City of Appleton

100 North Appleton Street
Appleton, WI 54911-4799
www.appleton.org

Meeting Agenda - Final

Utilities Committee

Tuesday, January 25, 2022 | **5:00 PM** | **Council Chambers, 6th Floor**

1. Call meeting to order

2. Roll call of membership

3. Approval of minutes from previous meeting

22-0037 Approval of the January 11, 2022 Utilities Committee Meeting Minutes.

Attachments: January 11, 2022 Utilities Committee Meeting MInutes.pdf

4. Public Hearings/Appearances

5. Action Items

22-0039 Request from Abby Ellenbecker for a credit adjustment for water use between May 29, 2021 and June 11, 2021 of $65.98 for 2518 S. Kernan Avenue.

Attachments: Timeline for Committee.pdf
Water Leak Policy 2020.pdf
Water Usage Monitoring Procedure.pdf

6. Information Items

22-0040 WPPI Capacity Agreement Revenue Review

Attachments: Revenue Summary WPPI Lease.pdf

22-0041 Discussion of 2019 Water System Master Plan.

Attachments: Water System Master Plan attachment (002).pdf

22-0042 AquaDuoscope Measuring Method Program.

Attachments: AquaDuoscope attachment.pdf

22-0043 Monthly Reports for October, November, and December 2021:
- Wastewater Treatment Plant Synopsis and Receiving Station Revenue Report
- Water Treatment Facility Synopsis
- Water Distribution and Meter Team Monthly Report - December

Attachments: 2021 Q4 Wastewater Synopsis.pdf
Receiving Station Revenue Report.pdf
2021 Q4 Water Synopsis.pdf
Water Main Breaks December.pdf

7. Adjournment

Notice is hereby given that a quorum of the Common Council may be present during this meeting, although no Council action will be taken.

Reasonable Accommodations for Persons with Disabilities will be made upon Request and if Feasible.

For questions on the agenda, contact Chris Shaw at 920-832-5945 or Paula Vandehey at 920-832-6474.

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Meeting Minutes - Final
Utilities Committee

Tuesday, January 11, 2022 | **5:00 PM** | **Council Chambers, 6th Floor**

1. Call meeting to order

Vice Chairperson Smith called the Utilities Committee meeting to order at 5:00 p.m.

2. Roll call of membership

Present: 4 - Meltzer, Smith, Doran and Thao

Excused: 1 - Martin

3. Approval of minutes from previous meeting

21-1782 Approval of the December 7, 2021 Utilities Committee Meeting Minutes.

Attachments: 120721.pdf

Thao moved, seconded by Doran, that the Minutes be approved. Roll Call. Motion carried by the following vote:

Aye: 4 - Meltzer, Smith, Doran and Thao

Excused: 1 - Martin

4. Public Hearings/Appearances

5. Action Items

21-1783 Approve 2022 Private Lead / Galvanized Service Replacement Program.

Attachments: 2022 Private Lead Galvanized Service Replacement Program.pdf

Meltzer moved, seconded by Doran, that the Report Action Item be recommended for approval. Roll Call. Motion carried by the following vote:

Aye: 4 - Meltzer, Smith, Doran and Thao

Excused: 1 - Martin

21-1784 Award Contract Amendment 3 to Jacobs Engineering for the Water Treatment Facility Optimized Corrosion Control Treatment (OCCT) Studies in the amount of $31,740 and a total revised contract of $190,790.

Attachments: OCCT Project 01-05-21.pdf

Doran moved, seconded by Thao, that the Report Action Item be recommended for approval. Roll Call. Motion carried by the following vote:

Aye: 4 - Meltzer, Smith, Doran and Thao

Excused: 1 - Martin

6. Information Items

21-1785 Monthly Reports for November 2021:
- Water Distribution and Meter Team Monthly Report

Attachments: Water Main Breaks November 2021.pdf

This item was discussed.

21-1786 Appleton's Water Main Break History

Attachments: Water Main Breaks History.pdf

This item was discussed.

7. Adjournment

Thao moved, seconded by Doran, that the Utilities Committee meeting be adjourned at 5:17 p.m.. Roll Call. Motion carried by the following vote:

Aye: 4 - Meltzer, Smith, Doran and Thao

Excused: 1 - Martin

331-126-100 – 2518 S Kernan Ave – Timeline of account activity

8/1/20 – Meter Reading 522.0 – quarterly consumption 6,300 gallons, bill for $162.77 sent 8/31/2021.

11/1/20 – Meter Reading 576.0 – quarterly consumption 5,400 gallons, bill for $157.30 sent 11/30/2021.

2/1/21 – Meter Reading 763.0 – quarterly consumption 18,700 gallons, bill for $287.03 sent 2/28/2021.

5/1/21 – Meter Reading 1331.0 – quarterly consumption 56,800 gallons, bill for $664.44 sent 5/31/2021

6/3/21 – Letter Sent for high use, water running at over 50 gallons per hour.

6/16/21 – Consumption history provided to Abby Ellenbecker by e-mail. A note also provided details of the infrequency of the continuous use and why the high use notification did not trigger until early June.

6/18/21 – Information for water use monitoring procedure was provided by e-mail the Abby Ellenbecker.

6/18/21 – Abby Ellenbecker submitted water credit policy review, however e-mail spelling delayed receipt of request until 8/3/21.

8/3/21 Meter Reading 2439.0 – quarterly consumption 110,800 gallons, bill for $1,660.00 (included current charges of $982.21 and past due charges of $677.79) was sent 8/10/2021.

8/3/21 – Request to review for the water loss credit policy adjustment was received from Abby Ellenbecker.

8/11/21 – Letter sent to Abby Ellenbecker with information on review of water credit. Credit was denied as no Aquahawk account was established for the account at the time the leak started and was discovered.

9/30/21 – Payment plan was established for Abby Ellenbecker to extend payment of the account balance until 8/22/2022. All lates fess are waived during payment plan contract.

1/11/2022 – Request for Utility Committee review.

"...meeting community needs...enhancing quality of life."

DEPARTMENT OF PUBLIC WORKS
Engineering Division
100 North Appleton Street
Appleton, WI 54911
(920) 832-6474
FAX (920) 832-6489

Revised Date: **September 17, 2020**

WATER LEAK POLICY

BEFORE THE METER

It is the sole responsibility of the property owner to maintain their water service and to ensure it is in proper working order and free of leaks. Water losses (leaks) that occur between the City connection (curb stop) and the water meter shall be the responsibility of the customer or the owner of the property.

Once a leak has been identified, the Water Utility will issue the property owner a 30 day notice to repair the water service unless the leak presents a risk to the public's health, safety or welfare. If the service is not repaired within the 30 days, the property owner will receive a 10 day final notice to repair the water service. If the service has not been repaired after the 10 days, the water service will be disconnected per Wisconsin Public Service Commission (PSC) Code 185.37 until the proper repairs have been made. The Water Utility may grant an extension for good cause provided the leak does not pose a risk to the public's health, safety or welfare. Private lead **and galvanized** service lines shall be fully replaced and not just repaired.

Water loss incurred after expiration of the 30 day notice may be subject to water loss charges. The charges will be determined based on an estimated water loss calculation performed by the Water Utility and will be billed at the current filed rates.

AFTER THE METER

Water losses (leaks) that occur on the premises, which are registered by the water meter, shall be the responsibility of the customer or the owner of the property. It is the sole responsibility of the customer to monitor their metered water and prevent leakage in all piping and fixtures on the premises at and beyond the metering point. The Utility shall inform each customer once per year

of this responsibility and to inform them that any leaks or other losses of water registered by the meter will be billed at the filed rates.

