

ERDC/CERL SR-11-4

Construction Engineering
Research Laboratory



**US Army Corps
of Engineers®**
Engineer Research and
Development Center

Center for the Advancement of Sustainability Innovations (CASI)

Army LEED-Certified Projects, August 2008 – January 2011

Richard L. Schneider and Justine A. Kane (Editors)

June 2011

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Richard L. Schneider and Justine A. Kane (Editors)

*Construction Engineering Research Laboratory
US Army Engineer Research and Development Center
2902 Newmark Drive
Champaign, IL 61822*



Final report

Approved for public release; distribution is unlimited.

Prepared for US Army Corps of Engineers
Washington, DC 20314-1000

Under MIPROGCERG4051, 27 April 2010, "Sustainable Design Development (Fiscal
Year 2011 LEED Validation Activity)"

Abstract: All Federal agencies are mandated to apply sustainable design principles to the siting, design, and construction of their facilities. Agencies are further required to certify the sustainability of 5% of the buildings constructed each year with an independent, third-party authority. The US Army's certifier is the US Green Building Council (USGBC) using the Leadership in Energy and Environmental Design's (LEED) rating system.

In Fiscal Year 2011, the Office of the Assistant Chief of Staff for Installation Management (OACSIM) requested that the US Army Engineer Research and Development Center—Construction Engineering Research Laboratory (ERDC-CERL) prepare profiles of all USGBC certified Army projects adhering to USGBC presentation format. The profiles highlight project ratings for the Army's highest-priority LEED credits—Energy Optimization (EA Cr1), Water Use Reduction (WE Cr3), and Construction Waster Management (MR Cr2); cite the total points and score by LEED major credit area; provide a narrative summary of the project; list the participants; and provide general cost and scope data.

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Preface

This work was performed for the Office of the Assistant Chief of Staff, Installation Management (ACSIM) under Military Interdepartmental Purchase Request MIPROGCERG4051, “Sustainable Design Development (Fiscal Year 2011 LEED Validation Activity),” dated 27 April 2010. The technical monitor was Vincent W. Kam, DAIM-ODF.

This report was prepared by the Engineering Processes Branch (CF-N) of the Facilities Division (CF), US Army Engineer Research and Development Center – Construction Engineering Research Laboratory (ERDC-CERL). At the time of publication, Donald K. Hicks was Chief, CEERD-CF-M; L. Michael Golish was Chief, CEERD-CF; and Martin J. Savoie, CEERD-CV-ZT was the Technical Director for Installations. William D. Goran was Director of the Center for the Advancement of Sustainability Innovations (CASI). The Deputy Director of ERDC-CERL was Dr. Kirankumar Topurdurti and the Director was Dr. Ilker Adiguzel.

This project required close coordination with many Army organizations to obtain the necessary project data and facilitate interaction with contractors. The following individuals are gratefully acknowledged for their contributions to this work:

- COL Curtis Arnold, Oklahoma National Guard
- Ms. Emma Chen, US Army Engineer District, Seattle
- Mr. Bob Datson, Colorado Department of Military & Veterans Affairs
- Ms. Paula Dolliver-Marshall, US Army Engineer District, Los Angeles
- Mr. Brent W. Dvorak, US Army Engineer District, Seattle
- Ms. Jeanette Fiess, US Army Engineer Division, NW
- Ms. Susan C. Galentine, US Army Garrison, Fort Carson
- Ms. Tammy R. Luke, US Army Engineer District, Honolulu
- Ms. Judith F. Milton, US Army Engineer District, Savannah
- LTC Max Moss, Oklahoma National Guard
- Mr. Brian A. Nohr, US Army Engineer District, Omaha
- Mr. Jonathan C. Petry, US Army Engineer District, Kansas City
- Mr. Brian G. Pieplow, US Army Engineer District, Norfolk
- Mr. Doug Pohl, US Army Engineer District, Louisville

- COL Deborah Roberts, Colorado National Guard, Construction and Facilities Management Office
- Mr. Gregory J. Scheurich, US Army Engineer District, Fort Worth
- Mr. Luis Seta, US Army Engineer District, Fort Worth
- COL Cliff Silsby, Kansas Army National Guard, Directorate of Facilities and Engineering
- Ms. Eileen L. Williamson, US Army Engineer District, Omaha.

COL Kevin J. Wilson was the Commander and Executive Director of ERDC, and Dr. Jeffery P. Holland was the Director.

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Executive Summary

Elements of Current Army Sustainability Policy

Sustainable design was first incorporated in Army engineering and design guidance in 1998. It is defined as the design, construction, operation, and reuse/removal of the built environment (infrastructure and buildings) in an environmentally and energy-efficient manner.

Initially, the terms *sustainable design* and *green building* were considered to be synonymous, both addressing better-performing, more desirable, and more affordable infrastructure and buildings. Army sustainable design was intended to address concerns about damage to the natural environment; emission of greenhouse gases and ozone-depleting chemicals; overuse of limited material resources; management of water as a limited resource; reductions in construction, demolition, and operational waste; indoor environmental quality; and occupant/worker health, productivity and satisfaction. Those sustainability concepts are still considered to be foundational principles today.

Current policy incorporates the sustainability or high-performance building requirements of four key mandates:

- Public Law 109-58, *The Energy Policy Act of 2005* (EPACT 2005)
- Public Law 110-140, *The Energy Independence and Security Act of 2007* (EISA 2007)
- Executive Order (EO) 13423, “Strengthening Federal Environmental, Energy, and Transportation Management” (24 January 2007)
- Executive Order (EO) 13514, “Federal Leadership in Environmental, Energy, and Economic Performance,” 5 October 2009.

All environmental, economic, and community factors contained in these mandates apply to the full Army facility life cycle as determined relevant to the Army mission and incorporated into implementation policy. New Army buildings, structures, and major renovations are required to achieve sustainability according to three metrics.

First, projects are being planned, programmed, budgeted, designed, and built to conform to the five guiding principles stated in the interdepart-

mental Memorandum of Understanding entitled “Federal Leadership in High Performance and Sustainable Buildings Memorandum” (2006):

- Employ integrated design principles.
- Optimize energy performance.
- Protect and conserve water.
- Enhance indoor environmental quality.
- Reduce environmental impact of materials.

Second, Army projects are being developed to conform to guidance detailed in ASHRAE Standard 189.1, *Standard for the Design of High-Performance, Green Buildings* (American Society of Heating, Refrigerating and Air Conditioning Engineers, January 2010).

Third, projects are required to achieve, at minimum, Silver certification through the US Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) green building rating system.

In 2004, the Office of the Assistant Secretary of the Army for Installations and Environment (OASA IE&E) published the *Army Strategy for the Environment: Secure the Future, Sustain the Mission*. The strategy describes a “triple bottom line” for sustainability: preserve mission, environment and community. Lack of sustainability in facility design, construction, operation, and disposal undermines the Army’s ability to execute its operations and accomplish its mission. The interdependence between mission excellence, energy security, environmental stewardship, and community relations has never before been so apparent.

In the context of the built environment, sustainability includes the following goals:

- Minimize the impact of facilities to the lands and ecosystems on which they are built, considering both site and region.
- Conserve water and return water to natural systems in an uncontaminated condition.
- Conserve energy and minimize the negative impacts to the atmosphere associated with energy production and consumption.
- Conserve natural resources and reduce waste.
- Eliminate occupants exposure to pollutants and health hazards within facilities.

Role of the USGBC

The USGBC is a nonprofit coalition that represents leading international organizations, including product manufacturers, environmental leaders, design professionals, retailers, and building owners. The organization promotes the construction and sustainment of buildings that are environmentally responsible, profitable, and healthy places to live and work. The USGBC mission is to accelerate the adoption of green building practices, technologies, policies, and standards. This committee-based organization works to advance the green building industry with market-based solutions and industry-to-government links. To accomplish these goals the USGBC has formed partnerships and priority programs with Federal departments and agencies, including the Department of Energy (DOE), the Environmental Protection Agency (EPA), the National Institute for Science and Technology (NIST), and the General Services Administration (GSA). The USGBC vision statement is “Green Buildings and Communities for a Healthy and Prosperous Planet.” Council policy includes three priority areas:

1. market transformation (through its LEED rating and building certification program)
2. integration and education of membership (through its website committee, ASTM International green building committee, meetings and conferences)
3. government/industry partnership programs (through its State and Local Green Building Initiatives Committee and Federal Government Committee).

The LEED™ Green Building Rating Tool

A major project of the USGBC is the development of LEED, its suite of nationally recognized green building rating systems addressing the complete lifecycle of buildings. LEED rating tools are currently available for Homes, Neighborhood Development, Commercial Interiors, Core and Shell, New Construction and Major Renovation, Schools, Retail, Healthcare, and Existing Buildings Operations and Maintenance. The Army has adopted LEED for New Construction and Major Renovation. The rating tools establish criteria for scoring designs on how well they have incorporated requirements for Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality. This rating tool also accommodates innovation under Innovation and Design,

and weights sustainability by national region using a system of Regional Credits. Projects are registered with the USGBC, and evaluated and scored by the Green Building Certification Institute (GBCI) as LEED-Certified, Silver, Gold, or Platinum depending on overall building score. Complete information on the USGBC and LEED is available at <http://www.usgbc.org>, and on the GBCI at <http://www.gbci.org>.

Project Profiles

To comply with current Federal law, the Army must achieve LEED certification for 5% of the buildings it constructs annually. The project profiles in this ERDC-CERL Special Report represent the majority of Army buildings that have been certified using LEED since 2008. The reports include projects that were selected for certification by the Office of the Assistant Chief of Staff for Installation Management (OACSIM) and others that were voluntarily certified by the agencies responsible for their design and construction. Not all certified projects are represented here, only those for which complete documentation could be obtained.

The project profiles in the report are adapted from single-page, two-sided handouts originally prepared by the USGBC. Each profile opens with a graphical summary of building information and rating score in terms of the Army's highest-priority LEED credits: Energy Optimization (EA Cr1), Water Use Reduction (WE Cr3), and Construction Waster Management (MR Cr2). The profiles also cite the total points and score by LEED Major Credit Area; provide a narrative overview on the project; list the project participants; and summarizes general cost and scope data. Further information on any of the projects may be obtained from the contacts identified in the profiles.

1 Platinum-Certified Projects

Platinum is the highest level of certification available under LEED. To achieve Platinum certification under LEED-NC v2.1 or 2.2 (New Construction versions 2.1 and 2.2, the rating criteria in effect at the time this facility was certified), a project must achieve a minimum of 52 points out of the possible 69 available. As of 24 January 2011, one Army project has been certified Platinum.



FAIRFAX VILLAGE FORT BELVOIR, VIRGINIA

60.6% reduction in energy costs
(LEED)

43.0% reduction in water use

89.8% of construction waste
diverted from the landfill

LEED Facts

Fairfax Village
Fort Belvoir, Virginia

LEED for New Construction Version 2.2
Certification awarded April 24, 2009

Platinum **55**

Sustainable Sites 10/14

Water Efficiency 4/5

Energy & Atmosphere 15/17

Materials & Resources 9/13

Indoor Environmental Quality 12/15

Innovation & Design 5/5

*Out of a possible 69 points

FAIRFAX VILLAGE NEIGHBORHOOD CENTER

Fort Belvoir Receives LEED Platinum Certification

PROJECT BACKGROUND

The Fairfax Village Neighborhood Center is a 3,770 SF building located in Fairfax Village on Fort Belvoir in Fairfax County, Virginia. Serving the community needs of the residents at Fort Belvoir, this building represents the Army's strong commitment to sustainability and openness to innovation. This project is the result of efforts by the project team to top all other sustainable efforts at Fort Belvoir and showcase the Fairfax Village Neighborhood Center as the "greenest" possible building. The project reached its objective to achieve a LEED-NC 2.2 Platinum Rating.

The building's program includes two property management offices with a reception desk and copy/fax room, a great room for larger social functions, conference room, kitchen, bathrooms, foyer, maintenance shed, patio/courtyard, playground, and surface parking lot.

STRATEGIES AND RESULTS

This success of this project is due to a committed project team and integrated design process that incorporates a number of impressive sustainable design strategies. The site has preserved almost double the development footprint with vegetated open space and hosts an educational butterfly garden as well as rain gardens for stormwater management. The site contains pervious concrete and impervious paving is shaded. The use of native and adapted, non-invasive, drought tolerant vegetation requires no permanent irrigation. Other sustainable features of the site include bike racks and a shower, preferred parking for LEFEVs and car/vanpools, a highly reflective roofing surface, and full cut-off exterior lighting for light pollution mitigation.

The building achieves exemplary performance for Energy Performance (60.6% energy savings by cost) and on-site renewable energy generation (22.65% by cost). A well insulated envelope with high performance glazing, efficient lighting controls, ground source heat pump system with vertical wells, roof-mounted photovoltaic panels and a south facing trellis for shading all contribute to the reduced impact of the building's operation. Enhanced commissioning will help ensure the building is constructed and operated as it is designed, and the use of no CFC, low-ozone-depleting and low-global-warming potential refrigerant maintains the projects commitment to sustainability.

Potable water use reduction also qualifies for exemplary performance at 43.1%. Dual-flush toilets, low-flow urinals, low-flow lavatory faucets with sensors, low-flow showerhead and low-flow aerators for the kitchen assist with the reduction in potable water use for the building.

The building employs a number of environmentally preferable products and techniques including reclaimed brick from a nearby building, reclaimed wood flooring, and playground equipment from a nearby playground. Advanced framing techniques including 24" framing, in-line framing and 2-stud corners help to reduce the use of materials, as does the use of recycled tile and carpet. Half of the wood used is FSC-certified, and rapidly renewable, regional and recycled materials used throughout the project. An impressive 89.8% of the construction and demolition waste was diverted from landfills.

In order to provide a safe and healthy environment for the employees and residents that use the building, indoor air quality and comfort were top priorities. There were zero/low emissions from all construction materials within the waterproofing membrane (drywall, paints, adhesives, carpet), and no-formaldehyde composite wood were used. Negative pressure has been provided in spaces with chemical use (janitor's closet) or that generate pollutants (copier room). Indoor air management was maintained during construction and pre-occupancy and premium filtration rated at MERV-16 was used. Occupants have access to control of the lighting and climate control which was designed to comply with ASHRAE standards for thermal comfort and indoor ventilation. Carbon dioxide monitoring is connected to a demand ventilation system to ensure adequate fresh air intake, and a thermal occupant survey will be taken to assist with any necessary adjustments. Views from at least 90% of the building's regularly occupied spaces will further enhance the indoor experience for all occupants.

The project also serves as an educational example to both the immediate community and the world at large through a green educational program that includes a self-guided tour spotlighting features on the interior and exterior of the building and including signage throughout the site and building, a kiosk showing energy consumption and a website.



Clark Realty Capital, LLC

Architect: Torti Gallas and Partners, Inc.

Civil Engineer: Bowman Consulting

Commissioning Agent: Advanced Building Performance, Inc.

Contractor: CRB Military Housing, LLC

Electrical Engineer: E.K. Fox & Associates, Ltd.

Environmental Advisor: Wetland Studies and Solutions, Inc.

Interior Designer: HOK

Landscape Architect: Parker Rodriguez, Inc.

LEED Consultant: Sustainable Design Consulting, LLC

MEP Engineer: E.K. Fox & Associates, Ltd.

Owner: Clark Realty Capital, LLC

Plumbing Engineer: E.K. Fox & Associates, Ltd.

Structural Engineer: Atlantic Engineering Services

Project Size: 3,770 square feet

Total Project Cost: \$1,500,000

Cost Per Square Foot: \$398

Photographs Courtesy of: Clark Realty Capital, LLC

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Clark Realty Capital, Inc.

703.781.2000

Fort Belvoir, VA

2 Gold-Certified Projects

Gold is the second-highest level of certification available under LEED. To achieve Gold certification under LEED-NC v2.1 or 2.2 (New Construction versions 2.1 and 2.2, the rating criteria in effect at the time these facilities were certified), a project must achieve between 39 and 51 out of the possible 69 available. Gold certification exceeds the level required by Army policy, but 12 projects—more than 25% of the Army projects certified as of 24 January 2011—have achieved Gold LEED certification. This is significant in that these Gold projects, on average, exceed Army targets for energy-cost reduction, water-use reduction, and construction-waste diversion by significant amounts.



**ARMED FORCES RESERVE CENTER
(AFRC) / FMS
NORMAN, OK**

32.2% reduction in energy costs
(LEED)

40.3% reduction in water use

80.6% of construction waste
diverted from the landfill

LEED Facts

Armed Forces Reserve Center
(AFRC) / FMS
Norman, OK

LEED for New Construction Version 2.2
Certification awarded August 16, 2010

Gold 39

Sustainable Sites 6/14

Water Efficiency 3/5

Energy & Atmosphere 9/17

Materials & Resources 6/13

Indoor Environmental Quality 11/15

Innovation & Design 4/5

*Out of a possible 69 points

ARMED FORCES RESERVE CENTER (AFRC) / FMS

AFRC/ FMS Receives LEED Gold Certification

PROJECT BACKGROUND

Following a March 2008 Base Realignment and Closure Act (BRAC) needs assessment, the Oklahoma Military Department (OMD) determined that a new Armed Forces Reserve Center/FMS (AFRC) complex was required. The new AFRC was to provide facilities for units during both drill weekends and full time occupancy, including space for administration and procurement functions, chaplain services, mess services, human resource services, physical training, classroom training, arms vault/storage and museum display. In addition, a new Facility Maintenance shop (FMS) on the campus was planned to serve as a main motor pool and service center for Army Reserve Vehicles and fleet maintenance logistics.

As a State of Oklahoma funded project, the AFRC had to comply with both state and federal regulations including the Energy Policy Act of 2005 which designates minimum energy savings targets required in the facility. In addition, the OMD requested that the AFRC be a LEED certified facility at the Silver level and have signature elements to distinguish the facility as a facility that upholds the looks and feel of a military facility and to extend the traditions of academy and armory combined. The new facility provides economy of scale by sharing common spaces, energy management techniques of new construction and facility management, and more efficient utilization of training space. The new facility also incorporates the latest anti-terrorism and force protection requirements; and internal flexibility to accommodate change over the life of the facility without undue expense of funds or material.

STRATEGIES AND RESULTS

The Armed Forces Reserve Center/FMS (AFRC) presents a unique opportunity to introduce a sustainably designed facility to various units that will utilize the building. The site features large water detention facilities to mitigate storm water runoff not to exceed pre-development quantity and rates. Porous vehicle storage area surfaces were introduced to limit the impervious surface and facilitate ground water recharge. Preferred parking spaces for fuel efficient POV vehicles and car pooling vehicles are placed near building entries, along with bicycle racks to encourage alternative modes of transportation to and from the site. Low water using native landscaping and turf areas, along with drip irrigation of trees and shrubs, achieved approximately 82% water irrigation savings. These features, coupled with further water savings through the use of water efficient plumbing fixtures, prompted the City of Norman to waive several permitting fees in recognition of the facility water reducing conveyance impact on local infrastructure.

The project utilizes a high thermal performance envelope using site cast tilt-up concrete panels, thermally broken low E glazed windows, and a reflective metal panel roof. The facility's high efficiency heating and cooling system are anticipated to reduce energy consumption by 32% over a standard constructed facility. Low water use plumbing fixtures account for a savings of 41% over standard fixtures. Working closely with a building commissioning agent, the building users have been trained to operate and tune the buildings systems for maximum efficiency and operations going forward.

To reduce the impact on landfills, approximately 81% of unused materials were diverted from the waste stream using a comprehensive waste management plan. The project team favored materials containing high recycled contents that were sourced within the immediate region. Enhanced filtration of air systems and an increase in natural ventilation bolstered the project's indoor air quality for building occupants. Finish materials such as paints, coatings, adhesives and flooring that emit low or zero volatile organic compounds were specified as well.

"These projects were 100% Federally funded, but executed under a Military Construction Cooperative Agreement with the State of Oklahoma using State procurement procedures. The Design-Builder was required to achieve LEED Silver Certification as part of the performance specifications; and delivered LEED Gold Certification as a no cost betterment to the Government."

COL Curtis Arnold, Oklahoma National Guard,
Directorate of Installation Management



National Guard Bureau/ Oklahoma National Guard/ Oklahoma Department of Central Services

Architect: LWPB Architecture
Civil Engineer: MacArthur Associated Consultants
Commissioning Agent: Solutions AEC
Contractor: The Korte Company
Electrical Engineer: Electrical Design Associates
Interior Designer: LWPB Architecture
Landscape Architect: Howard and Fairbairn Site Design
LEED Consultant: LWPB Architecture
Lighting Designer: LWPB Architecture
Mechanical Engineer: C.E. Jarrell
Owner: Oklahoma Army National Guard
Plumbing Engineer: C.E. Jarrell
Structural Engineer: KPFF Engineering

Project Size: 216,000 square feet
Total Project Cost: \$43 million
Cost per square foot: \$199

Photography Courtesy of: LWPB Architecture

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

**Directorate of Installation
 Management**
 405.228.5647
 Oklahoma National Guard





**BRIGADE COMBAT TEAM- HEAVY
(BCT-H) BARRACKS, UNACCOMPANIED
ENLISTED PERSONNEL HOUSING (UEPH)
COMPLEX
FORT CARSON, COLORADO**

39.7% reduction in energy costs
(LEED)

40.1% reduction in water use

62.9% of construction waste
diverted from the landfill

LEED Facts

BCT-H Barracks, UEPH Complex
Fort Carson, Colorado

LEED for New Construction Version 2.2
Certification awarded November 19, 2009

Gold 39

Sustainable Sites 7/14

Water Efficiency 3/5

Energy & Atmosphere 11/17

Materials & Resources 4/13

Indoor Environmental Quality 9/15

Innovation & Design 5/5

*Out of a possible 69 points

BCT-H BARRACKS, UEPH COMPLEX

Fort Carson is Committed to Sustainable Development

PROJECT BACKGROUND

The barracks project consists of five identical four-story barracks buildings which are now largely occupied by the 4th Infantry Division's 1st Brigade Combat Team. Each of the 152,000 square foot buildings contain 184 living suites consisting of two bedrooms, a kitchen, and bathroom. In total, the five building complex can provide housing for up to 1,840 soldiers.

The five buildings were procured by the U.S. Army Corps of Engineers, Omaha District, under two separate contracts to design and build the five fast track barracks. The two contracts are referred to as the BCT-H Barracks Complex project (buildings #1-4) and the adjoining UEPH (South) Barracks project (building #5). Together, the projects are commonly referred to as the BCT-H Barracks. Project schedules and budgets necessitated innovative design and construction techniques to meet the objectives of the Army.

This project is unique in regards to the modular construction being employed for each building. Upon completion of building foundations, modular boxes are hoisted into place four stories tall over the entirety of the 368 bedroom bow-tie shaped barracks buildings. The typical modular unit is approximately 14 feet wide by 51 feet long and arrives onsite with the interior finishes nearly completed. Roof systems, mechanical, electrical, plumbing, and fire protection connections are made onsite once the boxes are set. Each building has a "knuckle" area on each end a common lobby in the central area of the building that is built onsite with the use of steel and conventional wood framing. Stairwells and mechanical rooms are framed onto the end of each wing.

The exterior of the building is clad with an adhered veneer thin-brick system. The height and building composition prevented the use of conventional brick masonry, but a brick appearance was desired for aesthetic reasons. As a result, an adhered veneer cladding was selected in which 5/8" thick masonry bricks are adhered to the building wall with the use of a lath and parge coat system similar to that of a stucco system.

STRATEGIES AND RESULTS

The barracks achieved LEED certification for efficient energy, lighting, water and material use as well as incorporating a variety of other sustainable strategies. By using less energy and water, LEED certified buildings save money for families, businesses and taxpayers; reduce greenhouse gas emissions; and contribute to a healthier environment for residents, workers and the larger community.

LEED Certification of the barracks was based on a number of green design and construction features that positively impact the project itself and the broader community. These features include:

- High solar reflectance index rating of roofing materials help reject solar heat
- Landscaping and irrigation systems designed to reduce irrigation water consumption
- Plumbing fixtures selected to reduce water usage
- 21% of the building materials were extracted, harvested, and manufactured within 500 miles of the project site
- 12.5% of the building materials are made of recycled content
- All adhesives, sealants, paints, coatings, and carpeting were selected based upon their low VOC content
- 34% of the fuel consumed on the jobsite by vehicles and equipment was bio-diesel
- Covered bicycle storage for the building occupants to encourage alternative transportation methods

ABOUT FORT CARSON, COLORADO

Fort Carson, Home to the 4th Infantry Division and several large tenant units including the 43rd Area Support Battalion and the 10th Special Forces Group, is located in beautiful Colorado Springs, Colorado. The Installation was established in 1942 through land donated by the City of Colorado Springs to the War Department after the attack on Pearl Harbor. The Mountain Post Garrison Team provides units mission support and services including quality of life programs for the Fort Carson Soldiers, Families and the community to enable forces to execute expeditionary operations and to minimize stress on Soldiers and Families in a time of persistent conflict. The Fort Carson vision is to be the "Best Hometown in the Army - Home of America's Best."

"Given the extraordinary importance of climate protection and the central role of the building industry in that effort, Hensel Phelps demonstrates their leadership through their LEED certification of the barracks."

USACE Corps Representative, Fort Carson Re-Stationing Office



U.S. Army Engineer District, Omaha

Architect: Hayes, Seay, Mattern & Mattern, Inc. (HSMM) /AECOM

Civil Engineer: HSMM/AECOM

Commissioning Agent: TestMarcX Commissioning Solutions

Contractor: Hensel Phelps Construction Co.

Electrical Engineer: HSMM/AECOM

Interior Designer: HSMM/AECOM

Landscape Architect: HSMM/AECOM

LEED Consultant: Architectural Energy Consultants

Lighting Designer: HSMM/AECOM

Mechanical Engineer: HSMM/AECOM

Owner: Fort Carson Directorate of Public Works

Plumbing Engineer: HSMM/AECOM

Structural Engineer: HSMM/AECOM

Project Size: 763,420 square feet

Total Project Cost: \$132,664,610

Cost Per Square Foot: \$174

Photographs Courtesy of: Dressel-Martin Media Works

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

402.995.2417

Omaha District

719.526.1269

Fort Carson





**MEDIUM TACTICAL EQUIPMENT
MAINTENANCE FACILITY (TEMF), BLDG
11980
JOINT BASE LEWIS-MCCHORD (JBLM),
WASHINGTON**

47.1% reduction in energy costs
(LEED)

54.3% reduction in water use

89.3% of construction waste
diverted from the landfill

LEED Facts

Medium TEMF, Bldg 11980
Joint Base Lewis-McChord (JBLM), WA

LEED for New Construction Version 2.2
Certification awarded January 13, 2011

Gold 45

Sustainable Sites 10/14

Water Efficiency 5/5

Energy & Atmosphere 11/17

Materials & Resources 5/13

Indoor Environmental Quality 10/15

Innovation & Design 4/5

*Out of a possible 69 points



MEDIUM TEMF, BLDG 11980

TEMF Receives LEED Gold Certification

PROJECT BACKGROUND

Responding to the President's 2007 transformation initiative to "Grow the Force", Joint Base Lewis McChord (JBLM) began making preparations for an increased active soldier population. Part of this transformation included the post expanding its North Fort installation. This medium sized Tactical Equipment Maintenance Facility (TEMF) is an answer to the deployment support requirements of Growing the Force.

