed. Work continuing on valve configuration at Musser Park, finished

installing valve for future connection, still have to make the connection where the failed coupler was removed.

- 02/06/2018 – Began working on connection for Schley LS on Day St, got riser and elbow installed, setup ground thawing machine. Filled openings in the 30" pipe with flowable mortar at old car lot, pulling pit location, behind Lewis Bros. and behind TeStrakes. Replacement coupler scheduled for delivery did not show up. Heavy snow yesterday afternoon may have caused the delay?
- 02/07/2018 – Began removing trench boxes at Lewis Bros. and at Day St. (boxes and sheeting frozen to ground) using tarps and propane heaters to thaw ground. Coupler had not arrived by the end of the day.
- 02/08/2018 – Coupler arrived early morning, finished the connection at Musser Park. Continued backfilling holes.
- 02/09/2018 – Finished connection to new HDPE for Schley LS at Day and Nebraska St. poured trust block at that location.
- 02/12/2018 – Installed gate valve on connection at Day St. Finished filling line with hydrant water. Started up Papoose LS at 2:45 PM.

Iowa Department of Natural Resources NPDES Reporting

Facility: City of Muscatine WPCP

NPDES Number: 7048001

Month: November

Year: 2017

Additional comments for Monthly Operating Report:

On Monday October 30, 2017, the City of Muscatine sewer department was notified of water coming out of the ground at an intersection near Day and Nebraska Street in the south end of Muscatine. The leak was caused by a slow leak in the force main from Papoose Lift station to the Muscatine WPCP. The leak was flowing to a storm water sewer that discharges into Briar's Ditch, which flows into the Muscatine Slough. The discharge to Briar's Ditch was stopped the morning of November 1st. Additional sampling and lab analysis is ongoing. DNR and public notifications were made as required.

| Parameter | Spill Site | Briar's Ditch | | Muscatine Slough | |
|------------------------------|--------------|---------------|-----------|------------------|--------------|
| | | Grandview Ave | Musser St | Hwy 61 | Mittman Road |
| Monday October 30, 2017 | | | | | |
| E. coli | 2,600,000 | 350,000 | 5,475 | 122 | |
| Total Coliform MPN/100 mL | >240,000,000 | >120,000 | >24,000 | 2,100 | |
| CBOD mg/L | 150 | 32 | >36 | | |
| TSS mg/L | 196 | 15 | 20 | | |
| Ammonia mg/L | 15 | 0.8 | 0.4 | | |
| Tuesday October 31, 2017 | | | | | |
| E. coli | | 700,000 | 48,000 | 45 | 41 |
| Total Coliform MPN/100 mL | | 14,000,000 | 4,300,000 | 1983 | >2400 |

By Pass Data:

Iowa DNR Lab IA-189

| Parameter | Mississippi River | | Briar's Ditch | | Muscatine Slough | |
|------------------------------|---------------------------------|-------------------------|------------------|------------|------------------|-----------------|
| | River Front Park Gas Dock | River Front Canal St | Grandview Ave | Musser St | Hwy 61 | Mittman Road |
| November 1, 2017 | | | | | | |
| E. coli | | | | | 63 | 150 |
| Total Coliform MPN/100 mL | | | | | 1700 | 6900 |
| November 2, 2017 | | | | | | |
| E. coli | | 13,000 | | | 66 | 310 |
| Total Coliform MPN/100 mL | | 105,000 | | | >2400 | >2400 |
| November 3, 2017 | | | | | | |
| E. coli | 270 | 3,600 | 400,000 | 630,000 | 41 | 200 |
| Total Coliform MPN/100 mL | 2,800 | 22,000 | 5,200,000 | 4,900,000 | 960 | 980 |
| CBOD mg/L | <1.35 | 2.5 | 241 | 68.8 | 4.2 | 2.1 |
| TSS mg/L | 16 | 39 | 2250 | 57 | 4.3 | 7.0 |
| Ammonia mg/L | 0.06 | ND | ND | 5.8 | ND | ND |
| November 6, 2017 | | | | | | |
| E. coli | 250 | 9,300 | | 630,000 | 201 | 66 |
| Total Coliform MPN/100 mL | 4,100 | 69,000 | | 12,000,000 | 3,700 | 2,000 |
| November 7, 2017 | | | | | | |
| E. coli | 260 | 2,800 | | 74,000 | 120 | 5.2 |
| Total Coliform MPN/100 mL | >2,400 | 26,000 | | 670,000 | 2,400 | >2,400 |
| November 8, 2017 | | | | | | |
| E. coli | | 39,000 | | 10,000 | 98 | 9.7 |
| Total Coliform MPN/100 mL | | 240,000 | | 170,000 | 2,100 | 1,400 |
| November 9, 2017 | | | | | | |
| E. coli | 173 | 7,600 | 5,000 | 10,000 | 74 | 5.2 |
| Total Coliform MPN/100 mL | 2,800 | 170,000 | 290,000 | 460,000 | 2,800 | >2,400 |
| CBOD mg/L | 1.72 | 4.34 | | 24.0 | 4.37 | |
| TSS mg/L | 69 | 28 | | 29 | 5.0 | |
| Ammonia mg/L | ND | ND | | 0.37 | ND | |