Prior to requesting a bill adjustment for consideration, the following conditions shall be met:

1. Property shall be a residential property with 3 living units or less (100# accounts).
2. Customer had an active water customer portal account prior to the leak event.
3. Customer shall contact the Water Utility to schedule a one (1) hour appointment for a water meter technician to help identify or verify the possible leak(s). This will include an in-house inspection as well as reviewing the consumption history for the property.
4. The meter shall be tested by Water Utility personnel and witnessed by the customer at the Water Utility test lab.
5. The excess water volume for the billing period shall be at least three (3) times the average usage over the previous four quarters, but not less than a 10,000 gallon increase.
6. Customer may be required to submit the claim of loss and/or damage to the customer's property insurer e.g. homeowner's insurance and, if denied, provide the City written evidence of the denial.
7. Customer shall provide documentation that plumbing or appliance at point of water leak has been repaired.
8. Customer shall provide a written request to the Water Utility for a bill adjustment, explaining the details of the loss, justification for the water bill adjustment and the date the property was last occupied or inspected by the owner. Written request shall be received by the Water Utility within 120 days of the bill date in question.

If all of the above conditions have been met, the Public Works and Finance Director, or their designee, will jointly determine if a bill adjustment is appropriate.

Since any credit(s) issued will directly impact all of the Water Utility customers, consideration may be based on whether or not the leak may have resulted from the neglect or carelessness of the owner, agent or tenant. Any credit(s) issued will be per PSC Regulations.

WATER USAGE MONITORING PROCEDURE

Updated March 9, 2017

The Public Service Commission (PSC) does not require a Utility to monitor or notify for high water usage or significant changes in consumption. Therefore, it is the sole responsibility of each customer to monitor their metered water on their premises, at and beyond the metering point.

The Appleton Water Utility values the importance of providing good customer service and may assist with monitoring for significant increases in consumption and large leaks that a have potential to present a risk to the public's health, safety or welfare. Monitoring and notification of customer usage by the Utility is not guaranteed and is dependent upon several factors including, but not limited to, availability of staff, equipment and technology.

The Utility may monitor for significant increases in consumption utilizing available meter technology. The following parameters are recommended guidelines when monitoring for abnormally high consumption:

- #100 accounts (residential) - 30 gallons/hour for at least 120 consecutive hours
- #200 accounts (commercial) – 100 gallons/hour for at least 168 consecutive hours
- #300 accounts (industrial) – not monitored
- #400 accounts (public authority) – 100 gallons/hour for at least 168 consecutive hours
- #600 accounts (apartment bldgs.) - 100 gallons/hour for at least 168 consecutive hours

If a significant change in consumption has been identified by the Utility, the following process may be followed:

- Mail, email or text a high consumption notice to the customer to notify them of the increased water usage.
    - Utility may assist the customer in identifying the source of the increased water usage. This may include a phone conversation or up to a one (1) hour appointment at their property.
- Utility may visit the property if the leak is substantial and staff determines there may be the potential to present a risk to the public's health, safety or welfare (over 250 gal/hour).
    - If the Utility is not able to make contact with the customer, staff will leave a notice at the property advising the customer of the detected high consumption and asking for them to contact the Utility.
        - If no response within 48 hours, the Utility may turn the water off at the curb box until the customer requests the water to be turned back on.

This procedure is intended only to provide guidelines regarding the Utility's monitoring of, and response to, increased water usage. This procedure shall not be construed as making any promises, warranties, representations or the like to any property owner regarding the monitoring of water usage, nor is it intended in any way to relieve property owners of the ultimate responsibility to monitor water use on their property.

WPPI Capacity Agreement Revenue

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
January	$ -	$ 9,732.58	$ 9,218.23	$ 8,774.38	$ 8,418.13	$ 8,372.75	$ 8,790.93	$ 8,274.65	$ 8,205.38	$ 8,415.50	$ 8,044.15	$ 7,969.60	$ 8,218.93	$ 7,353.95	$ 6,438.42	$ 6,343.26	$ 7,151.93	$ 7,658.25	$ -	$ 7,188.25	$ 7,933.50	$ 152,502.77
February	$ -	$ 8,641.03	$ 8,724.85	$ 8,789.60	$ 8,277.18	$ 8,304.18	$ 8,649.95	$ 8,169.88	$ 8,201.58	$ 8,282.15	$ 8,051.75	$ 8,046.75	$ 8,307.50	$ 7,402.55	$ 6,278.97	$ 6,497.57	$ 7,037.63	$ 7,704.00	$ -	$ 7,216.75	$ 7,916.50	$ 150,500.37
March	$ -	$ 8,677.23	$ 8,818.18	$ 8,757.23	$ 8,389.55	$ 8,384.18	$ 8,674.70	$ 8,274.65	$ 8,214.90	$ 8,205.95	$ 8,061.28	$ 7,912.45	$ 8,084.63	$ 7,471.13	$ 6,364.70	$ 6,482.13	$ 8,054.23	$ 8,455.10	$ 7,999.28	$ 9,167.55	$ 8,562.40	$ 163,011.45
April	$ -	$ 8,679.13	$ 8,545.78	$ 8,698.45	$ 8,914.20	$ 8,888.53	$ 8,962.23	$ 8,813.28	$ 9,074.23	$ 9,144.53	$ 8,917.53	$ 8,874.00	$ 8,263.28	$ 7,132.55	$ 6,895.65	$ 6,468.42	$ 7,067.70	$ 7,602.50	$ 6,942.50	$ 7,580.50	$ 7,850.00	$ 163,314.99
May	$ -	$ 8,635.30	$ 8,618.15	$ 8,494.33	$ 8,448.83	$ 8,485.43	$ 8,221.33	$ 8,150.13	$ 8,461.23	$ 8,086.05	$ 7,920.08	$ 8,104.63	$ 7,256.80	$ 6,398.99	$ 6,480.42	$ 6,607.29	$ 7,302.03	$ 7,914.00	$ 7,099.50	$ 16,960.21	$ 7,953.00	$ 165,597.73
June	$ -	$ 8,736.28	$ 8,801.05	$ 8,484.80	$ 8,633.73	$ 8,816.90	$ 8,649.95	$ 8,816.88	$ 8,497.40	$ 8,514.68	$ 8,108.68	$ 8,676.13	$ 7,373.98	$ 6,438.42	$ 6,603.87	$ 6,566.15	$ 7,310.60	$ 8,154.00	$ 7,328.25	$ 7,922.00	$ 9,767.60	$ 162,201.35
July	$ -	$ 8,938.20	$ 9,239.20	$ 8,976.30	$ 9,439.55	$ 9,068.35	$ 8,859.50	$ 8,769.25	$ 8,996.53	$ 8,314.65	$ 8,388.70	$ 8,896.15	$ 7,393.98	$ 6,596.15	$ 6,507.86	$ 8,567.60	$ 7,453.48	$ 8,268.50	$ 7,648.25	$ 8,099.25	$ 8,204.50	$ 166,625.95
August	$ -	$ 9,751.63	$ 9,336.35	$ 9,372.55	$ 9,551.95	$ 9,788.45	$ 9,333.85	$ 8,683.53	$ 8,786.98	$ 8,402.28	$ 8,929.73	$ 9,364.78	$ 8,162.63	$ 6,666.45	$ 6,794.18	$ 8,109.20	$ 7,399.18	$ 8,128.25	$ 7,396.75	$ 8,070.75	$ 8,224.50	$ 170,253.97
September	$ 8,211.85	$ 9,288.73	$ 9,082.98	$ 8,934.40	$ 9,445.25	$ 9,111.88	$ 9,690.08	$ 8,757.83	$ 8,760.30	$ 8,556.58	$ 8,832.58	$ 8,707.55	$ 8,059.78	$ 6,522.44	$ 6,777.03	$ 7,834.88	$ 7,282.03	$ 8,008.25	$ 7,125.25	$ 7,876.50	$ 8,087.25	$ 174,953.42
October	$ 9,321.10	$ 9,180.13	$ 9,088.70	$ 9,012.50	$ 8,753.75	$ 7,202.85	$ 8,573.75	$ 8,917.85	$ 8,676.48	$ 8,297.50	$ 8,506.83	$ 8,690.43	$ 8,028.33	$ 6,507.00	$ 6,747.89	$ 7,437.68	$ 7,273.45	$ 7,571.25	$ 6,982.50	$ 7,893.50	$ 7,907.25	$ 170,570.72
November	$ 9,393.50	$ 9,193.48	$ 8,753.43	$ 8,673.40	$ 8,376.55	$ 7,049.81	$ 8,362.30	$ 8,205.38	$ 8,135.45	$ 8,270.83	$ 8,143.93	$ 8,267.50	$ 7,405.40	$ 6,349.26	$ 6,394.70	$ 7,140.50	$ 7,099.15	$ 7,702.50	$ 7,076.75	$ 7,787.75	$ 8,150.25	$ 165,931.82
December	$ 8,917.25	$ 9,307.03	$ 8,978.20	$ 8,406.70	$ 8,521.33	$ 6,880.98	$ 8,259.43	$ 8,300.63	$ 8,009.73	$ 8,301.33	$ 8,021.05	$ 8,261.80	$ 7,351.10	$ 6,325.26	$ 6,410.13	$ 6,923.33	$ 7,692.78	$ 7,719.75	$ 7,076.75	$ 7,893.50	$ 7,978.75	$ 165,536.81
YTD Total	$ 35,843.70	$108,760.75	$107,205.10	$105,374.64	$105,170.00	$100,354.29	$105,028.00	$102,133.94	$102,020.19	$100,792.03	$ 99,926.29	$101,771.77	$ 93,906.34	$ 81,164.15	$ 78,693.82	$ 84,978.01	$ 88,124.19	$ 94,886.35	$ 72,675.78	$103,656.51	$ 98,535.50	$ 1,971,001.35

