MURPHY
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MECHANICAL CONSTRUCTION MAINTENANCE SERVICE DESIGN
A CENTURY OF SOLUTIONS

2016 AGC Colorado ACE Awards

Category: 07 – Best Building Project – Specialty Contractor (Over $10 Million)
Contractor: Murphy Company
Project Name: Woodward Lincoln Campus ITS

Murphy Company was privileged to build on their longstanding relationship with Woodward, Inc. and M. A. Mortenson Company with the construction of the much anticipated Woodward Lincoln Campus Phase 1 project in Fort Collins, Colorado. This first phase included a 300,000 square feet manufacturing and production building for Woodward's Industrial Turbine Systems (ITS) group, which was followed by the construction of Phase 2, a 60,000 square foot corporate headquarters office building. These projects are the first steps in a plan that will allow Woodward to have capacity for expansion for years to come.

The former 100 acre Link-N-Greens golf course in Fort Collins was chosen as the site for Woodward's latest expansion. This site provides Woodward with additional real estate for future construction as well as allowing them to donate 30 acres of land to the city of Fort Collins for the city's Natural Areas Program. The city was able to use this space to expand the Poudre River bike trail and maintain the natural prosperity of the Poudre River within a busy city.

Woodward, which designs and manufactures energy control systems for the aerospace and energy industries, employs 6,500 workers worldwide, including about 1,200 in Larimer County. The Lincoln Campus site is Woodward's 4th location in Larimer County including facilities in Fort Collins, Windsor, and Loveland. Beyond the estimated 1,800 construction jobs generated over the 2 year plus construction portion of the project, this campus will house between 600 and 700 employees at full capacity making the project an economic stimulus for the entire state's construction sector, as well as for the City of Fort Collins' economic stability.

The project is seen as a catalyst for renovations to both the Mulberry Street thoroughfare as well as the widening & renovation of Lincoln Avenue, which are both major undertakings and improvements for the City of Fort Collins. The Lincoln Campus project was such an earmark for Fort Collins that they deemed the location one of the few "legacy projects" for the city. Needless to say, this project has been, and will continue to be, a driving factor for the development and wellbeing of the local community.

Woodward integrates leading edge technologies to meet the demand for fuel-efficient, low-emission, and high performance energy management. The ITS facility will give Woodward the upgraded capacity and ability to not only manufacture, but also test the various high sensitivity valves and control devices to meet and exceed their customer's needs.

Murphy Company's role on the project began by providing various preconstruction services in a design-assist format, including value engineering cost savings, engineering and design assistance, budgeting and project planning in conjunction with our team partners. The team approach was based on the Target Value Design concept, which essentially drives the design to meet a budget. This approach allowed the team to overcome an initial Basis of Design budget that was 15% higher than Woodward's target budget. One of the major cost factors evaluated early in the design was combining three separate buildings into one building. Other cost saving ideas included assistance in sizing of the house compressed air system, design of dynamic high pressure compressed air "swivel" arms to facilitate multiple sized valve testing scenarios, and assistance in evaluating and re-sizing the chilled water system to ensure initial and life cycle cost savings. Murphy Company worked with Mortenson Construction as well as architect/engineer Ghafari & Associates from an early stage in project development to ensure that added value from Murphy's preconstruction team was able to maximize the construction scope provided within Woodward's target budget.

Murphy's scope on the project included the entirety of the plumbing, HVAC, and mechanical piping along with Woodward's specialty process & compressed air systems. These systems totaled (3) 6,000 MBH high efficiency condensing boilers, (3) 540 ton condensing magnetic bearing chillers, (3) 8,250 MBH rooftop cooling towers, 2,000 square feet of under slab

snowmelt piping, (33) air handling units, and a 330 ACFM house air compressor. These systems included approximately 500,000 pounds of sheet metal and 50,000 linear feet of various style, bore, and diameter piping.

Murphy Company enjoyed success from the onset of the construction phase of the project, but not without challenges. Beginning with the install of underground piping and ductwork, continuing with the above ground installation and all the way through startup and commissioning, Murphy was able to meet these challenges head on and provide effective solutions.

To reach Woodward's standard for the polished concrete floor finish throughout construction, concrete was poured and finished after steel, roofing, and all other core building systems were in place, thereby increasing the difficulty of the mechanical installation. Throughout the first spring season of the project, Fort Collins experienced record rainfall before the building was "dried-in" from the elements. This inclement weather did not hinder Murphy's performance. Through the mud, Murphy was able to drive the install schedule across all trades. Ductwork, compressed air, and all other Murphy mechanical mains were installed before 50% roofing completion. The use of off-site prefabricated piping racks allowed Murphy to install chilled & heating water supply and return lines, with over 100 piping racks used throughout the facility. In a similar fashion, the use of ductwork fabrication and offsite pre-assembly allowed for installation of 20 foot long pre-fabricated sections of ductwork in sizes upwards of 96" wide to be installed in expedited fashion.

Woodward's approval of the installation for process gas and liquid test cell scopes of work while the main portion of the building was still under construction, presented unique challenges for the project team. Mortenson decided to separate the execution of these scopes from that of the main building to ensure there was simultaneous focus placed on both scopes of work. The teams for this added work executed brilliantly and finished well within completion of the base scope.

