



OSHKOSH COUNTY PARK VIEW HEALTH CENTER – WATER HEATER REPLACEMENT STUDY

Prepared for:

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A. INTRODUCTION

PROJECT BACKGROUND AND SCOPE

The Park View Health Center is a 154,000 square feet three story skilled nursing care facility. The building houses up to 168 residents and offers 24 hour care, social services, psychiatric services, respiratory therapy, full service kitchen, laundry, and salon services. The main level and second level house the residents, and the lower level is made up of staff offices, staff cafeteria, storage, and mechanical spaces. The original building was constructed in 2008 and a 7,500 square feet therapy addition was constructed 2012. The facility is located at 725 Butler Ave in Oshkosh, WI.

The building has a central water heating plant along with a supplementary hydronic solar panel system consisting of four 8 panel arrays. The solar hot water is piped through a plate and frame heat exchanger which preheats the domestic water feed to the gas fired water heaters. There is a manual by-pass valve on the system in the event the solar water heating system needs to be taken offline. For the sake of this study, the solar water heating is not included in the domestic hot water calculations and is considered an unreliable water heating source.

The existing water heaters supply 140 degree F hot water throughout the entire facility. Thermostatic mixing valves are located near fixtures requiring 115 degree F water (i.e.: lavatories, showers, and resident fixtures). Two of the three domestic water heaters are original to the building, and one was replaced in the last several years.

The water heater replacement project was initiated by Winnebago County to study and evaluate the existing domestic water heating equipment and provide recommendations for an energy efficient robust replacement system. The gas fired water heaters have reached the end of their useful life and one water heater is currently not functioning.

PROJECT METHODOLOGY

JDR Engineering provided the following services to assess the water heating system and provide the conclusions found in this analysis:

1. Meeting with building facilities and tour the building.
2. Reviewed existing documents.
3. Reviewed existing water heating equipment, domestic water service room, and gas service.
4. Prepared study notes and Opinion of Probable Construction Cost (OPCC).