*Progam began in September 2001

Date: January 19, 2022
Copies: K. Rindt (via email)
C. Shaw (via email)
Utilities Committee

TABLE 10-1: SUMMARY OF WATER SYSTEM EVALUATION

Water System Pressures

Pressure Zone	Pressure Range		Average Pressure		Notes
	Average Day	Peak Hour	Average Day	Peak Hour	
Main Pressure Zone	~ 30 to 90 psi (day) ~ 35 to 95 psi (night)	~ 30 to 86 psi	~54 psi (day) ~59 psi (night)	~53 psi	~ 35 psi near Lake Park Road and Midway Road ~ 30-35 psi near Northland Avenue and Richmond Street (near pressure zone boundary) ~ 30-35 psi on 16-inch supply line to Lindbergh Standpipe (has customer services) ~10 psi on Ballard Road to North Reservoir (~50 psi at last customer service) ~ 65-90 psi near the Fox River
Ridgeway Pressure Zone	~ 40 to 70 psi	~ <40 to 68 psi	~55 psi	~50 psi	
North Pressure Zone	~ <35 to 90 psi	~ <35 to 86 psi	~65 psi	~60 psi	~90 psi on Apple Creek Road

Per NR 811, the minimum and maximum normal static pressure in the distribution system shall be 35 psi and 100 psi, respectively. The system pressure shall be maintained at a minimum of 20 psi under emergency conditions.

Available Fire Flows

Pressure Zone	Percent of Hydrants Providing Required Fire Flow While Maintaining 20 psi	Notes
Main Pressure Zone	95 percent	Deficiencies due to small diameter/older main including some 4-inch mains, dead ends.
Ridgeway Pressure Zone	94 percent	Deficiencies due to dead ends at pressure zone boundary, small diameter/older mains.
North Pressure Zone	99 percent	

Hydraulic Capacity (Headloss/Velocity)

- No water mains have higher than recommended velocities or headlosses.

Guidelines

- AWWA Manual M32 recommends that all pipe velocities should be less than 4 to 6 feet per second (fps) during normal operation.
- AWWA Manual M32 recommends headlosses in pipes less than 16-inches in diameter should be less than 5 to 7 feet per 1,000 feet of pipe during normal operating conditions. The recommended headloss limit for larger pipes in AWWA Manual M32 is 2 to 3 feet per 1,000 feet of pipe during normal operating conditions.

Water Age (Water Quality)

- Water age in Main Pressure Zone ranges typically from 1-5 days, with water age greater than 5 days at extremities/dead ends.
- Water age in North Pressure Zone and Ridgeway Pressure zone typically 5 to 8 days, with greater than 8 days at extremities/dead ends.
- Chlorine levels measured indicate that chlorine residuals are maintained within the system

Supply

- Adequate reliable supply (22 MGD hydraulic capacity of high lift pumps) to meet existing (14.9 MGD) and projected (17.7 MGD) maximum day demands.
- Adequate reliable capacity to supply the Ridgeway Pressures Zone and the North Pressure Zone under existing and projected 2040 demand conditions.

Storage

- The Main Pressure Zone had adequate total available effective storage to meet existing and projection demand conditions; however, has a deficiency in operational storage that is projected to grow to approximately 0.43 MG by 2040. The deficiency in operational storage can be offset with excess reliable supply capacity.
- The Ridgeway Pressure Zone has a storage deficiency of approximately 0.68 MG; however, it can be offset with excess reliable pumping capacity and the ability to transfer water from the North Pressure Zone via 47 Valve Station.
- The North Pressure Zone has a storage deficiency which is projected to grow to approximately 0.38 MG based on projected 2040 projections. The deficiency can be offset with excess pumping capacity under existing conditions; however, is projected to be slightly deficient (approximately 50,000 gallons) by 2040 with the additional demands and the increase in fire storage requirement (assuming industrial development).

System Reliability

- The raw water lake intake and transmission from the Raw Water Pump Station to the WTP have no redundancy to ensure a reliable supply of water to the WTP.
- Appleton can maintain water supply provided with auxiliary sources of power in the event of a power emergency or interruption. Appleton has standby power on site at the WTP and the North Booster Station, and a transfer switch at the Lindbergh Booster Station for a portable generator.

Water Loss Evaluation – Performance Indicators

Real Losses: 301 MG/year, 29 gallons per service connection per day
Infrastructure Leakage Index (ILI): 1.9
Financial:

- Non-revenue water as percent by volume of water supplied: 17.9% (has ranged from 13.7 percent to 17.9 percent in the past 5 years)
- Non-revenue water as percent of cost of operating system: 1.2%

Leak/Break Frequency

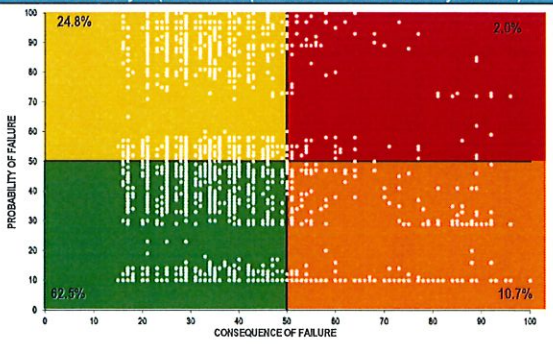
- Average number of leaks/breaks per 100 miles per year
  22 leaks/breaks per 100 miles per year (10 years)
  25 leaks/breaks per 100 miles per year (5 years)
- Optimized distribution system failure frequency identified in WRF Water Loss Report:
  ~15 failures per 100 miles per year
- Aggregate North American failure frequencies identified in WRF Water Loss Report:
  ~25 failures per 100 miles per year.

Water Main Reinvestment Level (KANEW Analysis)

- The City's water distribution system is an "average aged" water system; approximately 30 percent of the water mains are over 50 years old and approximately 10 percent of the water mains are over 70 years old.
- Based on the long and short life expectancies in the KANEW analysis, the total recommended replacement lengths in the first 10 years of replacement are approximately 80 miles (21 percent) and 104 miles (28 percent), respectively.
- Based on the long and short life expectancies in the KANEW analysis, the total replacement lengths over the 20 year period of replacement are approximately 103 miles (27 percent) and 128 miles (34 percent), respectively.

Note: AWWA Research Foundation developed KANEW software to be used to perform replacement rate analysis for water system based on water main inventory.