| Parameter | River Front Park Gas Dock | River Front Canal St | Grandview Ave |
|----------------------------------|--------------------------------|-------------------------|-----------------------------|
| November 13, 2017 | After Weekend with Rain | | |
| E. coli | 870 | 7,900 | 2,400 |
| Total Coliform MPN/100 mL | >2,400 | 41,000 | 82,000 |
| November 14, 2017 | | | |
| E. coli | 250 | 5,000 | |
| Total Coliform MPN/100 mL | 2,400 | 31,000 | |
| November 15, 2017 | | | |
| E. coli | 360 | 33,000 | |
| Total Coliform MPN/100 mL | 2,400 | 110,000 | |
| November 16, 2017 | | | |
| E. coli | 190 | 3,300 | |
| Total Coliform MPN/100 mL | 1700 | 27,000 | |
| CBOD mg/L | 1.37 | <2.57 | |
| TSS mg/L | 51 | 22 | |
| Ammonia mg/L | ND | 0.2 | |
| November 17, 2017 | | | |
| E. coli | 200 | 4,100 | |
| Total Coliform MPN/100 mL | 1,800 | 25,000 | |
| November 20, 2017 | | | |
| E. coli | 74 | 2,700 | |
| Total Coliform MPN/100 mL | 1,100 | 28,000 | |
| November 21, 2017 | | | Papoose Lift Station |
| E. coli | 200 | 1,400 | |
| Total Coliform MPN/100 mL | 1,300 | 69,000 | |
| BOD mg/L | | | 250 |
| Ammonia mg/L | | | 19.6 |
| November 22, 2017 | | | |
| E. coli | 250 | 32,000 | |
| Total Coliform MPN/100 mL | 5,400 | 120,000 | |
| November 28, 2017 | | | |
| E. coli | 95 | 7,100 | |
| Total Coliform MPN/100 mL | 1,200 | 69,000 | |
| BOD mg/L | | | 358 |
| Ammonia mg/L | | | 22.6 |
| November 30, 2017 | | | Papoose Lift Station |
| E. coli | 73 | 2,600 | 2,400,000 |
| Total Coliform MPN/100 mL | 1,300 | 69,000 | >2,400,000 |
| CBOD mg/L / BOD | 1.47 | <2.3 | 537 |
| TSS mg/L | 140 | 18 | 256 |
| Ammonia mg/L | | | 21.2 |

Sampling Points

Mississippi River

Papoose Lift Station Tunnel – Latitude 41°25'13.18"N Longitude 91°2'34.93"W

Gas Dock River Front Park –0.4 Miles Upstream from Papoose Lift Station Tunnel Latitude 41°25'20.77"N Longitude 91°2'2'17.82"W

Canal Street – Barge Dock 0.9 miles Downstream of Papoose Lift Station Tunnel Latitude 41°25'43.56"N Longitude 91°3'23.71"W

Briar's Ditch

Spill Site Nebraska and Day St. – Latitude 41°24'23.89"N Longitude 91°3'52.79"W

Grandview Avenue– Miles from SSO site Latitude 41°24'11.88"N Longitude 91°4'15.15"W

Musser Street –Latitude 41°24'24.86"N Longitude 91°4'24.37"W

Muscatine Slough

Hwy 61– Miles from SSO site Latitude 41°24'26.69"N Longitude 91°5'18.61"W

Mittman Road –Latitude 41°23'35.69"N Longitude 91°7'57.45"W



Muscatine WPCP By-Pass Data

NPDES Permit No. 7048001

DMR Date Dec-17

Continuation of monitoring of the Mississippi River during the Sanitary Sewer Overflow.

| Sample Date | Papoose LS | | | | Gas Dock | | | | Canal St | | | |
|-------------|------------|------|---------|------------|----------|-------|---------|------------|----------|------|---------|------------|
| | TSS | BOD | Ammonia | E. coli | TSS | CBOD | Ammonia | E. coli | TSS | CBOD | Ammonia | E. coli |
| | mg/L | mg/L | mg/L | MPN/100 mL | mg/L | mg/L | mg/L | MPN/100 mL | mg/L | mg/L | mg/L | MPN/100 mL |
| 12/5/2017 | 204 | >650 | 18 | 2,400,000 | | | | 170 | | | | 13,000 |
| 12/7/2017 | 188 | 644 | 19.3 | 3,400,000 | 41 | 1.57 | <0.7 | 84 | 21 | 5.94 | <0.7 | 12,000 |
| 12/12/2017 | 320 | >650 | 19.3 | 3,200,000 | | | | 190 | | | | 10,000 |
| 12/14/2017 | 220 | 357 | 21.9 | 4,200,000 | 20 | <1.28 | <0.7 | 880 | 14 | 3.33 | <0.7 | 13,000 |
| 12/19/2017 | 92 | 150 | 23.1 | 4,700,000 | | | | 364 | | | | 11,000 |
| 12/21/2017 | 208 | 250 | 23.1 | 7,100,000 | 59.3 | 1.44 | <0.7 | 150 | 9.3 | 2.88 | <0.7 | 6,800 |

