REPORT

PRELIMINARY ENGINEERING REPORT

FOR

WATER DISTRIBUTION SYSTEM IMPROVEMENTS

HEDRICK, IOWA

2021

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FOR

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2021

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.

Matthew J. Walker — 10/29/2021

Matthew J. Walker, P.E. — Date

License Number: 19697
My license renewal date is December 31, 2021

Pages or sheets covered by this seal:
All

Prepared by
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G&A 4021202

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2021

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INTRODUCTION

The City of Hedrick, Iowa is located in southwest Keokuk County. The existing Hedrick water distribution system provides potable water service to residents and businesses located within the city limits. There are approximately 298 water customers. Potable water is supplied to the City of Hedrick by Wapello Rural Water Association, Inc. (WRWA) through a water purchase contract.

The Hedrick water distribution system consists of a valve station, an elevated storage tank, and water main piping and appurtenances. WRWA delivers water to the City's valve station, which was formally the water treatment plant. The water treatment plant was abandoned in approximately 2009 when Hedrick connected to WRWA. The Hedrick elevated storage tank is filled by gravity flow with pressure from WRWA. New PVC water mains were installed in approximately 1985 to improve the water distribution system, however, several sections of cast iron pipe are still in service. The water distribution system also has sections of 1 inch and smaller piping that is used to service multiple houses. Significant water loss has been an issue for the City, but recent leak identification and repair work has substantially reduced the percentage of water loss.

The elevated storage tank is at least 87 years old and the exterior coating has failed and needs removed prior to being painted. Since lead-based paint has been identified in the exterior coating, containment would be required to remove the paint. The elevated storage tank also does not meet all the current standards for safety and sanitation. Improvements to repaint or replace the existing tank in the near future are required.

The City of Hedrick has authorized Garden & Associates, Ltd. to complete an evaluation of alternatives to repaint or replace the existing Hedrick elevated storage tank in order for the City to continue to provide dependable and safe water service for the foreseeable future. Improvements to the water piping system will also be evaluated to provide the City guidance when making future decisions to replace water main piping. The engineering report will be used to support applications for funding requests to USDA – Rural Development (USDA-RD), the Iowa Department of Natural Resources – State Revolving Loan Fund (IDNR-SRF), Community Development Block Grant (CDBG), or other sources identified by the City.

PROJECT PLANNING

Location (1.a)

The City of Hedrick is located in southwest Keokuk County, east of Highway 21 along Highway 149. The existing water tower and valve station are located southwest of West 2nd Street and North Main Street, see Figures 1 and 2 (attached to the report). The water distribution system is primarily located within the corporate limits of Hedrick, Iowa.

Environmental Resources Present (1.b)

No significant environmental impacts are anticipated for the proposed improvements. Proposed water main improvements would be located in existing City right-of-way that has been previously disturbed and the preliminary site for a proposed water tower was previously used as a yard area for a grain elevator. The proposed improvements will be consistent with funding agency environmental policies and regulations; the proposal will also comply with Iowa Department of Natural Resources (IDNR) rules and regulations. The proposed improvements are predicted to have "no effect" on threatened or endangered species, their habitats, or their proposed or designed critical habitats. The proposed improvements are not expected to involve historical or archeological properties; impacts to flood plains and wetlands are also not expected.

Population Trends (1.c)

The population growth, as established during a review of the census data presented below, is a downward trend since 2000, but is estimated to have been stable over approximately the past 10 years. Zero population growth from the 2010 population of 764 is predicted during the 20-year planning period.

1970	1980	1990	2000	2010
790	847	810	837	764

Community Engagement (1.d)

Hedrick water customers are represented by members of the elected City Council, who conduct public meetings at least monthly at City Hall. The public is invited to address the City Council at each regularly scheduled public meeting. Water utility customers are also able to present comments and questions related to the water distribution system during the scheduled business hours of City Hall.

EXISTING FACILITIES

Location Map (2.a)

Figure 1 shows the location of the existing Hedrick water distribution system, valve station, and elevated storage tank.

History (2.b)

The Hedrick elevated storage tank (also referred to as water tower) and water distribution system was in existence prior to 1935 as indicated by a tag on the water tower foundation with the date of 1934. However, a 1916 Sanborn Map also shows the water tower at its current location and a note indicating construction was in 1915. The existing 50,000 gallon water tower is a riveted tank with a conical roof. The riser pipe is insulated and has a stainless steel shield. The exterior coating on the existing elevated storage tank is less than 5 years old, and the age of the interior coating is not known.

The existing valve station is located in the abandoned water treatment plant. The water treatment plant was constructed in approximately 1978 to provide iron removal, zeolite softening, and disinfection, but was converted to a valve station in approximately 2009 when the City connected to WRWA for their water supply. Water is delivered by gravity from WRWA's water tower to the valve station through approximately 1 mile of 8-inch water main; WRWA's water tower is approximately 10 feet higher than Hedrick's water tower. The water purchase agreement with WRWA is for 144,000 gallons per day at a rate not to exceed 150 gallons per minute; maximum emergency deliver rate is not to exceed 290 gallons per minute. WRWA also allocates 27,900 gallons of storage from their water tower to the City of Hedrick.

Several water main improvement projects have been completed in the past 42 years. In 1979, 2-inch water main was installed to replace 1-inch and smaller water pipes at approximately five locations. In 1985, 6-inch and 8-inch polyvinyl chloride (PVC) water mains and fire hydrants were installed. The City has also completed numerous repairs in the past 3 years to reduce water loss. It is assumed that the majority of the 4-inch and larger water mains not replaced in 1985 are cast iron and water mains 3 inch and smaller are plastic (PVC or polyethylene).

Condition of Existing Facilities (2.c)

As listed in the Tower Visual Inspection Report in Appendix A, the following observations were made regarding the condition of the existing elevated storage tank.

- Significant failure of exterior coating requires full removal and replacement in the near future, several layers of paint are cracking and peeling off; please note that exterior coating contains lead, see Limited Asbestos Survey and Paint Sampling Report in Appendix B
- Structural steel and foundation appear in adequate condition
- Riser pipe insulation, ladder, safety climb, and overflow appear in good condition; please note that riser pipe insulation is a non-asbestos material, see Appendix B
- Balcony top rail is damaged; balcony does not meet OSHA standards and needs replaced
- Roof manway locking hasp is broken and needs repaired
- Tower does not have secondary manway
- Roof vent does not meet current standards
- Tank interior coating is failing and will need to be replaced within approximately 3 years
- Roof eave opening needs sealed or screened

The existing elevated storage tank has a high-water-level (HWL) elevation of 940.5 feet, which provides a minimum static pressure in Hedrick of approximately 50 psi. However, due to 1-inch and smaller water piping that serves multiple buildings, some water mains were hydraulically modeled (see Appendix C – Existing Water System – Operating Pressures) to have normal working pressures below 35 psi; 35 psi minimum is recommended by 10-States Standards section 8.2.1. The majority of potential low pressures are along Highway 149 on the east side of Hedrick. 2-inch and larger water piping was modeled to have normal working pressures above 35 psi. Pressure recordings would be required to verify the results of the hydraulic models.

In addition to the 50,000 gallons of elevated storage within the City of Hedrick, 27,900 gallons of storage capacity is reserved for the City in a WRWA water tower located approximately 1 mile away; 77,900 gallons of storage total. Please note that the storage reserved by WRWA for Hedrick is part of the existing water purchase agreement that expires in 2029. Based on the information tabulated below, approximately 71,400 gallons of storage is currently required to provide average day storage capacity and meet recommended fire flow requirements. Please note that in past years the average day demand was significantly higher due to leaks; the City will need to continue to maintain the distribution system to control unbilled water use.

ADD – Recorded (June 2020 to May 2021, see Table 1), gpd	44,900
ADD – Estimated from Population (100 gpd/person), gpd	76,400 [2]
ADD – Estimated from Customers (200gpd/customer), gpd	59,600 [2]
ISO Fire Flow (peak day demand & 340 gpm for 2 hours), gallons	71,400
IDNR Fire Flow [1](peak day demand & 250 gpm for 2 hours), gallons	60,600

ADD = Average Day Demand *ISO = Insurance Services Office, Inc.*
gpd = gallons per day *gpm = gallons per minutes*

Notes:
1. Calculation accounts for WRWA water supply having backup emergency power.
2. ADD per person/customer values used as comparison to verify recorded ADD flow.

The existing valve station consists of a buy meter provided by WRWA, a rubber flapper check valve, and an actuated butterfly valve. Water tower level monitoring and telemetry are also located in the valve station. The valve station appears in good condition.

The water distribution system is made up of approximately 15 percent cast iron piping and 20 percent of the piping is 1-inch in diameter or smaller; the majority of the piping is plastic. Detailed water service line information is not available, but it is estimated that 50 percent are copper and 50 percent are plastic. Lead service lines are not common and are replaced when discovered. Around 30 percent of the water meters are located in meter pits and are estimated to have been installed in the past 10 years. Approximately 70 percent of the water meters are located in buildings and are in need of replacement. The City is gradually replacing the old meters and transitioning to using meter pits.

Fire hydrants are generally located within one block (300 to 350 feet) of most buildings, but there are numerous locations, along the perimeter of the City, where hydrants are located further than one block away, see Figure 1. The majority of fire hydrants are on 6-inch and larger piping,

but around 20 percent are on 4-inch and smaller piping. Less than 20 percent of the dead-end water mains have a flushing device; the majority of the dead-ends are on 2 inch and smaller piping. Most water main junctions only have a single valve or no valves; large areas need to be shutdown to isolate the system during repairs, see Figure 1.

Using 2020 ISO hydrant flow testing results, see Appendix D, the water distribution system was calibrated and modeled for fire flow at 20 psi minimum system pressure, see Appendix C – Existing Water System – Fire Flow. Fire hydrants on 6-inch and large piping are predicted to provide approximately 700 to 900 gallons per minute, and fire hydrants on 4-inch and smaller piping are predicted to provide approximately 140 gpm to 550 gpm. Please note that the fire hydrant near Spring Street and West 5th Street was flow tested approximately 200 to 300 gpm below the anticipated flow rate; this fire hydrant should be retested after checking for closed valves in the vicinity.

Nine water distribution system repairs have been made in the past 2 years, which have significantly helped to reduce the amount of unbilled water; four leaks were on 4-inch cast iron piping or adjacent valves, three leaks were on 1-inch or smaller plastic piping, one leak was on a fire hydrant, and one leak was on a lead service line. Prior to this past year, average unbilled water exceeded 50 percent, but it is now approximately 24 percent, see Table 1.

Financial Status of Existing Facilities (2.d)

Financial information and existing debt listing will be provided by the City of Hedrick as required to complete funding applications.

Water/Energy/Waste Audits (2.e)

There are no audits of the City of Hedrick water system appurtenances. The gravity pressurized water system does use a significant amount of energy.

NEED FOR PROJECT

Health, Sanitation, and Security (3.a)

The existing elevated storage tank does not meet current standards for health, sanitation, security, and safety; deficiencies include the following:

- Failed exterior coating, containing lead paint, is peeling off; site is not fenced and is easily assessable from the adjacent alley
- Balcony railing is unsafe due to damage and balcony does not meet OSHA standards
- Roof manway cannot be locked
- Tower does not have a shell (sidewall) manway
- Roof vent does not meet current standards, including screening
- Roof eave opening is not sealed or screened

The water purchase agreement with WRWA that allocates 27,900 gallons of storage capacity to the City of Hedrick expires in 2029. The storage allocated by WRWA is needed to provide a

minimum of 71,400 gallons of storage based on ISO fire flow requirements. Preliminary discussion with WRWA indicates that the storage allocated in the water purchase agreement will not be reallocated to the City in 2029. Therefore, in 2029 Hedrick's existing 50,000 gallon water tower is predicted to not be sufficiently sized for the ISO fire flow volume.

The existing water distribution system contains old 4-inch and larger cast iron piping and 1-inch and smaller plastic piping that has been a consistent source of leaks and has required frequent repairs. Each location where water leaks from the distribution system is a potential source of contamination, if distribution system pressures drop below 0 psi. Frequent repairs may also negatively affect the health of customers that rely on a consistent water supply. The City plans to continue repairing leaks to control water loss and maintain adequate pressure in the water distribution system. The City will also continue to budget and complete capital improvements in areas with frequent main breaks.

Aging Infrastructure (3.b)

The existence of aging infrastructure in a potable water distribution system can result in numerous and costly negative impacts, in addition to interruption to service and an increased risk for contamination. Aged infrastructure includes the following:

- 50,000 gallons elevated storage tank: approximately 87 to 106 years old
- 4-inch and larger cast iron water main: age is not known

Reasonable Growth (3.c)

No growth is projected to occur in the proposed project area, however, water mains 2-inch and larger have some hydraulic capacity to accommodate additional water customers or increased water use by existing water customers.

ALTERNATIVES CONSIDERED

Elevated Storage Tank (4.a)

A project to rehabilitate or replace the existing elevated storage in the near future is required due to the failed exterior coating. Below are the options being considered.

Option 1 – No Project

If no project were to occur, the City of Hedrick would experience violations for the condition of the existing elevated storage tank and ultimately the tank would fail due to corrosion. The City would not be able to provide safe potable water to its residents. This alternative was eliminated from further consideration.

Option 2 – Rehabilitate Existing Elevated Storage Tank (Table 2, Figure 1)

With this option the City would rehabilitate the existing 50,000 gallon elevated storage tank by replacing the failed exterior coating and aged interior coating. Miscellaneous repairs would also

be completed so the tower will meet applicable health and safety standards. Repairs include the following:

- Replace balcony and railing
- Add locking hasp to roof manway
- Add shell manway
- Replace roof vent
- Seal or screen eave opening

Since Hedrick only has one water tower, and the WRWA water supply would not be able to adequately pressurize the Hedrick system for more than a short duration, portable pressure tanks totaling 10,000 gallons would be used to provide water storage and pressure while work is completed on the existing Hedrick water tower.

Environmental impacts anticipated with this option:

- No additional land would be disturbed
- A containment system would be required to contain the lead paint that is sand blasted from the water tower exterior
- Existing water tower would need to be repainted more frequently than a new water tower

As listed in Table 2, the Estimated Project Cost based on construction occurring in 2022 is $504,700.

This option is believed to provide the City with the lowest capital cost, but higher estimated annual Operation & Maintenance (O&M) costs when compared to the other option. The predicted Net Present Value (NPV) was approximately 6 to 7 percent more than the other alternatives. The higher NPV of this option, coupled with age of the existing tank, makes this option undesirable.

Option 3 – New Elevated Storage Tank – 50,000 or 75,000 Gallons (Tables 3A/3B, Figure 2)

With this option the City would construct a new 50,000 or 75,000 gallon elevated storage tank at a site nearby the existing water tower. The water supply from WRWA would continue to be delivered to the existing valve station. New 8-inch water main would be installed to connect the proposed water tower to the existing valve station and distribution system. Tower level controls would remain in the valve station. The existing water tower would be disconnected from the water distribution system and demolished once the proposed water tower has been successfully put into service.

The proposed water tower would be sized to provide sufficient storage capacity to deliver the ISO rated flow of 340 gpm plus water consumption during a 2 hour period (minimum of 71,400 gallons). Since WRWA's water tower has 27,900 gallons allocated to Hedrick, a 50,000 gallon elevated storage tank (Option 3A) is adequate for the duration of the existing water purchase agreement; the water purchase agreement expires in 2029. However, a 75,000 gallon elevated storage tank (Option 3B) would provide fire flow storage capacity without relying on the WRWA water tower.

Environmental impacts anticipated with this option:

- Additional land would be disturbed
  - Proposed water main installed in previously disturbed right-of-way
  - Preliminary water tower site is vacant lot that was previously used as a yard area for a grain elevator
- Existing water tower would be demolished and disposed

As listed in Table 3A, the Estimated Project Cost, for a new 50,000 gallon elevated storage tank, based on construction occurring in 2022 is $999,500.

As listed in Table 3B, the Estimated Project Cost, for a new 75,000 gallon elevated storage tank, based on construction occurring in 2022 is $1,027,400

Option 3A or 3B is believed to provide the City with a higher capital cost, but lower estimated annual Operation & Maintenance (O&M) costs when compared to the other option. The predicted Net Present Value (NPV) was approximately 6 to 7 percent less than the other alternative. The lower NPV of these options, coupled with selecting a long-term solution, makes these options desirable.

The decision between Option 3A or 3B will depend on if Hedrick wants to increase fire flow capacity within the City.

Water Distribution System (4.b)

The City of Hedrick public works department will continue to invest in the water distribution system by completing capital improvements to reduce water loss and repair sections of water main that are prone to failure. The options listed below are intended to help guide the City as local funding allows improvements to be completed. The City does not intend to complete a large scale project at this time, therefore only budgetary cost estimates were prepared and life cycle cost analysis was not considered; neither option will be recommended or analyzed in detail.

A plan to upgrade the water distribution system was completed with the following goals.

- Improve system pressure by replacing 1-inch and smaller water piping that serves multiple houses
- Provide fire hydrants that are spaced approximately 2 blocks and served by 6-inch minimum diameter water mains (minimum pipe size for fire flow as specified by the IDNR)
- Replace old cast iron water mains
- Loop dead end water mains when reasonable

Hydraulic Modeling Analysis to estimate distribution system pressures was completed using KY Pipe, see below for details.

- KY Pipe version 9.023 (6/4/2018)
- Hydraulic modeling performed with elevated storage being half full
- C factor = 140 for plastic pipe and 120 for cast iron pipe

- Modeling for estimating operating pressures was conducted utilizing a custom Peak Demand Diversity Curve for Rural Analysis, based on the following:
  - Q = A*N^0.5 + B*N + C, where
    A = 3
    B = 0.75
    C = 1
    N = Number of users
    Q = max instantaneous flow in gallons/minute
    Q = 1.2 gallons per minute, per user (for N > 50)
  - The portions of the distribution system with parallel piping (looped) were analyzed to predict flows through each portion of the loop; then flow was assigned to each pipe segment for series flow.
- Modeling for estimating fire flow was conducted utilizing KY Pipe Fireflow and Hydrant Analysis, based on the following
  - Minimum Pressure for Fireflows = 20 psi
  - Default Hydrant and Hose Constant = 130 (selected to calibrate modeled hydrants based on ISO hydrant flow data for flow tests through 2 1/2 inch nozzle)

Option 4 – Water Main Upgrades – Increase Operating Pressures (Table 4, Figure 3)

With this option, the City would prioritize water main improvements that increase operating pressures by replacing 1-inch and smaller water piping. Some of these locations were modeled to have normal working pressures below 35 psi. See Appendix C for the hydraulic modeling results which estimate water pressures before and after upgrades. At locations where fire hydrants are proposed, the small diameter water piping was replaced with 6-inch piping; at other locations 3-inch piping was selected as the minimum size.

As listed in Table 4, the Estimated (budgetary) Project Cost based on construction occurring in 2022 is $847,600

Please note that piping improvements in Option 4 are also shown in Option 5 – Water Main Upgrades – Fire Flow; Option 4 could be upgraded to Option 5 with additional improvements.

Option 5 – Water Main Upgrades – Fire Flow (Table 5, Figure 4)

This option is a complete upgrade of the water distribution system that both increases operating pressures (Option 4 improvements) and improves fire flow. See Appendix C for the hydraulic modeling results which estimate fire flows before and after upgrades. By utilizing 6-inch water mains to serve fire hydants spaced approximately 2 blocks, the majority of buildings in Hedrick would be located within 350 feet of a fire hydrant that is modeled to deliver more than 700 gpm through the 2 1/2 inch nozzle; two dead-end locations had modeled fire flows between 600 and 700 gpm.

As listed in Table 5, the Estimated (budgetary) Project Cost based on construction occurring in 2022 is $1,769,700.

SELECTION OF AN ALTERNATIVE

Life Cycle Cost Analysis (5.a)

Table 6 identifies the estimated cost of rehabilitating and replacing short-lived assets under each of the options detailed. The information provided in Table 6 is incorporated into Table 7, which is a summary of estimated annual O&M and replacement costs in present day dollars using Uniform Series Present Worth (USPW) calculations. Table 8 presents the estimated salvage value for items included with each option in terms of the single payment present worth.

Table 9 presents the Life Cycle Cost Analysis of the options evaluated. The Net Present Value (NPV) for each option has been prepared using the discount rate for 2021 of -0.5% and a 20-year planning period, as follows:

$$NPV = \text{Capital Cost} + \text{Annual O\&M} - \text{Salvage Value}$$

Non-Monetary Factors (5.b)

Option 2 – Rehabilitate Existing Elevated Storage Tank

- Visual inspection of water tower did not address potential deficiencies that are located underground (corroded piping, deteriorated foundation) or covered/hidden by paint or sediment
- Since Hedrick only has one water tower, the higher maintenance frequency on the existing water tower will disrupt the distribution system more than a new water tower
- Using the existing 50,000 gallon tank, the City would be relying on WRWA to continue to allocate additional storage from its water tower in future water purchase agreements, so the City can provide sufficient storage capacity for fire flow; storage for fire flow is estimated at 71,400 gallons. The storage allocated to the City by WRWA will likely not be included in future water purchase agreements, due to anticipated growth in WRWA's system; the existing water purchase agreement expires in 2029.

Option 3 – New Elevated Storage Tank – 50,000 or 75,000 Gallons (Tables 3A/3B, Figure 2)

- If Option 3A or 3B is selected, the final site for the proposed water tower may not be at the location shown on Figure 2; an option to purchase the site has not been executed and geotechnical investigation has not completed; additional water main may be required with a different site
- By selecting a 50,000 gallon tank, the City would be relying on WRWA to continue to allocate additional storage from its water tower in future water purchase agreements, so the City can provide sufficient storage capacity for fire flow; storage for fire flow is estimated at 71,400 gallons. The storage allocated to the City by WRWA will likely not be included in future water purchase agreements, due to anticipated growth in WRWA's system; the existing water purchase agreement expires in 2029.
- Communication companies that lease space on the existing water tower would need to move their equipment to the new water tower

RECOMMENDED ALTERNATIVE

It is recommended that the City of Hedrick, Iowa select Option 3B – New Elevated Storage Tank – 75,000 Gallons. This option is predicted to be the lowest cost alternative that best meets the following goals:

- Provide reliable long-term elevated storage
- Continue to utilize existing valve station and telemetry equipment
- Provide storage capacity that meets ISO recommendations for fire flow and exceeds the water system's average day demand without relying on storage allocated from WRWA

Preliminary Project Design (6.a)

The recommended improvements include constructing a new 75,000 gallon double ellipsoidal multi-column elevated storage tank. The elevated storage tank would be constructed at a site nearby the existing water tower to minimize piping improvements. For preliminary planning purposes, the location shown in Figure 2 was used to estimate the cost of piping improvements. 8-inch water main would be used to connect the new water tower to the existing water distribution system; connection point would be near the existing water tower. The new 8-inch piping would also be connected to the valve station. Estimated project cost is dependent on securing a new tower site near the existing water tower. The valve station would continue to be the connection point for the WRWA water supply and contain the tower level controls, buy meter, control valve, and telemetry equipment. An existing generator is connected to the valve station to provide backup emergency power.