Water Main Risk Analysis (Risk – Consequence of FailureHi x Probability of Failure)



High POF/COF (red) – Make a plan for replacement in short – term,
Moderate/Low POF, High COF (orange) – Monitor and proactively inspect/evaluate alternatives.
High POF, Moderate/Low COF (yellow) – Include in proactive replacement plan.
Low POF/COF (green) – Normal O&M

TABLE 10-6: SUMMARY DISTRIBUTION SYSTEM IMPROVEMENTS

Location	Diameter	Length	Description
1	8-inch	3,300 feet	Replace old 8-inch mains on East Florida Ave and Durkee Street between Capitol Drive and Meade Street.
2	8-inch	2,100 feet	Replace old 6-inch mains on North Appleton Street and West Weiland Avenue between West Marquette Street and North Division Street.
3	8-inch	1,450 feet	Replace old 8-inch mains on North Lawe Street between East Hancock Street and East Wisconsin Avenue.
4	8-inch	750 feet	Replace old 6-inch and 8-inch mains on North Meade Street between East Hancock Street and East Commercial Street. This location was identified in the previous Water System Master Plan as part of Segment H.
5	8-inch	2,200 feet	Replace old 4-inch, 6-inch, and 8-inch mains on North Rankin Street between East Atlantic Street and Nawada Court. This location was identified in the previous Water System Master Plan as part of Segment H.
6	8-inch	6,000 feet	Replace water main new the wastewater plant. A multitude of hydrants currently exist at this location, consider which should be used for fire protection purposes and strengthen water flow to that area with new 8-inch water main.
7	8-inch	2,300 feet	Replace old 4-inch and 6-inch water main on East Lawrence Street, South Oneida Street, and South Durkee Street between East College Avenue and South Appleton Street.
8	8-inch	3,250 feet	Replace old 6-inch water main on North Appleton Street between West Pacific Street and West Franklin Street, West Harris Street between North Appleton Street and North Oneida Street, Franklin Street between North Appleton Street and North Morrison Street, North Oneida Street between East Washington Street and West Packard Street.
9	8-inch	1,200 feet	Replace old 6-inch water main on North Superior Street between West Franklin Street and West Pacific Street. This location was identified in the previous Water System Master Plan as part of Segment D.
10	8-inch	2,600 feet	Replace old 4-inch and 6-inch water main on West Elsie Street between North Mason Street and North Richmond Street.
11	8-inch	700 feet	Replace old 6-inch on South Summit Street between West Prospect Avenue and West Fourth Street.
12	8-inch	700 feet	Replace old 6-inch on South Fairview Street between West Prospect Avenue and West Fourth Street.
13	8-inch	600 feet	Replace old 8-inch on West Fourth Street between South Douglas Street and South Outagamie Street.
14	12-inch	360 feet	New 12-inch water main between West Haskel Street and West Civic Street.
15	12-inch	1,050 feet	Replace old 8-inch on South Lyndale Drive extending south from the intersection with West Leonard Street.
16	8-inch	1,350 feet	Replace old 6-inch on Fairway Court between East Shaw Street and South Lawe Street.
17	8-inch	2,050 feet	Replace old 6-inch on South Walden Avenue between East Fremont Street and East Calumet Street.
18	8-inch	1,250 feet	Replace old 6-inch on South Walden Avenue between East Coolidge Avenue and East Taft Avenue.
19	8-inch	1,250 feet	Replace old 6-inch on South Fountain Avenue between East Coolidge Avenue and East Taft Avenue
20	12-inch	1,200 feet	Replace old 8-inch on West Second Street between South Lilas Drive and South Lynndale.
	8-inch	900 feet	Replace old 6-inch on South Westhaven Place between West Second Street and West Fourth Street.

TABLE 11-4: CAPITAL IMPROVEMENT PLAN

Short-Term Improvements (5 Years)	Estimated Cost
42-inch Raw Water Main to WTP for Reliability (approximately 7,500 feet)[1]	$7,500,000
Raw Water Intake Main at Raw Water Pump Station[1]	$9,000,000
Improvements & Modifications to Existing Lake Pump Station & Existing Lake Intake System[1]	$3,600,000
Water Main Replacement to Address Fire Deficiencies (~ 7 miles, ~1.4 miles annually)[2]	$5,500,000
Water Main Replacement - Year 1: ~6.6 miles[3]	$4,600,000
Water Main Replacement - Year 2: ~6.6 miles[3]	$4,600,000
Water Main Replacement - Year 3: ~6.6 miles[3]	$4,600,000
Water Main Replacement - Year 4: ~6.6 miles[3]	$4,600,000
Water Main Replacement - Year 5: 6.6 miles[3]	$4,600,000
Subtotal	**$47,900,000**
Engineering and Contingencies[4]	$19,160,000
Total	**$67,060,000**

Long-Term Improvements (10-20 Years)	Estimated Cost
Transmission Mains for Development (approximately 6.2 miles)	$4,400,000
Water Main Replacement- Year 11: ~3.8 miles[3]	$2,700,000
Water Main Replacement- Year 12: ~3.8 miles[3]	$2,700,000
Water Main Replacement- Year 13: ~3.8 miles[3]	$2,700,000
Water Main Replacement- Year 14: ~3.8 miles[3]	$2,700,000
Water Main Replacement- Year 15: ~3.8 miles[3]	$2,700,000
Water Main Replacement- Year 16: ~3.8 miles[3]	$2,700,000
Water Main Replacement- Year 17: ~3.8 miles[3]	$2,700,000
Water Main Replacement- Year 18: ~3.8 miles[3]	$2,700,000
Water Main Replacement - Year 19: ~3.8 miles[3]	$2,700,000
Water Main Replacement -Year 20: ~3.8 miles[3]	$2,700,000
Demolish Matthias Tower	$180,000
Subtotal	**$31,580,000**
Engineering and Contingencies[4]	$12,632,000
Total	**$44,212,000**

Mid-Term Improvements (5-10 Years)	Estimated Cost
Transmission Mains for Development (approximately 6.2 miles)	$4,400,000
Water Main Replacement - Year 6: ~8.0 miles[3]	$5,500,000
Water Main Replacement - Year 7: ~ 8.0 miles[3]	$5,500,000
Water Main Replacement - Year 8: ~8.0 miles[3]	$5,500,000
Water Main Replacement - Year 9: ~8.0 miles[3]	$5,500,000
Water Main Replacement - Year 10: ~8.0 miles[3]	$5,500,000
Potential New South Pressure Zone:	
New 0.5 MG Spheroid Tower in Potential South Pressure Zone	$1,200,000
New Flow Control Valve from Potential South Pressure Zone to Main Pressure Zone	$210,000
South Pump Station including VFD, 0.2 MG Underground Reservoir, backup generator, SCADA	$1,500,000
Subtotal	**$34,810,000**
Engineering and Contingencies[4]	$13,924,000
Total	**$48,734,000**

Grand Total	$160,006,000

Footnotes:

1 Estimated cost from Appleton Public Works Department, November 2018.

2 Replacement cost provided by Appleton Department of Public Works at $130 per foot for 8-inch water main, and $150 per foot for 12-inch water main replacement.

3 Replacement rates based on KANEW analysis with first 5 years lowered to include recommended water main replacements for fire flow deficiencies. Replacement cost provided by Appleton Department of Public Works at $130 per foot for 8-inch water main

4 Assumed 15 percent for engineering and 25 percent for contingencies.

Notes:

- Estimates do not include land purchase, if necessary.
- The Engineer's Estimate is only an estimate of possible construction costs for budgeting purposes. This estimate is limited to the conditions existing at its issuance and is not a guaranty of actual price or cost. Uncertain market conditions such as, but not limited to: local labor or contractor availability, wages, other work, material market fluctuations, price escalations, force majeure events, and developing bidding conditions, etc. may affect the accuracy of this estimate. AECOM is not responsible for any variance from this estimate or actual prices and conditions obtained.
- This estimate is an AACE Class 4 Order of Magnitude cost estimate.
- Estimates are 2019 dollars unless otherwise noted.

MEMO

"...meeting community needs...enhancing quality of life."