The TEMF combines a motor-pool for large equipment with supporting administrative and training functions. The main building features high bay repair workspace with natural daylighting and a heated floor slab; it was constructed without any interior columns allowing a 10 ton overhead bridge crane to run the length of the 13,000 SF. Adjacent to the repair bays is a vehicle service corridor with a maintenance pit allowing vehicles to be serviced with assembly line efficiency. Specialized Repair benches for small component repair are served with Weapons and ComSec Vaults for high security. Administrative functions are located on the second floor providing both management and training areas. The main building equips seven deployment service containers (SATS, ASLMS and ComVan), is surrounded by a 210,640 SF vehicle hardstand, and includes a separate 6,000 SF Organizational Storage Building.

UNIQUE PROJECT FEATURES

Being located on in the JBLM North Fort expansion made this project distinct when compared to conventional projects. The site, was classified as a Brownfield but among the pollutants mitigated on this site were "UXO", which is short for "Un-Exploded Ordnance" as this site was historically used for bombing practice. Construction was halted and the site evacuated six different times during excavation.

Several sustainable technologies are showcased in this building. The most innovative is a "Solar Air Heating" or "SolarWall" system, which is both a passive cooling and active heating system. It works by capturing the sun's radiant energy into a column of air trapped in a cavity created within a special metal wall panel. During hot periods of the day it creates a chimney effect and passively channels hot air away from the building. This uses no energy and allows the building to remain cooler than a conventional building. When the building needs to be heated, the captured warm air is mechanically pulled into the HVAC system. Because the air is pre-heated, it greatly reduces the energy demand on the boilers feeding the air handlers. Heat recovery plates within the air handlers also reduce the energy demands of the HVAC. This system is used in harmony with a low intensity radiant floor throughout the large open repair and service bays.

Another technology used to reduce energy demand had the added benefits of increasing user comfort. Solar tube skylights with parabolic lenses to track the sun's movement are combined with large areas of translucent panels (KalWall) daylight the repair bays and admin areas. Daylight harvesting systems further reduce the power demands automatically reducing the number of lamps operating according to light providing a consistent level of light. All windows, skylights, and doors meet Anti-Terrorism Force Protection requirements for blast protection.

Going beyond the technologies showcased within the building, it is important to look at the construction of the building. Walls were detailed to eliminate thermal bridging creating the most efficient envelope possible. In addition to R-38 batt insulation in the roof system, rigid blocking was installed to thermally break the metal roof panels from the metal purlins. Exterior cladding is comprised of an insulated sandwich panel of metal and rigid insulation. The foundation has a thickened slab edge, wrapped with rigid insulation to thermally separate the building from the cold adjacent ground. High-performance windows, thermally broken translucent panels, and insulated coiling doors were selected to complete the enhanced envelope.

This project was extremely successful in achieving its sustainability goals because everyone involved was very excited about the LEED process. The Design-Build contracting method of this project allowed the Architect and the Contractor to coordinate all the sustainability goals early in the project and offer a greater performing facility to the Corps of Engineers as betterments to the Firm Fixed Price contract.

"In the past, you would have to spend more money for LEED-certified buildings and it would take 20 years to see a return. In today's market, adding green features doesn't cost as much, and you can see the efficiency of a LEED-certified building almost immediately. I'm very proud of our Bristol team for going beyond the basic requirements to create greater savings for our client and for the taxpayers."

Tracy Willis, Project Manager, Bristol Design Build Services, LLC



U.S. Army Engineer District, Seattle

Architect: Belay Architecture

Civil Engineer: Bristol Environmental and Engineering Services Corporation

Commissioning Agent: Joel Rasmussen, LNS Engineers

Contractor: Bristol Design Build Services

Electrical Engineer: Wood Harbinger

LEED Consultant: Belay Architecture

Mechanical Engineer: FSi Consulting Engineers

Owner: Fort Lewis Directorate of Public Works

Project Size: 34,509 square feet

Total Project Cost: \$13,773,283

Cost per square foot: \$371

Photography Courtesy of: US Army Engineer District, Seattle

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

206.764.3742

Seattle District

253.967.6221

JBLM





4TH ENGINEER (EN) COMPANY OPERATIONS FACILITY (COF) NORTH FORT CARSON, COLORADO

43.6% reduction in energy costs
(LEED)

49.0% reduction in water use

76.9% of construction waste
diverted from the landfill

LEED Facts

EN COF North
Fort Carson, Colorado

LEED for New Construction Version 2.2
Certification awarded December 6, 2010

Gold **42**

Sustainable Sites 8/14

Water Efficiency 3/5

Energy & Atmosphere 11/17

Materials & Resources 7/13

Indoor Environmental Quality 10/15

Innovation & Design 3/5

*Out of a possible 69 points

ENGINEERING COMPANY OPERATIONS FACILITY (COF) NORTH

Fort Carson is Committed to Sustainable Development

PROJECT BACKGROUND

The 4th EN Company Operations Facility (COF) North at Fort Carson is a multi-functional building that provides soldiers space for classroom training, administrative offices, locker rooms, and unit storage. Three to eight companies of a battalion can be consolidated in a COF. The building can be reconfigured internally without changing the footprint of the building if the battalion structure or space demands change. Using a U.S. Army Corps of Engineers template for the layout, the project team focused on creating an energy-efficient envelope with durable materials.

LAND USE & COMMUNITY

The landscape design combined environmental concerns with the Army's desire for a pleasing sidewalk layout, which also met the Army Corp's Anti-Terrorism requirements. Local stone was used in lieu of grass in many areas to save water. Indigenous species were selected for regional hardiness and low maintenance needs. In order to encourage the use of alternative methods of transportation, the North COF parking lot provides minimal parking, as compared to similar building types in the Institute for Transportation Engineers Parking Generation Study. It also includes dedicated parking spaces for fuel-efficient vehicles and carpool vehicles. Additionally, the project provides secure locations for bicycles as well as showers and changing facilities for bike commuters. The building is located within walking distance of several basic services on the base, providing connectivity, and encouraging the soldiers to walk or bike around base.

WATER CONSERVATION AND USE

To reduce water use, the restrooms were outfitted with dual-flush toilets, waterless urinals, showers with 1.5 gpm flow restrictors, and timed faucets with 0.5 gpm aerators. These features reduce the building's potable water use by 46.8%, saving roughly 937,000 gallons per year.

ENERGY

With a goal of LEED Silver certification, the design team incorporated energy-efficient design strategies. To minimize heating and cooling loads, the team separated the building into administration and readiness area zones. The readiness area requires less heating and no cooling. A building automation system and variable-speed drives ensure that all systems are running at optimal efficiency. Advanced commissioning will be implemented. The project team maximized the efficiency of the building MEP systems and daylighting through the use of translucent wall panels. Lighting was selected for both durability and energy efficiency, and daylighting controls that adjust artificial light levels based on the amount of available daylight were installed. Site lighting was designed to use 50% less energy than a comparable building designed in minimal compliance with ASHRAE Standard 90.1-2004. The mechanical system uses fan-powered, variable-air-volume (VAV) series and parallel terminal units with low temp hot-water heating coils and ECM motors, VAV air handlers, and air-cooled condensing units. The condensing natural-gas boiler is rated at 95% efficiency. Domestic water also uses a condensing boiler. Carbon dioxide sensors ensure adequate ventilation. A measurement and verification (M&V) system was designed directly into the energy delivery system through an energy management and control system.

MATERIALS & RESOURCES

Materials selection prioritized recycled content, energy efficiency, indoor air quality, local sources and manufacturers, and FSC rating. Contractors provided the location of extraction, fabrication, and manufacture for all applicable materials used on the project. The Landscaping, Concrete, Masonry, and Gypsum were extracted, fabricated, and manufactured within 500 miles of the construction site. Recycled-content materials used on the project include Asphalt, Concrete, Rebar, Void Form, Masonry, PEMB, Metal Studs, Fence, Wire Mesh, Chain Link, Misc Metals, Solid Surfaces, Snow Guards, Backer Rod, Doors, Floors, Drywall, Ceiling, and Specialties. The building includes collection areas for recycling aluminum, glass, paper, corrugated cardboard, and plastic.

INDOOR ENVIRONMENT –RMH & HPCC

The building's two relay panels can support up to 36 separately controlled lighting zones. Occupancy sensors and manual overrides were installed for each open office area and separate office. Windows allow daylight into the building, and occupants have the option to turn off the overhead lighting and rely on task lighting if they prefer. The project team selected all interior adhesives, sealants, carpets, paints, coatings, and composite wood and agrifiber products for their low emissions of volatile organic compounds (VOCs). To protect construction professionals and prevent contamination of the ventilation systems, the project team created and enforced an indoor-air-quality management plan. Before occupancy, the team performed detailed visual inspections of all air-conveyance systems, and the building was flushed with 14,000 cubic feet of air per square foot of floor area.



U.S. Army Engineer District, Omaha

Architect: RNL Design
Civil Engineer: Martin/Martin, Inc.
Commissioning Agent: MEP Commissioning, Inc.
Contractor: Hensel Phelps Construction Co.
Electrical Engineer: Strugeon Electrical
Interior Designer: RNL Design
Landscape Architect: RNL Design
LEED Consultant: Architectural Energy Corporation
Mechanical Engineer: RAD Engineering
Owner: Fort Carson, Colorado Directorate of Public Works - United States Army
Structural Engineer: Martin/Martin, Inc.

Project Size: 79,000 square feet
Total Project Cost: \$14,675,000
Cost per square foot: \$186

Photography Courtesy of: Danica Larsen Photography, Denver, CO

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

402.995.2417
 Omaha District
 719.526.1269
 Fort Carson





DIVISION HEADQUARTERS BAND TRAINING FACILITY FORT CARSON, COLORADO

51.0% reduction in energy costs (LEED)

51.6% reduction in water use

93.0% of construction waste diverted from the landfill

LEED Facts

Division Headquarters Band Training Facility
Fort Carson, Colorado

LEED for New Construction Version 2.2
Certification awarded January 7, 2010

Gold 41

Sustainable Sites 5/14

Water Efficiency 4/5

Energy & Atmosphere 11/17

Materials & Resources 5/13

Indoor Environmental Quality 12/15

Innovation & Design 4/5

*Out of a possible 69 points

DIVISION HQ BAND TRAINING FACILITY

Fort Carson is Committed to Sustainable Development

FORT CARSON'S SUSTAINABILITY GOAL

Sustainable Development ("Create a community that encourages social, civic and physical activity while protecting the environment."), incorporates stormwater, U.S. Green Building Council Leadership in Energy and Environmental Design (LEED), construction, transportation and master planning into a cohesive goal. The goal emphasizes programming, designing and building LEED-certified buildings with a target of all new buildings and major renovations on Fort Carson achieving LEED certification and all new buildings and renovations achieving LEED Gold by 2017.

PROJECT BACKGROUND

DLR Group designed the Division HQ Band Training Facility at Fort Carson, Colorado. The \$5.5 million sustainable facility includes rehearsal, storage and office space for the 40-member Ivy Division Band who moved to Fort Carson from Fort Hood, Texas in the summer of 2009. Designed for superior acoustical quality, the facility is equipped with sound-proof practice rooms, three rehearsal rooms, instrument storage space, a recording studio and administrative offices.

DLR Group made the soldiers and their mission the top priority when designing their facility. The acoustical properties in the building enhance the band's ability to rehearse and train for their missions, while the sustainable features included in the facility contribute to the morale and well-being of the soldiers.

The 13,000 SF training facility was the first building at Fort Carson to utilize a geothermal heating and cooling system which uses 40, 400-foot deep wells that transfer heat into and out of the building by circulating water below ground where the Earth's temperature is constant. The building materials used for this project contained recycled content and were locally produced to create a green healthy environment for the Band. The cork flooring used throughout the rehearsal spaces was selected for its acoustical properties and is also considered a rapidly-renewable material that contributed to the sustainability of the facility. The facility received LEED Gold Certification by the U.S. Green Building Council.

AWARDS

- Mountain States Construction, Landmark Project of 2009
- Design Build Institute of America, Rocky Mountain Region, 2009 Best Project for Public Service Buildings under \$15,000,000

ABOUT FORT CARSON, COLORADO

Fort Carson, Home to the 4th Infantry Division and several large tenant units including the 43rd Area Support Battalion and the 10th Special Forces Group, is located in beautiful Colorado Springs, Colorado. The Installation was established in 1942 through land donated by the City of Colorado Springs to the War Department after the attack on Pearl Harbor. The Mountain Post Garrison Team provides units mission support and services including quality of life programs for the Fort Carson Soldiers, Families and the community to enable forces to execute expeditionary operations and to minimize stress on Soldiers and Families in a time of persistent conflict. The Fort Carson vision is to be the "Best Hometown in the Army - Home of America's Best."



U.S. Army Engineer District, Omaha

Architect: DLR Group
Civil Engineer: Nolte Engineering
Contractor: Main/Mass a SDVOSB Joint Venture
Electrical Engineer: ME Group
Interior Designer: DLR Group
Landscape Architect: Design Collaborative
LEED Consultant: DLR Group
Mechanical Engineer: ME Group
Owner: Fort Carson, CO – United States Army
Plumbing Engineer: ME Group
Structural Engineer: MGA Structural Engineers

Project Size: 12,600 square feet
Total Project Cost: \$6,343,170
Cost per square foot: \$400

Photography Courtesy of: DLR Group

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

402.995.2417
 Omaha District
 719.526.1269
 Fort Carson





**ARMED FORCES RESERVE CENTER
(AFRC) WEST OKLAHOMA CITY (OKC)
MUSTANG, OKLAHOMA**

37.4% reduction in energy costs
(LEED)

40.3% reduction in water use

77.0% of construction waste
diverted from the landfill

LEED Facts

Armed Forces Reserve Center (AFRC)
West OKC
Mustang, Oklahoma

LEED for New Construction Version 2.2
Certification awarded September 30, 2010

Gold 40

Sustainable Sites 6/14

Water Efficiency 3/5

Energy & Atmosphere 10/17

Materials & Resources 6/13

Indoor Environmental Quality 11/15

Innovation & Design 4/5

*Out of a possible 69 points

ARMED FORCES RESERVE CENTER (AFRC) WEST OKC

AFRC received LEED Gold in Mustang, OK

PROJECT BACKGROUND

Following a facility needs assessment precipitated by the March 2008 Base Realignment and Closure Act (BRAC), the Oklahoma Military Department (OMD) determined that a new Armed Forces Reserve Center/FMS (AFRC) complex was required. The new AFRC was to provide facilities to be used for units during both drill weekends and full time occupancy, including space for administration and procurement functions, chaplain services, mess services, human resource services, physical training, classroom training, arms vault/storage and museum display. In addition, a new Facility Maintenance shop (FMS) on the campus was planned to serve as a main motor pool and service center for Army Reserve Vehicles and fleet maintenance logistics.

As a State of Oklahoma funded project, the AFRC had to comply with both state and federal regulations including the Energy Policy Act of 2005 which designates minimum energy savings targets required in the facility. In addition, the OMD requested that the AFRC be a LEED certified facility at the Silver level and have signature elements to distinguish the facility as a facility that upholds the looks and feel of a military facility and to extend the traditions of academy and armory combined. The new facility provides an economy of scale by sharing common spaces, energy management techniques of new construction and facility management, and more efficient utilization of training space; incorporates the latest anti-terrorism and force protection requirements; and incorporates internal flexibility to accommodate change over the life of the facility without undue expense of funds or material.

STRATEGIES AND RESULTS

The Armed Forces Reserve Center (AFRC) West OKC presents a unique opportunity to introduce a sustainably designed facility to various units that will utilize the building. The site features large water detention facilities to mitigate storm water runoff not to exceed pre-development quantity and rates. Porous surfaces at vehicle storage areas were introduced to limit the impervious surface and facilitate ground water recharge. Preferred parking spaces for fuel efficient POV vehicles and car pooling vehicles are placed near building entries, along with bicycle racks to encourage alternative modes of transportation to and from the site. Application of water efficient strategies using native landscaping and turf areas, along with drip irrigation of trees and shrubs, accomplishes approximately 98% water irrigation savings.

The project utilizes a high thermal performance envelope using site cast tilt-up concrete panels, thermally broken low E glazed windows, and a reflective metal panel roof. The facilities high efficiency heating and cooling system are anticipated to reduce energy consumption by 37% over a standard constructed facility. Water savings by the use of water efficient plumbing fixtures inside the building, resulted in a potable water savings of 40%, making the facility eligible for an exemplary credit for water use reduction. Working closely with a building commissioning agent, the building users have been trained to operate and tune the buildings systems for maximum efficiency and operations going forward.

To reduce the impact on landfills, approximately 77% of unused materials were diverted from the waste stream using a comprehensive waste management plan. The project team favored materials containing high recycled contents that were regionally sourced within the sites immediate region. Careful attention to materials selection helped the facility to achieve a recycled content of 37% qualifying for an exemplary credit for recycled content. Enhanced filtration of air systems and increased natural ventilation bolstered project's indoor air quality for building occupants. Finish materials such as paints, coatings, adhesives and flooring that emit low amounts or zero volatile organic compounds were specified as well.

"These projects were 100% Federally funded, but executed under a Military Construction Cooperative Agreement with the State of Oklahoma using State procurement procedures. The Design-Builder was required to achieve LEED Silver Certification as part of the performance specifications; and delivered LEED Gold Certification as a no cost betterment to the Government."

COL Curtis Arnold, Oklahoma National Guard,
Directorate of Installation Management



National Guard Bureau/ Oklahoma National Guard/ Oklahoma Department of Central Services

Architect: LWPB Architecture
Civil Engineer: MacArthur Associated Consultants
Commissioning Agent: Solutions AEC
Contractor: The Korte Company
Electrical Engineer: Electrical Design Associates
Interior Designer: LWPB Architecture
Landscape Architect: Howard and Fairbairn Site Design
LEED Consultant: LWPB Architecture
Lighting Designer: LWPB Architecture
Mechanical Engineer: Charles E. Jarrell Contracting
Owner: State of Oklahoma Department of Central Services / Oklahoma Military Department
Plumbing Engineer: Charles E. Jarrell Mechanical Contractors
Structural Engineer: KPFF Engineering

Project Size: 179,530 square feet
Total Project Cost: \$45,398,000
Cost Per Square Foot: \$208

Photography Courtesy of: Joint Forces Headquarters - Oklahoma

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

**Directorate of Installation
Management**

405.228.5647
Oklahoma National Guard





**1ST BRIGADE, 4TH INFANTRY DIVISION
TACTICAL EQUIPMENT MAINTENANCE
FACILITIES (TEMF)
FORT CARSON, COLORADO**

31.9% reduction in energy costs
(LEED)

34.1% reduction in water use

89.5% of construction waste
diverted from the landfill

LEED Facts

1st Brigade, 4th Infantry Division TEMF
Fort Carson, Colorado

LEED for New Construction Version 2.2
Certification awarded May 18, 2010

Gold 39

Sustainable Sites 10/14

Water Efficiency 4/5

Energy & Atmosphere 6/17

Materials & Resources 6/13

Indoor Environmental Quality 9/15

Innovation & Design 4/5

*Out of a possible 69 points



TACTICAL EQUIPMENT MAINTENANCE FACILITIES

Fort Carson is Committed to Sustainable Development

PROJECT BACKGROUND

This project consists of six Tactical Equipment Maintenance Facility (TEMF) buildings, designed to maintain and repair military vehicles and tactical equipment. The TEMF buildings are located adjacent to the new Company Operation Facilities (COF) to create an organized 'campus' plan to support deployment and daily unit operations. Total project square footage is approximately 176,500 SF.

TACTICAL EQUIPMENT MAINTENANCE FACILITIES (TEMF)

Each TEMF is composed of a 'Repair Bay' area and the support 'Core' areas. The Repair Bay consists of single story garage areas that are serviced by 10-ton or 35-ton bridge cranes and used for service and repair of Army tactical equipment. The two-story support Core contains administration offices, training, conference and break rooms, consolidated bench, storage rooms and vaults, latrine and locker rooms, mechanical, electrical and telecommunications rooms.

Design and construction strategy closely match the new COF buildings in massing, materials, color and detail. The facilities are constructed of insulated precast concrete panels that provide an economical, durability and versatility of a prototypical civilian office-warehouse building. The simple plan arrangement provides flexibility of use and allows possible internal expansion to better serve the evolving needs of the U. S. Army.

Cost effective strategies were incorporated into the design of the TEMF buildings to improve sustainability and decrease energy consumption. Increased shell insulation, efficient lighting and mechanical systems, day lighting techniques, recycling and waste management requirements are among the numerous features included in the project.

STRATEGIES AND RESULTS

The TEMF's site is a redeveloped brownfield which is located and designed to promote community connectivity to multiple public facilities and residential areas. The connectivity is enhanced through a network of public transportation, pedestrian walkways, bicycle paths, and preferred parking for both fuel-efficient vehicles and carpools. 59% of the previously developed site has been restored with native planting to provide habitat and promote biodiversity. To further minimize impacts on microclimates and human and wildlife habitats, 100% of the roofing area has been design with highly reflective materials.

The site and facility has limited its water consumption through the implementation of native plantings that require no permanent irrigation and low-flow, automatic plumbing fixtures that account for over 45% water usage reduction for each building as compared to a baseline case.

The facility utilizes enhanced exterior wall, roof, and floor construction; efficient windows; mechanical units with efficiency ratings higher than the baseline; and stepped daylighting controls. These strategies in aggregate are anticipated to reduce the facility's energy cost by 31.9%. In addition to the energy savings, both the electrical systems and daylighting of spaces have been designed to create an environment that promotes productivity, provides comfort, and enhances the well-being of the occupants. Lighting controls for individual comfort have been provided at 100% of the workstations and all conference rooms are equipped with a dimmer system to provide multi-level light control. Of the regularly occupied spaces, the buildings ranged from 78-85% of the spaces have been designed to incorporate daylighting and from 91-97% have views to the exterior natural environment.

To support the local economy and to reduce the environmental impacts resulting from transportation; 26% of the materials are products that are extracted and manufactured within the region. The materials selected by the design-build team utilized high recycled content materials such as concrete, structural steel, brick, precast, metals and interior finishes which accounted for over 35% of the total materials cost. Paints, coatings, adhesives, sealants, carpet and VCT flooring systems all feature low volatile organic compounds and chemical emissions. A carefully monitored construction waste management plan resulted in 89% of waste diverted from the landfill. The roller compacted concrete accounted for a large percentage of the waste that was recycled and turned into Class 6 road base.



U.S. Army Engineer District, Omaha

Architect: Leo A Daly
Civil Engineer: U.S. Army Corp of Engineers; PBS&J
Commissioning Agent: E Cube, Inc.
Contractor: M.A. Mortenson Construction
Electrical Engineer: Leo A Daly
Interior Designer: Leo A Daly
Landscape Architect: U.S. Army Corp of Engineers
LEED Consultant: Leo A Daly
Lighting Designer: Leo A Daly
Mechanical Engineer: Leo A Daly
Owner: Fort Carson, Colorado Directorate of Public Works - United States Army
Plumbing Engineer: Leo A Daly
Structural Engineer: Leo A Daly

Project Size: 233,000 square feet
Total Project Cost: \$93,345,000
Cost per square foot: \$263

Photography Courtesy of: Leo A Daly

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

402.995.2417

Omaha District

719.526.1269

Fort Carson





CHILD DEVELOPMENT CENTER, FORT IRWIN, CALIFORNIA

34.4% reduction in energy costs
(LEED)

52.1% reduction in water use

96.5% of construction waste
diverted from the landfill

LEED Facts

Child Development Center
Fort Irwin, California

LEED for New Construction Version 2.2
Certification awarded January 24, 2011

Gold 42

Sustainable Sites 6/14

Water Efficiency 3/5

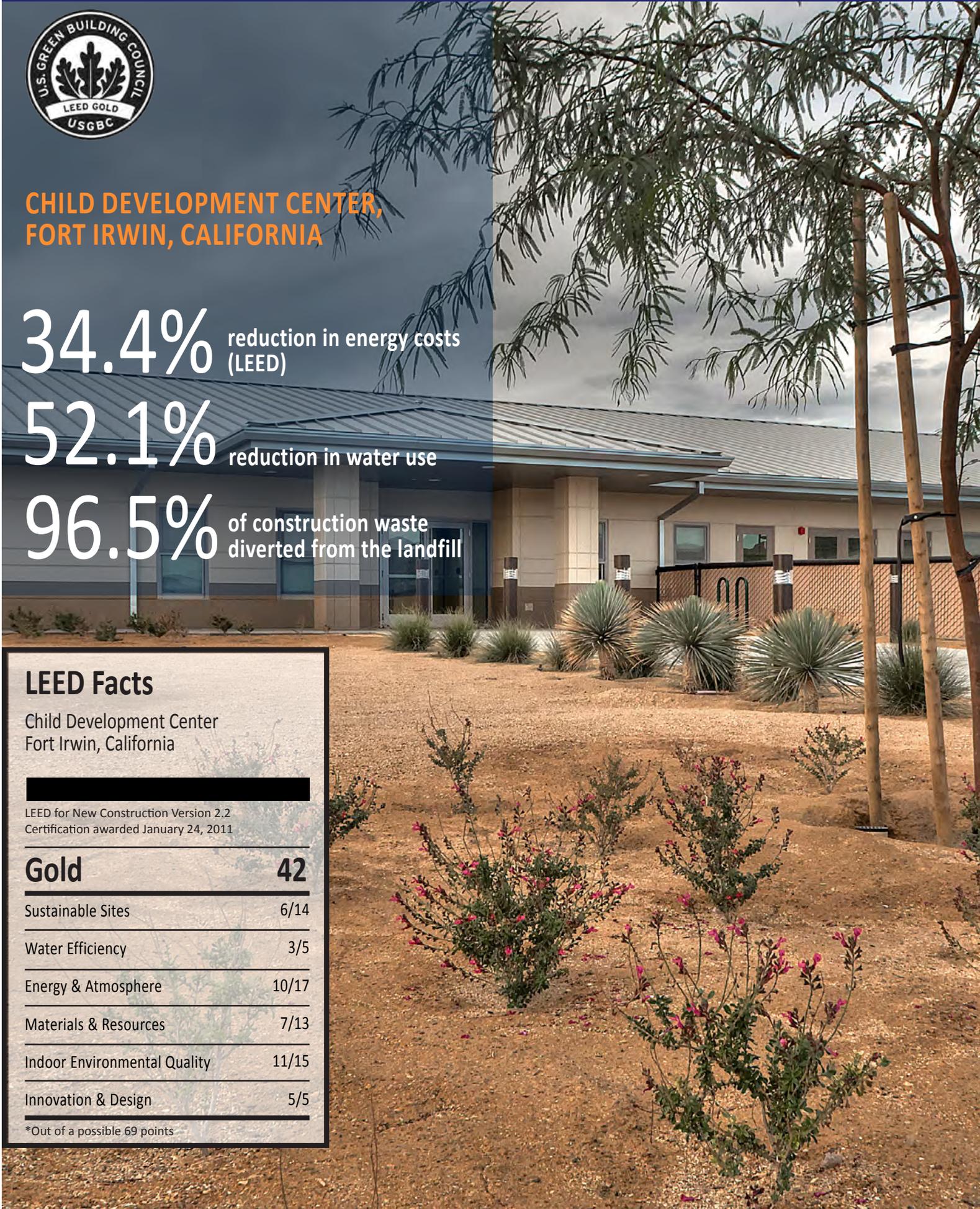
Energy & Atmosphere 10/17

Materials & Resources 7/13

Indoor Environmental Quality 11/15

Innovation & Design 5/5

*Out of a possible 69 points



CHILD DEVELOPMENT CENTER

Fort Irwin Receives LEED Gold Certification

PROJECT BACKGROUND

The Child Development Center was slated to start in Fiscal Year 2012 but was pulled forward to Fiscal Year 2008 as a congressional insert. Fort Irwin National Training Center has approximately 17000 personnel on site with over 7000 families. The existing Child Development Center was outdated and inadequate for infant to 6 years of age children. The Huntsville Center of Standardization had a concept design for the Design Build that was awarded to RQ-RBA Joint Venture Construction, Inc. The medium size Child Development Center will accommodate 232 children with age appropriate playgrounds and state of the art interior. The design-build project utilized preformed stud cast concrete panels which expedited the project. This fast track project was completed from final design to completion of construction in 11 months. This LEED Silver project was certified LEED "Gold" with USGBC on 24 January 2011.

