
CampusEnergy2021
BRIDGE TO THE FUTURE
Feb. 16-18 | CONNECTING VIRTUALLY
WORKSHOPS | Thermal Distribution: March 2 | Microgrid: March 16

University of Illinois at Chicago Master Plan & Critical Power

Presented by:

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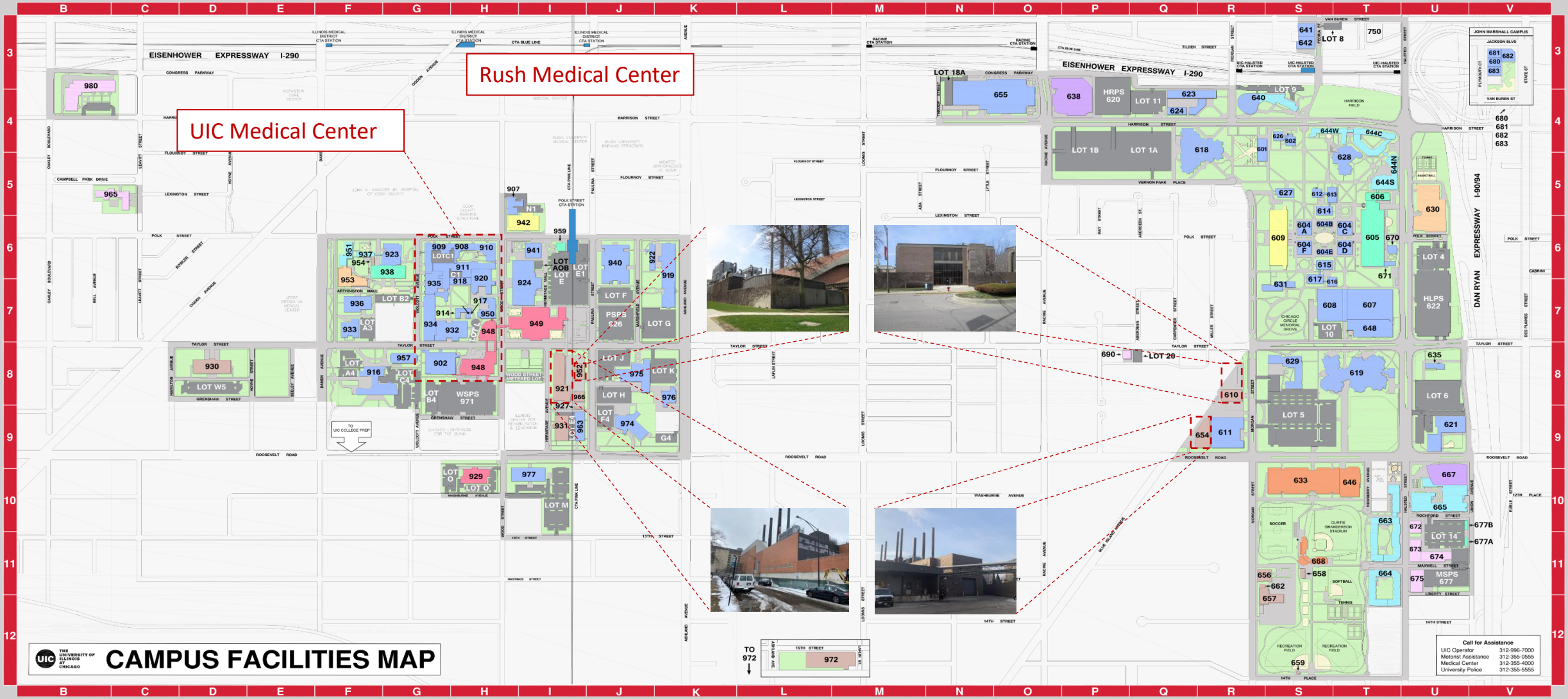
Q&A Will Not Be Answered Live

Please submit questions in the Q&A box.
The presenters will respond to questions off-line.