The existing water tower would remain in service during construction of the new elevated storage tank, and be demolished once the new water tower is placed in service. The existing lead based exterior paint would be disposed of when the water tower is demolished. Please note that demolition of the existing concrete foundation was not included in the estimated construction cost.

The new water tower high-water-level would be the same as the existing tower, approximately 940.5 feet m.s.l., which provide a minimum static pressure of approximately 50 psi. Water delivery rate from the WRWA water tower would remain the same; 144,000 gallons per day at a rate not to exceed 150 gallons per minute, maximum emergency deliver rate not to exceed 290 gallons per minutes. Flow capacity to the City of Hedrick customers and fire hydrants would not substantially change with the project.

Water distribution system improvements to increase operating pressures and fire flows are not included in this project, but the City will continue to regularly complete repairs and capital improvements as their yearly budget allows.

Proposed Project Schedule (6.b)

- File Engineering Report with IDNR ---------- November 2021
- Enter into Engineering Services Agreement ---------- November 2021
- Secure Land ---------- November 2021
- Complete Geotechnical Exploration at Tower Site ---------- December 2021
- Submit Funding Applications ---------- December 1, 2021
- Complete Engineering Design ---------- February 2022
- Apply for Construction Permit from IDNR ---------- March 2022
- CDBG Application ----------April 2022
- Bid Letting for Project Construction ---------- October 2022
- Complete Construction of Project ---------- November 2023
- Project Closeout ---------- December 2023

The above proposed project schedule is contingent upon securing adequate amounts of funding.

Permit Requirements (6.c)

Construction of the proposed improvements may require the following permits:

- Iowa DNR Construction Permit
- Iowa DNR Notification of Demolition and Renovation
- City of Hedrick Building Building/Demolition Permit

Sustainability Considerations (6.d)

The recommended alternative will provide a long-term reliable solution with a life cycle of more than 75 years if properly maintained. No green infrastructure is known to exist for the distribution of potable water.

Preliminary Project Cost Estimate - Engineer's Opinion of Probable Cost (6.e)

The Estimated Project Cost for Option 3B – New Elevated Storage Tank – 75,000 Gallons as described above, and as presented in Table 3B is $1,027,400.

American Iron and Steel provisions were considered during preparation of the cost estimates.

Annual Operating Budget (6.f)

Income (6.f.1)

The City of Hedrick, Iowa is planning to establish water utility rates for their utility customers as required to pay for incurred project debt and ongoing costs associated with the proposed water distribution system project.

Annual O&M Costs (6.f.2)

Hedrick water rates for utility customers will be established as required to pay operations and maintenance (O&M) costs associated with the proposed water distribution system improvements. The estimated annual O&M costs for the water system, including the proposed improvements are shown in Table 7; the annual O&M including costs associated with replacing short-lived assets are predicted to be $129,076.

Debt Repayments (6.f.3)

Table 10 outlines potential project funding using readily available loans, with calculated annual debt service payments, for the Recommended Alternative. USDA-RD water loans and SRF drinking water loans are being considered for financing the proposed improvements. The City of Hedrick, Iowa may be eligible for a Community Development Block Grant (CDBG) through IEDA; costs for financing with a CDBG were not estimated.

For USDA-RD loan calculations, an interest rate of 1.375% for a 40-year term loan is assumed. The estimated annual debt payment based on the loan and no CDBG grant is $33,564 and an estimated annual funded depreciation and loan reserve amount of $3,692. Total 40-year loan cost is $1,490,242. Estimated monthly customer cost based on 298 customers is approximately $10.

For IDNR SRF loan calculations, an interest rate of 1.75% for a 30-year term loan is assumed. The estimated annual debt payment based on the loan and no CDBG grant is $43,169 and an estimated annual loan administration amount of $1,252. Total 30-year loan cost is $1,332,630. Estimated monthly customer cost based on 298 customers is approximately $12.

It should be noted that the final financing breakdown of fees will be determined by the loan service provider and the City.

Reserves (6.f.4)

The City of Hedrick, Iowa will be required to maintain the required reserves, if USDA-RD financing is selected, as is standard with USDA-RD loans.

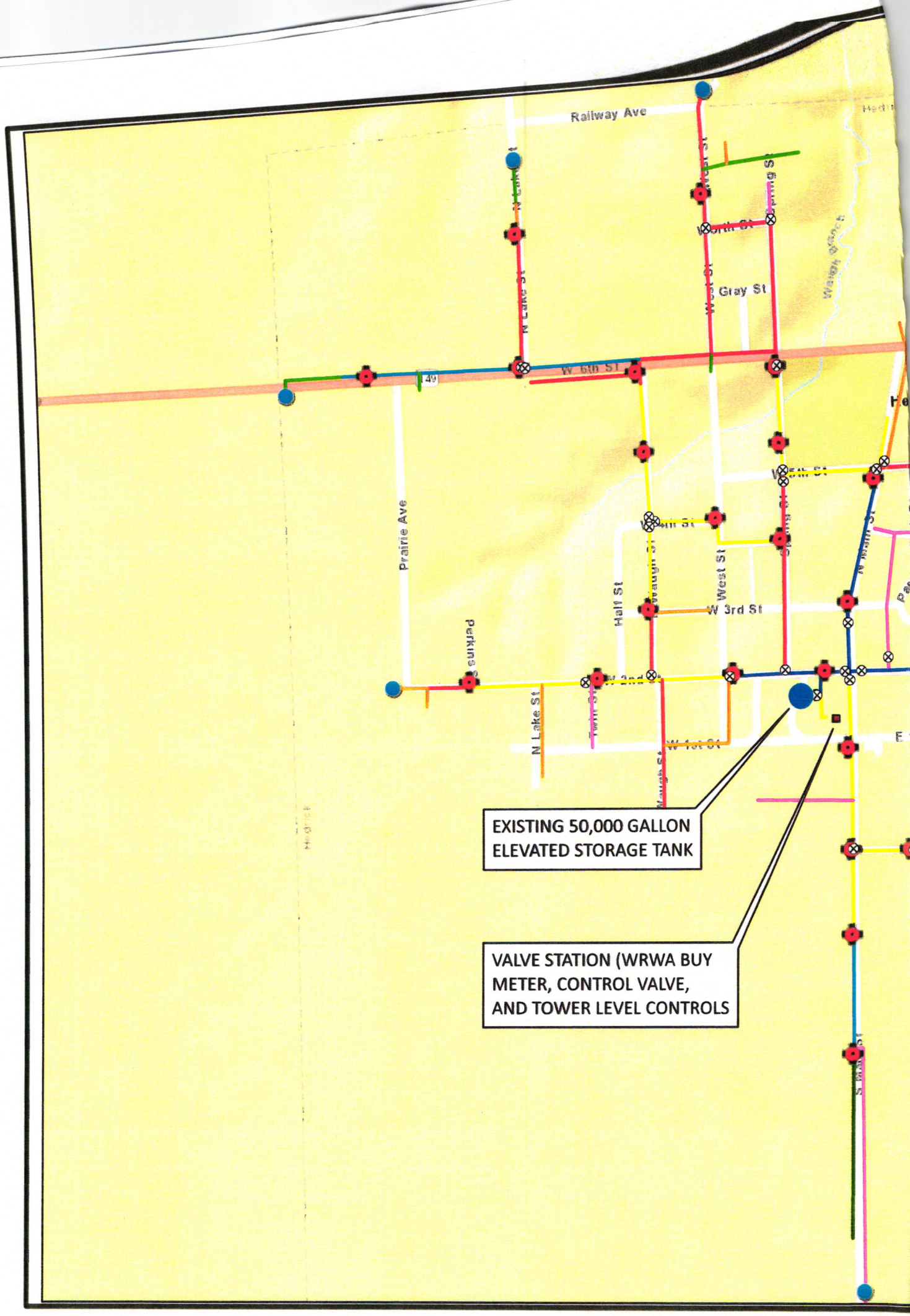
CONCLUSION AND RECOMMENDATIONS

It is recommended the City of Hedrick proceed with Option 3B – New Elevated Storage Tank – 75,000 Gallons, and complete funding applications as required to finance the project.

Respectfully Submitted on this 29th day of October, 2021.

GARDEN & ASSOCIATES, LTD.
Matthew J. Walker, P.E.

FIGURES


Railway Ave
N Lake St
West St
Gray St
W 6th St
Prairie Ave
Hall St
W 3rd St
N Lake St
EXISTING 50,000 GALLON ELEVATED STORAGE TANK
VALVE STATION (WRWA BUY METER, CONTROL VALVE, AND TOWER LEVEL CONTROLS

WATER DISTRIBUTION SYSTEM IMPROVEMENTS HEDRICK, IOWA 2021

EXISTING WATER SYSTEM MAP

DRAWN BY: KJR
DATE: 9/9/2021
PROJECT NO.: 4021202
REVISIONS:

N

625 FT

SHEET NO.: FIGURE 1

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Creston, Iowa 50801
641.782.4005 Phone
641.782.4118 Fax
email@gardenassociates.net

WATER DISTRIBUTION SYSTEM IMPROVEMENTS HEDRICK, IOWA 2021

PROPOSED ELEVATED STORAGE TANK

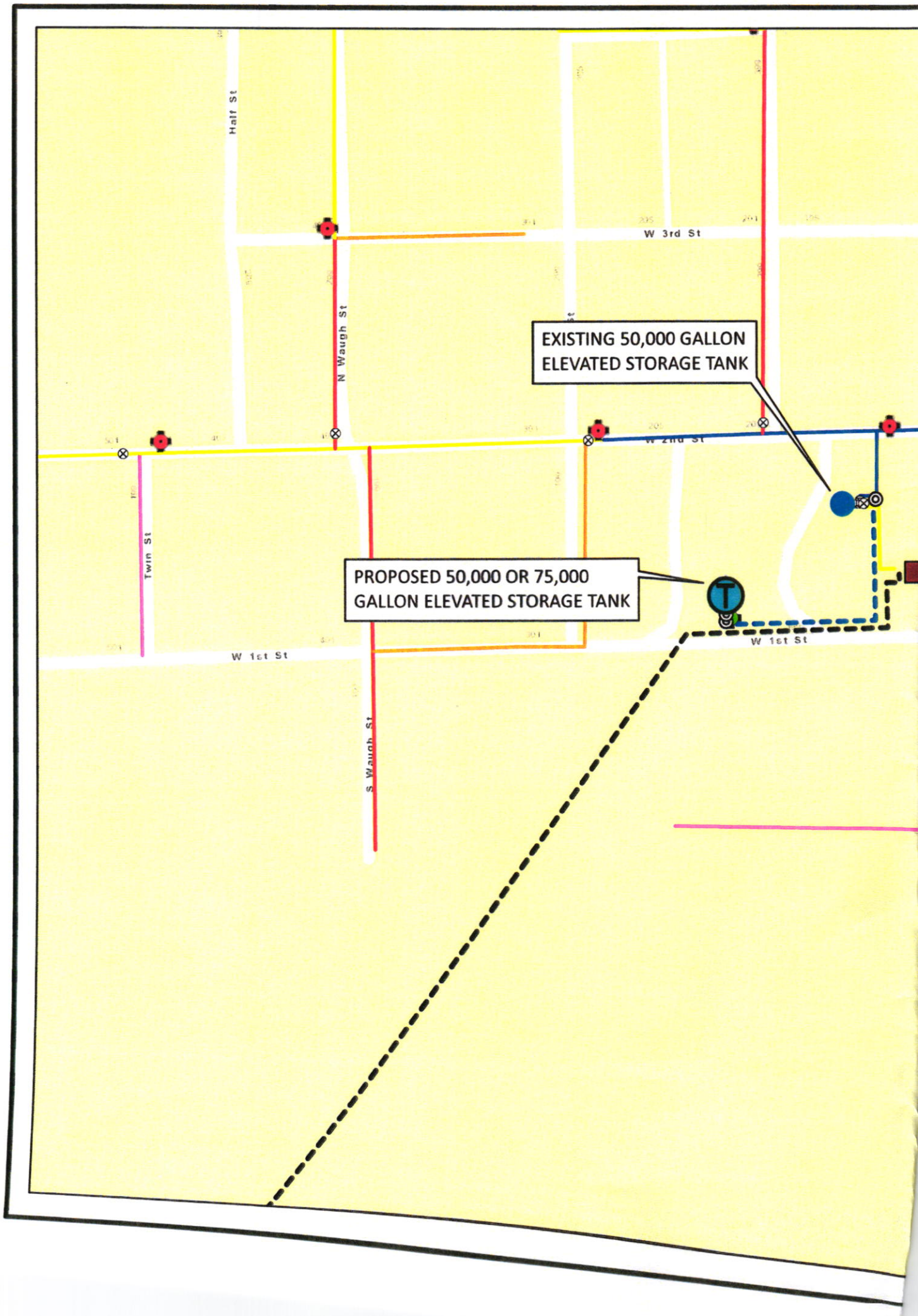
N

200 FT

DRAWN BY: KJR DATE: 9/9/2021 PROJECT NO.: 4021202

REVISIONS:

SHEET NO.:
FIGURE 2


Half St
W 3rd St
N Waugh St
EXISTING 50,000 GALLON
ELEVATED STORAGE TANK
W 2nd St
Twin St
PROPOSED 50,000 OR 75,000
GALLON ELEVATED STORAGE TANK
W 1st St
W 1st St
S Waugh St

GARDEN & ASSOCIATES, LTD.
ENGINEERS & SURVEYORS
1701 3rd Avenue East, Suite 1
P.O. Box 451
Oskaloosa, Iowa 52577
641.672.2526 Phone
641.672.2091 Fax
800.491.2524 Iowa Toll Free
806 Wyoming Ave.
Creston, Iowa 50801
641.782.4005 Phone
641.782.4118 Fax
email@gardenassociates.net

WATER DISTRIBUTION SYSTEM IMPROVEMENTS HEDRICK, IOWA 2021

N

625 FT

WATER MAIN UPGRADE - INCREASE OPERATING PRESSURE

DRAWN BY: KJR

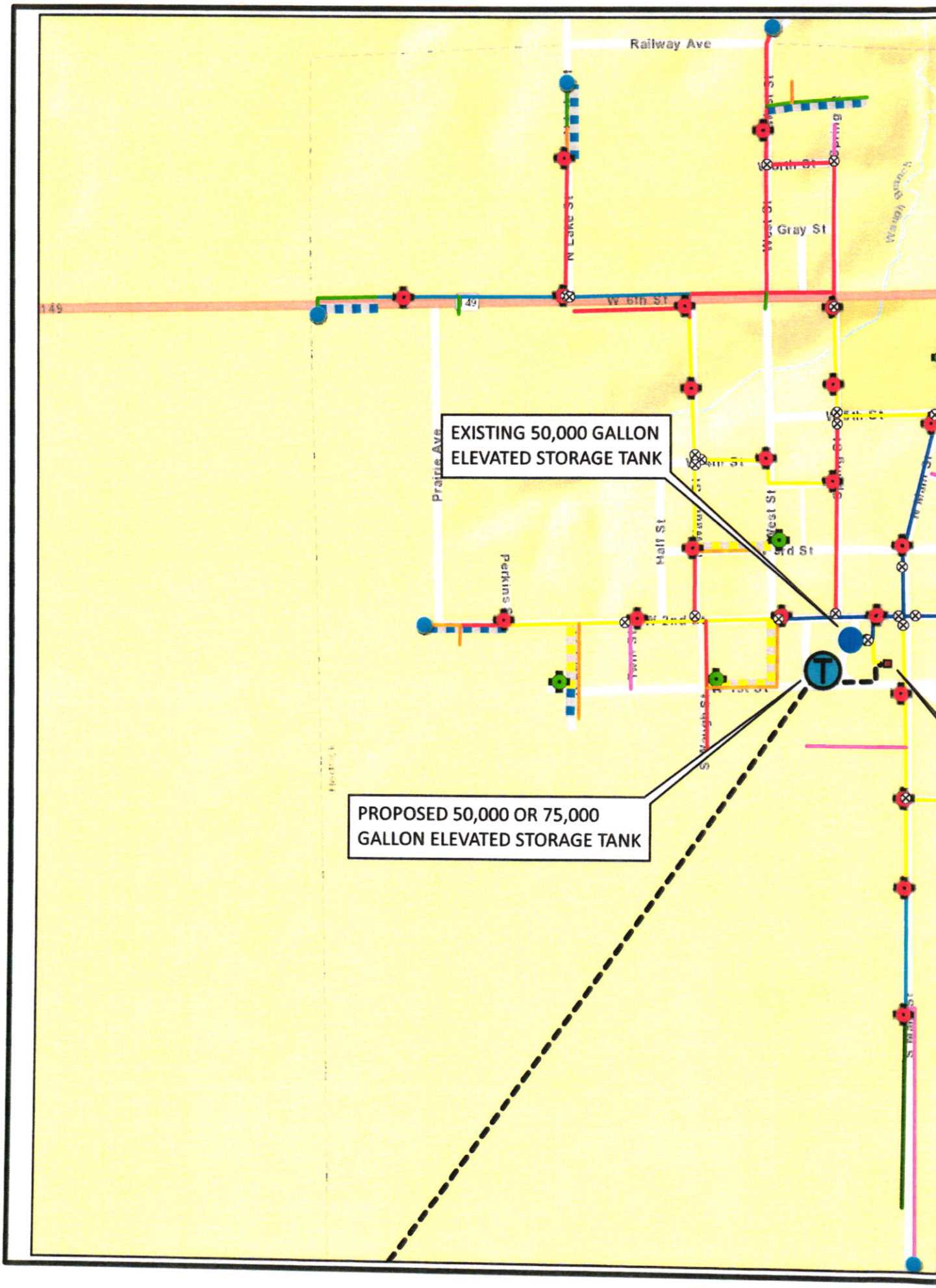
DATE: 9/9/2021

PROJECT NO.: 4021202

REVISIONS:

SHEET NO.:

FIGURE 3


Railway Ave
N Lake St
West St
North St
Gray St
W 6th St
149
49
Prairie Ave
Half St
Perkins St
EXISTING 50,000 GALLON
ELEVATED STORAGE TANK
PROPOSED 50,000 OR 75,000
GALLON ELEVATED STORAGE TANK

GARDEN & ASSOCIATES, LTD.
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email@gardenassociates.net

WATER DISTRIBUTION SYSTEM IMPROVEMENTS HEDRICK, IOWA 2021

N

625 FT

WATER MAIN UPGRADE - FIRE FLOW

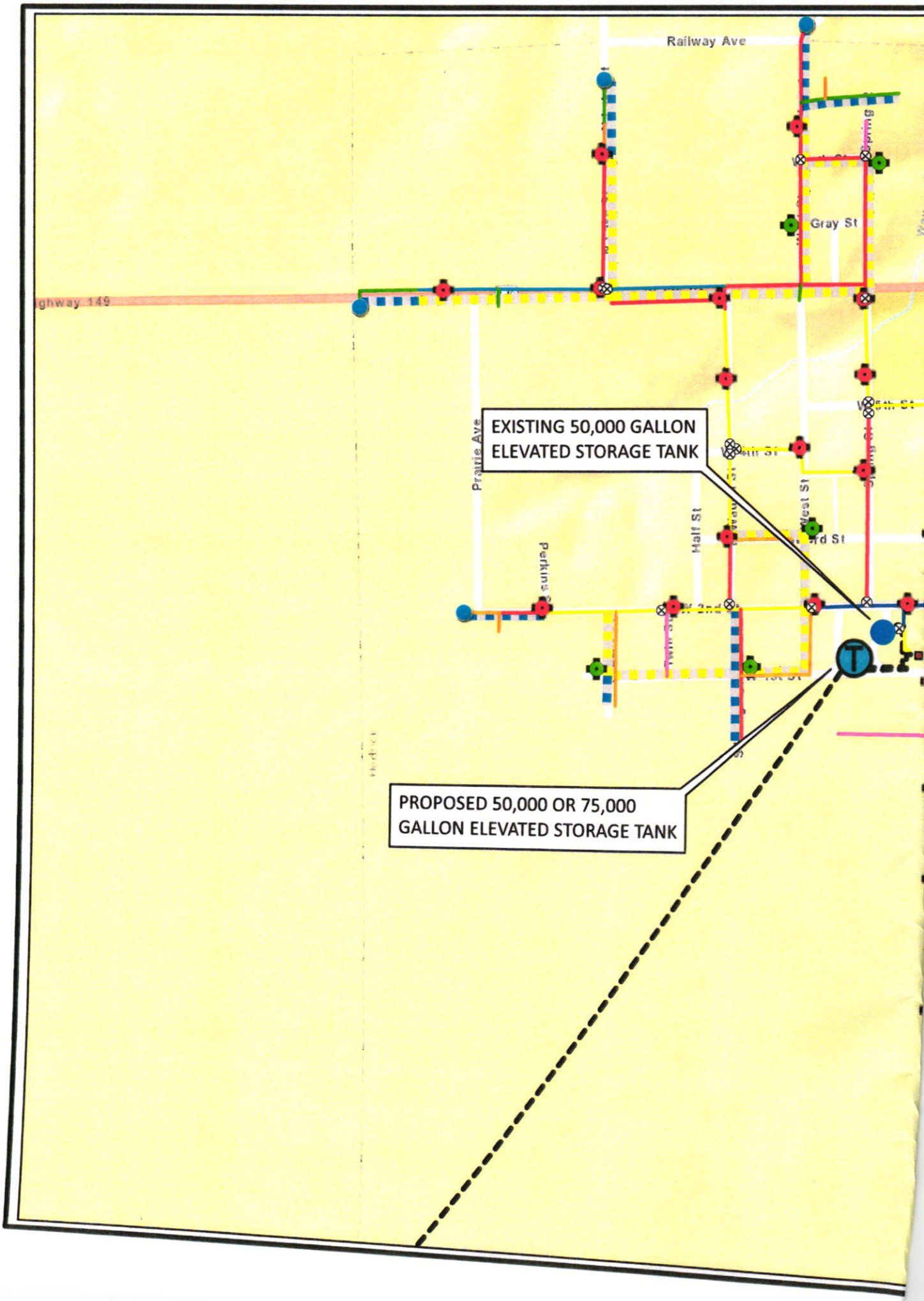
DRAWN BY: KJR

DATE: 9/9/2021

PROJECT NO.: 4021202

REVISIONS:

SHEET NO.: FIGURE 4


Railway Ave
Gray St
Prairie Ave
Half St
Perkins
EXISTING 50,000 GALLON
ELEVATED STORAGE TANK
PROPOSED 50,000 OR 75,000
GALLON ELEVATED STORAGE TANK

