ESC engineering

project brief

Larimer County Fairgrounds
relocated in Loveland

Increasing attendance at the Larimer County Fairgrounds, less than an hour north of Denver, Colorado, convinced county officials the facility needed to be relocated as the existing site was landlocked with no room to expand and was in a major flood plain. The vision was to build a larger, more flexible facility to bring more capabilities to the county. County taxpayers approved a sales tax increase to purchase land within the City of Loveland and a bond to construct the new fairgrounds facility to be owned and managed by Larimer County.

SUMMARY:
Fairgrounds Design Engineering

GOALS:

- Meet critical schedule to coincide with county fair opening date
- Provide evaluation and full design for maximum flexibility and expansion
- Control costs within mandated funding constraints

SYSTEM COMPONENTS:

- Looped power network
- Flexible and portable power stations for varying event usage
- Standby power provisions
- Lightning protection system

HIGHLIGHTS:

- Met crucial schedule milestones and delivered on time and under budget
- Successfully implemented power and adjunct system designs meeting local utility requirements
- Delivered highly flexible and expandable system for future uses
- Complied with FAA requirements in regards to nearby airport

APPLICATION:

Phase One of the new state-of-the art fairgrounds and events complex, known as The Ranch, featured roughly 150 acres of site work and six buildings. One of these buildings, the 162,000-sq-ft Budweiser Events Center, is a 7,200 seat multi-purpose venue that is home to the Colorado Eagles of the East Coast Hockey League (ECHL). This spectator facility offers easily changeable surfaces including ice, dirt, concrete, carpet and wood, to accommodate sporting events, rodeos, trade shows, conferences and music concerts. Other buildings included a 36,000-sq-ft Exhibition Hall, a 76,000-sq-ft Indoor Arena, two Outdoor Arena and Livestock Pavilions each with 48,000 square feet, and an 8,100-sq-ft maintenance building. The Ranch hosts over 850,000 guests each year and the Events Center earned a top ten ranking in Venues Today during its first year of operation.

ESC engineering, Inc. (ESC) – with a presence in Larimer County since 1978 and established relationships with key city, county, and fairgrounds staff – was a logical choice to be the electrical engineering firm on the project. Expectations were high that a local firm could provide enhanced project team coordination efforts and expedite both the design and construction processes.

REQUIREMENTS:

- Develop design and provide project management and construction coordination for an accelerated schedule to meet county fair opening date.
- Evaluate requirements, design electrical power and data communication systems, and perform cost studies for site infrastructure and six buildings with flexibility and expansion in mind.
- Coordinate with and provide electrical design for the municipal utility extending distribution power.
- Provide design for specialty lighting, fire alarm, security, telephone and data systems, HVAC, emergency power systems, and building lightning protection as well as coordination with system designers and suppliers for the paging/announcing equipment and the Event Center's video system and scoreboard.
- Create flexible non-building-related power provisions (e.g., carnival midway, vendor spaces, travel bus hookups).

CHALLENGES:

Electric design efforts began in November and Phase One was completed in time for the Larimer County Fair the following August. The aggressive design and construction schedule often meant ESC was designing while construction was occurring, requiring extensive coordination and diligent focus. Pertinent information from other contractors for electrical design was quite often made available after design submittal deadlines had passed.

The bond issue for project funding mandated keeping within a strictly defined budget. The original electrical contractor operated under a Guaranteed Maximum Price (GMP) construction management approach with ESC acting in a design-assist capacity. This contractor was replaced mid-stream, however, with a new electrical firm hired on a hard bid basis. This resulted in a substantial increase in project definition, complexity and scope with a steadily increasingly contract amount.

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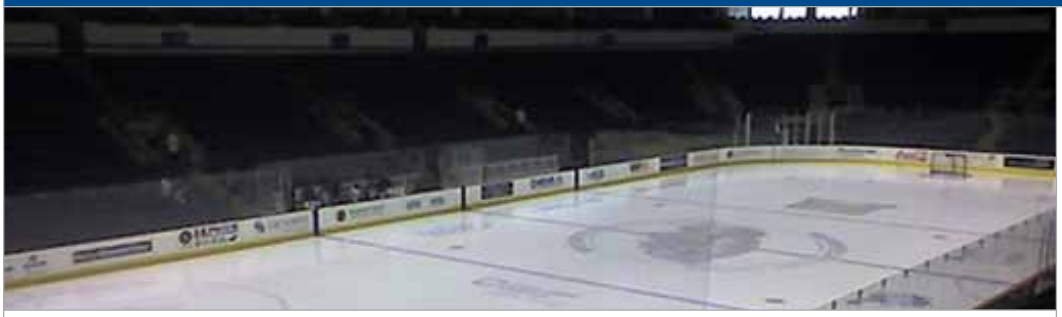