Fort Irwin is located in the Mojave Desert with temperatures ranging from 20 degrees F to 120 degrees F. A Sustainable design with exterior landscaping, shade structures and large play areas so children could play outside and inside during such extreme temperatures were an ongoing challenge.

STRATEGIES AND RESULTS

The HVAC conservation features were to lower annual operating fan motor costs, filter outside air and supply airflows to enhance occupants comfort. The operation of a central plant offers energy savings over the range of heating and cooling cycles. The vegetation is reflective of the existing desert habitat with primarily native plants. The irrigation system features an automatic controller with water saving features such as flow and rain sensing devices, which reduce the amount of water used. After the plants are established, the system can be stopped which will provide additional water conservation. The 'cool' roof system has high solar reflections and high thermal emittance. Exterior lighting is photocell controlled and the interior lighting is high efficient fluorescent lamps. Forty-one percent of the total materials used in the project were regional material. Ninety-six point five percent of site and construction debris was recycled and diverted from landfills. The facility is conserving fifty percent of the potable water needs and a fifty-two percent rate reduction for water use through the providing of dual-flush toilets and low flow aerator faucets. Windows are dual-pane "low E", high visible transmittance to help reduce lighting loads. Almost every room and all classrooms have views to the outside which has shown to improve the morale of the employee and moods of the children. The site has preferred parking for five percent of parking capacity for fuel efficient vehicles (FEV) and five percent for carpool parking which are clearly marked by signs.



U.S. Army Engineer District, Los Angeles

Architect: RQ Construction, Inc.
Civil Engineer: R.E. Berg Engineering
Contractor: RQ-RBA JV (Joint Venture Between RQ Construction & Richard Brady & Associates)
Electrical Engineer: Engineering Partners, Inc.
Landscape Architect: Crescere Design Landscape Architecture
Mechanical Engineer: DS Engineering, Inc.
Owner: Fort Irwin Directorate of Public Works

Project Size: 25,000 square feet
Total Project Cost: \$8,280,214
Cost per square foot: \$272

Photography Courtesy of: Kortum Studios
 Photography

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

213.452.3921
 Los Angeles District
 760.380.3076
 Fort Irwin





**1ST BRIGADE, 4TH INFANTRY
DIVISION BRIGADE AND BATTALION
HEADQUARTERS (BBHQ)
FORT CARSON, COLORADO**

30.5% reduction in energy costs
(LEED)

44.1% reduction in water use

53.9% of construction waste
diverted from the landfill

LEED Facts

1st Brigade, 4th Infantry Division BBHQ
Fort Carson, Colorado

LEED for New Construction Version 2.2
Certification awarded December 2, 2008

Gold 40

Sustainable Sites 7/14

Water Efficiency 3/5

Energy & Atmosphere 12/17

Materials & Resources 3/13

Indoor Environmental Quality 11/15

Innovation & Design 4/5

*Out of a possible 69 points

1ST BRIGADE, 4TH INFANTRY DIVISION BBHQ

Fort Carson Building Awarded First Army LEED Gold

BY MICHAEL FLETCHER

U.S. ARMY CORPS OF ENGINEERS – OMAHA DISTRICT

One of the newest structures at Fort Carson, Colo., is the first in the U.S. Army to be awarded the U.S. Green Building Council's Gold Certificate for leadership in energy and environmental design. Certifications available are basic, silver, gold or platinum. All new military construction must meet or exceed the LEED Silver certification standard.

The 1st Brigade, 4th Infantry Division Brigade and Battalion Headquarters building is one of the environmentally sustainable Department of Defense buildings being built under U.S. Army Corps of Engineers contracts in response to realignments under the Base Realignment and Closure program and the return of 70,000 soldiers by 2013 due to overseas base closures. The 4th Infantry Division is returning to familiar ground as the unit was at Fort Carson for 25 years before moving to Fort Hood, Texas in 1995 and later deploying to Iraq.

"The design by the architectural engineering team of Hensel Phelps Construction Company and RNL Design gave a best value solution and within budget," said Vince Turner, chief of the Corps' Omaha District Military Branch Planning Programs and Project Management Division. "They took the Army standardized design and added some unique steps to meet the requirements of the construction on Fort Carson and a brigade combat team with track vehicles. The design also uses native plants, natural daylight, an interior court yard, and used reflective, energy efficient, blast-resistant windows to achieve a very livable, sustainable building.

"It's one thing to say during the design that we got the LEED points, but certification means that you actually met the standard," Turner said. "My hat is off to the design team and contractor. They had to make a very coordinated effort to exceed the requirements and achieve the superior Gold rating."

Key sustainable performance characteristics include:

- Reduced potable water consumption for irrigation by 95.7%
- Reduced water use by 44.1%
- 30.5% reduction in energy costs
- Energy efficiency measures included high albedo roofing, reduced lighting power density, extensive daylighting, CO2 sensors for demand control ventilation, energy recovery systems, condensing boiler, s air-cooled variable speed chillers, variable flow HW/CHW pumps, HW/CHW temperature reset on outside air temperature and supply air temperature reset on outside air temperature.
- 53.9% Construction Waste Diverted from the Landfill
- Recycled content materials of 32.8%

"The team kept a focus on delivering the best possible facility within project constraints," said Florian Walicki, principal at RNL. "The implementation of sustainable strategies that enhance operations and reduce energy costs was RNL's primary goal when modifying the standard design. The result is a building with added value, and the LEED Gold certification is a testament to that."

In addition to achieving Certified Gold LEED by USGBC, the project and contractors have received the following recognitions: Outstanding Design-Build Project - Silver Level, from McGraw-Hill Colorado Construction Magazine - Gold Hard Hat Award; Excellence in Construction Award – Design Build, from Associated Builders and Contractors (ABC) Colorado Chapter; Design Build All Projects – Prime Contractor: Hensel Phelps Construction Company, from Associated General Contractors Colorado Chapter; Design Build All Projects – Subcontractor Contractor: Sturgeon Electric, from Associated General Contractors (AGC) Colorado Chapter; and DBIA Rocky Mountain Region's 2008 Design-Build Excellence Award – Public Project over \$15 million.

"It is only common sense to pursue design and construction elements that will save resources, lower costs and provide an overall better facility for the Soldier. I believe it is our responsibility to lead the way for other government agencies and civilian industries to pursue sustainable construction projects."

Maj. Mark Himes, Fort Carson Corps of Engineers



U.S. Army Engineer District, Omaha

Architect: RNL Design
Civil Engineer: Martin/Martin
Commissioning Agent: Architectural Energy Corporation
Contractor: Hensel Phelps Construction, Company
Mechanical Engineer: AE Associates, Inc.
Owner: Fort Carson Directorate of Public Works

Project Size: 141,002 square feet
Total Project Cost: \$33,531,000
Cost Per Square Foot: \$221

Photographs Courtesy of: Hensel Phelps Construction, Company

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

402.995.2417

Omaha District

719.526.1269

Fort Carson





**CRISIS CITY INCIDENT COMMAND CENTER BUILDING (ICCB)
SALINA, KANSAS**

33.3% reduction in energy costs (LEED)

50.9% reduction in water use

83.2% of construction waste diverted from the landfill

LEED Facts

Crisis City Incident Command Center Building (ICCB)
Salina, Kansas

LEED for New Construction Version 2.2
Certification awarded October 19, 2010

Gold 39

Sustainable Sites 5/14

Water Efficiency 4/5

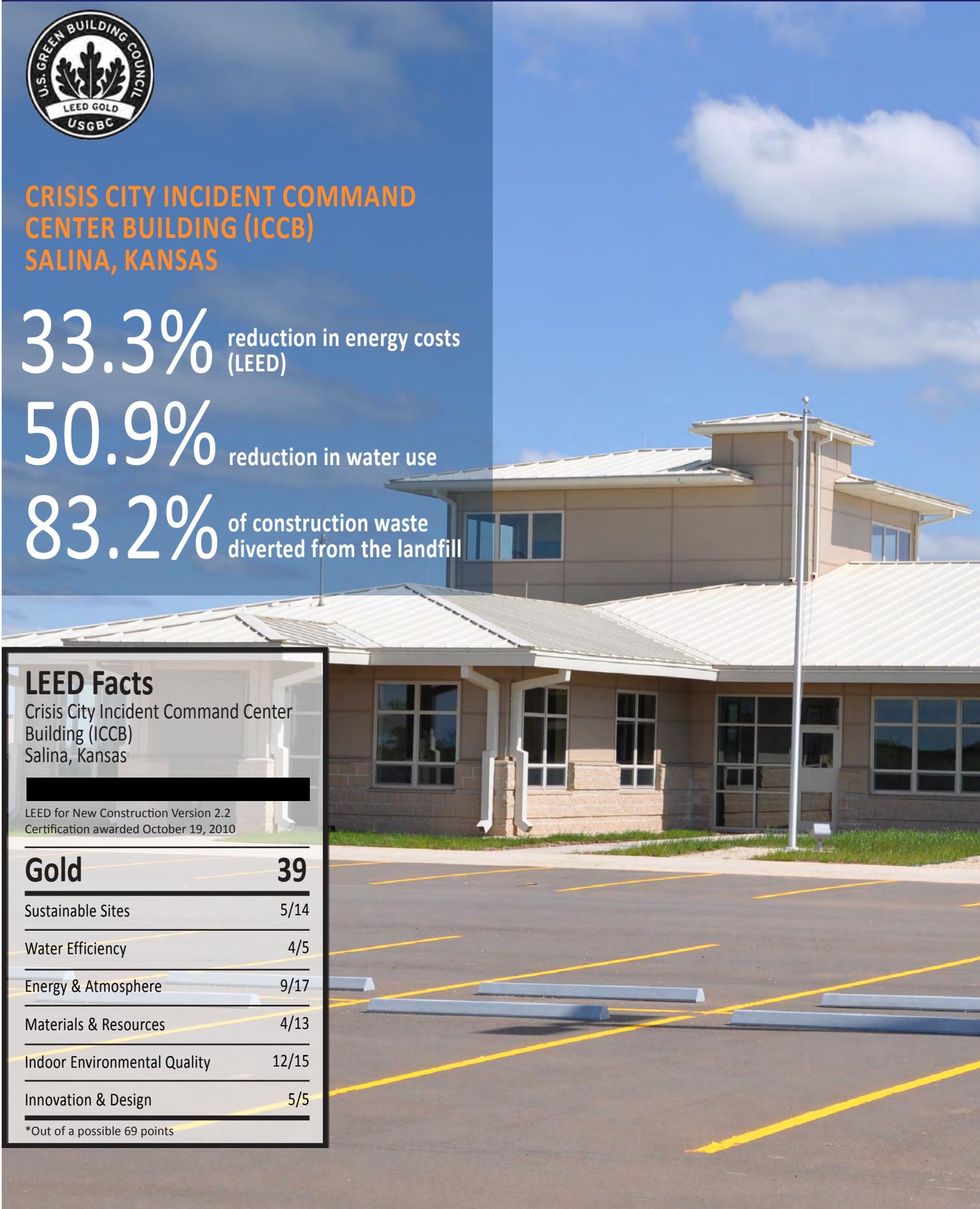
Energy & Atmosphere 9/17

Materials & Resources 4/13

Indoor Environmental Quality 12/15

Innovation & Design 5/5

*Out of a possible 69 points



CRISIS CITY ICCB

Crisis City Receives LEED Gold Certification

PROJECT BACKGROUND

The Crisis City Incident Command Center Building (ICCB) is a two story, 7,265 SF structure with a 6,550 SF footprint. The building includes a reception area and administrative office space, a conference room, two training classrooms, two locker rooms, a break room and training venue observation room. The building also includes support spaces for storage, communication equipment, a janitor's closet and a mechanical room. The ICCB will be capable of future additions in several directions.

The ICCB is a slab-on-grade with recycled content light steel structural system and light gauge metal framing. Exterior walls are composed of masonry veneer and aluminum composite panels. Window glazing is tinted insulating glass set in thermally broken frames. Large roof overhangs are employed on the south and east face of the building for shade and to protect the exterior from the elements. The roof is a 4:12 pitch standing seam metal roof. The exterior materials were selected for their durability, low maintenance demands, their ability to minimize heat transfer between the building interior and exterior, regional manufacturing source and the recycled content of the material.

Primary interior finishes are gypsum board coated with low-VOC paints, floor tile, recycled content carpet tile and recycled content wall tile. Interior finishes have been chosen for their durability, application to the building program, recycled content, and low-VOC contribution and for the ease or economics of cleaning them over the course of the building's life.

The HVAC system is a variable refrigerant volume heat recovery system. Each interior zone has an individually controlled direct expansion heat pump to heat and cool the space as needed. The heat rejection is controlled by a single outdoor heat recovery heat pump which uses two compressors to send R410A refrigerant to each zone. The outdoor heat pump uses one constant volume compressor and one variable volume compressor to adjust to a varying interior load. The heat recovery system is capable of simultaneous heating and cooling allowing for the shifting of loads from one zone to another.

An energy recovery ventilator (ERV) conditions and supplies ventilation air to each zone as required. The ventilation air is sent through an air to air desiccant heat exchanger with the relief air. The ventilation air is further conditioned through either a direct expansion coil with R410A refrigerant for cooling or an electric coil for heating. The ventilation rate was designed to meet the requirements of ASHRAE 62.1-2004.

The primary plumbing system reduces water consumption with a combination of low flow water closets, ultra low flow urinals and reduced flow lavatories with hands free sensors. The design water closets have 1.28 gpf, sensor operated flush valves and have bowls designed for 1.28 gpf. The design urinals have 0.13 gpf, sensor operated flush valves and urinals bodies have been designed for the 0.13 gpf flush valve. The design lavatory is a multi-station, sensor operated, ultra low flow lavatory with 0.5 gpm per station. The kitchen sink are reduced flow with 2.2 gpm.

CRISIS CITY BACKGROUND

Crisis City is the first phase in the development of the Great Plains Joint Regional Training Center. Crisis City will imitate a small town destroyed by natural and/or man-made catastrophes, offering hands-on training to first-responders; both military and civilian. Crisis City will feature a rail-bed and railcars for valuable HAZMAT training, a rubble pile and grain bins providing search and rescue training, and a farm training venue offering experience with farming and grain silo accidents. There will also be training in military operations and urban terrain.

Crisis City consists of the ICCB, seven Training Venues (TV1 – TV7) and associated Inclement Weather Shelters (IWS), a helipad, and improvements for future on site lodging in the form of double wide pre-manufactured mobile homes. Also included are parking facilities, street infrastructure and a sanitary lagoon.

The Great Plains Joint Regional Training Center is located on the Smoky Hills Weapons Range southwest of Salina, Kansas. Smoky Hills is the largest and busiest range in the Air National Guard encompassing 36,000 acres and featuring one of the longest runways in the central United States. Also located on Smoky Hills are the Air National Guard impact range and Army Reserve National Guard training facility.



Kansas National Guard

Architect: Tevis Architects
Civil Engineer: Delta Engineering
Commissioning Agent: ProBalance
Contractor: Gracon Corporation
Electrical Engineer: Smith & Boucher
Interior Designer: Tevis Architects
Landscape Architect: Tevis Architects
LEED Consultant: Smith & Boucher
Mechanical Engineer: Smith & Boucher
Owner: Kansas Army National Guard
Plumbing Engineer: Smith & Boucher
Structural Engineer: Walter P. Moore

Project Size: 7,265 square feet
Total Project Cost: \$5,150,000
Cost per square foot: \$247

Photography Courtesy of: Tevis Architects

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Kansas Army National Guard
 785.274.1613
 Directorate of Facilities & Engineering





**WHOLE BARRACKS RENEWAL, 2F2/2G
BATTALION/ BRIGADE HEADQUARTERS
BUILDINGS
SCHOFIELD ARMY BARRACKS,
HONOLULU, HAWAII**

24.7% reduction in energy costs
(LEED)

48.5% reduction in water use

79.0% of construction waste
diverted from the landfill

LEED Facts

Whole Barracks Renewal
Schofield Army Barracks, Honolulu,
Hawaii

LEED for New Construction Version 2.2
Certification awarded October 26, 2010

Gold 40

Sustainable Sites 6/14

Water Efficiency 4/5

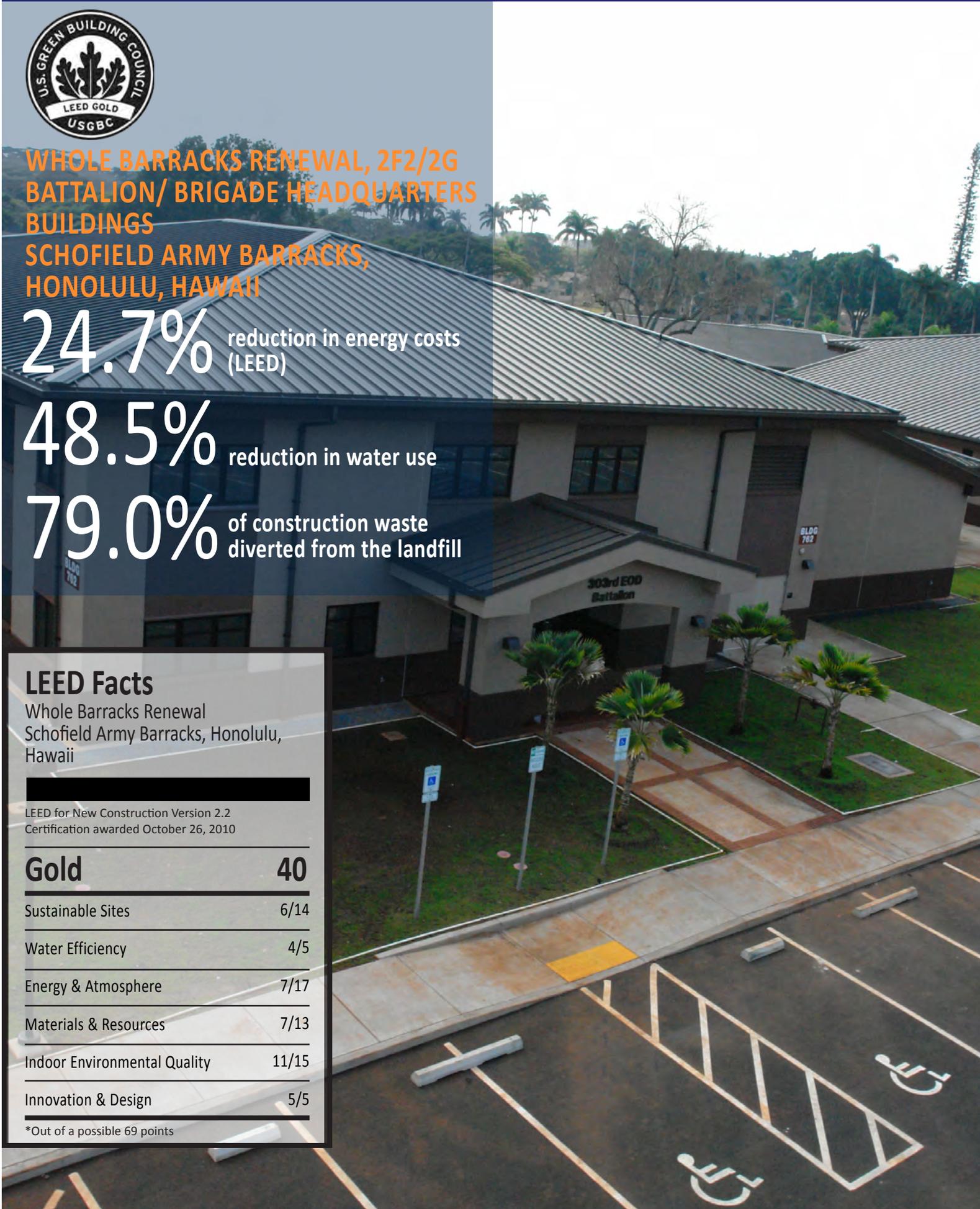
Energy & Atmosphere 7/17

Materials & Resources 7/13

Indoor Environmental Quality 11/15

Innovation & Design 5/5

*Out of a possible 69 points



WHOLE BARRACKS RENEWAL

Schofield Army Barracks Receives LEED Gold

PROJECT BACKGROUND

The Whole Barracks renewal, 2F2/ 2G is a new operations complex located on Schofield Army Barracks, Honolulu, HI. The total project consists of two large Battalion/ Brigade headquarters (BN) buildings and two Company Operation Facilities (COF) buildings. The Complex facilities, which serve deployment and daily operations of the Army, are located within walking distance of barracks and dining facilities.

The two battalion buildings in the complex, house administrative and command operations, and are similar to office buildings in the private sector. Each are exact replicas and built to meet the Army's program requirements. The Army's sustainability goal for this project was LEED Silver Certification, with an emphasis on energy conservation and improved livability.

Each BN building is about 15,000sf and consists of two floors. The BN building includes open and closed office spaces, classrooms, conference rooms, and other office support facilities. They serve a Command Section, Sustainment, Logistics Operation, Intelligence, Surveillance and Reconnaissance, Operations, Plans and Training, and Information Management. Given unique Army demographics, the project has been designed for a 20 percent female and 80 percent male population.

PROJECT SUSTAINABILITY FEATURES

The 2F/2G2 – BN project has been developed on a rehabilitated brownfield site that is located in close proximity to multiple community services. This helps reduce the pressure on undeveloped land. Bicycle storage and showers have been provided to encourage alternate modes of transportation. Site design has provided open space equal to 25% of the project building footprint. Minimum use of uplights reduces night sky pollution and cut off fixtures reduce site boundary light spill.

The facility's landscaping design is comprised of a native landscape palette, and does not require permanent irrigation beyond the initial establishment period. 48% potable water use reduction is anticipated from the use of dual-flush toilets, low-flow urinals and low-flow faucets.

It is expected that the facility's energy use will be 25% lower than the energy code. Energy efficiency strategies include high efficiency building envelope and glazing systems, shading devices, high efficiency cooling and heating systems, and efficient lighting systems. Enhanced commissioning of building systems was performed to ensure that the energy efficiency strategies and systems were installed and are operated as per design.

The design-build team utilized materials that were regionally sourced and had high recycled content including concrete, CMU, structural steel and metals. 100% of all wood products in the project are from sustainably managed forests. A carefully monitored construction waste management plan resulted in more than 78% of construction waste diverted from the landfill.

The facility has been designed and constructed to maintain very high interior space air quality. Testing was conducted at occupancy to verify the air quality conditions. All paints, adhesives, sealants, composite wood and VCT flooring systems installed in the project have very low volatile organic compounds and chemical emissions. The cooling system has been designed to supply 30% additional fresh air to the space. Monitoring systems have been installed to ensure that there is no stale air buildup in the space.

The projects sustainability efforts continue into the operations phase: a green housekeeping plan and an integrated pest management plan have been implemented in the project to reduce exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particle contaminants.



U.S. Army Engineer District, Honolulu

Architect: Mason Architects
Civil Engineer: MACTEC Engineering
Commissioning Agent: InSynergy Engineering Inc.
Contractor: Nan, Inc.
Electrical Engineer: InSynergy Engineering Inc.
Interior Designer: Susan Chun
Landscape Architect: Walters, Kimura, Motoda
LEED Consultant: Paladino & Co.
Mechanical Engineer: InSynergy Engineering Inc.
Owner: Schofield Barracks, Directorate of Public Works
Plumbing Engineer: InSynergy Engineering Inc.
Structural Engineer: Wilson Okamoto Corp.

Project Size: 34,790 square feet
Total Project Cost: \$18,993,900
Cost per square foot: \$546

Photography Courtesy of: Silent Eye Aerial Photography

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

808.438.9862
Honolulu District

808.656.3154

U.S. Army Garrison, Hawaii





COMBAT AVIATION BRIGADE (CAB) DINING FACILITY FORT RILEY, KANSAS

26.6% reduction in energy costs
(LEED)

32.6% reduction in water use

52.2% of construction waste
diverted from the landfill

LEED Facts

CAB Dining Facility
Fort Riley, Kansas

LEED for New Construction Version 2.2
Certification awarded March 14, 2011

Gold 40

Sustainable Sites 10/14

Water Efficiency 4/5

Energy & Atmosphere 8/17

Materials & Resources 6/13

Indoor Environmental Quality 9/15

Innovation & Design 3/5

*Out of a possible 69 points



CAB DINING FACILITY

Fort Riley Receives LEED Gold Certification

PROJECT BACKGROUND

In preparation for the redeployment of the 1st Infantry Division's Combat Aviation Brigade (CAB), following a 15-month deployment to Iraq, the garrison at Fort Riley, through the U.S. Army Corps of Engineers, contracted for a new dining facility on the grounds of Marshall Army Airfield. The master plan for the new dining facility, which is the military equivalent of a civilian college or corporate cafeteria, is intended to provide meal services near high-occupancy duty areas, and to relieve surges of traffic from the airfield, to other portions of the Post, during meal periods.

STRATEGIES AND RESULTS

Through thoughtful planning, the CAB Dining Facility offers the following features:

The dining facility has been centrally located, within walking distance of the hangars and other high-occupancy duty stations at Marshall Army Airfield. Careful consideration of building location and orientation was given with regard to views of the Flint Hills region immediately surrounding the airfield. Additionally, bicycle racks are provided for both staff and visitors, with changing rooms provided for the staff.

The location of the dining facility at the airfield has been designed to maintain adequate levels of green-belt open-space. As part of this design, 89.7% of the project site area is maintained as vegetated, protected or restored habitat, maximizing an open space over four times greater than the area of the building's footprint, immediately surrounding the building. As a further measure of the site's sustainability, all vegetated open space is composed of non-irrigated native and/or adaptive species that have been selected for their drought tolerance and their ability to survive solely upon annual precipitation.

Of the remaining site areas, the hardscape has been designed to help reduce heat island effects by providing minimum 29 SRI concrete, in lieu of heat absorbing asphalt, wherever possible. Additionally, a major portion of the dining facility's roof is composed of highly reflective white TPO membrane with an SRI value of 97, significantly higher than the required minimum of 78.

Sustainable environmental measures have been implemented within the building envelope, as well. Careful selection of existing, industry-standard, water-saving plumbing fixtures, including kitchen equipment, has resulted in a 32% reduction of potable water use.

A high-level of indoor environmental quality was maintained throughout the construction cycle, beginning with the dust and contaminate control measures established during construction, selection and use of low- and no-VOC finishes, the implementation of a whole-building flush-out prior to occupancy, the provision of a separately-ventilated chemical use area, and increased ventilation throughout the building.

Building energy requirements were further reduced by the use of Energy Star labeled kitchen and HVAC equipment, high-efficiency window systems, and building sunshades. Indoor lighting is fully automated, through the use of occupancy sensors and time clocks. And, HVAC equipment is user-adjustable and zone-controlled, separately, between kitchen, serving and dining areas.