TABLES

TABLE 1: WATER USAGE SUMMARY
WATER DISTRIBUTION SYSTEM IMPROVEMENTS
HEDRICK,IOWA
2021

June 2018 - May 2019					
Date	Purchased	Billed Residential	Non Residential	Unbilled	
	(gals)	(gals)	(gals)	(gals)	%
Jun-18	2,374,000	937,310	165,627	1,271,063	54
Jul-18	1,837,000	932,800	140,556	763,644	42
Aug-18	1,990,000	1,078,621	102,093	809,286	41
Sep-18	1,799,000	938,732	56,583	803,685	45
Oct-18	1,293,000	792,292	45,284	455,424	35
Nov-18	1,412,000	927,191	37,861	446,948	32
Dec-18	1,324,000	992,971	58,679	272,350	21
Jan-19	1,485,000	804,616	42,612	637,772	43
Feb-19	2,376,000	765,747	41,970	1,568,283	66
Mar-19	3,752,000	769,822	47,700	2,934,478	78
Apr-19	4,233,000	1,225,003	27,944	2,980,053	70
May-19	3,661,000	748,037	46,800	2,866,163	78
Total	27,536,000	10,913,142	813,709	15,809,149	---
Maximum	4,233,000	1,225,003	165,627	2,980,053	78
Average	2,294,667	909,429	67,809	1,317,429	50
Minimum	1,293,000	748,037	27,944	272,350	21
Number of Connections	297	275	22	297	
Average per connection, gpd	254	109	101	146	
Average per capita (764 pop.), gpd	99	39	3	57	

June 2019 - May 2020					
Date	Purchased	Billed Residential	Non Residential	Unbilled	
	(gals)	(gals)	(gals)	(gals)	%
Jun-19	3,238,000	1,012,630	133,335	2,092,035	65
Jul-19	2,992,000	923,875	111,388	1,956,737	65
Aug-19	3,209,000	1,055,156	99,670	2,054,174	64
Sep-19	2,638,000	942,352	60,227	1,635,421	62
Oct-19	2,428,000	970,840	31,309	1,425,851	59
Nov-19	2,755,000	803,841	94,438	1,856,721	67
Dec-19	3,158,000	1,025,181	66,236	2,066,583	65
Jan-20	3,990,000	809,141	51,568	3,129,291	78
Feb-20	5,126,000	871,891	35,347	4,218,762	82
Mar-20	2,959,000	1,052,450	37,770	1,868,780	63
Apr-20	1,593,000	817,280	33,164	742,556	47
May-20	1,178,000	798,927	40,122	338,951	29
Total	35,264,000	11,083,564	794,574	23,385,862	---
Maximum	5,126,000	1,055,156	133,335	4,218,762	82
Average	2,938,667	923,630	66,215	1,948,822	62
Minimum	1,178,000	798,927	31,309	338,951	29
Number of Connections	295	273	22	295	
Average per connection, gpd	328	111	99	217	
Average per capita (764 pop.), gpd	126	40	3	84	

June 2020 - May 2021					
Date	Purchased	Billed Residential	Non Residential	Unbilled	
	(gals)	(gals)	(gals)	(gals)	%
Jun-20	1,364,000	1,039,387	133,065	191,548	14
Jul-20	1,481,000	991,437	89,068	400,495	27
Aug-20	1,322,000	1,174,452	126,719	20,829	2
Sep-20	1,264,000	1,085,266	87,746	90,988	7
Oct-20	1,208,000	914,847	48,099	245,054	20
Nov-20	1,158,000	963,105	52,444	142,451	12
Dec-20	1,379,000	732,899	146,357	499,744	36
Jan-21	1,394,000	988,011	43,948	362,041	26
Feb-21	1,211,000	950,519	59,617	200,864	17
Mar-21	1,343,000	821,814	44,690	476,496	35
Apr-21	1,633,000	718,221	51,187	863,592	53
May-21	1,385,000	829,636	79,503	475,861	34
Total	16,142,000	11,209,594	962,443	3,969,963	---
Maximum	1,633,000	1,174,452	146,357	863,592	53
Average	1,345,167	934,133	80,204	330,830	24
Minimum	1,158,000	718,221	43,948	20,829	2
Number of Connections	298	276	22	298	
Average per connection, gpd	148	111	120	36	
Average per capita (764 pop.), gpd	58	40	3	14	

TABLE 2: REHABILITATE EXISTING ELEVATED STORAGE TANK
WATER DISTRIBUTION SYSTEM IMPROVEMENTS
HEDRICK, IOWA
2021

(Construction in 2022)

	Unit	Estimated Quantity	Unit Price	Extended Price
Upgrade Existing 50,000 gallon Elevated Storage Tank				
Exterior Coating Removal, Containment, and Disposal	LS	XXXX	XXXX	$ 150,000
Exterior Coating	LS	XXXX	XXXX	$ 90,000
Interior Coating Removal and Replacement	LS	XXXX	XXXX	$ 48,000
Miscellaneous Repairs - Balcony, Roof, Vent, and Manway	LS	XXXX	XXXX	$ 48,000
Portable Pressure Tank	LS	XXXX	XXXX	$ 30,000
			Miscellaneous Associated Work @ 5% of Construction	$ 18,300
			Total Estimated Construction Cost	**$ 384,300**
			Construction Phase Contingencies @ 3% of Construction	$ 11,500
			Property Acquisition	$ -
			Geotechnical Investigation	$ -
			Owner Project Development	$ -
			CDBG Administration	$ -
			Legal Services	$ 10,000
			Bond Counsel	$ 11,000
			Environmental Assessment	$ 4,000
			Permits and Fees	$ 800
			Interim Financing	$ 15,100
			Engineering - Preliminary	$ 30,000
			Engineering - Basic Services	$ 27,900
			Construction Observation	$ 8,100
			Engineering - Additional Services	$ 2,000
			TOTAL ESTIMATED PROJECT COST	**$ 504,700**

TABLE 3A: NEW ELEVATED STORAGE TANK - 50,000 GALLONS
WATER DISTRIBUTION SYSTEM IMPROVEMENTS
HEDRICK, IOWA
2021

(Construction in 2022)

	Unit	Estimated Quantity	Unit Price	Extended Price
New 50,000 gallon Elevated Storage Tank				
Elevated Storage Tank - 50,000 Gallon, 120' to HWL, Shallow Foundation	LS	XXXX	XXXX	$ 650,000
Demolish Existing Elevated Storage Tank	LS	XXXX	XXXX	$ 33,000
8-inch Water Main, Directional Bored w/ Tracer Wire	LF	550	$ 80.00	$ 44,000
8 inch Gate Valve and Box	EA	2	$ 3,000.00	$ 6,000
Connections to Existing Water Main	EA	2	$ 3,000.00	$ 6,000
Miscellaneous Associated Work @ 5% of Construction				$ 37,000
Total Estimated Construction Cost				**$ 776,000**
Construction Phase Contingencies @ 3% of Construction				$ 23,300
Property Acquisition				$ 10,000
Geotechnical Investigation				$ 5,500
Archaeological Assessment				$ 2,000
Owner Project Development				$ -
CDBG Administration				$ -
Legal Services				$ 10,000
Bond Counsel				$ 11,900
Environmental Assessment				$ 6,000
Permits and Fees				$ 1,500
Interim Financing				$ 30,000
Engineering - Preliminary				$ 30,000
Engineering - Basic Services				$ 74,100
Construction Observation				$ 16,200
Engineering - Additional Services				$ 3,000
TOTAL ESTIMATED PROJECT COST				**$ 999,500**

TABLE 3B: NEW ELEVATED STORAGE TANK - 75,000 GALLONS
WATER DISTRIBUTION SYSTEM IMPROVEMENTS
HEDRICK, IOWA
2021

(Construction in 2022)

	Unit	Estimated Quantity	Unit Price	Extended Price
New 75,000 gallon Elevated Storage Tank				
Elevated Storage Tank - 75,000 Gallon, 120' to HWL, Shallow Foundation	LS	XXXX	XXXX	$ 675,000
Demolish Existing Elevated Storage Tank	LS	XXXX	XXXX	$ 33,000
8-inch Water Main, Directional Bored w/ Tracer Wire	LF	550	$ 80.00	$ 44,000
8 inch Gate Valve and Box	EA	2	$ 3,000.00	$ 6,000
Connections to Existing Water Main	EA	2	$ 3,000.00	$ 6,000
			Miscellaneous Associated Work @ 5% of Construction	$ 38,200
			Total Estimated Construction Cost	**$ 802,200**
			Construction Phase Contingencies @ 3% of Construction	$ 24,100
			Property Acquisition	$ 10,000
			Geotechnical Investigation	$ 5,500
			Archaeological Assessment	$ 2,000
			Owner Project Development	$ -
			CDBG Administration	$ -
			Legal Services	$ 10,000
			Bond Counsel	$ 11,900
			Environmental Assessment	$ 6,000
			Permits and Fees	$ 1,600
			Interim Financing	$ 30,800
			Engineering - Preliminary	$ 30,000
			Engineering - Basic Services	$ 74,100
			Construction Observation	$ 16,200
			Engineering - Additional Services	$ 3,000
			TOTAL ESTIMATED PROJECT COST	**$ 1,027,400**

TABLE 4: WATER MAIN UPGRADES - INCREASE OPERATING PRESSURES
WATER DISTRIBUTION SYSTEM IMPROVEMENTS
HEDRICK, IOWA
2021

(Construction in 2022)

	Unit	Estimated Quantity	Unit Price	Extended Price
Upgrade Water Mains to Increase Operating Pressures				
Budget Project Cost - 3-inch Water Main Improvements	LF	3,800	$ 62.00	$ 235,600
Budget Project Cost - 6-inch Water Main Improvements	LF	4,500	$ 78.00	$ 351,000
Fire Hydrant Assembly	EA	11	$ 7,000.00	$ 77,000
Miscellaneous Associated Work @ 5% of Construction				$ 33,200
Total Estimated Construction Cost				**$ 696,800**
Construction Phase Contingencies @ 3% of Construction				$ 20,900
Property Acquisition				$ -
Geotechnical Investigation				$ -
Archaeological Assessment				$ -
Owner Project Development				$ -
CDBG Administration				$ -
Legal Services				$ -
Bond Counsel				$ -
Environmental Assessment				$ -
Permits and Fees				$ 900
Interim Financing				$ -
Engineering - Preliminary				$ -
Engineering - Basic Services				$ 82,000
Construction Observation				$ 42,000
Engineering - Additional Services				$ 5,000
TOTAL ESTIMATED PROJECT COST				**$ 847,600**

TABLE 5: WATER MAIN UPGRADES - FIRE FLOW
WATER DISTRIBUTION SYSTEM IMPROVEMENTS
HEDRICK, IOWA
2021

(Construction in 2022)

	Unit	Estimated Quantity	Unit Price	Extended Price
Upgrade Water Mains for Fire Flow				
Budget Project Cost - 3-inch Water Main Improvements	LF	5,100	$ 55.00	$ 280,500
Budget Project Cost - 6-inch Water Main Improvements	LF	15,200	$ 70.00	$ 1,064,000
Fire Hydrant Assembly	EA	10	$ 7,000.00	$ 70,000
Miscellaneous Associated Work @ 5% of Construction				$ 70,700
Total Estimated Construction Cost				**$ 1,485,200**
Construction Phase Contingencies @ 3% of Construction				$ 44,600
Property Acquisition				$ -
Geotechnical Investigation				$ -
Archaeological Assessment				$ -
Owner Project Development				$ -
CDBG Administration				$ -
Legal Services				$ -
Bond Counsel				$ -
Environmental Assessment				$ -
Permits and Fees				$ 2,000
Interim Financing				$ -
Engineering - Preliminary				$ -
Engineering - Basic Services				$ 142,800
Construction Observation				$ 89,100
Engineering - Additional Services				$ 6,000
TOTAL ESTIMATED PROJECT COST				**$ 1,769,700**

TABLE 6: SHORT-LIVED ASSETS - ESTIMATED ANNUAL REHABILITATION AND REPLACEMENT COSTS (Federal Discount Rate = -0.5%) WATER DISTRIBUTION SYSTEM IMPROVEMENTS HEDRICK, IOWA

	Rehabilitate Existing Elevated Storage Tank			New Elevated Storage Tank - 50,000 Gals			New Elevated Storage Tank - 75,000 Gals		
	Table 2			Table 3A			Table 3B		
Item	Number	Est Annual Cost (Today's Dollars)	Predicted Life	Number	Est Annual Cost (Today's Dollars)	Predicted Life	Number	Est Annual Cost (Today's Dollars)	Predicted Life
Control Valves	1	$190	20 years	1	$190	20 years	1	$190	20 years
Service Meters	298	$2,980	15 years	298	$2,980	15 years	298	$2,980	15 years
Elevated Storage Tank Coatings	1	$11,291	12 years	1	$6,638	20 years	1	$7,435	20 years
Telemetry	1	$2,561	10 years	1	$2,561	10 years	1	$2,561	10 years
Total Estimated Annual Cost		**$16,832**			**$12,179**			**$12,976**	

TABLE 7: ESTIMATED ANNUAL OPERATION AND MAINTENANCE (O&M) COSTS WATER DISTRIBUTION SYSTEM IMPROVEMENTS HEDRICK, IOWA

	Rehabilitate Existing Elevated Storage Tank	New Elevated Storage Tank - 50,000 Gals	New Elevated Storage Tank - 75,000 Gals
Item	Table 2	Table 3A	Table 3B
Operations	$25,800	$25,800	$25,800
Water Tower Maintenance	$4,000	$3,000	$3,300
Repairs & Maintenance - Distribution System	$8,000	$8,000	$8,000
Repairs & Maintenance - Capital Improvements	$16,000	$16,000	$16,000
Rural Water Purchase	$55,000	$55,000	$55,000
Vehicle, Supplies, & Misc	$3,000	$3,000	$3,000
Testing	$500	$500	$500
Utilities	$4,500	$4,500	$4,500
Total Estimated Annual Cost O&M	$116,800	$115,800	$116,100
Estimated Short-Lived Assets Annual Cost (Table 5)	$16,832	$12,179	$12,976
Total of Annual Costs	$133,632	$127,979	$129,076

TABLE 8: ESTIMATED SALVAGE VALUE (Federal Discount Rate = -0.5%)
WATER DISTRIBUTION SYSTEM IMPROVEMENTS
HEDRICK, IOWA

	Rehabilitate Existing Elevated Storage Tank		New Elevated Storage Tank - 50,000 Gals		New Elevated Storage Tank - 75,000 Gals	
	Table 2		Table 3A		Table 3B	
Item	Estimated Salvage Value (Today's Dollars)	Predicted Life	Estimated Salvage Value (Today's Dollars)	Predicted Life	Estimated Salvage Value (Today's Dollars)	Predicted Life
Building	$11,335	25 years	$11,335	25 years	$11,335	25 years
Elevated Storage Tank	$83,514	25 years	$694,199	75 years	$720,899	75 years
Total Estimated Salvage Value	**$94,849**		**$705,534**		**$732,234**	

TABLE 9: LIFE CYCLE COST ANALYSIS
WATER DISTRIBUTION SYSTEM IMPROVEMENTS
HEDRICK, IOWA

	Rehabilitate Existing Elevated Storage Tank	New Elevated Storage Tank - 50,000 Gal	New Elevated Storage Tank - 75,000 Gal
	Table 2	Table 3A	Table 3B
Estimated Capital Cost	$504,700	$999,500	$1,027,400
Estimated O&M and Short-Lived Assets (USPW)	$2,818,250	$2,699,030	$2,722,156
Single Payment Present Worth of Salvage	$94,849	$705,534	$732,234
Net Present Value (20 yrs, -0.5% Fed Discount Rate)	**$3,228,101**	**$2,992,996**	**$3,017,322**

TABLE 10: ESTIMATED ANNUAL COST FOR EACH OPTION
WATER DISTRIBUTION SYSTEM IMPROVEMENTS
HEDRICK, IOWA

	Rehabilitate Existing Elevated Storage Tank	New Elevated Storage Tank - 50,000 Gals	New Elevated Storage Tank - 75,000 Gals
	Table 2	Table 3A	Table 3B
Estimated Project Cost	$504,700	$999,500	$1,027,400
USDA Rural Development Loan, 40 Year Term			
Loan Amount	$504,700	$999,500	$1,027,400
Annual Debt Service (USDA-RD 40 yr loan, 1.75%)	$16,488	$32,653	$33,564
USDA-RD Funded Depreciation and Loan Reserve	$1,814	$3,592	$3,692
TOTAL ANNUAL LOAN COST	**$18,302**	**$36,245**	**$37,256**
TOTAL 40-YEAR LOAN COST	**$732,067**	**$1,449,793**	**$1,490,242**
Total Number of Customers	298	298	298
Monthly Cost per Customer	**$5**	**$10**	**$10**
IDNR SRF Loan, 30 Year Term			
Estimated Project Cost	$504,700	$999,500	$1,027,400
Reduction to Interim Financing Costs	-$15,100	-$30,000	-$30,800
Loan Origination (0.5%)	$2,400	$4,800	$5,000
Loan Amount	$492,000	$974,300	$1,001,600
Annual Debt Service (IDNR-SRF 30 yr loan, 1.75%)	$21,205	$41,992	$43,169
Loan Administration (0.25% of principal)	$615	$1,218	$1,252
TOTAL ANNUAL LOAN COST	**$21,820**	**$43,210**	**$44,421**
TOTAL 30-YEAR LOAN COST	**$654,600**	**$1,296,296**	**$1,332,630**
Total Number of Customers	298	298	298
Monthly Cost per Customer	**$6**	**$12**	**$12**

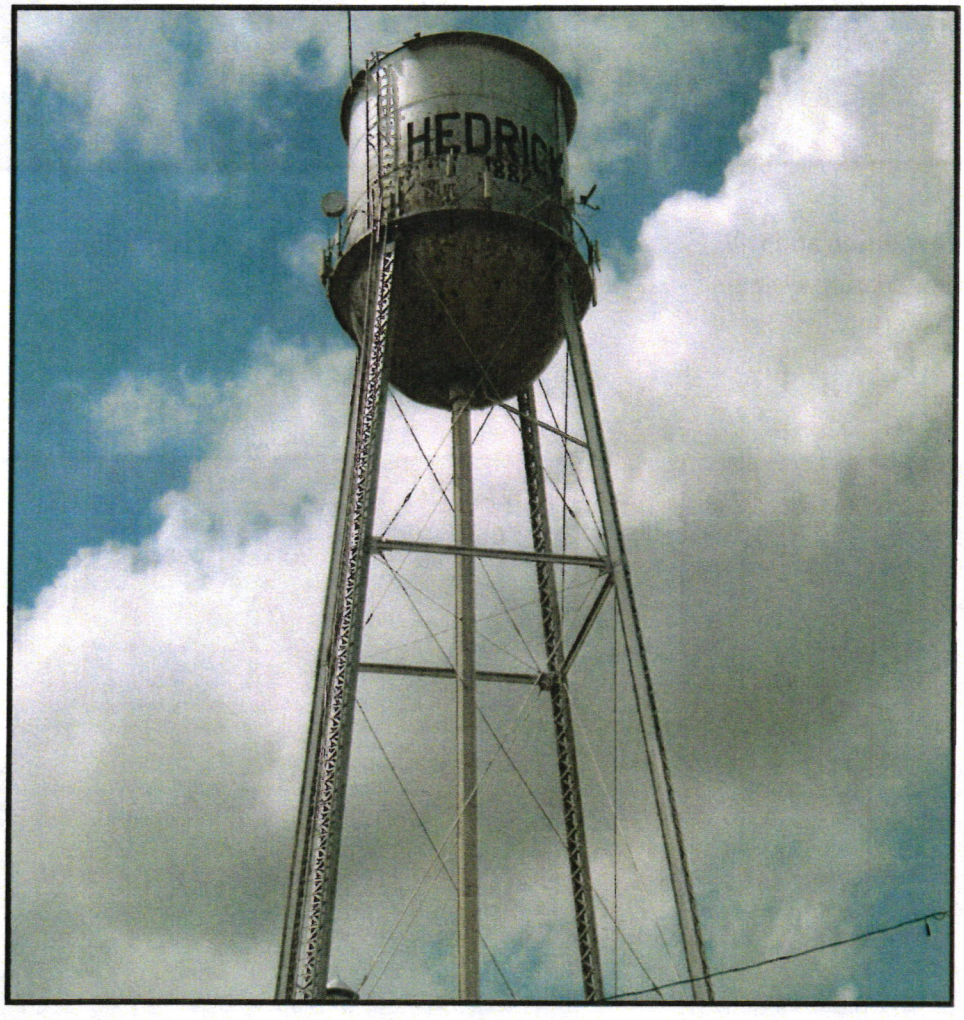
APPENDIX A

Tower Visual Inspection Report
Viking Industrial Painting
July 2020

VIKING
INDUSTRIAL PAINTING

Hedrick, Iowa

Visual Inspection - July 2020



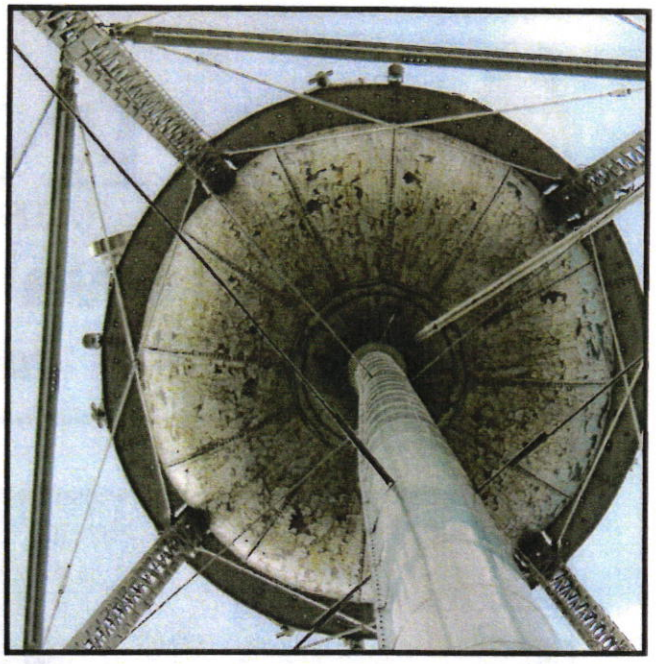
Preparer:
Brandon VanderMey
Field Representative
NACE CIP Level 2 Inspector

Contact Information:
763-453-9739
brandon@viptanks.com

Company Contact:
PO Box 24162
Omaha, NE 68124
Website: www.viptanks.com

VIKING
INDUSTRIAL PAINTING

Exterior coatings in very poor condition and will require full removal prior to new coating system application.



Riser insulation jacket in good condition.

Cracking and peeling of several layers of paint.

Cracking and peeling of several layers of paint.

Foundation pads are in good condition above grade.

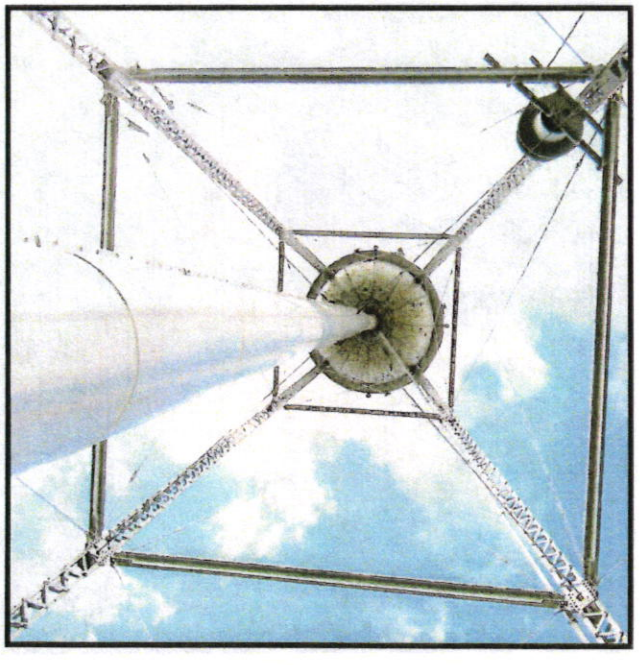
Foundation pads are in good condition above grade.

