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**FROM COMPLIANCE TO SUSTAINABILITY:
ARMY RESERVE CONSTRUCTION PROJECT MOVING OFF
THE ELECTRICAL GRID**

By Lieutenant Colonel Bradley A. Duffey

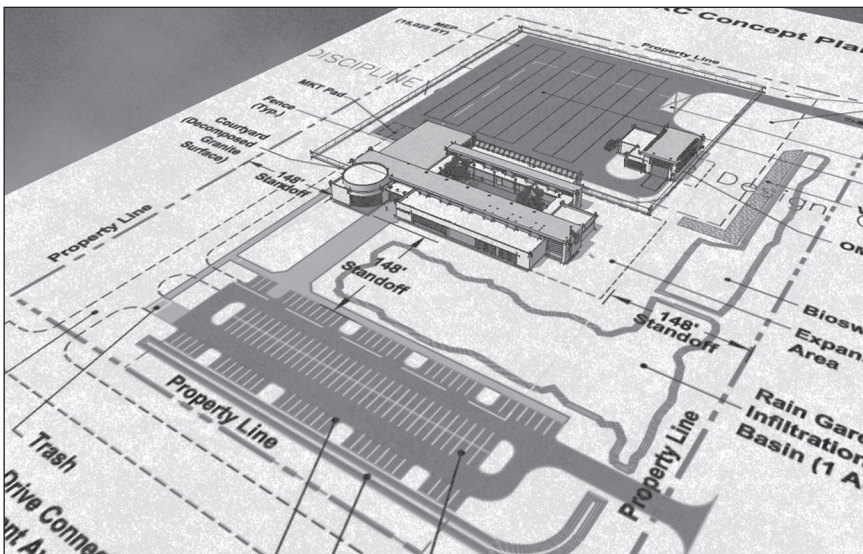
Reducing fossil fuel consumption and conserving air, land, and water resources while trying to strengthen operational capacity and meeting current and future requirements may appear to be a daunting task, but the United States Army's Office of the Assistant Chief of Staff of Installation Management–Army Reserve Division is successfully doing both.

The project is the United States Army Reserve Center in Las Cruces, New Mexico, and the goal is to get the facility off the grid—or self-sustaining in all its energy needs—by 2012. The center will include a 32,000-square-foot training building, a 4,841-square-foot vehicle maintenance shop, a 1,065-square-foot unheated storage building, and a 15,760-square-foot organization parking lot. The project will be the Army's pilot program for Leadership in Energy and Environmental Design (LEED) Platinum. The extra costs of building to LEED Platinum standards will be paid for with energy savings.

LEED is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. The Assistant Secretary of the Army for Installations and Environment laid out in a 2005 policy memorandum the Army strategy for integrating the principles and practices of sustainability on Army installations. That memorandum mandated that all military building construction, beginning in fiscal year 2008, would achieve at least the LEED Silver rating.

LEED was created to define “green building” by establishing a common standard of measurement, promoting integrated design practices, and transforming the building market. LEED provides a complete framework for assessing building performance and meeting sustainability goals. Based on well-founded scientific standards, LEED emphasizes state-of-the-art strategies for sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. The United States Green

Building Council (USGBC) has outlined criteria that engineers can follow to gain LEED points. Using innovative wastewater technologies, redeveloping brownfields, building on sites easily accessible to public transportation, and reusing materials are just a few of the criteria. Under the system in place at the time, LEED Silver rating, the minimum for military construction projects, required between 33–38 points. LEED Gold took between 39–51 points, and LEED Platinum was between 52–69 points. A building with a LEED Silver rating consumes 30 percent less energy than a standard design. Depending on the steps taken to achieve the LEED Silver rating, the extra construction costs can be an added 5 to 30 percent.