Sampling Points

Mississippi River

Papoose Lift Station Tunnel – Latitude 41°25'13.18"N Longitude 91°2'34.93"W

Gas Dock River Front Park –0.4 Miles Upstream from Papoose Lift Station Tunnel Latitude 41°25'20.77"N Longitude 91°2'2'17.82"W

Canal Street – Barge Dock 0.9 miles Downstream of Papoose Lift Station Tunnel Latitude 41°25'43.56"N Longitude 91°3'23.71"W



Muscatine WPCP By-Pass Data

NPDES Permit No. 7048001

DMR Date Dec-17

Hauled wastewater from Kraft Heinz Muscatine Plant

| Date | Manifest Load # | Tanker Gallons | TSS (mg/L) | TSS (lbs) | BOD (mg/L) | BOD (lbs) |
|------------|-----------------|----------------|------------|-----------|------------|-----------|
| 12/1/2017 | 13952 | 6000 | | | | |
| 12/4/2017 | 13953 | 6000 | 185 | 9 | 2070 | 104 |
| 12/4/2017 | 13954 | 6000 | | | | |
| 12/4/2017 | 13955 | 6000 | | | | |
| 12/12/2017 | 13956 | 6000 | 550 | 28 | 3030 | 152 |
| 12/13/2017 | 13957 | 6000 | | | | |
| 12/13/2017 | 13958 | 6000 | 520 | 26 | 691 | 35 |
| 12/13/2017 | 13959 | 6000 | | | | |
| 12/14/2017 | 13960 | 6000 | | | | |
| 12/14/2017 | 13961 | 6000 | 327 | 16 | 1300 | 65 |
| 12/14/2017 | 13962 | 6000 | | | | |
| 12/15/2017 | 13963 | 6000 | | | | |
| 12/15/2017 | 13964 | 6000 | 225 | 11 | 1480 | 74 |
| 12/15/2017 | 13965 | 6000 | | | | |
| 12/15/2017 | 13966 | 6000 | | | | |
| 12/18/2017 | 13967 | 6000 | | | | |
| 12/18/2017 | 13997 | 6000 | 104 | 5 | 707 | 35 |
| 12/18/2017 | 13968 | 6000 | | | | |
| 12/18/2017 | 13969 | 6000 | | | | |
| 12/19/2017 | 13970 | 6000 | | | | |
| 12/19/2017 | 13971 | 6000 | | | | |
| 12/19/2017 | 13972 | 6000 | 92 | 5 | 751 | 38 |
| 12/19/2017 | 13973 | 6000 | | | | |
| 12/20/2017 | 13974 | 6000 | | | | |
| 12/20/2017 | 13975 | 6000 | | | | |
| 12/20/2017 | 13976 | 6000 | 273 | 14 | 2830 | 142 |
| 12/20/2017 | 13977 | 6000 | | | | |
| 12/21/2017 | 13978 | 6000 | | | | |
| 12/21/2017 | 13979 | 6000 | 117 | 6 | 88 | 4 |
| 12/21/2017 | 13980 | 6000 | | | | |
| 12/21/2017 | 13981 | 6000 | | | | |
| Total | 31 Loads | 186000 | | | | |



Muscatine WPCP By-Pass Data

NPDES Permit No.

7048001

DMR Date

Jan-18

Continuation of monitoring of the Mississippi River during the Sanitary Sewer Overflow.

| Sample Date | Papoose LS | | | | Gas Dock | | | | Canal St | | | |
|-------------|------------|------|---------|------------|----------|------|---------|------------|----------|------|---------|------------|
| | TSS | BOD | Ammonia | E. coli | TSS | CBOD | Ammonia | E. coli | TSS | CBOD | Ammonia | E. coli |
| | mg/L | mg/L | mg/L | MPN/100 mL | mg/L | mg/L | mg/L | MPN/100 mL | mg/L | mg/L | mg/L | MPN/100 mL |
| 1/4/2018 | 222 | 540 | 21.7 | NS | | | | | | | | |
| 1/11/2018 | 110 | 277 | 16.6 | NS | | | | | | | | |
| 1/18/2018 | 140 | 360 | 23.2 | NS | | | | | | | | |
| 1/23/2018 | 180 | 386 | 18.4 | 3,900,000 | | | | | | | | |
| 1/30/2018 | 230 | 579 | 20.0 | 4,400,000 | 21 | 3.92 | <0.8 | 500 | 39 | 3.01 | <0.8 | 14,000 |
| | | | | | | | | | 29 | 3.91 | <0.8 | 8,800 |