TO: Utilities Committee

FROM: Paula Vandehey, Director of Public Works PAV

DATE: January 14, 2022

SUBJECT: **AquaDuoscope Measuring Method Program.**

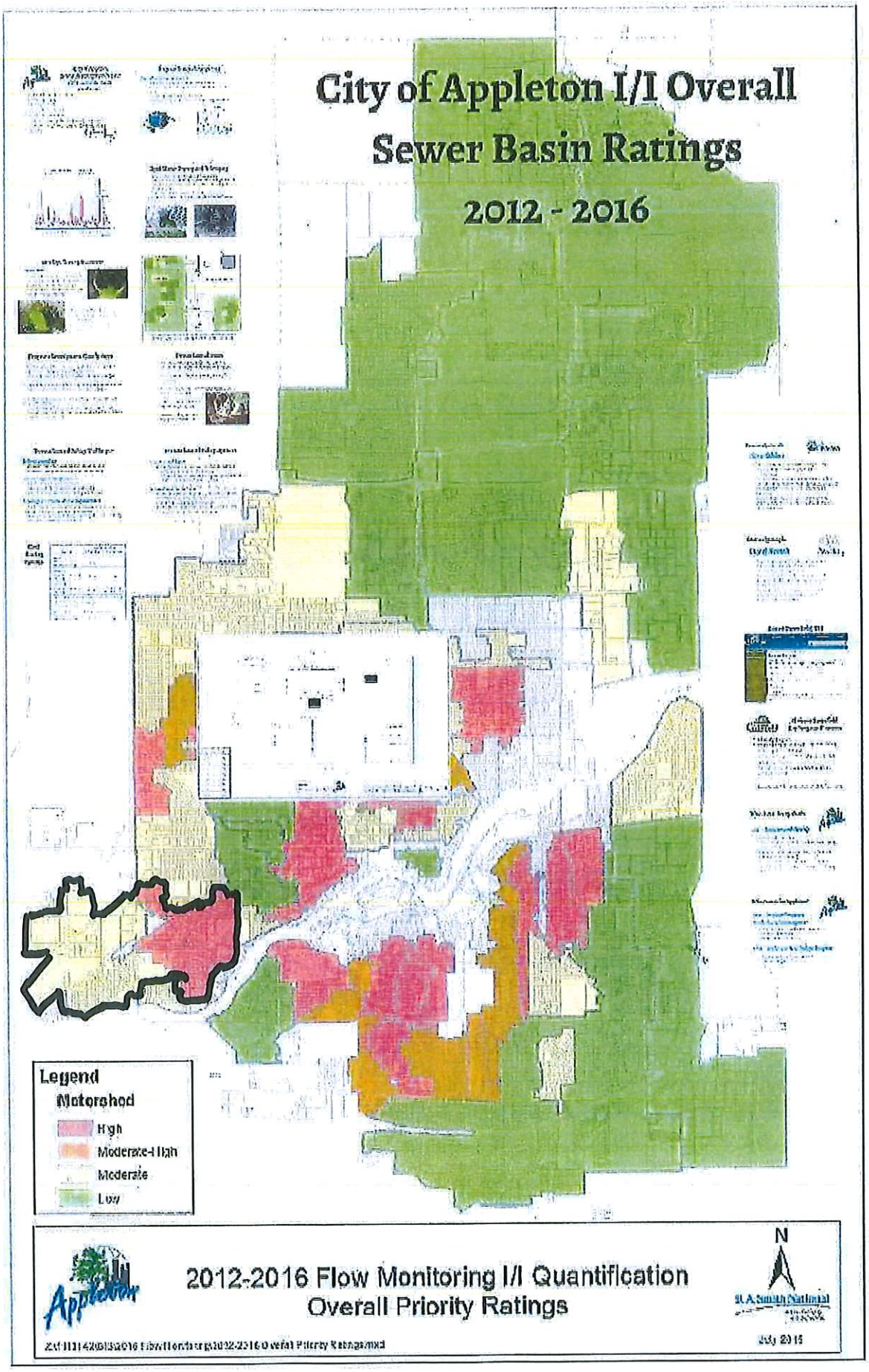
The City of Appleton has been working to address Inflow and Infiltration (I/I) into our sanitary sewer system for over 30 years. All of the major cross-connections and leaking sewer mains that we are aware of have been addressed. However, the amount of clear water (I/I) getting into the sanitary sewer system continues to be significant, and at times, creates challenges at the Wastewater Treatment Plant.

The City currently televises approximately 11% (35 miles) of our sanitary sewer system annually in an attempt to identify areas of I/I. Locations identified are then added to our 5-Year Capital Improvement Program to be addressed accordingly. Recently the City has implemented a sanitary lateral replacement program where we replace approximately 30 private laterals from the sewer main to the home.

A new technology that is now available to us is the AquaDuoscope Measuring Method Program. The company that invented this leakage detection system (Aquapriori) is located in Finland. In 2019 they performed their first ever demonstration project in the United States in Ashland, Wisconsin. They helped that community identify several "hot spots" which were then isolated and fixed accordingly, reducing the overall I/I in that community.

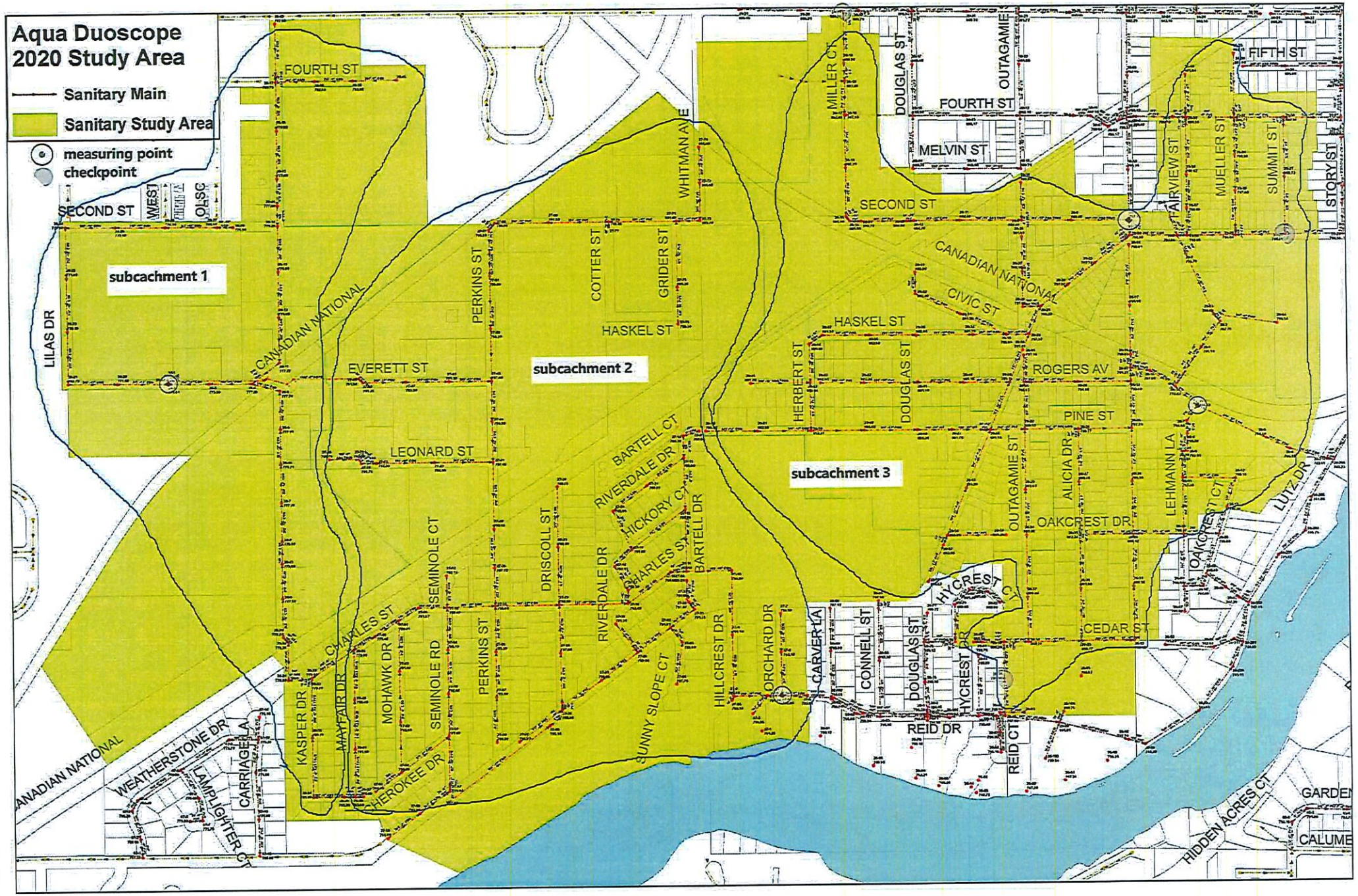
Aquapriori will be training Appleton staff this spring to use the AquaDuoscope Measuring Method on the area shown on the attached maps, which includes 11 miles of sanitary sewer main and one lift station. We are excited to utilize this new technology to help us identify locations of I/I, and we will keep the Committee updated on what we discover.

