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Proposed Field House Study

Campus Distribution System Analysis

University of Wisconsin – La Crosse
La Crosse, WI

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Purpose

The purpose of this report is to evaluate whether the new proposed Fieldhouse on the campus of the University of Wisconsin La Crosse should be mechanically conditioned as a stand-alone facility or connected to the campus steam, chilled water and power central services.

Considerations

The facility is planned for a plot of land that is east of the current Roger Harring Stadium. This location is at the eastern most end of campus. Currently the campus steam and chilled water distribution systems do not extend to that location of the campus.

The planned gross building area of the facility is 110,000 square feet. Comparing this facility type with UW Systems Load Analysis Worksheets for other UW Campus's in the state, an athletic field house would be projected to have a heating load of 50 sq.ft/btu. Using this value a heating load of 5,500 MBTU would be anticipated for this facility. The cooling load projection was developed utilizing a similar restoration process. At 500 square foot per ton this facility would have a cooling load of 40 tons to air condition the lobby area, office space and locker rooms.

Campus signal ductbank system would extend (4) 4" PVC conduits encased in concrete from S18 east along Pine Street to a new manhole at the Field House site. Provide midway manholes as needed. Fiber will be pulled by Fieldhouse Project and possibly phone cables from campus building head-end facilities as needed.

Campus primary ductbank system would extend (4) 5" PVC conduits encased in concrete from P18 to a new manhole at the Fieldhouse site. Provide one new 5kV, 350kCM feeder from P18 to the manhole at the site and then loop back to P18. This cable will be spliced into new feeder cable F9/F10 loop to be installed under the substation project. The loop to be installed under the substation project will begin at the campus 5kV vault and extend to P22 and loop back to the vault. This loop will also serve the new Student Union and Science Building. The Fieldhouse project will extend the feeder loop from the new power manhole on the Fieldhouse site to (2) 5kV loop switches in the building. No switchgear will be needed on the Fieldhouse site as part of this utility project.

Consideration was given to providing a utility power service under the stand alone option but since campus signal ductbanks were necessary under both the standalone and campus service options campus power is extended under both options. The primary ductbank system becomes more cost effective to install along with the signal ductbank to the building in the same construction area.

Options

Stand-Alone Building Utility Services

Building heat would be generated from two natural gas hot water boilers. The boiler hot water produced would be distributed throughout the building to the terminal heating equipment. The boilers and pumping system would be located in a central mechanical room.

Chilled water for the facility would be produced by an air cooled chiller system. This unit could either be located on grade or roof of facility. Central mechanical room equipment with distribution pumps would distribute chilled water throughout the building.

Campus Services

Campus steam, chilled water, primary and signal ductbanks to the new athletic facility would be routed in the Pine Street area.

This routing is broken up into three areas. The Utility Upgrade Area would increase the steam box conduit size from Steam Pit 1 at the Heating Plant to Mitchell Hall. The steam and condensate pipe size would be increased to a 6” steam and a 3” condensate to accommodate the loads for the future Fieldhouse and the proposed additional of the school to the east of the stadium. A new 10” chilled water service would extend from the east end of the existing chiller plant to just north of Mitchell Hall and provide a 6” branch take-off to Mitchell Hall for future connection to campus distribution system.

The Utility Extension Area would extend a new steam box conduit (6” steam/3” condensate) from just north of Mitchell Hall to a location south of the proposed Fieldhouse. New 6” chilled water piping would also be extended from in the same route. The primary and signal ductbank distribution system would be extended in this area from existing Vaults 19 northeast corner of the East Avenue and Pine Street intersection to just south of the proposed Fieldhouse.

First Cost

The majority of the building mechanical and electrical systems are similar for the standalone or campus distribution systems being evaluated. These estimates consider only costs that are different between the options:

Stand-Alone Building Utility Services:

<u>Equipment</u>	<u>Units</u>	<u>Cost/Unit</u>	<u>Total</u>
Hot Water Boilers	2	\$100,000	\$206,000
Air Cooled Chiller, Pumps, Piping, Controls	1	\$100,000	\$100,000
Primary Ductbanks	820 LF	\$350/ft.	\$287,000
Electrical Cabling, Transformer, Switches	1	\$220,000	\$220,000
Campus Signal Vaults and Ductbanks	820 LF	\$350/ft.	\$287,000
	Total		\$1,100,000

Campus Services

The following breaks out the costs associated with connecting the new Fieldhouse to the current campus distribution system. Each area is defined on the attached plan.

Make note the cost per foot to install primary and signal ductbank systems will be decrease when installed in conjunction with a larger utility project including steam and chilled water piping.

Utility Upgrade Area:

<u>Utility</u>	<u>Length (ft.)</u>	<u>Cost/ft.</u>	<u>Total</u>
Steam Pits and Box Conduit (6" HPS/3"PCR)	280	\$1,800	\$504,000
10" Chilled Water	460	\$500	\$230,000
6" Chilled Water	60	\$450	\$27,000
Total			\$761,000

Utility Extension Area:

<u>Utility</u>	<u>Length (ft.)</u>	<u>Cost/ft.</u>	<u>Total</u>
Steam Pits and Box Conduit (6" HPS/3"PCR)	570	\$1,000	\$570,000
6" Chilled Water	480	\$450	\$216,000
Primary Vaults and Ductbanks	720	\$300	\$216,000
Signal Vaults and Ductbanks	720	\$300	\$216,000
Total			\$1,218,000

Building Service Area:

<u>Utility</u>	<u>Length (ft.)</u>	<u>Cost/ft.</u>	<u>Total</u>
Steam Pits and Box Conduit (4" HPS/2"PCR)	100	\$1000	\$100,000
6" Chilled Water	100	\$450	\$45,000
Signal Ductbanks	100	\$300	\$30,000
Primary Ductbanks	100	\$300	\$30,000
Electrical Cabling, Transformer, Switches			\$220,000
HX, PRV Station, Cond. Pump, Meters			\$150,000
Total			\$575,000

Campus Service Total \$2,554,000

Operational Expenses**Energy**

The standalone system is estimated to have an increased energy cost of \$35,000 to \$40,000 more per year in operating cost.

Maintenance

The standalone system will have higher annual operating costs from staffing and maintaining the equipment.

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