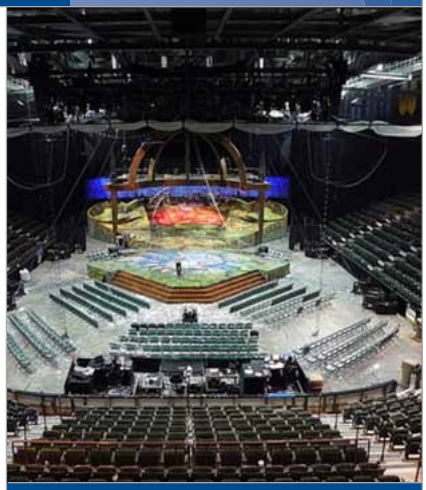

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ESC worked with city and county personnel and local utility companies to establish detailed system parameters and determine costs for primary service, energy usage and demand rates for utility metering of the facility's low voltage distribution system.

The two outdoor livestock pavilions, indoor arenas, exhibition buildings and various non-building sites were designed as multi-use facilities. Electrical design needed to provide effective and flexible ways to distribute power for a variety of functions while minimizing exposed electrical cables and wiring.

Near proximity to a municipal airport required an electrical design evaluation to determine FAA mandated structure heights and low glare solutions for site- and building-related lighting. The Ranch is also situated on the highest point of land within the county's valley floor, so a risk assessment was required to evaluate and recommend lightning protection measures.

SOLUTION:

ESC dedicated full time design services and resources to accommodate this project's fast-track scheduling, even clearing ESC team members of other client commitments to focus exclusively on project demands and deadlines to minimize changes in scope that would adversely affect timelines and costs. ESC also conducted cost studies and provided critical systems analysis and quality control on all power provision and electrical systems aspects. When the initial electrical contractor was replaced, ESC was involved in the hiring process to bring the new contractor up to speed and minimize cost increases.

ESC conducted a feasibility analysis for The Ranch's distribution system. Findings recommended locational points of entry from the complex perimeter with loop feed capability for future expansion. ESC designed a medium voltage distribution structure around the facility's perimeter with branches feeding into each building. Underground electric and data/communication services were developed with conduit routing of inter-building services for the fire and security alarm systems, telephone, cable television, public address, paging, security, and general energy management. Primary building-related service was extended through multiple pad mount transformers. Electrical service design for the Events Center was done in accordance with maximum transformer size restrictions established by the municipal utility and with each transformer feeding a separately bussed section of the main distribution switchboard. Emergency standby power supplies were also designed, with an engine-generator for the Events Center and battery powered standby units for the other buildings.

Flexible site and building power provisions were routed through stationary underground and above-ground conduit systems, as well as six portable systems. Sixteen underground 480V interlock outlets in flush waterproof vaults were designed to provide outdoor event site power and to accommodate the portable rain tight power systems.

The Ranch was the first significant development built in near proximity to the municipal airport so any potential FAA concerns needed to be factored into electrical designs. ESC determined that The Ranch was outside of the glide slope to the main runway. Since The Ranch was within the airport's traffic pattern, outdoor lighting heights were designed well under critical FAA parameters.

A Lightning Risk Assessment took into account structure types and construction methodology, occupancy, relative location, topography and lightning frequency for The Ranch. A Risk Value Index was calculated to be in the Moderate to Severe range and ESC recommended a full UL Master Label system.

RESULTS:

ESC provided accountability in all aspects of project involvement and was the only professional discipline to provide comprehensive design services for the Phase One buildings and site infrastructure (in this case: electrical engineering). ESC team members met all deadlines despite difficult schedule expectations and ongoing changes in project scope. Extensive in-house participation and inter-discipline team meetings and dedicating substantial resources to keep the project on course and within budget parameters resulted in the complex opening on schedule for its first fair.

FOLLOW-UP:

Numerous addendum items after design completion required continued involvement by ESC, including interior and exterior signage, sound and video systems, communications, security, food service, the scoreboard, additional show power, and an exterior staging area at the Events Center.

The Ranch has been a major success and improvement over the previous facilities allowing much greater use by more organizations. The Budweiser Events Center is a focal point of the site with continued sellouts for the Colorado Eagles and many popular national music acts.

ESC engineering

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