Campus Overview

- Student population of +33,000
- One-third of undergraduates are first-generation students
- Ranked “Top 20 in Diversity” (*U.S. News & World Report*)
- Ranked #8 “Best Value in Nation” (*Wall Street Journal*)
- 16 top-ranked colleges, including 7 health sciences

University of Illinois at Chicago Campus Overview



East Campus Utility System

- Combined Heat and Power Plant (nominal 20 MW)
  - (2) Dual-fuel engine generators
  - Waste heat recovery in form of HTHW (20 MMBtu/hr)
- High-Temperature Hot Water – HTHW (nominal 200 MMBtu/hr)
  - (3) Dual-fuel HTHW generators
  - HTHW system operated at 400 psig, 350°F
- Chilled Water – CHW (nominal 8,525 tons)
  - (5) Electric-motor-driven centrifugal chillers
  - (1) 6-cell counterflow cooling tower
- Direct-Buried and Utility Tunnel Distribution

West Campus Utility System

- Combined Heat and Power Plant (nominal 40.5 MW)
  - (3) Natural-gas-fired combustion turbines (with heat recovery steam generators)
  - (3) Spark gas engine generators
  - Waste heat recovery in form of steam (270 kpph)
- Medium-Pressure Steam – MPS (nominal 780 kpph)
  - (4) Natural-gas-fired or dual-fuel boilers
  - (3) Heat recovery steam generators with natural gas duct burners
  - Steam distributed at 150 psig, 425°F
- Chilled Water – CHW (nominal 14,400 tons)
  - (7) Electric-motor-driven centrifugal chillers
  - (3) 2-cell crossflow cooling towers
- Emergency Electrical Power (nominal 3.6 MW)
- Direct-Buried and Utility Tunnel Distribution

Utility System Condition Assessment

- 1 – The asset should be replaced as soon as practicable
- 2 – The asset is showing signs of deterioration and maintenance costs are increasing
- 3 – The asset meets performance requirements and is starting to show signs of deterioration; maintenance costs are increasing
- 4 – The asset meets performance requirements and, in some cases, shows signs of deterioration; maintenance costs are increasing or will start to increase
- 5 – The asset is in excellent or near new condition and should be replaced when it reaches the end of its useful life; the asset has no performance issues

East Campus Plants

Equipment	Remaining Life
Spark Gas Engine Generators	25-30 Years (With Overhauls)
Dual-Fuel Engine Generators	10 Years
Heat Recovery HTHW Generators	6-10 Years
HTHW Generators	10-20 Years
Chillers	2 to 6 Years
Cooling Towers (Counterflow/Crossflow)	5-8 Years