The project's environmental impact, as a result of raw materials requirements, was reduced by the use of building materials with more than 21% recycled content, more than 29% of materials produced within the region, and nearly 100% of wood from FSC-certified sources. Additionally, with the help of Fort Riley's Material Recovery Facility, more than 52% of construction waste was diverted from landfill.



U.S. Army Engineer District, Kansas City

Architect: MaxFour

Civil Engineer: MaxFour

Commissioning Agent: Innovative Sustainable Solutions, Inc.

Contractor: MaxFour-Weitz JV

Electrical Engineer: Henderson Engineers, Inc.

Interior Designer: MaxFour

Landscape Architect: MaxFour

LEED Consultant: MaxFour

Lighting Designer: Henderson Engineers, Inc.

Mechanical Engineer: Metro Air Conditioning, Inc.

Owner: Fort Riley, Kansas - United States Army

Plumbing Engineer: Henderson Engineers, Inc.

Structural Engineer: The Sheflin Group, Inc.

Project Size: 17,658 square feet

Total Project Cost: \$8,299,000

Cost Per Square Foot: \$374

Photographs Courtesy of: MaxFour-Weitz JV and Marketmedia, LLC

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

816.389.3819

Kansas City District

785.239.3410

Fort Riley



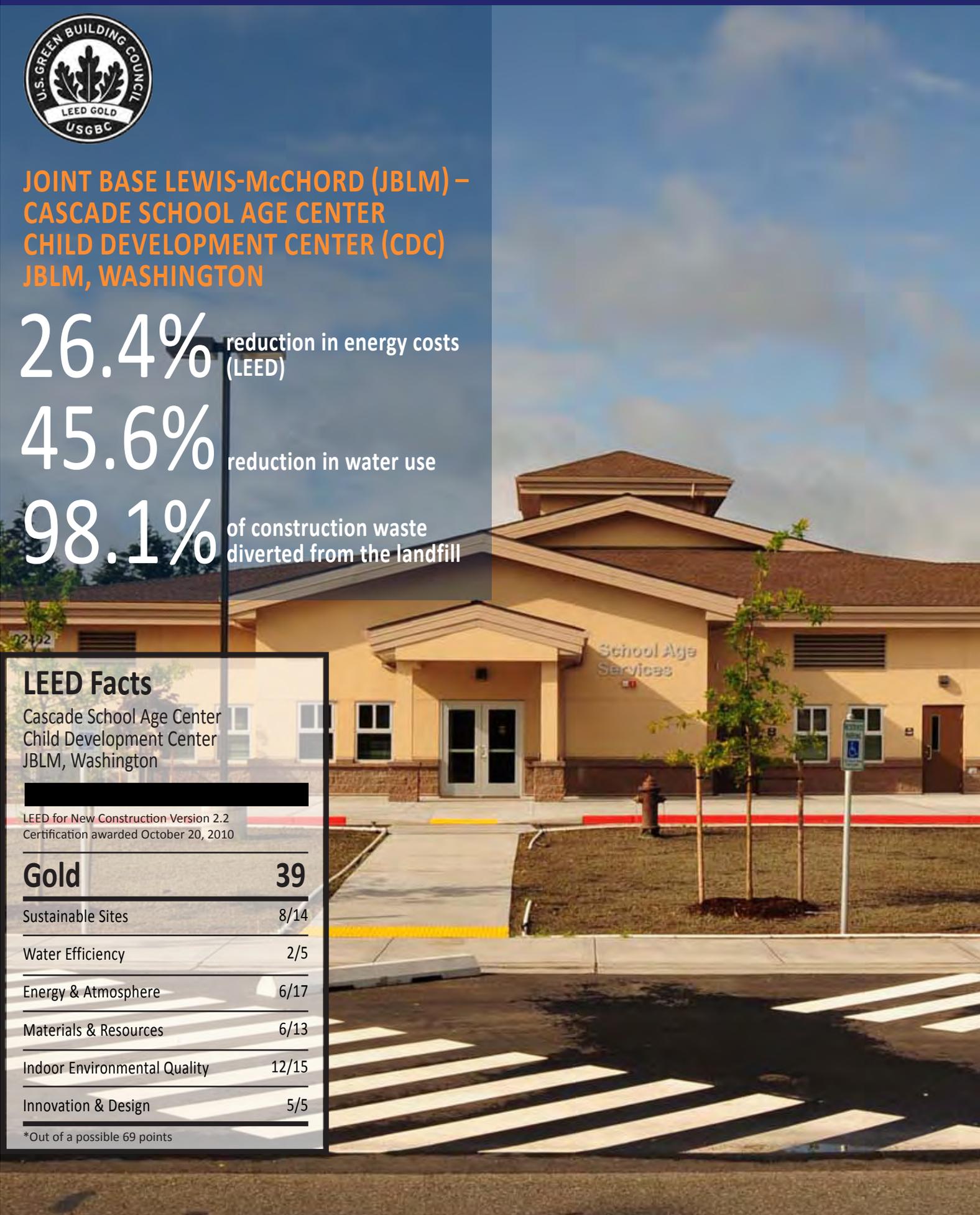


JOINT BASE LEWIS-McCHORD (JBLM) – CASCADE SCHOOL AGE CENTER CHILD DEVELOPMENT CENTER (CDC) JBLM, WASHINGTON

26.4% reduction in energy costs
(LEED)

45.6% reduction in water use

98.1% of construction waste
diverted from the landfill



LEED Facts

Cascade School Age Center
Child Development Center
JBLM, Washington

LEED for New Construction Version 2.2
Certification awarded October 20, 2010

Gold 39

Sustainable Sites 8/14

Water Efficiency 2/5

Energy & Atmosphere 6/17

Materials & Resources 6/13

Indoor Environmental Quality 12/15

Innovation & Design 5/5

*Out of a possible 69 points

CASCADE SCHOOL AGE CENTER CDC

CDC Receives LEED Gold Certification

Project Background

Army initiatives such as Transformation, Modular Force, Global Posturing, BRAC, Grow the Force all contribute to mission related re-stationing of thousands of soldiers and their families. JBLM is realizing unprecedented growth as a result of these initiatives. The goal of JBLM MWR Child, Youth and School Services (CYSS) programs is to reduce conflict between parental responsibilities and unit mission requirements. The Cascade School Age Center CDC, along with several others, have been constructed at JBLM to accommodate its unprecedented growth in population.

STRATEGIES AND RESULTS

The CDC site shares parking with an adjacent community center which reduces the need for parking. Over 50% of the impervious surfaces and 75% of the roof consist of highly reflective materials that reduce heat island effect.

The CDC building uses improved roof and wall insulation, insulated glazing, high-efficiency light fixtures, 96% efficient natural gas-fired water heater, and high-efficiency air-to-air heat pumps with demand-controlled ventilation to achieve 31% savings over an ASHRAE 90.1-2004 compliant baseline building (not including process energy) and over 26% cost savings per LEED calculations.

The design-build team succeeded in diverting over 98% of the construction waste from the landfill. The team also utilized materials with high recycled content including the concrete, carpet, and acoustical ceiling tiles to achieve over 21% combined recycled content value for the project.

The design-build team achieved 12 Indoor Environmental Quality credits. These credits included low VOC paints, adhesives, sealants, carpet, and composite woods. Both lighting and thermal comfort comply with controllability requirements. A post occupancy survey was performed and over 80% of the responding occupants were satisfied with the thermal comfort in the building. The building design also provides views for over 90% of the occupants, and incorporates signage explaining the sustainable features of the facility.

About the JBLM Child Development Center (CDC)

The project houses administrative areas, a commercial kitchen and activity areas for school age children. It is intended to be similar to a daycare in the private sector community. The Child Development Center houses 195- child capacity for children ages 6 to 10 years. The facility provides staff with visual control of the entire building to aid them in facilitating programming, supervising the children, and supervising activities. The facility is child friendly and designed to support risk management and is relatively maintenance free.

“The MWR, Child, Youth and School Services (CYSS) programs foster and develop our children of today, who will become the leaders of tomorrow. The Cascade School Age Center Child Development Center (CDC) is an outstanding example of the Army’s commitment to building a sustainable future. The plaque on display in the CDC provides a constant reminder to today’s impressionable youth, and their parents, of the realization of sustainability today that will contribute to the sustainable future of tomorrow.”

Quote Attribution: Brent W. Dvorak, P.E., LEED(r)
AP USACE, Senior Project Engineer Administrative Contracting Officer



U.S. Army Engineer District, Seattle

Architect: BCRA, Inc.
Civil Engineer: BCRA, Inc.
Commissioning Agent: Neudorfer Engineers, Inc.
Contractor: Berschauer Phillips
Electrical Engineer: BCE Engineers
Interior Designer: BCRA, Inc.
Landscape Architect: AHBL, Inc.
LEED Consultant: BCRA, Inc.
Mechanical Engineer: BCE Engineers
Owner: Joint Base Lewis-McChord Family & Morale, Welfare & Recreation
Plumbing Engineer: BCE Engineers
Structural Engineer: BCE Engineers

Project Size: 23,000 square feet
Total Project Cost: \$9,500,000
Cost per square foot: \$413

Photography Courtesy of: Dane Meyer

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council’s Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices
 206.764.3742
 Seattle District
 253.967.6221
 JBLM





SOLDIER FAMILY ASSISTANCE CENTER FORT CARSON, COLORADO

42.5% reduction in energy costs
(LEED)

46.6% reduction in water use

54.5% of construction waste
diverted from the landfill

LEED Facts

Soldier Family Assistance Center
Fort Carson, Colorado

LEED for New Construction Version 2.2
Certification awarded January 13, 2011

Gold **40**

Sustainable Sites 7/14

Water Efficiency 3/5

Energy & Atmosphere 8/17

Materials & Resources 6/13

Indoor Environmental Quality 11/15

Innovation & Design 5/5

*Out of a possible 69 points

SOLDIER FAMILY ASSISTANCE CENTER

Fort Carson is Committed to Sustainable Development

FORT CARSON'S SUSTAINABILITY GOAL

Sustainable Development ("Create a community that encourages social, civic and physical activity while protecting the environment."), incorporates stormwater, U.S. Green Building Council Leadership in Energy and Environmental Design (LEED), construction, transportation and master planning into a cohesive goal. The goal emphasizes programming, designing and building LEED-certified buildings with a target of all new buildings and major renovations on Fort Carson achieving LEED certification and all new buildings and renovations achieving LEED Gold by 2017.

PROJECT BACKGROUND

The Soldier Family Assistance Center (SFAC), designed by DLR Group, is the first building completed in Fort Carson's new Warrior In Transition (WIT) Complex.

Fort Carson's WIT program provides treatment for nearly 500 soldiers, many of whom are recovering from post-traumatic stress disorder and other war wounds. The mission of the WIT is to provide primary care and case management to return soldiers to the force or aid in their transition back to civilian life. The new \$8,000,000 WIT facility contains a community center, office space and childcare for soldiers in the program and their families.

STRATEGIES AND RESULTS

In an effort to create a healthy healing environment, DLR Group's design solution included daylighting to maximize natural light into the space, and used low-VOC materials to provide high indoor air quality. The design also included the following environmentally sustainable elements: recycled-content and regionally-produced materials, efficient water systems, natural vegetation landscaping and cool roofing to reduce additional heat.

The SFAC is the second facility at Fort Carson to utilize a highly energy-efficient, closed-loop, ground-source heat pump system, which uses 36, 400-foot deep wells that transfer heat to and from the building by circulating water below ground where the Earth's temperature is constant. This facility is pursuing LEED Gold Certification from the United States Green Building Council.

ABOUT FORT CARSON, COLORADO

Fort Carson, Home to the 4th Infantry Division and several large tenant units including the 43rd Area Support Battalion and the 10th Special Forces Group, is located in beautiful Colorado Springs, Colorado. The Installation was established in 1942 through land donated by the City of Colorado Springs to the War Department after the attack on Pearl Harbor. The Mountain Post Garrison Team provides units mission support and services including quality of life programs for the Fort Carson Soldiers, Families and the community to enable forces to execute expeditionary operations and to minimize stress on Soldiers and Families in a time of persistent conflict. The Fort Carson vision is to be the "Best Hometown in the Army - Home of America's Best."



U.S. Army Engineer District, Omaha

Architect: DLR Group
Civil Engineer: Nolte Engineering
Contractor: Main/Mass a SDVOSB Joint Venture
Electrical Engineer: ME Group
Interior Designer: DLR Group
Landscape Architect: Design Collaborative
LEED Consultant: DLR Group
Mechanical Engineer: ME Group
Owner: Fort Carson, CO – United States Army
Plumbing Engineer: ME Group
Structural Engineer: MGA Structural Engineers

Project Size: 13,397 square feet
Total Project Cost: \$8,355,281
Cost per square foot: \$492

Photography Courtesy of: DLR Group

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices
 402.995.2417
 Omaha District
 719.526.1269
 Fort Carson



3 Silver-Certified Projects

Silver is the Army-required level of LEED certification. To achieve Silver certification under LEED-NC v2.1 or 2.2 (New Construction Versions 2.1 and 2.2, the rating criteria in effect at the time these facilities were certified), a project must achieve between 33 and 38 points out of the possible 69 available. Twenty-eight projects—more than 60% of the Army projects certified as of 24 January 2011—have achieved Silver certification. These Silver projects, on average, meet or exceed Army targets for energy-cost reduction, water-use reduction, and construction-waste diversion.



ARMED FORCES RESERVE CENTER (AFRC) BELL, CA

40.1% reduction in energy costs
(LEED)

21.3% reduction in water use

98.1% of construction waste
diverted from the landfill

LEED Facts

Armed Forces Reserve Center
Bell, CA

LEED for New Construction Version 2.2
Certification awarded July 12, 2010

Silver 34

Sustainable Sites 7/14

Water Efficiency 2/5

Energy & Atmosphere 11/17

Materials & Resources 5/13

Indoor Environmental Quality 6/15

Innovation & Design 3/5

*Out of a possible 69 points

ARMED FORCES RESERVE CENTER

Bell Receives LEED Silver Certification

PROJECT BACKGROUND

The Armed Forces Reserve Center in Bell, CA was part of the Base Realignment and Closure Program (BRAC). The facility was designed to house four military branches: Army Reserve, Army National Guard, Navy Reserve, and the Marine Corps Reserve. The design build project included incorporating each branch's design standards into the entire facility. A 40 acre site was chosen that included the demolition of army warehouses that were building in the 1940's and 1950's.

The Project consisted of three buildings; Administration Building, Operation Maintenance Shop (OMS Building), and the Unheated Storage Building (UHS). The Administration Building featured areas for Offices, a Training Kitchen, Armory Vaults, Simulator Room, Classrooms, Sipernet Rooms, and Misc. Storage Rooms. The OMS Building featured Large Work bays for each branch. Some of these areas included large cranes, Oil and Lube pump systems, battery charging rooms, and Water and Air hoses. The building also included a 60 ft tower that could be used for both parachute cleaning/drying on the inside and repelling on the outside. Storage and Office areas are also in this building. The UHS building was also divided up for each branch to have secure storage for their use.

STRATEGIES AND RESULTS

The projects Green choices started with the demolition of the existing buildings. First a substantial amount of asbestos abatement was done prior to the demolition. During demolition over 70,000 tons of material was diverted from landfills from the demolition process. This includes over 35,000 tons of crushed concrete that was used for the base under the buildings and spread throughout the site.

The site featured large open space that required no irrigation and was planted with native seeding. The project was also able to reduce the heat island effect on the roof by using a high reflective white TPO roof and use white concrete where ever possible.

The design of the buildings allowed for an overall energy improvement of 36.9% over the baseline design. This comes mainly from the central plant heating/cooling systems and energy efficient lighting throughout all buildings.

The design-build team focused on getting materials that were local regional and had high recycle contents. The team also made sure to use paints, adhesives, and sealants that all met the low VOC requirements. The team also focused on indoor air quality both during construction and before occupancy.

"The project was only required to be designed to SPIRIT Certification. However, the contractor, Sundt Construction, decided to go beyond the requirements and get the project LEED silver Certification. All users of the facility (Army, Navy, Marine Corps, National Guard) were involved during design development (through several design development progress meetings at various stages of design completion) and were all very pleased with the final product."

- Stan Fujimoto, Project Engineer Army Corps of Engineer



U.S. Army Engineer District, Louisville

Architect: Michael Baker Corporation
Civil Engineer: Michael Baker Corporation
Commissioning Agent: Pacific Rim Mechanical
Contractor: Sundt Construction
Electrical Engineer: Michael Baker Corporation
Interior Designer: IKM Incorporated
Landscape Architect: Green Gems Landscaping
LEED Consultant: EcoLogic Studios
Lighting Designer: Michael Baker Corporation
Mechanical Engineer: Michael Baker Corporation
Owner: 63rd Regional Readiness Command, United States Army
Plumbing Engineer: Michael Baker Corporation
Structural Engineer: Michael Baker Corporation

Project Size: 237,899 square feet

Total Project Cost: \$65,552,801

Cost per square foot: \$232

Photography Courtesy of: Michael Baker Corporation

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

502.315.6766
 Louisville District Public Affairs
 650.526.9414
 63rd RSC, DPW





DIVISION HEADQUARTERS COMPLEX, UNACCOMPANIED ENLISTED PERSONNEL HOUSING (UEPH) AND COMPANY OPERATIONS FACILITY (COF) FORT CARSON, COLORADO

40.1% reduction in energy costs
(LEED)

32.2% reduction in water use

75.9% of construction waste
diverted from the landfill

LEED Facts

Division Headquarters Complex,
UEPH and COF
Fort Carson, Colorado

LEED for New Construction Version 2.2
Certification awarded February 15, 2010

Silver 34

Sustainable Sites 5/14

Water Efficiency 3/5

Energy & Atmosphere 11/17

Materials & Resources 4/13

Indoor Environmental Quality 10/15

Innovation & Design 1/5

*Out of a possible 69 points



DIVISION HEADQUARTERS COMPLEX, UEPH AND COF

Fort Carson is Committed to Sustainable Development

FORT CARSON'S SUSTAINABILITY GOAL

Sustainable Development ("Create a community that encourages social, civic and physical activity while protecting the environment."), incorporates stormwater, U.S. Green Building Council Leadership in Energy and Environmental Design (LEED), construction, transportation and master planning into a cohesive goal. The goal emphasizes programming, designing and building LEED-certified buildings with a target of all new buildings and major renovations on Fort Carson achieving LEED certification and all new buildings and renovations achieving LEED Gold by 2017.

PROJECT BACKGROUND

On May 13, 2005 the Pentagon released its Base Realignment and Closure Program (BRAC) recommendations, which included plans to realign Fort Hood, Texas. As a result, a Brigade Combat Team and Division Headquarters Unit were moved to Fort Carson, Colorado. With the mandated BRAC deadline looming, Fort Carson was looking for innovative ways to speed construction of the new facilities required to house these new arrivals. The UEPH and COF serving the Division Headquarters Unit are located on 18.5 acres of open land at Fort Carson.

UNACCOMPANIED ENLISTED PERSONNEL HOUSING (UEPH)

The 89,269-square-foot barracks contains 122 two-bedroom apartments to house 244 soldiers. The barracks houses single soldiers and is similar to apartment-style housing in the private sector community surrounding the Base. The design of the Division Headquarters Barracks for Fort Carson creates a dynamic and safe environment which fosters a sense of community and camaraderie among enlisted personnel.

COMPANY OPERATIONS FACILITY (COF)

The COF is a pre-engineered metal building with exterior pre-cast and metal panels and a sloped standing seam metal roof. The COF serves four Companies, approximately 850 soldiers and is based on the Standard Design for a COF. The COF has three main sections: the administration module, the readiness module and the hardstand area. The administration module consolidates administrative functions for all companies in one building with individual company command suites, conference rooms, and a four-room cluster of platoon offices for each company along with a Troop Aide Station.

STRATEGIES AND RESULTS

After extensive design work to support the established design specifications in the original RFP, AECOM presented an improved Building Layout on the site for both the Company Operations Facility (COF) and the U-shaped barracks building that was completely different from the RFP documents. This innovative solution improved existing vehicular and pedestrian traffic issues on base and provided flexibility for landscaping and site improvements that visually separated the new buildings from the adjacent parade field and recreational area. The team worked with the Corps of Engineers to approve the revision, resulting in a superior final product with no added costs or schedule delays.

In addition, the Barracks was designed using a modular construction strategy, with apartment blocks being assembled offsite, then assembled and finished at the building site. This strategy minimized onsite construction and site disruption. This fast-track strategy enabled quick completion of the facilities to facilitate compliance with BRAC deadlines.

The UEPH and COF complex is LEED Silver certified. Sustainable features include energy-efficient lighting systems, oversized electrical conductors that reduce energy by 30% over ASHRAE 90.1, high-efficiency boilers and water heaters, energy recovery units and low-flow plumbing fixtures.

"The design team for the Division Headquarters, COF and Barracks did a very good [job] during design. They were willing to make any adjustments that the customer needed as long as the design could stay in budget. They used a novel approach of modular construction for the barracks which allowed the prime contractor to meet a very tight schedule. The Structural Engineer worked closely with the government to meet progressive collapse requirements that were never considered for modular construction."

Quote Attribution: Greg Sipes, Project Engineer, USACE - Omaha



U.S. Army Engineer District, Omaha

Architect: AECOM
Civil Engineer: AECOM
Contractor: Hensel Phelps Construction Co.
Electrical Engineer: AECOM
Interior Designer: AECOM
LEED Consultant: AECOM
Lighting Designer: AECOM
Mechanical Engineer: AECOM
Owner: Fort Carson, Colorado - United States Army
Plumbing Engineer: AECOM
Structural Engineer: AECOM

Project Size: 174,878 square feet
Total Project Cost: \$34,200,000
Cost per square foot: \$196

Photography Courtesy of: United States Army

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

402.995.2417

Omaha District

719.526.1269

Fort Carson





**13TH AIR SUPPORT OPERATIONS
SQUADRON (ASOS) FACILITY
FORT CARSON, COLORADO**

37.1% reduction in energy costs
(LEED)

53.5% reduction in water use

70.7% of construction waste
diverted from the landfill

LEED Facts

13th Air Support Operations
Squadron (ASOS) Facility
Fort Carson, Colorado

LEED for New Construction Version 2.2
Certification awarded May 14, 2010

Silver 35

Sustainable Sites 5/14

Water Efficiency 4/5

Energy & Atmosphere 10/17

Materials & Resources 5/13

Indoor Environmental Quality 9/15

Innovation & Design 2/5

*Out of a possible 69 points



13TH AIR SUPPORT OPERATIONS SQUADRON (ASOS) FACILITY

Fort Carson is Committed to Sustainable Development

FORT CARSON'S SUSTAINABILITY GOAL

Sustainable Development ("Create a community that encourages social, civic and physical activity while protecting the environment."), incorporates stormwater, U.S. Green Building Council Leadership in Energy and Environmental Design (LEED), construction, transportation and master planning into a cohesive goal. The goal emphasizes programming, designing and building LEED-certified buildings with a target of all new buildings and major renovations on Fort Carson achieving LEED certification and all new buildings and renovations achieving LEED Gold by 2017.

13TH AIR SUPPORT OPERATIONS SQUADRON (ASOS)

The 13th Air Support Operations Squadron (ASOS) integrates air power into Army scheme of maneuvers. The squadron controls employment of allocated air assets on the battlefield and provides weather observation and weather forecasting to support to Army garrison and battlefield commanders. They coordinate and manage joint air operations with other service components and allied air forces. The 13th ASOS supports the 4th Infantry Division and the 10th Special Forces Group at Fort Carson. The 13th Air Support Operations Squadron (ASOS) building is 35,710 square feet and will house administrative, training, and equipment maintenance activities. The remaining 14,460 square feet will be a pre-engineered metal building for forty HMMWV (Humvee vehicles) storage and equipment storage.

STRATEGIES AND RESULTS

The 13th ASOS maximized the existing open space and limited construction to 11-percent of the site. Water efficient landscaping was also designed to reduce potable water consumption by 93.8-percent. The site also includes preferred parking for fuel-efficient vehicles and bicycle storage. The stormwater system is designed to limit the post-development runoff to pre-development rate and quantity. Both low-sloped and steep-sloped roofing materials help mitigate the heat island effect on the site.

The facility utilizes highly-efficient construction techniques, enhanced building envelope, thermal comfort for occupants, optimized energy performance, and enhanced refrigerant management.

The design-build team utilized materials with high recycled content including the asphalt paving, concrete, structural steel and metals. Paints, adhesives, sealants, VCT flooring, carpeting, and composite woods all feature low volatile organic compounds and chemical emissions. The project team also developed and implemented a Construction Indoor Air Quality Management Plan During Construction and Before Construction and performed a building flush of the space prior to occupancy. A carefully monitored construction waste management plan resulted in more than 70% of waste diverted from the landfill.

ABOUT FORT CARSON, COLORADO

Fort Carson, Home to the 4th Infantry Division and several large tenant units including the 43rd Area Support Battalion and the 10th Special Forces Group, is located in beautiful Colorado Springs, Colorado. The Installation was established in 1942 through land donated by the City of Colorado Springs to the War Department after the attack on Pearl Harbor. The Mountain Post Garrison Team provides units mission support and services including quality of life programs for the Fort Carson Soldiers, Families and the community to enable forces to execute expeditionary operations and to minimize stress on Soldiers and Families in a time of persistent conflict. The Fort Carson vision is to be the "Best Hometown in the Army - Home of America's Best."



U.S. Army Engineer District, Omaha

Architect: C.H. Guernsey & Company
Civil Engineer: C.H. Guernsey & Company
Commissioning Agent: Superior Balance & Commissioning, Inc.
Contractor: PCL Construction Services, Inc.
Electrical Engineer: C.H. Guernsey & Company
Interior Designer: C.H. Guernsey & Company
Landscape Architect: C.H. Guernsey & Company
LEED Consultant: N/A
Lighting Designer: N/A
Mechanical Engineer: C.H. Guernsey & Company
Owner: Fort Carson, Colorado - United States Army
Plumbing Engineer: C.H. Guernsey & Company
Structural Engineer: ZAHL-FORD, Inc.

Project Size: 35,710 square feet
Total Project Cost: \$12,395,672
Cost per square foot: \$245

Photography Courtesy of: PCL Construction Services, Inc.

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

402.995.2417
 Omaha District
 719.526.1269
 Fort Carson





**BRIGADE COMBAT TEAM- HEAVY (BCT-H) DINING FACILITY
FORT CARSON, COLORADO**

32.0% reduction in energy costs (LEED)

45.2% reduction in water use

51.3% of construction waste diverted from the landfill

LEED Facts

BCT-H Dining Facility
Fort Carson, Colorado

LEED for New Construction Version 2.2
Certification awarded September 17, 2010

Silver 35

Sustainable Sites 7/14

Water Efficiency 3/5

Energy & Atmosphere 8/17

Materials & Resources 5/13

Indoor Environmental Quality 8/15

Innovation & Design 4/5

*Out of a possible 69 points



BRIGADE COMBAT TEAM- HEAVY (BCT-H) DINING FACILITY

Fort Carson is Committed to Sustainable Development

FORT CARSON'S SUSTAINABILITY GOAL

Sustainable Development ("Create a community that encourages social, civic and physical activity while protecting the environment."), incorporates stormwater, U.S. Green Building Council Leadership in Energy and Environmental Design (LEED), construction, transportation and master planning into a cohesive goal. The goal emphasizes programming, designing and building LEED-certified buildings with a target of all new buildings and major renovations on Fort Carson achieving LEED certification and all new buildings and renovations achieving LEED Gold by 2017.

