

2018 AGC ACE Awards

Category 5: Best Building Project, Subcontractor, \$2-\$6M

Specialty Contractor: Sturgeon Electric Company, Inc.

Project Name: Auraria Higher Education Center – North Classrooms Renovation and Upgrades

Nestled in the heart of downtown Denver, the Auraria Higher Education Center (AHEC) is Colorado's largest campus and home to three separate collegiate institutions: Metropolitan State University of Denver, Community College of Denver, and University of Colorado-Denver. Peering across the 150-acre campus, you see the past and present beautifully interwoven, as historic buildings from Denver's infancy arise gracefully in concert with modern student facilities. However, two years ago, the North Classroom building - one of the largest and most heavily visited buildings on campus - stood in contrasting discord with its institutional neighborhood. Neither historic nor modern, the once-iconic building had spiraled into disrepair. Major systems were beginning to fail, and AHEC leadership feared the North Classroom's diminished aesthetics had likely turned away many interested students and faculty. Having weathered nearly 30 years of service without a significant upgrade, the makeover needed for the North Classroom was much more than skin-deep.

Renovations comprised five phases of construction, encompassing six stories and 115,405 GSF of overall renovated space. The project included upgrades to aging and malfunctioning mechanical and electrical systems throughout, renovation/reconfiguring of 34 general assignment classrooms on floors 1-3, multiple labs and conference rooms, 53,000 square feet of common area, restrooms and atrium upgrades, and updates to IT, audio/video and ADA systems. In addition, the facility received complete replacement of air handling equipment, a new cooling tower, two new building transformers and a backup support generator.

To add to the project's complexity, the North Classroom is home to 31% of all classroom space, including laboratories and massive auditoriums, so classes could not be easily relocated or re-scheduled. Therefore, renovations had to occur without disturbance to student/faculty activities.

Facing multiple project challenges, Sturgeon Electric's approach incorporated a dynamic shift away from traditional contracting methods, where wasteful byproducts of conventional

construction delivery methods often foster misalignment between project teams. Opting instead for an integrated, forward-thinking, team-oriented approach, Sturgeon Electric's delivery resulted in mutual success for all project partners, while reaping improvements to project efficiency, safety, quality and employee morale.

Solutions of Special Projects:

“The project was challenging on many levels: Overnight shifts. Occupied building. Unforeseen conditions. Challenging building inspectors. Add to that a high sensitivity factor to disrupting the education process and you have an even greater challenge to get the work done without making noise, dust, odors or inconvenience! Sturgeon Electric rose to the occasion at every challenge, always providing answers and constantly exhibiting a great “we can do this” spirit.”

- Kimberly Griffin, Project Manager Facilities Projects, University of Colorado Denver

With restricted access due to daily student/faculty activity, demolition and reconstruction efforts couldn't be performed in traditional linear fashion. Outages and equipment down-time, elements which are often helpful to the process of replacing equipment, were not feasible. These conditions resulted in:

1. A highly irregular schedule. To accommodate daily student/faculty activity, Sturgeon Electric crews adopted irregular or sporadic shifts. Sometimes crews weren't able to work at all. This made schedule keeping difficult, presented hurdles for labor and materials logistics, and affected employee morale.
2. Zero reference documents. With no record drawings or as-builts to refer to, foremen had no frame of reference for distinguishing different systems amidst jumbled, unmarked, nearly 30-year-old conduits and cabling. To make matters worse, conduit systems spanned multiple rooms, so determining existing conduit pathways, systems or circuiting was highly arduous, since adjacent classrooms could not be disturbed.

Solution: Rather than approach the project as a whole, Sturgeon Electric, Inc. (Sturgeon Electric) worked closely with AHEC faculty, Saunders Construction, and all other project partners to

divide schedules and work plans by individual rooms to address the unique features of each environment accordingly.

Team leaders from each trade discipline assembled weekly to develop and continually refine detailed short-interval schedules for individual rooms. This allowed for need-based schedules rather than a traditional 8-hour slot, allowing teams to maximize every 24-hour period. For example, if the mechanical partner needed access during evening hours, Sturgeon Electric's crews would shift schedules to allow other trade partners accessibility when needed.

Sturgeon Electric assigned an investigative team of 2-3 personnel to trace and identify conduit and systems whenever accessible, well ahead of scheduled construction activities.

Results: Detailed schedules for individual rooms provided each discipline an opportunity to designate their own window for activities; this accommodated AHEC's needs and fostered accountability for every project discipline.