One of the most interesting and challenging portions of the gas test cell deployment scope included the rigging and final setting of (4) 80 foot long, 161,000 pound high pressure

compressed air tanks. The crane for these tank lifts was a 440 ton crawler crane contracted by Murphy to travel to Fort Collins from northern Canada. There were very few (if any) cranes in the contiguous United States that were up for the task. The preplanning for this work took place over six months and the tank lifts were executed to perfection.

Along with the help of the Mortenson BIM modeling team, the entire project was coordinated, detailed, fabricated, and installed per a cohesive BIM 360 model. This model provided the contractors ample ability to preplan, fabricate, and resolve "clashes" in the field with minimal conflict at the site between trades. Along with the ability to detect potential clashes before installation of material and systems, the BIM model allowed Murphy to utilize state of the art Trimble equipment to drastically cut field layout time, thus expediting the early stages of installation. Beyond the benefits the BIM model provided to the construction team, it also provided Woodward with a valuable asset for service, maintenance and management of their building well into the future.

Apart from the aforementioned successes, the shining star for Murphy Company was undoubtedly their use of prefabrication. Murphy received a Mortenson Star Award in Quality for the extensive use of in-house prefabrication shops and the resulting high quality of the installed product. As previously mentioned, Murphy installed thousands of feet of piping in the skeleton of the building using prefabricated structural steel racks. In addition to the Murphy installed utility and process piping systems, these racks were used to hang pipes from various in-house trades across multiple different systems. In addition, Murphy also pre-fabricated equipment skids with pumps, chillers and boilers and installed these skids before the beginning of the installation of the exterior building skin. This helped Murphy expedite the mechanical room installation and ultimately help in the timely completion of the project.

In closing, the first phase of the Lincoln Campus development is a project that Murphy Company will take pride in for years. The opportunity to be an integral part of the project team with Woodward, Mortenson, and Ghafari was truly special. The relationships developed over the course of the project have resulted in further projects with these partners, and we anticipate will lead to future successful work across the state in the near and foreseeable future.


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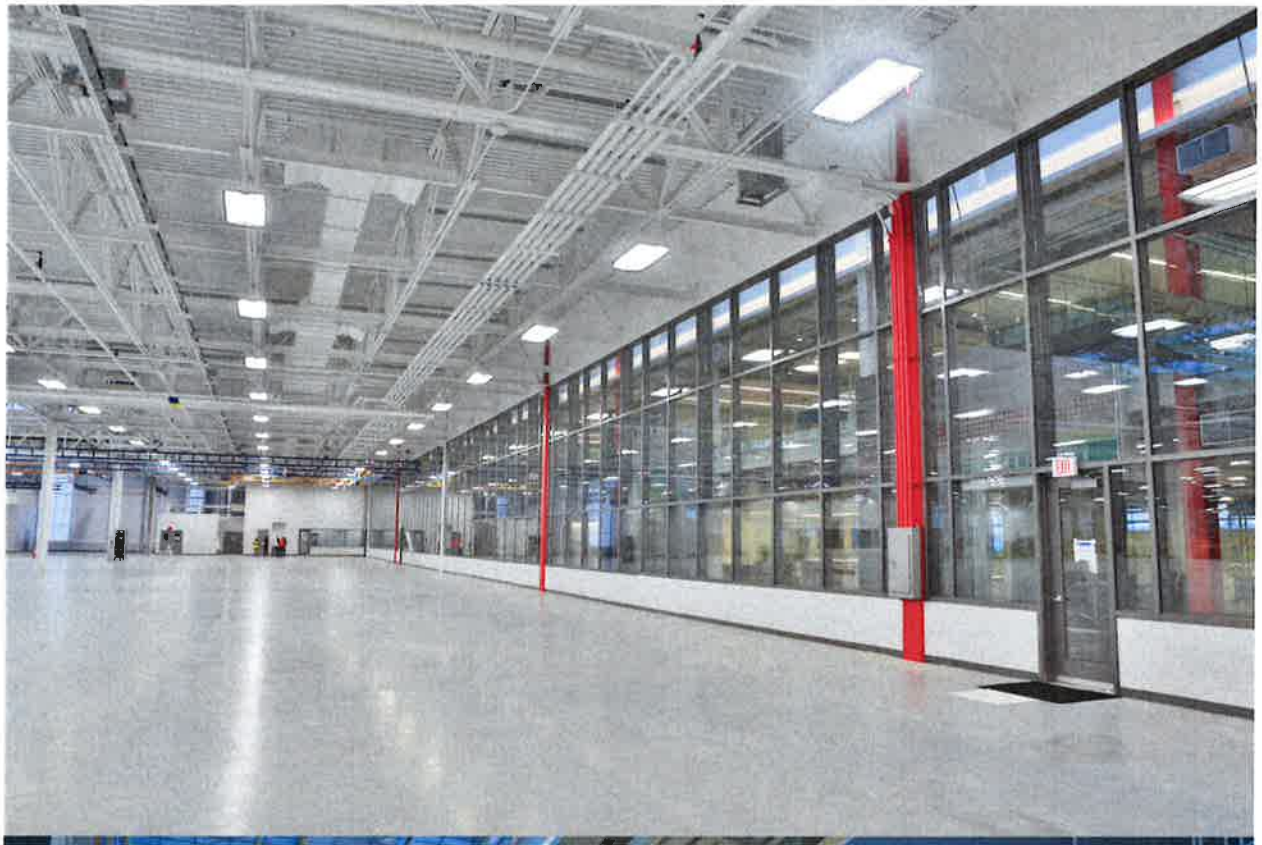


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