BCT-H DINING FACILITY

The Fort Carson Dining Facility is single-story, 26,500-sf dining facility that serves 1,300 soldiers. The facility includes site development, parking lots, landscaping and sidewalks. Open space and picnic pavilions are provided for outdoor recreation use.

The primary features of the Dining Facility include a 624-seat dining room with a dramatic skylight located over the server, and a commercial food preparation kitchen which provides 3,900 meals per day, served in three shifts. The kitchen is full service and equipped for on-site preparation of all meals by a staff of 54, and contains over 300 pieces of equipment. Other functions include a queuing area, smaller carry-out kitchen, high capacity dish wash room, dry storage rooms, public toilet rooms, administrative and staff support areas, service and maintenance rooms, and a two truck receiving dock.

STRATEGIES AND RESULTS

The facility meets LEED® silver criteria by employing numerous energy saving and sustainable design features. Specific features included; Cool roof – White EPDM roofing; recycled content -steel, concrete, tiles; 45.2% reduction in water use with low flow plumbing fixtures; air quality monitoring devices; low VOC building materials; water efficient landscaping; energy savings by using special kitchen hood controls; open area site layout; improved storm water management and quality; and selection of regionally manufactured building materials.

HVAC systems were selected to meet mandatory energy savings requirements in an otherwise energy intensive building type, solving the difficult challenge to achieve a 38.5% energy savings in a building with a large commercial kitchen operating at full capacity year round. The main factor in reaching this goal was the use of variable control of systems including roof top air handlers; hot and chilled water pumping; and kitchen exhaust hood and make-up systems. Monitors and sensors regulate equipment to provide exactly what is required and eliminate energy waste. The system monitors building CO2 levels. Cooking hood make-up air is connected to the HVAC system to maintain proper pressurization.

The exterior design, developed in accordance with installation design guidelines, consists of modern and traditional elements. The exterior wall assembly have an R value of 28.3 and the roof assembly has an R value of 20. The facility was pressure tested achieving .08 cfm/sf. The window system incorporates sun shades in the curtain wall and uses semitransparent glazing above the sun shades to reduce solar heat gain and glare. The window system is coupled with automatic daylighting perimeter controls calculating the amount of daylight and controlling lighting at the perimeter to reduce energy costs.



U.S. Army Engineer District, Omaha

Architect: Burgess & Niple, Inc.
Civil Engineer: Burgess & Niple, Inc.
Commissioning Agent: Precision Test and Balance
Contractor: Alutiq LLC
Electrical Engineer: Burgess & Niple, Inc.
Interior Designer: Burgess & Niple, Inc.
Landscape Architect: Burgess & Niple, Inc.
LEED Consultant: Burgess & Niple, Inc.
Lighting Designer: Burgess & Niple, Inc.
Mechanical Engineer: Burgess & Niple, Inc.
Owner: Fort Carson, Colorado - United States Army
Plumbing Engineer: Burgess & Niple, Inc.
Structural Engineer: WJA Design Collaborative

Project Size: 26,507 square feet
Total Project Cost: \$15,462,345
Cost per square foot: \$522

Photography Courtesy of: United States Army & Burgess & Niple, Inc.

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices
 402.995.2417
 Omaha District
 719.526.1269
 Fort Carson





**WHOLE BARRACKS RENEWAL
JOINT BASE LEWIS-MCCHORD (JBLM),
WASHINGTON**

15.0% reduction in energy costs
(LEED)

33.6% reduction in water use

89.5% of construction waste
diverted from the landfill

LEED Facts

Whole Barracks Renewal
JBLM, WA

LEED for New Construction Version 2.1
Certification awarded August 26, 2008

Silver 37

Sustainable Sites 10/14

Water Efficiency 3/5

Energy & Atmosphere 5/17

Materials & Resources 6/13

Indoor Environmental Quality 8/15

Innovation & Design 5/5

*Out of a possible 69 points

WHOLE BARRACKS RENEWAL

Fort Lewis Earns LEED Silver for UEPH

JBLM SUSTAINABILITY GOALS

JBLM leads the Department of Defense by aggressively looking for ways to improve the economic, social, and environmental components of all current missions in an effort to achieve true sustainability. As part of this commitment, JBLM has set an aggressive goal to construct new facilities with a LEED rating. The Army and Air Force strongly believe that the design and construction of their facilities should be done so in a manner consistent with their mission. JBLM's sustainability vision statement includes a commitment to conserving natural resources for tomorrow's generations, while seeking choices that enhance neighboring communities' abilities to have a productive future.

PROJECT BACKGROUND

The FY04 Whole Barracks Renewal Project (just one of a series of similar projects) included the construction of a 300 person barracks to house Soldiers. The Barracks has 150 units each with two occupants; each unit includes a bathroom and kitchen. Common areas, including a lobby and mailroom, are on the first floor. An open courtyard in the center of the building provides an outdoor communal space.

Fort Lewis has a strong commitment to the incorporation of sustainable design strategies and practices into all facilities and operations on the installation. The FY04 Barracks was the first project to be submitted for LEED certification. Fort Lewis is dedicated to sustainable building and taking forward the lessons learned for future projects.

STRATEGIES AND RESULTS

The project design took into careful consideration the impacts that construction would have on the site. A 359,274 gallon rainwater harvesting system was installed to both manage stormwater on site as well as provide irrigation during the summer months, which accounts for a significant reduction in potable water use. Additionally, native and drought resistant plants were selected for the landscaping to further reduce potable water needs. The typical landscape at Fort Lewis includes large areas of turf with very little shrubbery. At the FY04 Barracks project this standard practice has been reversed in order to save on irrigation requirements and to provide a more varied landscape.

Within the building, water efficient fixtures have been installed allowing the project to demonstrate a 36% water savings. Waterless urinals were installed on the main floor and low flow showerheads were installed within the living units. The building is primarily naturally ventilated and does not have any air conditioning. Mild conditions combined with an integrated design allowed for the elimination of air conditioning and instead operable windows will provide cooling and ventilation in the summer months. Committed to providing quality indoor air, low emitting paint, adhesives, sealants and carpets were used throughout the building. Fort Lewis decided to make the Barracks a non-smoking facility to further protect the health of those in the building.

Construction waste was closely monitored throughout construction in order to achieve close to a 90% diversion rate. Products with a high-recycled content that were manufactured locally were given preference as is shown by achievement of credits MRC4 and MRC5.

ABOUT JOINT BASE LEWIS-MCCHORD

On Oct. 1, 2010, a process that began five years ago culminated when Joint Base Lewis-McChord reached its final operational capability and was formally established as one of 12 joint bases worldwide. Merging Fort Lewis and McChord Air Force Base, the creation of JBLM was directed as part of a 2005 Base Realignment and Closure action. With the establishment of the joint base, all installation support functions are provided by the Army-led Joint Base Garrison to all the services on the base - Army, Air Force, Navy and Marines.



U.S. Army Engineer District, Seattle

Architect: WJA Design Collaborative
Design /Build Contractor: Absher Construction
Civil Engineer: WJA Design Collaborative
Commissioning Agent: Green Building Services
Energy Modeling: Green Building Services
Environmental Advisor: Green Building Services
Electrical Engineer: Ault Electric Co
HVAC Engineer: Hermanson Company
Interior Designer: WJA Design Collaborative
Landscape Architect: WJA Design Collaborative
Lighting Consultant: Ault Electric Co
Owner: United States Army Corps of Engineers
Structural Engineer: WJA Design Collaborative
Sustainable Design Consultant: Green Building Services

Project Size: 109,770 square feet
Total Project Cost: \$19,425,245
Cost per square foot: \$177

Photography Courtesy of: Green Building Services

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

206.764.3742

Seattle District

253.967.6221

JBLM





**MARSHALL ARMY AIRFIELD AND
SOUTHSIDE FACILITIES
FORT RILEY, KANSAS**

17.7% reduction in energy costs
(LEED)

42.9% reduction in water use

98.7% of construction waste
diverted from the landfill

LEED Facts

Marshall Army Airfield and
Southside Facilities
Fort Riley, Kansas

LEED for New Construction Version 2.2
Certification awarded October 1, 2010

Silver 33

Sustainable Sites 8/14

Water Efficiency 4/5

Energy & Atmosphere 4/17

Materials & Resources 5/13

Indoor Environmental Quality 7/15

Innovation & Design 5/5

*Out of a possible 69 points

MARSHALL ARMY AIRFIELD AND SOUTHSIDE FACILITIES

Fort Riley Earns LEED Silver for Airfield Campus

PROJECT BACKGROUND

As Fort Riley continues to receive expanded missions from the consolidation of Army operations around the United States, the Fort Administration is committed to sustainable expansion, seeking LEED Silver certification for all new and renovated construction projects.

In support of the Combat Aviation Brigade, Burns & McDonnell served as the Design-Build contractor for the construction of a 4,500' runway with airfield and approach lighting, helicopter parking aprons, taxiways, compass swing base, 6-bay helicopter maintenance hangar, two battalion headquarters, three company operations facilities, lighting control building, site work and utility upgrades.

MARSHALL ARMY AIRFIELD CAMPUS

The expansion to the airfield site was developed as a campus setting and clustered with existing infrastructure in order to reduce paved surfaces such as additional access roads, sidewalks and parking areas.

The airfield campus was organized in two distinct zones. Large-scale aircraft-oriented industrial buildings are sited along the airfield flight line. Smaller, human-scale administrative facilities are located across a central spine road with trees to provide sight and sound buffers from flight line activities.

STRATEGIES AND RESULTS

Storm water runoff is treated through a series of vegetated swales and retained on site to maintain the natural flow of the nearby Kansas River. Open space surrounds each building creating vistas and pleasant outdoor congregation spaces, while a physical training trail and exercise stations weave throughout the project site.

Energy and water efficiencies were aggregated across a campus with varying functions ranging from a helicopter maintenance hangar, taxiways with directional lighting, aircraft aprons with specialized pilot-operated lighting controls and smaller-scale 16,000 square foot administrative headquarters.

Energy conservation measures include improved thermal envelope, high performance glazing, lighting controls, occupancy sensors and high-efficiency chillers and boilers. Low-flow plumbing fixtures reduce water use by 43% and native landscape eliminates the need for a permanent irrigation system.

The largest amount of demolition debris came from removal of the airfield's existing damaged runway. Over 65,000 tons of concrete pavement was crushed and stockpiled on-site. This material was then recycled as base aggregate for the new parking areas and building slabs, resulting in over 98% of construction and demolition waste material diverted from landfill.

Locally available materials were selected for use on the Fort, with over 44% of building materials from regional sources. CMU, brick and precast concrete provide durable and easily maintained finishes to ensure longevity in areas of heavy troop usage. Additionally, the area's gypsum plants and steel fabrication mills supplied building materials with lower embodied energy and reduced transportation impacts.

ABOUT FORT RILEY

Fort Riley, named in honor of Major General Bennett C. Riley who led the first military escort along the Santa Fe Trail, was established in 1853 as a military post to protect the movement of people and trade over the Oregon-California and Santa Fe trails. More than a century later, Fort Riley continues to play an important role in the defense of our nation and the training of our soldiers.

Located in the central flint hills region of Northeast Kansas, Fort Riley is approximately 60 miles west of Topeka, the state capital of Kansas. Surrounded by tallgrass prairie, the Fort Riley Military Reservation covers 100,656 acres across Geary and Riley counties.

"We must plan and execute actions which enable us to provide necessary forces to the Combatant Commanders while operating in an environment of reduced or limited fiscal and natural resources. Just as we fight as we train, we must train and operate as we fight to become more self-sufficient, and efficient with the resources we have."

Vice President, Facility Management
Quote Attribution: Fort Riley Website



U.S. Army Engineer District, Kansas City

Architect: Burns & McDonnell
Civil Engineer: Burns & McDonnell
Commissioning Agent: Burns & McDonnell
Contractor: Burns & McDonnell
Interior Designer: Burns & McDonnell
LEED Consultant: Burns & McDonnell
Mechanical Engineer: Custom Engineering
Owner: United States Army Garrison, Fort Riley
Structural Engineer: Burns & McDonnell

Project Size: 204,000 square feet
Total Project Cost: \$57,758,074
Cost per square foot: \$198

Photography Courtesy of: Burns & McDonnell

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

816.389.3819
Kansas City District
785.239.3410
Fort Riley





**GROW THE FORCE (GTF) JACKSON AVE BARRACKS
JOINT BASE LEWIS-MCCHORD, WA**

36.4% reduction in energy costs (LEED)

42.7% reduction in water use

85.5% of construction waste diverted from the landfill

LEED Facts

GTF Jackson Ave Barracks
Joint Base Lewis-McChord, WA

LEED for New Construction Version 2.2
Certification awarded December 10, 2010

Silver 35

Sustainable Sites 10/14

Water Efficiency 4/5

Energy & Atmosphere 4/17

Materials & Resources 6/13

Indoor Environmental Quality 8/15

Innovation & Design 3/5

*Out of a possible 69 points

GTF JACKSON AVE BARRACKS

Fort Lewis Earns LEED Silver for Barracks

JBLM SUSTAINABILITY GOALS

Air Quality- Reduce installation stationary source and non-tactical motor vehicle air emissions by 85% by 2025.

Energy- Reduce total energy consumption by 30% by 2015.

-Sustain all activities on Post using renewable energy sources and generate all electricity on post by 2025.

Sustainable Community- Create sustainable neighborhoods for a livable JBLM community that enhances the Puget Sound Region.

Products and Materials- Recycle all material use to achieve zero net waste by 2025.

Sustainable Training Lands- Maintain the ability of JBLM to meet its current and future military missions without compromising the integrity of natural and cultural resources, both on the installation and regionally.

-Recover all listed and candidate federal species in the South Puget Sound Region.

Water Resources- Treat all wastewaters to Class A reclaim standards by 2025 to conserve water resources and improve Puget Sound water quality.

PROJECT BACKGROUND

Designed with Joint Base Lewis-McChord's sustainability goals as a top priority, the UEPH project achieved a high Silver rating without sacrificing quality or comfort. These barracks feature garden style apartments with a kitchenette, washer and dryer unit, full bath, two walk-in closets, and an eating area in each unit. The end results are three facilities which house 300 personnel with a semi-enclosed courtyard and a visitor center intended to perform both as a visitor center and community area as a pool table is included.

STRATEGIES AND RESULTS

To achieve a high silver rating, the facilities utilized site design strategies such five infiltration basins to achieve zero net runoff of stormwater, bicycle storage spaces, reserved parking spaces for low emitting and fuel efficient vehicles, a highly reflective roof, water efficient landscaping, maximized open spaces and site light pollution reduction.

Through architectural and engineering design strategies, the facilities utilized measures which included optimal building orientation, day lighting, building envelope efficiencies, optimized energy performance, enhanced refrigerant management, thermal comfort, increased ventilation, and energy and water efficient fixtures.

During construction, several innovative techniques were implemented and closely monitored. These included waste management techniques which resulted in 85.5% of waste being diverted from the landfill, 22.12% of materials installed were from post and pre consumer recycled content, low VOC content of all adhesives, sealants, paints and primers, and an indoor air quality plan to ensure that all occupants during and after construction have clean air to breathe.

ABOUT JOINT BASE LEWIS-MCCHORD

On Oct. 1, 2010, a process that began five years ago culminated when Joint Base Lewis-McChord reached its final operational capability and was formally established as one of 12 joint bases worldwide. Merging Fort Lewis and McChord Air Force Base, the creation of JBLM was directed as part of a 2005 Base Realignment and Closure action. With the establishment of the joint base, all installation support functions are provided by the Army-led Joint Base Garrison to all the services on the base - Army, Air Force, Navy and Marines.

"Through an integrated design and construction process the GTF Jackson Avenue Barracks provides an environmentally responsive home for 300 of this country's greatest assets, it's soldiers. With occupant comfort and health in mind, the complex utilized varied USGBC green design techniques to achieve its LEED Silver certification."

John Rhebergen, AIA, LEED AP BD + C, Vice President of GMLV



U.S. Army Engineer District, Seattle

Architect: GLMV Architecture, Inc.

Civil Engineer: PEC Engineers

Contractor: MW Builders, Inc.

Mechanical Engineer: LST Consulting Engineers

Owner: Fort Lewis Directorate of Public Works

Project Manager: GLMV Architecture, Inc.

Project Size: 115,748 square foot

Total Project Cost: \$26,982,901

Cost per square foot: \$204

Photography Courtesy of: MW Builders, Inc.

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

206.764.3742

Seattle District

253.967.6221

JBLM





UNACCOMPANIED ENLISTED PERSONNEL HOUSING, BCT-1 FORT BLISS, TEXAS

40.5% reduction in energy costs (LEED)

20.9% reduction in water use

64.4% of construction waste diverted from the landfill

LEED Facts

Unaccompanied Enlisted Personnel Housing, BCT-1 Fort Bliss, Texas

LEED for New Construction Version 2.2
Certification awarded July 29, 2010

Silver 34

Sustainable Sites 8/14

Water Efficiency 3/5

Energy & Atmosphere 10/17

Materials & Resources 3/13

Indoor Environmental Quality 7/15

Innovation & Design 3/5

*Out of a possible 69 points



UNACCOMPANIED ENLISTED PERSONNEL HOUSING

LEED Certification for Army Facility

PROJECT BACKGROUND

On May 13, 2005 the Pentagon released its Base Realignment and Closure Program (BRAC) recommendations, which included plans to transform Fort Bliss into a heavy armor training post. As part of this transformation the panel recommended realigning this base to include approximately 11,500 new troops from the U.S. 1st Armored Division currently stationed in Germany, as well as units from Fort Sill and Fort Hood.

THE FORT BLISS EXPANSION PROGRAM

With a projected 300% increase in population by 2012 Fort Bliss is immersed in the biggest transformation in its 160-year history. The United States Army is investing more than \$3 billion in construction for new, top-of-the-line facilities for the incoming personnel and their families.

UNACCOMPANIED ENLISTED PERSONNEL HOUSING (UEPH)

The UEPH at Fort Bliss is the flagship facility for the new housing standard. The goal was to provide comfortable apartment-style quarters while also creating a livable and sustainable community for enlisted personnel. The facility houses 128 personnel around a community courtyard. The courtyard was specifically designed to enhance the quality of life by encouraging and supporting social activities among personnel.

STRATEGIES AND RESULTS

The UEPH site features preferred parking for fuel-efficient vehicles and a network of sidewalks to encourage pedestrian and bicycle traffic throughout the complex. The stormwater system is designed to limit the post-development runoff to pre-development rate and quantity. Highly reflective hardscape and roofing materials help mitigate the heat island effect on the site.

The facility utilizes highly-efficient construction techniques, enhanced building envelope, efficient windows with sunshades and split system mechanical units with SEER ratings higher than the baseline. These strategies in aggregate are anticipated to reduce the facility's energy cost by 40%. Enhanced commissioning of building systems was performed to aid energy efficiency of the facility.

The design-build team utilized materials with high recycled content including the concrete, structural steel and metals. Paints, adhesives, sealants and VCT flooring systems all feature low volatile organic compounds and chemical emissions. A carefully monitored construction waste management plan resulted in more than 64% of waste diverted from the landfill.

"Fort Bliss is leading the way as steward of the environment. In July 2010 the Unaccompanied Enlisted Personnel Housing (UEPH) for the Brigade Combat Team 1(BCT1) obtained the first LEED -NC v2.2 Silver certification for the Installation. The world has been faced with climate change and stresses on our human and natural resource environment, and yet, the Army and Fort Bliss are leading by example in the efforts in building and sustaining a healthy environment for the future."

Quote Attribution: USACE Tech Section, Ft. Bliss



U.S. Army Engineer District, Fort Worth

Architect: The Benham Companies, LLC
Civil Engineer: Jacobs Huitt-Zollars
Commissioning Agent: TMCx Colorado, LLC
Contractor: Hensel Phelps Construction Co.
Electrical Engineer: The Benham Companies, LLC
Interior Designer: The Benham Companies, LLC
Landscape Architect: Jacobs Huitt-Zollars
LEED Consultant: The Benham Companies, LLC
Lighting Designer: The Benham Companies, LLC
Mechanical Engineer: The Benham Companies, LLC
Owner: Fort Bliss, Texas - United States Army
Plumbing Engineer: The Benham Companies, LLC
Structural Engineer: Wallace Engineering

Project Size: 50,928 square feet

Total Project Cost: \$7,600,000

Cost per square foot: \$149

Photography Courtesy of: United States Army

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

817.886.1326

Fort Worth District

915.568.2121

Fort Bliss





**BASE REALIGNMENT AND CLOSURE
(BRAC)-MEDICAL EDUCATION AND
TRAINING CAMPUS (METC)
DINING FACILITY
FORT SAM HOUSTON, TEXAS**

14.0% reduction in energy costs
(LEED)

54.9% reduction in water use

84.9% of construction waste
diverted from the landfill

LEED Facts

BRAC-METC Dining Facility
Fort Sam Houston, Texas

LEED for New Construction Version 2.2
Certification awarded May 27, 2010

Silver 35

Sustainable Sites 9/14

Water Efficiency 4/5

Energy & Atmosphere 2/17

Materials & Resources 7/13

Indoor Environmental Quality 10/15

Innovation & Design 3/5

*Out of a possible 69 points

BRAC-METC DINING FACILITY

Dining Facility Receives LEED Silver Certification

PROJECT BACKGROUND

As part of the Base Realignment and Closure (BRAC) process, the Department of Defense has worked to consolidate programs shared amongst the different branches of the military. The development of the Medical Education and Training Campus (METC) at Fort Sam Houston, San Antonio, Texas is the result of the consolidation of the medical training programs of the Air Force, Army, and Navy. The campus is designed much like a small school of higher learning including dorms, classrooms, a dining hall and additional support facilities.

BRAC-METC DINING FACILITY

The BRAC-METC Dining Hall is a two-story 80,000 sf dining facility built as part of the Medical Education Training Campus (METC) at Fort Sam Houston in San Antonio, TX. This dining hall, the largest in North America, will provide three meals each day to approximately 4,800 medical trainees within three 30 minute dining periods. In addition to the demands imposed upon the design of feeding so many people in such a short period of time, the project was identified to incorporate sustainable design principles with LEED Silver as the goal.

The METC is a redevelopment of an area of the post which has fallen into disuse. It is intended as a multi-branch medical training center, accepting Air Force, Army and Navy personnel. The campus includes barracks, classroom buildings, the dining hall and various support facilities all located within a short march of one another. Along with the existing post facilities and services this new complex creates a 'small town' atmosphere helping to develop the sense of community while ensuring that all necessities are within walking distance for the trainees.

Three times each day, the trainees will march to the dining hall with their training unit. The units form up for muster in the open air pavilions adjacent to the dining hall before proceeding in, washing their hands and receiving their food. This mandatory hand washing combined with the demands of the commercial kitchen lead to a rather high baseline water use for the project. Through careful selection of wash basins and kitchen equipment the designed water use has been greatly reduced. In addition Fort Sam Houston has a 'no irrigation' policy helping to further reduce the facility's demand upon the region's limited potable water supplies.

Due to the kitchen activities and the large number of people passing through the dining hall the energy use demand for cooling and exhausting are higher than one would encounter in most other building types. This presented a unique challenge to the design team in their attempt to minimize the energy needed for the new facility. Through careful coordination between kitchen and mechanical system designers the design was integrated to meet the requirements of the kitchen staff while minimizing the building's energy use to maintain a comfortable indoor environment for everyone.

The dining hall itself is designed primarily of concrete, a material that meets the durability requirements of a military building, and is widely available in the area. Using tilt-panel construction and a careful attention to detail, the resulting building fits into the contextual aesthetic of the nearby 1920s era stucco finish buildings while incorporating modern design and meeting future needs of the military. The end result is a building which is durable, has lower operational costs than a comparable facility and most importantly meets the needs of the users.



U.S. Army Engineer District, Fort Worth

Architect: Jacobs
Civil Engineer: Jacobs
Commissioning Agent: Jacobs
Contractor: SpawGlass
Electrical Engineer: Jacobs
Interior Designer: Jacobs
Landscape Architect: Jacobs
LEED Consultant: Jacobs
Lighting Designer: Jacobs
Mechanical Engineer: Jacobs
Owner: Fort Sam Houston, Texas - United States Army
Plumbing Engineer: Jacobs
Structural Engineer: Jacobs

Project Size: 80,000 square feet
Total Project Cost: \$28,000,000
Cost per square foot: \$350

Photography Courtesy of: Jacobs

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices
 817.886.1326
 Fort Worth District
 210.221.1151
 Fort Sam Houston





**ARMY AVIATION SUPPORT FACILITY ON
BUCKLEY AIR FORCE BASE (AFB)
BUCKLEY AFB, AURORA, COLORADO**

40.0% reduction in energy costs
(LEED)

45.1% reduction in water use

93.8% of construction waste
diverted from the landfill

LEED Facts

Army Aviation Support Facility
on Buckley AFB
Buckley AFB, Aurora, Colorado

LEED for New Construction Version 2.1
Certification awarded August 19, 2008

Silver 35

Sustainable Sites 9/14

Water Efficiency 3/5

Energy & Atmosphere 6/17

Materials & Resources 5/13

Indoor Environmental Quality 8/15

Innovation & Design 4/5

*Out of a possible 69 points

ARMY AVIATION SUPPORT FACILITY



ARMY AVIATION SUPPORT FACILITY

Buckley AFB Receives LEED Silver Certification

PROJECT BACKGROUND

In 2003 the Colorado Army National Guard expanded the number and type of aircraft at the aviation command's Buckley Air Force Base Aviation Facility necessitating construction of a new Army Aviation Support Facility (AASF). Design was initiated in September 2003 for a new 110,000 AASF to serve as the home for their Aviation Command providing operations and maintenance support for the Guard's six CH-47 Chinook and sixteen UH-60 Blackhawk helicopters. The facility, their first to be designed for LEED® certification, focused on innovative solutions to meet current mission needs, but also to serve as an energy-efficient model for future designs. Located on Buckley Air Force Base in Aurora, CO the AASF also received the Air Force 2008 Honor Award for Sustainable Design, and the 2009 Honor Award for Interior Design.

SUSTAINABLE SITE

Light-reflective materials, selected for their contributions to energy savings and their positive impacts on the facility's micro-climate, were used for 100% of the roofing and 80% of the paving. Light-reflective paving has the additional benefit of reducing heat-related damage to parked aircraft and reducing lighting loads and enhances facility daylighting.

The AASF provides a critical link in the base storm water management plan. It provides more than 400,000 SF of vegetative open space and a stormwater detention system that, linked with a base-wide system, helps control base stormwater quantity and quality.

WATER EFFICIENCY

Xeriscape technology and roof runoff were used on the AASF to reduce irrigation water consumption by more than 50%. Domestic water consumption was also reduced with automatic cut-off plumbing fixtures, low-flow aeration faucet and shower heads, and waterless solutions that eliminate the need for water altogether. Together, these technologies are reducing water consumption in the facility by 45.1%.

ENERGY EFFICIENCY

Heat recovery, innovative daylighting solutions, high-efficiency equipment, a well-insulated building envelope, and facility management tools all contribute to a designed energy savings of 40%. Aircraft maintenance hangars require one air change per hour to prevent a fuel vapor build up explosion hazard. With over 2,000,000 cubic feet to be heated to 65 during the winter, degrees this can be costly. Heat exchanging units were inserted into the winter air stream to pretreat winter air. Evaporative cooling units were also inserted into the summer air stream to lower hangar temperatures up to 15 degrees when outdoor temperature tops 90 degrees.