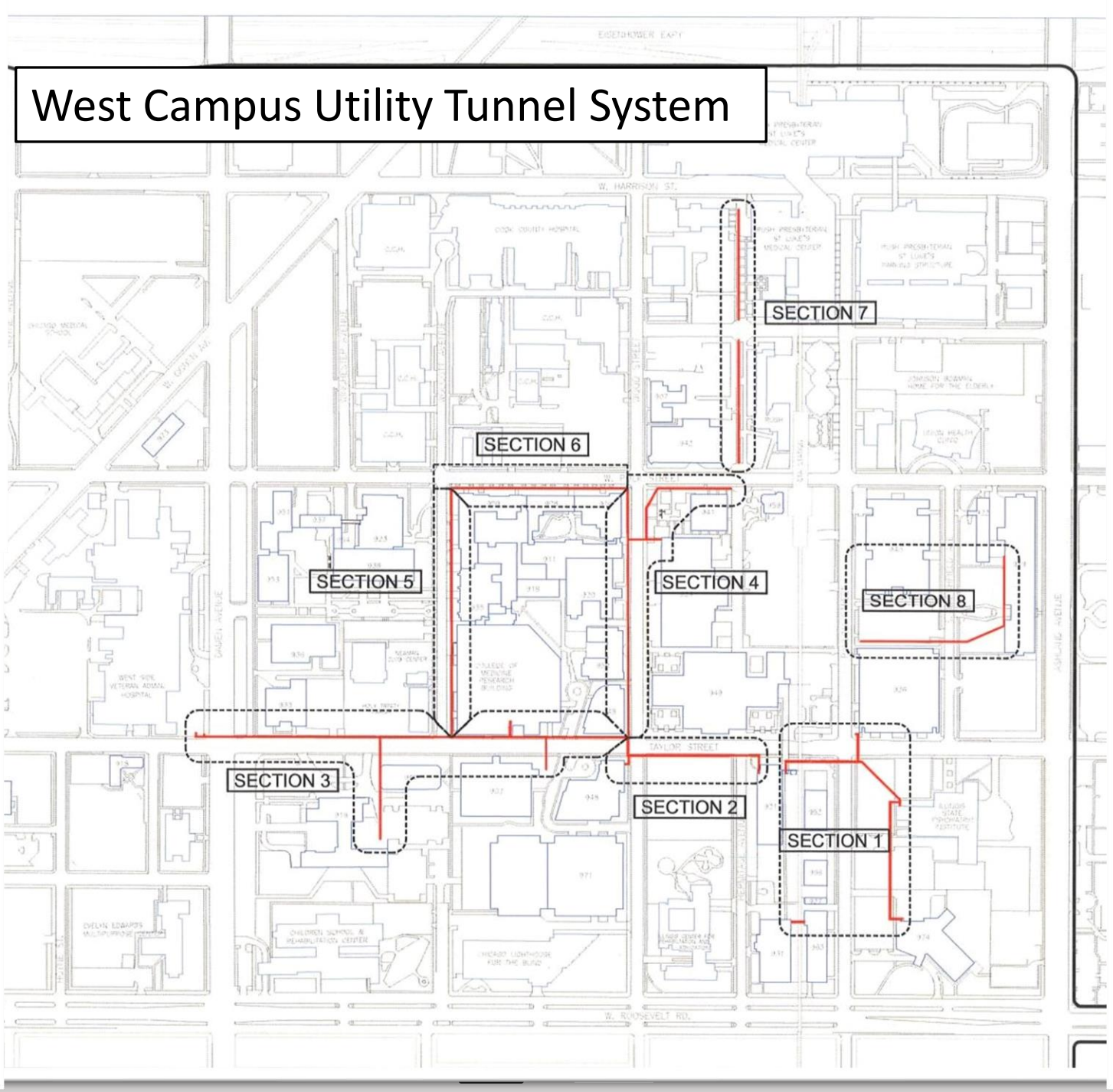
West Campus Plants

Equipment	Remaining Life
Combustion Turbines	6-10 Years
Spark Gas Engine Generators	15 Years
Heat Recovery Steam Generators	10 Years
Boilers 4 & 5	0-1 Year
Boiler 6	5 Years
Boiler 7	25 to 30 Years
Chillers	6 to 10 Years
Cooling Towers (Chiller Plant & Power Plant)	10-15 Years