Sampling Points

Mississippi River

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Muscatine WPCP By-Pass Data

NPDES Permit No. 7048001

DMR Date Jan-18

Hauled wastewater from Kraft Heinz Muscatine Plant

| Date | Manifest Load # | Tanker Gallons | TSS (mg/L) | TSS (lbs) | BOD (mg/L) | BOD (lbs) |
|-----------|--------------------|-------------------|---------------|--------------|---------------|--------------|
| 1/10/2018 | 13982 | 6000 | 417 | 21 | 1920 | 96 |
| 1/11/2018 | 13983 | 6000 | 530 | 27 | 3270 | 164 |
| 1/17/2018 | 13984 | 6000 | 440 | 22 | 1980 | 99 |
| 1/17/2018 | 13985 | 6000 | | | | |
| 1/18/2018 | 13986 | 6000 | 400 | 20 | 355 | 18 |
| 1/18/2018 | 13987 | 5500 | | | | |
| 1/18/2018 | 13988 | 5500 | | | | |
| 1/18/2018 | 13989 | 6000 | | | | |
| 1/19/2018 | 13990 | 6000 | 630 | 32 | 3180 | 159 |
| 1/19/2018 | 13991 | 6000 | | | | |
| 1/19/2018 | 13992 | 6000 | | | | |
| 1/19/2018 | 13993 | 6000 | | | | |
| 1/22/2018 | 13994 | 6000 | | | | |
| 1/22/2018 | 13995 | 6000 | 1100 | 55 | 5830 | 292 |
| 1/22/2018 | 13996 | 6000 | | | | |
| 1/22/2018 | 13998 | 6000 | | | | |
| 1/23/2018 | 13999 | 6000 | | | | |
| 1/23/2018 | 14253 | 6000 | 390 | 20 | 1810 | 91 |
| 1/23/2018 | 14254 | 6000 | | | | |
| 1/23/2018 | 14255 | 6000 | | | | |
| 1/24/2018 | 14256 | 6000 | | | | |
| 1/24/2018 | 14257 | 6000 | 270 | 14 | 1510 | 76 |
| 1/24/2018 | 14258 | 6000 | | | | |
| 1/24/2018 | 14259 | 6000 | | | | |
| 1/25/2018 | 14260 | 6000 | | | | |
| 1/24/2018 | 14261 | 6000 | 330 | 17 | 2130 | 107 |
| 1/25/2018 | 14262 | 6000 | | | | |
| 1/25/2018 | 14263 | 6000 | 460 | 23 | 2784 | 139 |
| 1/26/2018 | 14264 | 6000 | | | | |
| 1/26/2018 | 14265 | 6000 | 490 | 25 | 2780 | 139 |
| 1/26/2018 | 14267 | 6000 | | | | |
| 1/29/2018 | 14269 | 6000 | | | | |
| 1/29/2018 | 14270 | 6000 | 140 | 7 | 768 | 38 |
| 1/29/2018 | 14271 | 6000 | | | | |

| | | | | | | |
|-----------|-------|--------|-----|----|------|-----|
| 1/29/2018 | 14272 | 6000 | | | | |
| 1/30/2018 | 14274 | 6000 | 450 | 23 | 2630 | 132 |
| 1/31/2018 | 14278 | 6000 | 290 | 15 | 1950 | 98 |
| Total | 37 | 221000 | | | | |



Muscatine WPCP By-Pass Data

NPDES Permit No. 7048001

DMR Date Feb-18

Continuation of monitoring of the Mississippi River during the Sanitary Sewer Overflow.

| Sample Date | <i>Papoose LS. Discharge</i> | | | |
|-------------|------------------------------|-------------|----------------|----------------|
| | <i>TSS</i> | <i>BOD</i> | <i>Ammonia</i> | <i>E. coli</i> |
| | mg/L | mg/L | mg/L | MPN/100 mL |
| 2/7/2018 | 184 | 351 | 20.7 | 4,400,000 |
| | <i>Riverfront Park</i> | | | |
| | <i>TSS</i> | <i>BOD</i> | <i>Ammonia</i> | <i>E. coli</i> |
| | mg/L | mg/L | mg/L | MPN/100 mL |
| 2/13/2018 | 7 | 2.24 | <0.8 | 301 |
| 2/16/2018 | 9.8 | 3.06 | <0.8 | 1,153 |
| | <i>Gas Dock</i> | | | |
| | <i>TSS</i> | <i>CBOD</i> | <i>Ammonia</i> | <i>E. coli</i> |
| | mg/L | mg/L | mg/L | MPN/100 mL |
| | 13 | 1.95 | <0.8 | 132 |
| | 188 | 3.04 | <0.8 | 121 |
| | <i>Canal St</i> | | | |
| | <i>TSS</i> | <i>CBOD</i> | <i>Ammonia</i> | <i>E. coli</i> |
| | mg/L | mg/L | mg/L | MPN/100 mL |
| | 6.6 | <2.65 | <0.8 | 201 |

Sampling Points

Mississippi River

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Papoose Creek
Lift Station
Bypass to
Mississippi River