Overflow terminates above grade and has screen and flapper gate.

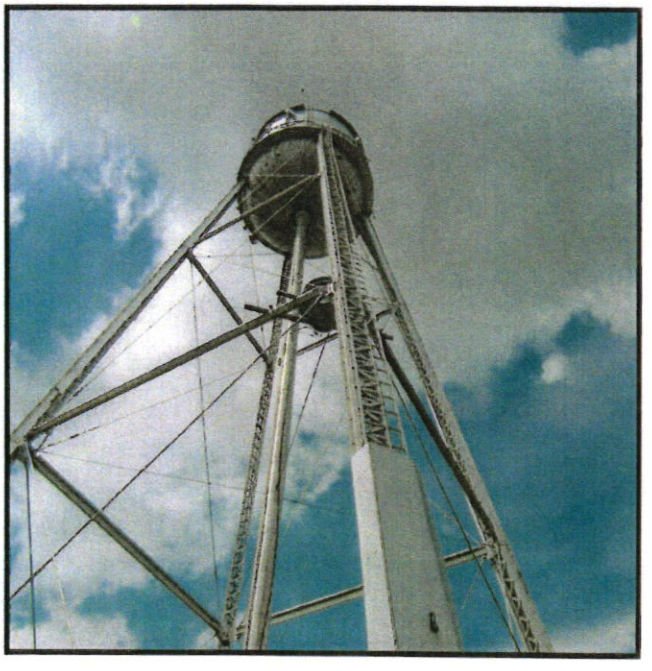
Overflow drainage pad.

Riser pipe base.

Riser pipe base.



Insulation jacket in good condition.



Ladder is new OSHA compliant ladder with cable safety climb and locked ladder gate.

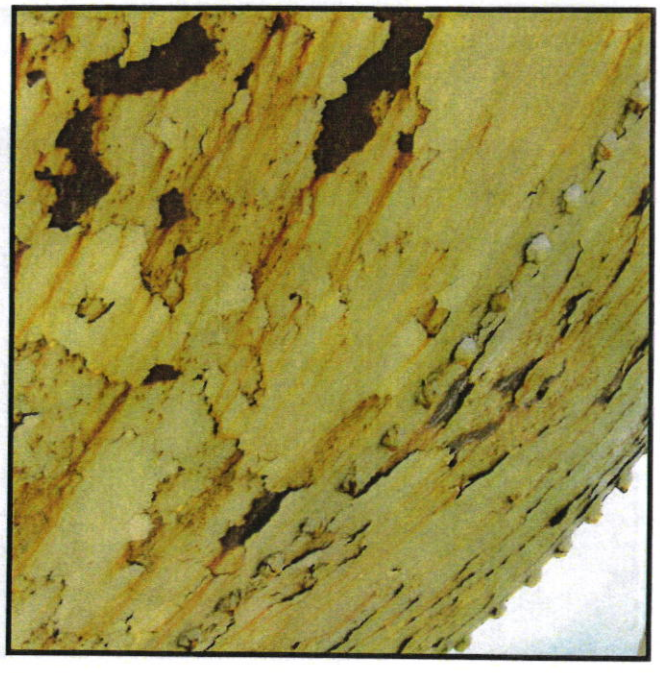
Lower strut.

Lower strut.

Upper strut.

Upper strut.

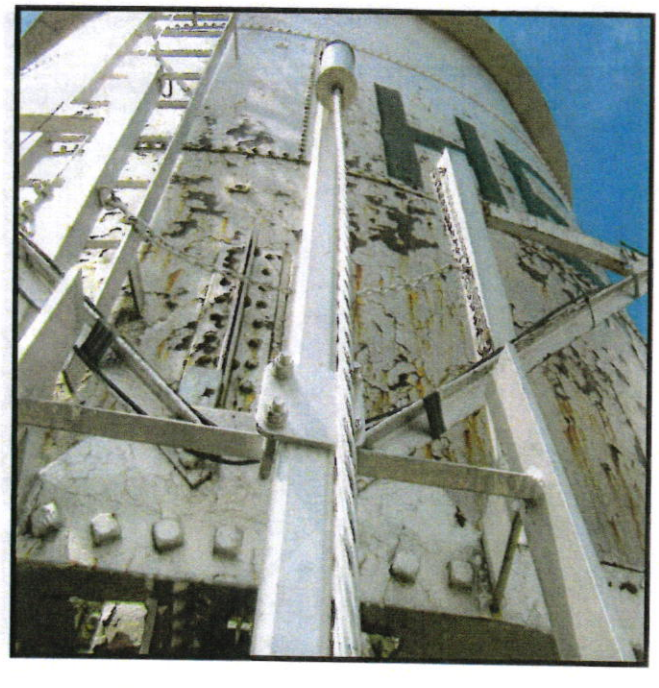
VIKING
INDUSTRIAL PAINTING



Tank belly coating failure.

Tank belly coating failure.

Tank belly coating failure.

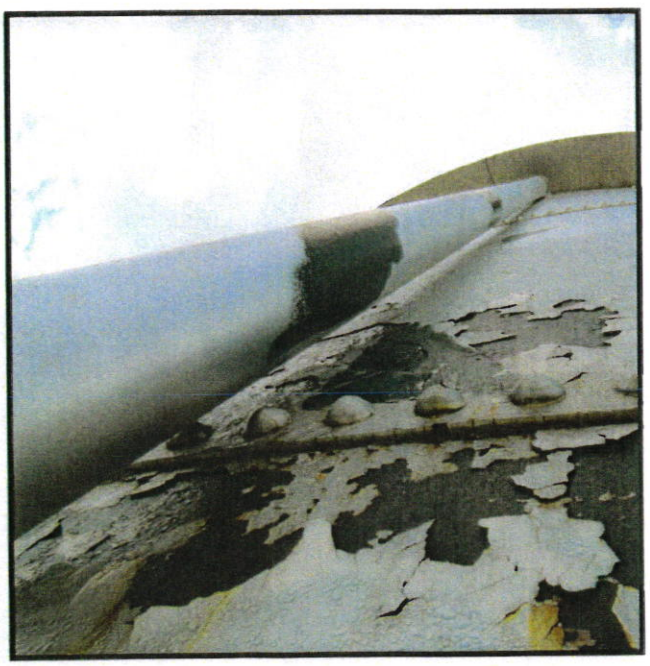


Cable safety climb bracket properly fastened to ladder.

Balcony railing not dimensionally compliant with OSHA. Lacks mid-rail, toe plate, and is not proper height.

Coating failures on tank shell.

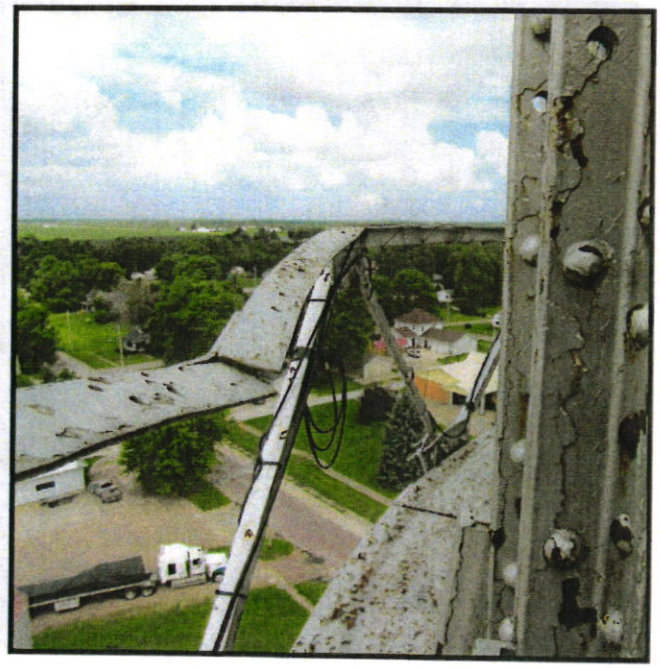
Coating failures on tank shell.



Coating failures on tank shell.

VIKING
INDUSTRIAL PAINTING

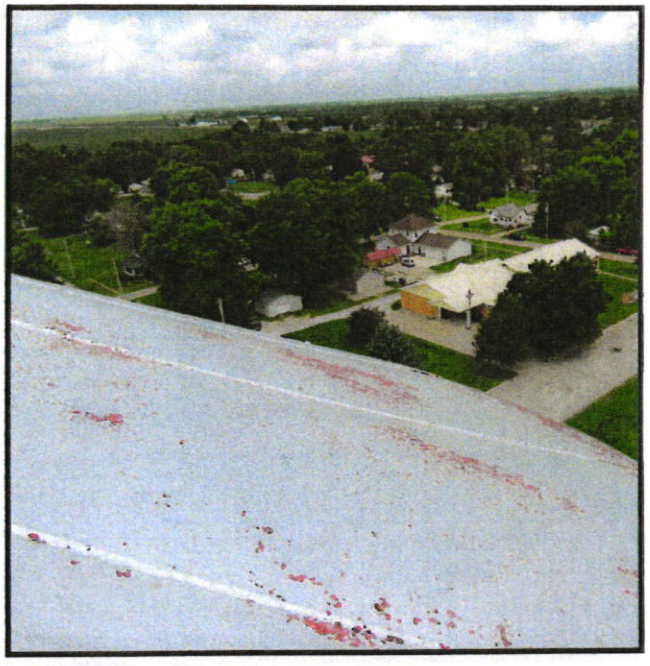
Balcony top rail damaged and bent in towards tank shell.



Balcony top rail damaged and bent in towards tank shell.

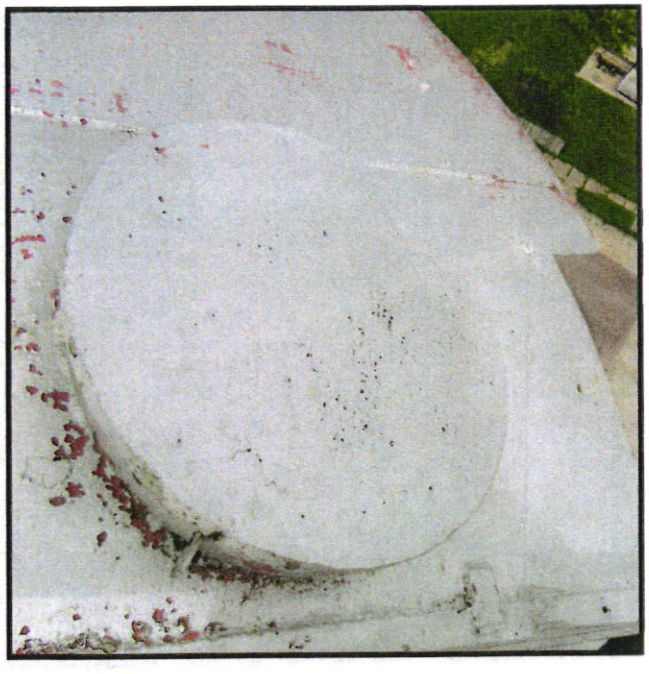
New OSHA compliant shell ladder.

Shell ladder equipped with cable safety climb.



Roof coatings overall holding up well in, but some intercoat adhesion loss.

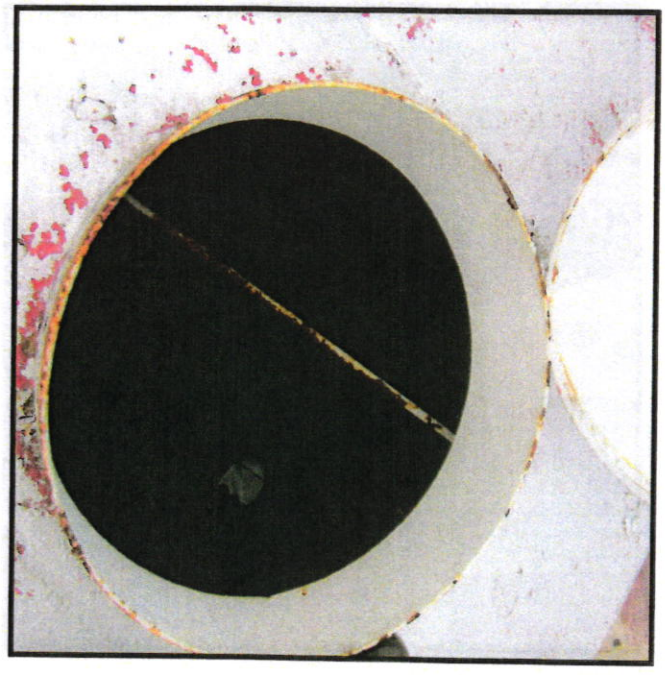
Shell/Roof ladder safety climb bracket properly fastened to ladder.



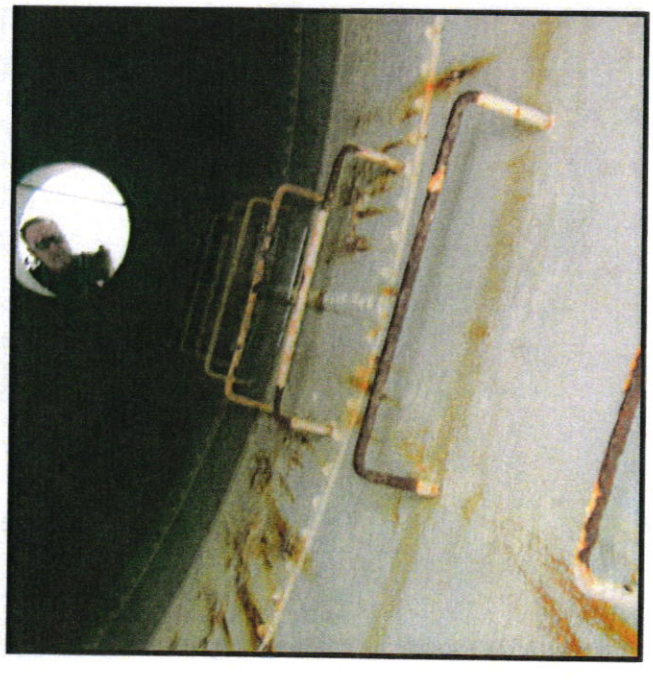
24" roof manway.

Roof manway hasp has broken off so lid can not be secured with lock or fastener.

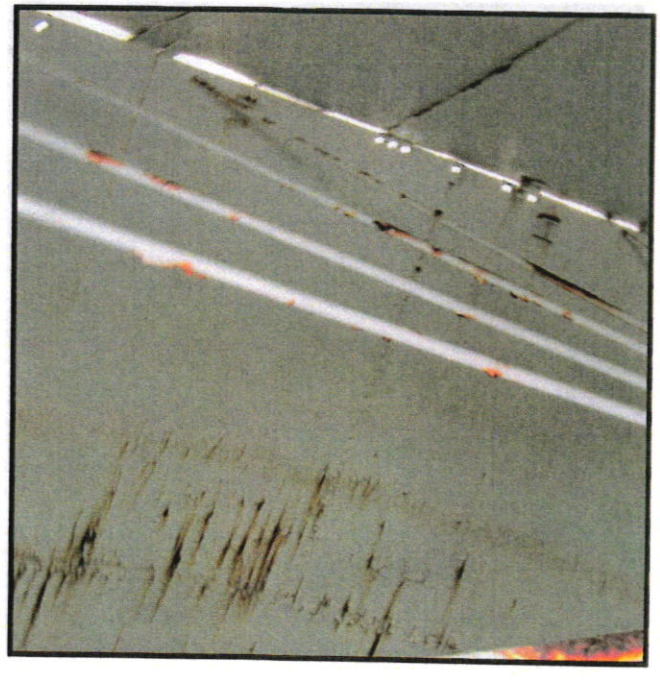
Roof vent does not meet current standard.



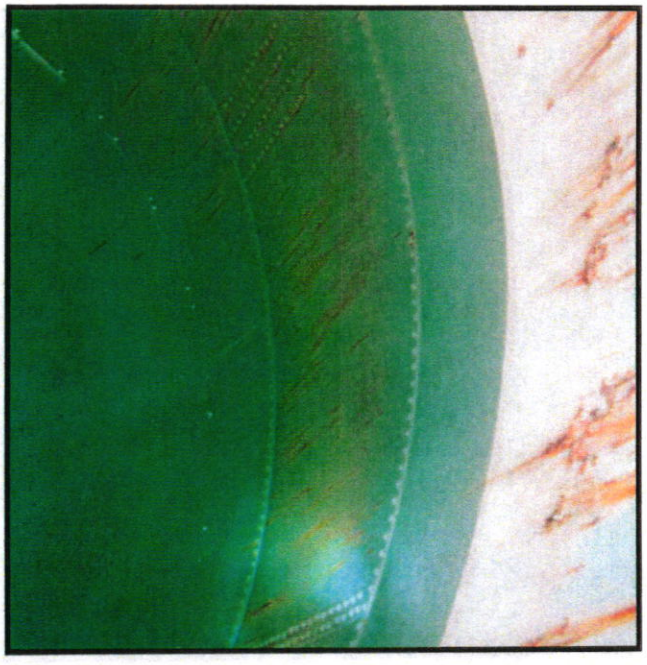
Roof manway.



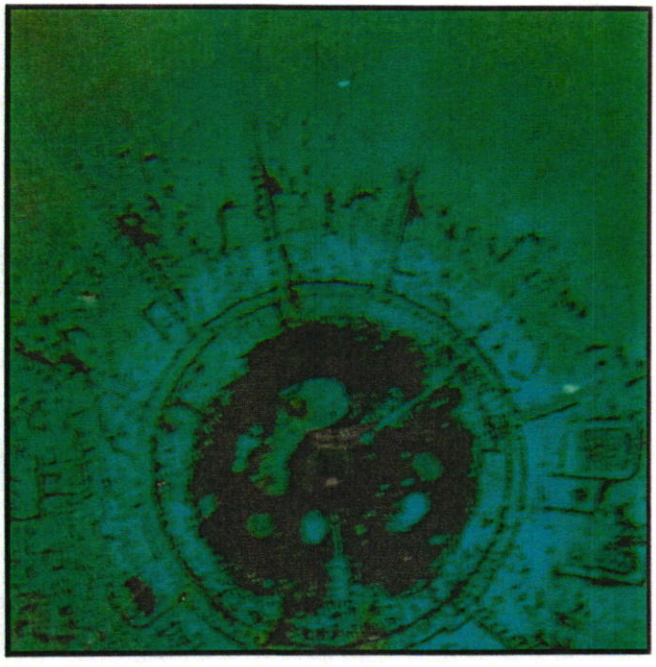
Tank interior wet coating failures.



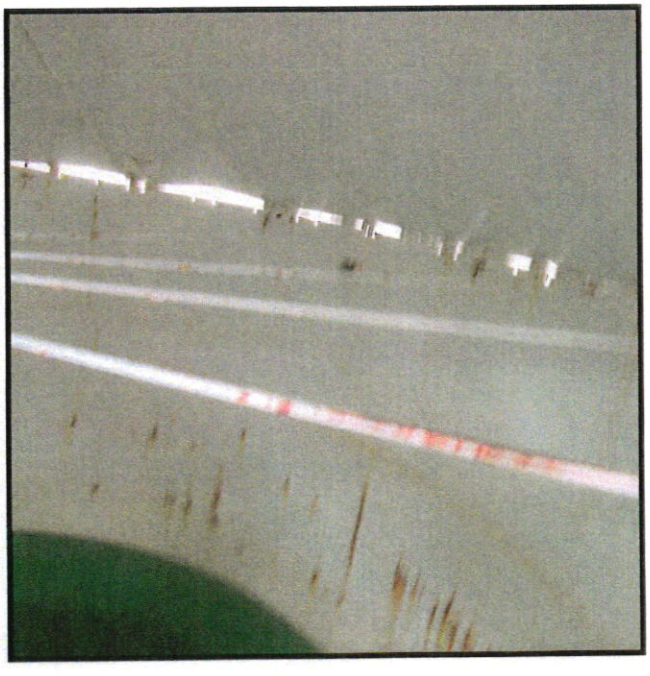
Tank interior wet coating failures.



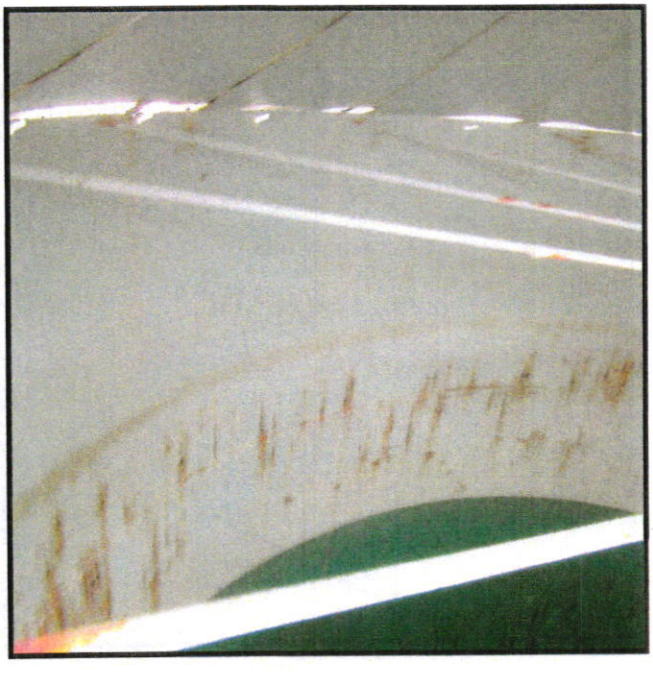
Tank interior wet coating failures.



Light sediment in tank belly.

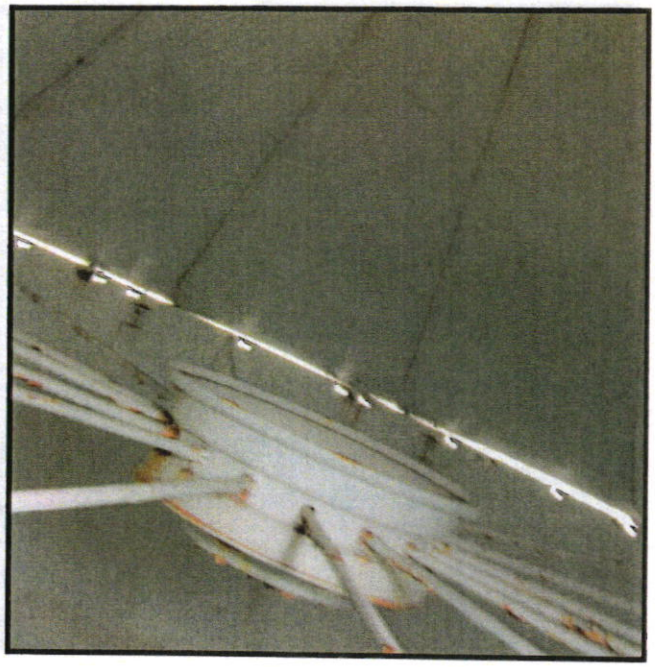


Coating failures. Eave gap opening. Spider rods.

