CHAPTER/REGIONAL TECHNOLOGY AWARD - SHORT FORM

1. Category - Check one and indicate New, Existing, or Existing Building Commissioning (EBCx)

☐ Commercial Buildings	☐ New	☐ Existing or	☐ EBCx
Institutional Buildings:			
☐ Educational Facilities	☐ New	☐ Existing or	☐ EBCx
☐ Other Institutional	☐ New	☐ Existing or	☐ EBCx
☐ Health Care Facilities	☐ New	☐ Existing or	☐ EBCx
☐ Industrial Facilities or Processes	☐ New	☐ Existing or	☐ EBCx
☐ Public Assembly	☐ New	☐ Existing or	☐ EBCx
■ Residential (Single and Multi-Family)			

2. Name of building or project: 200 N Dearborn Condominium

City/State: Chicago/IL

3. Project Description: Chiller Replacement

Project Study/Design Period: 03/2016 (Begin date (mm/yyyy)) to 03/2017 (End date (mm/yyyy))

Percent Occupancy at time of submission: 100%

4. Entrant (ASHRAE member with significant role in project):

a. Name: Swiss (Last) Greg (First) (Middle)

Membership Number: 8298163

Chapter: Illinois

Region: VI

b. Address (including country): 1819 S. Michigan Ave, Suite 907

Chicago (City) IL (State) (Zip) USA (Country)

c. Telephone: (O) 847.650.8536 d. Email: gswiss@cyclone.energy

e. Member's Role in Project: Project Lead

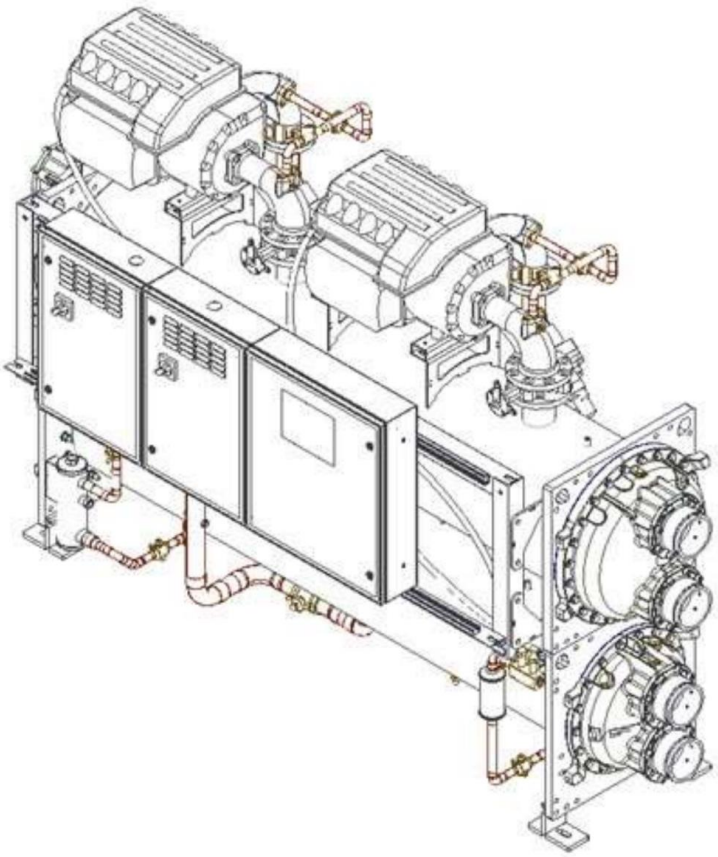
f. Member's Signature: Gregory R Swiss

5. Engineer of Record: Tom Kelleher, AMS

By affixing my signature above, I certify that the information contained in this application is accurate to the best of my knowledge. In addition, I certify that I have discussed this entry with the owner and have received permission from the owner to submit this project to the ASHRAE Technology Awards Competition.

200 N Dearborn Chiller Replacement

2018 ASHRAE TECHNOLOGY AWARDS SUBMISSION



Project Introduction

200 N Dearborn is a 360,000 sf multi-family building built in 1989 as apartments and converted later into condominiums. 200 N Dearborn Condominium Association found themselves in a situation that many existing buildings do, with an aging central plant that was past its useful life.

In 2016 Cyclone Energy Group developed a Design-Build-Commission process for the heating plant replacement. The property management group expressed a future interest and need for a similar project to replace the chilled water plant.

The project timeline was as follows:

> October of 2017, Lieberman the property management group, retained Cyclone for a chiller study to review potential chiller options based on a life cycle cost analysis.
>
> December of 2017, ComEd announced a limited time chiller incentive bonus. Based on the initial chiller study, Cyclone calculated the bonus would increase the potential chiller incentive from ComEd from $40,000 to $120,000.
>
> February 21st of 2018, Condominium Association signed contract for a chiller replacement motivated by the temporary bonus offering by ComEd.

