Final Project Report

Live On Nebraska Building Retro-Commissioning and Optimization

Live On Nebraska
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Prepared for:

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FINAL PROJECT REPORT

OVERVIEW

This Final Project Report provides a summary of work performed pursuant to the Live On Nebraska building retro-commissioning and optimization project, initiated by Ken Hansen in 2021 by the University of Nebraska Medical Center (UNMC). The purpose of the project was to identify deficiencies through retro-commissioning and optimize the mechanical system equipment for maximum performance and energy efficiency.

The affected equipment included the following items as well their components, the Building Automation System (BAS), and various interdependent components affecting the functional performance of the HVAC system:

- AHU-01, Serves First Floor
    - 20, Floor Level Devices
- AHU-02, Serves Second Floor
    - 22, Floor Level Devices
- HX-1A/B Glycol system for AHUs and Unit Heaters (UH)
- HX-2A/B Building Hot Water System
- CWP, Building Chilled Water Booster Pump
- Steam Meter
- Chilled Water Meter

DEFINITIONS

The following definitions are offered to clarify the meaning of key, often used terms:

OPTIMIZATION

Optimization refers to the process of repairing and tuning a mechanical system's equipment, components and controls so that the mechanical system can perform up to its maximum potential. Optimization strategies focus on achieving owner and facility specific operational requirements, while providing the optimum balance of occupant comfort, safety, and energy efficiency.

The optimization process involves:

- Identification and correction of existing deficiencies in the mechanical systems' equipment and components that are preventing the systems from performing designed. This involves considerable inspection and testing of system components for operational integrity.
- Reprogramming of the system controls to implement sequences that conform with established UNMC standards and facility-specific operational strategies.

RETRO-COMMISSIONING

Retro-Commissioning applies the commissioning process to a building or group of buildings that was not previously commissioned. It encompasses reviewing drawings and design intent, testing, evaluating, adjusting, and correcting building systems in order to conserve energy and resources, improve comfort, maximize productivity, and ensure operation and maintenance procedures meet current facility requirements and the owner's needs.

PROJECT APPROACH

In accordance with the proposal objectives, each of the affected equipment was inspected and tested for operational integrity to determine needed repairs. In addition, end users, facility staff, and the design engineer were interviewed when appropriate to identify to identify opportunities to enhance both energy and operational efficiencies. Solutions and budgetary estimates were developed for correcting the deficiencies and implementing improvements. UNMC staff were responsible for implementing repairs, while Optimized Systems provided recommendations, training, and overall guidance. Optimized Systems performed the optimization programming once deficiencies were resolved.

PROJECT OUTCOMES

SUMMARY

The inspection and functional performance testing of the mechanical systems equipment identified a total of 32 deficiencies, which were turned over to UNMC to correct. As of the writing of this report, 20 of those deficiencies have been closed and 12 are still open. The list of remaining deficiencies was re-sent to UNMC on November 8th.

In addition, controls were reprogrammed to optimize the operation of the mechanical systems and implement UNMC's control standards. Occupancy sensors were installed in the surgical suites and integrated into the Building Automation System. AHU-01 has been reprogrammed to look at occupancy and control the surgical suites temperature and humidity requirements per the FGI Guidelines provided.

It should be noted that Optimized Systems has expressed concerns about energy use by operating to the parameters specified.

OUTSTANDING ISSUES

Due to the layout of the ductwork and the mechanical system design, the air handler serving the first floor (AHU-01) has to speed up the return fans to satisfy the return air valves on the system (RAV-01 and RAV-02). As a result of this operation, the return fans are pulling more air out of the entire first floor, causing the floor's pressure to be extremely negative.

The VFD for Exhaust Fan-04 (which serves autopsy room 139) is operating above max Hz/speed to try and satisfy Exhaust Air Valve (EAV)-101. EAV-101 is not meeting the setpoint.

RECOMMENDATIONS

To resolve the first-floor building pressure issues, Optimized Systems has provided two options. The least expensive is to complete a first floor rebalance of the return air system to redirect return flow to the RAVs. The building pressure will be improved, but not controllable.

The other option is to add control damper(s) to the return air system so all branches off the system can be variable and controllable. The return air system is a mixed system; some dampers can modulate (RAVs) while the rest of the system uses hard-balanced dampers that are set permanently. While this option is more expensive, budget price of $9,000, it will provide more control over the return air system and reduce pressure issues in most situations. Optimized Systems would be pleased to provide a proposal to execute this solution.

To resolve the Exhaust Fan issue, Optimized Systems recommends checking and/or balancing ductwork for any obstructions and/or incorrect configurations. Otherwise, a larger fan will need to be installed or a re-evaluation of rooms flows completed.

CLOSING

It has been our pleasure working with UNMC on this project. We are confident that the result of this project will significantly improve the operations of the Live On Nebraska building. We hope you have found our involvement to be helpful and informative. If you would like to review any of the information in this report or discuss any aspects of the project, please do not hesitate to contact me.

Respectfully submitted,

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