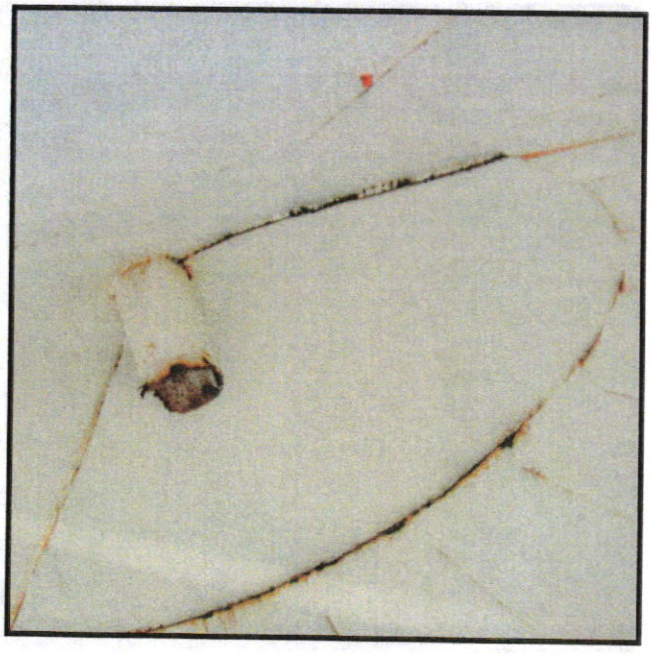


Coating failures. Eave gap opening. Spider rods.

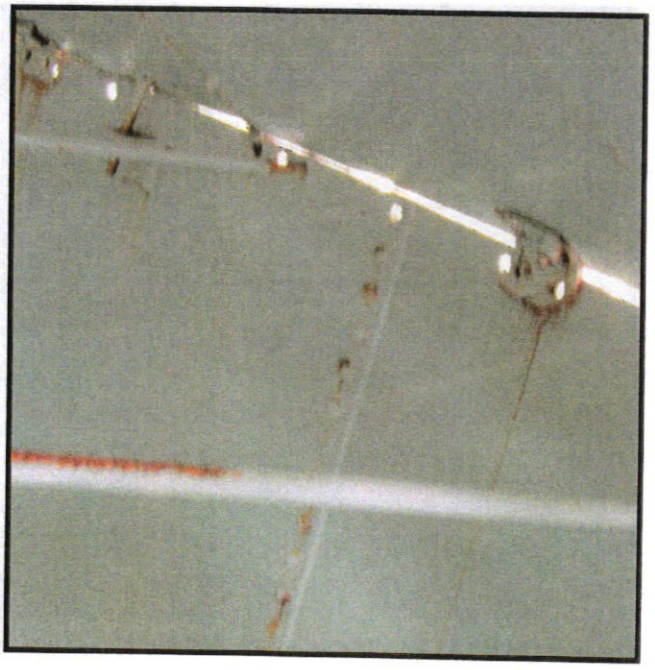
Roof eave opening.



Hub and spider rods.



Roof vent neck.



Roof eave opening.

AWWA & OSHA Compliance and Condition Worksheet for Potable Water Storage Tanks

*** Does meet AWWA & OSHA Standard = Y

*** Does NOT meet AWWA & OSHA Standard = N

	Safety Components:	Comments:	Standard:
	Ladders	Ladders are in good condition.	Y
	Fall Protection	Cable safety climb system on leg and shell/roof ladders.	Y
	Primary Manway	24" Curbed manway on roof.	Y
	Secondary Manways	No secondary access.	N

	Sanitary Components:	Comments:	Standard:
	Roof Vent	Roof vent is not up to current standard.	N
	Overflow	Overflow properly terminates just above grade and has drainage.	Y
	Sediment	Recommend cleaning and disinfecting interior every 3-5 years. Some light sediment observed.	

	Structural Components:	Comments:	Standard:
	Foundation/Grout/ Anchor Bolts	Foundation pads in good condition.	Y
		No structural issues observed	

	Security Components:	Comments:	Standard:
	Locks	Locked ladder gate on leg ladder. Other legs equipped with shields. No fastener on roof manway.	Y
	Fence	Site is not fenced.	

	Coating Condition:	Comments:	Standard:
	Exterior coatings	Exterior coatings are in poor condition and should be renovated.	
	Interior wet coatings	Interior coatings are in overall fair/good condition with some areas of touch up needed.	
	Interior dry coatings	NA	

Summary and recommendations:

- Exterior coatings are in poor condition and in need of renovation. Full blast removal of all coatings are needed, and a containment would be required to contain spent blast material and coating debris. Existing coatings likely contain lead so proper disposal of special waste would be required.
- Interior coatings are failing in many areas, most notable on the sidewalls of the tank. The roof and belly coatings are in better condition. Recommend blasting and relining within the next 2-3 years.
- Roof vent should be replaced at time of coating renovation.
- Secondary manway should be installed at time of coating renovation.
- Balcony railing, due to not meeting OSHA standard, and due to damage of top rail, should be modified or fully replaced.
- Roof could be stitch or seal welded to tank shell to remove eave gap and improve integrity.
- Roof manway hasp should be repaired to allow for lock or fastener to be used.

APPENDIX B

Limited Asbestos Survey and Paint Sampling Report
Terracon Consultants, Inc.
July 27, 2021

Limited Asbestos Survey and Paint Sampling Report

Hedrick Water Tower
Near West 1st Street and West 2nd Street
Hedrick, Iowa

July 27, 2021
Terracon Project No. 06217099

Prepared for:
Garden & Associates LTD
Oskaloosa, Iowa

Prepared by:
Terracon Consultants, Inc.
Cedar Rapids, Iowa

July 27, 2021

Terracon

Garden & Associates LTD
1701 3rd Avenue E, Suite 1
Oskaloosa, Iowa 52577

Attn: Mr. Matt Walker, P.E.
P: (641) 672-2526
E: mwalker@gardenassociates.net

Re: Limited Asbestos Survey and Paint Sampling Report
Hedrick Water Tower
Near West 1st Street and West 2nd Street
Hedrick, Keokuk County, Iowa
Terracon Project No. 06217099

Dear Mr. Walker:

Terracon Consultants, Inc. (Terracon) is pleased to submit this report to Garden & Associates LTD (Garden) for the above-referenced water tower structure. The purpose of this report is to present the results of the limited asbestos survey and paint sampling performed on July 12, 2021. This survey was conducted in accordance with Terracon's Proposal P06217099 dated July 2, 2021.

Terracon understands that the Hedrick Water Tower is located to the north of West 1st Street and south of West 2nd Street in Hedrick, Keokuk County, Iowa. The water tower is approximately 120-feet tall and is scheduled to either be repainted or demolished. Laboratory analysis did not identify concentrations of asbestos in the materials sampled from the water tower. Laboratory analysis of paint samples identified lead and chromium in concentrations above the laboratory's reporting limits.

Terracon appreciates the opportunity to provide this service to Garden & Associates LTD. If you have questions regarding this report, please contact Taryn at 319-221-7322 or taryn.rowley@terracon.com.

Sincerely,
Terracon Consultants, Inc.

For
Taryn Rowley
Field Scientist

Eric W. Harris
Environmental Department Manager

TABLE OF CONTENTS

LIMITED ASBESTOS SURVEY AND PAINT SAMPLING REPORT
Hedrick Water Tower
Near West 1st Street and West 2nd Street
Hedrick, Keokuk County, Iowa

Terracon Project No. 06217099
July 27, 2021

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) conducted a limited asbestos survey and paint sampling on the Hedrick Water Tower located to the north of West 1st Street and south of West 2nd Street in Hedrick, Keokuk County, Iowa (shown in Exhibits 1 and 2 in Appendix B). Terracon understands that the approximately 120-foot tall water tower is scheduled to either be repainted or demolished. The survey was conducted by Ms. Taryn Rowley, a State of Iowa-licensed asbestos inspector, in general accordance with **Terracon's Proposal** P06217099 dated July 2, 2021.

As part of the survey activities, accessible water tower and infrastructure components were inspected. Homogeneous areas of suspect asbestos-containing materials (ACM) were visually identified and documented; **Terracon's sampling activities were limited to** sample collection from the ground only.

Although reasonable effort was made to survey accessible suspect materials, additional suspect but unsampled materials could be located above ground level, or in other concealed areas or areas where investigation was not feasible without significant damage and/or excavation. Suspect ACM samples were collected in accordance with the sampling protocols outlined in United States Environmental Protection Agency (USEPA) 40 Code of Federal Regulations (CFR) Part 763-Asbestos, Subpart E-Asbestos-Containing Materials in Schools [known as the Asbestos Hazard Emergency Response Act, (AHERA)]. Samples were delivered to an accredited laboratory for analysis by polarized light microscopy (PLM).

Paint samples were also collected from accessible painted surfaces. The paint samples were submitted to an accredited laboratory for analysis of chromium and lead.

1.1 Project Objectives

Asbestos survey services were conducted at the Hedrick Water Tower mentioned above to satisfy requirements of the USEPA regulations under 40 CFR Part 61, Subpart M, National Emission Standards for Hazardous Air Pollutants (NESHAP), which applies when structures are renovated or demolished.

Paint sampling was conducted to identify chromium and lead containing paints on painted components of the water tower so that proper worker protection, environmental protection, and disposal can be completed.

1.2 Reliance

This report is for the exclusive use of Garden & Associates LTD and the City of Hedrick, Iowa. Reliance by any other party is prohibited without written authorization of Terracon and Garden & Associates LTD. Reliance on this report by Garden & Associates LTD, the City of Hedrick, Iowa and all authorized parties is subject to the terms, conditions, and limitations stated in the signed Agreement for Services and this report.

2.0 FIELD ACTIVITIES

2.1 Asbestos Survey

The asbestos survey was conducted by Ms. Taryn Rowley, a state of Iowa licensed asbestos inspector (license # 20-4775) on July 12, 2021. A copy of her asbestos inspector license is included in Appendix F. The asbestos survey was conducted in accordance with the sample collection protocols established in USEPA 40 CFR 763.86, Sampling. A summary of survey activities is provided below.

2.1.1 Asbestos Visual Assessment

Survey activities were initiated with visual observation of the water tower, from the ground, to identify homogeneous areas of suspect ACM. A homogeneous area (HA) consists of materials that appear similar throughout in terms of color and texture with consideration given to the date of application.

Please note that Terracon did not dismantle or disassemble water tower components, scale the tower, or assess the interior of the tank as part of the survey. There may be materials in, below, or on the water tower that would not be accessible without destructive sampling activities.

2.1.2 Asbestos Physical Assessment

A physical assessment of each HA of suspect ACM was conducted to assess the friability and condition of the materials. A friable material is defined by the USEPA as a material that can be crumbled, pulverized, or reduced to powder by hand pressure when dry. Friability was assessed by physically touching suspect materials.

2.1.3 Asbestos Sample Collection

Based on results of the visual observation, bulk samples of suspect ACM were collected in accordance with the sampling protocols outlined in 40 CFR 763.86 – Sampling. Samples of suspect materials were collected from randomly selected locations in each HA and from areas that were safe to access (components located above ground level were not sampled as a part of this survey). Samples were placed in sealable containers and labeled with unique sample numbers using an indelible marker. The selection of sample locations and frequency of sampling were based on Terracon's observations and the assumption that like materials in the same area are homogeneous in content.

If materials are discovered during future repair/repainting or demolition activities that have not been characterized, they should be sampled prior to disturbance to determine if they contain asbestos or they can be assumed to contain asbestos and appropriately abated.

Terracon collected 6 bulk samples from two HAs of suspect ACM from the tower. A summary of suspect ACM samples collected during the survey is provided in Table 1 in Appendix A and is included as part of the chain of custody (COC) presented in Appendix C. Representative photographs are presented in Appendix D.

2.1.4 Asbestos Sample Analysis

Bulk samples were submitted under COC to EMSL Analytical, Inc. (EMSL) in Cinnaminson, New Jersey for analysis by polarized light microscopy (PLM) with dispersion staining techniques in accordance with USEPA's *Method for the Determination of Asbestos in Bulk Building Materials* (600/R-93-116). The percentage of asbestos, if present, was determined by microscopic visual estimation. EMSL is NVLAP accredited (lab code 101048-0).

2.2 Painted Surface Coating Assessment

Terracon collected three paint chip samples from the water tower utilizing a chisel and sample bag. The three paint chip samples were submitted under COC to EMSL for analysis of total chromium and total lead by USEPA methods SW-846 3050B *Acid Digestion of Sediments, Sludges, and Soils* and /6010C *Inductively Coupled Plasma – Atomic Emission Spectrometry*. Due to laboratory delays, EMSL transmitted the chromium samples to their Indianapolis, Indiana location to meet the reporting deadlines. A summary of the paint chip samples is provided in Table 2 in Appendix A. The lab report and the COCs are provided in Appendix C.

3.0 FINDINGS

3.1 Asbestos Survey Findings

Asbestos was not reported by the analytical laboratory in samples collected from the tower structure.

Table 1 included in Appendix A provides information on the sampled materials, sample locations, and approximate quantities. EMSL's laboratory analytical report and the COC are included in Appendix C. Photographs of the project area are presented in Appendix D.

3.2 Paint Chip Findings

The analytical laboratory reported concentrations of lead and total chromium in the paint chip samples collected from the water tower. Table 2 provided in Appendix A provides a summary of the paint chip sample results. EMSL's laboratory analytical report and the COC are included in Appendix C.

4.0 RECOMMENDATIONS

4.1 Asbestos Recommendations

If additional but unsampled suspect ACMs are revealed during repainting/repair or demolition activities, the material(s) must be assumed to contain asbestos and treated as such unless sampled by an accredited inspector and laboratory analysis determines otherwise.

The reader of this report should understand the limitations of this survey. Laboratory results of samples collected should not be extrapolated to other areas unless a licensed asbestos inspector as determined the materials to be homogenous. If the project area as defined in this report or plans change, additional assessment of previously unsampled suspect ACMs may be necessary.

A summary of applicable asbestos regulations is presented in Appendix E.

4.2 Chromium and Lead Containing Paint Recommendations

Terracon recommends that the contractor(s) involved in the demolition be notified of the presence of lead and chromium-containing coatings on painted components. The Occupational Safety and Health Administration's (OSHA) lead and hexavalent chromium[1] [Cr(VI)] standards for construction (29 CFR 1926.62 and 1926.1126, respectively) apply regardless of the

[1] Although the samples were analyzed for total chromium, the hexavalent form is often found in paint or may be generated by torch cutting.

concentrations and contractor(s) will need to provide appropriate personal protective equipment and conduct personal exposure monitoring, at a minimum. Terracon recommends the contractor(s) review the specified work tasks and methods involved in the demolition process and prepare a detailed lead/chromium management plan. The management plan should identify the work procedures and health and safety measures to be used in the lead/chromium material removal. *The levels indicated could create conditions above published occupational exposure limits. No other substances were analyzed. The contractor should not rely on this testing and analysis for any purpose other than an indication of the existence of these two constituents.*

Certain painted materials may have to be abated by a qualified contractor prior to torch cutting or other means of dismantling. If waste materials containing lead or chromium are generated, they may be regulated as hazardous waste. Waste from demolition activities, such as debris, paint chips, dust, and sludges, that exhibit the toxicity characteristic must be managed and disposed of as a hazardous waste under the Resource Conservation and Recovery Act (RCRA). A composite, representative sample of the demolition debris/waste must be tested by the Toxicity Characteristic Leaching Procedure (TCLP) to determine if it is regulated as hazardous waste under 40 CFR 261 Identification and Listing of Hazardous Waste.

Recycling of painted components may not require TCLP testing. Terracon recommends contacting the recycling recipient to confirm that they will accept the material.

A summary of applicable lead and chromium regulations is presented in Appendix E.

5.0 LIMITATIONS/GENERAL COMMENTS

Terracon did not perform sampling that required dismantling of water tower components or investigation into the subsurface areas of the water tower. Reasonable efforts to access suspect materials were made; however, areas of the water tower above ground level were not able to be sampled due to safety concerns and the need for a lift.

This survey was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the same locale. The results, findings, conclusions, and recommendations expressed in this report are based on conditions observed during our survey of the building. The information contained in this report is relevant to the date on which this survey was performed and should not be relied upon to represent conditions at a later date. This report has been prepared on behalf of and exclusively for use by Garden for specific application to their project as discussed. This report is not a bidding document. Contractors or consultants reviewing this report must draw their own conclusions regarding further investigation or remediation deemed necessary. Terracon does not warrant the work of regulatory agencies, laboratories, or other third parties supplying information that may have been used in the preparation of this report. No warranty, express or implied is made.

APPENDIX A

TABLES

TABLE 1 – ASBESTOS SURVEY SAMPLE LOCATION SUMMARY BY HOMOGENEOUS AREA (HA)

TABLE 2 – PAINT CHIP SAMPLE SUMMARY

Terracon

Table 1 - Asbestos Survey Sample Location Summary by Homogeneous Area (HA)

HA #	Sample #	Material Description	General Location	Sample Location	Lab Results
01	01-SC3-01	Silver paint	All around water tower	Northwest leg of tower	None Detected (ND)
	01-SC3-02			Southwest leg of tower	ND
	01-SC3-03			Southeast leg of tower	ND
02	02-PI4-04	Fiberglass insulation	Middle water pipe of water tower	Middle water pipe, 2 feet above ground	ND
	02-PI4-05			Same location as sample 04	ND
	02-PI4-06			Same location as sample 04	ND

Table 2 – Paint Chip Sample Summary

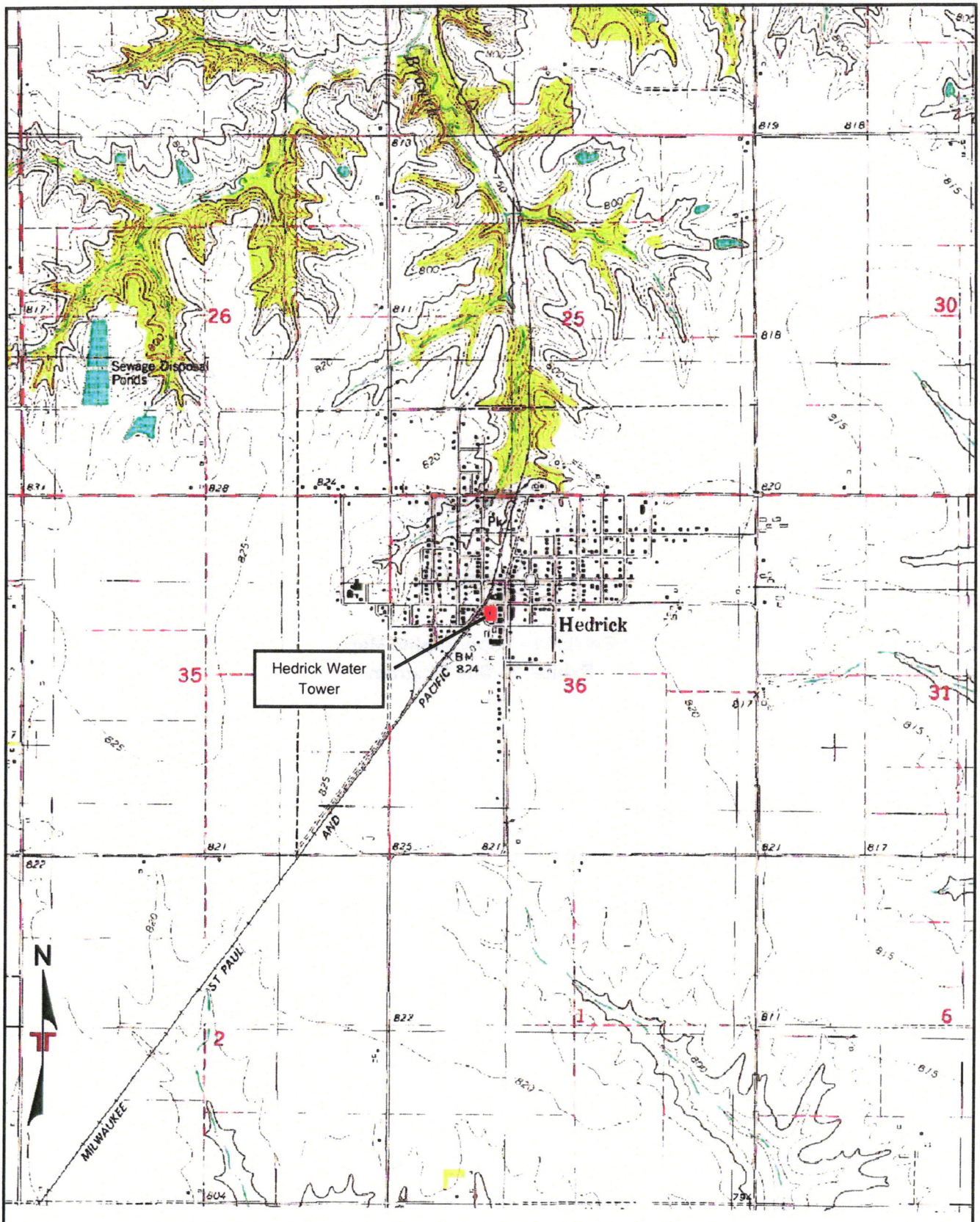
Positive results indicate the pant sample contains chromium or lead.

Sample #	Substrate	Color	Sample Location	Chromium Sample Result (% by weight)	Lead Sample Result (% by weight)
Pb1/Cr1	Metal	Silver	Northwest leg of water tower	0.044%	1.7%
Pb2/Cr2	Metal	Silver	Southeast metal connector to northwest leg	0.052%	0.82%
Pb3/Cr3	Metal	Silver	Southwest leg of water tower	0.073%	1.0%

APPENDIX B

EXHIBITS

Exhibit 1 - Topographic Map
Exhibit 2 - Site Diagram



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
QUADRANGLES INCLUDE: HEDRICK, IA (1/1/1980).