Attachments



11 Miles

1 lift station


Aqua Duoscope
2020 Study Area
Sanitary Main
Sanitary Study Area
measuring point
checkpoint
subcachment 1
subcachment 2
subcachment 3
FOURTH ST
SECOND ST
WEST
OLSC
LILAS DR
CANADIAN NATIONAL
EVERETT ST
LEONARD ST
PERKINS ST
COTTER ST
GRIDER ST
WHITMAN AVE
HASKEL ST
MILLER CT
DOUGLAS ST
OUTAGAMIE
FOURTH ST
MELVIN ST
FIFTH ST
FAIRVIEW ST
MUELLER ST
SUMMIT ST
STORY ST
SECOND ST
CANADIAN NATIONAL
CIVIC ST
HASKEL ST
HERBERT ST
DOUGLAS ST
ROGERS AV
PINE ST
OUTAGAMIE ST
ALICIA DR
LEHMANN LA
OAKCREST CT
OAKCREST DR
LUTZ DR
BARTELL CT
RIVERDALE DR
HICKORY CT
CHARLES ST
BARTELL DR
DRISCOLL ST
SEMINOLE CT
RIVERDALE DR
HYCREST CT
CEDAR ST
CARVER LA
CONNELL ST
DOUGLAS ST
HYCREST DR
REID DR
REID CT
ORCHARD DR
HILLCREST DR
SUNNY SLOPE CT
PERKINS ST
SEMINOLE RD
MOHAWK DR
MAYFAIR DR
CHARLES ST
KASPER DR
CHEROKEE DR
WEATHERSTONE DR
LAMPLIGHTER CT
CARRIAGE LA
CANADIAN NATIONAL
HIDDEN ACRES CT
CALUME

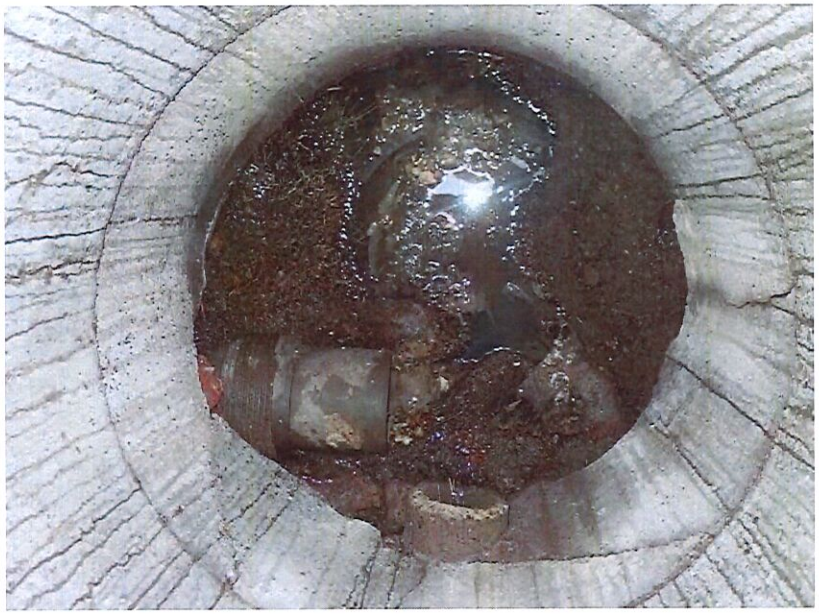
AQUAPRiORi

AQUA® DUO SCOPE

- AquaDuoscope®-measurements are used in the waste water network

- Measurements give us information about the inflow / infiltration leakages (I/I) in the waste water network

- AquaDuoscope®-softa counts the content of the inflow / infiltration of the sample taken from the sewer pipeline



AQUAPRiORi

AQUA® DUO SCOPE

- We measure the flow rate and take a sample of the waste water. When surface or ground water gets into the sewer pipeline, it changes the measured quality parameters.
- With AquaDuoscope® - measurements we can determine the amount of leakage water in the waste water flow.
- With AquaDuoscope® it is possible to determine the sources of leakage. Our technique is fast and cost-efficient.
- Based on the results it is possible to prioritize renovations in the areas that most need to be renovated.

AQUAPRIORI

AQUA® DUO SCOPE

- AquaDuoscope®-measurements can be cost-efficiently carried out in very large areas
- AquaDuoscope®
  - is faster and cheaper implementing than TV inspections
  - gives a total picture of I/I (leakages) in a specific area

- with **AquaDuoscope®** You can…
  - determine the amount of I/I (surface and ground water) in the waste water flow
  - determine the sources and exact places of I/I
  - prioritize renovations in the areas that most need to be renovated
  - target the sewer liner technologies
  - save money!

Appleton Wastewater Treatment Plant
Operations Synopsis
October 2021 – December 2021

Wastewater Treatment Program

- The Appleton Wastewater Treatment Plant (AWWTP) final effluent met Wisconsin Department of Natural Resources (WDNR) discharge monitoring reporting limits for carbonaceous biochemical oxygen demand (CBOD), total suspended solids (TSS), phosphorous, and ammonia. The plant maintained good treatment and a healthy microbiological population with a sludge retention time of 10.5 days. Dewatering processes functioned well and converted 17.2 million gallons (MG) of primary digested sludge to biosolids.

Summary of Treatment

Parameter	October	November	December	Average
Industrial Flow (MG)	28.2	30.1	35.2	31.2
Domestic Flow (MG)	210.6	196.1	244.5	217.1
Total Flow (MG)	238.8	226.2	279.7	248.2
Influent CBOD Load (Avg Daily lbs)	22,823	21,361	22,716	22,300
Influent TSS Load (Avg Daily lbs)	39,975	41,426	44,747	42,049
Influent Phosphorous Load (Avg Daily lbs)	499	480	515	498
Influent Ammonia Load (Avg Daily lbs)	2,031	2,054	2,478	2,188
Effluent CBOD Load (Avg Daily lbs)	307	359	426	364
Effluent TSS Load (Avg Daily lbs)	254	223	281	253
Effluent Phosphorous Load (Avg Daily lbs)	24	18	13	18
Effluent Ammonia Load (Avg Daily lbs)	32	43	102	59
% Treatment Removal of CBOD	98.7	98.3	98.1	98.4
% Treatment Removal of TSS	99.4	99.5	99.4	99.4
% Treatment Removal of Phosphorous	95.2	96.3	97.5	96.3
% Treatment Removal of Ammonia	98.4	97.9	95.9	97.4

Work in Progress:

- 2019 Appleton Wastewater Plant Improvement Projects: The project includes replacement of the Return Activated Sludge (RAS) pumps, process piping modifications (e.g., blended sludge, filtrate, waste gas flare), outside secondary chemical offloading containment repairs, primary clarifiers #5 & #6 drive replacements (2020 CIP), and H-Building effluent pump replacements (2020 CIP). Staab Construction (Staab) proceeded with construction activities during the reporting period. Work completed through the reporting period included the waste gas flare rehabilitation, filtrate pipe modifications, blended sludge pipe replacement, plant air compressor replacements, primary clarifier drive replacement, RAS Pumps #1 – #6 and #12, and removal of remnant RFE system equipment. Final project completion is set for March 2022, but ongoing supply chain disruptions will likely require this be extended.
- Appleton Wastewater Plant Sludge Storage Building Addition: Applied Technologies, Inc. (ATI) advanced preliminary design work on the concept selected by Project Team staff which best met the needs of the AWWTP from a regulatory, functionality, reliability, efficiency, and capital cost standpoint. ATI provided 60% design plans for review during the final quarter of 2021. The public bidding phase is scheduled to occur in March 2022.

