



The University of Massachusetts Amherst North Chiller Plant

Master Planning, System Design and Construction Approaches

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Agenda

- Introduction to UMass Amherst
- Project background
- Expectations of the project and project team
- Campus Master Planning influences
- Mechanical challenges & responses
- Plant challenges & responses
- Contingencies
- Lessons Learned



Introduction to UMass

- Research 1 university (ranked 26th)
- Founded in 1863 as a Public University (Mass Ag)
- About 1,500 acres with over 300 buildings (37 built in the last 10 years) with over 12.7M GSF of building space
- Over 30,500 students (grad and undergrad); about 3,000 staff and faculty
- Dubois Library Tallest academic; 2nd tallest in the world
- CHP facility (presented on at IDEA 2018)



Background and Expectations



- Started as analysis of cooling source for new Physical Sciences Building
- Old plant limitations
- Meet current and known future cooling needs
- Ease of O&M, upgrades, valves & redundancy
- Fits in with 2012 Campus Master Plan
- Completed within a single "off-season"
- Little to no downtime to Research 1 buildings served
- Visual learning tool for the engineering community



Two View Corridors & Campus Grid



Two View Corridors & Campus Grid



View Corridors & Campus Master Plan





Parallelogram plan shape responds to forces outside in & inside out







View of angled chillers































Technology on Display



Technology on Display



Technology on Display





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Sustainability & Universal Design



Key Topics

- Plant Layout Development
- Plant Construction
- Equipment Locations & Access
- Free Cooling
- Distribution Piping
- Utilization of BIM



Plant Layout Development





Plant Construction



Equipment Locations & Access

- Diagonal Chillers
- Roof HVAC Equipment
- Hatches ground floor to roof





Free Cooling

- Dedicated 200 ton "winter" cooling tower
- Heat exchanger can operate with all cooling towers





Distribution Piping

Polymer Chiller

Plant

North Chiller Plant



Pipe Materials, Installation, & Restoration





Building Information Modeling

UMassAmherst





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Contingencies



- New Plant in a single off-season for completion was risky, but necessary.
 - Know your buildings... well
- Build-in proper, realistic
 - contingencies
 - Be conservative!





- But still expect the unexpected!
 - Temp 12 kV service to 2 buildings
 - Temp 1,500 T air-cooled chiller plant
 - Active buried storm MH

Lessons Learned

- Extensive testing of controls sequences when combining plants.
 - Differential pressure control points
 - Make up water sources
 - Working pressures
- Project management
 - GC vs. CM
 - Establish milestones to focus work around seasonal efforts
 - Risk (liq damages) vs. reward (early completion incentives)
- How the North Chiller Plant is working today...





The Commonwealth's Flagship Campus



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