Artist rendering of Las Cruces facility

There is more to this project than the typical solar panel placement, solar-lighted parking lot, trees for shade, or waterless urinals. A unique feature of the project is the use of rammed earth materials such as clay and sand compressed into formwork. Rammed earth construction uses noncombustible materials that are thermally massive and extremely durable. The thermally massive rammed earth walls in the Las Cruces project will absorb heat during the day and slowly leach the heat throughout the buildings, significantly reducing interior temperature swings. The thermal mass concept is also referred to as “passive design.” Passive systems are simple, have few moving parts, need minimal maintenance, and require no mechanical systems. The project also uses *bioswales*, which are landscape elements designed to remove silt and pollution from surface runoff water. These bioswales, an alternative to storm sewers, are enhanced with an abundance of deep-rooted native plants. The cost in using bioswales is less than underground piping, and additional cost savings come from not having to use turf, which requires more water and maintenance. Incorporating bioswales as part of this project increased the USGBC points to achieve Platinum status.

The design of the training building has a courtyard in the middle of the structure. The courtyard is not just a trendy feature, but creates a stack effect as air naturally moves throughout the courtyard. The dimensions of the courtyard, coupled with the inside and outside air temperatures, create the airflow rate. The type of window in the building gives occupants additional control over the airflow into their offices. This courtyard design, using natural airflows, creates an airflow rate similar to a household fan and uses no electricity, as opposed to a typical household fan that uses an average of 200 watts of electricity.

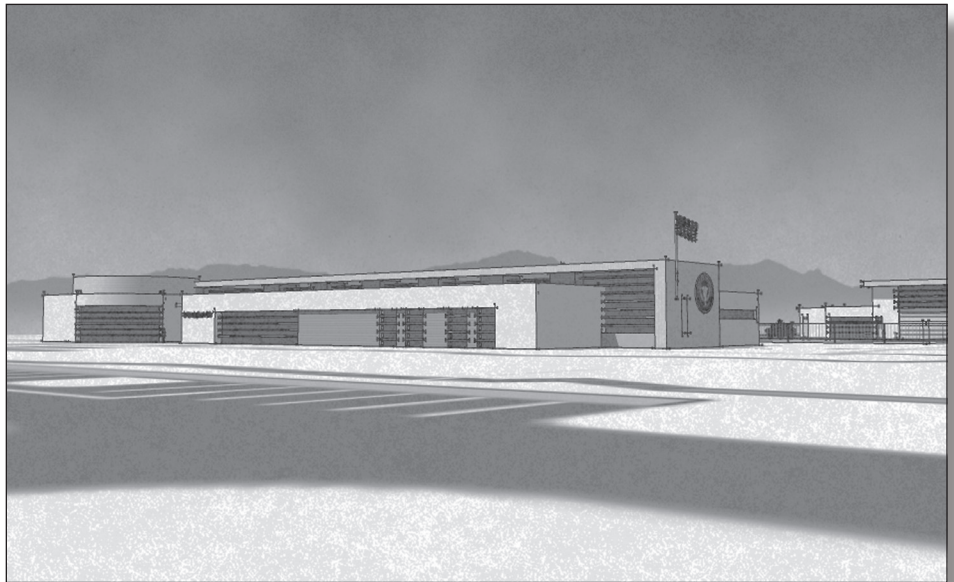
The Office of the Assistant Chief Of Staff of Installation Management has quickly accelerated the goal of getting off the grid by 2030 with this Las Cruces project. More important, the Army Reserve is using this technology and innovation to anticipate future challenges to reduce

consumption of natural resources while at the same time meeting current and future mission requirements. 

Lieutenant Colonel Duffey, a student at the National War College, Fort McNair, Washington, D.C., was a project officer for the Office of the Chief of Staff for Installation Management when this article was submitted. His past assignments include police mentor team chief, Bala Baluk, Afghanistan; operations officer, Afghan Regional Security Integration Command–West; and reserve liaison construction officer for the Joint Multinational Training Command, Grafenwoehr, Germany. He holds a bachelor's from the University of Central Oklahoma in Edmond, Oklahoma, and a master's from Central Michigan University in Mount Pleasant, Michigan.



Artist rendering of central courtyard



Artist rendering of southeast view of facility