The AASF has a state-of-the-art monitoring and control capability that provides facility managers building mechanical systems internet access to control performance. This link allows an operator to adjust set points to turn heat down after hours or ventilate the building with cool night air on hot days. Dimming ballasts, light sensors, and an effective daylighting contribute to a saving of 30% over the energy for typical lighting.

MATERIAL AND RESOURCES

The AASF project made every effort to use materials made from recycled materials. The recycled content of steel, concrete, carpet and other interior finishes was carefully monitored. Steel used in the structural framing, roof, corrugated metal siding and interior corrugated finishes was 80% – 95% recycled material. Overall, more than 20% of the material in this building came from recycled material. In addition, over 75% of the excess materials generated were diverted to material recyclers, with more than 8,000 tons of material diverted from landfills and used in some other form for construction.

INDOOR ENVIRONMENTAL QUALITY

The AASF pays particularly careful attention to indoor environmental quality. A smoke-free environment and materials with low volatile organic compounds (VOCs) reduce indoor chemical pollutants and make the air healthier to breathe. The hangar also uses a combination of light shelves, skylights, and translucent wall panels to flood the building with daylight. Combined, the three systems provide enough daylight through the majority of the day to light the hangars sufficiently without artificial light. But when daylight levels drop below 50 foot candles on the floor, daylight sensors signal the hangar's light dimmers to increase artificial lighting. This daylight harvesting system is estimated to save 30% of the electricity used to light the hangar.

"The Army Aviation Support Facility was created with sustainability in mind, but the final product far surpasses mere efficiency. It is aesthetically stunning, and it blends effortlessly with its native environment."

Clyde A. Vaughn, Lt. General, US Army, Director, Army National Guard



Colorado National Guard

Architect: CH2M HILL with Coover-Clark and Associates
Civil Engineer: CH2M HILL
Commissioning Agent: CH2M HILL
Contractor: CH2M HILL
Electrical Engineer: CH2M HILL
Interior Designer: Coover-Clark and Associates
Landscape Architect: Coover-Clark and Associates
LEED Consultant: CH2M HILL
Lighting Designer: CH2M HILL
Mechanical Engineer: CH2M HILL
Owner: Colorado Army National Guard
Plumbing Engineer: CH2M HILL
Structural Engineer: CH2M HILL

Project Size: 109,920 square feet
Total Project Cost: \$29,271,000
Cost per square foot: \$191.05

Photography Courtesy of: Ron Johnson Photography

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Colorado Army National Guard
 720.250.1371
 Construction and Facilities Management Office





UNIT MAINTENANCE FACILITIES, COF FORT CARSON, COLORADO

33.7% reduction in energy costs
(LEED)

49.4% reduction in water use

77.5% of construction waste
diverted from the landfill

LEED Facts

Unit Maintenance Facilities, COF
Fort Carson, Colorado

LEED for New Construction Version 2.2
Certification awarded January 13, 2011

Silver **36**

Sustainable Sites 5/14

Water Efficiency 3/5

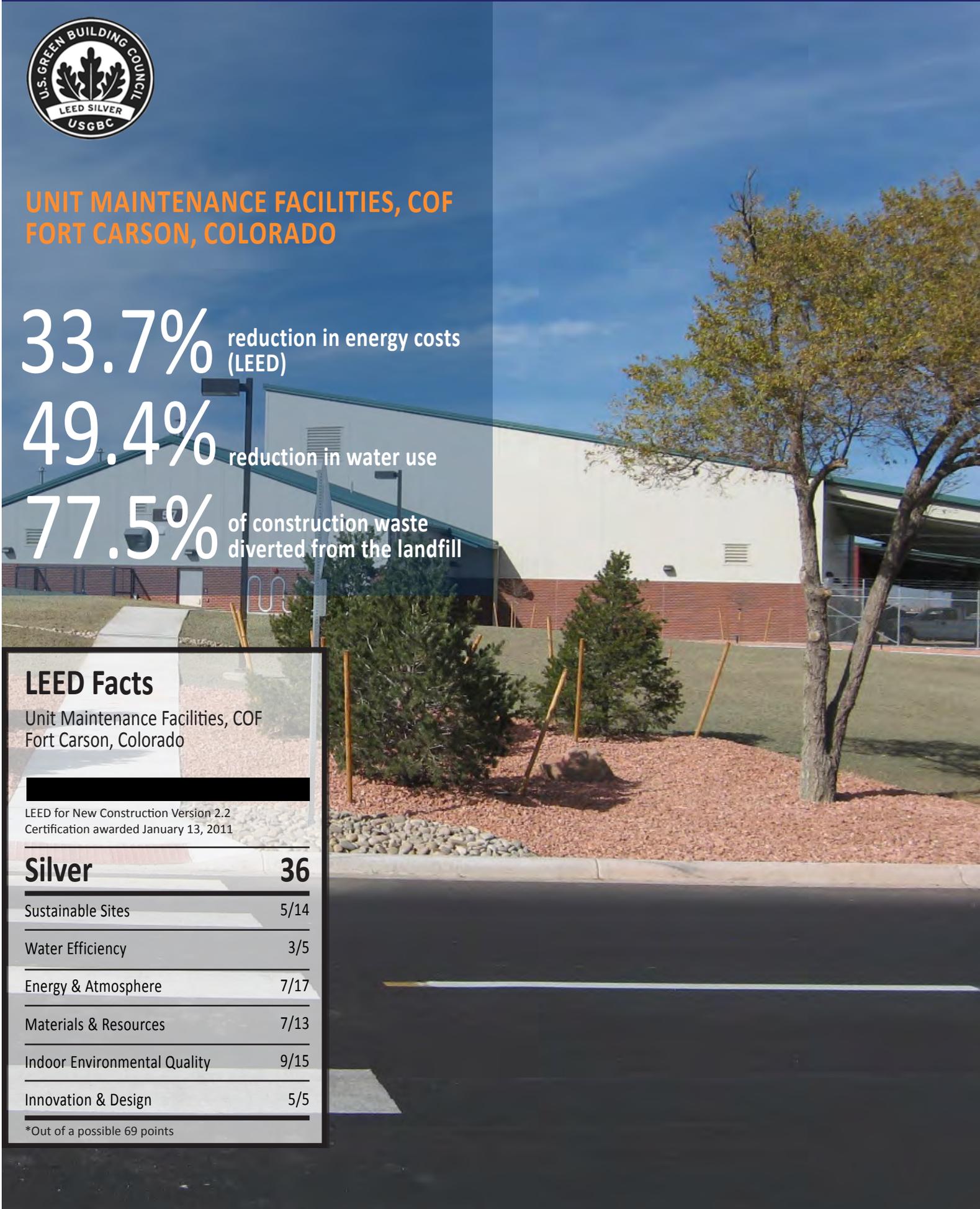
Energy & Atmosphere 7/17

Materials & Resources 7/13

Indoor Environmental Quality 9/15

Innovation & Design 5/5

*Out of a possible 69 points



UNIT MAINTENANCE FACILITIES, COF

Fort Carson Receives LEED Silver Certification

PROJECT BACKGROUND

The architectural theme for the Company Operations Facility (COF) – Unit of Maintenance (UM) at Fort Carson enhances the established campus environment that conveys an appropriate sense of place, pride, community and identity for soldiers in the 21st century to meet the future force structure of units of action. The design of the COF complements the visual image at Fort Carson and offers a visual unification with the design of the existing O’Connell COF. The simplicity of the architectural design, form, materials and colors were selected to express mission and function and to articulate an architectural character that is compatible with the Army installation design standards at Fort Carson. The overall goal is to provide a functional, quality and visually appealing facility that is a source of pride for the installation and delivered within budget and schedule.

FORT CARSON IS COMMITTED TO SUSTAINABLE DEVELOPMENT

Fort Carson’s sustainability goal - Sustainable Development (“Create a community that encourages social, civic and physical activity while protecting the environment.”), incorporates stormwater, U.S. Green Building Council Leadership in Energy and Environmental Design (LEED), construction, transportation and master planning into a cohesive goal. The goal emphasizes programming, designing and building LEED-certified buildings with a target of all new buildings and major renovations on Fort Carson achieving LEED certification and all new buildings and renovations achieving LEED Gold by 2017.

STRATEGIES AND RESULTS

The architectural character and materials chosen for the Company Operation Facilities achieves this purpose by incorporating modern materials and construction techniques, sustainable design features, anti-terrorism/force protection, low maintenance, durability and safety.

The primary structure of the COF is a pre-engineered metal building. The life cycle of pre-engineered metal buildings compares exceptionally well with other building materials and meets the Army’s objective that these buildings have a 25-year useful life before needing any major renovation, repair, or replacement. This building system incorporates the best life-cycle cost considerations to ensure maximum use of U. S. Army Corps of Engineers (USACE) standard designs including the flexibility to accommodate unique mission requirements, local site conditions and architectural themes. The pre-engineered building system has undergone the test of time and provides the USACE the highest degree of sustainability, reliability, and efficiency.

The structural steel members are factory electro-coated for positive protection against abrasion and corrosion and superior to the performance of spray-on primers produced by other manufacturers. The pre-engineered structure will be covered by insulated metal panels on the exterior skin of the building. These insulated panels provide increased R-values which led to better efficiency in heating, ventilation and air conditioning. The standing seam metal roof panels offer outstanding weather tightness and wind uplift resistance ratings.

The masonry veneer wall that wraps around the entire facility emulates the visual imagery established at the O’Connell installation and provides a durable and protective wall surface at the base of the wall. Choice of materials was selected for their architectural compatibility, longevity and maintenance characteristics. Pre-finished low maintenance materials and colors were selected to reflect the color palette of the installation. Protective measures are incorporated including blast-resistant window glazing and window frames.

LEED coordination efforts between the general contractors LEED-AP and DOR, Merrick’s LEED AP began in design and followed through LEED Design Review. All aspects of the building design were discussed for possible modification to attain the maximum possible LEED sustainable results. On the general contractors side constant coordination between Project Manager, QC, Superintendent and LEED AP guaranteed a positive result. Project Manager and LEED AP coordinated to procure LEED compliant materials through buyout. The result was Exemplary Performance: MR 4/ Recycled Content with 33.33% attained. It is a TEPA policy to surpass RFP requirements [50% diversion from landfill] for Waste Management, 77.45% waste diverted from landfill for the project. Regional Material MR 5 though difficult to attain in Colorado attained 22.63%.

ABOUT FORT CARSON, COLORADO

Fort Carson, Home to the 4th Infantry Division and several large tenant units including the 43rd Area Support Battalion and the 10th Special Forces Group, is located in beautiful Colorado Springs, Colorado. The Installation was established in 1942 through land donated by the City of Colorado Springs to the War Department after the attack on Pearl Harbor. The Mountain Post Garrison Team provides units mission support and services including quality of life programs for the Fort Carson Soldiers, Families and the community to enable forces to execute expeditionary operations and to minimize stress on Soldiers and Families in a time of persistent conflict. The Fort Carson vision is to be the “Best Hometown in the Army - Home of America’s Best.”



U.S. Army Engineer District, Omaha

Architect: Merrick
Civil Engineer: Merrick
Commissioning Agent: Farnsworth Group
Contractor: TEPA EC, LLC
Electrical Engineer: Merrick
Interior Designer: Merrick
Landscape Architect: Merrick
Lighting Designer: Merrick
Mechanical Engineer: Merrick
Owner: Fort Carson, Colorado
Plumbing Engineer: Merrick
Structural Engineer: Merrick

Project Size: 20,730 square feet
Total Project Cost: \$3,200,000
Cost per square foot: \$154

Photography Courtesy of: TEPA EC, LLC

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council’s Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices
 402.995.2417
 Omaha District
 719.526.1269
 Fort Carson





WHITSIDE DINING FACILITY (DFAC) FORT RILEY, KANSAS

42.4% reduction in energy costs
(LEED)

32.1% reduction in water use

62.4% of construction waste
diverted from the landfill

LEED Facts

Whitside Dining Facility (DFAC)
Fort Riley, Kansas

LEED for New Construction Version 2.2
Certification awarded September 16, 2010

Silver **33**

Sustainable Sites 7/14

Water Efficiency 4/5

Energy & Atmosphere 5/17

Materials & Resources 6/13

Indoor Environmental Quality 10/15

Innovation & Design 1/5

*Out of a possible 69 points

WHITSIDE DINING FACILITY (DFAC)

Fort Riley Receives LEED Silver Certification

PROJECT BACKGROUND

In preparation for the redeployment of the 1st Infantry Division's Combat Aviation Brigade, following a 15-month deployment to Iraq, the garrison at Fort Riley, through the U.S. Army Corps of Engineers, contracted for a new barracks complex on the grounds of Camp Whitside. The new barracks complex includes the construction of six barracks buildings, under separate contract, and this accompanying dining facility, which is the military equivalent of a civilian college or corporate cafeteria.

STRATEGIES AND RESULTS

Through thoughtful planning, the Whitside Dining Facility offers the following features:

The dining facility has been centrally located within the complex of barracks buildings and connected to the complex through integrated troop paths that encourage pedestrian access. Careful consideration of building location and orientation was given with regard to views of the historic First Territorial Capitol of Kansas, located less than one-half mile south of the building, along Huebner Road. Additionally, bicycle racks are provided for both staff and visitors, with changing rooms provided for the staff.

The location of the dining facility within the complex has been designed to maintain adequate levels of green-belt open-space. As part of this design, 58.7% of the project site area is maintained as vegetated, protected or restored habitat, maximizing an open space 4.7 times greater than the area of the building's footprint, immediately surrounding the building. As a further measure of the site's sustainability, All vegetated open space is composed of non-irrigated native and/or adaptive species that have been selected for their drought tolerance and their ability to survive solely upon annual precipitation.

Of the remaining site areas, the hardscape has been designed to help reduce heat island effects by providing minimum 29 SRI concrete, in lieu of heat absorbing asphalt, wherever possible. Additionally, the dining facility's roof is composed of highly reflective white TPO membrane with an SRI value of 97, significantly higher than the required minimum of 78.

Sustainable environmental measures have been implemented within the building envelope, as well. Careful selection of existing, industry-standard, water-saving plumbing fixtures, including kitchen equipment, has resulted in a 32% reduction of potable water use.

A high-level of indoor environmental quality was maintained throughout the construction cycle, beginning with the dust and contaminate control measures established during construction, selection and use of low- and no-VOC finishes, the implementation of a whole-building flush-out prior to occupancy, the provision of a separately-ventilated chemical use area, and increased ventilation throughout the building.

Building energy requirements were further reduced by the use of Energy Star labeled kitchen and HVAC equipment, high-efficiency window systems, and building sunshades. Indoor lighting is fully automated, through the use of occupancy sensors and time clocks. And, HVAC equipment is user-adjustable and zone-controlled, separately, between kitchen, serving and dining areas.

The project's environmental impact, as a result of raw materials requirements, was reduced by the use of building materials with more than 20% recycled content, more than 25% of materials produced within the region, and nearly 70% of wood from FSC-certified sources. Additionally, with the help of Fort Riley's Material Recovery Facility, more than 62% of construction waste was diverted from landfill.



U.S. Army Engineer District, Kansas City

Architect: MaxFour

Civil Engineer: MaxFour

Commissioning Agent: Innovative Sustainable Solutions, Inc.

Contractor: MaxFour-Weitz JV

Electrical Engineer: Henderson Engineers, Inc.

Interior Designer: MaxFour

Landscape Architect: MaxFour

LEED Consultant: MaxFour

Lighting Designer: Henderson Engineers, Inc.

Mechanical Engineer: Metro Air Conditioning, Inc.

Owner: Fort Riley, Kansas - United States Army

Plumbing Engineer: Henderson Engineers, Inc.

Structural Engineer: The Sheflin Group, Inc.

Project Size: 17,254 square feet

Total Project Cost: \$7,700,000

Cost per square foot: \$342

Photography Courtesy of: MaxFour-Weitz JV

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

816.389.3819

Kansas City District

785.239.3410

Fort Riley





**CHILD DEVELOPMENT CENTER,
AGES 6-10 YEARS
FORT CARSON, COLORADO**

16.2% reduction in energy costs
(LEED)

41.3% reduction in water use

81.9% of construction waste
diverted from the landfill

LEED Facts

Child Development Center,
ages 6-10 years
Fort Carson, Colorado

LEED for New Construction Version 2.2
Certification awarded November 29, 2010

Silver **33**

Sustainable Sites 8/14

Water Efficiency 4/5

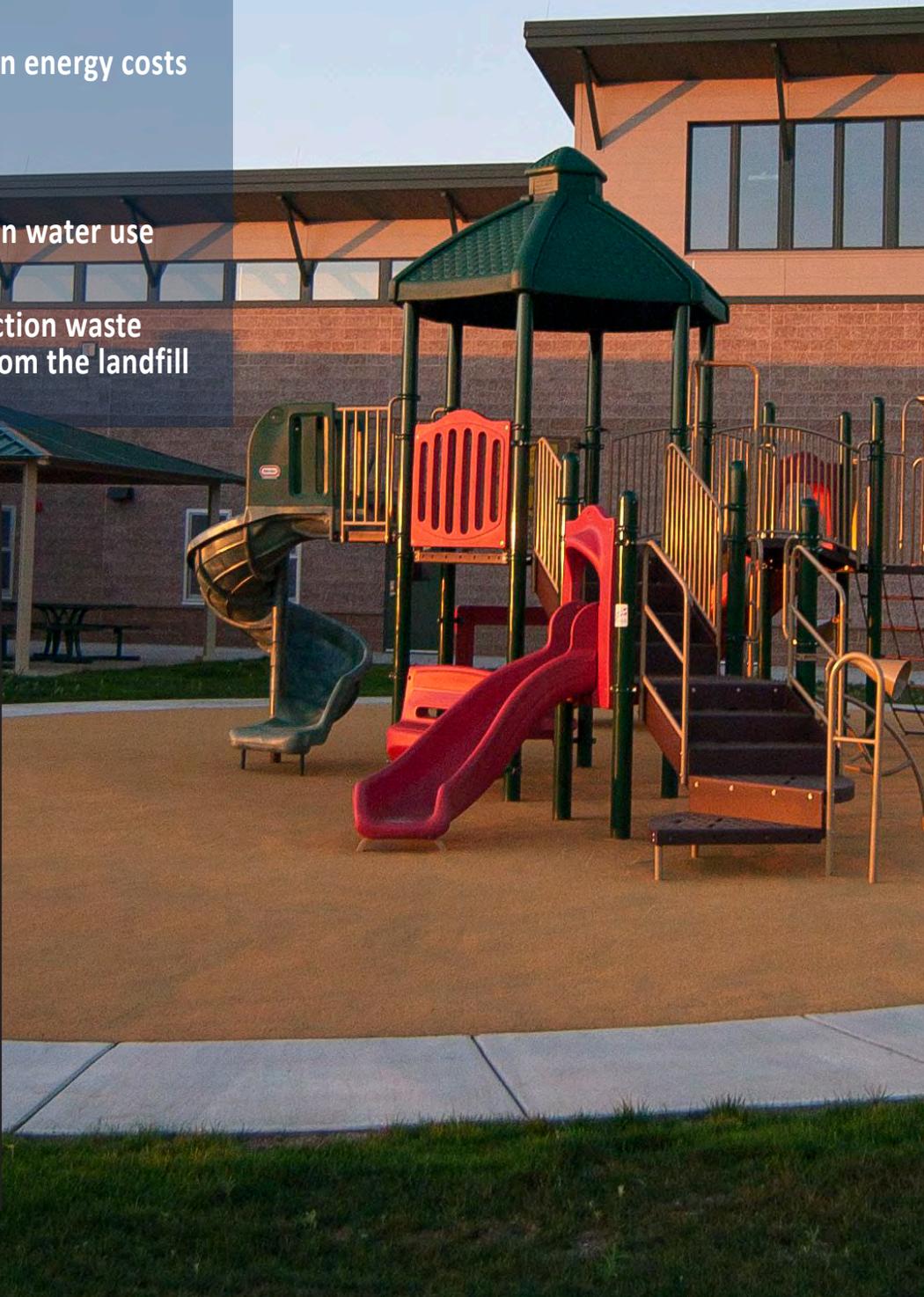
Energy & Atmosphere 3/17

Materials & Resources 5/13

Indoor Environmental Quality 10/15

Innovation & Design 3/5

*Out of a possible 69 points



CHILD DEVELOPMENT CENTER, AGES 6-10 YEARS

Fort Carson is Committed to Sustainable Development

PROJECT BACKGROUND

On May 13, 2005 the Pentagon released its Base Realignment and Closure Program (BRAC) recommendations, which included plans to expand Fort Carson. The expansion is relocating 3,762 soldiers of the 2nd Brigade, 2nd Infantry Division from Korea, and Ft. Hood, TX will transfer a 4th Infantry Division heavy brigade combat team and 4ID's Unit of Employment Headquarters.

FORT CARSON'S SUSTAINABILITY GOAL

Sustainable Development ("Create a community that encourages social, civic and physical activity while protecting the environment."), incorporates stormwater, U.S. Green Building Council Leadership in Energy and Environmental Design (LEED), construction, transportation and master planning into a cohesive goal. The goal emphasizes programming, designing and building LEED-certified buildings with a target of all new buildings and major renovations on Fort Carson achieving LEED certification and all new buildings and renovations achieving LEED Gold by 2017.

STRATEGIES AND RESULTS

The new Fort Carson Child Development Center (CDC) is located just north-west of the Carson Middle School off of Harr Ave in Fort Carson. It will provide diverse programs for the children (ages 6-10 years) of Active Duty military personnel before and after school, on holidays, and during the summer. The floor area of the facility is 23,000 square feet and will house between 195 and 225 children.

The location of the facility was predetermined in the Base's Master Plan and the project is constrained by a standardized floor plan that contains indoor and outdoor activity areas, administrative areas and a commercial kitchen. However, building orientation and construction materials were selected by the design/build team to maximize energy efficiency and sustainability. The exterior facades were also limited by Fort Carson's Installation Design Guidelines. However, sustainable design features and practices were still implemented. Load bearing masonry provides thermal mass and a durable finish; clerestory windows on the north elevation provide filtered daylight to the center of the facility; low-E glazing at all exterior windows reduces energy costs; and a combination of sloped and flat roofs helps reduce the heat island effect. The CDC plans on implementing a recycling program to educate the students that will also include the commercial kitchen waste stream.

The design-build team utilized materials with high recycled content including the concrete, masonry, structural steel and metals, helping the project achieve a total recycled content of 23.8%. Utilizing structural masonry also bolstered the regional materials for the facility, which sourced 15.7% of materials from within a 500 mile radius. Paints, adhesives, sealants and VCT flooring systems all feature low volatile organic compounds and chemical emissions. A carefully monitored construction waste management plan resulted in more than 81% of waste diverted from the landfill.

ABOUT FORT CARSON, COLORADO

Fort Carson, Home to the 4th Infantry Division and several large tenant units including the 43rd Area Support Battalion and the 10th Special Forces Group, is located in beautiful Colorado Springs, Colorado. The Installation was established in 1942 through land donated by the City of Colorado Springs to the War Department after the attack on Pearl Harbor. The Mountain Post Garrison Team provides units mission support and services including quality of life programs for the Fort Carson Soldiers, Families and the community to enable forces to execute expeditionary operations and to minimize stress on Soldiers and Families in a time of persistent conflict. The Fort Carson vision is to be the "Best Hometown in the Army - Home of America's Best."



U.S. Army Engineer District, Omaha

Architect: HB&A Architects
Civil Engineer: Farnsworth Group, Inc.
Commissioning Agent: Farnsworth Group, Inc.
Contractor: White Construction Group
Electrical Engineer: Farnsworth Group, Inc.
Interior Designer: HB&A Architects
Landscape Architect: Farnsworth Group, Inc.
LEED Consultant: Farnsworth Group, Inc.
Lighting Designer: Farnsworth Group, Inc.
Mechanical Engineer: RAD Engineering
Owner: Fort Carson, Colorado - United States Army
Plumbing Engineer: RAD Engineering
Structural Engineer: MGA Structural Engineers, Inc.

Project Size: 23,000 square feet
Total Project Cost: \$5,000,000
Cost per square foot: \$217

Photography Courtesy of: HB&A Architects

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

402.995.2417

Omaha District

719.526.1269

Fort Carson





1ST BRIGADE, 4TH INFANTRY DIVISION COMPANY OPERATIONS FACILITIES FORT CARSON, COLORADO

30.4% reduction in energy costs
(LEED)

31.4% reduction in water use

92.0% of construction waste
diverted from the landfill

LEED Facts

1st Brigade, 4th Infantry Division
Company Operations Facilities
Fort Carson, Colorado

LEED for New Construction Version 2.2
Certification awarded April 30, 2009

Silver **37**

Sustainable Sites 9/14

Water Efficiency 4/5

Energy & Atmosphere 6/17

Materials & Resources 6/13

Indoor Environmental Quality 8/15

Innovation & Design 4/5

*Out of a possible 69 points

1ST BRIGADE, 4TH INFANTRY DIVISION COMPANY OPERATIONS FACILITIES

Fort Carson is Committed to Sustainable Development

PROJECT BACKGROUND

This project consists of six Company Operations Facility (COF) buildings, designed and configured to accommodate thirty-two separate army companies ranging in size from 100 to 150 soldiers per company. Total project square footage is approximately 400,000 SF.

Design and construction strategy focused on combining modularity, organization, and repetition of plan and section with simple massing. Construction and design were modeled on the economy and versatility of a prototypical civilian office-warehouse building, which results in functional plan arrangements and distinct building elements to better serve the evolving needs of the United States Army.

COMPANY OPERATIONS FACILITIES (COF)

Each COF consists of three distinct elements: Readiness Module, Administrative Module and Covered Hardstand area. Company command offices, platoon offices, and conference rooms within the Administrative area support individual companies. A central corridor connects the administrative functions with the back-of-house support spaces of the Readiness Modules, which includes arms vaults, storage, and communications equipment. General building support facilities at each COF consist of toilets, lockers, showers, mechanical, electrical, and telecommunication rooms. A covered hardstand area is also provided at the rear of each of the six COF buildings to facilitate troop transportation.

The design and construction of the project includes a number of simple, cost effective strategies to improve sustainability and decrease energy consumption. Clerestory lighting, increased shell insulation, water conserving fixtures, recycled material, and the use of daylighting are among the numerous features that make each COF certifiable at the LEED® Silver Level as determined by the US Green Building Council. LEED® Silver Certification for all six buildings was achieved April 2009.

STRATEGIES AND RESULTS

The COF's site is a redeveloped brownfield which is located and designed to promote community connectivity to multiple public facilities and residential areas. The connectivity is enhanced through a network of public transportation, pedestrian walkways, bicycle paths, and preferred parking for both fuel-efficient vehicles and carpools. 59% of the previously developed site has been restored with native planting to provide habitat and promote biodiversity. To further minimize impacts on microclimates and human and wildlife habitats, 100% of the roofing area has been design with highly reflective materials.

The site and facility has limited its water consumption through the implementation of native plantings that require no permanent irrigation and low-flow, automatic plumbing fixtures that account for a 43% water usage reduction as compared to a baseline case.

The facility utilizes enhanced exterior wall, roof, and floor construction; efficient windows; mechanical units with efficiency ratings higher than the baseline; and stepped daylighting controls. These strategies in aggregate are anticipated to reduce the facility's energy cost by 30.4%. In addition to the energy savings, both the electrical and mechanical systems have been designed to create an environment that promotes productivity, provides comfort, and enhances the well-being of the occupants. Lighting controls for individual comfort have been provided at 92% of the workstations and all conference rooms are equipped with a dimmer system to provide multi-level light control. The mechanical systems have been designed to provide a temperature range of 68-77 degrees throughout the four seasons and a maximum humidity of 50.