- 2021 Appleton Wastewater Plant Solids Dewatering Equipment Upgrades: McMahon Associates, Inc. (McMahon) continued engineering services as part of the Solids Dewatering Equipment Upgrades project. The AWWTP will be adding one additional BFP (for a total of four new) which will provide the required dewatering capacity based on future growth projections and redundancy to facilitate critical maintenance events. McMahon is to present 60% design plans for review in January 2022. The public bidding phase is scheduled to occur in March 2022.
- 2021 Secondary Clarifier Drive Rebuild Project: On June 2, 2021, Common Council approved contract award for the removal, rebuilding, and reinstallation of drive equipment on Secondary Clarifiers #1 through #6 to Sabel Mechanical. Common Council also approved the sole source purchase of the associated rebuild parts through the original equipment manufacturer, Evoqua. Supply chain disruptions contributed to significant upfront delays with delivery of major parts and equipment. Complete shipments were finally received late in September 2021 which allowed Sabel to commence with the removal of drives on Secondary Clarifiers #3 and #6 on October 5, 2021. Final project completion is not anticipated to occur until the spring of 2022.

Regulatory Summary

- Monthly Discharge Monitoring reports for October, November, and December were filed electronically on time for regulatory compliance.
- The AWWTP Wisconsin Pollution Discharge Elimination System (WPDES) electronic permit application was submitted on October 2, 2021, as part of reissuance. The DNR will be submitting a draft permit for review and comment during the 1st quarter of 2022. The current WPDES permit expires on March 31, 2022.

Laboratory

- All sampling and laboratory testing procedures were performed in accordance with requirements outlined in the AWWTP WPDES permit.
- Discharge Monitoring Report (DMR) and Health Department testing program objectives associated with sampling and analysis were met during the reporting period.
- Analysis of Single-Blind Proficiency samples for laboratory recertification occurred during the reporting period.
- Sampling of influent in support of Wisconsin State Lab of Hygiene COVID Sewage Surveillance continued during the reporting period.

EFFLUENT QUALITY SUMMARY
July 2020/2021 – December 2020/2021

Table 1 – 2020 Monthly Permit Summary

Month	CBOD (mg/L)	TSS (mg/L)	TSS (lbs/day)	P (mg/L)	P[3] (lbs/day)	NH3-N [1] (mg/L)	Fecal[2] Coliform Colonies/ (100 ml)	Chlorine[2] Residual (mg/L)	pH (s.u.)
Permit Limit	*25*	*30*	*1,322 [3]*	*1*	*23 [3]*	*10, 11, 4.4, 18*	*400 col/100ml Geo.Mean*	*0.038 mg/L daily*	*6.0 - 9.0 daily limit*
July 2020	4	2	311	0.25	30	0.73	4	<0.032	6.7/6.9
August 2020	6	3	189	0.30	19	1.15	11	<0.032	6.6/7.2
September 2020	6	3	191	0.34	23	0.81	8	<0.032	6.8/7.2
October 2020	6	4	373	0.31	26	0.88	NA	NA	7.1/7.4
November 2020	6	3	286	0.19	18	0.59	NA	NA	6.9/7.2
December 2020	7	5	347	0.28	20	3.96	NA	NA	6.88/7.11
		Nov - April Period Average[3]			21.0				
		May - October Period Average[3]			22.5				

Table 2 – 2021 Monthly Permit Summary

Month	CBOD (mg/L)	TSS (mg/L)	TSS (lbs/day)	P (mg/L)	P[3] (lbs/day)	NH3-N [1] (mg/L)	Fecal[2] Coliform Colonies/ (100 ml)	Chlorine[2] Residual (mg/L)	pH (s.u.)
July 2021	4	2	382	0.16	22	0.36	5	<0.032	7.1/7.4
August 2021	4	2	259	0.21	23	0.25	28	<0.032	7.1/7.3
September 2021	4	1	90	0.19	15	0.12	4	<0.032	7.1/7.3
October 2021	5	4	254	0.37	24	0.50	NA	NA	7.3/7.3
November 2021	6	4	223	0.28	18	0.69	NA	NA	6.5/7.4
December 2021	6	4	281	0.18	13	1.38	NA	NA	7.1/7.2
		Nov - April Period Average[3]			15.5				
		May - October Period Average[3]			21.1				

NOTES:

1) Seasonal NH3-N limits: 10 mg/L Jan. 1 – Mar. 31, 11 mg/L Apr. 1 – May 31, 4.4 mg/L June 1 – Sep 30, 18 mg/L Oct 1 – Dec 31.

2) Seasonal fecal and residual chlorine limits are in effect May 1st through September 30th. Limit of Detection 0.032 mg/L.

3) April 1, 2017 WPDES Reissuance with new TSS limits expressed as monthly concentration limit (mg/L) and loading limit (lbs).

The future TMDL phosphorus limit will be 23 lbs/day expressed as a 6-month average during the months of May – October and November – April.

YEAR 2021 RECEIVING STATION REVENUE

Hauler	January	February	March	April	May	June	July	August	September	October	November	December	Y-T-D Total
A & B Leist Trucking	$ 110,206.08	$ 99,576.28	$ 112,441.21	$ 114,069.65	$ 128,729.06	$ 118,096.94	$ 155,925.24	$ 165,601.61	$153,077.94	$ 137,810.32	$ 112,948.14	$ 119,776.57	$ 1,528,259.04
Buttles Custom Ag	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Hickory Meadows	$ 20,276.34	$ 25,312.36	$ 29,607.87	$ 35,278.49	$ 27,916.08	$ 27,265.29	$ 41,158.16	$ 45,576.74	$ 36,397.10	$ 30,941.38	$ 23,336.49	$ 19,480.25	$ 362,546.55
Holland Sanitary Dist. 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Jeff Waldvogel Trkg.	$ 28,287.42	$ 30,970.38	$ 34,544.27	$ 42,086.75	$ 39,497.32	$ 36,605.25	$ 41,926.97	$ 48,241.45	$ 40,306.58	$ 46,696.88	$ 34,983.80	$ 32,531.95	$ 456,679.02
Movin Materials	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Waldvogel Trucking	$ 1,844.16	$ 1,556.53	$ 1,975.58	$ 1,869.36	$ 1,817.53	$ 1,893.85	$ 1,816.50	$ 1,645.17	$ 1,588.17	$ 1,697.56	$ 1,450.48	$ 1,251.01	$ 20,405.90
2021 Total	$ 160,614.00	$157,415.55	$ 178,568.93	$ 193,304.25	$ 197,959.99	$ 183,861.33	$ 240,826.87	$ 261,064.97	$231,369.79	$ 217,146.14	$ 172,718.91	$ 173,039.78	$ 2,367,890.51
2020 Total	$153,426.62	$137,976.81	$175,878.03	$179,887.25	$181,558.27	$202,129.38	$205,556.34	$175,571.51	$170,679.26	$195,882.29	$188,313.41	$ 180,651.32	$ 2,147,510.49

3% Rate Increase effective 1/1/18

1% Rate Increase effective 1/1/19

5% Rate Increase effective 10/1/20

Date: January 19, 2022

Copies: K. Rindt (via email)
C. Shaw (via email)
B. Kreski
Utilities Committee

Appleton Water Treatment Plant
Operations Synopsis
October, November, and December 2021

Performance Summary

The table below presents selected water production and quality performance metrics for the current and previous reporting periods.

Treated Water Quality. All compliance parameters met or exceeded regulatory requirements.

Water Production. Compared with Q3 of 2021 (Q/Q) average production decreased by over 12% consistent with seasonal demand variation. Compared with Q4 of 2020 (Y/Y), average water production increased by almost 1%.

Raw Water Quality. Average Q/Q lake turbidity declined by 40% consistent with seasonal change. Y/Y levels also declined by 18%.

Energy Efficiency. Applied electrical energy efficiency Q/Q and Y/Y declined by about 4% consistent with increased plant discharge pressure.