Project Manager: TLR	Project No. 06217099	Terracon 2640 12th St SW Cedar Rapids, IA 52404-3440	TOPOGRAPHIC MAP Hedrick Water Tower Hedrick, Keokuk County, Iowa	Exhibit 1
Drawn by: TLR	Scale: 1"=2,000'			
Checked by: EWH	File Name: Exhibits			
Approved by: EWH	Date: July 2021			

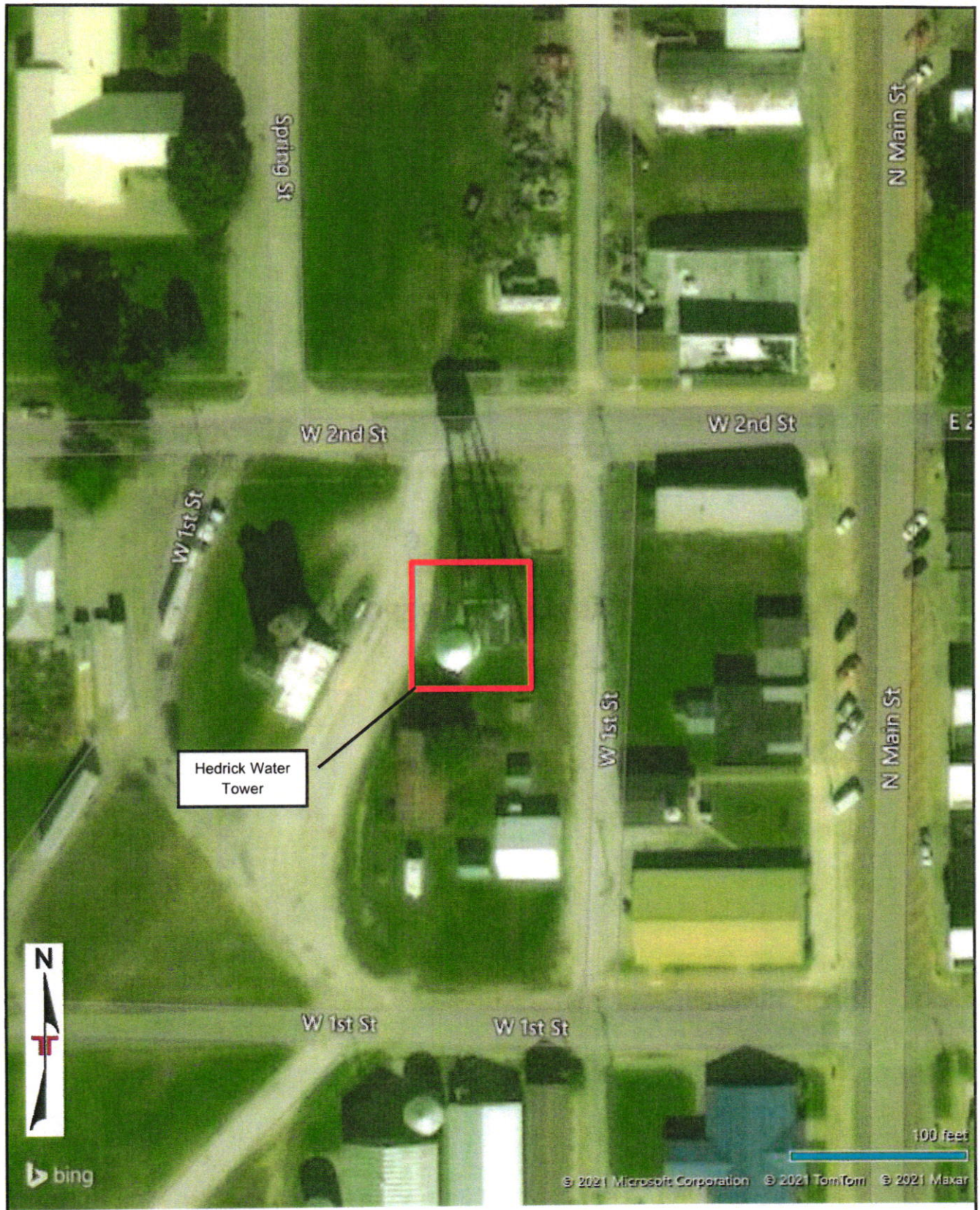


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager: TLR	Project No. 06217099	Terracon 2640 12th St SW Cedar Rapids, IA 52404-3440	SITE DIAGRAM	Exhibit
Drawn by: TLR	Scale: AS SHOWN		Hedrick Water Tower Hedrick, Keokuk County, Iowa	2
Checked by: EWH	File Name: Exhibits			
Approved by: EWH	Date: July 2021			

APPENDIX C

LABORATORY ANALYTICAL REPORTS AND COCS

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Tel/Fax: (800) 220-3675 / (856) 786-5974
http://www.EMSL.com / cinnasblab@EMSL.com

EMSL Order: 042117070
Customer ID: ACON77
Customer PO:
Project ID:

Attention: Taryn Rowley
Terracon Consultants, Inc.
2640 12th Street Southwest
Cedar Rapids, IA 52404

Phone: (319) 366-8321
Fax: (319) 366-0032
Received Date: 07/13/2021 9:50 AM
Analysis Date: 07/14/2021 - 07/21/2021
Collected Date:

Project: Hedrick Water Tower / 06217099 / Between West 1st Street and 2nd Street

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
01-SC3-01 *042117070-0001*	Northwest Leg of Toner - Silver Paint	Silver Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
01-SC3-02 *042117070-0002*	Southwest Leg of Tower - Silver Paint	Silver Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
01-SC3-03 *042117070-0003*	Southeast Leg of Tower - Silver Paint	Silver Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
02-PI4-04 *042117070-0004*	Middle Water Line 2 Above Ground - Fiberglass Insulation	Yellow Fibrous Homogeneous	50% Cellulose	50% Non-fibrous (Other)	None Detected
02-PI4-05 *042117070-0005*	Middle Water Line 2 Above Ground - Fiberglass Insulation	Yellow Fibrous Homogeneous	50% Cellulose	50% Non-fibrous (Other)	None Detected
02-PI4-06 *042117070-0006*	Middle Water Line 2 Above Ground - Fiberglass Insulation	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Analyst(s)
Danika Hasher (4)
Gregory Barry (2)

Samantha Rundstrom, Laboratory Manager
or Other Approved Signatory

Initial report from: 07/21/2021 21:05:04

Terracon

Asbestos Bulk Sample and Chain of Custody Form

Lab Order ID: _____

Select a Laboratory:

Cedar Rapids: 2640 12th St., SW, Cedar Rapids, IA 52404 (319) 366 8321

Lab Location: HQ - Cinnaminson, NJ 101048-0

Project Name:	Hedrick Water Tower	Project Number:	06217099	Project Manager:	Taryn Rowley
Project Address:	Near West 1st Street	City/State / Zip:	Hedrick, Iowa	Email Results To:	Taryn.rowley@Terracon.com

Site/Building: Between West 1st Street and West 2nd Street

Sample Identification: HA – BS Code – Sample #	Sample Location Description	HA General Location	Material Description (Type; Color/Texture)	Quantity (SF, LF, Cubic Ft, Units)	NESHAP Classification[1]	Notes/Physical Condition[2]
01 - SC3 - 01	Northwest leg of tower	All around water tower	Silver Paint		F C1 (C2)	(G) D SD
01 - SC3 - 02	Southwest leg of tower					
01 - SC3 - 03	Southeast leg of tower					
02 - PI4 - 04	Middle water line, 2 ft above ground	Middle water pipe	Fiberglass insulation		(F) C1 C2	(G) D SD
02 - PI4 - 05	| | | || | |					
02 - PI4 - 06						
– –					F C1 C2	G D SD
– –						
– –						
– –					F C1 C2	G D SD
– –						
– –						
– –					F C1 C2	G D SD
– –						
– –						

Sampling Date: 7/12/21 Collected by (print): Taryn Rowley Inspector's Signature: Taryn Rowley

Relinquished by: Taryn Rowley Date/Time: 7/12/21 1300 Received by: Date/Time:

Analysis: (PLM EPA 600/R-93/116) ☐ PLM 400 Point Count ☐ TEM ☐ Other _____

Turnaround Time (circle): 6 Hrs 24 Hrs 2 Days 3 Days (5 Days) Other _____

Instructions:

Terracon ARMS: ☑ Stop Positive: ☐ Number of samples: 6

[1] F = Friable; C1 = Category I: packings, gaskets, asphaltic roofing products, resilient flooring; C2 = Category II Non-Friable: any materials other than Cat. I containing >1% asbestos

[2] G = Good (<1%); D = Damaged (<10% distributed or >25% localized); or SD = Significantly Damaged (>10% distributed or >25% localized)

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856) 303-2500 / (856) 786-5974
http://www.EMSL.com cinnaminsonleadlab@emsl.com

EMSL Order:	202105473
CustomerID:	ACON77
CustomerPO:	06217099
ProjectID:	

Attn: **Taryn Rowley**
Terracon Consultants, Inc.
2640 12th Street Southwest
Cedar Rapids, IA 52404

Phone:	(319) 366-8321
Fax:	(319) 366-0032
Received:	07/13/21 9:50 AM
Collected:	7/13/2021

Project: **Hedrick Water Tower - 06217099**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
Pb1	*202105473-0001*	7/13/2021	7/15/2021	0.0444 g	1.7 % wt
	Site: Northwest Leg of Water Tower				
Pb2	*202105473-0002*	7/13/2021	7/15/2021	0.2526 g	0.82 % wt
	Site: Southeast Metal Conector to Northeast Leg				
Pb3	*202105473-0003*	7/13/2021	7/15/2021	0.2499 g	1.0 % wt
	Site: Southwest Leg of Water Tower				

Phillip Worby, Lead Laboratory Manager
or other approved signatory

Initial report from 07/20/2021 10:02:15

EMSL Analytical, Inc.
6340 CastlePlace Dr., Indianapolis, IN 46250
Phone/Fax: (317) 803-2997 / (317) 803-3047
http://www.EMSL.com indianapolislab@emsl.com

EMSL Order:	162115272
CustomerID:	ACON77
CustomerPO:	
ProjectID:	

Attn: **Taryn Rowley**
Terracon Consultants, Inc.
2640 12th Street Southwest
Cedar Rapids, IA 52404

Phone: (319) 366-8321
Fax: (319) 366-0032
Received: 7/14/2021 09:30 AM
Collected: 7/12/2021

Project: **Hedrick Water Tower-06217099**

Test Report: Chromium in Paint Chips by Flame AAS (SW 846, 7000B)

Client SampleDescription	*Collected*	*Analyzed*	*Weight*	*RDL*	*Chromium Concentration*
Cr1	7/12/2021	7/20/2021	0.2053 g	0.013 % wt	0.044 % wt
162115272-0001	Site: Nortwest Leg of Water Tower-Metal				
Cr2	7/12/2021	7/20/2021	0.2312 g	0.013 % wt	0.052 % wt
162115272-0002	Site: Southeast Metal Connector to Northeast Leg-Metal				
Cr3	7/12/2021	7/20/2021	0.2063 g	0.013 % wt	0.073 % wt
162115272-0003	Site: Soutwest Leg of Water Tower-Metal				

Allison Ford

Allison Ford, Chemistry Lab Manager
or other approved signatory

Samples analyzed by EMSL Analytical, Inc. Indianapolis, IN

Initial report from 07/21/2021 08:29:14

EMSL ANALYTICAL, INC.
TESTING LABS • PRODUCTS • TRAINING

Lead Chain of Custody

EMSL Order Number / Lab Use Only

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077

PHONE: (800) 220-3675
EMAIL: CinnaminsonLeadLab@emsl.com

Customer Information		Billing Information	
Customer ID:		Billing ID:	
Company Name:	Terracon Consultants, Inc	Company Name:	Terracon Consultants, Inc.
Contact Name:	Taryn Rowley	Billing Contact:	Taryn Rowley
Street Address:	2640 12th Street SW	Street Address:	2640 12th Street SW
City, State, Zip:	Cedar Rapids, IA, 52404	City, State, Zip:	Cedar Rapids, IA 52404
Country:	USA	Country:	USA
Phone:	3192217322	Phone:	3192217322
Email(s) for Report:	taryn.rowley@terracon.com	Email(s) for Invoice:	taryn.rowley@terracon.com

Project Information

Project Name/No: Hedrick Water Tower - 06217099

Purchase Order:

EMSL LIMS Project ID: (If applicable, EMSL will provide)

US State where samples collected: IA

State of Connecticut (CT) must select project location: ☐ Commercial (Taxable) ☐ Residential (Non-Taxable)

Sampled By Name: Taryn Rowley

Sampled By Signature: Taryn Rowley

No. of Samples in Shipment

Turn-Around-Time (TAT)

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 32 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☑ 1 Week ☐ 2 Week

Please call ahead for large projects and/or turnaround times 6 Hours or Less. *32 Hour TAT available for select tests only; samples must be submitted by 11.30am.

MATRIX	METHOD	INSTRUMENT	REPORTING LIMIT	SELECTION
CHIPS ☑ % by wt. ☐ ppm (mg/kg) ☐ mg/cm²	SW 846-7000B	Flame Atomic Absorption	0.008% (80ppm)	☑
*Reporting Limit based on a minimum 0.25g sample weight	SW 846-6010D*	ICP-OES	0.0004% (4ppm)	☐
AIR	NIOSH 7082	Flame Atomic Absorption	4µg/filter	☐
	NIOSH 7300M / NIOSH 7303M	ICP-OES	0.5µg/filter	☐
	NIOSH 7300M / NIOSH 7303M	ICP-MS	0.05µg/filter	☐
WIPE ☐ ASTM ☐ NON-ASTM	SW 846-7000B	Flame Atomic Absorption	10µg/wipe	☐
*If no box is checked, non-ASTM Wipe is assumed	SW 846-6010D*	ICP-OES	1.0µg/wipe	☐
TCLP	SW 846-1311 / 7000B / SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW 846-1311 / SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	☐
SPLP	SW 846-1312 / 7000B / SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW 846-1312 / SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	☐
TTLC	22 CCR App. II, 7000B	Flame Atomic Absorption	40mg/kg (ppm)	☐
	22 CCR App. II, SW 846-6010D*	ICP-OES	2mg/kg (ppm)	☐
STLC	22 CCR App. II, 7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	22 CCR App. II, SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	☐
Soil	SW 846-7000B	Flame Atomic Absorption	40mg/kg (ppm)	☐
	SW 846-6010D*	ICP-OES	2mg/kg (ppm)	☐
Wastewater Unpreserved ☐	SM 3111B / SW 846-7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
Preserved with HNO3 ☐ PH<2	EPA 200.7	ICP-OES	0.020 mg/L (ppm)	☐
Drinking Water Unpreserved ☐	EPA 200.5	ICP-OES	0.003 mg/L (ppm)	☐
Preserved with HNO3 ☐ PH<2	EPA 200.8	ICP-MS	0.001 mg/L (ppm)	☐
TSP/SPM Filter	40 CFR Part 50	ICP-OES	12 µg/filter	☐
Other: Total Chromium	SW-846 3050	Acid Digestion		☑

Sample Number	Sample Location	~~Volume / Area~~ Substrate	Date / Time Sampled
Pb1	Northwest leg of water tower	Metal	07/12/21 1000
Cr 1	↓	↓	↓
Pb2	Southeast metal conector to northeast leg	↓	↓
Cr 2	↓	↓	↓
Pb3	Southwest leg of water tower	↓	↓

Method of Shipment: Fed Ex

Sample Condition Upon Receipt:

Relinquished by: Taryn Rowley	Date/Time: 7/12/21 1030	Received by:	Date/Time
Relinquished by:	Date/Time:	Received by:	Date/Time

*6010C Available Upon Request

☐ **AGREE TO ELECTRONIC SIGNATURE** (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL ANALYTICAL, INC.
TESTING LABS • PRODUCTS • TRAINING

Lead Chain of Custody

EMSL Order Number / Lab Use Only

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077

PHONE: (800) 220-3675
EMAIL: CinnaminsonLeadLab@emsl.com

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Sample Number	Sample Location	~~Volume / Area~~ Substrate	Date / Time Sampled
Cr3	Southwest leg of water tower	Metal	07/12/21 1000

Method of Shipment:		Sample Condition Upon Receipt:	
Relinquished by:	Date/Time:	Received by:	Date/Time
Relinquished by:	Date/Time:	Received by:	Date/Time

Controlled Document - COC-25 Lead R16 4/19/2021

☐ **AGREE TO ELECTRONIC SIGNATURE** (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

APPENDIX D

PHOTOGRAPHIC DOCUMENTATION

PHOTOGRAPHIC DOCUMENTATION
Limited Asbestos and Paint Survey Report
Hedrick, Iowa

Photo 1: View looking northeast at water tower base.

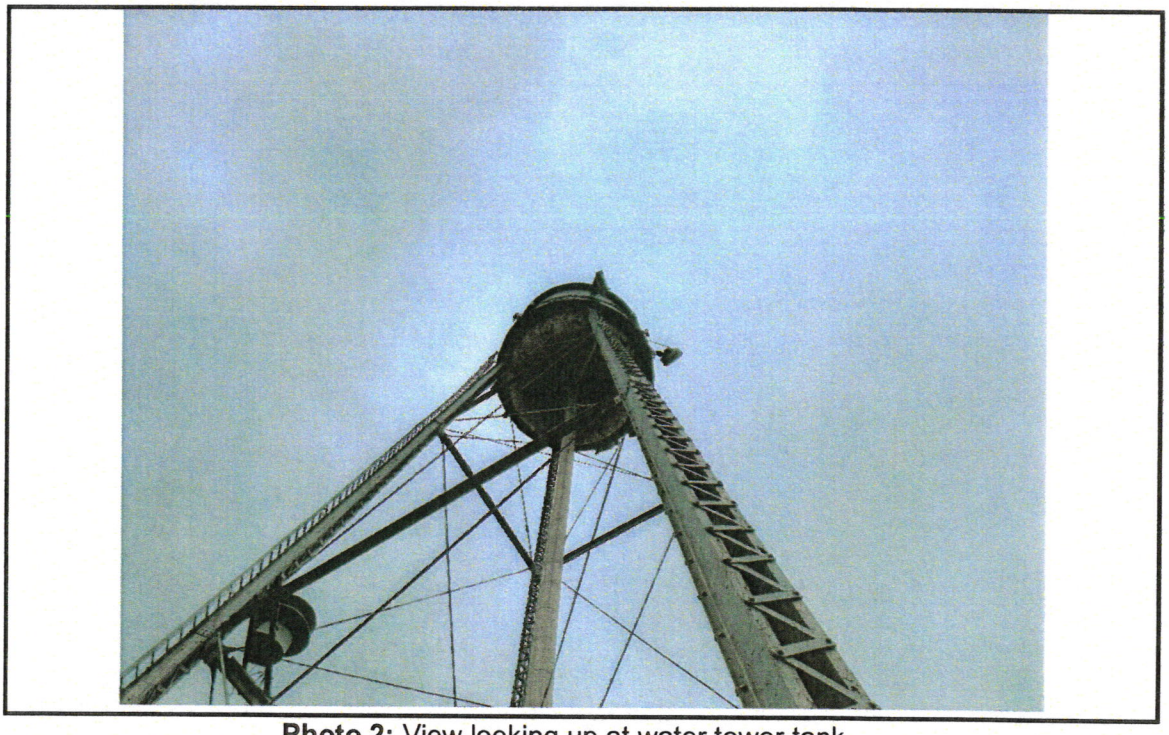


Photo 2: View looking up at water tower tank.

PHOTOGRAPHIC DOCUMENTATION
Limited Asbestos and Paint Survey Report
Hedrick, Iowa

Photo 3: View looking up at water tower.

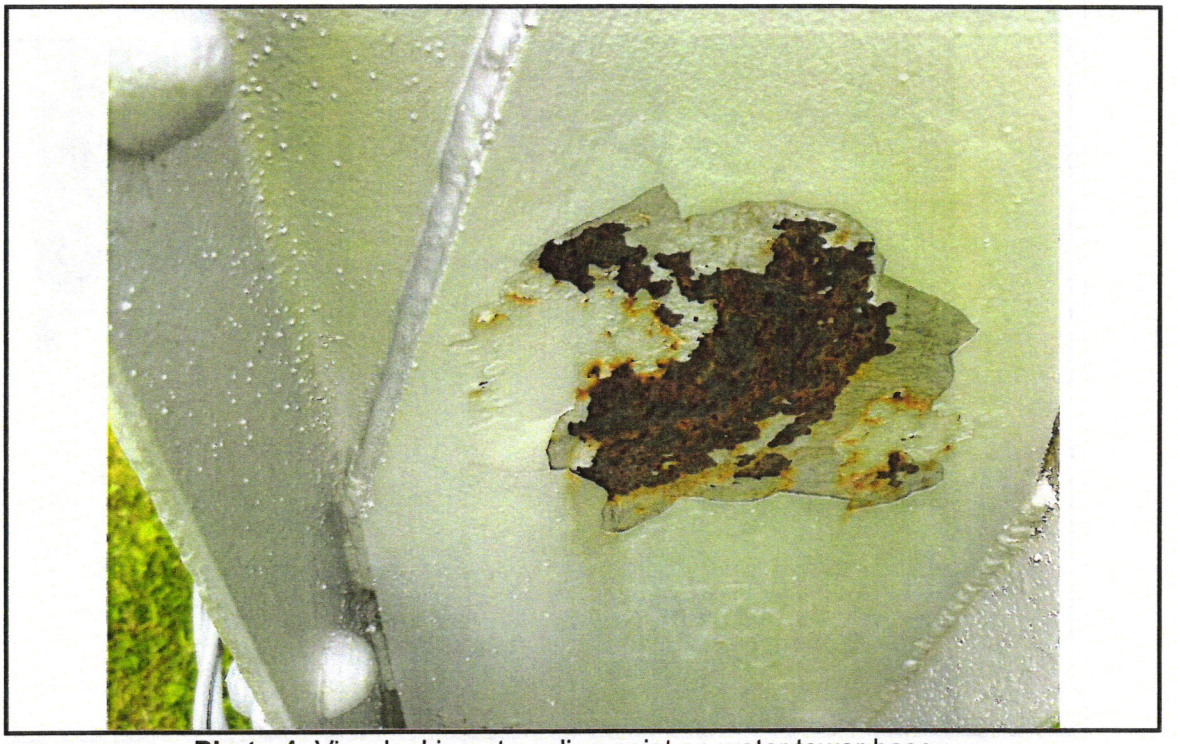


Photo 4: View looking at peeling paint on water tower base.

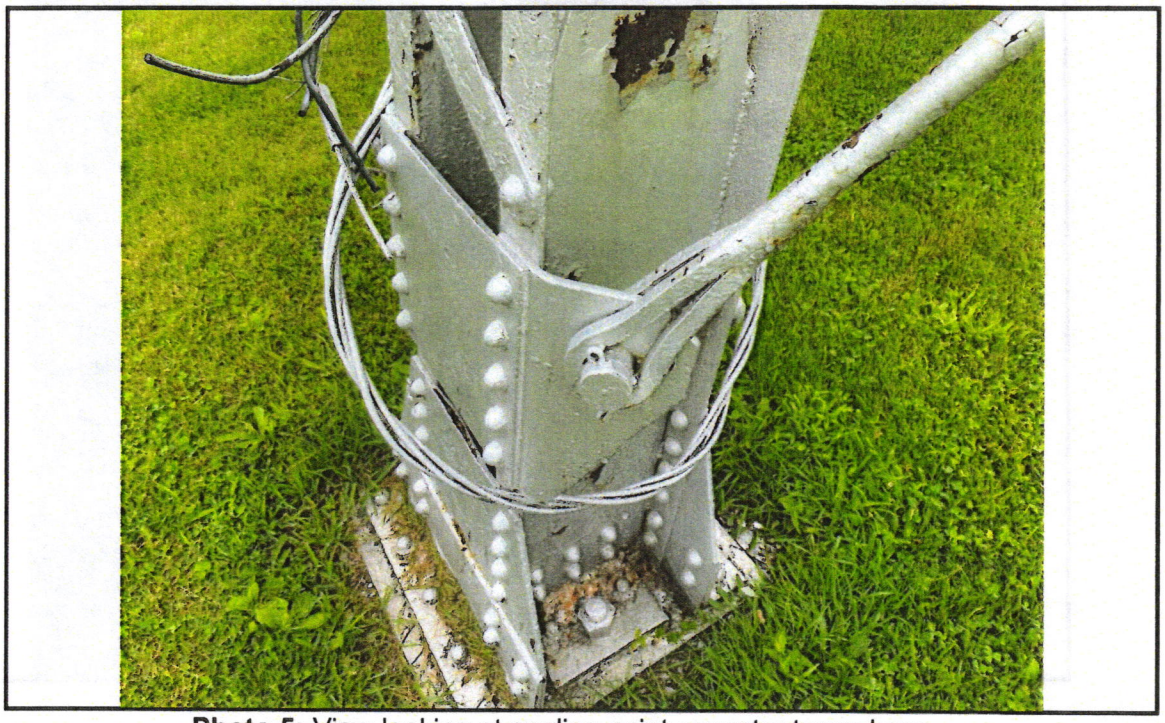


Photo 5: View looking at peeling paint on water tower base.