Musser Park

WPCP



LEAGUE ST

BREESE AVE

ROBY AVE

DIVISION ST

WARREN ST

WHITE ST

OREGON ST

DAY ST

BIRCH DR

MUSSER ST

GRANDVIEW AVE

RR Crossing

16" Water Line

EARL AVE

ILLINOIS ST

KANSAS ST

NEBRASKA ST

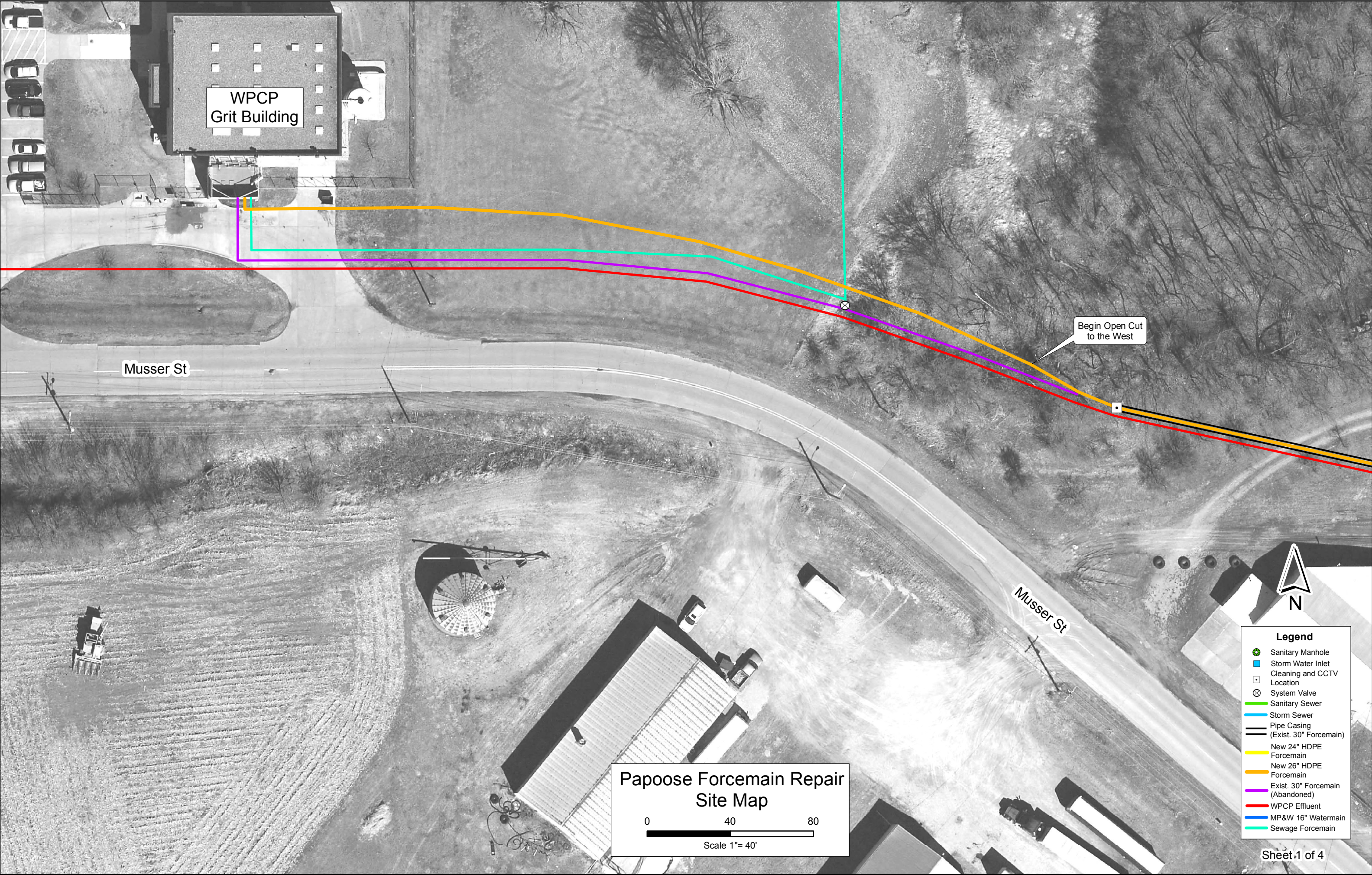
BAKER AVE

WPCP

Leak Location

Musser Park

30" Force Main



WPCP
Grit Building

Musser St

Begin Open Cut
to the West

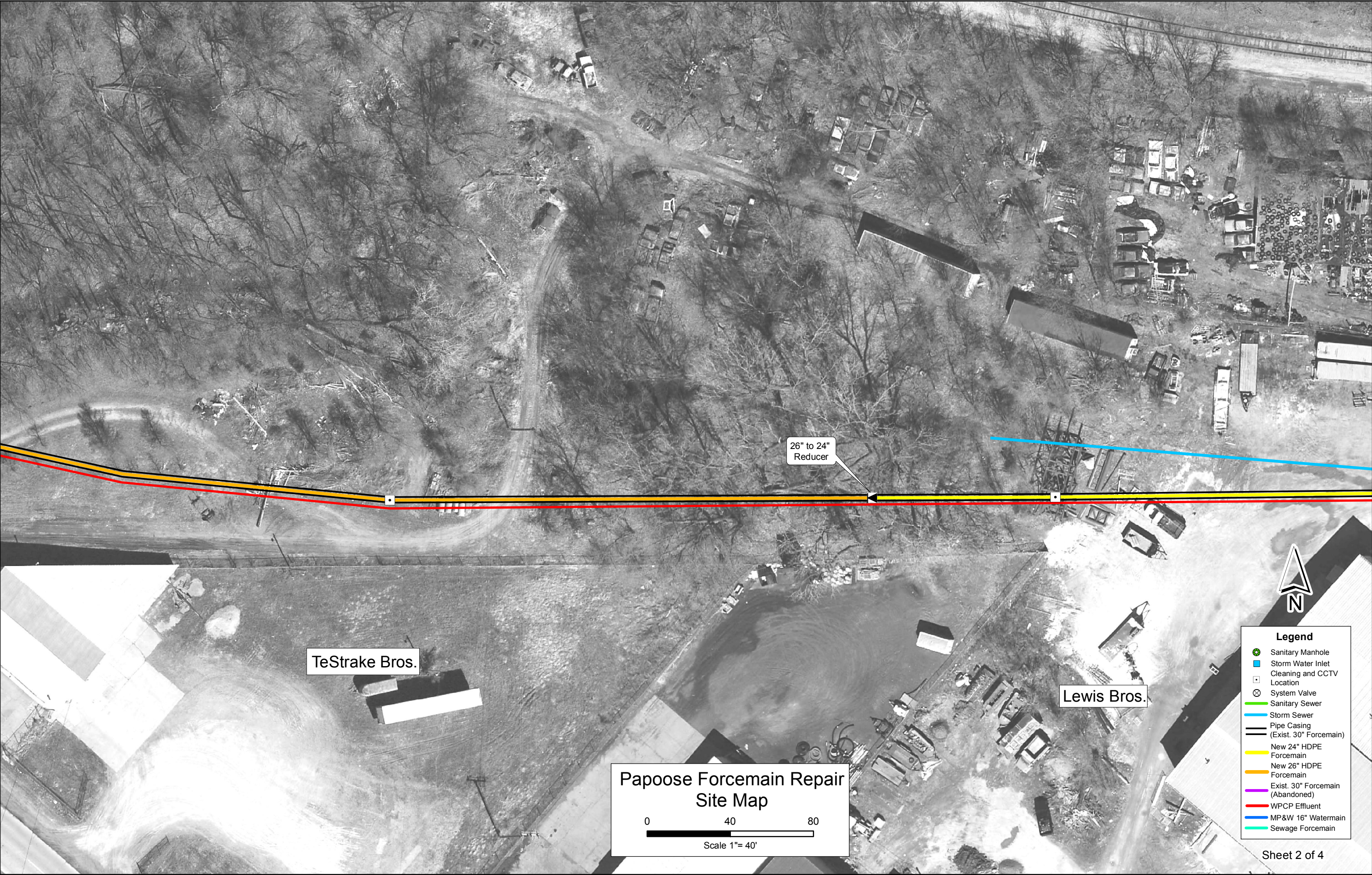
Musser St

Papoose Forcemain Repair
Site Map

0 40 80

Scale 1"= 40'

- Legend**
- Sanitary Manhole
 - Storm Water Inlet
 - Cleaning and CCTV Location
 - System Valve
 - Sanitary Sewer
 - Storm Sewer
 - Pipe Casing
 - (Exist. 30" Forcemain)
 - New 24" HDPE Forcemain
 - New 26" HDPE Forcemain
 - Exist. 30" Forcemain (Abandoned)
 - WPCP Effluent
 - MP&W 16" Watermain
 - Sewage Forcemain

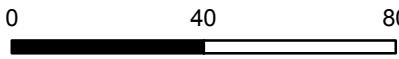


26" to 24"
Reducer

TeStrake Bros.

Lewis Bros.