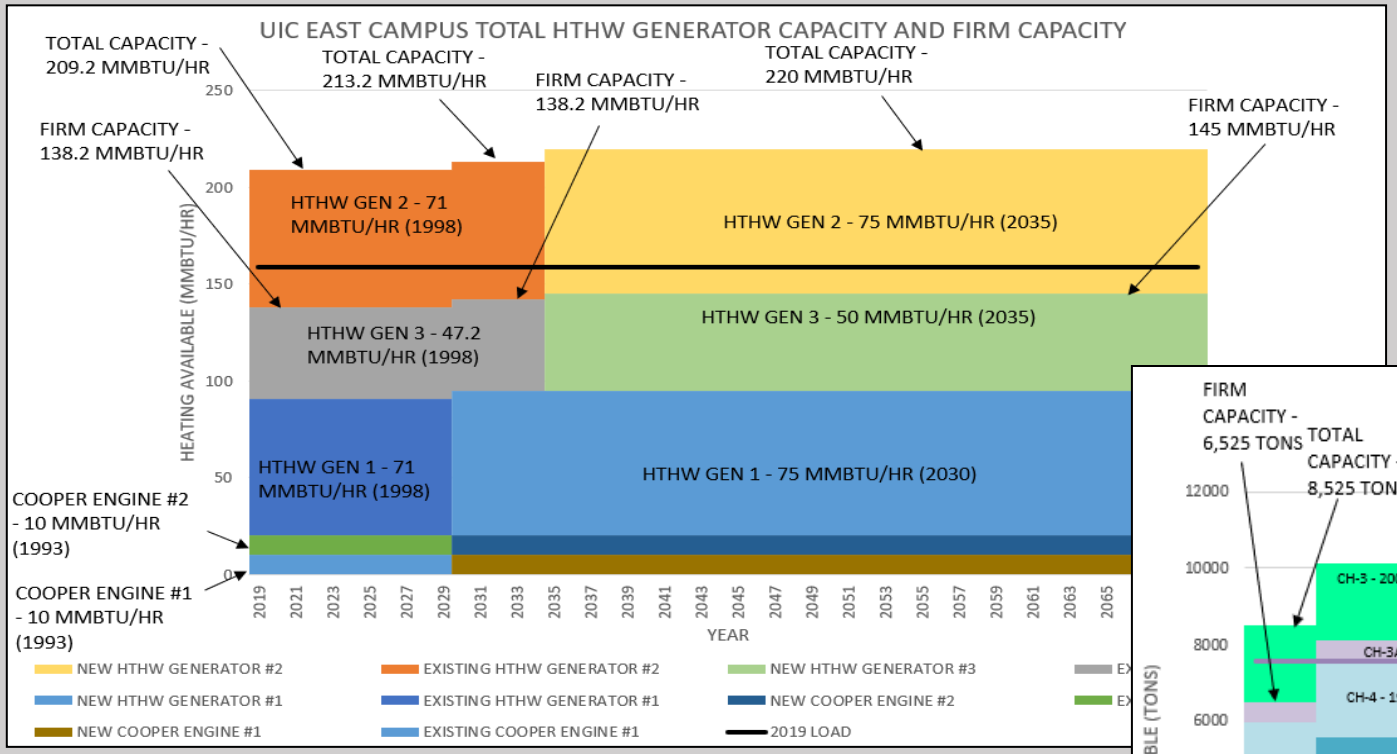
East Campus Distribution

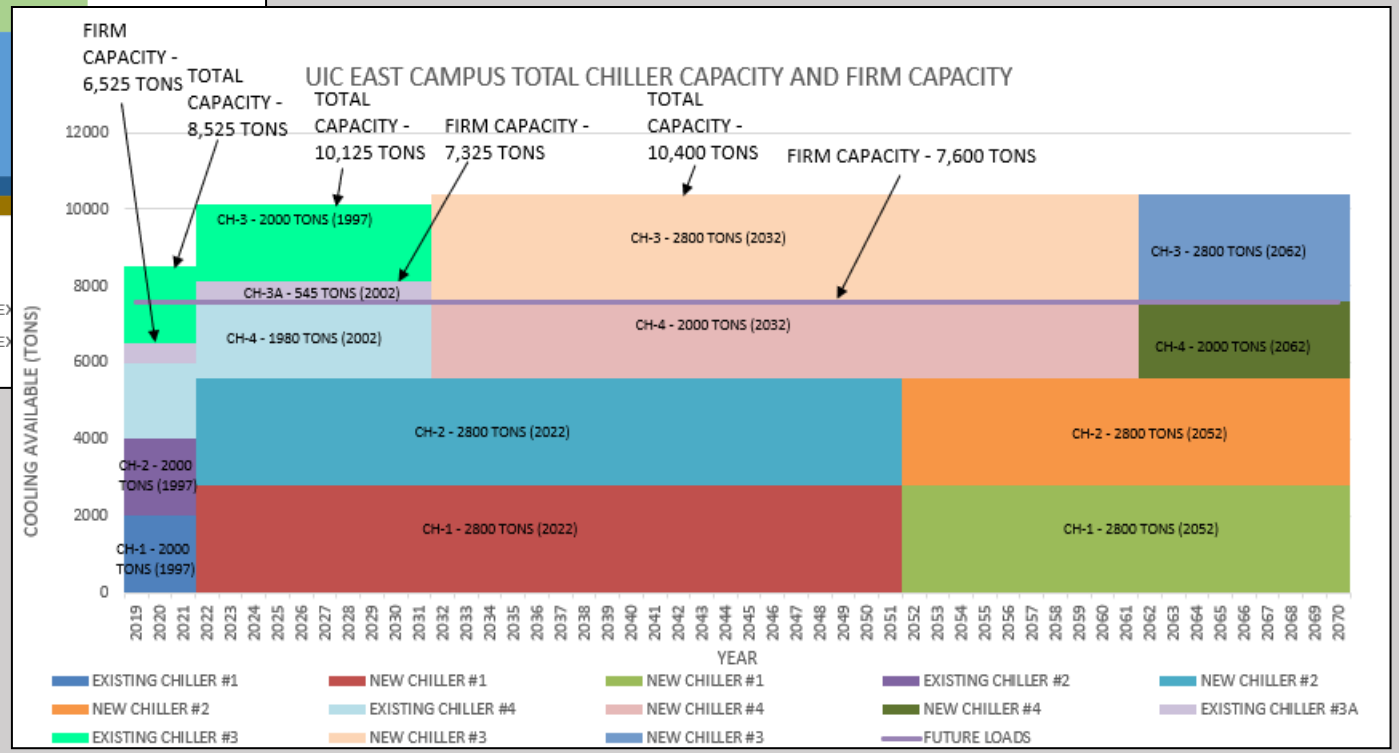
- HTHW distribution is being replaced in phases with pre-engineered piping system (Rovanco)
- Upgrades to East Campus valve vaults underway (Structural, Mechanical, and Electrical)
- Use of triple-offset butterfly valves for HTHW and CHW
- Opportunistic replacement of East Campus chilled water with HDPE piping

