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SUSTAINABLE INSTALLATIONS

THE ORIGINAL SCHEDULE FOR CONCRETE PAVING AND PRODUCTION

Rapid Paving and Production

The construction season in the Pacific Northwest is typically less than 10 months, leaving little leeway for delays. In fact, the average low temperatures are below freezing from November through March. Surveyors and construction crews teamed up to reconstruct the new runway with greater speed and efficiency than might otherwise be typical of a runway renovation of similar size and scope.

Throughout construction, the paving subcontractor used a stringless guidance system for placing the graded crushed aggregate base course, which provided a platform for subsequent material layers. The stringless guidance system consists typically of a GPS-guided machine control system that tracked elevation and slope as material was placed.

Advantages to this system were numerous. First, the approach allowed for more time on actual production and less time waiting for surveying and grade checking. Operators could finish jobs faster—and with minimal supervision—even in dusty, foggy, or dark conditions. Second, the need for stakes and stringlines, and the time needed for their installation, were alleviated. Personnel and machine costs also were reduced through the improved productivity.

The original schedule for concrete paving assumed production rates for single-lane paving to be on average 1,800 yd² per day, with additional time needed for concrete curing and dowel bar installation between each lane.

The contractor proposed paving two lanes wide, a width of 37.5 ft, eliminating the additional curing and installation time between each pour. Furthermore, production rates ended up averaging 2,500 yd² per day. This alone proved a tremendous improvement in saving time.

Energy Management

The Runway 05-23 project also included the installation of a new runway centerline and edge lighting system, runway distance markers, airfield signage, precision approach path lighting systems, approach lighting systems, electrical duct system and associated drainage, and revisions to the airfield lighting vault. The glide slope antennas, shelters and associated equipment also were relocated due to a change in threshold crossing height.

Through previous design considerations with Air Mobility Command, Atkins designed the airfield lighting systems to incorporate the use of LED lights and signage. Despite their higher upfront cost, the long-term benefits far outweigh this expense. LED lights have a longer life expectancy, consume less energy, and reduce stress on the airfield lighting cable. Additionally, the lights have an acute on/off contrast and produce a pure color that does not fade over time, which means safer, more reliable conditions. LED technology was used for the runway centerline lights, touchdown zone lights, runway guard lights, taxiway edge lights, and runway and taxiway signage.

The renovation of Runway 05-23 was completed on time in November 2011. Soon after, more than 1,300 airmen and civilians who were temporarily deployed to Grant County International Airport and Spokane International Airport returned to Fairchild AFB. With the construction completed, the 92nd Air Refueling Wing and 141st Washington ANG Air Refueling Wing can continue their support to the global mission.

Designing a Healing Environment

The Warrior-in-Transition Complex at Fort Carson meets LEED certification, but more importantly, its design delivers a healing environment for soldiers and their families.

BY THOMAS J. KAPELS, AIA, ASLA, LEED GREEN ASSOCIATE, M.SAME

The Warrior-in-Transition Complex at Fort Carson, Colo., is more than just a campus that meets sustainable facility military mandates as one of three U.S. Army installations moving toward Net-Zero energy standards. It also uses “green” solutions to create a healthy, efficient and safe environment.

Consisting of the Soldier Family Assistance Center, Company Headquarters, Battalion Headquarters, and the Warrior-in-Transition Barracks, the complex is significant from a sustainability and engineering perspective, but more importantly, from a quality of life perspective. The Soldier Family Assistance Center was first built in 2010 and achieved LEED Gold certification. The Barracks were completed in 2011 and are pursuing LEED Gold. The Headquarters Facilities were on track to be completed in April 2012 and each building is registered for an LEED Silver pursuit.

Raising the Sustainability Bar

Each building individually meets LEED certification requirements. But it is the combination of all four submitted together under one site plan that allows the complex as a whole to meet LEED New Construction for Multiple Buildings and Campus standards. These standards allow a set of buildings within a campus setting (such as a college, corporate, military, or multi-use development) to be certified as a set. A project may be built all at once, or in phases. This enables building owners to reduce the environmental impact of construction by approaching “green building” in a broader context.

Ways to reduce environmental impact can be spread across several buildings, or an entire campus or installation. Credits are then available to each facility that benefits from the shared amenities. This allows for economies of scale, and more opportunities to curb the environmental impact. And this method further encourages multiple parties to collaborate to earn LEED certification.

Promoting Well-Being

The 13,500-ft² Soldier Family Assistance Center was designed to rehabilitate wounded soldiers and their families through programs for physical, emotional

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and spiritual wholeness. Being the first of the four buildings on the complex, the Family Assistance Center established the overall design character, using a modern interpretation of a warm and encompassing “Craftsmen Style,” while honoring the existing architectural style of Fort Carson.

The massing of the Family Assistance Center and the design of the pedestrian hardscape creates community spaces for individuals to meet and interact while simplifying way-finding patterns throughout the complex. Design elements such as alternating gable roofs and clerestory windows draw attention to the primary entrance point as day-lighting brightens the inner lobby, children’s area and offices. Brick masonry and cultured stone on the fireplace bring the natural outdoor environment inside.

