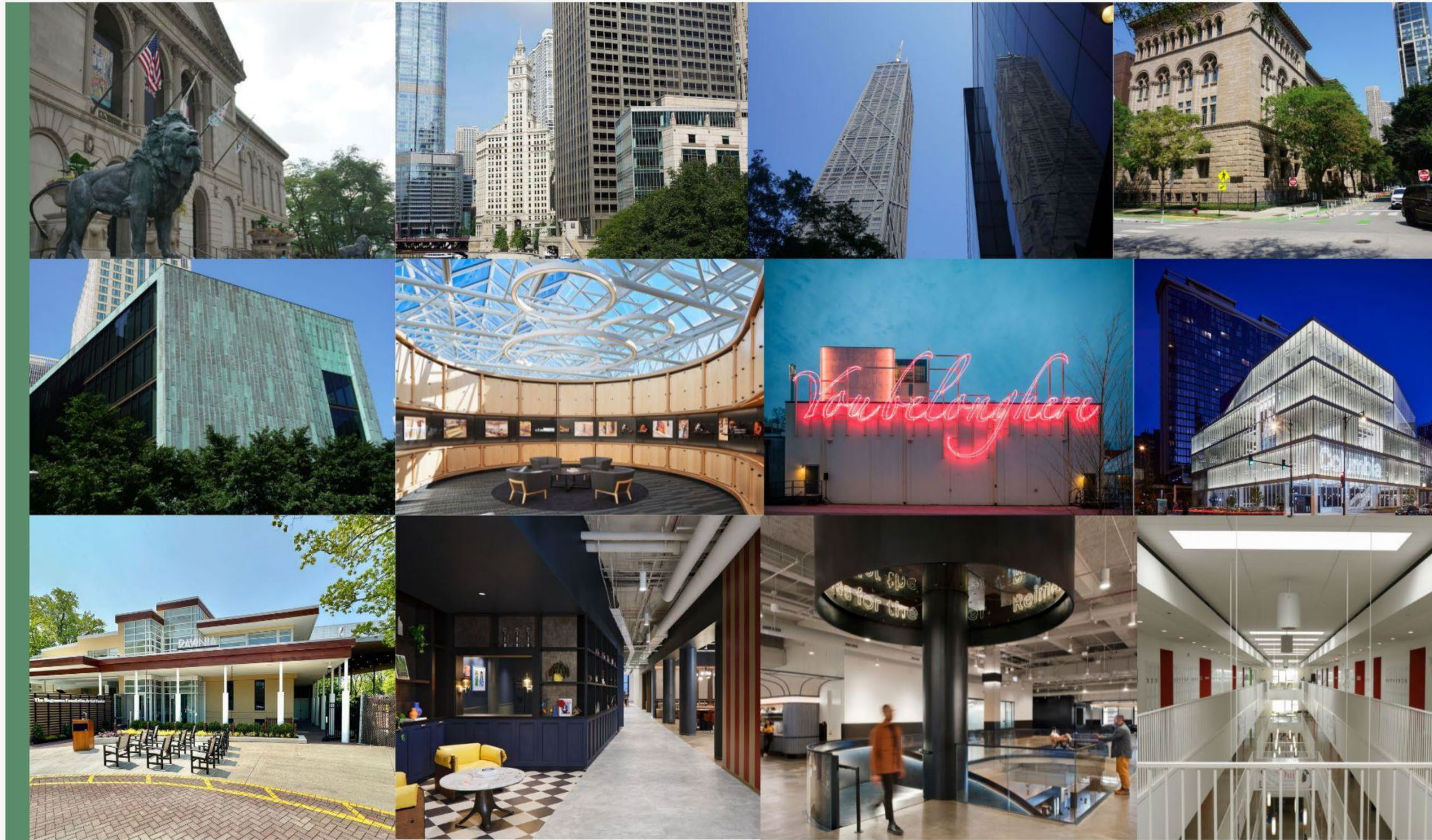


McGuire Engineers

The MEP/FP Challenges and Solutions of the Complex OPO Renovation

Background



McGuire Engineers

- Mechanical, Electrical, Plumbing and Fire Protection Consultants
- 40 Years in business
- Specialize in commercial, institutional, healthcare, data centers and high rise residential
- Buildings
 - Art Institute of Chicago, Willis Tower, Old Post Office

David Brooks, P.E.

- President and owner of McGuire Engineers
- Over 30 years of MEPFP design and consulting

Old Post Office History



Timeline

- 1921 – Original building completed, designed by Graham, Anderson, Probst & White
- 1932 – Major renovation bringing it to its present footprint, about 2.5 million square feet (Sears and Montgomery Ward)
- 1996 – U.S. Postal Service ceased operations
- 2001 – added to the National Register of Historic Places
- 2016 – 601W Companies purchases the building
- 2019 – Old Post Office opens

Fun Facts

- 2.5 million square feet
- LEED Gold certification
- Energy Star rating of 88% (average office building is 69)
- Gensler, Bear Construction, JLL, McGuire Engineers

Challenges and Solutions

Challenges

- Historic Building
 - Ceiling heights in some spaces
 - Openings for outside air
 - Existing structure and architectural elements
 - Above railroad tracks
 - Track fans
 - Access
 - Road runs through the building
- Project timeline
 - Needed cooling, heat and vent to condition 20 years of environmental exposure
 - No infrastructure available

Solutions

- Central DOAS with hydronic heating and cooling saved space, no exterior louvers
- VFD Fan Wall track fans first equipment installed
- District cooling plant and heating plant built on-site to bridge timeline

Example

For 100 Tons of Cooling:

- Ductwork
 - 7 ft. by 7 ft.
- Piping
 - (2) pipes, each 4 inches dia.
- Piping roughly 3,000 x more effective by volume transferring energy

Energy Conservation Measures and Net-Zero

Partial List of Energy Measures

New windows and spray insulation throughout	7%
River water for 1,500 ton chillers 1,500 ton free cooling 2,000 ton tenant cooling	9%
DOAS with energy recovery, demand control ventilation, and VFD fans	10%
Hydronic 4-pipe fan coils for north and east buildings	2%
Condensing Boilers	3.5%
Simple ECM Total	34.5%
Estimated Actual Savings	23-27%

District Cooling Thermal Energy Storage

Estimated Energy Savings	1%
Little if any energy savings, but net-zero advantages:	
• Reduces peak electrical demand • Grid carbon can be lower during charging • Electrical infrastructure reductions	

Getting to Net-Zero

- Electrify existing natural gas hot water plant with water source heat pumps
- Heat recovery chiller
- On-site PV where possible
- Reduce loads through retro Cx
- Procure off-site renewable electricity for the remaining load