CHARLES ROSE ARCHITECTS INC

PROJECTfacts

CHARLES ROSE ARCHITECTS INC: Architect
ARUP: MEP, FP Engineers
RSE ASSOCIATES, INC: Structural Engineer
NITSCH ENGINEERING: Civil Engineer
GROUNDVIEW: Landscape Architect
BET: Building Envelope Consultant

Situated in historic Greenfield's business district and constructed of traditional materials that complement the town's stately brick buildings, the John W. Olver Transit Center represents a significant technological departure from the past: With its dramatically limited emissions, it anticipates the future and President Obama's executive order requiring that all new federal buildings achieve net-zero by 2030. Embedded in the building's design are numerous strategies for energy conservation and generation. For example, the textured brick cladding the western side is a respectful nod to Greenfield's past, but its main purpose is green: a high-tech strategy in managing the building's exposure to afternoon sun. In parts, the brick dissolves and the façade becomes a kind of screen; these patterns control the amount of heat entering the building's interior in summer and winter.

The transit center pushes far beyond standard industry designations for "sustainable" design and represents a noteworthy achievement in green building practices in Massachusetts and the region. Buildings in the US typically use 39% of our energy, 70 % of electricity and account for 38% of carbon emissions. The transit center is designed to cut those numbers to zero and will produce the energy it uses in a sustainable way: through solar and geothermal sources, and a boiler on site fueled by wood pellets, a local lumber-industry byproduct. Key features:

- 22 geothermal wells buried 405 feet deep
- 98 kilowatt ground-mounted photovoltaic array, 7,300 square feet
- On-site 750 MBH (750,000 Btus per hour) boiler fueled by wood pellets
- Air-conditioning provided by an active "chilled beam" system
- Solar wall preheats fresh air in winter prior to intake
- Second-stage preheating via ground source heat-pump system
- Air-handling unit incorporates variable-speed fans and energy recovery wheel
- Daylight modeling used to determine optimal placement of windows and skylights
- All artificial light controlled by system incorporating occupancy sensors, photocells and dimming control
- LED light fixtures provided for parking lots
- Low-flow water fixtures yielding approximately 35% water savings
- Annual energy consumption estimated at 35 kBtu/square foot

Achieving net-zero, particularly in a large-scale building like the transit center, requires close collaboration between architects and engineers from the earliest design phase, says Charles Rose, design principal of Somerville-based Charles Rose Architects. Energy conservation is a critical topic in the early design phase. The team looks strategies that reduce heating and electric loads. We develop designs that project natural light deep into the building to reduce artificial lighting. We also look closely at materials for cladding and for places to super-insulate.

"Zero-net-energy design has revolutionized the way we work," Rose says. "We are creating buildings that are highly integrated. In other words, the only way to get to net-zero is by integrating mechanical and electrical engineering into the conceptual design phase. It's a fundamentally different way of designing a building. Our mechanical engineers are serious collaborators now. That's very important."