The challenge to the team was to have operational chiller plant by the May 31st deadline to receive the ComEd Bonus. Leaving only fourteen (14) weeks and from equipment order to operation.

Property Management: Lieberman Management Services
Design Build Firm: AMS
Project Lead: Cyclone Energy Group

The scope of the project was to replace two (2) 250 ton Carrier centrifugal chillers and primary chilled water pumps. Existing condenser pumps and cooling towers were upgraded recently and were not included in the scope except for the integration of the existing equipment.

Energy Efficiency

Energy efficiency was a key priority of the project the chiler IPLV was reduced by almost 50% the original chillers had an IPLV of 0.60 kW/ton to 0.3315.

Three chiller options were reviewed during the initial chiller LCCA analysis. Smardt (Centrifugal), York (Centrifugal), and Carrier (Screw) were selected as potential candidates. Due to the potential tight timeline of replacement leadtimes were requested from each manufacturer and the Carrier unit was excluded from further study based on an unacceptably long lead time. Existing chiller logs were reviewed and operator

interviews to develop a building cooling load model. The building cooling load model was then compared against monthly electric usage to check cooling load model estimates.

Annual energy use was the estimated based on the now two (2) chiller alternatives and results showed comparable energy use between the two chiller alternatives with a slight benefit (7% less annual energy costs) to the Smardt unit.

Initial energy use shows a dramatic energy reduction during the first few months of operation. An un-normalized graph of monthly energy use from ComEd's BEA service shows a significant reduction of summer energy use. Further analysis will need to be performed to calculate actual energy use reduction.

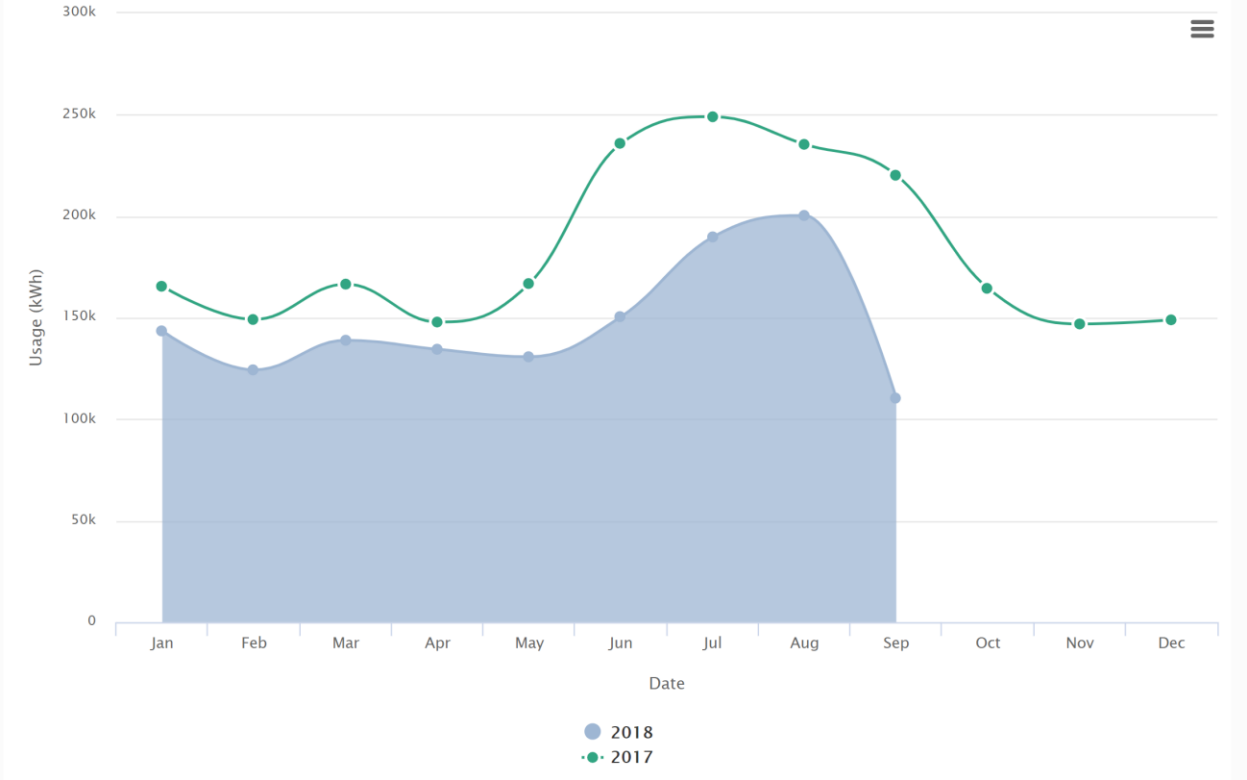


Figure 1: Monthly Energy Use Showing a Un-Normalized Energy Use Reduction from 2017 to 2018 Cooling Season As of September 2018

Indoor Air Quality

Project did not degrade or enhance indoor air quality.