Excellence in Project Execution and Management/Team Approach:

The facility's two main transformers had to be replaced, which were located on the roof in an extremely difficult location. They were carefully removed and replaced through a skin-tight hole cut into the ceiling via crane (see Photo-3). This procedure required significant planning and coordination, as tying existing systems into new transformers and the logistics of crane operations were very multifarious.

By working closely with AHEC, Saunders Construction, and the architect, Sturgeon Electric was able to identify opportunities to save the project's overall cost by \$460,373. Cost saving initiatives included:

- Providing an alternate lighting package, which fostered savings of \$245,466
- Eliminating partial ground fault protection from the main switchgear, saving \$6,800
- Substituting an alternate Surge Protection Device (SPD) manufacturer, saving \$22,400
- Replacing conduit with MC cable in concealed areas, saving \$12,408
- Rescheduling medium voltage transformer replacement to winter break, saving \$173,299

In another example of excellence in team approach, a new 250kW generator was added to support Mechanical and EM systems. Due to constrained space, the generator had to be placed 400 feet away and 6 stories down from the electrical room it was serving. Rather than traversing rooftops and exposing crews and materials to the elements (as originally planned), Sturgeon Electric investigative crews discovered alternate means of passage through the existing building. As a result, the re-routing of generator conduits provided a safer, higher quality installation while preserving building integrity and exterior aesthetics.

Construction Innovations/State-of-the-Art Advancement:

AHEC's master plan required five major elements in each of the 34 classrooms to meet LEED-Gold standards, all of which Sturgeon Electric achieved:

1. **Technology Upgrades:** Custom low-voltage lighting fixtures and the audio/video system were connected to intelligent controllers at the teacher's podium and entrance doors, allowing for energy-saving lighting systems and A/V presentation adjustments on-the-fly.
2. **New Furnishings:** Stadium seating within the three large auditoriums now incorporates an integral 120v outlet at each student chair (see Photo-2).
3. **ADA Compliance Issues:** Infrastructure that incorporates ADA features was provided, which previously did not exist.
4. **Lighting Upgrades:** The additions of long-lasting, LED lighting now brightly illuminate the stairwells and hallways, promoting long-term savings and student safety, all controlled by the Building Automation System, which conserves energy while greatly reducing the number of manually operated switches.
5. **Aesthetic Improvements:** Upgrades throughout the North Classroom include the latest in electrical lighting, power and technology packages, ensuring a world-class student experience.

Environmental and Safety:

If there is one notorious killer of electricians, it is the "shared neutral hazard." Electrical codes 30 years ago allowed for multiple circuits to share the same return path, or neutral, which completes an electrical circuit. The danger is that even with proper lock-out/tag-out controls,

you can still be unknowingly exposed to electrical shock due to the neutral being shared with a circuit which is not locked out. The shared neutral hazard was evident far and wide on the North Classroom renovation project, and was difficult to mitigate due to restrictions with ongoing operations. Aside from the deadly shock hazard, disconnecting a neutral can interrupt multiple circuits, leaving students and faculty in the dark, or ruining experiments.

To address this major safety concern, Sturgeon Electric foremen regularly conducted safety briefings focused on how to systematically pacify the shared neutral hazard, and incorporated isolated outages during off-hours to curb classroom interruptions.

Sturgeon Electric's crews worked 37,447 hours on the project, with zero lost-time accidents. This was a significant accomplishment considering the amount of installations that took place:

- 21 Miles of Raceway
- 81 Miles of Wire
- 1,773 Light Fixtures
- 1,387 Devices
- 245 Disconnects
- 196 Screen Display Mounts

Excellence in Client Service and/or Contribution to Community:

An integral part of AHEC's ten-year campus upgrade plan, the rejuvenated North Classroom building has vastly improved the student experience for 42,000 enrollees, while serving as a major upgrade to quality of life for hundreds of faculty.

Today's North Classroom is revitalized; it is a world-class facility where students and faculty can now thrive. Sturgeon Electric is proud to have been part of a dedicated team (*Saunders Construction, Braconier Mechanical, Parker Sheet Metal, Lundquist Associates Inc., Mountain Alarm Fire & Security, LINX, Johnson Controls, and the University of Colorado Denver*) who worked tirelessly, meticulously, and passionately to overcome multiple hurdles as a team, in order to deliver a highly complex project: one worthy of consideration for the Associated General Contractors award for *Best Building Project – Subcontractor: \$2-\$6M*.



Photo-3