To support the local economy and to reduce the environmental impacts resulting from transportation; 40% of the materials are products that are extracted and manufactured within the region. The materials selected by the design-build team utilized high recycled content materials such as concrete, structural steel, brick, precast, metals and interior finishes which accounted for over 33% of the total materials cost. Paints, coatings, adhesives, sealants, carpet and VCT flooring systems all feature low volatile organic compounds and chemical emissions. A carefully monitored construction waste management plan resulted in 92% of waste diverted from the landfill. This exemplary percentage was achieved by working together with a local rancher to re-use a large quantity of precast concrete insulated wall panels as pens and bins for storage of farm and ranch items.



U.S. Army Engineer District, Omaha

Architect: Leo A Daly
Civil Engineer: U.S. Army Corp of Engineers
Commissioning Agent: E Cube, Inc.
Contractor: M.A. Mortenson Construction
Electrical Engineer: Leo A Daly
Interior Designer: Leo A Daly
Landscape Architect: U.S. Army Corp of Engineers
LEED Consultant: Leo A Daly
Lighting Designer: Leo A Daly
Mechanical Engineer: Leo A Daly
Owner: Fort Carson, Colorado Directorate of Public Works - United States Army
Plumbing Engineer: Leo A Daly
Structural Engineer: Leo A Daly

Project Size: 410,095 square feet
Total Project Cost: \$94,695,053
Cost per square foot: \$151

Photography Courtesy of: Leo A Daly

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices
 402.995.2417
 Omaha District
 719.526.1269
 Fort Carson





**U.S. ARMY RESERVE CENTER
GAINESVILLE, FLORIDA**

16.4% reduction in energy costs
(LEED)

41.0% reduction in water use

71.8% of construction waste
diverted from the landfill

LEED Facts

U.S. Army Reserve Center
Gainesville, Florida

LEED for New Construction Version 2.2
Certification awarded October 29, 2009

Silver 36

Sustainable Sites 10/14

Water Efficiency 4/5

Energy & Atmosphere 5/17

Materials & Resources 4/13

Indoor Environmental Quality 10/15

Innovation & Design 3/5

*Out of a possible 69 points



U.S. ARMY RESERVE CENTER

Improving Quality of Life for Soldiers

PROJECT BACKGROUND

This project involved the renovation of a two-story office, 1940's era building that achieved LEED NC Silver Certification. The 25,000 SF Training Building houses offices, physical readiness area, library reading room, and fitness center and locker room. The project received the Restoration & Adaptive Reuse Award from the City of Gainesville Beautification Board in 2009.

MAKING OLD NEW AGAIN

The facility is designed to meet ADA-ABA and UFAS requirements and was designed with current Building Codes and Life Safety requirements. Spaces were arranged so that areas where soldiers primarily gather in the building are in the most protected areas.

The rework of the facility included new HVAC, electrical & telecom systems along with a new high albedo reflective roof and exterior coating system. The existing windows were replaced with a combination blast resistant glazing and glass block. A new storefront entry feature, driveway, and parking were re-worked to the North side of the building with new offices, classrooms, assembly room, and fitness room at the interior. The make-over included new interior finishes, and refinishing of the original wood floors on the second level. These renovations assisted in providing an improved environment for the office and training function in the facility.

STRATEGIES AND RESULTS

The facility is configured in a traditional E shape, maximizing the day lighting and cross ventilation potential as was the common practice for the construction time period. The majority of load-bearing walls were maintained in the Training Building. Lights were reused where feasible and relamped. The plumbing is new and includes flow sensor low flow fixtures and faucets. All paints, adhesives and carpet contained low VOCs.

Bicycle racks and shower/changing facilities were provided for occupants. Preferred parking for low-emitting/fuel efficient vehicles was also provided. During construction, a stormwater management plan was implemented to reduce impervious cover, promote infiltration, and capture and treat the storm water runoff which resulted in a 25% decrease in storm water runoff. The contractor also implemented a construction waste management plan that diverted 75% (191 tons) of on-site generated construction waste from the landfill.

The design reduced potable water use by 41% and energy efficiency was increased 15% above the 2004 ASHRAE standards required to meet LEED certification. Dedicated areas were allocated for the collection and storage of recycling materials, including cardboard, paper, plastic, glass, and metals.

ABOUT U.S. ARMY RESERVE CENTER

The two-story masonry structure was originally constructed for the US Navy in the 1940's. During the last fifty years, the facility has served as a training and staging complex for the Army Reserve units located in North Florida.



U.S. Army Engineer District, Louisville

Architect: KBJ Architects, Inc.

Civil Engineer: Brown and Cullen

Commissioning Agent: TLC Engineering for Architecture

Contractor: Q.B.S., Inc.

Landscape Architect: Janet O. Whitmill, R.L.A.

LEED Consultant: TLC Engineering for Architecture

MEP Engineer: TLC Engineering for Architecture

Structural Engineer: Atlantic Engineering Services

Project Size: 24,000 square feet

Total Project Cost: \$5,000,000

Cost Per Square Foot: \$208

Photographs Courtesy of: KBJ Architects, Inc.

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

502.315.6766
Louisville District Public Affairs
803.751.9651
81rd RSC, DPW





**4TH BRIGADE COMBAT TEAM (BCT)
VEHICLE MAINTENANCE COMPLEX
(VMC)
FORT BRAGG, NORTH CAROLINA**

36.0% reduction in energy costs
(LEED)

53.3% reduction in water use

63.8% of construction waste
diverted from the landfill

LEED Facts

4th BCT Vehicle Maintenance Complex
(VMC)
Fort Bragg, North Carolina

LEED for New Construction Version 2.2
Certification awarded September 13, 2010

Silver **36**

Sustainable Sites 6/14

Water Efficiency 5/5

Energy & Atmosphere 7/17

Materials & Resources 6/13

Indoor Environmental Quality 7/15

Innovation & Design 5/5

*Out of a possible 69 points



4TH BCT VEHICLE MAINTENANCE COMPLEX (VMC)

Fort Bragg Earns LEED Silver for VMC

PROJECT BACKGROUND

As home to a diverse array of military units, Fort Bragg's mission is to maintain the Army's strategic crisis response force, which is manned and trained to deploy rapidly by air, sea and land anywhere in the world.

Long committed to sustainability, Fort Bragg also piloted the first installation sustainability program for the Army in 2000. Over the next four years, Sustainable Fort Bragg served as the blueprint for the Army Strategy for the Environment, setting the benchmark for the Army's sustainability values.

In March 2008, the Secretary of the Army recognized Ft Bragg, N.C. as the winner of the first Secretary of the Army Sustainability Award. This award recognizes the outstanding sustainability initiatives by Army installations / activities and individuals.

THE FORT BRAGG PROGRAM

The project was designed and constructed to include Tactical Equipment Maintenance Facilities (TEMFs) for six battalions. The project type was to provide facilities for the purpose of maintaining, repairing, over hauling and storage of military tactical vehicles and equipment. The facilities were designed and constructed to be part of an overall complex centered on vehicle maintenance buildings, that included equipment and parts storage, administrative offices, secure communications storage and wash racks.

STRATEGIES AND RESULTS

The Vehicle Maintenance Complex site features preferred parking for fuel-efficient and low emitting vehicles, and bicycle storage racks to encourage bicycle traffic between the buildings in the complex. Highly reflective hardscape and roofing materials help mitigate the heat island effect on the site.

The facilities have water efficient landscaping and water conserving plumbing fixtures in order to use water efficiently.

The facilities utilize highly-efficient construction techniques, enhanced building envelope, and energy efficient windows. These strategies in aggregate are anticipated to reduce the facility's energy cost by 36%.

The design-build team utilized materials with high recycled content including the concrete block, structural steel, gypsum board, and metals. Paints, adhesives, sealants, plywood, carpet and vinyl composition tile flooring systems all feature low volatile organic compounds and chemical emissions. A carefully monitored construction waste management plan resulted in more than 64% of waste diverted from the landfill. Additional "Innovation in Design" LEED credits were achieved for exemplary performance in such areas as water use reduction, certified wood, and green house cleaning.

"Soldiers must have the land, water, air and energy resources they need to train, a healthy environment to train, and the support of local communities and the American people... We are building green, buying green, and going green to advance the triple bottom line plus of Army sustainability: Mission, Environment, and Community, plus cost savings, innovation and collaborative solutions."

Quote Attribution: Deputy Assistant Secretary of the Army for Environment, Safety and Occupational Health



U.S. Army Engineer District, Savannah

Architect: Michael Baker Jr. Inc.

Civil Engineer: Michael Baker Jr. Inc.

Commissioning Agent: Ivey Mechanical Company, LLC

Contractor: Walbridge

Electrical Engineer: Michael Baker Jr. Inc.

Interior Designer: IKM, Inc.

Landscape Architect: Michael Baker Jr. Inc.

Mechanical Engineer: Michael Baker Jr. Inc.

Owner: Fort Bragg, North Carolina - United States Army

Plumbing Engineer: Michael Baker Jr. Inc.

Structural Engineer: Michael Baker Jr. Inc.

Project Size: 129,434 square feet

Total Project Cost: \$42,000,000

Cost Per Square Foot: \$324

Photographs Courtesy of: Michael Baker Jr., Inc.

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

912.652.5279

Savannah District

910.396.0011

Fort Bragg





WHITSIDE BARRACKS 1-6 FORT RILEY, KS

32.2% reduction in energy costs
(LEED)

31.5% reduction in water use

67.0% of construction waste
diverted from the landfill

LEED Facts

Whitside Barracks 1-6
Fort Riley, KS

LEED for New Construction Version 2.2
Certification awarded September 29, 2010

Silver **36**

Sustainable Sites 4/14

Water Efficiency 4/5

Energy & Atmosphere 9/17

Materials & Resources 5/13

Indoor Environmental Quality 9/15

Innovation & Design 5/5

*Out of a possible 69 points

WHITSIDE BARRACKS 1-6

Fort Riley Earns LEED Silver for Barracks

PROJECT BACKGROUND

In preparation for the redeployment of the 1st Infantry Division's Combat Aviation Brigade, following a 15-month deployment to Iraq, the garrison at Fort Riley, through the U.S. Army Corps of Engineers, contracted for a new barracks complex on the grounds of Camp Whitside. The new barracks complex includes the construction of six barracks buildings, and an accompanying dining facility under separate contract, which is the military equivalent of a civilian college or corporate cafeteria.

A tilt-up precast concrete design was selected to achieve the Army's objective of a 25-year useful design life with a 50 year building replacement life. The roofing system is a sloped shingled roof with gabled ends. Building materials have been chosen based upon LEED requirements, life cycle costs, maintenance requirements, availability, color and texture as well as visual compatibility of the surrounding buildings.

Unit layouts were designed to create a residential feeling. Each room module consists of two sleeping rooms that accommodate 1 person each (1 + 1), each having a separate entry and individual lockable closets. Residents share a kitchen area with a microwave/refrigerator combination, a ceramic two burner electric cook top with ductless range hood, a stainless steel sink and garbage disposal and a lavatory with medicine cabinet. Each module shares a common bath/shower area and a toilet area with the adjacent sleeping room. All plumbing fixtures minimize water consumption.

Building common spaces include laundry rooms, storage areas, main vending and recycling areas, a reception area, communications and electrical rooms, and janitor rooms. The lobby also contains ADA compliant male and female public toilets for visitors.

STRATEGIES AND RESULTS

The Whitside Barracks site was selected to avoid disruption of any wetlands, farmlands or endangered species habitats. The surrounding habitat was protected or restored in order to lessen the impact of construction on the local eco-system. A high ratio of open space to development footprint was provided to promote bio-diversity. All interior and exterior lighting was designed to limit light pollution beyond the project boundaries.

The facility utilizes an enhanced building envelope, energy efficient windows, variable speed pumping systems, high-efficiency condensing boilers, a ventilation air energy recovery unit, high efficiency lighting and controls and water saving plumbing fixtures to help achieve its sustainability goals. The combination of these energy conservation measures are anticipated to reduce the facility's energy cost by more than 30% when compared to a baseline building. To boost sustainability, the project also incorporated LEED fundamental commissioning, outdoor air delivery monitoring, IAQ performance and controllability of systems features.

The design-build team utilized materials with high recycled content including the concrete, structural steel and metals. Paints, adhesives, sealants and VCT flooring systems all feature low volatile organic compounds and chemical emissions. A carefully monitored construction waste management plan resulted in more than 60% of waste diverted from the landfill.

ABOUT FORT RILEY

Fort Riley, named in honor of Major General Bennett C. Riley who led the first military escort along the Santa Fe Trail, was established in 1853 as a military post to protect the movement of people and trade over the Oregon-California and Santa Fe trails. More than a century later, Fort Riley continues to play an important role in the defense of our nation and the training of our soldiers.

Located in the central flint hills region of Northeast Kansas, Fort Riley is approximately 60 miles west of Topeka, the state capital of Kansas. Surrounded by tallgrass prairie, the Fort Riley Military Reservation covers 100,656 acres across Geary and Riley counties.



U.S. Army Engineer District, Kansas City

Architect: VOA Associates, Inc.
Civil Engineer: BHC Rhodes
Commissioning Agent: Doyle Field Services, Inc.
Contractor: Walton Construction Co.
Electrical Engineer: Hoss & Brown Engineers, Inc.
Interior Designer: VOA Associates, Inc.
Landscape Architect: VOA Associates, Inc.
LEED Consultant: VOA Associates, Inc.
Lighting Designer: Hoss & Brown Engineers, Inc.
Mechanical Engineer: Hoss & Brown Engineers, Inc.
Owner: Fort Riley Kansas - United States Army
Plumbing Engineer: Hoss & Brown Engineers, Inc.
Structural Engineer: Nayyar & Nayyar International, Inc.

Project Size: 345,492 square feet
Total Project Cost: \$66,307,586
Cost Per Square Foot: \$171

Photographs Courtesy of: United States Army

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

816.389.3819
 Kansas City District
 785.239.3410
 Fort Riley





CUSTER HILL FY07 UNIT OPERATIONS BARRACKS FORT RILEY, KANSAS

30.5% reduction in energy costs
(LEED)

42.4% reduction in water use

50.5% of construction waste
diverted from the landfill

LEED Facts

Custer Hill FY07 Unit Operations
Barracks
Fort Riley, Kansas

LEED for New Construction Version 2.2
Certification awarded September 13, 2010

Silver **34**

Sustainable Sites 3/14

Water Efficiency 4/5

Energy & Atmosphere 7/17

Materials & Resources 5/13

Indoor Environmental Quality 10/15

Innovation & Design 5/5

*Out of a possible 69 points

USTER HILL FY07 UNIT OPERATIONS BARRACKS

Fort Riley Earns LEED Silver for Barracks

PROJECT BACKGROUND

The Custer Hill FY07 Unit Operations Barracks consists of a three story, Unaccompanied Enlisted Personnel Housing (UEPH) facility for single soldiers. It contains 78 (1+1) room modules with supporting facilities to accommodate 156 persons. It is the last of four barracks placed in a "U" shaped arrangement with the parking located in the center and designed with exterior architectural style, materials and colors to be compatible with the brick exterior of the three adjacent original FY06 Barracks.

A tilt-up precast concrete design was selected to achieve the Army's objective of a 25-year useful design life with a 50 year building replacement life. The roofing system is a sloped shingled roof with gabled ends. Building materials have been chosen based upon LEED requirements, life cycle costs, maintenance requirements, availability, color and texture as well as visual compatibility of the surrounding buildings.

Unit layouts were designed to create a residential feeling. Each room module consists of two sleeping rooms that accommodate 1 person each (1 + 1), each having a separate entry and individual lockable closets. Residents share a kitchen area with a microwave/refrigerator combination, a ceramic two burner electric cook top with ductless range hood, a stainless steel sink and garbage disposal and a lavatory with medicine cabinet. Each module shares a common bath/shower area and a toilet area with the adjacent sleeping room. All plumbing fixtures minimize water consumption.

Building common spaces include laundry rooms, storage areas, main vending and recycling areas, a reception area, communications and electrical rooms, and janitor rooms. The lobby also contains ADA compliant male and female public toilets for visitors.

STRATEGIES AND RESULTS

The Custer Hill Barracks site was selected to avoid disruption of any wetlands, farmlands or endangered species habitats. The surrounding habitat was protected or restored in order to lessen the impact of construction on the local eco-system. A high ratio of open space to development footprint was provided to promote bio-diversity.

The facility utilizes an enhanced building envelope, energy efficient windows, variable speed pumping systems, high-efficiency condensing boilers, a ventilation air energy recovery unit, high efficiency lighting and controls and water saving plumbing fixtures to help achieve its sustainability goals. The combination of these energy conservation measures are anticipated to reduce the facility's energy cost by more than 30% when compared to a baseline building. To boost sustainability, the project also incorporated LEED fundamental commissioning, outdoor air delivery monitoring, IAQ performance and controllability of systems features.

The design-build team utilized materials with high recycled content including the concrete, structural steel and metals. Paints, adhesives, sealants and VCT flooring systems all feature low volatile organic compounds and chemical emissions. A carefully monitored construction waste management plan resulted in more than 64% of waste diverted from the landfill.

ABOUT FORT RILEY

Fort Riley, named in honor of Major General Bennett C. Riley who led the first military escort along the Santa Fe Trail, was established in 1853 as a military post to protect the movement of people and trade over the Oregon-California and Santa Fe trails. More than a century later, Fort Riley continues to play an important role in the defense of our nation and the training of our soldiers.

Located in the central flint hills region of Northeast Kansas, Fort Riley is approximately 60 miles west of Topeka, the state capital of Kansas. Surrounded by tallgrass prairie, the Fort Riley Military Reservation covers 100,656 acres across Geary and Riley counties.



U.S. Army Engineer District, Kansas City

Architect: VOA Associates, Inc.
Civil Engineer: BHC Rhodes
Commissioning Agent: Doyle Field Services, Inc.
Contractor: Walton Construction Co.
Electrical Engineer: Hoss & Brown Engineers, Inc.
Interior Designer: VOA Associates, Inc.
Landscape Architect: VOA Associates, Inc.
LEED Consultant: VOA Associates, Inc.
Lighting Designer: Hoss & Brown Engineers, Inc.
Mechanical Engineer: Hoss & Brown Engineers, Inc.
Owner: Fort Riley Kansas - United States Army
Plumbing Engineer: Hoss & Brown Engineers, Inc.
Structural Engineer: Nayyar & Nayyar International, Inc.

Project Size: 57,108 square feet
Total Project Cost: \$12,100,000
Cost Per Square Foot: \$212

Photographs Courtesy of: United States Army

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

816.389.3819
 Kansas City District
 785.239.3410
 Fort Riley





**UNIT OPERATIONS FACILITY (UOF)/
EXPLOSIVE ORDNANCE DISPOSAL (EOD)
71ST OPERATIONS GROUP BATTALION
HEADQUARTERS (BNHQ) AND COMPANY
OPERATIONS FACILITY (COF)
FORT CARSON, COLORADO**

59.6% reduction in energy costs
(LEED)

52.3% reduction in water use

57.2% of construction waste
diverted from the landfill

LEED Facts

UOF/EOD 71st Operations Group
BNHQ and COF
Fort Carson, Colorado

LEED for New Construction Version 2.2
Certification awarded June 18, 2010

Silver 33

Sustainable Sites 6/14

Water Efficiency 4/5

Energy & Atmosphere 10/17

Materials & Resources 1/13

Indoor Environmental Quality 8/15

Innovation & Design 4/5

*Out of a possible 69 points

UOF/EOD 71ST OPERATIONS GROUP BNHQ AND COF

Fort Carson is Committed to Sustainable Development

FORT CARSON'S SUSTAINABILITY GOAL

Sustainable Development ("Create a community that encourages social, civic and physical activity while protecting the environment."), incorporates stormwater, U.S. Green Building Council Leadership in Energy and Environmental Design (LEED), construction, transportation and master planning into a cohesive goal. The goal emphasizes programming, designing and building LEED-certified buildings with a target of all new buildings and major renovations on Fort Carson achieving LEED certification and all new buildings and renovations achieving LEED Gold by 2017.

PROJECT BACKGROUND

The UOF/EOD 71st Operations Group Battalion Headquarters (BNHQ) and Company Operations facility (COF) at Fort Carson, CO provided an opportunity to develop a new kind of integrated building design, one that is responsive to the needs of the troops today and flexible enough to meet the changing mission for twenty-five years into the future. The new BNHQ and COF provides administrative, warehouse, training and associated support spaces for five companies of the 71st Operations Group in a multi-building, integrated site design scheme. The BNHQ is a two story office facility, while the COF houses not only administrative areas, but deployment areas, weapons vaults and mezzanines for storage and administrative support.

STRATEGIES AND RESULTS

The UOF/EOD 71st Operations Group BNHQ & COF site features preferred parking for low-emitting / fuel efficient vehicles, bicycle racks, shower /changing facilities and a network of sidewalks to encourage pedestrian and bicycle traffic throughout the complex. HOV spaces have been provided, designated with a sign indicating "Carpool Parking." Open space on the project site is 556,980 square feet, 8 ½ times that of the building footprint. Highly reflective roofing materials help mitigate the heat island effect on the site. Site light trespass has been reduced to negligible amounts by careful placement and shielding.

Landscaping and irrigation systems have been designed to reduce potable by 90.8%. The BNHQ & COF utilize waterless urinals and low flow fixtures to reduce the amount of potable water consumed by 52.5% and water utilized for waste conveyance by 53.3% qualifying the project for a LEED exemplary performance point for water use reduction.

The BNHQ & COF utilize an enhanced building envelope with high efficiency low-e windows, a reduced lighting density coupled with infrared occupancy sensors and timers to control lighting, and Packaged rooftop HVAC Systems with VAV. These strategies in aggregate reduced the facility's energy cost by close to 60% qualifying the project for a LEED exemplary performance point for energy use reduction.

The BNHQ & COF have recycling bins located at each work station and a central collection point in the break room. A carefully monitored construction waste management plan resulted in more than 57% of waste diverted from the landfill.

Indoor air quality was closely managed during construction and before occupancy, and paints & coatings, carpet systems, and composite wood & agrifiber products all feature low volatile organic compounds and chemical emissions. All BNHQ & COF private offices are equipped with dual level switching allowing separate switching of each fixture with lighting levels controlled by the amount of daylight. All open offices are provided with task to meet individual requirements. The facility was designed to provide comfortable interior environment in accordance with ASHRAE 62.1-2004 and a survey generated to evaluate performance 6-18 months post occupancy.

ABOUT FORT CARSON

Fort Carson, Home to the 4th Infantry Division and several large tenant units including the 43rd Area Support Battalion and the 10th Special Forces Group, is located in beautiful Colorado Springs, Colorado. The Installation was established in 1942 through land donated by the City of Colorado Springs to the War Department after the attack on Pearl Harbor. The Mountain Post Garrison Team provides units mission support and services including quality of life programs for the Fort Carson Soldiers, Families and the community to enable forces to execute expeditionary operations and to minimize stress on Soldiers and Families in a time of persistent conflict. The Fort Carson vision is to be the "Best Hometown in the Army - Home of America's Best."



U.S. Army Engineer District, Omaha

Architect: C.H. Guernsey & Company
Civil Engineer: C.H. Guernsey & Company
Commissioning Agent: Superior Test & Balance Inc.
Contractor: PCL Construction, Inc.
Electrical Engineer: C.H. Guernsey & Company
Geotechnical: North American Testing, Inc.
Interior Designer: VOA Associates, Inc.
Landscape Architect: CLS & Associates
LEED Consultant: VOA Associates, Inc.
Lighting Designer: C.H. Guernsey & Company
Mechanical Engineer: C.H. Guernsey & Company
Owner: Fort Carson Directorate of Public Works
Plumbing Engineer: C.H. Guernsey & Company
Structural Engineer: Zahl-Ford, Inc.

Project Size: 57,629 square feet
Total Project Cost: \$18,272,112
Cost Per Square Foot: \$243

Photographs Courtesy of: PCL Construction, Inc.

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices
 402.995.2417
 Omaha District
 719.526.1269
 Fort Carson





**FY08 UNACCOMPANIED ENLISTED
PERSONNEL HOUSING (UEPH)
BARRACKS (BUILDINGS 7872, 7874,
7882, 7884)
FORT RILEY, KANSAS**

29.6% reduction in energy costs
(LEED)

24.5% reduction in water use

51.1% of construction waste
diverted from the landfill

LEED Facts

FY08 Unaccompanied Enlisted Personnel
Housing (UEPH) Barracks
Fort Riley, Kansas

LEED for New Construction Version 2.2
Certification awarded December 9, 2010

Silver 34

Sustainable Sites 6/14

Water Efficiency 3/5

Energy & Atmosphere 7/17

Materials & Resources 5/13

Indoor Environmental Quality 9/15

Innovation & Design 4/5

*Out of a possible 69 points

UNACCOMPANIED ENLISTED PERSONNEL HOUSING (UEPH) Fort Riley Receives LEED Silver Certification

PROJECT BACKGROUND

The FY08 Unaccompanied Enlisted Personnel Housing (UEPH) Barracks (Buildings 7872, 7874, 7882 and 7884) consist of four three-story, UEPH facilities for single soldiers. They each contain 78 (1+1) room modules with supporting facilities to accommodate 156 persons. They are located south of East Graves Street, Fort Riley, KS.

The exterior architectural style is similar to previous seven barracks built in another area of Ft. Riley, but of a different exterior design. The materials and colors were selected to be compatible with the aesthetics of the surrounding architecture. These barracks utilize an integral color and pattern set into a precast concrete panels that is similar in color to brick. A precast concrete design was selected to achieve the Army's objective of a 25-year useful design life with a 50-year building replacement life. The precast panels include integral rigid insulation which is also supplemented by interior batt insulation. The roofing system is a sloped shingled roof with gabled ends. Building materials have been chosen based upon LEED requirements, life cycle costs, maintenance requirements, availability, color and texture as well as visual compatibility of the surrounding buildings.

Unit layouts were designed to create a residential feeling. Each room module consists of two sleeping rooms that accommodate 1 person each (1 + 1), each having a separate entry and individual lockable closets. Residents share a kitchen area with a microwave/refrigerator combination, a ceramic two burner electric cook top with ductless range hood, a stainless steel sink and garbage disposal and a lavatory with medicine cabinet. Each module shares a common bath/shower area and a toilet area with the adjacent sleeping room. All plumbing fixtures minimize water consumption.

Building common spaces include laundry rooms, storage areas, main vending and recycling areas, a reception area, communications and electrical rooms, and janitor rooms. The lobby also contains ADA compliant male and female public toilets for visitors.

STRATEGIES AND RESULTS

The Graves Street Barracks site was selected to avoid disruption of any wetlands, farmlands or endangered species habitats. The surrounding habitat was protected or restores in order to lessen the impact of construction on the local eco-system. A high ratio of open space to development footprint was provided to promote bio-diversity.

The facility utilizes an enhanced building envelope, energy efficient windows, variable speed pumping systems, high-efficiency condensing boilers, a ventilation air energy recovery unit, high efficiency lighting and controls and water saving plumbing fixtures to help achieve its sustainability goals. The combination of these energy conservation measures are anticipated to reduce the facility's energy cost by more than 29.6% when compared to a baseline building. To boost sustainability, the project also incorporated LEED fundamental commissioning, EQ performance and controllability of systems features.