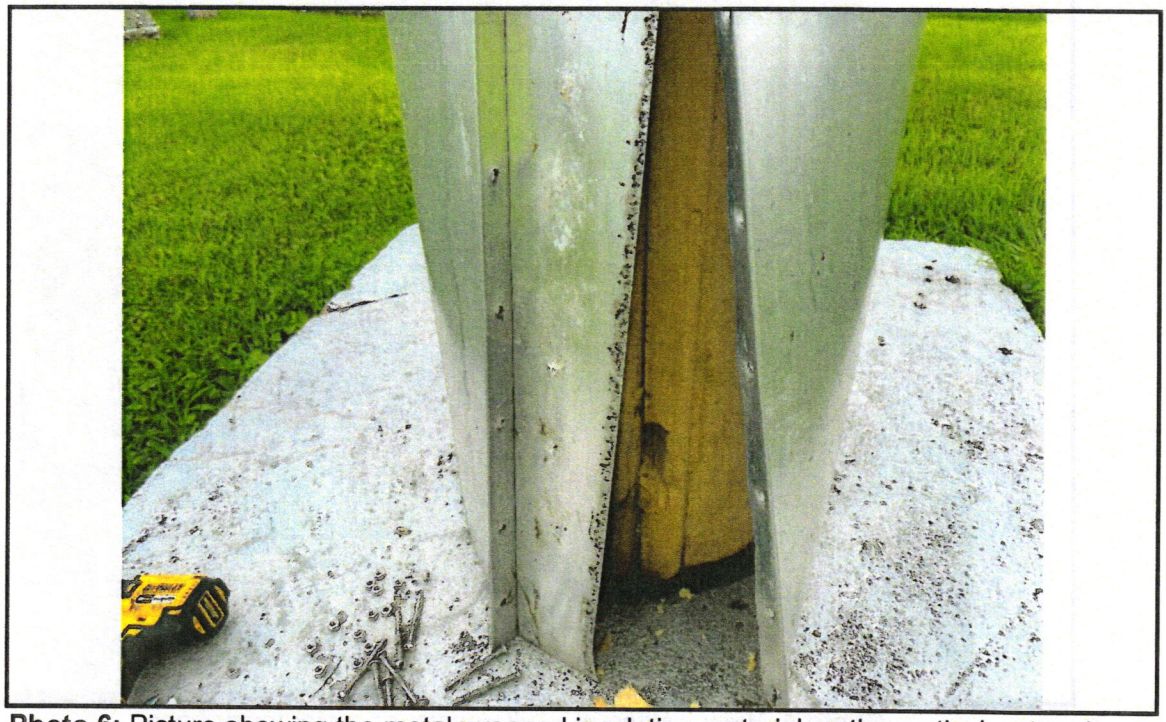


Photo 6: Picture showing the metal wrapped insulating material on the vertical water pipe centrally located under water tower.

Photo 7: View of insulated pipe centrally located under water tower.

Photo 8: View looking up at water tower.

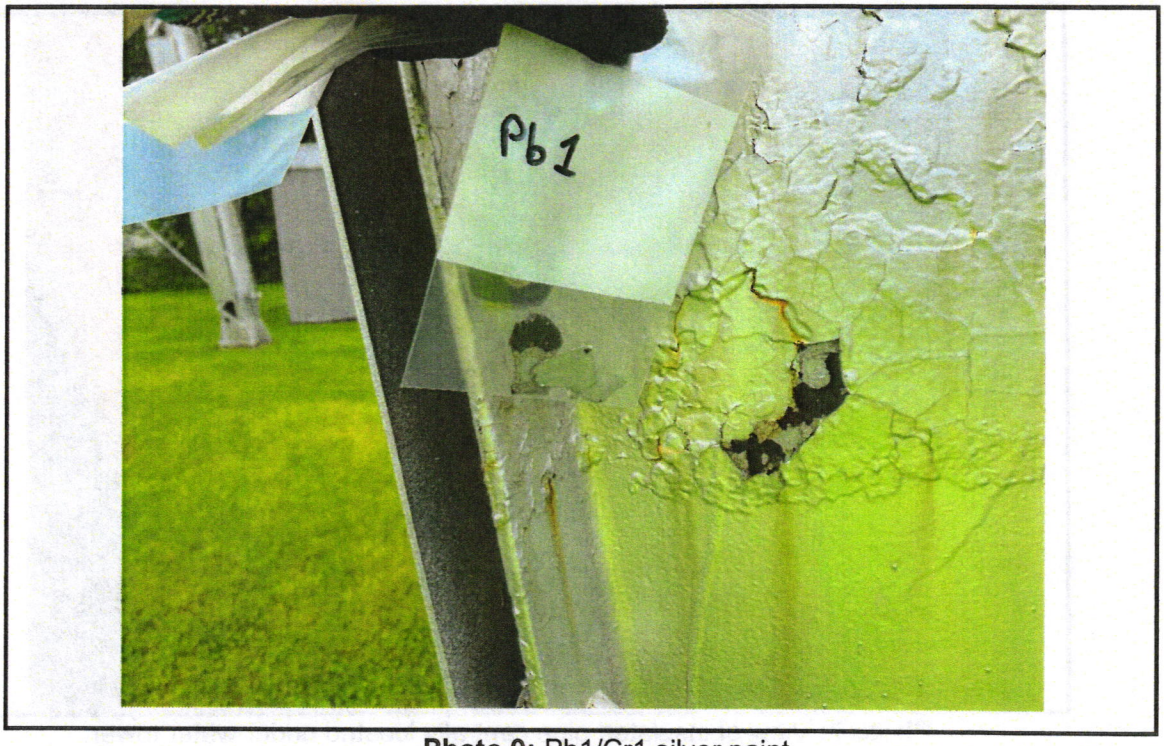


Photo 9: Pb1/Cr1 silver paint.

Photo 10: Asbestos sample, HA-01 silver paint

APPENDIX E

REGULATORY OVERVIEW

REGULATORY OVERVIEW

Asbestos

In Iowa, asbestos activities are regulated by the Iowa Department of Natural Resources (IDNR) and Iowa Workforce Development (IWD), Division of Labor. IDNR regulates asbestos fiber emissions under Iowa Administrative Code 567 Chapter 23 (IAC 567–23) and asbestos-containing waste disposal under IAC 567–109. IWD regulates occupational exposure to asbestos under IAC 875–10 and asbestos removal and encapsulation activities under IAC 875–155.

IAC 567–23.1(3) adopts the United States Environmental Protection Agency's (USEPA) asbestos NESHAP (40 Code of Federal Regulations (CFR) Part 61, Subpart M) by reference. Subpart M regulates asbestos fiber emissions and asbestos waste disposal practices. It also requires the identification and classification of existing building materials prior to demolition or renovation activity. Under NESHAP, asbestos-containing building materials are classified as friable, Category I nonfriable, or Category II nonfriable ACM. Friable materials are those that, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure. Category I nonfriable ACM includes packings, gaskets, resilient floor coverings, and asphalt roofing products containing more than 1% asbestos. Category II nonfriable ACM are any materials other than Category I materials that contain more than 1% asbestos.

Regulated ACM (RACM) must be removed before renovation or demolition activities that will disturb the materials. RACM includes:

- Friable ACM;
- Category I nonfriable ACM that has become friable or will be subjected to drilling, sanding, grinding, cutting, or abrading; and
- Category II nonfriable ACM that could be crumbled, pulverized, or reduced to powder during renovation or demolition activities.

The owner or operator must provide the IDNR and IWD with written notification of planned removal activities at least 10 working days prior to the commencement of asbestos abatement activities. Removal of RACM must be conducted by an Iowa-permitted asbestos abatement contractor.

IAC 875–155 Asbestos Removal and Encapsulation requires that any asbestos-related activity conducted in a public building be performed by personnel licensed or permitted by the IWD. Inspections for ACM must be conducted by IWD-licensed inspectors. Asbestos abatement must be performed by IWD-permitted asbestos abatement contractors. Management plans developed for the in-place management of asbestos-containing materials must be developed by an IWD-licensed management planner. When an abatement project design is prepared, it must be prepared by an IWD-licensed project designer.

IAC 875–10 adopts the Occupational Safety and Health Administration (OSHA) Asbestos standard for construction (29 CFR 1926.1101) by reference. The OSHA standard requires that employee exposure to airborne asbestos fibers be maintained below the permissible exposure limits (PEL) of 0.1 asbestos fiber per cubic centimeter of air (0.1 f/cc) as an 8-hour time-weighted average and 1.0 f/cc as a 30-minute excursion. The OSHA standard classifies construction and maintenance activities that could disturb ACM and specifies work practices and precautions that employers must follow when engaging in each class of regulated work.

Chromium

Chromium waste from renovation or demolition activities, such as debris, paint chips, dust, and sludges, that exhibit the toxicity characteristic must be managed and disposed as a hazardous waste under the Resource Conservation and Recovery Act (RCRA). A composite, representative sample of the demolition debris must be tested to determine if it is regulated as hazardous waste under 40 CFR 261 Identification and Listing of Hazardous Waste.

OSHA regulates occupational exposure to chromium metal and inorganic Cr(III) and Cr(VI) compounds under 29 CFR 1910.1000 Air Contaminants Tables Z–1 and Z–2. The PEL for chromium are as follows:

■ chromium metal	1.0 mg/m^3	8-hr TWA[2]
■ inorganic chromium (III) compounds (as chromium)	0.5 mg/m^3	8-hr TWA
■ inorganic chromium (VI) compounds (as chromate)	0.1 mg/m^3	ceiling limit

OSHA regulates occupational exposure to hexavalent chromium [Cr(VI)] in construction under 29 CFR 1926.1126. The Cr(VI) standard establishes an action level (AL) of 2.5 micrograms of Cr(VI) per cubic meter of air (µg/m^3, equivalent to 0.0025 mg/m^3) as an 8-hr TWA. The PEL for Cr(VI) is 5.0 µg/m^3 (equivalent to 0.005 mg/m^3) as an 8-hr TWA. The standard requires initial monitoring to evaluate employee exposures. If results are below the AL, no further action is required. If results exceed the AL, exposure monitoring must be repeated every six months, a medical surveillance program must be instituted, and Cr(VI) hazards must be communicated to employees. If results exceed the PEL, additional requirements are triggered.

Lead-Based Paint (LBP)

USEPA has defined LBP as containing 1.0 milligram per square centimeter (mg/cm^2) or 0.5 % by weight. However, that definition applies only to residential and child-occupied facilities. LBP waste from renovation or demolition activities, such as debris, paint chips, dust, and sludges, that exhibit the toxicity characteristic must be managed and disposed as a hazardous waste under RCRA, with the exception of whole-building demolition debris. Whole-building demolition debris is considered a non-hazardous waste with regard to lead. Therefore, no sampling/analysis of

[2] 8-hr TWA = 8-hour time-weighted average

painted components for lead is required for disposal as non-hazardous waste. If it is not a whole-building demolition debris, a composite, representative sample of the demolition debris must be tested to determine if it is regulated as hazardous waste under 40 CFR 261 Identification and Listing of Hazardous Waste.

IAC 875-10 adopts the OSHA lead standard for construction (29 CFR 1926.62) by reference. For the purpose of the standard, lead includes metallic lead, all inorganic lead compounds, and organic lead soaps. The OSHA standard does not define the amount of lead in paint that constitutes LBP and it applies to all construction work where an employee may be occupationally exposed to lead. All work related to construction, alteration or repair (including painting and decorating) is included. The standard applies to any detectable concentration of lead in paint, as even small concentrations of lead can result in unacceptable employee exposures depending upon on the method of removal and other workplace conditions. Under this standard, construction includes, but is not limited to, the following:

- Demolition or salvage of structures where lead or materials containing lead are present
- Removal or encapsulation of materials containing lead
- New construction, alteration, repair, or renovation of structures, substrates, or portions containing lead, or materials containing lead
- Installation of products containing lead
- Lead contamination/emergency clean-up
- Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed
- Maintenance operations associated with construction activities described above

Employers must assure that no employee will be exposed to lead at concentrations greater than the PEL of 50 $\mu g/m^3$ averaged over an eight-hour period without adequate protection. The OSHA standard also establishes an AL of 30 $\mu g/m^3$, which if exceeded, triggers certain requirements, including periodic exposure monitoring and medical monitoring.

APPENDIX F

ASBESTOS INSPECTOR LICENSE

TARYN ROWLEY

DOB: 07-30-1998

Issued: 08-12-2020

This person is licensed to perform asbestos work in the State of Iowa. ID card is intended for official use only and must be present on jobsite.

License Type	Number	Expires
INSPECTOR	20-4775	08-05-2021

DIVISION OF IOWA LABOR

Asbestos

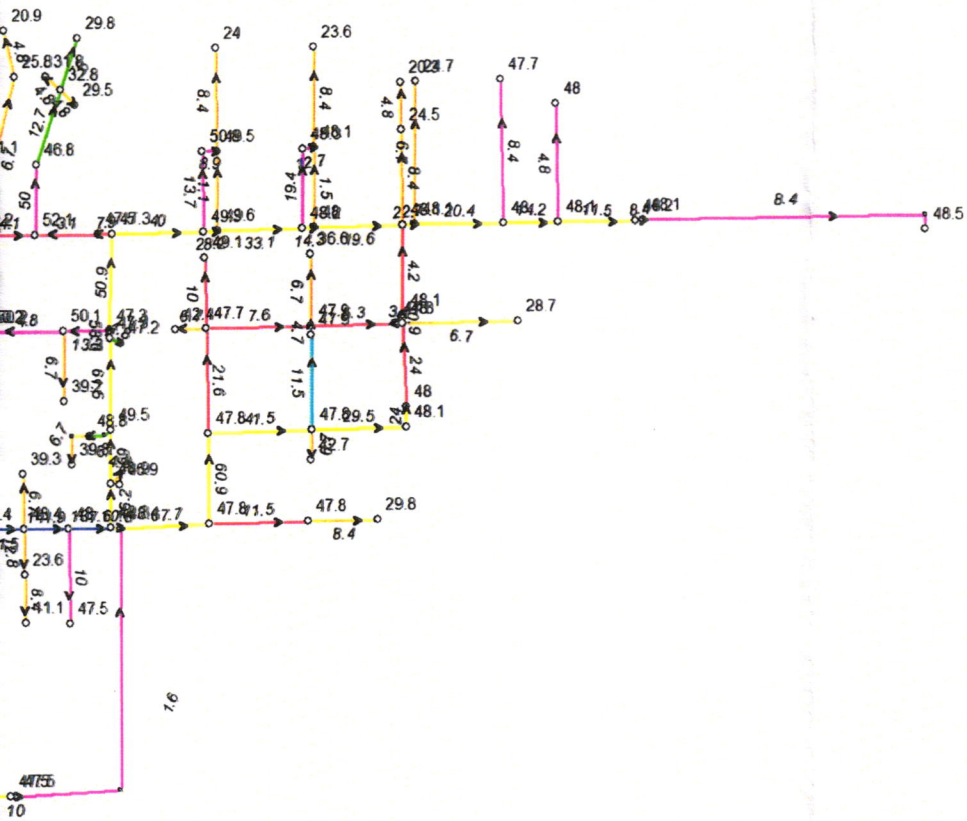
Rod A. Roberts
Labor Commissioner

APPENDIX C

Water System Hydraulic Modeling

Existing Water System – Operating Pressures
Existing Water System – Fire Flow
Water Main Upgrades – Increase Operating Pressures
Water Main Upgrades – Fire Flow

k Water System



GARDEN & ASSOCIATES, LTD.

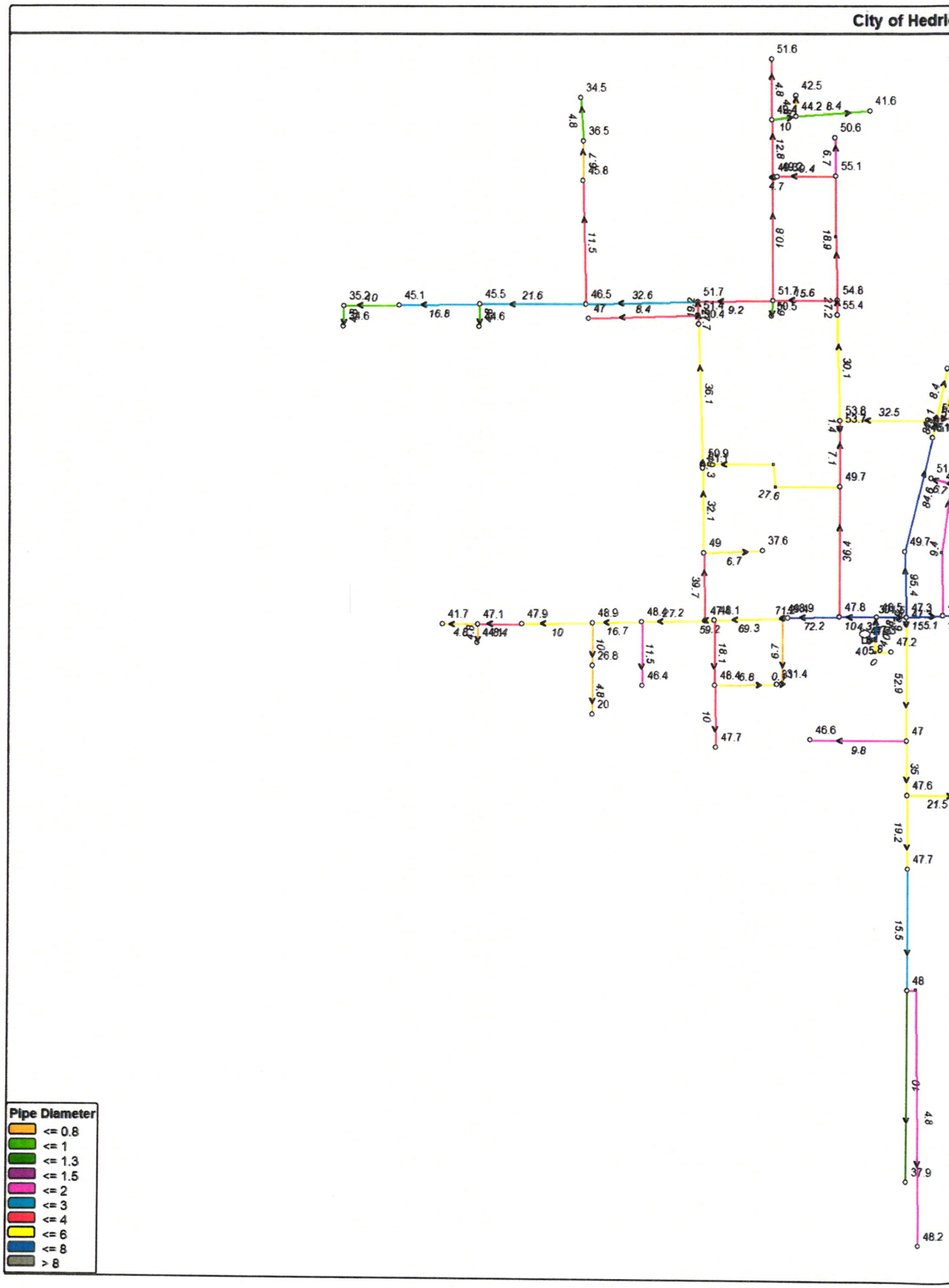
Existing Water System - Operating Pressures

September 2021

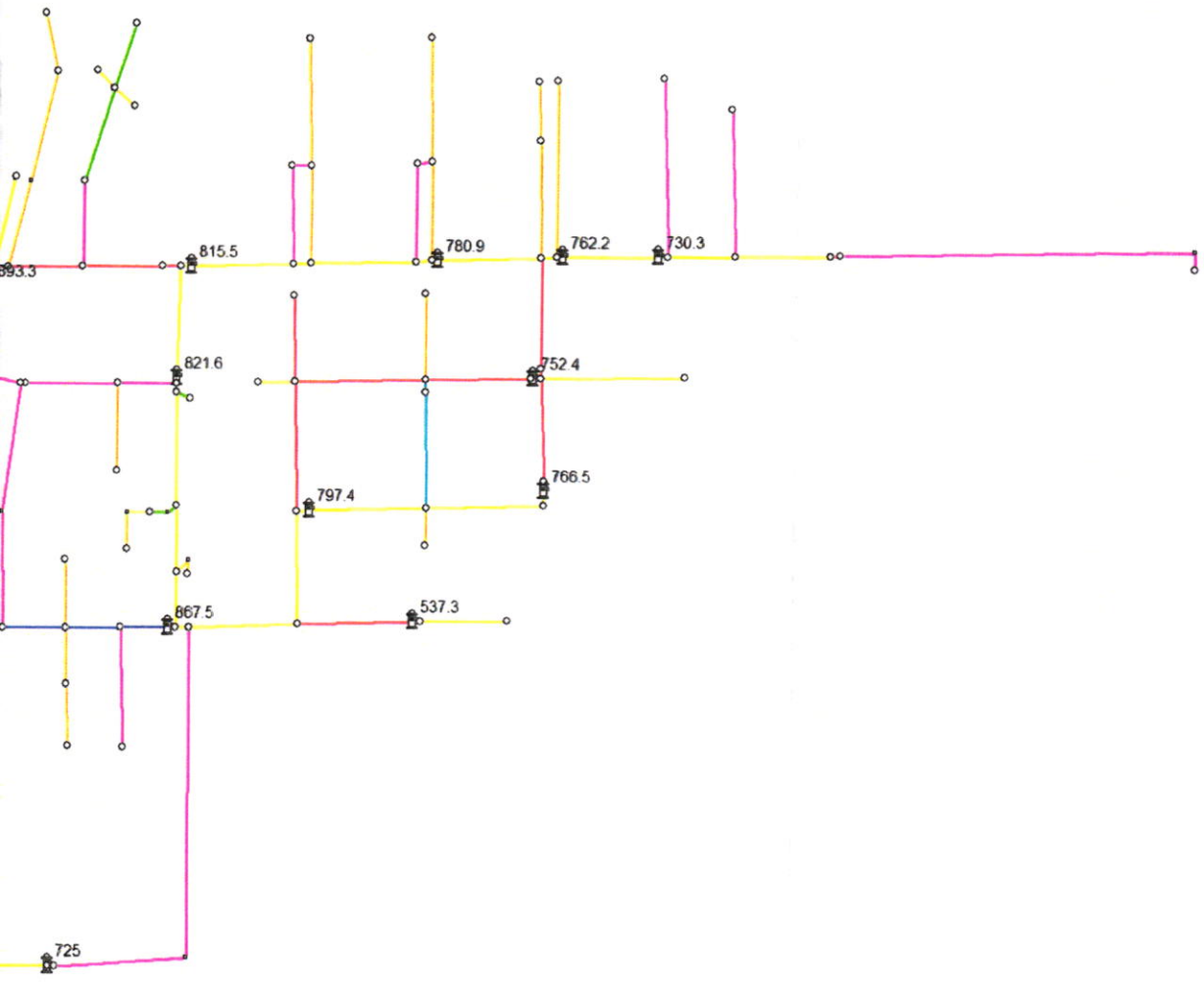
Pipe Label = Flow (gpm)