West Campus Utility Tunnel System

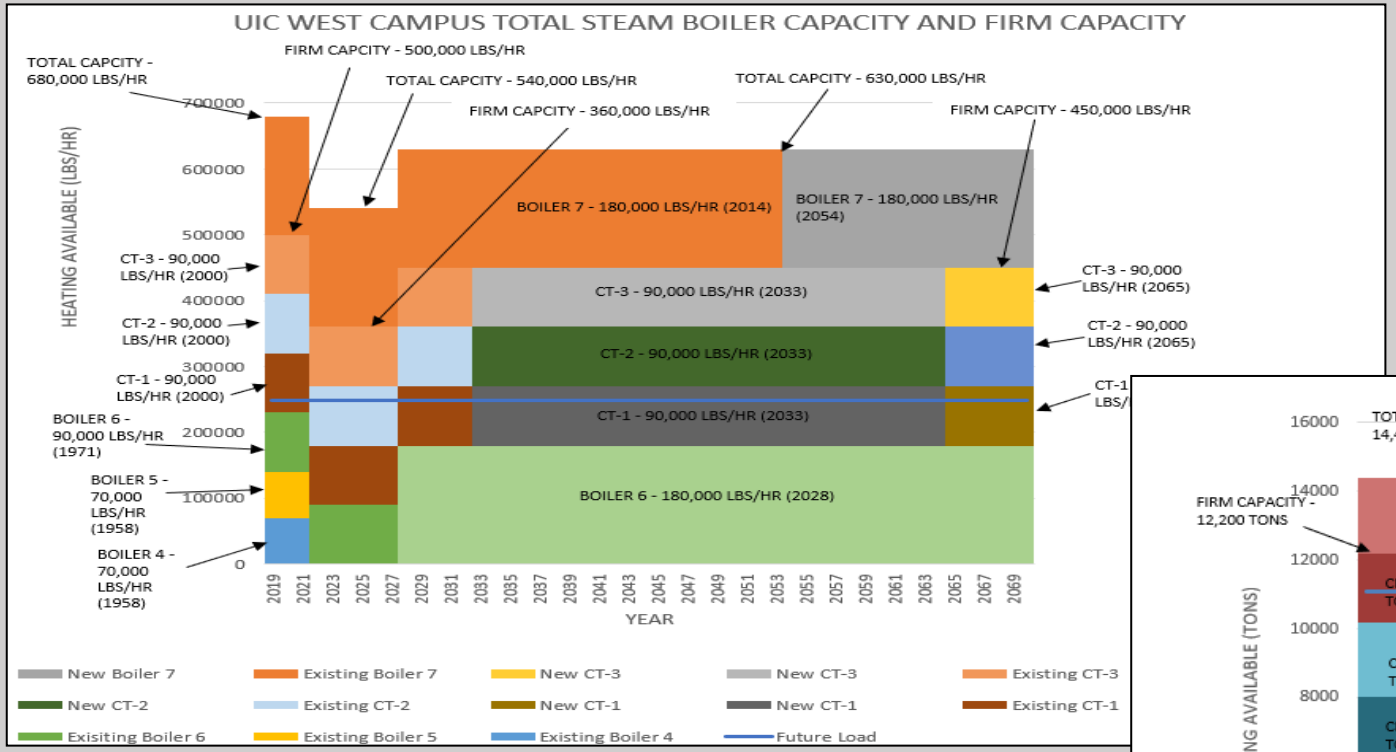


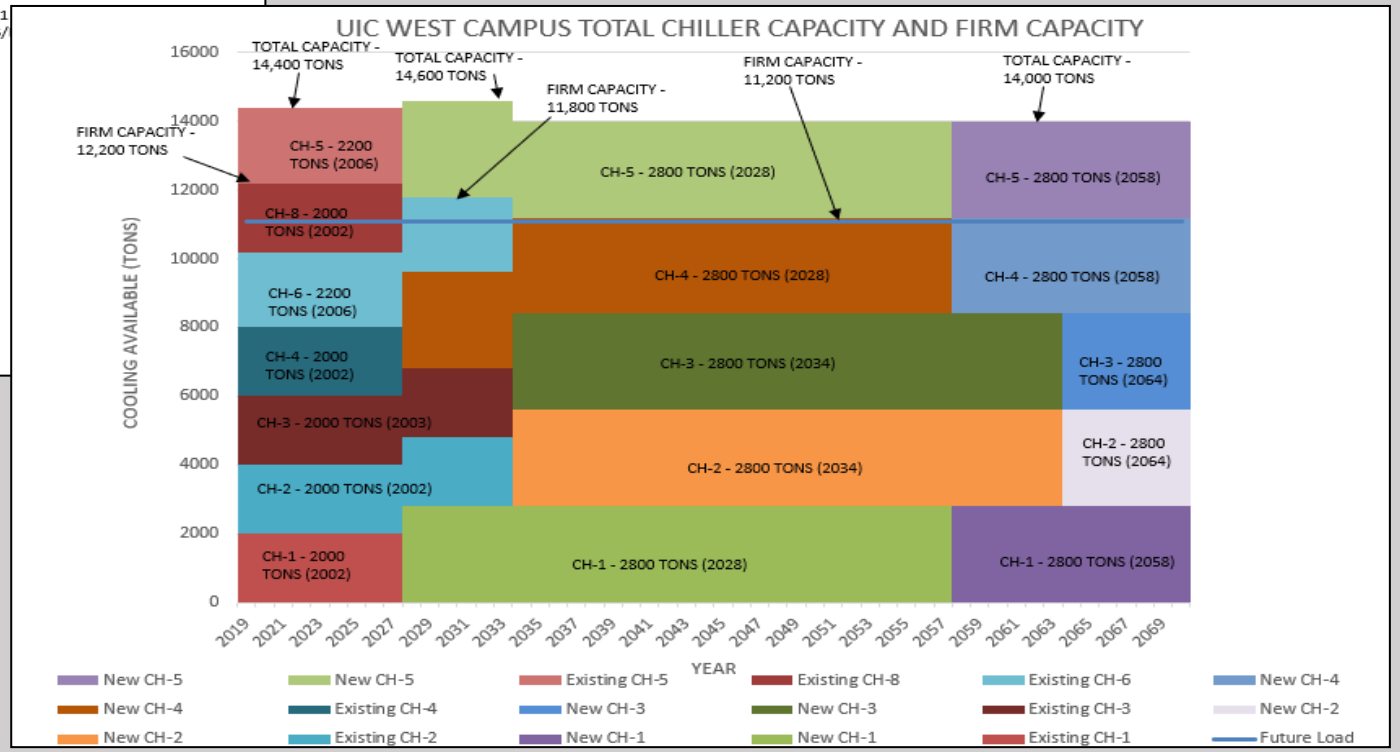
East Campus HTHW & CHW Capacities



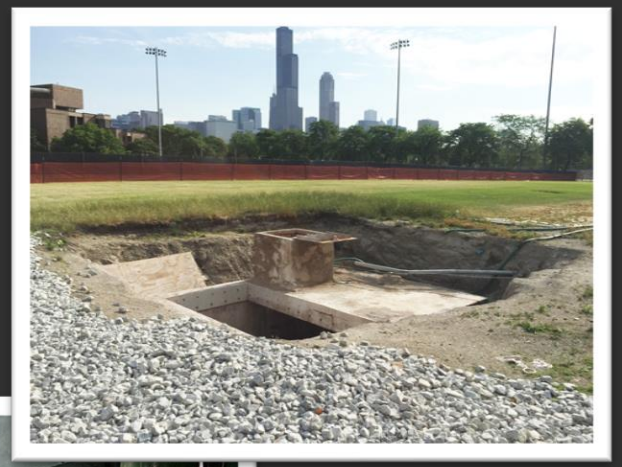


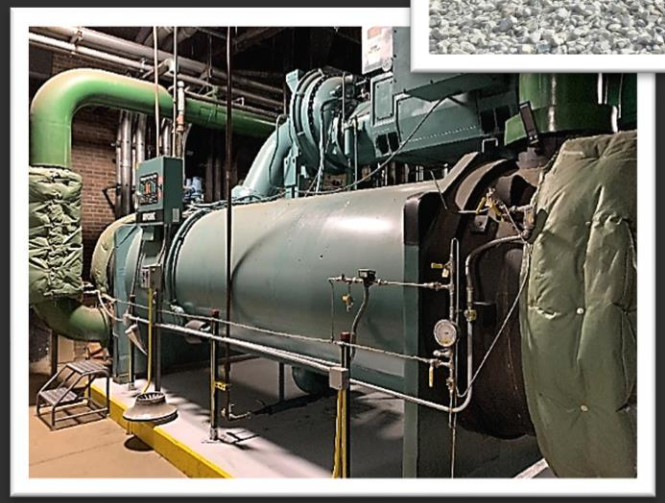
West Campus Steam & CHW Capacities





East Campus Opportunities





- Replace Power Plant North two-cell cooling tower (reliability)
- Replace Chiller 1 and 2 and associated cooling towers (reliability and efficiency)
- Upgrade/replace 480V switchgear (reliability)
- Eliminate single points of failure for compressed air and raw water (reliability)
- Complete replacement of South Campus HTHW distribution (safety, reliability, and efficiency)