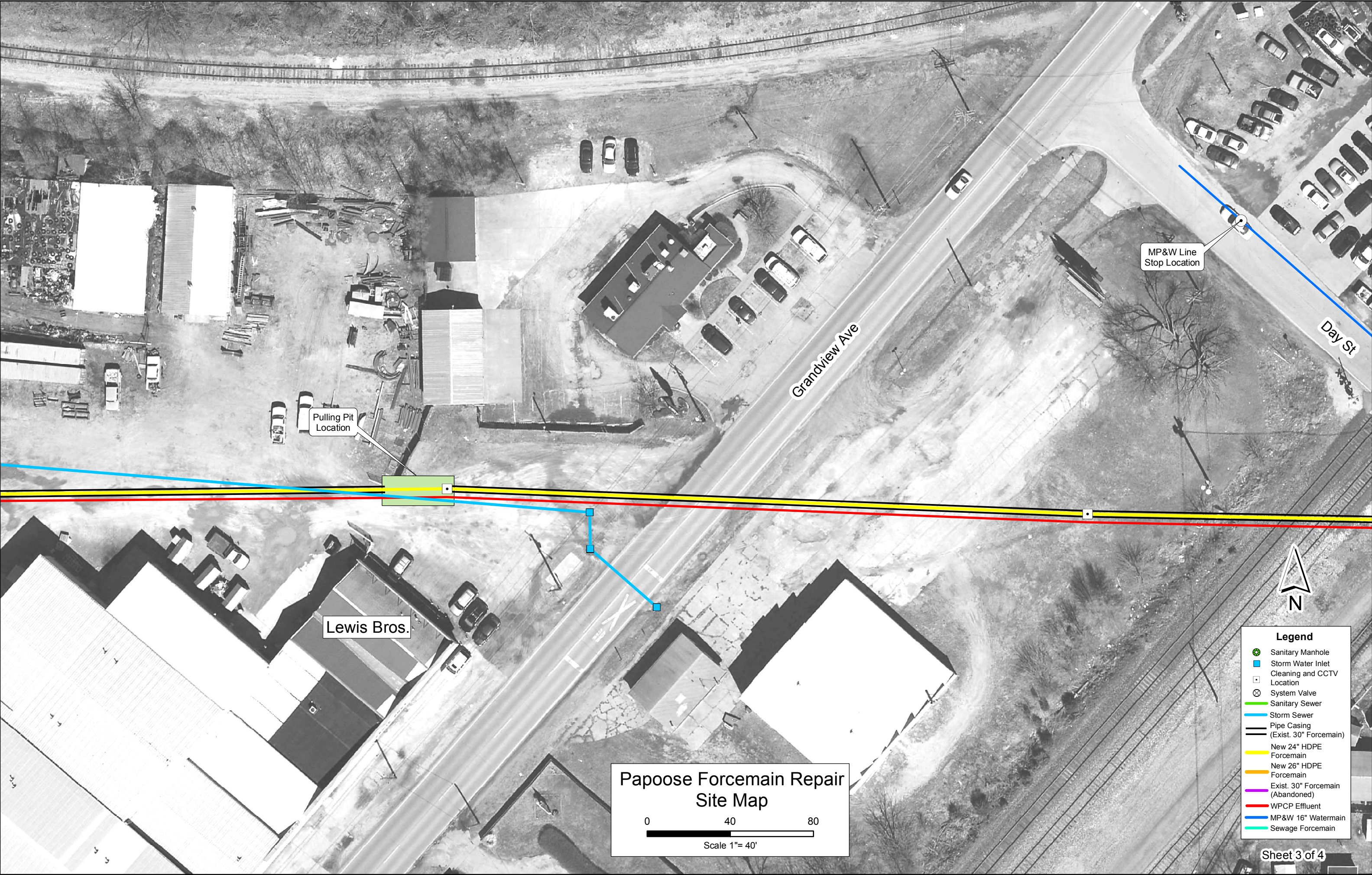
Papoose Forcemain Repair
Site Map



Scale 1"= 40'



- Legend**
- Sanitary Manhole
 - Storm Water Inlet
 - Cleaning and CCTV Location
 - System Valve
 - Sanitary Sewer
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 - (Exist. 30" Forcemain)
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 - Exist. 30" Forcemain (Abandoned)
 - WPCP Effluent
 - MP&W 16" Watermain
 - Sewage Forcemain







Detailed summary of repair and replacement options for Papoose Lift Station line in Muscatine, IA.

11/16/17

Least favorable approach

Best long term approach

Fastest end to bypass approach

Banding known leak then line

Lining the entire pipe, 20 yr fix, full pumping

| | #1 Emergency band now | #2 Prep for lining now | #3 Install 24" slip line now |
|--------|--|---|---|
| Week 1 | <ul style="list-style-type: none"> -Bypassing. -Expose line at repair origin point (Musser Park). Expose line at repair completion point (north side of Grandviw Ave.). Construct dewatering area. Begin cleaning line for inspection and lining installation. Jetting pipe walls, debris removal, complete dewatering, camera inspection, detailing required parameters for lining contractors. 2 weeks. -Order banding, 1 week out. Order piping for new 30" from Grandview Ave to WPCP. 1 week out. Order re-connection parts for exposed pipe sections, 1 week out. | <ul style="list-style-type: none"> -Bypassing. -Expose line at repair origin point (Musser Park). Expose line at repair completion point (north side of Grandview Ave.). Construct dewatering area. Begin cleaning line for inspection and lining installation. Jetting pipe walls, debris removal, complete dewatering, camera inspection, detailing required parameters for lining contractors. 2 weeks. -Order piping for new 30" from Grandview Ave to WPCP, 1 week out. Order re-connection parts for exposed pipe sections, 1 week out. -Per lining manufacturer, line must be cleaned, inspected and data collected before ordering. | <ul style="list-style-type: none"> -Bypassing. -Obtain engineering approval for structural integrity of 24" slip line within 30" force main for this section of repair. -Expose line at slip origin point (Musser Park). Expose line at mid point (north side of Grandview Ave.). Determine pipe condition from there to WPCP for possible slip line as well. -Order pipe, valves and accessories. -Secure rental equipment for slip lining. |