Node Label = Pressure (psi)

0 1000


City of Hedri
Pipe Diameter
<= 0.8
<= 1
<= 1.3
<= 1.5
<= 2
<= 3
<= 4
<= 6
<= 8
> 8

k Water System



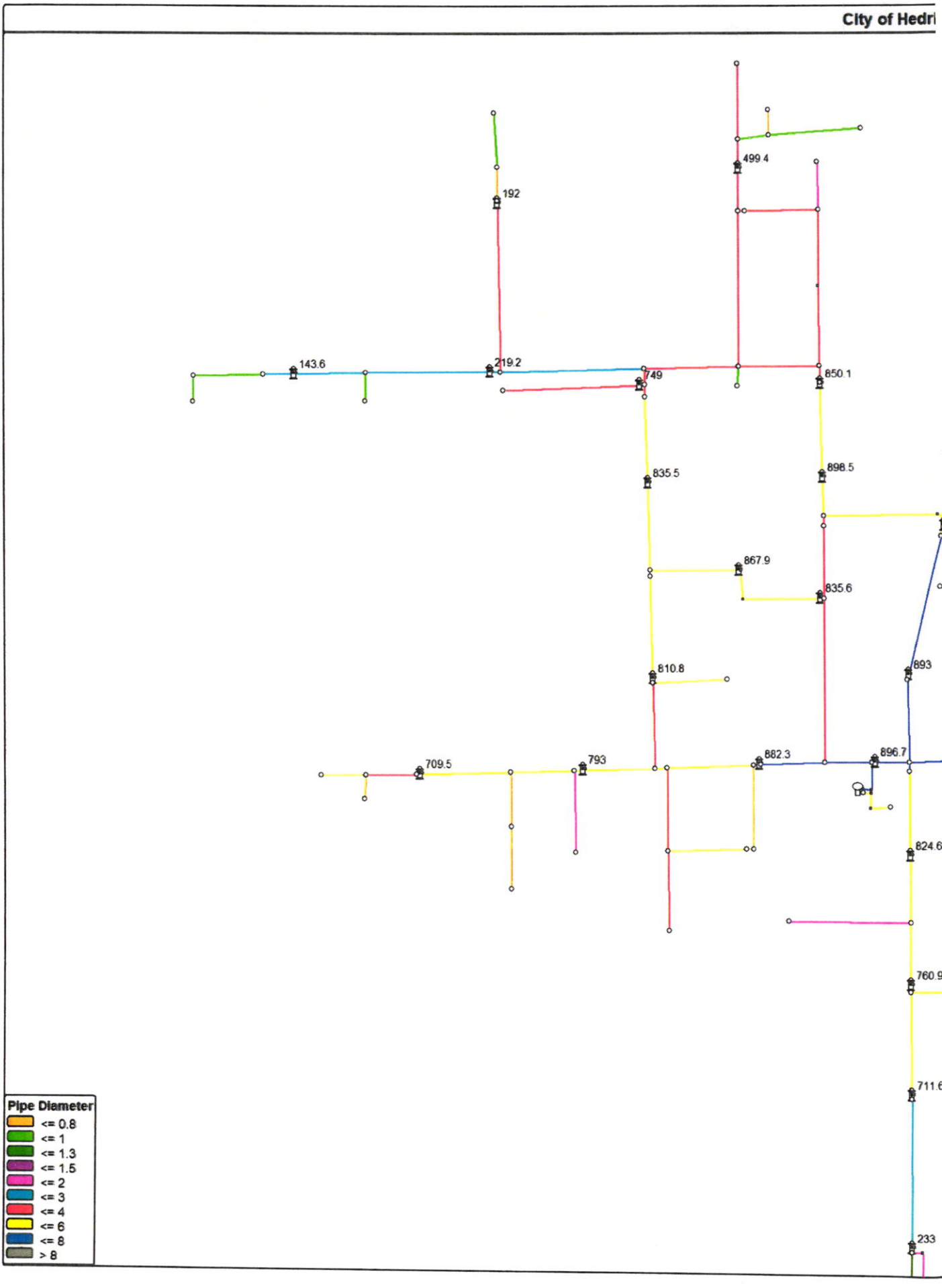
GARDEN & ASSOCIATES, LTD.

Existing Water System - Fire Flow

September 2021

Hydrant Label = Fire Flow at 20 psi (gpm)

0 1000


City of Hedri
499.4
192
143.6
219.2
749
850.1
835.5
898.5
867.9
835.6
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893
709.5
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824.6
760.9
711.6
233
Pipe Diameter
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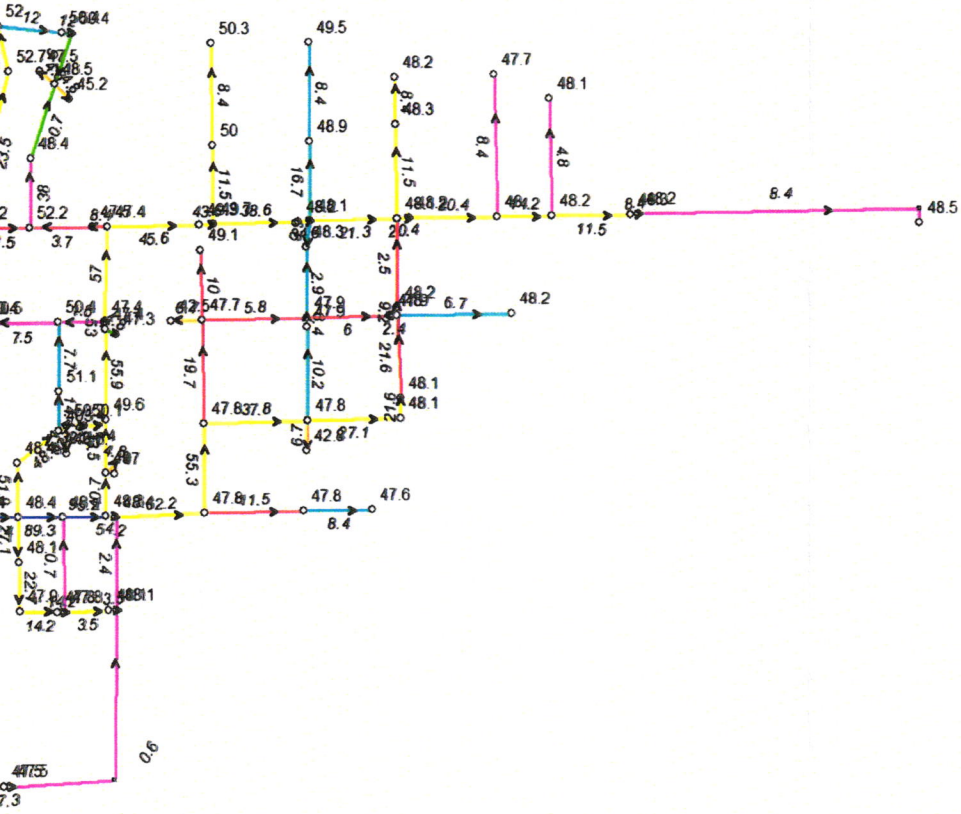
<= 1.3
<= 1.5
<= 2
<= 3
<= 4
<= 6
<= 8
> 8

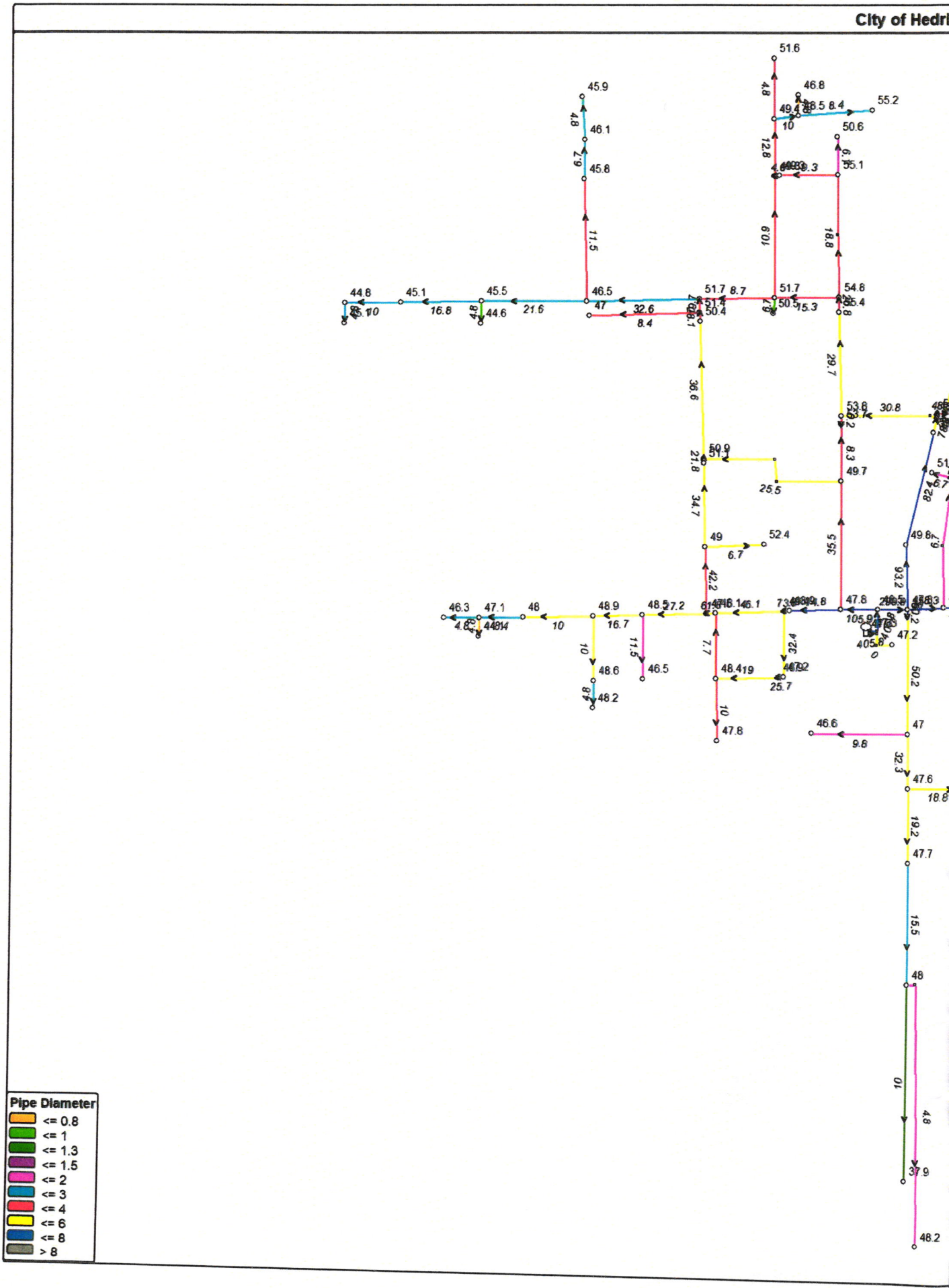
t Water System



GARDEN & ASSOCIATES, LTD.

Water Main Upgrades - Increase Operating Pressures
September 2021
Pipe Label = Flow (gpm)
Node Label = Pressure (psi)

0 1000


City of Hedri
Pipe Diameter
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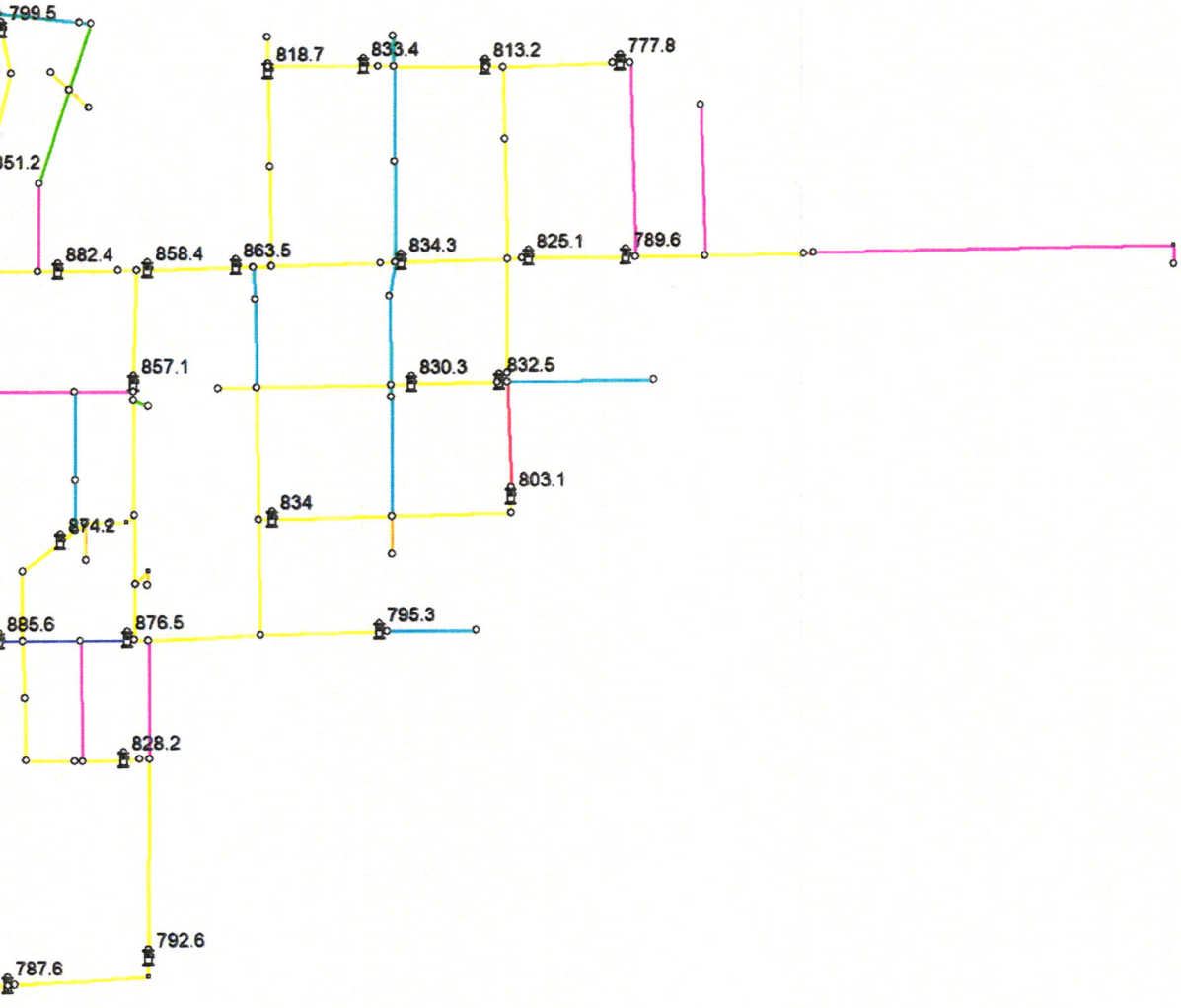
<= 1
<= 1.3
<= 1.5
<= 2
<= 3
<= 4
<= 6
<= 8
> 8

Water System



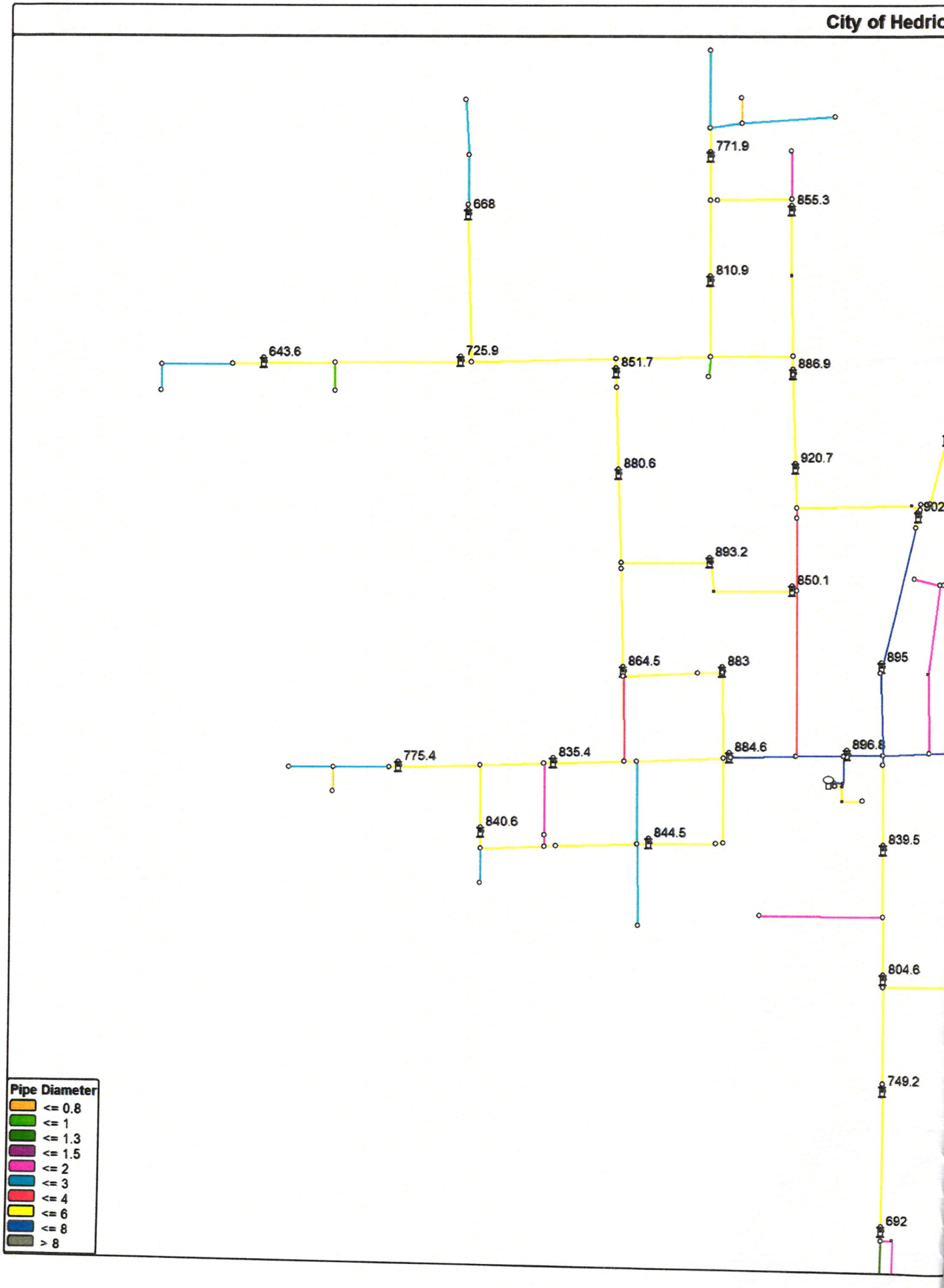
GARDEN & ASSOCIATES, LTD.

Water Main Upgrades - Fire Flow

September 2021

Hydrant Label = Fire Flow at 20 psi (gpm)

0 1000


City of Hedric
771.9
668
855.3
810.9
643.6
725.9
851.7
886.9
880.6
920.7
893.2
850.1
864.5
883
895
775.4
835.4
884.6
896.8
840.6
844.5
839.5
804.6
749.2
692
Pipe Diameter
<= 0.8
<= 1
<= 1.3
<= 1.5
<= 2
<= 3
<= 4
<= 6
<= 8
> 8

APPENDIX D

Hydrant Flow Data Summary
Insurance Services Office, Inc.
September 2020

INSURANCE SERVICES OFFICE, INC.

HYDRANT FLOW DATA SUMMARY

Community Hedrick FPSA

County Iowa(Keokuk, Wapello), State IOWA (14) Witnessed by: Insurance Services Office Survey Date: September 2, 2020

TEST NO.	TYPE DIST.*	TEST LOCATION	SERVICE	FLOW - GPM $Q=(29.83(C(d^2)p^{0.5}))$ INDIVIDUAL HYDRANTS			TOTAL	PRESSURE PSI STATIC	PRESSURE PSI RESID.	FLOW -AT 20 PSI NEEDED **	FLOW -AT 20 PSI AVAIL.	REMARKS***	MODEL TYPE	FLOW TEST DATE
1		North Main Street & 1st St	Hedrick Water Department, Main	710	0	0	710	40	35	1750	1500	(B)-(340 gpm)	FTPC	09/02/2020
2		2nd & Main Sts.	Hedrick Water Department, Main	730	0	0	730	50	45	2250	1900	(B)-(340 gpm)	FTPC	09/02/2020
3		West 2 Street & Perkins St	Hedrick Water Department, Main	730	0	0	730	48	35	750	1100	(B)-(340 gpm)	FTPC	09/02/2020
4		Spring and 5th	Hedrick Water Department, Main	580	0	0	580	59	25	2250	650	(B)-(340 gpm)	FTPC	09/02/2020
5		East 6 Street & Hursey St.	Hedrick Water Department, Main	710	0	0	710	50	25	1750	800	(B)-(340 gpm)	FTPC	09/02/2020

THE ABOVE LISTED NEEDED FIRE FLOWS ARE FOR PROPERTY INSURANCE PREMIUM CALCULATIONS ONLY AND ARE *NOT* INTENDED TO PREDICT THE MAXIMUM AMOUNT OF WATER REQUIRED FOR A LARGE SCALE FIRE CONDITION.

THE AVAILABLE FLOWS ONLY INDICATE THE CONDITIONS THAT EXISTED AT THE TIME AND AT THE LOCATION WHERE TESTS WERE WITNESSED.

*Comm = Commercial; Res = Residential.

**Needed is the rate of flow for a specific duration for a full credit condition. Needed Fire Flows greater than 3,500 gpm are not considered in determining the classification of the city when using the Fire Suppression Rating Schedule.

*** (A)-Limited by available hydrants to gpm shown. Available facilities limit flow to gpm shown plus consumption for the needed duration of (B)-2 hours, (C)-3 hours or (D)-4 hours.