B. PARK VIEW HEALTH CENTER

OVERALL KEY PLAN



ENLARGED KEY PLAN

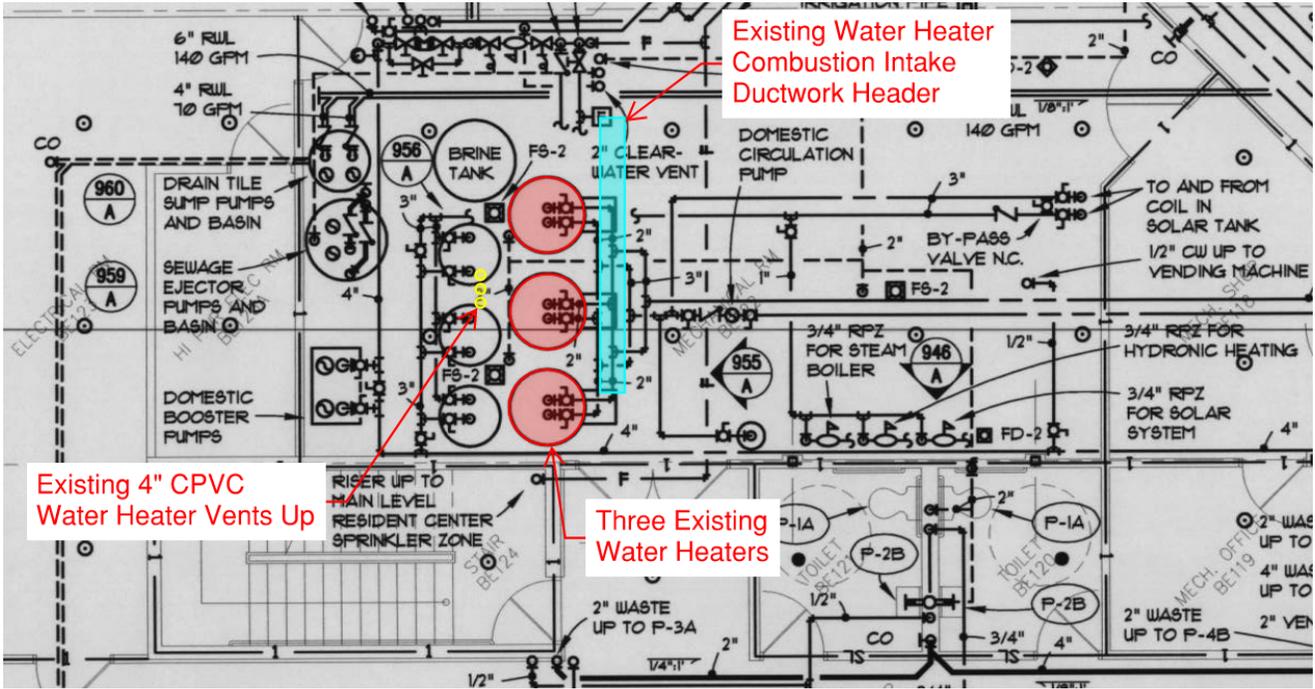


PHOTO OF EQUIPMENT



C. PLUMBING EVALUATION OF EXISTING CONDITIONS AND FINDINGS

The original 2006 drawings were provided for use in reviewing the existing conditions at the site. The three (3) existing gas fired tank water heaters are located in Mechanical Room BE122 on the lower level. The existing domestic water heating system generates 140 degree F hot water to serve the entire facility. ASSE certified thermostatic mixing valves are located in the ceiling space above the hand washing and residential plumbing fixtures and provide 115 degree F maximum hot water at the faucets and showers. An emergency automatic shutoff valve is installed on the 140 degree F hot water main leaving the mechanical room.

The existing water heaters sit side by side and are piped in parallel with evenly distributed pipe lengths. Each existing water heater is vented by a 4" CPVC pipe which individually routes vertically from the mechanical room up through the second floor roof. The existing water heater combustion intake is provided by a ducted intake header and connects to each water heater by means of a 6" round duct connection.

Domestic hot water temperature maintenance is provided by a piped system recirculating to within 25 feet of each fixture requiring hot water. A circulation pump located in the ceiling of Mechanical Room BE122 pumps the hot water back to the inlet side of the water heaters. A hot water expansion tank is connected to the inlet side of the water heaters to protect the system from over pressurization by thermal expansion. The existing hydronic solar hot water system pre-heats the cold water on the inlet side of the water heaters. During the time of this study, the existing hot water circulation pump, hot water expansion tank, and hydronic solar water pre-heating equipment are all working properly and are not required to be replaced or adjusted.

The existing hot water temperature and distribution design was an approved method for protection from Legionella when the building was constructed. The State of Wisconsin has since adopted the 2015 IECC for hot water recirculation regulations which states that hot water must be recirculated to within 24" of any hand washing fixture. As part of this study, JDR reviewed if there were any code implications when replacing domestic water heating equipment in a health care facility. JDR reviewed the State of Wisconsin DSPS health care plumbing code and contacted a DSPS plan reviewer. It was determined that a water heater replacement project does not require designing to the current code if the previous installation was code compliant at the time of construction. Therefore, no changes are required to be made to the existing hot water distribution piping or existing plumbing fixtures because the installation was code compliant in 2006.

Existing Domestic Water Heating Equipment Characteristics:

- Each Existing Water Heater (three total):
 - Manufacturer: PVI
 - Model: 800 P 250A-PV
 - Type: Gas fired tank
 - Gas Input: 565,000 Btu/hr
 - Gas Pressure Inlet: 4.5" WC – 14" WC
 - Gallons per Hour: 640 GPH
 - Temperature Rise: 100 degrees F (40 degrees F to 140 degrees)
 - Thermal Efficiency: 94% maximum
 - Storage: 250 gallons ASME rated
 - Electrical Info: 115 Vac, 1-Phase, 1/3 Hp, 15 total Amps

- Existing Domestic Hot Water System Totals:
 - Total Gas Input: 1,695,000 Btu/hr
 - Total Gallons per Hour: 1,920 GPH
 - Redundancy: 52% (based on 1,100,000 Btu/hr calculation)
 - Total Storage: 750 gallons

PROPOSED PROJECT RECOMMENDATIONS

The following recommendation is suggested to address the issues observed. The recommendation section has an Opinion of Probable Construction Cost (OPCC). The opinion of cost is based on our assessment of the market conditions and could be affected by many factors including, but not limited to, changes in labor rates, labor availability, and material availability.