| | | | |
|--------|---|---|---|
| Week 2 | <ul style="list-style-type: none"> -Bypassing -Complete line cleaning and inspection Musser to Grandview. -Excavation of leak area (ongoing from Week 1). Dangerous to workers with sand fill. Large excavation area then shoring. Work done around 16" water main causing risk of contamination to drinking water supply. 16" water main needs sufficient supports to avoid damage causing leakage, breakage or stress due to bend in the line. Water supplier not confident in integrity of supporting vavles and line stop. A break around sewage contaminated area causes immediate health risks, boil orders, loss of service. Use of hydro-excavation safest technique if main can be supported, adds 1 week for excavation. Unsure of ability to sufficiently support the water line at this location. Determine length of damaged line section, order banding. -Begin install of new 30" pipe to WPCP. -Receive banding. Install banding. -Begin install of re-connection to exposed ends. -Order lining, 3 weeks out. | <ul style="list-style-type: none"> -Bypassing -Complete line cleaning and inspection Musser to Grandview. -Begin install of new 30" pipe to WPCP. -Order lining, 3 weeks out. | <ul style="list-style-type: none"> -Bypassing -Receiving pipe and accessories. As they are possibly scattered in multiple locations including out of state, pipe to be installed as it arrives. |
|--------|---|---|---|

| | | | |
|--------|---|--|---|
| Week 3 | <p>-Complete re-connection. Pressure test. Determine if leaking (anticipated) is acceptable for pumping over ground to sanitary. Leaking is anticipated due to multiple bands covering long section of pipe. Pump leaked water overground to sanitary sewer.</p> <p>-Not bypassing, possibly not until mid-week</p> <p>-Complete installation of new 30" to WPCP.</p> | -Bypassing. | <p>-Bypassing</p> <p>-Receiving pipe and accessories. As they are possibly scattered in multiple locations, pipe to be installed as it arrives.</p> <p>Best case scenario, quick delivery of parts:</p> <p>-Connect 24" line to 30" N of Grandview Ave if remaining line to WPCP is not compromised.</p> <p>-Pressure test.</p> <p>-Stop bypassing.</p> |
| Week 4 | -Not bypassing | <p>-Bypassing.</p> <p>-Complete installation of new 30" to WPCP.</p> | <p>-If pipe from N Grandview Ave to WPCP is critical to fail, slip 24" line in the remaining line. More excavation openings needed for angle turns.</p> <p>Best case scenario, quick delivery of parts:</p> <p>-Finish 24" slip line to WPCP.</p> <p>-Stop bypassing.</p> |
| Week 5 | <p>-Bypassing.</p> <p>-Begin draining, dewatering and re-cleaning of 30" line to prep for lining installation, 1 week.</p> | -Bypassing | <p>-Finish 24" slip line to WPCP.</p> <p>-Stop bypassing.</p> |

| | | | |
|--------|---|---|--|
| Week 6 | -Receive lining. -Install lining. Crews not readily available. Work done in 3-4 days. -Connect new and repaired line. -Pressure test. -Stop bypassing, end of week. | -Receive lining. -Install lining, 3-4 days. -Connect new and repaired line. -Pressure test. -Stop bypassing, end of week. | -Possible overrun time, pipe delivery delays, weather. |
| Week 7 | -Possible overrun time, lining crew scheduling conflicts, weather. | -Possible overrun time, lining crew scheduling conflicts, weather. | |
| Week 8 | -Possible overrun time, lining crew scheduling conflicts, weather. | -Possible overrun time, lining crew scheduling conflicts, weather. | |

- Very aggressive construction schedule with multiple contractors, simultaneous work.
- The City is highly motivated to quickly end the bypass and create redundancy in the system, a goal that has been hindered by mandated separation project since 2005.
- City evaluated multiple options to compare risk to human health, environmental integrity and potential for success.
- City is well situated to handle this project financially due to very forward thinking council, administrator and staff. Rate structures have been carefully evaluated and adjusted to prepare for unforeseen events like this.
- A great deal of work on project #1 could gain one week with no bypass but puts human health and the drinking water suppl at risk.
- Project #3 stops the bypass most rapidly but reduces pumping capacity from the Papoose Lift Station. This will cause more frequent CSO's until a redundant line can be financed and installed (3-5 years). **Recommended Action**
- With a completely rehabilitated line, the City will plan for a new redudant 30" line from Musser Park to the WPCP. This will require extensive work crossing multiple streets and boring under multiple RR tracks. Expected construction in 2-3 years.
- 2300 ft total to rehabilitate or slip line. 1000 ft from Musser Park to north of Grandview Ave. 1300 ft from north of Grandview Ave to the WPCP.