The design-build team utilized materials with high recycled content including the concrete, structural steel and metals. Paints, adhesives, sealants and VCT flooring systems all feature low volatile organic compounds and chemical emissions. A carefully monitored construction waste management plan resulted in more than 51.1% of waste diverted from the landfill.

ABOUT FORT RILEY

Fort Riley, named in honor of Major General Bennett C. Riley who led the first military escort along the Santa Fe Trail, was established in 1853 as a military post to protect the movement of people and trade over the Oregon-California and Santa Fe trails. More than a century later, Fort Riley continues to play an important role in the defense of our nation and the training of our soldiers.

Located in the central flint hills region of Northeast Kansas, Fort Riley is approximately 60 miles west of Topeka, the state capital of Kansas. Surrounded by tallgrass prairie, the Fort Riley Military Reservation covers 100,656 acres across Geary and Riley counties.



U.S. Army Engineer District, Kansas City

Architect: Gossen Livingston Associates, Inc.
Civil Engineer: BHC Rhodes
Commissioning Agent: Hoss & Brown Engineers, Inc.
Contractor: Walton Construction Co.
Electrical Engineer: Hoss & Brown Engineers, Inc.
Interior Designer: Gossen Livingston Associates, Inc.
Landscape Architect: Gossen Livingston Associates, Inc.
LEED Consultant: Gossen Livingston Associates, Inc.
Lighting Designer: Hoss & Brown Engineers, Inc.
Mechanical Engineer: Hoss & Brown Engineers, Inc.
Owner: Fort Riley Directorate of Public Works
Plumbing Engineer: Hoss & Brown Engineers, Inc.
Structural Engineer: Dudley Williams and Associates, Inc.

Project Size: 228,432 square feet
Total Project Cost: \$46,072,439
Cost Per Square Foot: \$202

Photographs Courtesy of: U. S. Army Corps of Engineers, Kansas City District

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Public Affairs Offices

816.389.3819

Kansas City District

785.239.3410

Fort Riley





LAS VEGAS READINESS CENTER LAS VEGAS, NEVADA

32.0% energy savings

24.0% water savings

52.0% waste diversion resulting from recycling program

LEED Facts

Las Vegas Readiness Center
Las Vegas, Nevada

LEED for Existing Buildings Operations and Maintenance
Certification awarded November 11, 2010

Silver 49

Sustainable Sites 4/12

Water Efficiency 4/10

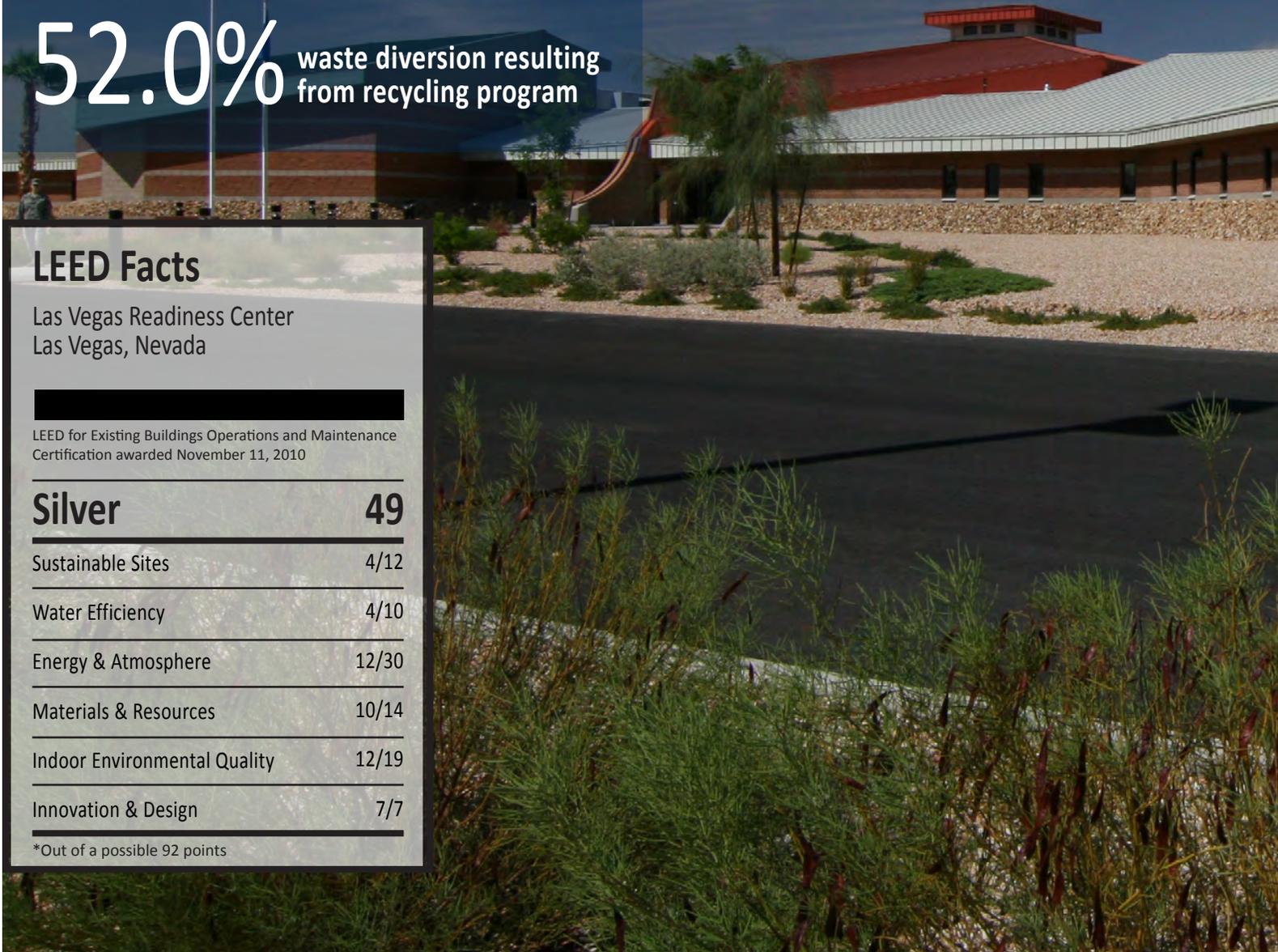
Energy & Atmosphere 12/30

Materials & Resources 10/14

Indoor Environmental Quality 12/19

Innovation & Design 7/7

*Out of a possible 92 points



LAS VEGAS READINESS CENTER

Readiness Center Receives LEED Silver Certification

PROJECT BACKGROUND

The Nevada National Guard Las Vegas (Henderson) Readiness Center was constructed in 2006 to replace facilities constructed in 1972 inadequate to appropriately support the units stationed in southern Nevada. The facility provides modern facilities meeting current and future assigned military unit needs for years to come. The 79,000 SF Readiness Center houses the 992nd Troop Command, 440th Signal Company, 777th Engineer Utility Team and a Medical Detachment established in 2007. The center provides the necessary facilities and environment for these units to achieve mission readiness for the continuing global war on terrorism, as well as missions assigned by the Governor of the State of Nevada. The facility includes assembly areas, complete kitchen facilities, classrooms, administration areas, material storage areas, work bay, and locker room with restroom facilities. The facility, originally designed to the Army's SPiRiT Gold standard (the Army's Sustainable Project Rating Tool was based on LEED-NC 2.0), is the first Army project to seek and achieve certification under the USGBC's LEED for Existing Buildings.

STRATEGIES AND RESULTS

The Las Vegas Readiness Center employs sustainable practices in the maintenance of building exterior and hardscape, integrated pest management, erosion control, and landscape maintenance. Written policies and management plans were developed to describe these practices and policies. Only native and adapted species of landscaping material are employed on the project along with an efficient, automatically controlled drip irrigation system which produces a 73% reduction in potable water use compared to the baseline. Efficient plumbing fixtures produce a 24% reduction in water use compared to the baseline. Highly reflective roofing materials help mitigate the roof heat island effect on the site.

The facility utilizes an enhanced building envelope, efficient windows with sunshades, a building energy management system and an efficient central plant to provide heating and cooling. As a result, the project qualifies for an Energy Star Rating of 81, which means that it performs better than 81% of similar building in the area.

Sustainable purchasing practices for the acquisition of on-going consumables, durable goods, computer equipment, cleaning supplies, and low mercury lamps reduce the facility's impact on the environment. An ongoing solid waste management program recycles ongoing consumables and durable goods reducing the amount of waste sent to landfills. A high performance green cleaning program including purchase of environmentally friendly cleaning chemicals and the use of walk-off mats maintains a clean, wholesome indoor environment. A ventilation rate 30% in excess of that required by ASHRAE standards provides plenty of clean outdoor air to occupants.

"This is the First Post LEED certified building for the Nevada National Army Guard. This Post certification is a tribute to our strong commitment to Energy and Environmental Design."

Quote Attribution: CPT. Daniel Thielen, acting FMO, Nevada Army National Guard



Nevada National Guard

Architect: Ganthner Melby, LLC, Architects & Planners

Sustainability Consultant: Golden Engineering

Project Size: 79,000 square feet

Total Project Cost: \$15,815,953

Photography Courtesy of: Ganthner Melby, LLC, Architects & Planners

ABOUT LEED

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Nevada Army National Guard

775.887.7252

Construction and Facilities Management Office



4 LEED-Certified Projects

Certified is the basic level of certification available under LEED. To achieve Certified status under LEED-NC v2.1 or 2.2 (New Construction Versions 2.1 and 2.2, the rating criteria in effect at the time these facilities were certified), a project must achieve between 26 and 32 points out of the possible 69 available.



NEW HAMPSHIRE NATIONAL GUARD JOINT FORCES HQ READINESS CENTER CONCORD, NEW HAMPSHIRE

25.0% reduction in energy costs
(LEED)

44.0% reduction in water use

93.6% of construction waste
diverted from the landfill

LEED Facts

New Hampshire National Guard Joint
Forces HQ Readiness Center
Concord, New Hampshire

LEED for New Construction Version 2.1
Certification awarded September 21, 2009

Certified 30

Sustainable Sites 8/14

Water Efficiency 4/5

Energy & Atmosphere 2/17

Materials & Resources 3/13

Indoor Environmental Quality 9/15

Innovation & Design 4/5

*Out of a possible 69 points



READINESS CENTER

Readiness Center Receives LEED Certification

PROJECT BACKGROUND

The 65,629 SF New Hampshire National Guard Joint Command Readiness Center provides the Guard with a headquarters building that helps both military and civilian personnel with their peacetime missions, and also serves as a command center for New Hampshire state military forces under times of natural emergencies, or in the event of terrorist acts. The three-phased project included the addition of the 16,500 square foot, state of the art, Civil Support Team (CST) Facility which houses the twenty-two person, highly trained, response team for the aforementioned natural and manmade events. This specialized team also functions as the liaison between the military and the public during such events.

Located in suburban Concord, New Hampshire's state capitol, the command center brings forth a strong military presence to the public as well as creates an iconic structure that now grounds the entire military base. The National Guard chose the project site, in part, due to its geographic and physical locations, a particularly centralized point in the State. It is across the street from the municipal airport and within close proximity to New Hampshire and New England major roadway networks. It is located on the existing State Military Reservation and is part of the ongoing efforts to consolidate and realign both State and Federal military forces. A newer command structure has replaced multiple antiquated systems in order to reduce manpower and alleviate overlapping functions. Both the Army and Air National Guard forces, as well as a civilian support staff occupy the building.

STRATEGIES AND RESULTS

Prior to construction, a waste management plan was initiated in order to recycle as much construction debris as possible and reduce the amount of waste trucked to landfills. The result was a 95% recycling rate, which amounts to approximately 2,400 tons of waste diverted from landfills.

A large number of building products, especially major construction materials, were sourced from within 500 miles of the job site in order to reduce the consumption of fossil fuels during transportation. Many materials and furniture products with high recycled content were specified and used throughout the building, and, along with finishes, contain either low or no volatile organic compounds (VOCs). In the interest of indoor air quality, urea formaldehyde was chosen for exclusion in the building. As part of the LEED certification process, the building underwent a two week flush-out period to help ensure that any fumes left over from construction or off-gassing were eliminated prior to occupancy.

A large effort was made to reduce overall site disturbance and contain the new building footprint within the existing footprint or previously paved roads, taxiway and runway areas. Paved areas not taken up by building footprint were excavated and restored with topsoil. Specific parking spaces dedicated to car and van pools and the addition of bicycle racks also encourage the reduction of fossil fuel use.

Fifteen acres of endangered species habitat were restored on the State Military Reservation for the federally endangered Karner Blue Butterfly and the state endangered Frosted Elfin Butterfly. Plantings and vegetative species used in the restoration process were carefully selected to provide not only livable habitat areas, but also to provide nectar-producing plants as the butterfly species' food source. Landscaping was minimized and designed to require minimal maintenance and little to no irrigation.

Parking lots and strategically placed drainage swales divert run-off to bio-retention basins located around the building. A combination of the sandy soils and the selection of flood resistant plantings help to mitigate run-off and limit contaminants percolating back into the soils and ultimately the groundwater aquifer. The bio-retention areas were also sited and sized to accommodate the facility's storm water system. The 49,000 square feet of Energy Star roofing, chosen to reduce the urban heat island effect, drains to the bio-retention areas for mitigation. These strategies allow for the majority of run-off and storm water to be handled on site.

Energy efficiency is achieved through a geothermal heating and cooling system, daylighting techniques that bring light deep into interior spaces, occupancy sensors that minimize energy wastage, direct digital controls for maximum HVAC system efficiencies, as well as efficient lighting systems. Water is conserved through low-flow fixtures and waterless urinals used throughout the facility.



New Hampshire Army National Guard

Architect: Oak Point Associates
Civil Engineer: Oak Point Associates
Commissioning Agent: Oak Point Associates
Contractor: Harvey Construction Corporation of NH
Electrical Engineer: Oak Point Associates
Interior Designer: Oak Point Associates
Landscape Architect: Oak Point Associates
LEED Consultant: Oak Point Associates
Lighting Designer: Oak Point Associates
Mechanical Engineer: Oak Point Associates
Owner: New Hampshire National Guard
Plumbing Engineer: Oak Point Associates
Structural Engineer: Oak Point Associates

Project Size: 82,014 square feet
Total Project Cost: \$16,495,360
Cost per square foot: \$180.81

Photography Courtesy of: Oak Point Associates

ABOUT LEED

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**New Hampshire Army National
Guard**

603.227.1464
Construction and Facilities Management Office





**LANE COUNTY ARMED FORCES RESERVE CENTER (AFRC), PHASE I MILITARY VEHICLE MAINTENANCE FACILITY
SPRINGFIELD, OREGON**

24.5% reduction in energy costs (LEED)

30.4% reduction in water use

91.2% of construction waste diverted from the landfill

LEED Facts

Lane County AFRC, Phase 1
Military Vehicle Maintenance Facility
Springfield, Oregon

LEED for New Construction Version 2.1
Certification awarded May 14, 2010

Certified 26

Sustainable Sites 4/14

Water Efficiency 2/5

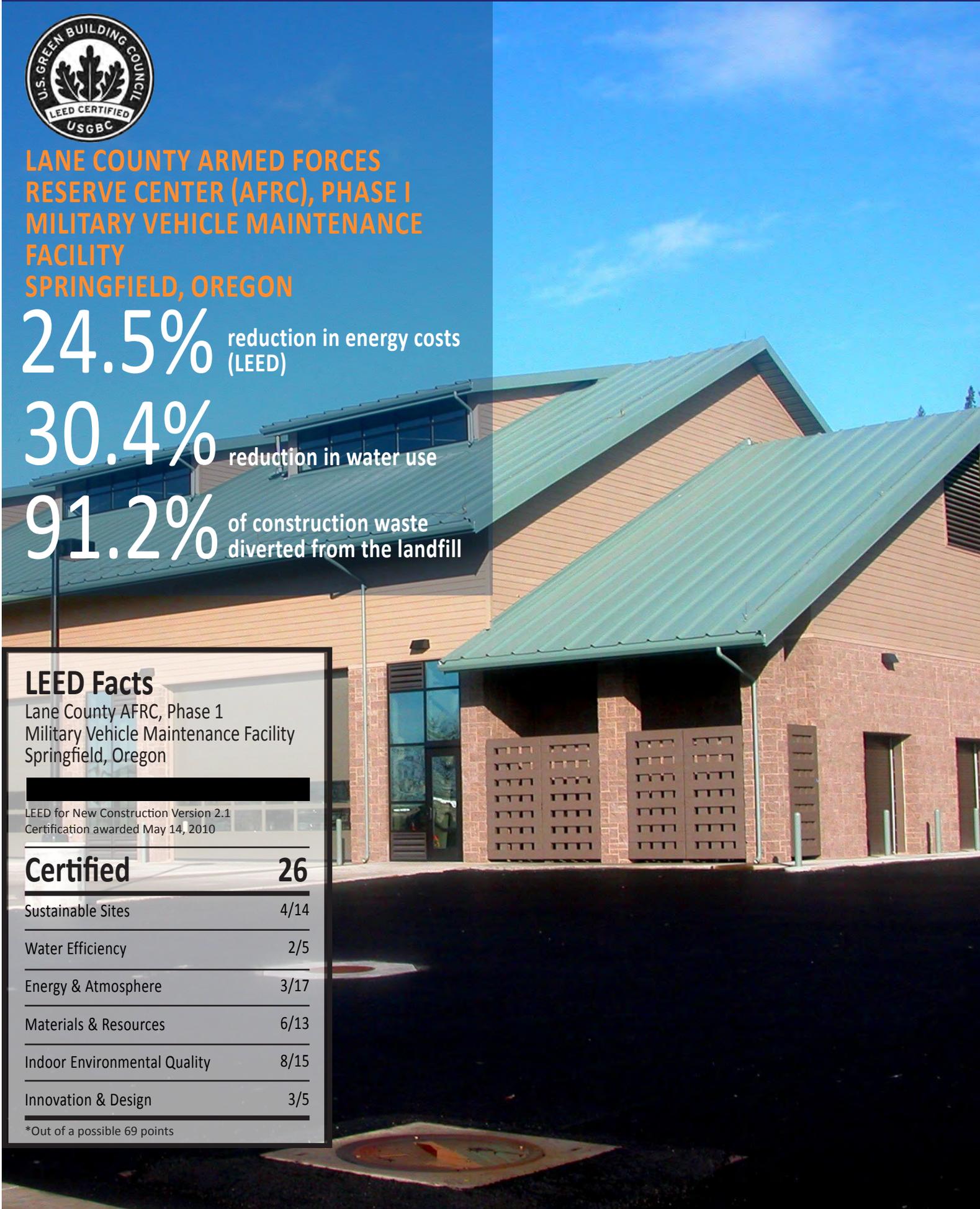
Energy & Atmosphere 3/17

Materials & Resources 6/13

Indoor Environmental Quality 8/15

Innovation & Design 3/5

*Out of a possible 69 points



MILITARY VEHICLE MAINTENANCE FACILITY

AFRC is Committed to Sustainable Development

PROJECT BACKGROUND

Long time in planning, the Armed Forces Reserve Center Complex replaces the older and out dated Armories located in Eugene and Cottage Grove. The project was separated into two phases, the first entailed the construction of a military vehicle maintenance facility to serve the Air National Guard and Marine Corps. The project includes a covered storage area for fuel truck parking, vehicle wash and outdoor service area, 82,000sf military vehicle parking area and 43,000sf asphalt public parking area.

LEED STRATEGIES AND RESULTS

SITE

Site design includes provisions for alternate transportation with the installation of bicycle racks near the main entrance to the facility.

Vegetative swales (bioswales) remove 80% of suspended solids from storm water runoff prior to entering the storm sewer system.

Much of the hardscape parking area has been constructed using concrete that helps reduce the heat island effect caused by development, earning a LEED credit.

The site light fixtures have been designed to keep lighting directed to the site, keeping the lighting within the site boundaries, thus saving energy from wasted light either lighting up areas outside the site or from lighting the night sky.

WATER USE REDUCTION

Potable water use is reduced by approximately 30% by using low flow urinals, low flow lavatories, low flow shower heads and kitchen sink fixtures.

CONSTRUCTION

The contractor reduced energy consumption by recycling 91% of the construction waste. Overall, the materials selected for construction contained over 27% recycled content.

Over 48% of the building materials were manufactured within 500 miles of the project site, further saving energy by reducing emissions from transportation vehicles.

AIR QUALITY

CO2 sensors have been provided to monitor for accumulations of the gas. Also, materials have been used, including paint, sealants and carpeting that contain minimal or no volatile organic compounds that would be harmful to construction personnel and/or users of the facility.

DAYLIGHT VIEWS

The design of the building allows at least 90% of all spaces occupied for critical visual tasks to have direct line of sight views to the outdoors. Being able to view outside provides employees with additional comfort in the work areas.



Oregon Army National Guard

Architect: Barrentine Bates Lee, AIA

Civil Engineer: Balzhiser & Hubbard Engineers

Commissioning Agent: Welsh Commissioning Group

Contractor: Wildish Building Co.

Electrical Engineer: Balzhiser & Hubbard Engineers

Landscape Architect: Cameron McCarthy Landscape Architecture & Planning LLP

LEED Consultant: Green Building Services

Lighting Designer: Balzhiser & Hubbard Engineers

Mechanical Engineer: Balzhiser & Hubbard Engineers

Owner: Oregon Military Department

Plumbing Engineer: Balzhiser & Hubbard Engineers

Structural Engineer: KPFF Consulting Engineers

Project Size: 14,133 square feet

Total Project Cost: \$2,021,857

Cost per square foot: \$143

Photography Courtesy of: Wildish Building Co.

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

**Construction and Facilities
Management Office**
503.584.3871
Oregon Army National Guard





NEW JOINT FORCE HEADQUARTERS PINEVILLE, LOUISIANA

12.0% reduction in energy costs
(LEED)

34.4% reduction in water use

95.3% of construction waste
diverted from the landfill

LEED Facts

New Joint Force Headquarters
Pineville, Louisiana

LEED for New Construction Version 2.2
Certification awarded June 8, 2009

Certified 30

Sustainable Sites 6/14

Water Efficiency 5/5

Energy & Atmosphere 2/17

Materials & Resources 5/13

Indoor Environmental Quality 9/15

Innovation & Design 3/5

*Out of a possible 69 points

NEW JOINT FORCE HEADQUARTERS

Camp Beauregard Receives LEED Certification

PROJECT BACKGROUND

The Joint Forces Headquarters project, Camp Beauregard, Pineville, LA, provides the Louisiana National Guard with a new two-story 68,360-sq-ft Joint headquarters facility along with a single-story 2,700-sq-ft JOC Emergency Vehicle Storage facility, a 2,600-sq-ft Entry Guardhouse, and other support facilities. Originally designed to meet the Army's SPiRiT Gold standard (the Army's Sustainable Project Rating Tool was based on LEED-NC 2.0), the project sought and was among the first Army projects to achieve formal USGBC LEED certification.

STRATEGIES AND RESULTS

The Joint Forces Headquarters' site provides bicycle racks, and shower /changing facilities to encourage alternative transportation use. Parking spaces have been set aside for high occupancy vehicles and spaces limited to 46% of the estimated facility occupants. Open space on the project site is 544,500 square feet, more than 14 ½ times that of the building footprint. Special care was taken to control storm water runoff. By using detention ponds and increased turf areas, runoff has actually be reduced below predevelopment quantities. Highly reflective concrete and grass paving have been employed to reduce heat islands.

No permanent landscaping and irrigation systems have been installed. The Headquarters utilizes low-flow toilets and urinals, greatly reducing the amount of sewage generated. Given the high male to female ratios, a 52.7% reduction in potable water use for sewage conveyance has been achieved. Similarly, use of low flow fixtures reduced the amount of potable water consumed by 34.4%.

The Joint Forces Headquarters project utilized Trane TRACE 700 to model a facility energy cost reduction of 12% over the ASHRAE 90.1-2004 baseline. An independent 3rd party Commissioning Agent (CxA) was hired to perform the commissioning services for the project. Commissioned systems included: chilled water system, heating water system, air handling system, terminal units, exhaust and supply systems, facility control system (building automation), pipe cleaning and flushing, vibration and sound tests, lighting control and emergency power systems.

A separate room has been provided for the storage of plastic, metal, paper, cardboard and glass recyclables. A carefully monitored construction waste management plan resulted in more than 95.3% of waste diverted from the landfill. The project achieved a combined recycled content of 17.1% , with 21.7% of the materials from within a 500 mile radius.

Indoor air quality was closely managed during construction and before occupancy, and a flush-out conducted in lieu of that air quality testing. Adhesives and sealants, paints & coatings, carpet systems, and composite wood and agrifiber products all feature low volatile organic compounds and chemical emissions. Lighting control systems consisting of daylighting sensors, multi-level switching, and occupancy sensors combine to conserve energy on days where natural light can provide adequate illumination. The HVAC systems are designed to comply with ASHRAE Standard 55-2004 and ASHRAE 62.1-2004 and a thermal comfort survey will be presented to the occupants of the building within a period of 6-18 months post-occupancy.

The project achieved an innovation in design credit for exemplary performance for achieving a construction waste diversion rate of 95.3%.



Louisiana Army National Guard

Architect: Alliance Inc.
Civil Engineer: Alliance Inc.
Commissioning Agent: Oak Point Associates
Contractor: Walton Construction
Electrical Engineer: Purtle & Associates
Interior Designer: Alliance Inc.
Landscape Architect: Alliance Inc.
LEED Consultant: HDR Architecture, Inc.
Lighting Designer: Purtle & Associates
Mechanical Engineer: Purtle & Associates
Owner: Louisiana Army National Guard
Owner's Representative: Jacobs Engineering Group
Plumbing Engineer: Purtle & Associates
Project Manager: Walton Construction
Structural Engineer: Logan Patri

Project Size: 66,941 square feet
Total Project Cost: \$32,934,569
Cost per square foot: \$492

Photography Courtesy of: Alliance, Inc.

ABOUT LEED

The LEED green building certification program is the national benchmark for the design, construction, and operations of green buildings. Visit the U.S. Green Building Council's Web site at www.usgbc.org to learn more about LEED and green buildings.

Louisiana Army National Guard
 504.278.8627
 Construction and Facilities Management Office



REPORT DOCUMENTATION PAGE

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14. ABSTRACT All Federal agencies are mandated to apply sustainable design principles to the siting, design, and construction of their facilities. Agencies are further required to certify the sustainability of 5% of the buildings constructed each year with an independent, third-party authority. The US Army's certifier is the US Green Building Council (USGBC) using the Leadership in Energy and Environmental Design's (LEED) rating system. In Fiscal Year 2011, the Office of the Assistant Chief of Staff for Installation Management (OACSIM) requested that the US Army Engineer Research and Development Center–Construction Engineering Research Laboratory (ERDC-CERL) prepare profiles of all USGBC certified Army projects adhering to USGBC presentation format. The profiles highlight project ratings for the Army's highest-priority LEED credits—Energy Optimization (EA Cr1), Water Use Reduction (WE Cr3), and Construction Waster Management (MR Cr2); cite the total points and score by LEED major credit area; provide a narrative summary of the project; list the participants; and provide general cost and scope data.					
15. SUBJECT TERMS sustainable design, Leadership in Environmental and Energy Design (LEED), Energy Policy Act of 2005 (EPACT 2005), Energy Independence and Security Act of 2007 (EISA 2007), Executive Order (EO) 13423, Executive Order (EO) 13514, green buildings					
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