- Repair tunnel sections to Buildings 631 and 648 (safety and reliability)
- Build Retro-commissioning Program

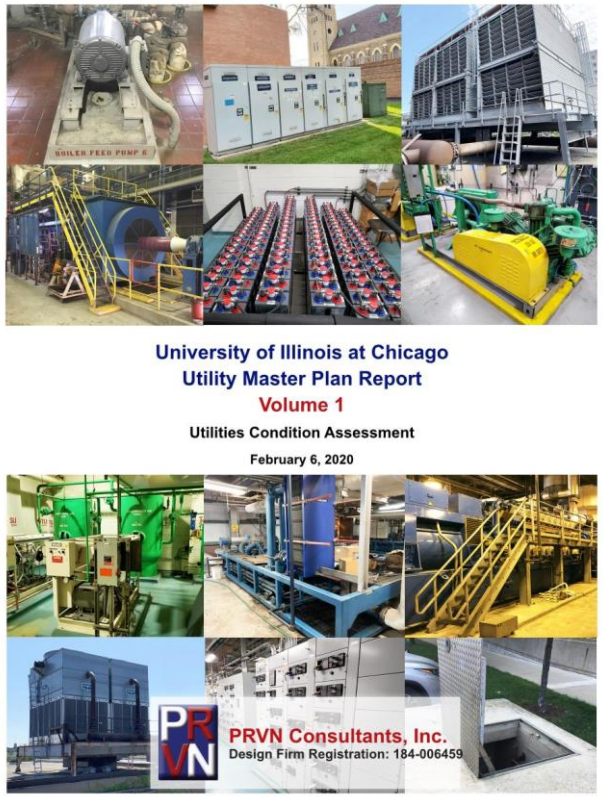
West Campus Opportunities

- Increase boiler makeup water (raw and RO water) storage capacity (reliability)
- Replace 12.47 kV distribution switchgear (reliability)
- Replace natural gas compressors (reliability)
- Increase black start engine generator capacity (safety and reliability)
- Replace Chillers 1, 4, and 5 and associated cooling towers (reliability and efficiency)
- Replace steam tunnel section at Rush Medical Center (safety and reliability)
- Build Retro-commissioning Program
- Replace West Campus critical power supply (safety and reliability)

West Campus Critical Power

- Planning phase for critical power upgrades
- Original equipment is nearing end of life and campus continues to grow
- System redundancy and reliability improvements in electrical distribution
- Difficult location and real estate limitations
- Increase system capacity and resilience

Next Steps



- Capital and O&M expenditure allocation
- Plan for Building Retro-commissioning Program
- Project planning for Condition 1 projects
- Design for Condition 1 projects
- Regular update to Utility Master Plan (5 to 10 Years)

Thank You!

Presented by:

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