Innovation

Key Aspect: Split Barrel Design

This project had an unbelievable tight deadline for a chiller project. Beyond the energy savings of the Smardt unit over York unit, Smardt offers a split barrel unit that had a maximum component weight below freight elevator capacity. This allowed a chiller replacement option that would not require a helicopter lift which would be expensive and potentially timeline disrupting.

The chillers were shipped to AMS's workshop assembled then dissembled and delivered to the building. The chillers were assembled onsite in less than one (1) shift. The split barrel design allowed greater timing flexibility and removed potential timing roadblocks common with helicopter lifts.

Key Aspect: Future Design Integration

Future system redesigns were incorporated into the piping layout to allow for future integration. Currently the chilled water system is a constant volume primary system with some 2-way valves and 3-way valves. Cyclone Energy Group discussed future system upgrades with the building operators and recommended eventual upgrade to variable primary flow and 3-way to 2-way valve conversions.

During the design phase Cyclone included piping layouts for a bypass to ensure minimum chiller flow rates are met when all 3-way valves have been converted to 2-way valves.

Cyclone ensured piping layout had sufficient straight runs and taps for future flow sensor inclusion to operate the bypass valve.

Additional taps were installed at key locations for future temperature and pressure monitoring as the building operators have an interest in a future building automation system. These taps were extremely inexpensive to install at this time of project making future upgrades as cost effective as possible. For future temperature gauges empty taps were installed. Existing pressure gauges had tees installed for future gauges so as to minimize insulation compromises.

Key Aspect: System Integration

The chiller project was integrated to some existing equipment namely the cooling towers and condenser pumps. Manufacturers were consulted to ensure that minimum flows for the cooling towers were maintained. After consultation the chiller condenser flow was below minimum cooling tower flow rates. Test and balancing was completed to ensure that minimum flows for both devices were met.

Key Aspect: Vibration and Acoustics

Buildign operators expressed early interest in resolving noise complaints from owners directly below the mechanical room. Two main issues were identified that were leading to excessive noise. Existing pump isolation pads were found to have deteriorated signicantly and were replaced. Pipe hangers were expected to be replaced with spring isolators; however, the new isolation pads and new insulation on the pipes proved to be sufficient after the building operator interviewed the affected occupants.

Operation and Maintenance

The building does not have operators onsite 24/7 and without an automation system the operators requested options to assist with remote monitoring.

The Smardt chillers have remote system access that can be used for monitoring purposes. A remote chiller alarm system was installed to provide email and text notification if chillers went into alarm. These two systems provided the building operators with significantly more troubleshooting capacity and ease of mind.

Due to the building not have an automation system the sequences of operation were written for documentation purposes and an extended investigation into “switch-over” from cooling to heating and vise-versa was completed as the system is two pipe. Interviews with building operators and manufacturers led to a step by step document of manual valve timing and system operation that would allow for a smooth transition from cooling season to heating season.

Cost Effectiveness

The chiller project was a extremely cost effective project. The contract was for $698,000 with a $120,000 chiller incentive from ComEd. The project was completed on time and under budget allowing for several “add-ons” to be completed as well.

A clear definition of project timeline as well as coordination and weekly team meetings allowed for potential roadblocks to be discussed and access to elevators and building storage space ensured project success.

Environmental Impact

400 lbs of R-11 removed and no future concerns over environmentally damaging leaks.

Team Members

Randy Byerley – Project Manager; AMS
Mitch Kesler – Property Manager; Lieberman Properties
Greg Swiss – Building Analyst for Cyclone Energy Group

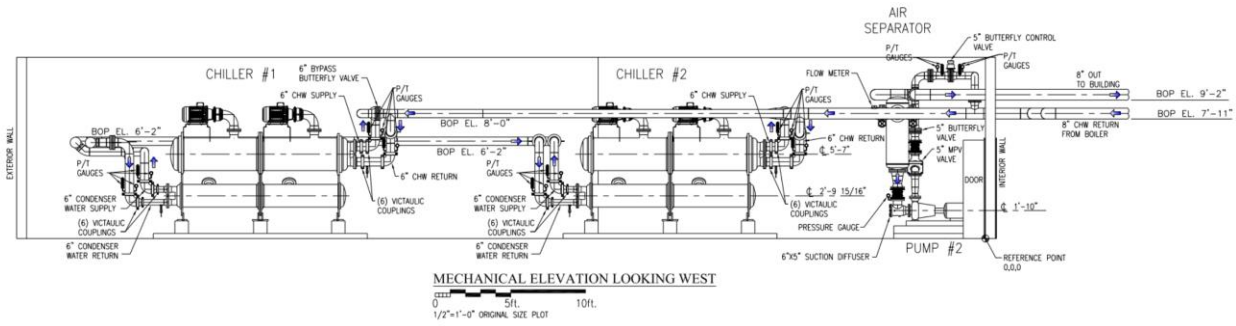


Figure 2: Chiller Retrofit Schematic