Thermal Infrastructure Planning, Rehabilitation and Expansion at University of South Alabama

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UNIVERSITY OVERVIEW

► Located in Mobile, Alabama

► University of South Alabama was established in 1963

► Approximately 15,000 students

► Commuter campus transitioning to residential campus

► Three (3) Chilled Water Plants and One (1) Boiler Plant
AGING INFRASTRUCTURE – AS OF 2011

► Cooling towers constructed in the 1960s
► Chillers 13 to 27 years old
► Hot water distribution piping with insulation problems
► Majority of chilled water piping transite
► Low delta T on campus
PLAN FORWARD

► Attack the Challenge in Steps
► Manageable Pieces
► Demonstrate Success Along the Way
► Generates Increased Support and Confidence
Building Interconnection Study

- Started from the outside and worked in
  - Fix pumping and delta T issues
- Developed hydraulic models for chilled and hot water systems

- Investigation found:
  - 3-way valves not functioning properly
  - Full line size building bypasses
  - Oversized constant speed pumping in buildings
  - Pumping connections installed backwards
Building Interconnection Study

- Recommended:
  - Removing 3-ways valves and bypasses
  - Installing VFDs on building pumps
  - Fix pumping connections

- The University self-performed work
- Saw increased delta T at their plants
  - During the summer, reduced the number of chillers used from 5 to 3
- Saw savings in the range of $500,000 after first year
- Gained support from administration
Cooling Tower and Chilled Water Capacity Expansion Study
- Cooling tower replacements were going to be needed soon
- Replacements would need to allow for easy continued expansion
- Planning for expansion without interruption to existing service
- The study allowed our teams to agree on a path forward
  - Assumed plant build out to 10,000 tons, from 5,500 tons

Plant Controls Study
- Reviewed and updated existing controls sequences in preparation of new equipment/capacity.
New Equipment Installations

- With administrative support the facilities group received funding to replace aging plant equipment.
- The 1960’s towers were replaced, in two phases, with seven packaged towers:
  - 8,750 tons of capacity
  - Towers were also headered and valved so that the new planned chillers could operate independently of existing chillers.
- A new 2,500 ton chiller was installed.
Underground Distribution Piping Replacements

- Due to:
  - Failing underground hot water piping
  - New loads coming online
- Large hot and chilled water distribution project was performed
  - Discussions with the University determined it would be best to oversize new pipes for future capacity needs
    - This would payoff four years down the road (stay tuned)
Utilities Master Plan

- Repairs and fixes to most vulnerable systems were now complete
  - Provided time to step back and think big picture
- Near and long-term campus loads were studied
- Hydraulic models updated
  - Adding new buildings and piping
- Underground distribution piping replacement plan
New Boiler Plant

- To meet increased hot water loads, a new boiler plant was designed and constructed
- The new 700hp boiler provided the University with N+1 redundancy
- Plant was designed to double capacity of initial installation
New Chiller Installation

- To meet increased chilled water loads and maintain N+1 redundancy, a new 2,500 ton chiller and cooling tower are currently being installed.
- This meets the build out discussed in the 2012 study.
UTILITY PLANNING/SOLUTIONS – 2019 AND ON

► New Chiller Installation

• This meets the build out discussed in the 2012 study.
HOT WATER DISTRIBUTION PROJECTS
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To date over 25 thermal utility repair and upgrade projects

Increased chilled water plant efficiencies by:
- Installing 2 x 2,500 ton chillers with VFDs
- 8 x 1,250 cooling tower with VFDs
- Updated controls system/sequencing

Installed 700 hp hot water boiler

Replaced or installed approximately 12,000 TF of new hot water distribution piping

Replaced of installed approximately 5,000 TF of new chilled water distribution piping
Questions?

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