WATER PLANT PARAMETERS	Previous (Q3 2021)			Current (Q4 2021)		
	July	August	September	October	November	December
Water Treated						
Finished (million gallons), total	302.1	310.0	283.6	268.9	252.7	260.3
Finished (million gallons / day), average	9.7	10.0	9.45	8.7	8.4	8.4
Electrical Energy (WTF)						
Consumption (Megawatt-hours)	549.1	564.2	527.6	511.5	486.7	498.4
MWH / million gallons produced	1.82	1.82	1.86	1.90	1.93	1.91
Lake Turbidity (NTU), average	8.02	30.11	32.93	9.12	18.84	13.47
Water System Microbial Quality						
Total Coliform Samples	81	81	81	81	81	81
Compliance with Standard	100%	100%	100%	100%	100%	100%
Finished Water Quality						
Water Temperature (Degrees F)	75.7	76.9	69.3	61.6	42.6	33.6
Turbidity (NTU), average	0.02	0.02	0.02	0.02	0.02	0.02
%<0.15 NTU standard	100	100	100	100	100	100
pH (SU), average	8.7	8.6	8.7	8.7	8.89	8.9
Total Chlorine (mg/L)	1.82	1.83	1.90	1.94	2.03	2.07
Fluoride (mg/L)	0.67	0.68	0.69	0.69	0.72	0.70
Orthophosphate (mg/L)	0.72	0.75	0.75	0.68	0.68	0.58

Laboratory

- In support of plant operations, staff conducted analyses according to method protocols for pH, turbidity, alkalinity, hardness, free/total chlorine, ammonia, phosphorus, potassium permanganate, and fluoride.
- In support of distribution operations, staff performed required 81+ monthly Coliform bacteria analyses along with heterotrophic plate count (HPC) testing.
- Staff collected and processed raw and finished water samples to comply with Disinfection By-Products Rule (DBPR) sampling requirements. Provided support to consecutive customers with shipping of DBPR2 samples.
- In support of OCCT demonstration project, completed daily samples and orthophosphate analyses along with stagnant / flowing samples and related water quality analyses.

Safety

- Maintained WTF Safety programs by completing scheduled safety inspections, fire prevention inspections, and monthly meetings. No significant incidents to report.
- Applied appropriate COVID-19 countermeasures as directed by city policy.

Operations

- Operated two UV Disinfection reactors continuously during the quarter. Completed lamp replacements as scheduled.
- Completed construction phase for the Lake Station mechanical/electrical rehabilitation.
- Completed triennial Sanitary Survey in cooperation with WDNR.
- Completed testing phase for Optimized Corrosion Control Treatment (OCCT) pipe loop testing apparatus.
- Completed annual cathodic protection maintenance. Observed evidence of partial icing of north face of Glendale Tower.
- Placed #4 Softener into service and began cleaning #1 Softener.
- Experienced icing event at Lake Station intake requiring operation of new “water door” and temporary deployment of portable pumps.

Staffing & Training

- Operations staffing levels were occasionally reduced by appropriately applied COVID-19 emergency leave instances.
- Welcomed replacement Instrument Technician in anticipation of incumbent retirement.
- Completed annual performance evaluation for all staff.

WATER MAIN BREAK/ JOINT LEAK REPORT - DECEMBER 2021

YEARLY WATER MAIN BREAK COMPARISON

DEC 20	DEC 21	YTD 20	YTD 21
27	15	105	137

LOCATION	BREAK DATE	WORK ORDER	TYPE OF PIPE	SIZE	YEAR	BREAK	ESTIMATED DURATION	ESTIMATED WATER LOSS IN GALLONS	DOLLAR VALUE OF WATER REVENUE LOSS**
2701 E. Henry St.	12/1/2021	296531	DIP	8"	1972	1/128" Crack	57 Days	2,700,219	$16,417.33
NOTES: Break was found when the crew was testing hydrants and with the correlator. This never surfaced. Duration is based on the last time this hydrant was tested.									
1200 E. Northland Av.	12/2/2021	296737	DIP	12"	1979	Four Holes (2", 3", 3",4")	16 Hours	1,958,621	$11,908.42
NOTES: Break was found as water was bubbling up. Duration is based on the time of call to repaired. Repairs were made & new breaks were occuring after turning the water back on.									
W. Northland Av. & N. Bennett St.	12/2/2021	296754	CIP	12"	1969	1/16" Crack	5 Hours	104,446	$635.03
NOTES: Break was called in by APD. Duration is based on the time it was reported and the amount of water.									
821 S. Pierce Av.	12/2/2021	296797	CIP	6"	1927	1/16" Crack	6 Hours	71,058	$432.03
NOTES: Break was called in by APD. Duration is based on the time it was reported and the amount of water.									

**Water Loss is calculated at the residential rate of $6.08 per 1000 gallons.

LOCATION	BREAK DATE	WORK ORDER	TYPE OF PIPE	SIZE	YEAR	BREAK	ESTIMATED DURATION	ESTIMATED WATER LOSS IN GALLONS	DOLLAR VALUE OF WATER REVENUE LOSS**
917 E. Capitol Dr.	12/2/2021	296736	DIP	12"	1967	4" Hole	3 Hours	523,000	$3,179.84
NOTES: Break was found as water was bubbling out of the road. Duration is based on time of report until it was repaired.									
1707 N. Ballard Rd.	12/9/2021	297018	CIP	8"	1962	1/64" Crack	6 Days	628,464	$3,821.06
NOTES: Break was found as there was water on the road. Duration is based on resident's note of water on road and the soil saturation.									
501 E. Taft Av.	12/10/2021	297057	CIP	6"	1957	3" Hole	3 Hours	3,113,600	$18,930.69
NOTES: Break was called in as water is bubbling on road. Duration is based on time of call until it was turned off for repair.									
1030 W. Whittier Dr.	12/12/2021	297092	CIP	8"	1964	1/16" Crack	2 Days	668,455	$4,064.21
NOTES: Break was called in by resident. Duration is established from when the resident first saw the water, along with the amount of water running down the road.									
1821 W. Reid Dr.	12/13/2021	297126	CIP	6"	1957	3" Hole	4 Hours	365,672	$2,223.29
NOTES: Break was found as water was bubbling out of the road. Duration is based on time of report until it was repaired.									
1705 N. Rankin St.	12/14/2021	297210	CIP	6"	1957	1/16" Crack	3 Hours	29,009	$176.37
NOTES: Break was called in by resident. Duration is based on time of call to when it was turned off for repair.									
157 Northbreeze Dr.	12/23/2021	297444	DIP	8"	1978	1/32" Hole	57 Days	13,533	$82.28

**Water Loss is calculated at the residential rate of $6.08 per 1000 gallons.

LOCATION	BREAK DATE	WORK ORDER	TYPE OF PIPE	SIZE	YEAR	BREAK	ESTIMATED DURATION	ESTIMATED WATER LOSS IN GALLONS	DOLLAR VALUE OF WATER REVENUE LOSS**
NOTES: Break was found as there was water on the road. Duration is based on soil saturation and the date of the last hydrant test.									
2624 S. Berry St.	12/23/2021	297448	CIP	8"	1968	12" Split	22 Days	1,990,460	$12,102.00
NOTES: Break was called in by a resident. Duration is bases on the soil saturation and the last time the hydrant was tested.									
1400 S. Memorial Dr.	12/24/2021	297446	CIP	8"	1928	One 2.5" Hole & Two 1.5" Holes	5 Hours	619,841	$3,768.63
NOTES: Break was found as water was coming out of the ground. Duration is based on soil saturation and the time of call until was it was off for repair.									
331 E. McArthur St.	12/27/2021	297483	CIP	8"	1957	1/6" Crack	4 Hours	59,551	$362.07
NOTES: Break was found as water was bubbling up. Duration is based on time of call and the soil saturation.									
College Av. Easement Road	122921	297483	DIP	12"	1960	5" Hole	4 Hours	971,614	$5,907.41
NOTES: Break was found as water was bubbling up. Duration is from time of call along with soil saturation.									

In addition to the dollar value of water revenue lost, there is an average cost of $9,000 to repair each water main break (including final restoration) and an average cost of $630 to produce the lost water for each main break.

**Water Loss is calculated at the residential rate of $6.08 per 1000 gallons.