The interior spaces further expanded this nature theme with a palette of earth hues, which accentuate the calming and healing nature. Strategically placing glass throughout the building takes full advantage of the views.

EFFICIENT SOLUTIONS

Site Design. The first step in achieving sustainability is proper site design. Though site selection was unaffected by the design team, the building, construction orientation and orientation are two factors the team did influence. The design was based on weathering patterns, wind and site topography, and to ensure the magnificent Cheyenne Mountain to the west was in view. The site also maximizes open space, reduces water demand by using natural vegetation, and offers small, secluded social areas.

Ground Source Heat Pump System. All four buildings on the complex are tied into a highly efficient ground source heat pump system for heating and cooling. The wells, commonly referred to as geothermal loops, are a closed-loop system that extends 400-ft to 500-ft into the ground. That depth allows the wells to take advantage of the constant temperatures of the earth. The 252 wells were cast concrete wells, or precast tubes that were either driven or used by the buildings. Each building has its own dedicated well field; but collectively, there are 126 individually dedicated geothermal wells.

In-Transit Barracks is the largest of the four buildings. Among many sustainable features, a solar thermal hot water heating system improves energy efficiency. The evacuated tube solar system—containing a thermal storage tank of 400-gal and 900-ft² of flat panel collectors—provides a heating capacity of 30 percent of the total domestic hot water load. The flat plate collectors are on the south-facing roof of the courtyard to maximize effectiveness. A plate-in-frame heat exchanger within the energy unit separates domestic water from the solar thermal fluid. This system is used in the preheat position to warm as much of the incoming domestic cold water as possible prior to entering the main domestic hot water storage tank. The energy absorbed by the solar system supplements the building heating load during peak winter conditions.

Daylighting. The Company and Battalion Headquarters buildings take advantage of daylight from the roof down to the occupied portions of the building where there are no windows. The light is distributed through diffusers that are located within the ceiling. In addition, each tubular skylight is equipped with an electronic dimming device that allows occupants to adjust the amount of daylight entering the space. The challenge was in living safely within the polycarbonate domes on the roof, while complying with the blast load requirements of Anti-Terrorism/Fortification Protection (AT/FP) requirements.

Construction Efficiency. One of the speed bumps in staying “efficient” was felt in the design and construction process. The team had to apply creative solutions to meet a tight schedule for the Administrative Buildings, starting with insulated precast concrete walls and roof slabs. The American Contractors for the Workforce (AWC)—is equipped with on-site renewable energy derived from solar hot-water panels, and a geothermal heating and cooling system.

A recently constructed barracks project at Hadnot Point on Camp Lejeune, N.C., features renewable energy features in the form of solar hot-water panels, and a geothermal heating and cooling system.

At North Carolina’s Camp Lejeune, a massive design-build effort covering multiple base sites aspires to answer every definition of sustainability.

One Goal: Sustainability at Multiple Sites

At North Carolina’s Camp Lejeune, a massive design-build effort covering multiple base sites aspires to answer every definition of sustainability.

BY KEVIN C. SWAIN, M.SAME and LARRY KIBBON JR., M.SAME

A $200 million initiative to build 11 bachelor enlisted quarters (BEQ), along with ancillary facilities, over multiple sites at North Carolina’s 156,000-acre Camp Lejeune required an ambitious approach to achieving passive and active energy. In addition to new residential units and associated utilities, project work called for construction of two telephone exchange buildings and a logistics movement control center. Work also involved razing several structures that had been deemed outdated.

This series of projects at the largest Marine Corps base on the East Coast details an extraordinary range of sustain-ability applications from energy conservation to environmental protection.

SUSTAINABLE INSTALLATIONS

One of the 11 BEQs—built under the direction of a design-build team led by Atlanta-based Archer Western Contractors (AWC)—is equipped with on-site renewable energy derived from solar hot water panels. These solar panels transfer heat to a water storage tank, assisting in heating the buildings domestic water.

At Camp Lejeune’s Hadnot Point site, two multi-story buildings were erected to provide housing to 100 residents, delivering more than 100,000-ft³ of living space. The site employs a geothermal piping system to assist in heating and cooling the new barracks. The network of geothermal wells to support it consists of 198 wells installed to take advantage of the earth’s capacity for retaining and imparting heat and cold.

Choosing to implement a geothermal solution came as a result of a change order initiated by the owner. The move followed a thorough lifecycle costing analysis conducted at the behest of NAVFAC, which wanted to determine what benefit there would be to installing a geothermal asset rather than using the conventional system specified in the contract.

The analysis concluded that a design change to adopt geothermal at the Hadnot Point site would yield a payback, as measured against projected annual util- ity payments, over the course of 25 years—a return on investment consistent with energy calculations associated with the project’s LEED submission.

Tom Kapels, AIA, ASLA, LEED Green Associate, M.SAME; Architect, H.W.kapel Group; 719-634-0205, or tkapels@dlrgroup.com.