Plumbing Recommendation summary:

For the plumbing system, the following recommended options are presented for consideration:

- Plumbing Recommendations: Replace the three (3) existing water heaters with a more efficient modern system sized appropriately for the building usage. The system will reuse the existing water heater venting and combustion intake infrastructure so not to disturb the existing vertical piping chase and existing intake louver.
- Recommended water heaters characteristics is as follows; gas fired, modulating burner, at least 96% thermal efficiency, 115 Vac/1-phase power connections, physical size of units will need to be like the existing due to space constraints.
- Include new gas regulators if manufacturer recommends.
- Water heaters will be installed in the same location as demolished water heaters located in Mechanical BE122. The intent is to reuse the existing 4" CPVC vertical venting and reconnect to the ducted combustion intake system.
- Water heater demolition and installed must be staged so the building water heating system remains active during replacement. The facility will be in full use during construction and hot water must be maintained at 140 degrees F per the State of Wisconsin health code requirements.
- Each New Water Heater Basis of Design (three total):
 - Manufacturer: Bock
 - Model: OT500N
 - Type: Gas fired tank
 - Gas Input: 80,000 – 500,000 Btu/hr (6 to 1 turndown)
 - Gas Pressure Inlet: 3.5" WC – 14" WC
 - Gallons per Hour: 576 GPH
 - Temperature Rise: 100 degrees F (40 degrees F to 140 degrees)
 - Thermal Efficiency: 97% maximum
 - Storage: 125 gallons ASME rated
 - Electrical Info: 115 Vac, 1-Phase
- New Domestic Hot Water System Totals:
 - Total Gas Input: 1,500,000 Btu/hr maximum
 - Total Gallons per Hour: 1,728 GPH
 - Redundancy: 46% (based on 1,100,000 Btu/hr calculation)
 - Total Storage: 375 gallons

Electrical Recommendation summary:

For the electrical system, the existing 120V-1phase power connection and feeders can be reused. A new fused disconnect to be installed next to each water heater controller.

D. OPINIONS OF PROBABLE CONSTRUCTION COSTS

SUMMARY

The following assessment summary is based on the options and various line items. Note that below figures do not include design fees.

Overall OPCC:

ITEM	Original	UNITS	UNIT COST	TOTAL COST
General Construction				\$0
Plumbing				\$84,286
Electrical				\$3,638
SUBTOTAL				\$87,924
CONTINGENCY (included in trades)				\$0
CONSTRUCTION BOND (not required)				\$0
GRAND TOTAL	\$0			\$87,924

Plumbing OPCC:

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Plumbing Recommendation: Remove and Replace Existing Water Heater Equipment				
Demolition of Existing Water Heaters	1	Lump	\$5,000	\$5,000
Water Heaters	3	Each	\$20,000	\$60,000
Valves, Piping, Insulation	3	Each	\$1,500	\$4,500
Small project markup	5%			\$3,475
Design Contingency	5%			\$3,649
General conditions	10%			\$7,662
SUBTOTAL				\$69,500
OVERHEAD & PROFIT				\$14,786
GRAND TOTAL				\$84,286

Electrical OPCC:

ITEM	QTY	UNITS	UNIT COST	TOTAL COST
Plumbing Recommendation: Remove and Replace Existing Water Heater Equipment				
Disconnect and Reconnect Water Heaters (Electrical)	3	Each	\$1,000	\$3,000
Small project markup	5%			\$150
Design Contingency	5%			\$158
General conditions	10%			\$331
SUBTOTAL				\$3,000
OVERHEAD & PROFIT				\$638
GRAND TOTAL				\$3,638